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BOOK OF ABSTRACTS

A New Horizon in Fisheries and Aquaculture Through Education, Research and Innovation

18-21 November 2019

Seri Pacific Hotel

Kuala Lumpur

Malaysia

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Oral Session Location

Scientific Session	Abbreviations	Venue
Fisheries Biology and Resource Management 2	FR*	Bunga Kenanga Room
Fisheries Biology and Resource Management 1	FR*	Bunga Raya Room
Nutrition and Feed	NF	Ballroom C
Aquatic Animal Health	AH	Ballroom A
Genetic and Biotechnology	GB	Bunga Tanjung Room
Post Harvest, Fish Product and Food Safety	PH	Bunga Anggerik Room A
Broodstock culture, Larviculture and Hatchery Management	BL	Bunga Melur Room
Aquaculture Systems and Management	AM	Bunga Lily Room
Algae and Aquatic Plants	AP	Bunga Anggerik Room B
Information Technology and Engineering	IT	Bunga Anggerik Room A
Fisheries Socioeconomics, Gender, Education and Extension	FS	Bunga Anggerik Room A
Special Session		
EURASTiP	S-EUR	Bunga Anggerik Room A
Seaweed	S-AP	Bunga Anggerik Room B
Antimicrobial Resistance	S-AMR	Ballroom A

Poster Session

The presentation and display of poster is subjected to the following schedule:

Date of Presentation and Display	19 November 2019	20 November 2019
Session	Fisheries Biology and Resource Management	Aquatic Animal Health
	Fisheries Socioeconomies, Gender, Extension and Education	Nutrition and Feed
	Genetic and Biotechnology	Aquaculture System and Management
	Algae and Aquatic Plants	Postharvest, Fish Product and Food Safety
		Broodstock culture, Larviculture and Hatchery Management

Special Session

Special Session 1 : European-Asian Technology and Innovation Platform (EURASTiP)

European-Asian Technology and Innovation Platform (EURASTiP)

Bunga Anggerik Room A

November 19, 2019 (Tuesday)		
Chairperson: Prof. Dr. Yeong Yik Sung & Mr. David Bassett		
Time	**Author(s)**	**Code**
11:30-11:40	**Enhancing Europe–South-East Asia Cooperation in Aquaculture Education – Achievements of the EU Horizon 2020 Project – EURASTiP (Part 1)** J. Maher[a]*, M. Reuver[a], J.C. Bostock[b], and Y.Y. Sung[c]	S-EUR-01
11:40-11:50	**Enhancing Europe–South-East Asia Cooperation in Aquaculture Education – Achievements of the EU Horizon 2020 Project – EURASTiP (Part 2)** J. Maher[a]*, M. Reuver[a], J.C. Bostock[b], and Y.Y. Sung[c]	S-EUR-02
12:50-12:10	**EURASTiP: The Future For Multi-Stakeholder Platforms in Determining the Strategic Research and Innovation Agenda and Promoting Sustainability in Aquaculture in se-Asia: the EURASTiP Initiative.** David Bassett[a]*	S-EUR-03
12:10-12:30	**Asia-Europe collaboration in open educational materials for aquaculture: EURASTiP and the AquaCase platform** John.C. Bostock[a]*, Bernd Ueberschär[b], and Marieke Reuver[c]	S-EUR-04

Enhancing Europe–South-East Asia Cooperation in Aquaculture Education – Achievements of the EU Horizon 2020 Project – EURASTiP

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Abstract

The European Union (EU) funded EURASTiP project is an initiative to reinforce international cooperation on aquaculture between Europe and south-east Asia. Consolidating existing collaborations in the field of aquaculture education and training as well as enhancing new collaboration through numerous activities is a key objective. EURASTiP firstly carried out a survey to identify existing aquaculture education networks and their activities, to gain a greater insight into past and current collaboration. Based on the outcomes, an alignment workshop brought together champions of major aquaculture education networks from both regions to exchange best practice in relation to aquaculture training provision and identify key themes that were subsequently discussed at three capacity building workshops. The workshops focused on: 1) Promoting Innovative Teaching through Collaboration in the International Aquaculture Sector; 2) Ensuring Education is Responding to Industry Needs; 3) Mobility. EURASTiP has also supported an exchange programme for aquaculture educators to maximise collaboration and strategic partnerships, through which thirteen Educator exchange visits have been supported. New, innovative training materials for aquaculture educators have been developed as well, for different types of training provision. These are available as Open Educational Resources (Pounds & Bostock 2019a&b). Also, a Best Practice Case Study Report has been developed to help with overall capacity building, including successful examples of collaborative education and training between Asia and Europe (Bostock 2019). This also includes a summary of issues to be considered when developing educational collaborations and student mobility, especially concerning recognition of academic qualifications and credits.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no 728030 (EURASTiP). This output reflects the views of the author(s).

Keywords: Education, Collaboration, Capacity Building, Europe, Asia

References

Bostock, J. (2019a). *EURASTiP Best Practice Case Studies: Aquaculture Training and Capacity Building Collaborations Between Europe and Southeast Asia* [online: www.eurastip.eu].

Pounds, A., & Bostock, J. (2019b). Open educational resources (OER) in higher education courses in aquaculture and fisheries: opportunities, barriers, and future perspectives. *Aquaculture International*, 27(3), 695–710. https://doi.org/10.1007/s10499-019-00355-9

Pounds, A., & Bostock, J. (2019b). Suitable economic models for Open Educational Resources initiative in aquaculture higher education. *Aquaculture International*, 1–11. https://doi.org/10.1007/s10499-019-00406-1

S-EUR-03

EURASTiP: The Future For Multi-Stakeholder Platforms in Determining the Strategic Research and Innovation Agenda and Promoting Sustainability in Aquaculture in se-Asia: the EURASTiP Initiative.

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Abstract

The European Asian Aquaculture Technology and Innovation Platform (EURASTiP) is a three year support action, funded through the EU Horizon 2020 programme, and coordinated by the University of Ghent and European Aquaculture Technology and Innovation Platform (EATiP).

EURASTiP is working towards a structured basis for multi-stakeholder dialogue in the aquaculture community between south east Asia and the EU.

The EU experience proves that achievement of such multiple development objectives is best facilitated through a multi-disciplinary and multi-stakeholder approach. The European Union has many successful examples, notably with the European Technology Platforms, where professionals, researchers, administrators and NGOs work together, providing a bottom-up approach to issue identification, needs and research prioritisation and problem-solving. A prerequisite for achieving successful cooperation between Europe and south east Asia is therefore to provide the necessary structural support to allow for constructive and pro-active dialogue between the industry and relevant stakeholders at both the national and international levels.

This session aims to introduce this working methodology, consider the opportunities for concrete interaction that have taken place between south east Asian and European stakeholders, including funded exchange opportunities and brokerage activity and consider the future roadmap for se-Asian / European cooperation and collaboration with regard to multi stakeholder platforms, both across se-Asia and between ASEAN-FEN countries and Europe.

Keywords: Aquaculture, Sustainable, EU, se Asia, technology platforms, multi stakeholder, Horizon 2020, European Union.

S-EUR-04

Asia-Europe collaboration in open educational materials for aquaculture: EURASTiP and the AquaCase platform

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Abstract

The EURASTiP project is an EU Horizon2020 initiative to reinforce international cooperation on aquaculture between Europe and countries from Southeast Asia. The project involves a range of research and networking activities which are generally documented in project reports or in websites articles etc. One component of the project is to develop teaching materials and resources out of these activities and to share them as Open Educational Resources (OER) via the AquaCase website. This website was established under the AQUA-TNET project (Erasmus+ Lifelong Learning Thematic Network for Aquaculture, Fisheries and Aquatic Resources Management) for sharing teaching resources between network members. It provides access to various resources developed under that project, particularly aquaculture industry case studies that can be used to support different learning activities for aquaculture students. New materials developed through EURASTiP are using the same model although the concept is extended well beyond the original template for aquaculture facilities to highlight issues arising out of aquaculture and value-chain activities in a range of geographic and socio-economic contexts. Materials include factual presentations and videos, spreadsheets for modelling, suggested group activities and assignments, self-test quiz templates and reference lists to additional resources. The new materials are being tested in both Europe and Asia through use in educational courses run by project partners. There is also a feedback form for other organisations or individuals to report on their use and experience of the materials. Lessons learned from the feedback will be documented and published via the EURASTiP website for future initiatives.

Keywords: Education, Open Educational Resources, OER, Aquaculture, AquaCase

Disclaimer: The EURASTiP project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no 728030. This output reflects the views only of the author(s), and the European Union cannot be held responsible for any use which may be made of the information contained therein.

Special Session 2: Antimicrobial Resistance in Aquaculture

Antimicrobial Resistance in Aquaculture

Sponsored by Global Antimicrobial Resistance Innovation Fund (GAMRIF), United Kingdom and International Development Research Centre (IDRC), Canada

Ballroom A

19th November 2019		
Chairperson: Assoc. Prof. Dr. Natrah Fatin Mohd Ikhsan		
Time	**Authors**	**Code**
11:30-11:50	**The Threat of Antimicrobial Resistance: A Case Study in Shrimp Aquaculture** Natrah Fatin Mohd Ikhsan[a,b,c], Sarmila Muthukrishnan [a], Hirzahida Mohd-Padil[a] and Nurliyana Muhammad[a]	S-AMR-01
11:50-12:10	**Roles of the Department of Fisheries under the Malaysian Action Plan on Antimicrobial Resistance Relating to Antimicrobial Resistant in Aquaculture** Wan Norhana Md Noordin[a]*and Rozana Johari[b]	S-AMR-02
12:10-12:30	**Standard Procedure of Antimicrobial Susceptibility Testing for *Flavobacterium columnare* Isolated from Freshwater Fish Species and Their Antimicrobial Resistance in Thailand** Channarong Rodkhum[a]* and Putita Chokmangmeepisarn[a]	S-AMR-03
12:30-12:50	**Antimicrobial resistance in pathogenic bacteria on striped catfish (*Pangasianodon hypophthalmus*) in the Mekong Delta, Vietnam** Dung Tu Thanh[a]* and Quach Van Cao Thi[a]	S-AMR-04

S-AMR-01

The Threat of Antimicrobial Resistance: A Case Study in Shrimp Aquaculture

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Abstract

Increasing demands of seafood is a force factor for farmers to intensify their farming. Intensive farming increases stress to the host and introduces new diseases or pathogens to emerge. Thus, this scenario has increased the usage of antibiotics in aquaculture worldwide. Antimicrobial drugs can be very useful in combating pathogenic bacterial infections in human and animal. However, it has negative implications as it increases the number of anti-microbial resistance (AMR) micro-organisms that can spread from animal to human by direct exposure or consumption of food containing AMR. In aquaculture systems, antibiotics are generally added in the feed or directly into the water system. Once, the antibiotics get into the water; it starts to disperse evenly by the aid of the paddlewheel aerators and impose a selective pressure, which eventually changes the ecosystem of the environment. Consequently, some bacteria increase their fitness in the new environment via intrinsic resistance or acquired resistance. Acquired resistance is the most crucial factor in antimicrobial resistance mechanisms due to its transmissible nature where it is estimated that 90% of bacteria from the seawater are resistant to one or more antibiotics. In this paper, the threat and potential risk of AMR particularly in shrimp aquaculture will be discussed. This include potential mitigation strategies to reduce AMR involving quorum quenching mechanisms.

Keywords : Antibiotic, diseases, aquatic animal, communication

S-AMR-02

Roles of the Department of Fisheries under the Malaysian Action Plan on Antimicrobial Resistance Relating to Antimicrobial Resistant in Aquaculture

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Abstract

Antimicrobial resistance (AMR) is a serious and growing global public health threat. The intensification of animal production methods to cater for the demand of increasing human population has worsened this problem with an increase use of antimicrobials in agriculture including fisheries. In view of the importance of AMR, the United Nations General Assembly has called for cooperation between the World Health Organization (WHO), the World Animal Health Organization (OIE) and the Food and Agriculture Organization (FAO) to provide support to the development and implementation of the national action plan on AMR. The Malaysia Action Plan on AMR (MyAP-AMR) has been established in 2017 with a cohesive and collaborative approach across federal departments including the Department of Fisheries (DoF) with mandates to address and mitigate AMR in respective sectors. This paper presents the roles played by the DoF in complementing the activities planned under the NAP AMR which includes i) Antimicrobial Usage (AMU) survey; ii) AMR surveillance; iii) Education and awareness and iv) Strengthening governance relating to AMU and AMR in aquaculture.

Keywords: Antimicrobial resistance, aquaculture, disease

S-AMR-03

Standard Procedure of Antimicrobial Susceptibility Testing for *Flavobacterium columnare* Isolated from Freshwater Fish Species and Their Antimicrobial Resistance in Thailand

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Abstract

Flavobacterium columnare is Gram negative long rod shape bacteria which can be founded in freshwater environments. It is the causative agent of columnaris disease in freshwater fish species. The disease can cause high mortality in several freshwater fish species such as Nile tilapia (*Oreochromis niloticus*), hybrid red tilapia (*Oreochromis sp.*), and striped catfish (*Pangasianodon hypophthalmus*) and freshwater Asian sea bass (*Lates calcarifer*). The farmers usually use antibiotics for the purpose of either prophylactic or treatment of this disease. However, the non-prudent usage of antibiotics or illegal of antimicrobials use (AMU) can cause an increasing prevalence rate of antimicrobial resistance (AMR) *F. columnare*. Nowaday, prevalence of AMR *F. columnare* isolated from freshwater fish species in Thailand are increasing such as quinolone resistance and oxytetracycline resistance. In order to establish AMR control strategies in aquaculture, routine monitoring program of the AMR *F. columnare* and study of the resistant mechanism should be implemented and standardized. A common method for evaluation bacterial susceptibility generally in clinical practice is *in vitro* antimicrobial susceptibility testing (AST) such as disk diffusion, agar dilution, and broth dilution method. However, these common methods have some limitation when using for evaluation of susceptibility results of aquatic bacterial pathogens such as the different in culture medium and incubating temperature. Therefore, the specific protocol is required for AST of aquatic animal bacterial species especially for *F. columanare*. Briefly, prior to perform antimicrobial susceptibilty test, *F.columnare* are required culturing on Anacker and Ordal broth (AOB). The disk diffusion test for *F. columnare* should be performed by using 1:5 diluted Mueller-Hilton agar (DMHA) as recommended by CLSI guideline VET03-A. To perform broth dilution test for minimal inhibitory concentration (MIC), *F. columnare* need to be diluted 1:100 with 1:5 cation-adjusted Mueller-Hinton Broth (CAMHB) to get appropriate bacterial concentration before inoculation. The standardized AST for aquatic animal bacterial species will provide the precise susceptibility information for using in prevention and control strategies of AMR in aquaculture.

Keywords: antimicrobial susceptibility testing, antimicrobial resistance, *Flavobacterium columnare*, freshwater fish, standard procedure

S-AMR-04

Antimicrobial resistance in pathoginic bacteria on striped catfish (*Pangasianodon hypophthalmus*) in the Mekong Delta, Vietnam

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Abstract

Production of freshwater species, such as catfish, has grown dramatically in recent years. Vietnam is the world leader in striped catfish (*Pangasianodon hypophthalmus*) production, with 1.4 million tons produced in 2018. Intensification of their culture conditions has led to an increase in disease outbreaks, especially bacterial infections, with *Aeromonas hydrophila* and *Edwardsiella ictaluri* being a major catfish pathogen. Although the use of antibiotics has been essential for the control of these infections, there are concerns that their overuse may increase multidrug-resistant bacteria. The review present the general picture of molecular mechanisms related to multiple antibiotic resistance (MAR) bacterial isolates. The development and spread of AMR bacteria and antimicrobial resistant genes (ARGs) are also discussed. Class 1 integrons harboring different combinations of the resistance gene cassettes dihydrofolate reductases (*dfrA1*), aminoglycoside adenyltransferases (*aacA4, aadB*), rifampin ADP-ribosyl transferase (aar2), metallo-betalactamase (blaVIM-1) and hypothetical proteins (orfC) were detected in bacterial isolates. In addition, other genes responsible for resistance to tetracycline (*tet*), genes resistant to sulfonamide (*sul1* and *sul2)* and florfenicol resistant gene (*floR)* were also detected in these class 1 integron-positive bacterial isolates. In the conjugation experiments, *A. hydrophila* and *E. ictaluri* can transfer their resistance genes to *Escherichia coli*. In generally, the use of antibiotics in fish farming should be discouraged. To avoid the risk of drug resistance, developing vaccines for catfish commercial farms have to be urgently considered.

Keywords: Antimicrobial resistance, bacteria, resistance genes, striped catfish

Special Session 3: China-ASEAN Seaweed Session

China-ASEAN Seaweed Session

Sponsored by Ocean University of China

Bunga Anggerik Room B

November 19, 2019 (Tuesday)		
Chairperson: Prof. Dr. Lim Phaik Eem & Assoc. Prof. Dr. Liu Tao		
Time	**Authors**	**Code**
11:30-11:50	**Understanding the Physiological and Biochemical Responses of *Kappaphycus alvarezii* to Acute Warming** Yushanthini Nair Kumar[a,b], Sze-Wan Poong[b] , Claire Gachon[c], Juliet Brodie[d] and Phaik-Eem Lim[b]*	S-AP-01
11:50-12:10	**Photosynthetic Characteristics of *Kappaphycus alvarezii* under Different Stress Treatments** Yahui Yu[a]*, and Tao Liu[a]	S-AP-03
12:10-12:30	**Status and Prospect of Seaweeds Industry in China** Tao Liu[a], and Qi Zizhong[a]	S-AP-04
12:30-12:50	**Current Farming Practices of Economic Seaweeds in Thailand** Rapeeporn Ruangchuay[a]*, Anong Chirapart[b] and Jantana Priboon[b]	S-AP-05
12:50-14:00	**Lunch**	
Chairperson: Assoc Prof. Dr. Liu Tao & Assoc. Prof. Dr. Qi Zizhong		
14:00-14:20	**Trends in World Seaweed Production and Utilization** Siti Aishah Abdullah @ Christine A. Orosco	S-AP-06
14:20-14:40	**Cultivation of *K. alvarezii* in Different Depth Using the Long Line Method: Biochemical Composition, Gel Strength and Carrageenan Content** Maya Puspita[a*], Hariadi Adnan[a], Muhammad Zainuddin[b], Muhammad Yusuf Prabowo[b], and Liu Tao[c]	S-AP-07
14:40-15:00	**Micropropagation and Sea-based Nursery Growth of Selected Commercial *Kappaphycus* Species in Penang, Malaysia** Majid Khan Majahar Ali[a,b], Alan T. Critchley[c] and Anicia Q. Hurtado[a]*	S-AP-08

S-AP-01

Understanding the Physiological and Biochemical Responses of *Kappaphycus alvarezii* to Acute Warming

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Abstract

The eucheumatoids, *Kappaphycus* and *Eucheuma*, are cultivated in tropical or subtropical regions for the production of carrageenan, a hydrocolloid widely used in the food and cosmeceutical industries. *Kappaphycus alvarezii* is a highly valued economic crop in the Coral Triangle, with the Philippines, Indonesia and Malaysia ranked among the largest producers. In the absence of measures to mitigate climate change, extreme events including heatwaves, typhoons, El Niño and La Niña, are expected to increase in frequency and magnitude. This inadvertently brings adverse effects to the seaweed cultivation industry, especially in the tropics. Temperatures are rapidly reaching the upper limit of biologically tolerable levels and an increase in reports of ice-ice and pest outbreaks is attributable to these shifts of environmental parameters. Nevertheless, few reports exist on the response of eucheumatoids to a changing environment, in particular for global warming. Understanding the responses and possible mechanisms for acclimation to warming is crucial for a sustainable seaweed cultivation industry. Here, the physiological and biochemical responses of *K. alvarezii* to acute warming indicated that the strain used in the current study is unlikely to survive sudden increases in temperature above 36°C. As temperature increased, the growth rates, photosynthetic performance, phycocolloid quality (carrageenan yield, gel strength and gel viscosity) and pigment content (chloropyhll-*a*, carotenoid and phycobilliproteins) were reduced while the production of reactive oxygen species increased. This study provides a basis for future work on long term acclimation to elevated temperature and mesocosm-based multivariate studies to identify heat-tolerant strains for sustainable cultivation.

Keywords: *Kappaphycus alvarezii*, elevated temperature, carrageenan quality, pigment contents

S-AP-03

Photosynthetic Characteristics of *Kappaphycus alvarezii* under Different Stress Treatments

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Abstract

The red algae *Kappaphycus alvarezii, one* the most important aquaculture species in *Kappaphycus alvarezii, which is* widely distributed in tropical waters, has become the main crop of carrageenan production at present. Ice-ice is one of the major factors which decreased the production of *Kappaphycus alvarezii.* It is generally believed that the phenomenon is caused by unfavourable environmental conditions. However the specific molecular mechanism of ice-ice in algae remains unclear. In order to study the influence of temperature, salinity and dehydration on the photosynthetic characteristics of *Kappaphycus alvarezii*. The photosynthesis parameters of *Kappaphycus alvarezii* were measured by chlorophyll fluorescence at different time points under high-temperature, low-temperature, high-salinity, low-salinity, fresh water and dehydration treatment in this study. We found that high-temperature, low-temperature, freshwater and dehydration treatment resulted in the decrease of the maximum photosynthetic activity of *Kappaphycus alvarezii*. Futher, High-temperatures(40℃) and fresh water treatment for 24 hours induced the ice-ice.

Keywords: *Kappaphycus alvarezii*, photosynthesis, stress

S-AP-04

Status and Prospect of Seaweeds Industry in China

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Abstract

Seaweeds play key roles in marine ecosystems and traditionally have been harvested as food, animals and fertilizer in China. Currently, few genera i.e. Saccharina, Undaria, Porphyra, Eucheuma/Kappaphycus and Gracilaria took more than 95% of the world's cultivated seaweed production. The latest Chinese fishery statistical yearbook (2019) shows the yearly seaweed culture yield is over 2.35 million tons, which is over 50% of world seaweed yield. As the largest seaweed raw material consumer, China has developed the advanced technologies in the field of seaweed culture and seaweed processing, and established a complete industrial chain from seaweed cultivation to the processing of food and health products. The success of seaweed industry development in China shows that science and technology innovation is the key factor of industrial development. The cooperation between China and ASEAN in seaweed culture and the development and research of seaweed in food, medicine, chemical industry and other fields can enrich the fishery cooperation between China and ASEAN, generate more additive value chains, and also provide a model for the sustainable aquaculture towards the global food security.

Keywords: Sustainable aquaculture, seaweed culture, food security

S-AP-05

Current Farming Practices of Economic Seaweeds in Thailand

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Abstract

Current farming practices of economic seaweed were done for database of Thailand. The survey and deeply interview were done to the owner of the active farms. Two genera of were done. Forty farms for *Caulerpa* and 13 farms for *Gracilaria* were investigated. Each genus was done in two species: *Caulerpa lentilifera* and *Caulerpa corynephora*, *Gracilaria fisheri, Gracilaria tenuistipitata*. The cultivation area was only in the southern part in the both coasts; the Gulf of Thailand and Andaman. Culture method for *Caulerpa* was done both inshore by cage culture and on land in pond and tank culture while *Gracilaria* was done only did in pond as monoculture and co-culture with mud crab. Total biomass of *Caulerpa* was in the range of 250-300 tons fresh weight per year while biomass of *Gracilaria* was ranged of 170-200 tons dry weight per year. Mostly production was used as food for local consumption. The activity of the seaweed cultivations was uptrend.

Keywords: *Caulerpa lentilifera, Caulerpa corynephora, Gracilaria fisheri, Gracilaria tenuistipitata*

S-AP-06

Trends in World Seaweed Production and Utilization

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Abstract

More than 95% of the 31.2 million tonnes commercial seaweeds in the market are from aquaculture. The red seaweeds, *Kappaphycus* and *Eucheuma*, the main sources of the phycocolloid carrageenan overtook the brown seaweed, *Laminaria (Saccharina) japonica* in 2010 as a result of aggressive farming by Indonesia. Micropropagation methods are increasingly used to produce quality seedlings for better growth and hydrocolloid yield. The drivers for the industry continue to be their use as direct human food, as sources of phycocolloids (agar, carrageenan and alginate) and in agriculture. Traditionally considered as the lowly sea vegetables in the Asian diet, seaweeds rose to fame as gourmet food when famous chefs in Europe and America created recipes that included seaweeds for its versatility, nutritional value and sustainable production methods that became known as "seaweed gastronomy" or "phycogastronomy". The subsequent demand has led to collecting trips for foraging focusing on local fresh seaweeds, sustainable harvest strategies followed by culinary classes, selective farming, greater awareness of food safety and quality of food-grade seaweeds. To ensure buyers get what they are paying for, international seaweed certification and standards have been developed, over and above the national level certification of good agricultural practices (GAP). The phycocolloid industry got a boost with the use alginates in drinkable mineral water pods that replaced the notorious plastic bottle. The demand has led to greater seaweed awareness, development of land-based culture systems, food safety, particularly with regards to arsenic, better drying, preservation and selection of potential commercial seaweed species. In addition, seaweed farming is increasingly seen as a possible remedy for global warming and climate change. Implications of these developments to Asia, in the approaches, methods and objectives of teaching seaweed biology and cultivation are also discussed.

Keywords: seaweed production and utilization, seaweed standards and certification, edible water pods, climate change remedy, teaching seaweed biology

S-AP-07

Cultivation of *K. alvarezii* in Different Depth Using the Long Line Method: Biochemical Composition, Gel Strength and Carrageenan Content

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Abstract

Seaweeds have become an interesting resource to exploit due to its hydrocolloids – algal derivative products that can be formulated to many different products. Sea vegetables for human consumption constitute about 83 % of production, while the remaining is used as fertilizers and animal feed additives, medical applications, and biotechnological application. Specific Growth Rate (SGR) of *K. alvarezii* showed the highest value from K50 or samples cultivated in 50 cm depth. Protein, ash, lipid, carbohydrate, and fiber of *K. alvarezii* were 0,58-0,78 %, 22,18-23,09 %, 0,00-0,01 %, 76,32-77,14 %, and 14,38-18,31 % of dry material, respectively. The highest carrageenan yield, gel strength and viscosity were shown by *K. alvarezii* cultivated in 50 cm depth. *K. alvarezii* examined in this study did not contain any heavy metals. According to FT-IR analysis, carrageenan – extracted from three different depths samples, contained ester sulphates bond, glicosidic bond, galactose, and anhydrogalactose. This study was collaboration project between Indonesian Seaweed Association and Ocean University of China under Demonstration Plot Program. The main purpose of the collaboration was to expand seaweed production especially for *K. alvarezii*. In other word, this collaboration is designated for both commercial and scientific purposes.

Keywords: growth rate, proximate, *Kappaphycus alvarezii*, carrageenan.

S-AP-08

Micropropagation and Sea-based Nursery Growth of Selected Commercial *Kappaphycus* Species in Penang, Malaysia

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Abstract

The increasing demands for seaweeds have promoted the designation of the seaweed industry as the third Entry Point Project (EPP), under the National Key Economic Area (NKEA) initiative of the Economic Transformation P rogramme (ETP) of the Malaysian government. The farming of carrageenophytes has emerged as a successful enterprise and provides a promising, alternative livelihood option for low - income, coastal communities in several countries. However, over time, the productivity of the red seaweed crop has declined in some regions due to sourcing of seedlings from single, selected genetic stocks considered to have initially higher yield potential but which resulted in strain fatigue, or loss of vigour. To circumvent the crop productivity issues arising from clonal propagation, the raising of planting materials from the development and successful micro-propagation of *Kappaphycus*, has been initiated in order to support the sustainability of selected, farmed carrageenophytes . Four strains of *Kappaphycus* spp. (viz. *K. alvarezii* (tambalang brown and green,) *K. malesianus* (aring-aring) and *K. striatus* (sacol green)) were used in the present study to optimize the use of *Ascophyllum* Marine Plant Extract Powder (AMPEP $K^{+)}$ which had previously been demonstrated to be effective as a culture medium ingredient, acting as a biostimulant, when applied with the addition of terrestrial plant growth regulators (PGRs). The optimum combination of 3 mg L^{-1} AMPEP K^{+} + PGRs was used in out-planting the microplantlets to a sea-based nursery. Salinity and turbidity were found to be positively correlated with growth rates in open water. The use of the brown seaweed-derived extract acting as a biostimulant and as the main ingredient of the cost-effective culture medium for the micro-propagation for all four strains of *Kappaphycus* tested was highly encouraging. So much so that the treatment has the potential to be promoted as a generic protocol for the economic and commercial mass

production of new plantlets (asexual seedlings) which are urgently required for Malaysian seaweed farming to meet its fullest potential.

Keywords: *Kappaphycus* cultivars, AMPEP K^+, micropropagation, sea-based nursery, cylindrical cag

Oral Presentation

Session 1 : Fisheries Biology and Resource Management 1

Session 1 : Fisheries Biology and Resource Management 1

Bunga Raya Room

November 19, 2019 (Tuesday)		
Time	**Title**	**Code**
11:00-11:30	**Refreshment and Poster Viewing**	
11:30-13:00	Aquatic Animal Health Session	
13:00-14:00	**Lunch**	
Chairperson: Dr. Tan Min Pau		
14:00-14:15	**Scalloped Spiny Lobster (*Panulirus homarus* Linnaeus, 1758) in Palabuhanratu Bay, West Java, Indonesia: Biology Reproductive Aspects** Ali Mashar[a*], Novia Indah Kintani[a], Agus Alim Hakim[a], Rudi Alek Wahyudin[b], Isdradjad Setyobudiandi[a], and Yusli Wardiatno[a,c]	O-FR1-A1
14:15-14:30	**Puerulus Settlement of *Panulirus ornatus* (Fabricius, 1798) in Lianga Bay, Philippines** Amor Rojas-Salinas[a*], Emilie G. Tubio[b], Ruby C. Gonzales[b], and Jessie G. Gorospe[c]	O-FR1-A2
14:30-14:45	**Distribution and Utilization of the Emerging Invasive Mussel Species, *Mytella charruana*, in the Philippines** Vince Neil B. Fuertes[a], Harold M. Monteclaro[a*], and Rochelle A. De Los Reyes[a]	O-FR1-A3
14:45-15:00	**Efficacy of Fluorochromes Tagging Method for Juvenile Sandfish *Holothuria scabra*** Noor Amalia Shaiful Kahar[a], Sitti Raehanah[a*,] Muhamad Shaleh[a], Faihanna Ching Fui Fui[a], Rafidah Othman[a], Mabel Manjaji Matsumoto[a], Saleem Mustafa[a], an d Shigeharu Senoo[a]	O-FR1-A4
15:00-15:15	**Distribution and Abundance of Some Gastropods in Mangrove Habitat from Rakhine Costal Region, Myanmar** Saw Marlar Than[a*], Khin Thuzar Win[a], Khin Mar Kyi[a], Maung Maung Gyi[a], and Kay Lwin Tun[a]	O-FR1-A5
15:15-15:30	**A Histological Study of the Different Portions of the Gonad of**	O-FR1-A6

	***Pholas orientalis* (Gmelin)** Yrla Mey P. Santander[a*], and Gerald F. Quinitio[a]	
15:30-15:45	**Length-weight Relationship and Condition Factor of the Suckermouth Armoured Catfish Genus *Pterygoplichthys* (Siluriformes: Loricariidae) from Perai River and Skudai River and the Effect of Water Quality** Haslawati Baharuddin[a*], and Mohamad Sufiyan Salmi[a]	O-FR1-C1
15:45-16:00	**Distribution of Stingrays in the South China Sea, Terengganu Malaysia** Nur Arina Hayati Binti Mohidin[a], Hisam Fazrul[a*], Sukree Hajisamae[b], Maizah M. Abdullah[c], and Mazlan Hashim [d]	O-FR1-C2
16:00-16:15	**Review About Physiological Characteristic and Feeding Behavior of Khela Mahseer, *Tor douronensis* Broodstock** Hanan Hayimadeeyoh[a], Thumronk Amornsakun[a*], Rossita Shapawi[b], Sarawuth Chesoh[c], Poramat Musikarun[d], Nobuo Suzuki[e], and Yutaka Takeuchi[f]	O-FR1-B1
16:15-16:30	**Optimization of Halal Gelatin Production from Edible Jellyfish, *Acromitus hardenbergi* Using Different Concentrations of Acetic Acid** Nicholas M.H. Khong[a,c], Hui Teng Tan[a], Yam Sim Khaw[a], and Fatimah Md. Yusoff[a,b*]	O-FR2-E1
16:30-17:00	**Poster Viewing**	

November 20, 2019 (Wednesday)		
Time	**Title**	**Code**
Chairperson: Dr. Mahadi Mohammad		
10:00-10:30	**Refreshment and Poster Viewing**	
10:30-10:45	**Follicular atresia in Patin Buah, *Pangasius nasutus* Bleeker 1863 population of Sungai Pahang, Malaysia** Zafri Hassan[a]*and Annie Christianus[a]	O-FR1-B12

10:45-11:00	**Observation on Fish Species of Pawn Chaung (Nam Pawn creek), Kayah State** Thein Soo[a*], Ohn Ohn Yee[b], and Soe Soe Mar[c]	O-FR2-A2
11:00-11:15	**Survival Rate and Histological Study of Barred Loach Fish (*Nemachilus fasciatus)* Ovary Fed with Different Feeding Rate** Yunita Maimunah[a*], Bella Citra Wijaya[a], and Agoes Soeprijanto[a]	O-FR2-A3
11:15-11:30	**Species Composition of some Fishes in Haipa Waterfall, Mongsue Township, Southern Shan State, Myanmar** Nang Lao Kham[a*], Myo Htet Htet Saung[a], Sein Sein Win[a], and San San Myint[b]	O-FR2-A4
11:30-11:45	**Trophic Interactions and Ecological Attributes of a Reservoir Ecosystem in India** Preetha Panikkar[a]*, M. Feroz Khan[a], B. K. Das[b], Sibinamol, S.[a], and Ramya V.L.[a]	O-FR2-A5
11:45-12:00	**Feeding Behaviour in the Early Juvenile of Sultan Fish, *Leptobarbus hoevenii*** Hsein-Loong Au[a*], Thumronk Amornsakun[b], Poramat Musikarun[c], Pornpanom Promkaew[c], and Leong-Seng Lim[a]	O-FR2-A6
12:00-12:15	**The Biological Aspects Comparison of Nile Fish (*Oreochromis niloticus*) on Eutrophic and Oligotrophic Reservoir from Indonesia** Diana Arfiati[a*], Nadya Agustarina Saputri[a], Nimas Styaningrum[a], and Asthervina Widyastami Puspitasari[a]	O-FR2-B1
12:15-12:30	**Gut Contents of *Cirrhinus mrigala* (Hamilton-Buchanan, 1822) from Nyaung Kaing In (lake), Monywa Township** Win Mar[a*]	O-FR2-B2
12:30-12:45	**Occurrence of Fish Fauna in Htanaung Taing in (Lake), Myingyan Township, Mandalay Region, Myanmar** San San Aye[a*], and Nan Hmwe[a]	O-FR2-B3
12:45-13:00	**Occurrence of Commercial Fishes in Loikaw Environs, Kayah State, Myanmar** Khin Ni Ni Win[a]	O-FR2-A1
13:00-14:00	**Lunch**	

Chairperson: Dr. Mohd Fazrul Hisam		
14:00-14:15	**Growth and Morphological Development of Early Life Stages of Japanese Catfish, *Silurus asotus* in Tropical Region** Siti Umey Syahirah Mat Nawang[a], Ching Fui Fui[a*] and Shigeharu Senoo[b]	O-FR2-B5
14:15-14:30	**The Impact of Pollutants on Fish Species From Ayeyarwady River in Thayet Environs** Thin Thin Soe[a*]	O-FR2-B6
14:30-14:45	**Diversity of Some Fish Species in Hlaing River Segment Between Insein and Shwe Pyi Thar Townships, Yangon Region, Myanmar** Cho Cho Mar[a*]	O-FR2-B7
14:45-15:00	**Fish Species Diversity in the Upstream and Downstream of Sittaung River, Taungoo District in Bago Region, Myanmar** Toe Toe Soe[a*], Khin Thuzar Win[a], Nu Hnin Kyein[b], and Win Win Than[c] Dr. Toe Soe	O-FR2-B8
15:00-15:15	**Composition and Abundance of Fish Species in the Segment of Chindwin River, Near Phaung Byin and Minnyar, Molike District** Khin Soe Win[a*]	O-FR2-B9
15:15-15:30	**The Fecundity and Length- weight Relationship in Female Macrognathus Aral (Bloch & Schneider, 1801) from Thiri Yadanar Market of Monywa** Nwe Ni Saw[a*], and Khin Soe Win[b]	O-FR2-B10
15:30-15:45	**Species Richness and Population Abundance of Fishes in Leasable Inlets of Twante Township, Yangon Region, Myanmar** May Thu Rein Oo[a*], Min Thu Aung[b], and Kay Lwin Tun[a]	O-FR2-B11
15:45-16:00	**Population Abundance and Reproductive Biology of *Otolithoides pama* in Bago River, Myanmar** Khin Thu Zar Win[a*], Saw Marlar Than[a], Khin Mar Kyi[a], Maung Maung Gyi[a], and Kay Lwin Tun[a]	O-FR1-D10
16:00-16:15	**The Response of Fish and The Catches Toward The Differences**	O-FR1-E3

	Color of Light Arif Baswantara[a*], Anas Noor Firdaus[a], Wahyu Puji Astiyani[a], Indra Jaya[b], and Roza Yusfiandayani[b]	
16:15-16:30	**The Impact of Buried Revetment on Some Physical Parameters Related to The Leatherback Sea Turtle (*Dermochelys coriacea*) Nesting: A Case Study of Thasai Beach, Phang-Nga Province, Thailand** Hirun Kanghae[a], Wannasa Ruangkaew[a], Samsiyah Waesamaae[b], and Supat Khongpuang[b*]	O-FR1-E2
16:30-17:00	**Poster Viewing**	

O-FR1-A1

Scalloped Spiny Lobster (*Panulirus homarus* Linnaeus, 1758) in Palabuhanratu Bay, West Java, Indonesia: Biology Reproductive Aspects

Ali Mashar[a*], Novia Indah Kintani[a], Agus Alim Hakim[a], Rudi Alek Wahyudin[b], Isdradjad Setyobudiandi[a], Yusli Wardiatno[a,c]

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Abstract

Scalloped spiny lobster (*Panulirus Homarus* Linnaeus, 1758) is one of the most abundant lobster found in Palabuhanratu Bay. Lobster management based on the reproductive biology aspects is needed to ensure the sustainability of lobster in the nature. This study was conducted to analyse some reproductive biology aspects of *Panulirus homarus* to find out about the spawning season and the lobster fishery condition due to the size at sexual maturity. The research was conducted on October 2016 until March 2017. Lobster carapace length and weight were measured, then laboratory analysis was carried out for the berried female lobster. Result showed that the lobster was dominated by lobster with the size of 40–50 mm of carapace length. Size at sexual maturity of female lobster were 49.50 mm of carapace length. Berried female lobster found on each month. Lobster fecundity ranged from 25,000 up to 151,000 eggs per female lobster. The peak of spawning season occurred on October and lobster fishery were in a good condition.

Keywords: Fecundity, Palabuhanratu Bay, Reproductive biology, Sexual maturity

O-FR1-A2

Puerulus Settlement of *Panulirus ornatus* (Fabricius, 1798) in Lianga Bay, Philippines

Amor Rojas-Salinas[a*], Emilie G. Tubio[b], Ruby C. Gonzales[b], and Jessie G. Gorospe[c]

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Abstract

Successful marine resource management intervention for conservation and sustainability requires assessment. This study investigated the puerulus settlement of *Panulirus ornatus* in Lianga Bay, Philippines that established new fishery in the area. The study covered four months which was the fishing season where pueruli occurred. Peak abundance was noted during first quarter of lunar phase and in the month of April. Abundance had significant differences across stations (depths), moon phases, and sampling months but not significant over sampling sites. Lianga Bay could potentially have more or less 1.13 million pueruli per settling season from the three study sites alone. Mean abundance in the Bay moderately correlates with bottom salinity and winds. A long-term study on the settlement of *P. ornatus* in the Bay is recommended to enhance knowledge on local biology and ecology to sustain its population and fishery.

Keywords: Fecundity, Puerulus, Settlement, *Panulirus ornatus*, Abundance, Fishery

O-FR1-A3

Distribution and Utilization of the Emerging Invasive Mussel Species, *Mytella charruana*, in the Philippines

Vince Neil B. Fuertes[a], Harold M. Monteclaro[a*], and Rochelle A. De Los Reyes[a]

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Abstract

The occurrence of the invasive mussel species *Mytella charruana* in the Philippines were investigated from April 2018 to June 2019. Site surveys, focus group discussions and key informant interviews were conducted among local fishers, mussel and oyster growers and local fishery officials to determine the period of the emergence of *M. charruana*, its habitat niche, its impact with the local fishery, and the local government unit's response to the invasive mussel species. Since its first reported incidence in 2016, *M. charruana* has spread to the northern and western coasts of Luzon. Reports showed competitive advantage of *M. charruana* with the green mussel *Perna viridis* and oysters in terms of temperature and salinity tolerance. *M. charruana* is also capable of growing on any substrate, colonizing estuaries, fouling on fish cages, stakes, and ropes used in oyster and green mussel cultures. A decline in the production of oysters and mussels were observed among traditional culture areas where *M. charruana* has established. On the other hand, survey showed various utilization of *M. charruana*. In non-traditional culture sites, the occurrence of this species has provided food and livelihood opportunities to the communities. However, on the sociopolitical aspect, local and national enablers had been slow in recognizing the threat of *M. charruana* to the green mussel and oyster industries. Local government units of affected sites have yet to respond to the phenomenon, thus, there is a need to develop action plans on how to deal with the *M. charruana* occurrence in the country.

Keywords: *Mytella charruana*, Invasive mussel species, Distribution, Utilization, Philippines

O-FR1-A4

Efficacy of Fluorochromes Tagging Method for Juvenile Sandfish *Holothuria scabra*

Noor Amalia Shaiful Kahar[a], Sitti Raehanah[a*], Muhamad Shaleh[a], Faihanna Ching Fui Fui[a], Rafidah Othman[a], Mabel Manjaji Matsumoto[a], Saleem Mustafa[a], and Shigeharu Senoo[a]

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Abstract

Holothuria scabra or commonly known as sandfish have been harvested for hundreds of years for trading in Asia. Overfishing of this species was reported to cause the decrease in the world landings. Due to this, interest in replenishing the population of sandfish through active management measures such as sea ranching, stock enhancement and restocking has increased. In many places, sea ranching program has evidence of promoting benefits to coastal fishing communities. For sea ranching of sea cucumber, efficient and cost-effective tagging method has not yet been developed. Thus, this present study is conducted to determine the best tagging method for juvenile sandfish, *H. scabra*. Five types of fluorochromes tag; tetracyclines, oxytetracycline, tetracycline hydrochloride, alizarin red S and alizarin were tested on the juvenile sandfish with size between 20 to 30 g. Sandfish were immersed in the tested fluorochromes solution for 12, 24 and 48 hours. It is important to ensure that the volume of fluorochrome solution (mL) used is 10 times the weight (gram) of the juveniles used. A sample of 2-5 mm were excised from the ventral side of juvenile's body wall and were examined under epifluorescent microscope (Zeiss Axiovert) for the presence of stained spicules. This technique can efficiently differentiate between the released juveniles and the wild juveniles, thus could be used for effective sea ranching program.

Keywords: Fishery management, Fishery stock assessment, Sea ranching, Restocking, Stock enhancement

O-FR1-A5

Distribution and Abundance of Some Gastropods in Mangrove Habitat from Rakhine Costal Region, Myanmar

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Abstract

Distribution and abundance of some gastropod species in mangrove habitat in Rakhine Costal Region, Myanmar was studied. Field surveys were conducted from three study sites located at mangrove forest near Rambree river. Three study sites were chosen according to mangrove habitat; non-degraded habitat, Nypah plantation habitat and degraded habitat. The sampling period was two years starting from January, 2012 to December, 2013. A total of 18 gastropods species belonging to 13 genera, seven families under seven orders were collected. The species were *Telescopium telescopium*, *Cerithidea decollata*, *Cerithidea rhizophorarum*, *Cerithideosilla incisa*, *Nerita lineata*, *Nerita turrrita*, *Neritina violacea*, *Littoraria melanostoma*, *Littoraria ardouiniana*, *Littoraria scabra*, *Thais gradata*, *Indothais blanfordi*, *Murex trapa*, *Pugilina cochlidium*, *Onchidium griseum*, *Onchidium damelli*, *Cassidula rugata*, *Ellobium aurisjudae*. At all different sites, the most common species were *Telescopium telescopium*, *Cerithideopsilla incisa*, *Nerita lineata* and *Littoraria melanostoma*. The highest seasonal occurrence of gastropods is in cold season (October to Janary). The highest number of individual was recorded in non-degraded study site. In the field survey, two threatened factors of the gastropod species were found; the vast number of edible gastropods were harvested from natural population for the whole year and they are losing their habitat due to deforestation.

Keywords: Seasonal occurrence, Gastropods

O-FR1-A6

A Histological Study of the Different Portions of the Gonad of *Pholas orientalis* (Gmelin)

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Abstract

Angelwing clam *Pholas orientalis* (Gmelin) is a marine bivalve indigenous to the coastal waters of central Philippines and has great commercial value. Angelwing clam were collected from Pontevedra, Negros Occidental to describe its gonad anatomy and compare the maturity stage of the different portions in female and male gonad. Two sampling periods were made. Five males and five females were used. A portion of the gonad was taken from its anterior, middle, and posterior and was processed for histological analysis. During the two sampling periods, female gonad showed only ripe, partially spawned, and spent stages. In males, early active, ripe, partially spawned, and spent stages were observed. No hermaphroditic individual was observed. There is no significant difference ($P>0.05$) between each portion of the female gonad in December but in February significant difference ($P<0.05$) was observed between the posterior and middle portion of the female gonad. The anterior and middle portion were not significantly different ($P>0.05$). In the male gonad, significant difference ($P<0.05$) was observed between the anterior and posterior portion in December. However, in February, no significant difference ($P>0.05$) was observed between the different portions. Moreover, no significant difference ($P>0.05$) was observed between the different portions of the gonad in both male and female when the two sampling periods were combined. In both male and female gonads, the maturity stage of the anterior portion is sometimes different from the middle and posterior portion or vice versa. Therefore, the middle portion will best represent the maturity stage of the whole gonad.

Keywords: Bivalve, Gonad anatomy, Histology, Reproductive biology

O-FR1-C1

Length-weight Relationship and Condition Factor of the Suckermouth Armoured Catfish Genus *Pterygoplichthys* (Siluriformes: Loricariidae) from Perai River and Skudai River and the Effect of Water Quality

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Abstract

The Amazon Suckermouth Armoured Catfish (Family: Loricariidae) has achieved global distribution as one of the most successful invasive freshwater fish. However, there are still limited studies on the invasion of this species in Peninsular Malaysia. In this report we studied two locations Perai River and Skudai River, which were reported as among the most polluted river and the water quality conditions that made the fish survived. Length-weight relationship and condition factor of the suckermouth catfish were investigated. Positive allometric growth revealed *b* value of 2.96 for Perai River, and 3.04 for Skudai River. The condition factors were 0.87 – for Perai River and 0.79 for Skudai River, whereas value below 1 indicate poor growth for such environment, and suggesting low water quality condition affected the fish growth rate.

Keywords: Length-weight relationship, Condition factor, *Pterygoplichthys* spp., Invasive alien species

O-FR1-C2

Distribution of Stingrays in the South China Sea, Terengganu Malaysia

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Abstract

An experiment was designed to determine the distribution of stingrays in the South China Sea, Malaysia. Research is done at open water area with three habitats (20m,30m and 40m) in Bidong Island, Kapak Island and Gelok Island with seasonal division (heavy, moderate and dry) based on the quantity of rainfall. Samples were collected monthly for one year by using stingray gillnets. Results show that ten species of stingrays were caught during the sampling which are Maculabatis gerradi (20.9%), Pastinachus ater (18.6%), Himantura uarnak (17.4%), Hemitrygon parvonigra (11.6%), Aetobatus acellatus (10.5%), Pateobatis jenkinsii (9.3%), Rhinoptera javanica (7.0%), Brevitrygon walga (2.3%), Gymnura poecilura (1.2%) and Urogymnus asperrimus (1.2%). Stingray were find high at the depth of 40m with 50 species (58.1%) catches compared to 30m depth (27.9%) and 20m depth (14%). The highest species caught at 40m depth are *Pastinachus ater* and *Maculabatis gerrardi*. The higher species caught in 30m depth is *Maculabatis gerrardi* while in 20m depth is *Hemitrygon parvonigra* and *Himantura uarnak*. Stingray species caught highest during the dry seasonal division with 48 species (55.8%) compared during moderate (33.7%) and heavy (10.5%) season. The highest species caught during the dry season was *Hemitrygon parvonigra*, Maculabatis gerrardi, *Pastinachus ater* and *Himantura uarnak*. This study will contribute to stingray's distribution in South China Sea and can be guidelines for stingray fisheries in the future.

Keywords: Stingray gillnets, Habitat, Seasonal, South China Sea and artisanal fisheries

O-FR1-B1

Review About Physiological Characteristic and Feeding Behavior of Khela Mahseer, *Tor douronensis* Broodstock

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Abstract

Tor douronensis is a type of freshwater fish that is important to the economic fish of Thailand. There is a name called dialect or Malayu that “Khela”. They can be found only in the lower Southern of Thailand. In the family cyprinidae. Shaped like a *Tor tambroides*. But the fish has a distinctive appearance that is pink, has a large, slender body and cylindrical shape. The upper body is dark brown and the side of the body silver or gold. Is a fish that lives in streams or areas with high oxygen, Water is quite cool, Waterfall area or the main upstream areas in the area of Yala. Found especially in the Hala-Bala waterfall within the Hala-Bala park, Yala province. The fish is a famous fish especially in Yala province. At present the fish has a high market demand. Both in the consumption and marketing of beautiful fish because it is a fish that has good taste can eat whole scales and has a beautiful appearance. Causing the price to be as high as 2,000 baht per kilogram and in Hong Kong that is popularly consumed Price up to 5,000 baht per kilogram. It is a fish that is high in freshwater fish in Thailand. At present fish are endangered due to the construction of the Bang Lang dam in Bannang Sata district, Yala province. Causing loss of habitat, spawning sources in nature resulting in less quantity. Therefore has been compiled broodstock from the Hala-Bala waterfall for breeding. Until able breeding can release fish into the Bang Lang dam. But still able to breeding small quantities because fish that live in deep forests. Therefore having problems in moving fish from nature to be able breeding is quite difficult. Therefore considered fish breeding as an urgent problem. They should have a study of breeding to reduce the problem of

extinction of fish in the future. The problem of this fish is extinction and reduce. Therefore should be studied about nutrition requirement and feeding habits. The basic knowledge is understand the ecosystem and behavior of this fish. Fish has different feeding habits and depending on the physiological characteristics of that fish. By considering is internal organs gastrointestinal tract such as mouth, teeth, stomach, intestines. Another important element that affects maturation is the food of fish. The food used must therefore be suitable for the needs of that fish and the study of reproductive biology of fish is another factor that will help to propagate successfully. In each species has different breeding and spawning depends on various factors such as the spawning season, suitable spawning sources and the age of maturation. The basic knowledge of reproductive biology of fish can be used for fish propagation.

Keywords: Feeding behavior; Physiological broodstock; Broodstock; Khela Mahseer, *Tor douronensis*

O-FR2-E1

Optimization of Halal Gelatin Production from Edible Jellyfish, *Acromitus hardenbergi* Using Different Concentrations of Acetic Acid

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Abstract

Gelatin is the denatured form of collagen, which can be extracted from jellyfish. Aquatic-based gelatin has huge potentials in industrial applications as alternatives to land-based gelatin (porcine and bovine), which is tainted with hygienic and religious issues. Thus, there is an increasing demand for aquatic gelatin. Hence, this study aimed to optimize the halal gelatin production from edible jellyfish (*Acromitus hardenbergi*). First, fresh jellyfish was washed thoroughly and soaked in 0.1M sodium hydroxide overnight. The crude collagenous matters were washed till nearing pH neutral, and heated for 6 hours at 55 °C using different concentrations of acetic acid (0.1M, 0.5M and 1M). The gelatin was obtained as supernatant after centrifugation and subjected to spray drying and texture analysis. Acetic acid with 0.1M, 0.5M and 1M concentrations extracted 81.34%, 93.15% and 93.57% of the jellyfish to gelatin, respectively. Prior to spray drying, the highest volume of supernatant (gelatin) after centrifugation was observed in both 0.1M and 1M acetic acid (11 L), while 0.5M acetic acid extracted 10 L of supernatant. Extraction using 1M acetic acid provided significantly higher ($p < 0.05$) gelatin amount, 15.86 ± 0.005 g/kg than the other concentrations of acetic acid. These findings suggested that 1M acetic acid can be utilized in the extraction of aquatic gelatin, which will be cost effective and sufficient for the downstream works.

Keywords: Optimization, Halal gelatin, Production, Edible jellyfish, Acetic acid

Follicular Atresia in Patin Buah, *Pangasius nasutus* Bleeker 1863 Population of Sungai Pahang, Malaysia

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Abstract

Follicular atresia is the degeneration of oocyte and the follicular wall in vertebrate ovaries including fish. Depending on occurrence rates and peculiarity, ovarian atresia can impact fecundity and ovulation rate in captive fish broodstock as well as wild individuals in their natural environment. A study was conducted to examine the seasonal ovarian development of patin buah *Pangasius nasutus* Bleeker 1863 population in Sungai Pahang, Malaysia. Ovary specimens were collected from fish samples caught from August 2005 until July 2006. One of the purposes of the histological analysis was to describe the different morphology of atretic oocytes occurred throughout oogenesis. There were six types of atretic oocyte morphology found in the study, all of which present at different oocyte development. Although it is understandably common in captive fish where resources are deprived, the high occurrence of atretic oocytes in the wild fish population may indicate concerning environmental or ecological conditions, and may have deleterious effect on the population turnover. As the finding has dated about 13 years ago, future research on *P. nasutus* natural population may benefit from this study that sets baseline information as a comparison.

Keywords: Follicular atresia, Patin buah, *Pangasius nasutus*, Sungai Pahang

O-FR2-A2

Observation on Fish Species of Pawn Chaung (Nam Pawn creek), Kayah State

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Abstract

Study on fresh water fishes from Pawn Chaung (Nam Pawn), a creek from Kayah State, Northern Myanmar was carried out within the period of December 2017 to September, 2018. The sampling sites were at Saw Lon village (site I), Bawlakhe (site II) and point of Pawn and Htu Chaung (site III). The samples were collected twice a month to record the occurrence of fish species in seasonally. According to the results, a total of 24 fish species, belonging to 21 genera and 11 families of 5 orders were recorded in the study areas. All the recorded samples were under the orders of Cypriniformes, Osteoglassiformes, Perciformes, Synbranchiformes and Siluriformes. Among those, the fish species under the Order Cypriniformes was observed as the highest composition representing (45.83%) of total species followed by Siluriformes (29.17%), Synbranchiformes (12.5%), Perciformes (8.33%) and Osteoglassiformes with a single species (4.12%).

Key words: Cypriniformes, Osteoglassiformes, Perciformes, Synbranchiformes, Siluriformes

O-FR2-A3

Survival Rate and Histological Study of Barred Loach Fish (*Nemachilus fasciatus)* Ovary Fed with Different Feeding Rate

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Abstract

High price and increasing demand has suppressed the natural population of Barred loach fish (*Nemachilus fasciatus*). Barred loach fish is widespread population in Java and Sumatra Island, Indonesia. However, the distribution is not extensive. Fish culture techniques related to feeding management and technology is not known yet, thus, this study aims to determine feeding rate of Barred loach fed with earthworm (*Lumbricus rubellus*). Fish feeding rate were 7%, 9%, 11% and 13% of body weight. The best feeding rate of L. rubellus in treatment D was feeding rate of 13% which resulted in highest GSI value at the end of maintenance at 13.06%. The gonadal maturity levels obtained during the study were level 2 to 5. Observation of gonad histology of Barred loach during the study found primary oocyte phase, alveolar cortex phase, vitellogenic phase and mature oocyte phase. By 13% feeding rate also gives highest survival rate of 91.67% and specific growth rate of 0.80% / day.

Keywords: Feeding rate, Barred Loach fish, GSI, Ovary, Survival rate

O-FR2-A4

Species Composition of some Fishes in Haipa Waterfall, Mongsue Township, Southern Shan State, Myanmar

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Abstract

The study was conducted in Haipa waterfall from November, 2018 to May, 2019. Haipa waterfall is situated in Mongsue Township in Southern Shan State of Myanmar. The Haipa waterfall runs from the Num Pang River. A total of 18 species of fishes were recorded during the study period. These fish species were under 15 genera belonging to nine families and four orders. The fish community of Haipa waterfall was collected by using the gill nets. Among the nine families, the highest species composition was observed in Cyprinidae (38.89%) while the lowest species composition (5.56%) occurs in Cobitidae, Mastacembelidae, Synbranchidae, Osphronemidae, Cichlidae and Channidae. Among the recorded 18 species, Cyprinus carpio and Oreochromis nicholsi were more abundant than other species. Taxonomic research support biodiversity associated with surveys, distribution and ecosystem services, and is also the basic knowledge for other fish related subjects. Therefore the present study aims to identify the species composition and abundance of fishes in Haipa waterfall and to conserve the species richness in this area.

Keywords: Freshwater, Haipa waterfall, Fish community, Gill net.

O-FR2-A5

Trophic Interactions and Ecological Attributes of a Reservoir Ecosystem in India

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Abstract

The trophic interactions of an ecological community is represented by the food web, which shows the flow of biomass and energy among different organisms in the ecosystem. A trophic model of Karapuzha reservoir in the state of Kerala in South India was constructed using 15 functional groups to describe the trophic flows. Karapuzha reservoir, (Lat. 11°37' N Long.76°10'30'' E) located in the state of Kerala in South India has an area of 855 ha is an important reservoir well suited for culture based fisheries. The tilapiine fish, *Oreochromis mossambicus* the most dominant fish in the reservoir ecosystem which formed about 53.35% of the total fish catch was observed to play important ecological functions. Trophic levels (TL), estimated from the weighted averages of prey trophic levels, varied from 1.0 for phytoplankton, macrophytes, and detritus to 3.36 for the top predator, Aquatic birds. The trophic aggregation routine showed that most of the biomass and flows are concentrated on trophic levels II and III. Biomasses associated with the highest trophic levels (TL IV and V) were very small, 0.733 and 0.351 respectively. The energy flows are concentrated in the lower part of the food web. The mixed trophic impact matrix indicates that very small fraction of changes in biomass of *Clarias gariepinus* would have negative effects upon eels and snake heads. Similarly small changes in *O. mossambicus* biomass would have negative impact upon the planktivorous fishes. Eels have negative impact on most of the fish groups and even the aquatic birds. The (P/R) is an indicator of maturity of the ecosystem. The production over respiration ratio shows a high value (4.95) for which could be attributed to the age of ecosystem. The ecological attributes derived from the model suggest an overall picture of the Karapuzha Reservoir as a system of a low degree of maturity.

Keywords: Energy flow, Trophic impact, Reservoir attributes.

O-FR2-A6

Feeding Behaviour in the Early Juvenile of Sultan Fish, *Leptobarbus hoevenii*

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Abstract

Sultan fish, *Leptobarbus hoevenii* is an expensive freshwater fish cultured in Southeast Asian countries. The present study examined the sensory-mediated feeding behavior in the early juvenile of *L. hoevenii* to determine its major sense in food detection. The ingestion ratios of *Moina* by the *L. hoevenii* with their vision (V), olfaction (O) or/ and touch (T) senses blocked through environmental manipulation were compared to that of the *L. hoevenii* fed under the normal condition (Control). The fish vision was blocked by placing them in a total dark room; the olfactory sense was masked by introducing concentrated *Moina* juice to the fish; frozen *Moina* was used to avoid the fish from detecting them through the vibration generated from their swimming movement. Totally 7 treatments (Control, V, O, T, VO, VT or OT blocked) were prepared in this study. Each treatment was repeated with 30 replicates. Each replicate contained a fish (3.53cm±0.33) with 300 ml of water in a 500 ml beaker, and fed with 30 *Moina* within 20 minutes. After 20 minutes, the remaining *Moina* was counted, and the number of the ingested *Moina* was expressed in percentage. The least significant difference (LSD) of the mean from each treatment was calculated to detect the significant difference (α = 0.05) among the data. Generally, the ingestion ratios from treatments which involved vision blockage (V, VO, and VT) were very low, and were significantly lower than that of Control, and vice versa. In conclusion, it is confirmed that vision is the primary sense for *L. hoevenii* in food detection.

Keywords: Sensory organs, Visual sense, Feeding preference, Rearing conditions, Sultan fish, *Leptobarbus hoevenii.*

O-FR2-B1

The Biological Aspects Comparison of Nile Fish (*Oreochromis niloticus*) on Eutrophic and Oligotrophic Reservoir from Indonesia

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Abstract

Selorejo reservoir is classified as eutrophic waters and Wonorejo reservoir is classified as oligotrophic waters which are inhabited by introductory fish, namely Nile fish or tilapia (*Oreochromis niloticus*). The objective of this study was to compare the length and weight, and condition factor of Nile fish which was captured by using fishing rods with hook size 3-4 (on oligotrophic waters), and hook size 7-8 (on eutrophic waters). The study was conducted on July to August 2018 in the Wonorejo reservoir (oligotrophic), Tulungagung, East Java, Indonesia, and February to March 2019 in the Selorejo reservoir (eutrophic), Ngantang, Malang, East Java, Indonesia, with survey method. The total sample was taken about 35 fish from total 4 times sampling in every week at 3 stations on Selorejo reservoir, while on the Wonorejo reservoir, the total sample was about 79 fish from total 3 times sampling which was conducted every two weeks. The length average of Nile fish in Selorejo reservoir was 17.8 ± 2.2 cm, whereas in Wonorejo reservoir was 15.3 ± 2.5 cm. The weight of Nile fish in Selorejo reservoir had an average was about 114 ± 35 grams, and 74.6 ± 38.6 gram in Wonorejo reservoir. The condition factor of Nile fish in both reservoirs was relatively same with an average value was 1.01. The condition of waters either oligotrophic or eutrophic did not affect the fish condition which was captured in those reservoirs. The Nile fish caught in the Selorejo reservoir (eutrophic) is relatively heavier and bigger than in the Wonorejo reservoir (oligotrophic) even though the hook size is smaller. Fish from Selorejo reservoir (eutrophic) is easier to get food so that the average fish is larger.

Keywords: Eutrophic waters, Oligotrophic waters, Nile fish.

O-FR2-B2

Gut Contents of *Cirrhinus mrigala* (Hamilton-Buchanan, 1822) from Nyaung Kaing In (lake), Monywa Township

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Abstract

The gut contents of of *Cirrhinus mrigala* was studied from October 2017 to December 2018. The sample collection was made once per month and ten specimens for each time from Nyaung Kaing Lake. Three of ten specimens in each month were analysed. The identification of gut contents of *C. mrigala* was primarily followed after Edmonson 1959. The feeding intensity divided into five categories. The gut content observation was made using occurrence percentage and number method including the quantitative measuring method. A total of 52 species belonging to 52 genera, 48 families, 43 orders, 26 classes and 18 phyla were recorded. The most dominated prevalence of detritus was 61.48% in October. The least prevalence was zooplankton found as 4.91% in October. 33 species of phytoplanktons, 13 species of zooplanktons, three species of bacteria and three species of fungi were recorded from the species studies. The wide range of dietary materials, *C. mrigala* is designated as omnivorous fish.

Keywords: Bacteria; Detritus; Fungi; Phytoplankton; Zooplankton

O-FR2-B3

Occurrence of Fish Fauna in Htanaung Taing in (Lake), Myingyan Township, Mandalay Region, Myanmar

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Abstract

A total number of 36 fish species (180282 individuals) confined to 27 genera and distributed among 15 families and eight orders were recorded during November, 2017 to July, 2018 in Htanaung Taing In (Lake), Myingyan Township, Mandalay Region. This study was aimed to investigate the occurrence of fish species in Htanaung Taing In (Lake). Species composition was highest in the order Cypriniformes (36.11%), followed after Siluriformes (25.00%), Perciformes (16.67%), Clupeiformes, Osteoglossiformes and Synbranchiformes (5.56% each), Mugiliformes and Tetraodontiformes (2.78% each). Among 36 fish species, 26 species (12621 individuals) in November, 25 species 49935, 15934 individuals) each in December and April, 27 species (26285 individuals) in January, 24 species (29239 individuals) in February, 26 species (23533 individuals) in March, 24 species (15156 individuals) in May, 18 species (6829 individuals) in June and 13 species (750 individuals) in July were observed. *Notopterus notopterus*, *Systomus sarana*, *Cirrhinus mrigala*, *Gibelion catla*, *Labeo calbasu*, *L. rohita*, *Wallago attu* and *Oreochromis* sp. were occurred in all study month whereas *Cabdio morar*, *Raiamas guttatus*, *Macrognathus aral*, *Channa punctata* were occurred in July. According to Ponderal Index (PI), the total number of fish individuals of one dominant species (54.82%), 15 permanent species (41.04%), three present species (2.03%) and 17 rare species (2.11%) were evaluated and recorded. It is suggested that fish fauna in the lake need to be maintained for fisher folks and also for local people consumption.

Keywords: Fish, Occurrence, Htanaung Taing In (Lake), Myanmar

O-FR2-A1

Occurrence of Commercial Fishes in Loikaw Environs, Kayah State, Myanmar

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Abstract

Occurrence of commercial fishes from Loikaw environs, Kayah State, Myanmar was carried out from December, 2017 to September, 2018. A total of 36 fish species belonging to 26 genera and 17 families under eight orders were recorded. The highest species composition was under the order Cypriniformes (44.44%), followed by Perciformes (22.22%), Synbranchiformes (11.11%), Siluriformes(8.33%), Osteoglossiformes(5.56%), Clupeiformes(2.78%), Scombriformes(2.78%) and Characiformes (2.78%). The percentage of species composition was the highest in family Cyprinidae(38.89%), followed by family Mastacembelidae(8.35%), and four families: Notopteridae, Ambassidae, Cichlidae and Channidae(5.56% each), while those of eleven families: Clupeidae, Balitoridae, Cobitidae, Pangasiidae, Clariidae, Heteropneustidae, Synbranchidae, Gobiidae, Belontiidae, Scombridae and Serrasalmidae were the lowest (2.78% each). Fish specimens were systematically identified and described provided by relevant photographs. Fish species composition, parameters employed and commercial value were given in tables. All species were commercially important however the highest commercial value was *Channa striata*.

Keywords: Occurrence, Commercial, *Channa striata.*

O-FR2-B5

Growth and Morphological Development of Early Life Stages of Japanese Catfish, *Silurus asotus* in Tropical Region

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Abstract

This study was conducted to investigate the morphological development of early life stages of Japanese catfish, *Silurus asotus* cultured under tropical region. The eggs and larvae were obtained from artificial seed production. The findings shows eggs of Japanese catfish began to hatch 30 hours and 15 minutes after fertilization. Immediately after hatching (0 hAH), larvae (4.71 ± 0.87 mm) had large yolk sac, closed mouth, invisible eyes and maxillary barbels with 100% survival. On 6 hAH, anus developed and pigmentation was deposited in the eyes with total length, 5.51 ± 0.25 mm. Next, larvae with total length, 5.57 ± 0.25 mm had mandibular barbels developed and pigmentation on the body increased at 12 hAH. On 18 and 24 hAH with total length 5.86 ± 0.70 and 6.44 ± 0.69 mm respectively, larvae had 4 barbels around mouth and yolk sac decreased. On the 30 hAH (7.01 ± 0.41 mm), yolk sac continued to decrease, barbels elongated and mouth opened with functional lower jaw. At this period, the larvae start to feed on rotifer and otohime. At 36 hAH, mouth opened and another mandibular barbels developed. On the 42 hAH (7.48 ±0.05 mm), larval stomach developed and six barbels had appeared around the mouth. On 48 hAH, body pigmentation of larvae increased and upper and lower jaw fully developed at the total length, 7.82 ± 0.37 mm. Maxillary barbels were relatively longer. The findings on larval development of Japanese catfish at early stage will contribute to better understanding of the most suitable rearing practice to further enhance the overall growth performance under tropical region.

Keywords: Growth, Morphological development, Early life stages, Japanese catfish, Tropical region

O-FR2-B6

The Impact of Pollutants on Fish Species From Ayeyarwady River in Thayet Environs

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Abstract

The pollutants of freshwater fishes from Ayeyarwady River, Thayet Environs were carried out during July, 2014 to June, 2016. Four study sites were selected in the study area depending on the impact of human activities. A total of 47 species of 33 genera from 20 families that belong to seven orders were recorded during the study period. Physical environment like water contents, temperature, humidity and rainfall were seasonally recorded. Different fishing methods and organic contents of water in different sites were studied and content of heavy meatal relations with water parameters and fish. The relationship between fish species occurrence and water quality was recorded to assess the deterioration of the environment. In present study, the maximum number of fishes was observed in site IV and II respectively that the less impact of human activities while those minimum number of fishes in site I that area was industrial area. The relationship between the fish population and water quality was measured. The diversity of fish species, abundance in each study sites related to the water quality was assessed. The largest number of fishes was collected in cool season and the smallest number of fishes was obtained in wet season. Based on the observed data discussion was made with emphasis on conservation aspect. Finally, the comparison with the collected fish population from 2014 to 2016 was studied in the study area.

Keywords: Water pollutants, Fresh water, Water quality, Fish population

O-FR2-B7

Diversity of Some Fish Species in Hlaing River Segment Between Insein and Shwe Pyi Thar Townships, Yangon Region, Myanmar

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Abstract

A total of 21 fish species belonging to 13 families of six orders were recorded from Hlaing River segment of Ywama ward (west) of Insein Township and War Tayar village of Shwe Pyi Thar Township. Species richness of fish in two study sites was higher from May to September although population abundance was higher from June to October in 2010 and 2011. *Puntius sophore*, *Amblypharyngodon mola* and *Osteobrama belangeri* were most abundant species in two study sites and *Polynemus paradiseus* was most abundant in War Tayar village. Diversity of fish species in May and June in Ywama ward (west) and April, May, July and October to December in War Tayar village was found to be higher. Species richness in May to August was higher in two study sites. Seral community was observed in April and November in Ywama ward (west) and January and February in War Tayar village. In 2011, diversity of fish species in January to March in Ywama ward (west) and May and October to December in War Tayar village was found to be higher. Species richness in January, May and November was higher although seral community was found in April in two study sites.

Keywords: Species richness, Population abundance, Diversity

O-FR2-B8

Fish Species Diversity in the Upstream and Downstream of Sittaung River, Taungoo District in Bago Region, Myanmar

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Abstract

This study conducts to generate a primary database on ichthyofauna distribution and diversities in the upstream and downstream of Sittaung River in Bago Region of Myanmar. This study provides the information needed to obtain the future distribution of river fish. Fish diversities are assessed by calculating the various diversities indices such as Shannon – Weiner biodiversity index (H′), Simpson's dominance index (D), Simpson's index of diversity (1-D), Pielous evenness (J) and Margalef index (Ma) of species richness analysis from December 2018 to November 2019. Water quality was analyzed in monthly. The result of the present study has 63 fish species belonging to 10 orders and 24 families. According to the fishermen interview survey, we know that on the number of rare some fish species such as *Silonia silondia* (Nga-myin), *Tenualosa ilisha* (Nga-tha-lauk), *Anguilla bengalensis* (Nga-lin-ban), *Aorichthys aor* (Nga-jaung), *Mystus leucophasis* (Nga-nouk-thawa), *Mystus gulio* (Nga-yawe) and *Rita rita* (Nga-htwe). These are affected due to increase in unwise anthropogenic activities.

Keywords: Anthropogenic activities, Diversity, Downstream, Upstream, Water quality

O-FR2-B9

Composition and Abundance of Fish Species in the Segment of Chindwin River, Near Phaung Byin and Minnyar, Molike District

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Abstract

The study of species composition, occurrence and abundance of fishes were conducted in Chindwin River segment between Phaung Byin and Minnyar village, Mawlaik District, Sagaing Region during December, 2017 to September 2018. A total of 40 species belonging to 33 genera, 19 families under eight orders were recorded. Fish species were recorded monthly during study period. The systematic position and recorded species of the most distinctive characters were described. Cypriniformes comprised the most species composition (15 species, 37.5%) in the study area, with the highest percentage of catch, (38.46%) at site I and (36.84%) at site II. Species occurrence were the total number of species and individuals 40 and 60000 respectively, the highest number of species and individuals (40 and 14925) respectively in April and March, 2018 and the lowest (30 and 5754) respectively in January, 2018 in the study area. Among the recorded species, ten species were found in two study sites and throughout the study period. The total number of species and specimens were (39 and 33200) respectively at site I, (38 and 26800) respectively at site II, in the study period. The highest number of species and specimens were (33 and 8050) respectively in April and March, 2018 and the lowest (27 and 3106) respectively in January and May, 2018 at site I. The highest number of species and fish were (32 and 6875) respectively in March, 2018 and the lowest (26 and 2648) respectively in December, 2017 and May, 2018 at site II. Regarding to relative abundance, five and four species were considered as very common at sites, 25 and 26 species as uncommon at site I and II. The most very common species was *Salmophasia sardinella.* The least uncommon species were *Channa marulius, Leiodon cutcutia* and *Oreochromis niloticus*.

Keywords: Cypriniformes; Lowest; Highest; Site I; Site II

O-FR2-B10

The Fecundity and Length- weight Relationship in Female Macrognathus Aral (Bloch & Schneider, 1801) from Thiri Yadanar Market of Monywa

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Abstract

A total of 120 specimens of *Macrognathus aral* from Thiri Yadanar market of Monywa were used to investigate the fecundity and length-weight relationship during July 2018 to June 2019. Among these 60 specimens was count for fecundity. The absolute fecundity of *M.aral* ranged from 819 528 to 1610 46 eggs, the length in size class of 16.90 0.59 to 24.10 0.14 cm. While the weight of *M. aral* ranged from 19.95 3.19 to 49.51 2.77 g, its absolute fecundity was 1056 593 to 990 726 g. Absolute fecundity ranged from 580 318 – 3569 512 eggs was observed in ovary weight groups of 1.06 0.48 – 6.76 1.05 g. According to the regression, the absolute fecundity was more correlated with the ovary weight (r = 0.9682) than with the standard length (r = 0.1886) and body weight (r = 0.0739). The significantly correlation between standard length and body weight, correlation coefficient r = 0.95 and the value of b = 3.0248 were revealed in work of length – weight relationship. Thus positive allometric growth was observed in *M. aral* during study period

Keywords: Absolute, Correlation Coefficient, Relative, Regression

O-FR2-B11

Species Richness and Population Abundance of Fishes in Leasable Inlets of Twante Township, Yangon Region, Myanmar

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Abstract

Population abundance and diversity of fish species and impact of habitat disturbance on fish species community in six leasable inlets of Twante Township, Yangon Region were investigated. The study period lasted from June, 2013 to May, 2015. A total of 35 fish species belonging to 17 families of six orders were recorded by with their respective 13 types of fishing gears from six studied sites. The order Perciformes was found to be the most dominant group in Kasinkani Hin Thar Atie, Abay Ilamu, Theingone Thanphyu Yone Kyi Tan and Ohn Pin Chaung , whereas, the order Cypriniformes was the most dominant group in Tamankyi Htet Out and Ma Die inlets. *Pseudambassis ranga* was found in all studied sites .Maximum number and quantity of fish was caught by stationary bagnet, cast net and brush park. Total catch number and quantity (kg) of fish in Tamankyi Htet Out increased and those of other inlets decreased in the successive years. Catch Per Unit Effort (CPUE) of all studied inlets were decreased in the successive year. Although mature and stable communities were observed, total numbers of fishermen and fishing gears in all studied sites increased year after year.

Keywords: Fishes, Fishing gears, Leasable inlets, Myanmar

O-FR1-D10

Population Abundance and Reproductive Biology of *Otolithoides pama* in Bago River, Myanmar

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Abstract

Otolithoides pama (Hamilton,1822) was one of the most abundant fish in Bago River and they are also the commercial fishes. Population abundance and reproductive condition of *Otolithoides pama* was studied in Bago River, Myanmar from June 2008 to June 2010. The highest catch number of individuals was recorded in May 2009 and April 2010 with 10889 and 11004 individuals respectively. The lowest catch number of individuals was recorded in November 2008 and October 2009 with 1493 and 1685 individuals respectively. The largest individuals of captured *O. pama* was a male of 23 cm total length and a female of 33 cm. To study the reproductive biology of *O. pama*, 20 males and 20 females were collected monthly and their GSI,HSI and histological observation of gonads were examined. *O.pama* had multiple spawning patterns. The highest GSI value of male was recorded in June with 6.47% whereas female GSI is highest 18.09% in April.

Keywords: Population abundance, Reproductive condition, *Otolithoides pama*, Gonadosomatic index, Hepatosomatic index

Session 2 : Fisheries Biology and Resource Management 2

Session 2 : Fisheries Biology and Resource Management 2

Kenanga Room

November 19, 2019 (Tuesday)		
Time	**Title**	**Code**
Chairperson: Dr. Haslawati Baharuddin		
11:00-11:30	**Refreshment and Poster Viewing**	
11:30-11:45	**Morphometric Diversity of Indian Mackerel (*Rastrelliger kanagurta* Cuvier, 1861) As A Management Base** Zairion[a,b*], Agus Alim Hakim[a], Bagus Aditya Riyadi[a], Mohammad Mukhlis Kamal[a], Ali Mashar[a], Hawis Madduppa[a,c], and Yusli Wardiatno[a,b]	O-FR1-D1
11:45-12:00	**Neritic Tuna Fishery and Stock Assessment of *Euthynus affinis* in Malaysia** Effarina Mohd Faizal Abdullah[a*], and Sallehudin Jamon[a]	O-FR1-D2
12:00-12:15	**Gill Plasticity of Hoven's Carp *Leptobarbus hoevenii* Under Exposure to Temperature and Low Water pH Stress** Suhaini Mohamad[a*], Rabi'atul 'Adawiyyah Zainuddin[a], Sharifah Rahmah[b], Mazlan Abd Ghaffar[c], and Hon Jung Liew[a]	O-FR1-C3
12:15-12:30	**Population Biology of the Leopard Coral Trout, *Plectropomus leopardus* in Two Live-reef-fish-for-food-trade Sites in the Philippines** Casauay Robert Bryan[a*], Hazel Arceo[b], and Porfirio Alino[a]	O-FR1-D4
12:30-12:45	**The Yield Per Recruit Analysis of Dwarf Whipray, *Brevitrygon heterura,* in Gulf of Thailand and Adjacent Waters** Supapong Pattarapongpan[a*], and Matsuishi Takashi Fritz[b]	O-FR1-D5
12:45-13:00	**Morphology and Biology of Indian Scad (*Decapterus russelli*) (Rüppell,1830) in Bali Strait, Madura Strait, Southern Waters of East Java Using Stock Identification** Tri Djoko Lelono[a*], Gatut Bintoro[a], and Daduk Setyohad[a]	O-FR1-D6
13:00-14:00	**Lunch**	

Chairperson: Assoc. Prof. Dr. S. M. Nurul Amin		
14:00-14:15	**Species Diversity and Population Structure of Fishes in The Khanom Estuary, Khanom District, Nakhon Si Thammarat Province, Southern of Thailand** Nidsaraporn Petsut[a*], Sitthi Kulabtong[b], and Jirawaeth Petsut[a]	O-FR1-B2
14:15-14:30	**An Investigation on the Species Composition of fishes from trawl net catches and length - weight relationship of Ribbon Fish *Lepturacanthus savala* (Cuvier, 1828) at Chaung-tha Coastal Area** Jue Ko Ko Thet[a*]	O-FR1-B3
14:30-14:45	**Species Composition and Abundance of some Clupeids Fishes from Sin Ma and Nga Yoke Kaung Areas, Lower Rakhine Coast** Soe Thaw ThawTun[a*]	O-FR1-B4
14:45-15:00	**Study on Some Aspects of Biology of *Otolithoide spama* (Ham-Buch., 1822) from Ayeyarwady Delta Region, Myanmar** Lwin Mar Aung[a*]	O-FR1-B5
15:00-15:15	**Reproductive Biology of The Native Brackishwater Fish *Pseudapocryptes elongatus* in the Kalimireng River, East Java Indonesia** Fani Fariedah[a*] and Maheno, S.W[a]	O-FR1-B6
15:15-15:30	**Fish Diversity in Jali River Estuary of Purworejo Regency, Indonesia** Djumanto[a*], Rustadi[a], Ustadi[a], and Bambang Triyatmo[a]	O-FR1-B7
15:30-15:45	**Synchronization of the Birth Time of Coral Platy Fish *Xiphophorus maculatus* (Günther, 1866) Using a Combination of Temperature and Different Doses of Oxytocin** Fajar Maulana[a], Muhammad Zairin Junior[a*], Alimuddin[a], and Muhammad Fahmi Alamsyah[a]	O-FR1-B8
15:45-16:00	**Species and Abundance of Fish at the Bang-rad Canal mouth, Trang Province, Thailand** Wikit Phinrub[a*], Sutkanung Na Ranong[a] and Manoch Khamcharoen[a]	O-FR1-B9

16:00-16:15	**Biodiversity of Aquatic Macroinvertebrate at Four Different Habitats in Madong Bay, Bintan Island** Agus Alim Hakim[a*], Rifqi Irfan Nurshafwan[a], Bambang Widigdo[a], Achmad Farajallah[a], Yuyun Qonita[a], Yusli Wardiatno[a], and Ali Mashar[a]	O-FR1-B10
16:15-16:30	**Some Reproductive of Matured Female Spotted Scat, *Scatophagus argus* Linnaeus, 1766** Afiq Affifuddin Rahmat[a], Thumronk Amornsakun[a*], Liew Hon Jung[b], Sarawuth Chesoh[c], Sitthisak Jantarat[c], Nobuo Suzuki[d], Jirayut Ruensirikul[e], Thodsaphol Pholrat[f] and Anuar Hassan[g]	O-FR1-D7
16:30-17:00	**Refreshment and Poster Viewing**	
Chairperson: Assoc. Prof. Dr. S. M. Nurul Amin		
17:00-17:15	**Population Study of Swanggi Fish (*Priacanthus tayenus*) and Layur Fish (*Lepturacanthus savala*) Prigi, Trenggalek Regency, East Java** Wahyu Isroni[a*], and Nurul Maulida[b]	O-FR1-D8
17:15-17:30	**Does Background Colours Influences Physiological Response and Spawning Performance of Red Jewel Cichlid, *Hemichromis bimaculatos* ?** Sallehhuddin Mohadzir[a*], Nurshahieda Mohamad[a], Sharifah Rahmah[b], and Hon Jung Liew[a]	O-FR1-D9

November 20, 2019 (Wednesday)		
Time	**Title**	**Code**
Chairperson: Dr. Nazia Abdul Kadar		
10:00-10:30	**Refreshment and Poster Viewing**	
10:30-10:45	**Intrinsic Vulnerability of Artisanal Fisheries: Evidence from Landing Port in Banyusangka, Madura Island** Yonvitner[a*], Nandi Syukri[b], Surya Gentha Akmal[b], and Rikza Fadlian[b]	O-FR1-E4
10:45-11:00	**Climate Parameter (SST) in Relation to Fish Production: Preliminary Assessment of Small Pelagic and Demersal Fish Adaptation in Sunda Strait** Yonvitner[a*], Mennofatria Boer[b], Dwi Muninggar Pratiwi[b], Rahmat Kurnia[b], Surya Genta Akmal[b], and Ernik Yuliana[c]	O-FR1-E5
11:00-11:15	**Resource Dependency of Tun Mustapha Park's Coastal Communities on the Live Reef Food Fish Trade (LRFFT)** Paramjeet Kaur Mithoo-Singh[a,b*], and B. Mabel Manjaji-Matsumoto[a,b*]	O-FR1-E6
11:15-11:30	**Effect of Temperature on Hydrocarbon Bioremediation in Simulatedpetroleum-Polluted Seawater Collected from Tokyo Bay** Pa Myat Thwe Myint Aung[a*], Qintone Li[b], Seiya Takahashi[c], and Motoo Utsuni[c]	O-FR1-E7
11:30-11:45	**Assessment of Anchovy Fish Catches by Purse Sein Net in Kyeintali Coastal Area, Rakhine Region** Thu Thu Min[a*]	O-FR1-E8
11:45-12:00	**GAB Sorption Prediction Models For Philippine Marine Species-Common Dolphinfish (*Coryphaena hippurus*)** Jose P. Peralta[a*]	O-FR1-E1
12:00-12:15	**Sustainable Management of Skipjack Tuna (*Katsuwonus pelamis*) Resource in South Coast of Pacitan Regency, East Java, Indonesia** Gatut Bintoro[a*], Tri Djoko Lelono[a], Arief Setyanto[a], and Jerna Ferda Kusuma[a]	O-FR1-E10
12:15-12:30	**Seasonal and Interannual Variability of Surface Chlorophyll-a Off The Halmahera Island**	O-FR2-D1

	Riza Yuliratno Setiawan[a*], Anindya Wirasatriya[b,c], and Iskhaq Iskandar[d]	
12:30-12:45	**Chlorophyll-a Variability Off The Depok Coastal Area** Mega Oceanna[a*], and Riza Yuliratno Setiawan[a]	O-FR2-D2
12:45-13:00	**The Influence of Seasonal and Interannual Variability on Surface Chlorophyll-a Off The Western Lesser Sunda Islands** Novia Kurniawati Saputro[a] and Riza Yuliratno Setiawan[a*]	O-FR2-D3
13:00-14:00	**Lunch**	
Chairperson: Dr. Mohd Zafri Hassan		
14:00-14:15	**Knowledge, Attitude, and Practices (KAP) of the Stakeholders on the Role of the Collaborative Governance Institution in the Resource Management of Banate Bay, Philippines** Liberty N. Espectato[a*], Harold M. Monteclaro[a], Hazel O. Arceo[b], Liah C. Catedrilla[c], and Carlos C. Baylon[c]	O-FR2-D4
14:15-14:30	**Migration of Fishers and Its Implication in Fisheries Management** Ruby P. Napata[a*], Liberty N. Espectato[a], Alice Prieto-Carolino[b], and Juhn Chris P. Espia[b]	O-FR2-D5
14:30-14:45	**Effect of Capture Fishery on Fisher Community of Mepya Sanpya Village, Kyanktan Township, South Yangon Division** Min Thu Aung[a*], Thet Thet Myaing[b], Thida Than[c], Saw Ohnmar[b], and Min Min Thein[b]	O-FR2-D6
14:45-15:00	**Catch Trend of Fishery Resources from Rajang Delta, Sarawak, Malaysia: A Case for Daro Coastal Area** M. Golam Mustafa[a*], Abu Hena Mustafa Kamal[a], Hadi Hamli[a], Johan Ismail[a], Adam Ak. Jakaress[b], Amy Halimah Rajaee[a], and Mohd Hanafi Idris[c]	O-FR2-D7
15:00-15:15	**Estimation of Input Utilization and Efficiency of Trawl Fishery in Southern Bay of Bengal** Jeyya Jeyanthi. Pe[a*], and R. Raghu Prakash[b]	O-FR2-D8
15:15-15:30	**Fisheries Dependence and Livelihood Vulnerability in Jakarta Bay and Seribu Islands: A Case Study**	O-FR2-D9

	Ima Kusumanti[a*], Sebastian Ferse[b] and Marion Glasser[b]	
15:30-15:45	**Fishery Resources with Diversity Indices and Fishing Practice in Bilu island, Mon State, Myanmar** Kyaw Naing Oo[a*], Khaing Myat Myat Htwe[a], Kyaw Swa Aung[a], and Naw Zar Chi Lin[a]	O-FR2-B12
15:45-16:00	**Coral Community of Pulau Mertang, Johor** Mohamad Saupi Ismail[a*], and Mei Ling Khoo[b]	O-FR1-E9
16:00-16:15	**Effectiveness of Real-Time Closure for Mobile Species in Multi-species Fisheries** Munehara Masami[a*] and Matsuishi Takashi Fritz[b]	O-FR2-D10
16:15-16:30	**Fishing motivations among students in Universiti Putra Malaysia (UPM), Selangor, Malaysia** Muhammad Salihin Amir Hamzah and *Izharuddin Kamaruddin	O-FR2-B13
16:30-17:00	**Poster Viewing**	

O-FR1-D1

Morphometric Diversity of Indian Mackerel (*Rastrelliger kanagurta* Cuvier, 1861) As A Management Base

Zairion[a,b*], Agus Alim Hakim[a], Bagus Aditya Riyadi[a], Mohammad Mukhlis Kamal[a], Ali Mashar[a], Hawis Madduppa[a,c], Yusli Wardiatno[a,b]

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Abstract

Indian mackerel (*Rastrelliger kanagurta*) is very potential small pelagic species in Java Sea; however their stock structure as a management basis is lack information in this sea as one of among Fisheries Management Area (FMA) in Indonesia. This research was aims to analyses morphometric differences of *Rastrelliger kanagurta* from three locations (i.e. East Lampung, Rembang, and Madura Strait) as representative of Java Sea from the west to the east. Differences in morphometric characters between species can be used to evaluate population structure and identify stocks. The concept of stock separates the population into groups with different growth rates and reproductive dynamics, irrespective of genetic similarities. Analysis of the relationship between length of weights shows the same growth pattern that is negative allometric, geographical location causes biota to have different morphological characters, so it can affect grouping that occurs in one species. Cluster analysis divided (*Rastrelliger kanagurta*) into two separate populations using the Truss Network Analysis (TNA) method for analyses thirty-four morphological characters. Discriminant analysis shows the existence of overlapping populations in Rembang and Madura Strait, while East Lampung population was different. Those two indicating stock unit of this species in Java Sea might manage separately.

Keywords: Fishery management, Fish stock, Jawa Sea, Morphometric, TNA.

O-FR1-D2

Neritic Tuna Fishery and Stock Assessment of *Euthynus affinis* in Malaysia

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Abstract

Neritic tuna species are among the important pelagic fish caught by commercial and traditional fishing gears. The main neritic tuna found in Malaysian waters are longtail (*Thunnus tonggol*), kawakawa (*Euthynnus affinis*) and frigate tuna (*Auxis thazard*). In 2018, neritic tunas contribute about 5% of the total marine catches in Malaysia. Annual catch of neritic tuna in the Malacca Straits is about 32% and had showed a decreasing trend but the opposite was observed in the South China Sea. Purse seiners contributed about 85% of the annual catches of neritic tuna and it is the most important fishing gear for this fishery, especially the 40-69.6 GRT and >70 GRT vessel size. Monthly length weight measurement of kawakawa showed a relationship of $W = 0.000025\ L^{2.9335}$. This present study will also include information on biological aspects of kawakawa such as growth parameters and length distribution.

Keywords: Neritic tuna, *Euthynnus affinis*, Growth parameters.

O-FR1-C3

Gill Plasticity of Hoven's Carp *Leptobarbus hoevenii* Under Exposure to Temperature and Low Water pH Stress

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Abstract

Climate warming and environmental acidification is known to negatively impact all level of aquatic organisms from molecular cellular to organism and population. For ammonotelic freshwater species, any abiotic factor fluctuation will cause disturbance specifically on gill site. Therefore, this study was designed to investigate the effect of temperature (28 vs. 32°C) and pH (7 vs. 5) stress on gill modeling structure of Hoven's carp after 20 days of exposure. Results demonstrated by increased 4°C of temperature and reducing the neutral pH to pH 5 caused severity changes on primary and secondary lamellae as well as cell within lamellae. Results also showed that a significantly differences ($P<0.05$) between basal epithelial thickness (BET) in primary lamellae among the group with the thinner BET trend were noticed at high temperature in both neutral and acidic pH. The secondary lamellae of Hoven's carp exposed to high temperature in neutral pH become more elongate and thinner compare in both acidic group where secondary lamellae become elongate but thicker. However, the restructuring gill model were more severe in acidic groups with aneurysm, hypertrophy, hyperplasia and fusion of secondary lamellae occur as compared to neutral pH groups. Thus, the structuring the gill model induced by temperature and pH stress can be early indicator of environmental stress. This study conclude that both temperature and pH stress have an impact on gill structural of Hoven's carp to facilitate osmorespiration compromising strategy for survival.

Keywords: Branchial, Warming, Stress, Physiology, Remodeling, Teleost

O-FR1-D4

Population Biology of the Leopard Coral Trout, *Plectropomus leopardus* in Two Live-reef-fish-for-food-trade Sites in the Philippines

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Abstract

Philippines is one of the top exporters of the most targeted grouper species, the leopard coral trout, *Plectropomus leopardus* in the global live-reef-fish-for-food-trade (LRFFT). Yet, despite reports on declining stocks, this species remains largely unmonitored and undocumented in the country. This study characterized the population of *P. leopardus* in two Philippine municipalities: Bongao, a newly emerging LRFFT site, and Taytay, the country's current center of LRFFT. Results revealed that the Bongao population had larger and older individuals (SL_{mean} = 33 cm; age_{mean} = 9 yrs old). At least 80% of the samples were above the minimum market weight of 500g ($weight_{mean}$ =1067g). Sex ratio was 4.85:1 while onset of sexual maturity were 27 cm and 4.2 years, respectively. In contrast, Taytay had significantly smaller and younger individuals (SL_{mean} = 25 cm; age_{mean} = 7 yrs old) with 67% of the samples already falling below the minimum market weight ($weight_{mean}$ =492g). The 19:1 sex ratio in Taytay indicates shortage of males in the population. Immature individuals comprised 20% of the samples, onset of sexual maturity were 19 cm and 3 years, respectively, and growth rate where higher (K=0.15) compared to Bongao (K=0.09). These indicate growth and biological overfishing of the *P. leopardus* population in Taytay and may have altered growth rates as compensatory mechanism to deteriorating stocks. Both Taytay and Bongao must regulate current LRFFT activities to prevent further stock deterioration. Furthermore, Philippines must upscale its current aquaculture initiatives and include this species as one of the top priorities for research.

Keywords: Live-reef-fish-for-food-trade (LRFFT), Groupers, *Plectropomus leopardus,* Population biology, Stock assessment

O-FR1-D5

The Yield Per Recruit Analysis of Dwarf Whipray, *Brevitrygon heterura*, in Gulf of Thailand and Adjacent Waters

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Abstract

Fisheries Management of Elasmobranch is an issue for Southeast Asia over a decade. Former stock assessments were focused only for species associated with tuna fisheries. SEAFDEC, in cooperation with member countries, implemented one-year shark and ray data collection during 2015 – 2016. All fishery information including length and weight composition of elasmobranches landing were collected daily. Dwarf whipray *Brevitrygon heterura* is a common species of elasmobranch in Gulf of Thailand and adjacent waters. They were caught for house hold and local consumption as bycatch. Even the current status announced by IUCN red list and CITES still be 'Not Evaluated' (NE), but regarding to the low fecundity as other elasmobranches, dwarf whipray stock status were concerned to be violated by current fishing pressure. Beverton and Holt's Yield per recruit and spawning stock biomass per recruit analysis were used as a quick assessment method regarding to uncomplicated input requirements. A total of 1665 specimens were measured weekly from 4 local landing sites in 3 countries namely Thailand (1), Cambodia (1) and Vietnam (2), respectively. Biological parameters (L_∞, K and t_0) were determined using Electronic Length Frequency ANalysis (ELEFAN) provided in package TropFishR of R program. Mortality estimation using Jones and van Zalinge's method for total mortality (Z), Pauly's method for natural mortality (M) estimation and probability of capture provided in Fishery Stock Assessment Tool (FiSAT), respectively. The result was expected to be the representative for the stock status of dwarf whipray in Gulf of Thailand for further management measure.

Keywords: Dwarf whipray, Gulf of Thailand, Yield per recruit, bycatch, Stock Assessment

O-FR1-D6

Morphology and Biology of Indian Scad (*Decapterus russelli*) (Rüppell,1830) in Bali Strait, Madura Strait, Southern Waters of East Java Using Stock Identification

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Abstract

Stock estimation identification and biology information of Indian Scad *(D. russelli)* are used to determine the source of stock. The purpose of this study is to know the kinship and biology of Indian Scad *(Decapterus spp)* in southern waters of East Java, Bali Strait and Madura Strait. Data collection **on** July – August 2017, December 2017, January – March 2018. The kinship of *D. russelli* in these three waters are quite far and have a very far kinship with *D. macarellus* and *D. kurroides. D. russelli* and *D. macrosoma* have a quite close kinship. Result showed that two of five morphometry character component factors of *D. russelli* in three waters have difference character percentage of 37,73% and similarity percentage of 62,27%. Length and weight correlation in Madura Strait is isometric negative W=0,0193 $FL^{2,817}$ model Von Bertanfanly Growth Formula (VBGF $L_t = 28{,}28\left\{1 - e^{-0{,}88(t-(-0{,}18}\right\}$ length maturity (Lm) male 15,3 cm FL female 16,7 cm FL. Type of foods that found are 6 phylums. Length and weight correlation in southern waters of East Java and Bali Strait are positive isometric W=0,0092 $FL^{3{,}094}$. model VBGF $L_t = 26{,}16\left\{1 - e^{-0{,}63(t-(-0{,}20)}\right\}$ length maturity (Lm) male 13,9 cm FL and female 16,1 FL. Type of foods that found are 12 phylums. *D. russelli* in these three waters are identified from different stock based on T-test. That caught in all waters most of them are immature.

Keywords: Principal Component Analysis (PCA), Length weight correlation, Infinitive length, Length maturity, Type of food

O-FR1-B2

Species Diversity and Population Structure of Fishes in The Khanom Estuary, Khanom District, Nakhon Si Thammarat Province, Southern of Thailand

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Abstract

Species diversity and population structure of fishes in the Khanom Estuary, Khanom District, Nakhon Si Thammarat Province, resulting from a study carried out in the period November 2016 (northeast monsoon) and July 2017 (southwest monsoon)at ten sampling stations. In this survey, fish specimens were collected by beach seine and dip-net. A total of 1,406 individuals fish representing 37 species from 27 families were found. The most dominant family was Gobiidae [5 species (13.5%)], e.g. *Acentrogobius viridipunctatus*, *Acentrogobius caninus*, *Glossogobius* sp., *Brachygobius doriae* and *Gobiopterus chuno* followed by Ambassidae with three species (8.1%) and other families with one or two species each. *Ambassis kopsii* and *Gerres filamentosus* are the most widely distributed fish in the study area. Found in brackish water canal ecosystems, estuary ecosystems and the coastal marine ecosystem. In the part of population structure, in November 2016, the average abundance of fish population found that between 0.43 – 1.34 individual /m^2 and in July 2017, the average abundance of fish population found that between 0.87–3.76 individual/m^2. The highest average fish product in the southwest monsoon seasons (July) is about 3.46 Kg./Rai. The data of diversity index, evenness index and dominance index of fish specimens showed that, the fish specimens in collecting site were low to medium diversity (0.73–1.73). The distribution of fish specimens in the northeast monsoon and southwest monsoon seasons were not evenness and some fish specimens are dominance more than other specimens in each collecting sites.

Keywords: Diversity, Population structure, Khanom Estuary, Nakhon Si Thammarat Province

O-FR1-B3

An Investigation on the Species Composition of fishes from trawl net catches and length - weight relationship of Ribbon Fish *Lepturacanthus savala* (Cuvier, 1828) at Chaung-tha Coastal Area

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Abstract

To assess the species composition of fishes, the samples were collected seasonally from trawl net catches which are commonly used in Chaung-tha Coastal Area in 2017. The trawl net is one of the advanced types of fishing gear of artisanal or traditional fishing methods to catch fish. The collected fishes were then identified and all the composition was recorded. Within the study period, a total of 37 species belongs to 33 genera were collected from the trawl net catches. Among the recorded species, *Lactsrius lactsrius* and *Nemipterus japonicas* were represented as the highest catch abundance in trawl net catches particular in July and *Otolithes ruber* were in August. The list of species composition was presented in paper. Along with the species composition, Length-weight relationship particular fish species were also studied. Ribbon fish, *Lepturacanthus savala*, one of the common and commercially important species in the study area, was selected to study the Length-weight relationship of that species. It aimed to get the information for better understanding of the biology and statistical analysis of Ribbon fishes. The equation of correlation regression analysis, $Y= 6.1594X- 214.23$ ($R^2 = 0.7964$) were used. The result was shown as $W = 0.0005 L^{3.0732}$.

Keywords: *Lactsrius lactsrius*, *Nemipterus japonicas*, *Lepturacanthus savala*, Trawl net catches

O-FR1-B4

Species Composition and Abundance of some Clupeids Fishes from Sin Ma and Nga Yoke Kaung Areas, Lower Rakhine Coast

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Abstract

Species composition, monthly occurrence and abundance of some clupeids fishes were studied in Sin Ma and Nga Yoke Kaung Areas, Lower Rakhine Coast within the period of 2018-2019. A total of seven species of clupeids under 3 subfamilies belongs to family Clupeidae were recorded. Among those, *Dussumieria acuta* and *Dussumieria elopsoides* were rarely found in both study areas and these species were economically insignificant. Average catch weight (kg/boat) of study fishes were randomly. The species composition of some clupeids and other fish caught by drift gill net using mesh size of 2.5" – 3.5" and by sardinella net using mesh size of 1.25" are monthly described. Species composition was calculated in terms of percentages by weight. In order to estimate the abundance of some commercially important clupeids in study areas, catch per unit effort (CPUE) of each species were calculated from the catch weight (kg) during study periods. The best fishing season of *Tenualosa ilisha* was observed from June to September and the maximum catch per unit effort (CPUE) value was observed in August. However, *Tenualosa toli* was more abundant during September to February in study areas. The species *Sardinella albella* was dominant in all study months, followed by *Sardinella longiceps* and *Sardinella gibbosa*. The catches of *sardinella* spp. were low in monsoon period and high in January to February. The fishing areas and fishing gears used for herring and sardine fishes were also recorded.

Keywords: *clupeids fishes, Sardinella albella, Tenualosa toil, Sardinella longicepsm, Sardinella gibbosa*

O-FR1-B5

Study on Some Aspects of Biology of *Otolithoide spama* (Ham-Buch., 1822) from Ayeyarwady Delta Region, Myanmar

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Abstract

Some aspects of biology of *Otolithoide spama* was studied from Ayeyarwady Delta Region, Myanmar within the period of June 2015 to January 2016. The samples were collected at fishery villages along the Nga-Wun River, Ayeyawady Delta Region. The results of monthly occurrence of sex ratio, ova development, size at first maturity, gonadosomatic index (GSI), relative condition factor (Kn), spawing season and fecundity were presented. The result of sex ratio indicated that males are predominated in December while females are in August. Maturity stages in male and female were classified into seven stages in the investigation. Size at first maturity of female and male were ranged from 17.5 cm to 21 cm. GSI and Kn value was high in July and November for female and in November and July for male. The reproductive periods of both sexes of *Otolithoide spama* were observed between July and November in study area. Fecundity of the fishes was ranging from 1040 to 39095.

Keywords: *Otolithoide spama*, Nga-Wun River, Gonadosomatic index, Ayeyarwady Delta, Relative condition factor

O-FR1-B6

Reproductive Biology of The Native Brackishwater Fish *Pseudapocryptes elongatus* in the Kalimireng River, East Java Indonesia

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Abstract

The mudskipper *Pseudapocryptes elongatus* is amphidromous fish which can be easily found in the canal of rivers. Recently, the demand of the *P. elongatus* for human consumption has been increased, especially in East Java. Fisehermen continuously catch this fish in its habitat thus, threat the existence in future.To prevent this species from extinction, immediate action must be conducted e.g., by performing domestication. To do this, one of the initial steps is by understanding the reproductive biology including female gonadosomatic index (GSI), maturity stage, fecundity and food habits. In this research individual of the *P. elongatus* were collected from Kalimireng River every two weeks from November 2016 to January 2017 to be subsequently observed GSI, maturity stage, relative gut length (RGL), and fecundity variation. The result suggested that mature females were observed in the sampling period with the highest of GSI was 0.4703% and maturity 5. However no spawned fish in the canal were observed, indicated that *P. elongatus* may spawn in the sea after the rainy season. Gut analysis illustrated that *P. elongatus* is an omnivore, with the highest RGL was 1.9 with diets consist of *Chrysophyta* (37%), *Rotifera* (30%) and *Cyanophyta* (26%). Salinity of the canal ranging from 7 to 29 ppt, suggested that *P. elongatus* is an euryhaline fish while the dissolved oxygen ranging from 1.82 to 4.8 ppm, indicated that *P. elongatus* able to survive in the hypoxia waters. All of these findings are important as the initial action for domestication and aquaculture purposes.

Keywords: Fecundity, Food habits, Gonadosomatic index, Maturity stage, Mudskipper

O-FR1-B7

Fish Diversity in Jali River Estuary of Purworejo Regency, Indonesia

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Abstract

The aim of this study was to determine the diversity of fish species, the distribution of length and weight of fish and the role of estuary as a habitat of nursery ground and feeding ground for some species of freshwater, brackish and sea finfish. The research stations were located in the mouth of the Jali river and lagoon along the coast, each of which was determined 5 stations. Fish sampling was conducted in January, March, May, July, August 2017 at noon during low tide using a cestnet with mesh size of 1 cm. All fish samples was collected, stored in cool boxes and transfered to the laboratory. Each fish sample was identified, then measured in length and weight. The results obtained were the number of juvenile fish caught as many as 897 individual that consists of 7 orders, 19 families and 26 species. The greatest fish presence was the Mystus gulio with attendance at 71.9%, and the second largest was Moolgarda engeli with attendance of the 15.6%. The mouth of the Jali river is very important for some important economical fish species as a nurshery ground, feeding ground and spawning ground for fish.

Keywords: Community, Fishes, Juvenile, Coastal, Purworejo

O-FR1-B8

Synchronization of the Birth Time of Coral Platy Fish *Xiphophorus maculatus* (Günther, 1866) Using a Combination of Temperature and Different Doses of Oxytocin

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Abstract

Coral platy fish *X. maculatus* is a livebearer ornamental fish that retain the eggs inside the body and give birth to live, free-swimming progenies. The large-scale production of this fish is faced is challenged with the uneven birth time, that lead to the size variety within the production. To synchronize the birth-time, we used the combination between temperature and hormonal treatment with oxytocin immersion. This study was conducted using randomized block design with triplicates of eight combination treatments between the oxytocin doses (0; 0.1; 0.2; 0.4 mL/L) and temperature (28 °C and 31 °C). The 30 final pregnant female with size 4,00±0,19 cm and weight 2,00±0,07 g fish were soaked for 12 hours in each treatment condition. The treated female is then placed in an aquarium that has been given aquatic plants (*Hydrilla* sp.) as the substrate of the birth place. Observations were carried out every hour for 2 days to get tillers from each birth to then be cared in separate containers. The percentage of female birth and total number of larva birth was calculated in term of mean ± standard deviation. The results indicated that the optimum combination to increase the synchronization of the birth-time is 0.2 mL/Oxytocin at 31 °C with the percentage of the birth was 70±10.00% with the number of larvae as 86.91±0.76; However, no interaction was found between the temperature and the dose of the oxytocin.

Keywords: Birth synchronization; Coral platy; Livebearer; Oxytocin; Temperature

O-FR1-B9

Species and Abundance of Fish at the Bang-rad Canal mouth, Trang Province, Thailand

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Abstract

This study aimed to the species and abundance of fish. The fish samples were collected from near the Bang-rad Canal mouth in the Palian Basin, Trang Province, Thailand. The twelve samplings were carried out by gillnets during June 2017 to May 2018. A total of 982 fish specimens belonging to 25 family and 35 species were identified. The four most *number of specimens* were *Arius maculatus*, *Sillago sihama*, *Nibea soldado*, *Gerres erythrourus*, which were 193, 150, 147 and 120 fishes respectively. The highest of occurrence frequency were *Sillago sihama* (100%), *Nibea soldado* (91.67%), *Arius maculatus* (83.33%) and *Thryssa hamiltonii* (66.67%). The most abundance and the number of fish species were found in June 2017 (237 fishes and 17 species), followed by September (189 fishes and 7 species) and lowest in May 2018 (22 fishes and 4 species). The number of fish specimens and number of species from all months were analysed by t-Test which showed significant (P<0.05).

Keywords: Diversity, Fish, Mangrove, Coastal, Andaman

O-FR1-B10

Biodiversity of Aquatic Macroinvertebrate at Four Different Habitats in Madong Bay, Bintan Island

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Abstract

Bintan Island is located in Wallace territory and the fauna is categorized to Asiatic group. Macroinvertebrates community structure can be an indicator to determine the ecological status. The study aimed to evaluate the community structure of aquatic macroinvertebrates from mangroves, seagrass, floating net, and lift net habitat in Madong Bay, Bintan Island, Indonesia. This research was conducted from September 2018 until November 2018. Samples were collected by artificial substrate from all habitats. The habitats were grouped to determine the habitat similarity based on the existence of organisms. Phylum of molluscs and arthropods were found in every observation. Margalef index, Shannon-Wiener index, and Pielou index were increased every month but the Simpson index was decreased. Seagrass and lift net habitat formed a clad, while floating net and mangroves formed another clad. Ecological condition of Madong Bay was stable and good condition to evaluate the macroinvertebrate community in just three months.

Keywords: Artificial substrate, Cluster, Community structure, Habitat

O-FR1-D7

Some Reproductive of Matured Female Spotted Scat, *Scatophagus argus* Linnaeus, 1766

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Abstract

The reproductive aspect of matured female spotted scat, *Scatophagus argus* spawner was studied by determining its gonadosomatic index (GSI) and fecundity in Pattani bay, Thailand. A total of ten matured female fishes were used in this experiment. After carried out the experiment, it was found that the mean of GSI was 8.93±1.49 % (Mean±SD, n=10) and the fecundity was 224,382.93±77,310.82 ova/fish respectively. Besides, the size of matured female fish was ranged from 15-19 cm in average total length and 100-210 g in average body weight. In addition, the type of egg was floating and rounded. The diameter of eggs can be divided into four groups which were 275.40±28.08 µm in group 1(11.84%), 416.77±55.78 µm in group 2(68.22%), 580.43±49.17 µm in group 3(18.73%) and 759.24±37.80 µm in group 4(1.19%), respectively (Mean±SD, n=10000). From the diameter of fish eggs were showed group 2 and 3 are ready to spawning. Furthermore, the female fishes that stimulate with the chemical injection using 20 µg/ kg of superfact were showed the abdomen width was increase from 28.30±2.98 mm before injection to 38.77±6.84 mm after injection (Mean±SD, n=12) and the abdomen increment was around 80.22%. The fish total length (TL) and body weight (BW) of mature female fishes were linearly related and could be represented by the linear regression as: BW = 27.155 TL- 294.13, R^2 = 0.7824, n = 10. Meanwhile, the relationship between body weight (BW) and fecundity (Fe) could also be represented by the linear regression as Fe = 1803.5 BW – 60575, R^2 = 0.8562, n=10.

Keywords: Fecundity, Gonadosomatic index, Diameter of egg, Abdomen increment, Spotted scat, *Scatophagus argus*

O-FR1-D8

Population Study of Swanggi Fish (*Priacanthus tayenus*) and Layur Fish (*Lepturacanthus savala*) Prigi, Trenggalek Regency, East Java

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Abstract

Swanggi fish (Priacanthus tayenus) and Layur Fish (Lepturacanthus savala) are demersal fish that have important economic value. The purpose of this study is to determine the status of swanggi fish stocks and sustainable and sustainable management. Data analysis consisted of: length frequency distribution, sex ratio, length weight relationship, gonad maturity size, gonad maturity level, age group identification, estimation of growth, mortality and exploitation parameters, surplus production model, and fishing season index. The results showed swanggi fish and layur fish had negative allometric growth patterns.

Keywords: Swanggi fish, layur fish, Stock studies, Growth

O-FR1-D9

Does Background Colours Influences Physiological Response and Spawning Performance of Red Jewel Cichlid, *Hemichromis bimaculatos* ?

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Abstract

Cichlid is parental mouthbrooder species with highly territorial defensive. In captive, this behaviour become even more aggressive to defend their territory for mating opportunity. This situation not only cause severe injury to broodfish but also cause massive loss of production. This aggressiveness behaviour is known to be significantly affect by surrounding environment which background of colour is one of the main factors. According to medical therapy, surrounding environment colour plays an important role to control behaviour and moodiness of an individual. With similar effect may influence fish responses which have yet been documented specifically on this red jewel cichlid. Therefore, this experiment was conducted to investigate the effect of different background colours on spawning performances of red jewel cichlid, *Hemichromis bimaculatus* in respect to pairing formation, spawning frequency, hatchability. Six different colours blue, yellow, red, green, white and black were chosen according to medical therapeutic purposes. Fish were exposed to different colours acutely for one hour and chronically for 40 days prior subject to osmorespiration assay. Result shown that oxygen consumption was high in blue, white and black when fish were introduced to acutely, meanwhile higher oxygen consumption were noticed in black and white under chronically exposure. Differently, higher ammonia excretion was only noticed when fish exposed to white colour acutely, no effect was recorded chronically. In different experiment series, five red jewel cichlids at sex ratio of 2 males and 3 females were introduced into each background colour with triplication. Once pairing process successfully formed, the unpaired individuals were removed from the experimental tank and all spawning performance were monitored. Results shown that red jewel cichlid preferred blue and yellow colours background with faster pairing formation, highest spawning frequency, parentally responsibility and hatching performance compared to other background colours. Research also suggested that both yellow and blue colours have positive effect in red jewel cichlid rearing. As remark, background colours have an impact on the physiology, reproductive and rearing of red jewel cichlid.

Keywords: Cichlid, Ornamental fish, Background colour, Osmorespiration, Reproduction

O-FR1-E4

Intrinsic Vulnerability of Artisanal Fisheries: Evidence from Landing Port in Banyusangka, Madura Island

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Abstract

Fishing activity in around Madura coast has been dominated by artisanal fisheries, which is have characteristic low fishing technology, one day fishing and focus for household income. The fishing activity potential to decrease, vulnerability and unsustainable of stock. These research conducted in fish landing port at Banyusangka-Madura Island. Main focus of this research are to evaluate fish stock vulnerability and intrinsic vulnerability. Result of this research found, species catch were dominated by small pelagic and demersal fish. Evidence from fish landing also record 12 species with categorize as very high vulnerability, 10 species as high vulnerability, and 3 species as medium vulnerability. The fishing gear which have been high vulnerability were trammel net, line, and dogol and others as medium vulnerability such as payang, purse seine and gillnet. Therefore to design management plan, important to understand of impact and risk to species and fishing technology. In this case, the very high vulnerability species and high gear risk should have first priority to manage.

Keywords: Vulnerability, Artisanal, Pelagic, Demersal, Madura

O-FR1-E5

Climate Parameter (SST) in Relation to Fish Production: Preliminary Assessment of Small Pelagic and Demersal Fish Adaptation in Sunda Strait

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Abstract

Effect of global temperature change, in a long time, will ‘not be a global issue, but also as part of fish adaptation and the impact of global change production and community livelihood. Therefore, needed extensive research to explain, how the temperature in tropical waters connect to fish behavior on recruitment, growth, and then to production and social welfare. Both temperature and production is an important indicator to evaluate climate and fish production impact. This information set as a baseline to check the influence of temperature on biology and fishing intensity in water. This research was conducted in Selat Sunda strait at 2018, particularly in Labuan fish landing port that focus to kind demersal and pelagic fish as an example. Average of sea temperature from 2009-2019 reach 29,51 ± 0,4, with annually fluctuation record at 0,08% per year. That means the increasing sea temperature at 0,0186 ^{o}C will have an impact on fish production. Pelagic fish production trend, also decrease 5,4% of yellow strip fish, 7,07% demersal fish (kurisi 5,47% and kuniran 12,79%). Therefore, the temperature increasing at 008% in a year will be able as a decrease in production at 7,69%. Therefore, the change of gonad maturity to length at first capture or maximum length ratio is an important indicator review sea temperature impact to biology. In the end, these indicators showed that the implication of sea temperature to pelagic and demersal impact as a part of global change.

Keywords: Pelagic, Demersal, Climate, Adaptation, Production

O-FR1-E6

Resource Dependency of Tun Mustapha Park's Coastal Communities on the Live Reef Food Fish Trade (LRFFT)

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Abstract

Tun Mustapha Park (TMP): a birth-child from Malaysia's commitment towards the Convention of Biological Diversity (CBD) to protect at least 10% of marine and coastal areas by 2020; is a large multiple use marine protected area encompassing almost the entire marine ecosystem off the northern Tip of Borneo, potentially considered a microcosm of the Coral Triangle bioregion. Our mixed-method study aims to address issues related to Goal 2 of the CTI-CFF Regional Plan of Action (RPOA), which is "Ecosystem Approach to Management of Fisheries (EAFM) and Other Marine Resources Fully Applied". A sequential exploratory design of qualitative data collection, followed by quantitative data collection has been designed; whereby in-depth, focus group interviews and participatory observation will corroborate information to be obtained from the survey questionnaires administered to key stakeholders involved in the LRFFT. Preliminary analyses of our qualitative findings reveal transboundary environmental problems including practice of destructive fishing methods and illegal trade along the shared boundary of the TMP marine seascape with neighbouring Philippines. Development of sound hypothetical explanatory mechanisms upon completion of the study to understand perceptions, interactions and involvement of coastal communities in the LRFFT; along with acquisition of statistically sound data on the juvenile fishing aspect of the industry will potentially assist in increasing support towards regulatory activities conducted by officials of Sabah Parks and Sabah Department of Fisheries; a cost and time-efficient approach to improve the conservation effectiveness that is promised by marine protected areas such as TMP.

Keywords: Coastal communities, Food fish trade, Live capture fisheries, Marine natural resources, Tun Mustapha Park

O-FR1-E7

Effect of Temperature on Hydrocarbon Bioremediation in Simulated Petroleum-Polluted Seawater Collected from Tokyo Bay

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Abstract

This study focuses on the effect of temperature on biological removal of petroleum hydrocarbons. Seawater samples were collected from two stations in Tokyo Bay seasonally, and were made into petroleum-polluted seawater by adding mixtureof n-alkanes in fixed concentration in laboratory. A 28 days of bioremediation incubation experiment was carried out with and without additional nutrients supplement in each season, and the remain hydrocarbons during incubations were measured by GC-MS. *alkB* gene, the functional gene responsible for alkane degradation, was also recorded throughout the incubation. Our results showed that bioremediation efficiency of petroleum hydrocarbon was highest in summer, followed by spring, autumn, and winter respectively. Alkanes with as much as 34 carbon atoms can be significantly degraded within 28 days of incubation in summer, and in contrast, no obvious degradation can be recognized in winter regardless of the number of carbon atoms. N-alkanes degradation efficiency were generally associated with, but not necessarily correlated to the copy number of *alkB* gene.

Keywords: Bioremediation, Petroleum pollution, Hydrocarbon degradation, *alk*B gene

O-FR1-E8

Assessment of Anchovy Fish Catches by Purse Sein Net in Kyeintali Coastal Area, Rakhine Region

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Abstract

Assessment of catch rate of Anchovy fishes from Kyeintali coastl area, Rakhine Region was presented in the paper. Anchovy fishes is small, common forage fishes under the family Engraulidae. Most species are found in Marine waters and several will enter brackish water. It is one of the ecological important species and provides good earning for the local communities in Rakhine Region. Dried Anchovy from Rakhine Region is popular and export to many other places. The main operation for catching Anchovy is purse sein net. In the present study, a total of 7 species such as *Septipinna taty*, *Thryssa baelama*, *Thryssa setirostris*, *Stolephorus commersonii*, *Stolephorus indicus*, *Coilia dussumieri* and *Coilia ramcarati* of Anchovy fishes were recorded from Kyeintali coastal area during the period of study. The identification keys for those species were also presented. Monthly occurrence of Anchovy species, catch rate and gear operation in the study area was recorded. Among the species, *Thryssa setirostris*, *Thryssa baelama*, *Stolephorus commersonii* and *Stolephorus indicus* were found in all months for year round. The catch weight of *Stolephorus indicus* is recorded as the highest catches representing 14.3 % (202721.3 kg of total catches) and the catch weight of *Septipinna taty is* recorded as the least representing 1.5% (15993. 6 kg of total catches). However, the catch rate of the Anchovy fishes in Rakhine Region is decreasing within more than ten years.

Keywords: Anchovy fishes, Catch rate, Engraulidae, Purse sein net, Rakhine Region

O-FR1-E1

GAB Sorption Prediction Models For Philippine Marine Species- Common Dolphinfish (*Coryphaena hippurus*)

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Abstract

Fish is very perishable. It will spoil within 6 hours at ambient temperature under tropical conditions. The removal of fish moisture the soonest possible, will minimize the growth of microorganisms, and render the fish shelf stable. This is where fish drying becomes important. Drying is a simultaneous heat and mass transfer phenomena wherein the fish is heated, the fish moisture is transported from the inside to the fish surface, and eventually evaporated and carried by the drying air. These processes will continue until equilibrium is established. In drying, there are three major concerns. These are 1) the physical and mathematical aspects of drying, 2) the fish physico-chemical changes during the process, and 3) the optimization of the drying process(Bruin &Luyben, 1980). Knowledge of final moisture and water activity relationships is the best index for dried fish shelf stability. One method to determine dried fish shelf stability is via sorption isotherms. Sorption isotherm determines the interaction between moisture and other food components. It represents the relationship of equilibrium moisture content and water activity as a function of temperature of a food product (Kumar & Mishra, 2006; Tonon et al., 2009). This paper is discusses the use of the GAB model on the development of predicted sorption isotherms on Common Dolphinfish (*Coryphaena hippurus*).

Keywords: GAB model, Sorption isotherm, Water activity, Dolphinfish

O-FR1-E10

Sustainable Management of Skipjack Tuna (*Katsuwonus pelamis*) Resource in South Coast of Pacitan Regency, East Java, Indonesia

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Abstract

Skipjack tuna (*Katsuwonus pelamis*) is one of the most dominant fish caught in the Indian Ocean, especially in Pacitan Regency. The sustainability of skipjack tuna (K. *pelamis*) must be maintained because of its important role in the fisheries economy in Pacitan Regency. This research was conducted in Pacitan waters, East Java starting from January to March 2019 aimed to estimate Maximum Sustainable Yield (MSY), Total Allowable Catch (TAC), Maximum Economic Yield (MEY), and Free Access Equilibrium (FAE) state, and ilustrate the utilization rate and status of skipjack tuna (*K. pelamis*) resource. Research method was quantitative analysis. The data were analyzed using surplus production methods based on Schaefer, Fox, and Gordon-Schaefer models. Result indicated that the estimated catch in the MSY level of Schaefer model was 1,906 tons with an effort of 1,435 trips, and the value of TAC was 1,525 tons. The estimated MEY value was 1,881 tons with an effort of 1,273 trips. While the FAE estimation was in 764 tons with an effort of 2,546 trips. Analysis of Gordon-Schaefer's model stated that the highest income was obtained in MEY level. It was about 19.5 billion Rupiahs (IDR). Another analysis informed that utilization rate based on Schaefer and Fox modles was 112% and 139% respectively. It can be concluded that utilization of skipjack tuna (K. *pelamis*) resource in Pacitan waters has achieved over exploited level.

Keywords: Surplus production, Maximum economic yield, Utilization rate, Gordon-Schaefer, Overexploited

O-FR2-D1

Seasonal and Interannual Variability of Surface Chlorophyll-a Off The Halmahera Island

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Abstract

Long-term satellite data (2003-2017) are analyzed to investigate the variability of ocean surface chlorophyll-a (Chl-a) concentration off the Halmahera Island under influence of the Indonesian Australian Monsoon and the El Niño-Southern Oscillation (ENSO). In this study, we first analyzed the seasonal variability of Chl-a, and then describe the relationship between sea surface Chl-a, sea surface temperature (SST), and sea surface wind stress in the region. Our results demonstrate that prevailing northerly and southeasterly wind stresses play a pivotal role in generating Chl-a maxima off the Halmahera Island. On seasonal time scale, the strengthening of northerly and southeasterly wind stresses (up to ~0.01 N m-2) during the Northwest and Southeast Monsoon seasons produce enhanced phytoplankton blooms associated with sea surface cooling (~28.8 °C) in the area of study. On interannual time scale, the largest positive Chl-a and wind stress anomalies and the coolest SST anomaly are observed in 2006 during El Niño event. Meanwhile, the greatest negative Chl-a anomaly is prevailed during the 2016 negative IOD event. This study demonstrates that wind variability is the essential factor in determining the magnitude of Chl-a maxima off the Halmahera Island.

Keywords: Chlorophyll-a, ENSO, Halmahera Island

O-FR2-D2

Chlorophyll-a Variability Off The Depok Coastal Area

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Abstract

The Depok Beach (DB) is located in the southern coast of Yogyakarta, Indonesia. The DB is an important region due to it serves as a traditional fisheries landing port. In addition, the sea off the DB is also pivotal for fisheries production due to the area becomes productive during austral winter. In the present study, we investigate the influence of Australian-Indonesian monsoon system on the variability of ocean surface chlorophyll-a off the DB. Specifically, we measured chlorophyll-a in water samples that were collected during the period of December 2018 – May 2019. The wavelengths used for measurement are 664 nm, 647 nm, and 630 nm. Results show that the highest chlorophyll-a concentration is observed in May with a value of 7.9 mg m^{-3}. Whereas the lowest chlorophyll-a concentration is found in December with a value of 1.8 mg m^{-3}. We suggest that the high chlorophyll-a concentration during the Southeast Monsoon (May) is caused by upwelling. In contrast, the low chlorophyll-a concentration during the Northwest Monsoon (December) is a product of downwelling. Furthermore, we suggest that changes in the monsoon wind have substantially contributed to the degree of ocean productivity off the DB.

Keywords: Chlorophyll-a, Australian-Indonesian monsoon, Depok Beach

O-FR2-D3

The Influence of Seasonal and Interannual Variability on Surface Chlorophyll-a Off The Western Lesser Sunda Islands

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Abstract

Long-term satellite data (2003-2017) are analyzed to investigate the variability of ocean surface chlorophyll-a (Chl-a) concentration off the western Lesser Sunda Islands (WLSI) under influence of the Indonesian Australian Monsoon, the El Niño-Southern Oscillation (ENSO), and the Indian Ocean Dipole (IOD). In this study, we first analyzed the seasonal variability of Chl-a, and then describe the relationship between sea surface Chl-a, sea surface temperature (SST), and sea surface wind stress in the region. Our results demonstrate that prevailing southeasterly wind stress plays a pivotal role in generating Chl-a maxima off the WLSI. Particularly on seasonal time scale, the strengthening of southeasterly wind stress (up to ~0.01 N m^{-2}) during the Southeast Monsoon season produces enhanced Chl-a concentrations (0.59 mg m^{-3}) associated with sea surface cooling (~28.8 °C) in the area of study. In contrast, the Chl-a maxima completely vanishes during the Northwest Monsoon season. On interannual time scale, the largest positive Chl-a and wind stress anomalies and the coolest SST anomaly are observed in 2006 when El Niño and positive IOD events occur at the same time. Meanwhile, the greatest negative Chl-a anomaly is prevailed during the 2016 negative IOD event. This study demonstrates that wind variability is the essential factor in determining the magnitude of Chl-a maxima off the WLSI.

Keywords: Chlorophyll-a, ENSO, Lesser Sunda Islands, Indian Ocean Dipole

O-FR2-D4

Knowledge, Attitude, and Practices (KAP) of the Stakeholders on the Role of the Collaborative Governance Institution in the Resource Management of Banate Bay, Philippines

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Abstract

Resource management issues usually transcend beyond jurisdictional boundaries. One strategy to expand the management process is to scale-up the structure into a broader partnership through the formation of collaborative governance arrangements such as inter-local government unit (LGUs) alliances. Banate Bay Coastal Resource Management Council, Inc. (BBRMCI) is one of the pioneering inter-LGU alliances in the Philippines. It was created in 1996 and is composed of four municipalities (towns) bordering a common resource, the Banate Bay. This paper will present the preliminary results of a study conducted to assess the knowledge, attitude, and practices (KAP) of the stakeholders on the alliance, whether or not, it has attained its sustainable resource management goals. A face-to-face interview of 474 randomly selected respondents from the four municipalities was conducted. The interview schedule used was developed, pilot -tested, and translated to local dialect (*Hiligaynon*). The information from this study will serve as an input for conducting further institutional analysis of the alliance to be able to improve its role in resource management.

Keywords: Resource management, Collaborative governance, KAP study, Banate Bay, Philippines

O-FR2-D5

Migration of Fishers and Its Implication in Fisheries Management

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Abstract

Migration has been a great part of the fishers struggle to survive and to prosper, to escape various forms of insecurity and poverty and respond to opportunities. The study was conducted to describe and analyze patterns of in-migration among fisherfolk and its implication to fisheries management. A total of 303 migrant fishing families in four coastal municipalities in Southwest Panay, Philippines were interviewed in a household survey. Key informant interview and a validation workshop were also conducted. The results of the study revealed that the migrant fishers are mostly using hook and line and they introduce to the local fishers modifications in the gear such as using different kinds of luring techniques. Also, they introduced different fishing practices and rituals. Moreover, the paper will discuss the relationship of these fishing practices and rituals in relation to the management of fisheries resources. Policy recommendations were also included in the paper.

Keywords: Fisheries management; Fisheries migration; Hook and line; Philippines; Southwest Panay

O-FR2-D6

Effect of Capture Fishery on Fisher Community of Mepya Sanpya Village, Kyanktan Township, South Yangon Division

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Abstract

During May 2017 through April 2018, weekly survey was carried out to study effect of capture fishery in Mepya Sanpya village of Kyauktan Township, South Yangon Division. Fish resource richness, catchability and generating value of fish in capture fishery were also investigated. Local fishermen of present study site conducted their fishing activities in open access area of Gulf of Moattama and Andaman Sea and their fishing gears were commercial types. A total of 21 fish species belonging to 15 families of four orders were recorded to catch. In which, the catch of pelagic and demersal fish types were the richest followed by coastal dwellers. Huge amount of dominant species (*Otolithoides pama, Polynemus paradiseus, Arius bilineatus, Tenualosa ilisha* and *Osteogeneiosus militaris)* were subjected by catching and monthly income from fishing was high in November to January. Total length of about 50% of recorded fish species were observed to under size comparing with the FishBase recommended common length. Exploiting of fish smaller than its common length is notified irresponsible. Six species (*Congresox talabon, Sillaginopsis panjus, Otolithoides biauriaus, Liza valgiensis, Eleutheronema tetradactylum* and *Polynemus indicus*) were found as the rare species of the catch in the present study.

Keywords: Capture fishery, Resource, Richness and catchability

O-FR2-D7

Catch Trend of Fishery Resources from Rajang Delta, Sarawak, Malaysia: A Case for Daro Coastal Area

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Abstract

Malaysia is endowed with vast coastal fishery resources which contributes ~1% in national GDP. Sarawak is the major state of Malaysia having high potential coastal resources. The study was conducted from December 2018 to May 2019. The purpose was to update current status of the coastal fisheries, and to identify gaps for further research and measures for resilient fisheries. The study was undertaken through desk-based review and analysis of secondary data along with a focus on the primary fish landing data supported by data collected directly from fishers' catches. FAO production data (1950–2011) for fishing zone 71 (Sarawak-Sabah) showed a sharp incremental trends (70100MT to 682004MT; R=0.992). The Sarawak fishery was mainly contributed by coastal catches (0.07mMT to 0.11mMT). A distinct monthly fluctuation was found in fish catches Sarawak coast. There are steady landing from March to August whereas declining trends from September to February was found. Data from case study site (*Daro*) exhibited 40.9MT catch in 2018 and monthly varied from the lowest 3004 kg (in November) to the highest 3693kg (March). Fishing efforts in terms of fishermen, vessels and gears were steadily increased over the period 2000 to 2016. The main contributing species/groups by weight was shrimp (39%) followed by Gonjeng (15%), and Sembilang, Ketam and Bulu (4%). There were 78 contributing species showed in historic database of *Daro* in catch assessment form. But, there were only 34 species found to be contributing in catch during 2018. Out of 34 species, 23 were found contributing regularly (12 months) whereas the other 11 species contributing seasonally in catch. We found 27 species in the sample survey in *Daro* estuary during April 2019. The ecological variation in seasonal pattern might be the driving factors for these species contributing variation in catch.

Keywords: Coastal fisheries, Catch trends, Species shifting, Ecological drivers, Sarawak, Malaysia

O-FR-D8

Estimation of Input Utilization and Efficiency of Trawl Fishery in Southern Bay of Bengal

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Abstract

Trawl fishery is a prominent kind of mechanised fishery contributed more than 50% to the total marine fish production in India. Generally, input utilization and efficiency are the two economic indicators that determine the profitability of fishing systems as like any other production systems. There has been tremendous increase in engine power utilization in the marine fishing system, which is more prominent among trawlers. The present study highlighted the input utilisation of trawlers with special reference to indiscriminate use of engine power in Kakinada, Andhra Pradesh State, East Coast of India. The trawl fleet size (OAL) between 32 – 46 feet was conducted for the study covering 156 trawl fishing fleets. The technical and economic efficiency of trawl fishery were also been optimised. From the results, it was found that small trawlers showed high exploitation in engine power utilisation followed by medium trawlers. Around 23 per cent of trawlers showed over utilization of engine power compared to the standards. The technical optimum (TOL) and economic optimum (EOL) showed that medium trawlers gained comparatively high with 28% more revenue than other two vessel categories.

Keywords: Input utilization, Technical efficiency, Economic efficiency and trawl fishery

O-FR2-D9

Fisheries Dependence and Livelihood Vulnerability in Jakarta Bay and Seribu Islands: A Case Study

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Abstract

Jakarta Bay Ecosystem (JBE) consists of two areas; Jakarta Bay ('mainland') and the Seribu Islands ('islands'). These ecosystem, have experienced a series of drastic environmental shifts in recent decades. They both are heavily impacted by human activities with organic waste delivered directly to the rivers without special treatment, which is then transported into the bay. This study aims to describe and investigate the economic value of important species, the fisheries dependence, and its relation to the vulnerability of livelihoods. This study performed the differences of main resource use in the two study areas. On the islands, C*aesio cuning* (Redbelly yellowtail fusilier) is the most economically valuable in fishers' perception due to easy caught and high marketability, while *Rastrelliger kanagurta* (Indian mackerel) is mentioned by the respondents in the mainland due to the fact that it can be processed. People perceived the diminishing of stock in JBE to be caused mainly by overexploitation that occurs in the islands and pollution in the mainland. In this study, overexploitation is mentioned as the main cause in the islands due to two factors: a rising number of fishermen, and fishing methods that use destructive gear. Pollution is the main cause of diminishing stock on the mainland due to the direct influence from the rivers and tributaries in Jakarta City. Although the stocks are declining, the fishermen still depend on the fishery. Open-mindedness and acceptance of different types of knowledge and skills are the reasons why the people in the islands have alternative livelihoods. From this study, communities in the mainland tend to be more vulnerable to the decrease in fishery resources because they have low livelihood assets, fisheries dependence with limited alternative livelihoods.

Keywords: Jakarta Bay, Seribu Islands, Fisheries dependence, Alternative livelihood

O-FR2-B12

Fishery Resources with Diversity Indices and Fishing Practice in Bilu island, Mon State, Myanmar

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Abstract

Myanmar has a long coastline approximately 2,832 km and fishery resources; marine, brackish and fresh water aquatic fauna are rich and diverse along costal of Myanmar especially in Gulf of Mottama, Mon State. They are utilized as food in many forms; dried, salted, smoked, paste, sauce, fresh state for locally consumption and also export items. The fishery resources were collected from the two fish lading sites; Sabelar and Kalwei,Bilu Island. The fishery resources caught by bagnets and drift nets were sampled at Sebalar and Kalwei twice a month at each station from September 2018 to May 2019. In Sebalar only stationary bagnets were used as the main fishing gear while it is middle size boat with drift net in Kalwei. for main catch..The specimens were randomly collected from three owners possessing 5-8 boats respectively for bagnet fishery at Sebalar and three middle size boat in Kalwei. The average catch of a single boat was calculated for diversity indexes assessment. A total of 59 species of 47 genus confined to 36 families representing 14 orders were recorded in the order Perciformes comprised 35 % of the highest catch with (13) families including (20) species .Five species of crabs and six species of shrimps and prawns were also recorded as fishery resources .The highest species number occurred at September and October for both study sites. According to Shannon-Winner index H', (1.13 – 1.63) for bagnet fishery while those of (1.07 – 2.81) in drift net fishery. The Shannon eveness (E) revealed the higher values of 0.51 in January and 0.52 for March compared with other months in bagnet fishery but the value ranges of 0.38 – 0.81 occurred in driftnet fishery. Simpson's index value (D) occurred (0.57-0.75) in bagnet fishery but (0.50 to 0.92) in drift net fishery.

Keywords: Coastline, Aquatic fauna, Bagnet, Drift net, Crab , Shrimps, Prawns, Diversity Shannon, Simpson

O-FR1-E9

Coral Community of Pulau Mertang, Johor

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Abstract

A pilot study was conducted at nine sites around Mertang islands using a modified line intercept transect method to determine the coral community of the islands. Results showed the reefs around Pulau Mertang were in good condition with an average live coral cover of 51.0%, significantly higher than the average live coral cover for Malaysia (42.5% in 2017). Hard corals were found monopolizing the benthic fauna along all transects. A total of 25 different genera from 12 families of scleractinian coral were observed during this survey. The dominant generas found at Pulau Mertang are Acropora and Montipora, while other sessile life form was dominated by zoanthids. The percentage cover of the abiotic component of transect was dominated by dead corals. Coral genus diversity was highest at Pulau Mertang Barat, followed by Pulau Mertang Timur and Pulau Mertang Tengah. All islands show low values of mortality index. This study concluded that the reefs around Pulau Mertang were still in good condition, constitutes a healthy reef, with high conservation class. The reef at Pulau Mertang is significant from an ecological point of view as it is the closest representation of an undisturbed reef of a non-marine park island in Johor. Thus, this study forms an initial step in understanding the reef community and provides a basis for future observations on the marine ecosystem of Pulau Mertang.

Keywords: Coral community, Coral cover, Coral diversity, Genera richness, Pulau Mertang

O-FR2-D10

Effectiveness of Real-Time Closure for Mobile Species in Multi-species Fisheries

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Abstract

Closure management is a common fisheries management. Most of closure decides on the area and period in advance (fixed closure). However, it's difficult to apply the fixed closure to manage mobile species because prediction of mobile species migration includes large uncertainties. Real-time closure updates the closure area based on the latest catch. Therefore, real time closure might flexibly respond to the uncertainties. This study evaluates the effectiveness of real-time closure for mobile species in multi-species fisheries with comparing to fixed closure by simulation. In this simulation, conserved species and other species were distributed and migrated on a line for simplicity. Four scenarios for the distribution and migration were prepared. To introduce the uncertainties of migration, random numbers were used in distribution and migration model. Fish outside closure were caught at fixed rate in this simulation. The simulation is conducted with 1000 iterations in each scenario. Management performance were evaluated by catch reduction of conserved species (CR) and ratio of other species catch compared to the simulation without closure (RC). The results showed that average CR in real-time closure was higher than fixed closure in most of scenarios. The average RC in real-time closure were a little lower than fixed closure in scenarios 3 and 4. However, real-time closure had less variability in results than fixed closure. Therefore, it became clear that real-time closure flexibly responded to uncertainties of migration and showed reliable closure effects. It is concluded that real-time closure would be effective for mobile species management in multi-species fisheries.

Keywords: Management strategy evaluation, Migration, Uncertainty, Species selectivity, Flexible management

O-FR2-B13

Fishing Motivations Among Students in Universiti Putra Malaysia (UPM), Selangor, Malaysia

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Abstract

This study was conducted to understand the basic socio-demographic backgrounds, fishing motivations and fishing constraints among the students of Universiti Putra Malaysia (UPM), Selangor. A set of survey questionnaire was used to collect the student's data related to fishing, with a face-to-face sampling technique. Three faculties were selected as the study areas by using a simple-random-sampling technique. The faculties selected were the Faculty of Modern Language and Communication, the Faculty of Engineering, and the Faculty of Forestry. A total of 220 students involved as respondents with a response rate of 73.3%. In terms of the students' backgrounds, most of the students are Malay (71.8%), followed by Chinese (16.8%) and Indian (10.5 %), while the male and female students comprise of 72.3% and 27.7%, respectively. Almost half of the students (47.7%) claimed that they were an angler, while the rest (52.3%) were not. The students would prefer to fish at the 'urban' fishing site (66.8%) and 'rural' site (33.2%), and would not prefer to fish at the 'remote' or 'wilderness' fishing sites. Results for the fishing motivations revealed that most students go for fishing as 'to be outdoors' (4.33±0.63), and this was followed by item 'to experience solitude and tranquillity' (4.30±2.80). In terms of constraint of fishing, the students were not able to participate in recreational fishing due to 'I have too many works and family commitments' (4.10±0.81), followed by 'I can't afford (RM) to fish more often' (3.95±0.97). The findings of this study would provide some basic information about the student anglers, which would be useful for the university's management and for the fisheries managers, to highlight this sub-group of angler's for a better management of recreational fisheries in Malaysia.

Keywords: Recreational fishing, Recreational anglers, Student anglers, Universiti Putra Malaysia

Session 3 : Nutrition and Feed

Session 3 : Nutrition and Feed

Ballroom C

November 19, 2019 (Tuesday)		
Time	**Title**	**Code**
Chairperson: Dr. Clement de Cruz		
11:00-11:30	**Refreshment and Poster Viewing**	
11:30-11:45	**Physical Properties and Nutrient Content of Fish Feed with Fermented Moringa Leaf Meal as Feed Ingredient** Senny Helmiati[a*] , Rustadi[a], Alim Isnansetyo[a] and Zuprizal[b]	O-NF-A6
11:45-12:00	**Haemato-physiological Response of Nile Tilapia (*Oreochromis niloticus*, Linnaeus, 1758) Fed with Phytochemically Enriched Formulated Diet** Jaynos R. Cortes	O-NF-B4
12:00-12:15	**Formulation of Diet Using Different Leaf Meal as Supplement to Fish Meal, Copra Meal and Rice Bran as A Plant Protein Source in Tilapia (*Oreochromis niloticus*, Linnaeus, 1758) Diets** Dominador F. Bacalso, Jr[a*], Mario S. Sinday[a] and Jaynos R. Cortes[a]	O-NF-B6
12:15-12:30	**Fish Meal Replacement by Using Alternative Ingredient in Climbing Perch, *Anabas testudineus* Diet** Dg Siti Rahayu Zaihurin[a] , Annita Yong Seok Kian[a] , Thumronk Amornsakun[b*] , Sarawuth Chesoh[c] and Nobuo Suzuki[d]	O-NF-B7
12:30-12:45	**Autolysis Production of Protein Hydrolysate from Suckermouth Armored Catfish (*Pterygoplichthys* sp.)** Rahmi Nurdiani[a]*, Asep A. Prihanto[a], and Lina Widya Sari[a]	O-NF-B8
12:45-13:00	**Impact of Fish Oil Coated Feed to Growth and Energy Mobilization of Nile Tilapia (*Oreochromis niloticus*) Juvenile under Different Lipid Level and Feeding Frequency** Tan Chee Ping[a*], Mok Wen Jye[a,b], and Liew Hon Jung[c]	O-NF-B9
13:00-14:00	**Lunch**	

Chairperson: Dr. Kamarul Zaman Zarkasi		
14:00-14:15	**Evaluation of Rubber Seed Oil as A Dietary Lipid Source for Nile Tilapia** Muhammad Agus Suprayudi[a]*, Andika Gumilang Kushayadi[a], Dedi Jusadi[a], and Ichsan Achmad Fauzi[a]	O-NF-B10
14:15-14:30	**Effect of Environmental Probiotics on the Growth Performance of the Juvenile Tiger Grouper (*Epinephelus fuscugottatus*)** Sharifah Noor Emilia[a]*, Mohd Fitri Bin Md Razak[a], Syarah Norjanisa Mat Jani[a], Siti Nur Syuhada binti Othman[a] and Noor Syazwani binti Omar[a]	O-NF-E6
14:30-14:45	**The Role of β-Glucan in Improving Growth and Feed Utilization of White Leg Shrimp (*Litopenaeus vannamei*)** Pham Duy Hai[a*], Vo Dai Khang[b], Tran Van Khanh[a], Le Hoang[a], and Nguyen Van Nguyen[a]	O-NF-D1
14:45-15:00	**Evaluation of Rice Bran Protein Concentrate as Soybean Meal Replacement in Practical Diets for Juvenile Black Tiger Shrimp, *Penaeus monodon* (Fabricius, 1798)** Fredson H. Huervana[a]*and Dr. Rex Ferdinand M. Traifalgar[a]	O-NF-D3
15:00-15:15	**Effects of Dietary Nucleotides on Growth, Survival and Metabolic Response in Whiteleg Shrimp, *Litopenaeus vannamei* against Ammonia Stress Condition** Mok Wai Yee[a], Annita Yong Seok Kian[a*], Mohammad Tamrin Mohamad Lal[a], Rossita Shapawi[a], and Yang-Su Kim[b]	O-NF-D6
15:15-15:30	**Sugarcane Juice is A Potential Feeding Attractant for Mud Crab, *Scylla tranquebarica* as Determined Behaviourally** Kit-Shing Liew[a*], Leong-Seng Lim[a], Annita Seok-Kian Yong[a] and Gunzo Kawamura[a]	O-NF-D7
15:30-15:45	**Effect of Different Inclusion Level of Arachidonic acid (ARA) from Fungi *Motirella* sp. on Female Reproductive Performance of Malaysian Giant Freshwater Prawn, *Macrobrachium rosenbergii*** Saadiah Ibrahim[a*], Mhd Ikhwanuddin[b], Chaiw Yee Teoh[c], Zainoddin Jamari[d] and Wing Keong Ng[e]	O-NF-D10
15:45-16:00	**Dietary Protein Requirement of Juvenile Blue Swimming Crab, *Portunus pelagicus*** Nurul Anisah Abd Hamid[a], Mohd Salleh Kamarudin[a,b*] and Aziz	O-NF-E1

	Arshad[a,b]	
16:00-16:15	**The Growth and Survival of the Blue Swimming Crab (*Portunus pelagicus*) on Three Local Feeds** Restiana Wisnu Ariyati[a*], Yoni Trienes[b], Sri Rejeki[a], Lestari Lakhsmi Widowati[a], and Roel H. Bosma[b]-	O-NF-E2
16:15-16:30	**Suitable Feed For First Feeding of the Mud Crab Larvae, *Scylla tranquebarica*** Noorsyarinah Sanudin[a] and Annita Yong Seok Kian[a]*	O-NF-E3
16:30-17:00	**Refreshment and Poster Viewing**	

November 20, 2019 (Wednesday)		
Time	**Title**	**Code**
Chairperson: Dr. Wam Nurul Nadiah Wan Rasdi		
10:00-10:30	**Refreshment and Poster Viewing**	
10:30-10:45	**The Effect of Different Feed Types on Growth, Survival and Reproduction of Rotifer *Brachionus plicatilis*** Nadiah W. Rasdi[a*] Umar Shaari [a] and Mhd Ikhwanuddin[b]	O-NF-E5
10:45-11:00	**Cannibalism and Naupliar Development of Marine Harpacticoid Copepod *Euterpina acutifrons*** Woraporn Tarangkoon[a,b*] Wachirapan Kongnuan[b] and Suwat Tanyaros[a,b]	O-NF-E7
11:00-11:15	**Enrichment of Freshwater Zooplankton *Moina micrura* with Probiont Isolated from Microalgae** Nur Amalina Samat[a], Fatimah M. Yusoff[b], Chong Chou Min[b] and Murni Marlina Karim[a,b*]	O-NF-E9
11:15-11:30	**Haloarchaea as Dietary Source for the Brine Shrimp *Artemia*** R.M.A. Lopes-dos-Santos[a*], Marleen De Troch[b], Peter Bossier[a] and Gilbert Van Stappen[a]	O-NF-D9
11:30-11:45	**Utilization of Bio-Organic Fertilizer and Agro-Industry Residue for Culture of Cladocerans, *Moina macrocopa* and a Copepod, *Oithana* sp. as a Potential Live Food Species** Amirah Yuslan [a], Nadiah W. Rasdi[a*], Hidayu Suhaimi[a] and Mhd Ikhwanuddin[b]	O-NF-C3

11:45-12:00	**Effect of Salinity and Nutrition on the Development of Wild Algae in *Artemia* Production Site at the Mekong Delta-Viet Nam** Tran Huu Le[a*], Nguyen Thi My Chi[a] and Nguyen Van Hoa[a]	O-NF-A5
12:00-12:15	**An Investigation on Morphology, Daily Growth Form and Life Cycle of Brine Shrimp *Artemia* sp. using Different Kinds of Feeding** Wint Yee Paing[a*]	O-NF-D4
12:15-12:30	**The Effect of Nutrition Quality and Growth Performance of Nile Tilapia With Natural Feeding of *Daphnia magna* Mass Cultured using Organic Wastes Based on Fermentation Time Difference** Vivi Endar Herawati[a]*, Johannes Hutabarat[a], Pinandoyo[a], YS Darmanto[b], Nurmanita Rismaningsih[c], and Ocky Karnaradjasa[d]	O-NF-B2
12:30-12:45	**Microbial Community Diversity Associated with the Shrimp Gut in Relation to the Melanin as a Feed Additive by the *in vitro* Growth** Kamarul Zaman Zarkasi[a*], Kong Suet Kei[a], Nurul Syakirah Mohamad Suhaimi[a] and Darah Ibrahim[a]	O-NF-D2
12:45-13:00	**Characterization of the Relationships between Dietary Taurine and Physiological Response of Juvenile Totoaba Using Saturation Kinetic Model** Tony Budi Satriyo[a,b*], Mario A. Galaviz[b], Guillaume Salze[c], and Lus M. López[b]	O-NF-E4
13:00-14:00	**Lunch**	
Chairperson: Dr. Clement de Cruz		
14:00-14:15	**Growth Performance of Koi-carp (Cyprinidae) under Probiotic-based Culture System** Anik M. Hariati[a*], DGR. Wiadnya[b], A. Yuniarti[a], and Endaryani[c]	O-NF-B11
14:15-14:30	**Survival and Expression of Immune Related Gene in Rainbow Trout, *Oncorhynchus mykiss* Pre-fed Dietary Arginine, Ornithine, and Citrulline Supplementation upon Challenge with *Vibrio anguilarum*.** Ichsan Achmad Fauzi[a]*, Yutaka Haga[b], Hidehiro Kondo[c], Ikuo Hirono[c],and Shuichi Satoh[b]	O-NF-B5
14:30-14:45	**Comparison of the Growth Performance and Survival Rate of Empurau Post Fries Mixed with Hoven's Carp and Silver**	O-NF-A3

	Barb Post Fries in Different Aquaponics Systems using Lacto-sacc Supplemented Feed Sharifah Lia Farliana Binti Wan Alias[a] and Mohammad Bodrul Munir[a*]	
14:45-15:00	**Effect of Various Media on the Spore Production of *Bacillus* sp. Indigenous Aquatic** Ating Yuniarti[a], Iftitah Laili[a], Nasrullah Bai Arifin[a] and Anik M. Hariati[b]	O-NF-A4
15:00-15:15	***Chlorella* Addition Affects Bioflocs Physical and Biochemical Characteristics and its Utilization by African Catfish and Giant Prawn** Julie Ekasari[a*], Utomo Adi Nugroho[a], Nurul Fatimah[a], Pande Gde Sasmita Julyantoro[b] and F.M.I. Natrah[c]	O-NF-A2
15:15-15:30	**Evaluation of the Nutritive Value of Seaweed Protein Concentrate as a Sustainable Feed Ingredient in the Diets of *P. monodon*** Carl John Saromines[a,b*] and Rex Ferdinand Traifalgar[a]	O-NF-D5
15:30-15:45	**Effect of algal food and salinity on the spat rearing of hatchery-produced green mussel *Perna viridis*** Josel F. Cadangin[a*], Fiona L. Pedroso[a], Mary Jane A. Amar[a], Donna C. Rendaje[a], Lily Anne G. Piñosa[a] and Jean Rose H. Maquirang[a]	O-NF-E10
15:45-16:15	**Poster Viewing**	

O-NF-A6

Physical Properties and Nutrient Content of Fish Feed with Fermented Moringa Leaf Meal as Feed Ingredient

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Abstract

Moringa oleifera Lam. has been widely studied as an alternative protein source in fish diets and seems to be a promising protein source. This study was conducted to determine of fermented Moringa leaf meal as a replacement for fish meal in feed formulations based on nutrient content and physical properties (floatability, water stability, durability and pellet density). Five diets namely feed A (10% of unfermented Moringa leaf meal as a replacement for fish meal) as control, feed B (0% of fermented Moringa leaf meal as a replacement for fish meal), feed C (10% of fermented Moringa leaf meal as a replacement for fish meal), feed D (20% of fermented Moringa leaf meal as a replacement for fish meal) and feed E (30% of fermented Moringa leaf meal as a replacement for fish meal) were formulated. Physical test parameter of the fish feed was analyzed using analysis of variance and Dunnet test with a test level of 5%, while data on nutrient content were analyzed descriptively. The result showed that concentration 20% of fermented Moringa leaf meal as a replacement for fish meal was significantly affect to the water stability of fish feed. The nutrient contents of feeds range from 27.24$\pm$1.39 to 31.32$\pm$1.43% for protein, 13.25$\pm$0.12 to 15.41$\pm$3.08% for moisture, 13.74$\pm$0.07 to 15.87$\pm$0.11% for fat, 10.65$\pm$0.25 to 13.16$\pm$0.03% for ash, 3.09$\pm$0.31 to 5.44$\pm$0.41% for crude fiber, 38.48$\pm$0.35 to 42.65$\pm$1.68% for carbohydrate 4.75$\pm$0.53 to 6.11$\pm$0.56% for calcium and 0.96$\pm$0.00 to 1.86$\pm$0.07% for phosporus.

Keywords : nutrient content, physical properties, fish feed, fermented Moringa leaf meal

O-NF-B4

Haemato-physiological Response of Nile Tilapia (*Oreochromis niloticus*, Linnaeus, 1758) Fed with Phytochemically Enriched Formulated Diet

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Abstract

An experiment was conducted to determine the haemato-physiological response of Nile Tilapia (*Oreochromis niloticus*) fed with phytochemically enriched diets. This was carried out for 90 culture days using four treatments where three out of four were seaweed supplemented diets (*Kappaphycus alvarezii, Ulva reticulata, Sargassum muticum*). Treatments were distributed with the following: Treatment I (Control), Treatment II (*K. alvarezii*), Treatment III (*U. reticulata*), and Treatment IV (*S. muticum*). In the growth performance, Treatment I reached the highest final mean weight and length while lowest in Treatment IV. Survival rate was found highest in Treatment II and lowest in Treatment IV. In the case of GSI and HSI, Treatment I achieved the highest values while lowest in Treatment IV. The maximum SSI value was achieved by treatment III while it was least achieved by Treatment IV. In condition factor, Treatment IV classified as fair fish, while the rest of the Treatments attained the excellent condition. In the gonadal development, 27.27% are at Stage I (Immature) while 38.64% are at Stage II (Maturing I), 20.45% Stage III (Maturing II) and 13.64% reached Stage IV (Mature). As to haematological response, Treatment III had the highest count of White Blood Cell while lowest in Treatment II. Red Blood Cell counts were found highest in Treatment and least counted in Treatment IV. Treatment I had the highest count of platelet while lowest in Treatment IV. The physico-chemical parameters of water such as temperature and pH fell within the tolerable limits for *O. niloticus* culture.

Keywords: *Oreochromis niloticus*, physiological response, haematological response, gonadal maturity, seaweed extracts

O-NF-B6

Formulation of Diet Using Different Leaf Meal as Supplement to Fish Meal, Copra Meal and Rice Bran as A Plant Protein Source in Tilapia (*Oreochromis niloticus*, Linnaeus, 1758) Diets

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Abstract

Feeding trials using formulated diets supplemented with different leaf meals were conducted to evaluate the growth and survival performance of Tilapia *Oreochromis niloticus* stocked in 15 experimental units of Styrofoam boxes under laboratory condition for 30 culture days. There were three treatments in triplicate manner. Experiment employed a Completely Randomized Design. The performance of the diets were evaluated after 30 days of culture based on the growth and Survival rate of the tested fish. Treatment fed with the river tamarind *Leucaena leucocephala* leaf meal obtained highest Average Body Weight of 13.92 grams, followed by Treatment fed with Horseradish *Moringa oleifera* leaf meal with an ABW of 12.20 grams and the least was in Treatment fed with water spinach, *Ipomoea aquatica* of 7.30 grams. Specific growth rate was better in Treatment fed with river tamarind *Leucaena leucocephala* followed by the 2 Treatments. Survival rate was best in Treatments I and II with 100% and low in Treatment III with 54.29%. Water parameters were all in tolerable limits, fluctuations were minimal that the tested fish can still grow and survive normally. The *Oreochromis niloticus* both growth and survival rate revealed significantly different among the treatments means. Further analysis made and found out that Treatment II had differed significantly for growth and survival rate.

Keywords: Different leaf meals, Formulated diets, Plant protein source, *Oreochromis niloticus*, Supplement

Fish Meal Replacement by Using Alternative Ingredient in Climbing Perch, *Anabas testudineus* Diet

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Abstract

An eight weeks experiment was carried out to investigate the effect of fish meal replacement by using the alternative ingredient in climbing perch, *Anabas testudineus*. The experiment was conducted in 15 cages total with a density of 30 tails in each starting with the body weight of 0.62±0.15 g (Mean±SD, n=450). The ingredient used were fish waste by-product (FWP). Five different treatments were tested. As a control, the commercial pellet was used and the other four treatments were formulated according to the level of fish meal replacement (0%, 25%, 50%, and 75%). All formulated feeds containing 40%, 10% for crude protein and crude lipid respectively. All treatments were randomly design and triplicate. As a result, fish fed with 0% of fish meal replacement diet demonstrated significant higher weight gain (WG) compared to other fish fed with fish waste supplemented diet ($P<0.05$). Meanwhile, there is no significant different difference in total length (TL) from control diet and up to 25% of fish meal replacement ($P>0.05$). In this trial, 100% of survival were observed in all treatment. As for the feed conversion ratio (FCR), fish fed with 0% fish meal replacement diet performed better FCR compared to other diets ($P<0.05$). Survival did not influence by the diet. In conclusion, fish fed 0% fish meal replacement demonstrated higher in WG, TL, and FCR. Fish meal replacement with a level of 25% and above with fish waste by-product poorer in growth performance but suggested level of fish meal replacement was only up to 25% by using FWP.

Keywords: Fish waste by-product, Alternative ingredient, Fish meal replacement, Climbing perch, *Anabas testudineus*

O-NF-B8

Autolysis Production of Protein Hydrolysate from Suckermouth Armored Catfish (*Pterygoplichthys* sp.)

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Abstract

Suckermouth armored catfish (*Pterygoplichthys* sp) was underutilized and considered as invasive species. This fish is rich in protein and has potency as source of nutritious fish protein hydrolysate (FPH). The aim of this research was to observe the effect of hydrolysis condition (pH and hydrolysis duration) on the characteristics of suckermouth armored catfish (*Pterygoplichthys* sp) protein hydrolysate. The samples were hydrolyzed by endogenous enzymes under different pH (5, 7, 9) and hydrolysis duration (12hr and 24hr) at room temperature. The antioxidant activity, yield, degree of hydrolysis (DH), and amino acid content of FPH were observed. The degree of hydrolysis (DH) differed significanty ($P<0.05$), ranging from 22,08 ± 1,77% to 40,67 ± 1,19%. The highest yield (57,39 ± 0,17%) and antioxidant activity (63,99 ± 0,62%.) was observed on fish protein hydrolyzed at pH 9 for 24hr. *Pterygoplichthys* sp protein hydrolysate was high in lysine, glutamic acid and glysine. The data obtained indicate that extracted fractions from *Pterygoplichthys* sp likely have high nutritional value and could find a potential use in food formulations.

Keywords: Autolysis, Suckermouth armored catfish, Fish Protein Hydrolysate, Antioxidant

O-NF-B9

Impact of Fish Oil Coated Feed to Growth and Energy Mobilization of Nile Tilapia (*Oreochromis niloticus*) Juvenile under Different Lipid Level and Feeding Frequency

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Abstract

A five-week two factorial experiment was setup to investigate the effects of different daily feeding frequency (2 or 4 times per day) and variable lipid level (3%, 5%, and 7%) of fish oil coated feed on the growth and physiology of Nile tilapia (*Oreochromis niloticus*) juvenile. Fish of 4.5±1.3 g were equally stocked into 6 individual 120 L capacity recirculating aquaculture system (RAS) at a rate of 25 fish per tank. Fish were fed daily at 3% of their body weight. Growth parameters were assessed weekly and at week 5, fish from each treatment were randomly selected for osmorespiration assay, biochemical composition and fatty acids analysis. Generally, fish fed at 4 times daily had slightly better relative weight gain (RWR), and specific growth rate (SGR) and feed conversion ratio (FCR), than those fed twice a day. However, their protein and glycogen in muscle and liver were significantly lower ($p<0.05$) compared to fish ate twice a day. Additional lipid in feed (5% and 7%) caused significantly higher ($p<0.05$) lipid storage in liver compared to 3% feed but had no effects in muscle. Elevated feeding frequency improved growth, but energy storage suffered because of poorer digestion arose from more rapid movement of food through the gastrointestinal tract. This suggests that elevated feeding frequency may not be ideal for juvenile tilapia nutritional profiles which may later influence growth out performance. In conclusion, varying daily feeding frequency may had greater influence over different lipid content in feed in the growth and physiology aspects of juvenile tilapia.

Keywords: Fatty acids, feed nutrition, fish physiology, recirculating aquaculture system (RAS), Tilapia

O-NF-B10

Evaluation of Rubber Seed Oil as A Dietary Lipid Source for Nile Tilapia

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Abstract

Rubber seed is an agro-industrial by product, which is native to tropical regions and has been considered underutilized. Rubber seed is high in protein and oil, but also contains considerably high anti-nutritional factor. One of its derivative products, rubber seed oil (RSO), is potential to be used as a new lipid source for aquaculture diet. It is rich in essential fatty acids in particular linoleic acid (40.1%) and linolenic acid (17.6%), which are higher than those of other vegetable oils such as palm oil and corn oil. However, rubber seed oil contains an anti-nutritional factor in particular hydrogen cyanide (HCN). HCN is classified into heat labile, therefore, heating could effectively reduce the HCN content. The present study elucidated the use of processed and unprocessed rubber seed oil as a dietary lipid and essential fatty acids source for Nile tilapia. The use of unprocessed rubber seed oil resulted in adverse effects on the fish growth performance, mostly caused by the high level of HCN in the diet. On the other hand, when it was processed, rubber seed oil can be used to replace corn and palm oils in Nile tilapia diet.

Keyword: Rubber seed oil, Nile tilapia, lipid source, essential fatty acids

O-NF-E6

Effect of Environmental Probiotics on the Growth Performance of the Juvenile Tiger Grouper (*Epinephelus fuscugottatus*)

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Abstract

Epinephelus fuscugotattus was a famous fish species in local and international restaurants because delicious in taste and can only be found in certain areas in Asia including Malaysia. However, this species is forgotten because the slow growth performance and introduction of hybrid grouper accelerate breeders moving into new species. The goal of this study is to determine the ability of environmental probiotics *Shewanella* sp., *Bacillus* sp., and *Serratia* sp. increase the growth performance of juvenile tiger grouper *Epinephelus fuscoguttatus*. Here, we provided two treatments: treatment and control, each treatment has three replicates. Experimental fish food is provided by 2% of fish body weight by introduce amount of bacteria by using spray method in every meal consumed per day is 10^8CFU/day. Results showed that the average daily gain (ADG), mean weight (MW), and specific growth rate (SGR) of juvenile *Epinephelus fuscoguttatus* group fed with probiotics *Shewanella* sp., *Bacillus* sp., and *Serratia* sp. were significantly higher compare to the control diet group. Meanwhile, the feed conversion ratio (FCR) of these three experiments were significantly lower than control group. The survival rate (SR) was 100% for Experiment A. These results showed that probiotics *Shewanella* sp., *Bacillus* sp., and *Serratia* sp. have the ability to enhance growth performance of juvenile Tiger Grouper and bring profit to farmers by shorten the cultivation period and the rate of consumption of food.

Keywords: *Bacillus* sp; *Shewanella* sp; *Serratia* sp.; high survival; total length

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O-NF-D1

The Role of β-Glucan in Improving Growth and Feed Utilization of White Leg Shrimp (*Litopenaeus vannamei*)

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Abstract

Investigation of the effects of β-glucan supplement in the diets on growth performance and feed utilization of white leg shrimp was the aim of the present study. The experiment was set up to consist of six treatments with three replicates, including of a base diet (M-O) without containing β-glucan supplement, four test diets (M-A, M-B, M-C, M-D) comprising with increasing levels of β-glucan and a positive control diet contained a commercial β-glucan (COG) product (M-E). White leg shrimp juveniles, initial body weight of 0.15 g/shrimp, were fed experimental diets containing graded levels of β -Glucan at 0, 250, 500, 750, 1000 ppm and 500 ppm of commercial β –Glucan for 60 days. The results indicated that the greater growth obtained (7.21 and 7.23 g) at shrimp fed 1000 ppm β - Glucan diet (M-A) and 500 ppm COG diet (M-E), respectively while the lowest growth and poorest feed efficiency observed at the non-supplemented β-Glucan diet (6.54 g and FCR: 1.43). Furthermore, there were no any significant differences in growth and feed utilization of shrimp recorded among the test diets containing 250, 500, 750 mg/Kg. The findings indicated that β-Glucan is a promising feed additive for improving growth and feed efficacy of white shrimp.

Keywords: β-glucan, white leg shrimp, diet, growth performance, feed utilization.

O-NF-D3

Evaluation of Rice Bran Protein Concentrate as Soybean Meal Replacement in Practical Diets for Juvenile Black Tiger Shrimp, *Penaeus monodon* (Fabricius, 1798)

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Abstract

The potential of rice bran protein concentrate as an alternative protein source to soybean meal in practical diets for juvenile black tiger shrimp, *Penaeus monodon*, was assessed. This feed ingredient was tested in a feeding trial designed to replace soybean meal protein in the diets of *P. monodon* at 0%, 25%, 50%, 75% and 100%. Five isonitrogenous diets were formulated to contain 44% protein. Fifteen juveniles (0.47 ± 0.002 g) were randomly assigned in twenty 60-l rectangular tanks equipped with a recirculating seawater system and fed ad libitum for 50 days. Results show no significant differences ($P>0.05$) among the treatments in terms of weight gain, daily feed intake, feed conversion ratio (FCR), protein efficiency ratio (PER), specific growth rate (SGR) and survival. Also, there were no significant differences in whole body composition (dry matter, protein, lipid, ash) of shrimp fed with different levels of rice bran protein replacement. This feed material was found to be highly digestible with apparent dry matter (ADMD) and protein (APD) digestibility coefficients at 83.05 ± 0.02% and 87.20 ± 0.30%, respectively. The essential amino acids were found to be complete with essential amino acid index (EAAI) of 84 and amino acid chemical score index (ACSI) of 25 with tryptophan as the limiting amino acid. Collectively the data suggest that rice bran protein concentrate could replace dietary soybean meal protein at 100% without affecting the growth performance and biochemical composition of *P. monodon*. Rice bran as by product of the rice industry is produced in large quantities in Southeast Asian countries and the utilization of rice bran protein concentrate as feed ingredient is considered a renewable and eco-friendly approach to attain a sustainable production of *P. monodon* in the ASEAN region.

Keywords: Rice bran protein concentrate, *Penaeus monodon*, soybean meal, alternative protein

Effects of Dietary Nucleotides on Growth, Survival and Metabolic Response in Whiteleg Shrimp, *Litopenaeus vannamei* against Ammonia Stress Condition

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Abstract

This trial was conducted to evaluate the effects of nucleotides on growth of whiteleg shrimp, *Litopenaeus vannamei*, and the survival and metabolic responses to ammonia stress test. Experimental diets were high fish meal diet (HFMD), low fish meal diet (LFMD), and five LFMD test diets, each supplemented with 0.1% guanosine monophosphate (GMP), 0.1% inosine mono-phosphate (IMP), 0.1% mixture of GMP and IMP, 0.1% mixture of GMP, IMP, uridine monophosphate (UMP) and cytidine monophosphate (CMP), and a yeast extracted commercial product. The shrimp specimens (initial body weight, 0.99±0.01g) were randomly distributed into 7 groups and fed four times daily for 8 weeks. After the trial, final body weight was recorded and haemolymph was withdrawn for haematological analysis. The shrimp was then challenged with 70mg/L ammonia (LC50) for 10 days. Survival and haemolymph of the shrimp were taken after exposure to ammonia. The highest growth performance was observed in the shrimp fed diet supplemented with GMP ($P<0.05$), while survival was not influenced by the test diets in the feeding trial. In the ammonia challenge test, the highest survival was observed in the shrimp fed GMP supplemented diet compared to others. The plasma protein, glucose, and cholesterol levels increased in all the treatments while triglycerides level decreased post challenge. Cortisol level recovered at day 10^{th} after the challenge. Shrimps fed with nucleotides diets showed higher protein and glucose level compared to control groups post challenge. In general, nucleotides supplemented in the diet enhanced growth, improved stress resistance while modulating the hemolymph metabolites in *L. vannamei* under ammonia stress.

Keywords: dietary nucleotides, metabolic response, ammonia stress, whiteleg shrimp, *Litopenaeus vannamei*

O-NF-D7

Sugarcane Juice is A Potential Feeding Attractant for Mud Crab, *Scylla tranquebarica* as Determined Behaviourally

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Abstract

Feeding attractant can promote feed intake of the farmed animals. Portunid crabs are sensitive to saccharides. Sugarcane, a cheap and cultivated crop in Malaysia, is rich in saccharides. The present study examined the potential of sugarcane juice as feeding attractant for the mud crab, *Scylla tranquebarica*. Two behavioural assays, the (1) threshold test, and (2) feeding attractant test were conducted on 42 individuals of *S. tranquebarica*, obtained from the Shrimp Hatchery of Borneo Marine Research Institute. The threshold test was conducted by pipetting different concentrations (0.01, 0.1, 1, 10, 50, & 100%) of sugarcane juice to the crabs, and the threshold that stimulates their positive feeding responses (antennular flicking and mouthpart movement) was determined. In the feeding attractant test, the crabs were fed with the chopped fish and squid, without or with 15 minutes immersion in different concentration levels of sugarcane juice at 5, 25, 50, and 100%. The number of crabs that approached to each feed type were recorded. From Test 1, the threshold of sugarcane juice to trigger the positive feeding response in the crabs was determined at 0.3%. In Test 2, squids treated with 50% and 100% of sugarcane juice, attracted significantly higher number of crabs (paired t-test, $P<0.05$) than the non-treated squid. Although the crabs were attracted by the fish treated with 100% of sugarcane juice, the number was not significantly higher ($P>0.05$) than that provided with the non-treated fish. Based on these outcomes, it was concluded that sugarcane juice is a potential feeding attractant for the *S. tranquebarica*.

Keywords: Portunids, chemo-sense, sugars, feeding, behavioural assay.

O-NF-D10

Effect of Different Inclusion Level of Arachidonic Acid (ARA) from Fungi *Motirella sp* on Female Reproductive Performance of Malaysian Giant Freshwater Prawn, *Macrobrachium rosenbergii*

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Abstract

A 50-day feeding trial was conducted to determine the optimal level of dietary arachidonic acid (ARA) to improve gonad development in female giant freshwater prawn, *Macrobrachium rosenbergii*. Four experimental maturation diets using different inclusion level of ARA: 0, 1, 2 and 3 % were formulated and processed, namely 0_ARA, 5_ARA, 10_ARA and 15_ARA. The results for gonad development in terms of the average gonadosomatic index (GSI) for broodstock fed with diet 0_ARA,5_ARA,10_ARA and 15_ARA were 2.51±0.53, 2.21±0.50, 2.68±0.40 and 2.26±0.52, respectively. Although no significant different detected, the GSI for broodstock fed diet 10_ARA with the value of 2.68±0.40 is numerically higher than others. Total percentage of ovarian stages III, IV and V for prawn broodstock fed with diets 0_ARA,5_ARA,10_ARA and 15_ARA were 34, 30, 51 and 35, respectively. Meanwhile, the hepatosomatic index showed increasing value with the increasing level of dietary ARA with the value of 4.30 ±0.30, 4.84 ± 0.30, 4.97 ±.31 and 5.10 ±0.30. The results indicated that diet 10_ARA gave better gonad development and diet 15_ARA showed negative effect. Thus, 10% ARA of total fatty acid is the optimal dietary level for gonad development of freshwater giant prawn.

Keywords: Arachidonic acid, gonadonosomatic index, maturation diet, *Macrobrachium rosenbergii*

O-NF-E1

Dietary Protein Requirement of Juvenile Blue Swimming Crab, *Portunus pelagicus*

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Abstract

An experiment was conducted to determine the optimal dietary protein requirement for juvenile blue swimming crabs (*Portunus pelagicus*). Five isoenergetic (18 kJ g^{-1}) diets were formulated to contain graded levels of protein, 30, 35, 40, 45 and 50% and the juveniles were fed twice daily at 4% of body weight for 30 days. Crabs were individually housed in 500 ml plastic containers at 10 containers per replicate in completely randomised design. All treatments were triplicated. The results indicated that dietary protein had a significant effect ($P<0.05$) on weight gain, specific growth rate (SGR), feed conversion ratio (FCR) and protein efficiency ratio (PER) of the juvenile crabs. The highest weight gain and SGR were attained at 50% dietary protein. FCR and PER became significantly better when the dietary protein increased from 30% to 50%. The best FCR (1.01) was achieved at 50% dietary protein level. Crude protein content in whole-body significantly increased with increase of dietary protein levels. Juvenile crabs fed with 50% protein had the highest protein content in whole-body than those fed with the other diets. This study indicated that 50% protein was the best dietary level for juvenile blue swimming crabs.

Keywords: *Portunus pelagicus*, growth, juveniles, nutrition, protein requirement

O-NF-E2

The Growth and Survival of the Blue Swimming Crab (*Portunus pelagicus*) on Three Local Feeds

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Abstract

Due to the growing popularity of the blue swimming crab (*Portunus pelagicus*) its fishery catches have increased since the early 1950s. Aquaculture of *P. pelagicus* might be an alternative for fisheries and reduce the pressure on the overexploited stock. *P. pelagicus* is reported to be a species with high fecundity, relative ease of hatchery production, relatively short larval duration, and fast growth rate. However, knowledge about possible feed preferences of juvenile and adult *P. pelagicus*, and feed-use efficiency is limited. The objective of this study was to compare the efficiency of three locally available feeds for farming *P. pelagicus*. One hundred sixty (160) juvenile *P. pelagicus* were divided over 20 circular tanks, based on size classes, and the four feed treatments: (Diet A) Shrimp pellets + flesh of Asian green mussel (*Perna viridis*), (Diet B) Shrimp pellets + fresh *Acetes indicus*, (Diet C) Shrimp pellets (100%), (Diet D) Shrimp pellets (150%). Although no significant difference was observed in survival rate there is a significant difference in the effect of three local feed as the main diet for the growth of crab. Diet A gave high specific growth rate and feed conversion ratio as well as diet D but the feed cost of diet A was significantly higher compared to those of diet B, C and D. The eFCR and the feed cost were significantly different between the diets, but the FCR_{DM} was not. Shrimp pellets seem to be a suitable and stable diet for the culturing of juvenile blue swimming crabs.

Keyword. Indonesia, Aquaculture, Feed, crab juveniles.

O-NF-E3

Suitable Feed For First Feeding of the Mud Crab Larvae, *Scylla tranquebarica*

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Abstract

Poor quality of feed is one of the factors that caused high mortality in mud crab larval rearing. The present study was conducted to find the suitable feed for first feeding of mud crab larvae, *S. tranquebarica*. Larvae were introduced with enriched rotifer, newly hatched *Artemia* or a mixed of enriched rotifer and newly hatched *Artemia.* Rotifer was enriched with five types of enrichment including live and digested *Nannochloropsis* sp. (4 X 10^7 cells/mL), live and digested *Tetraselmis* sp. (7.5 X 10^5 cells/mL), and a commercial product. Triplicate groups of newly hatched larvae stocked at 30 individual/L were subjected to these treatments until they moulted into zoea 2 (Z2) stage. Results showed that larvae fed with only rotifer enriched with live *Nannochloropsis* sp. exhibited the highest survival (93.33±9.43%). Larvae fed exclusively on enriched rotifer showed relatively higher survival than those fed with mixed feeding. There was no significant difference observed on the growth and larval stage index for larvae fed exclusively with enriched rotifer and mixed feeding. Meanwhile, larvae fed exclusively with newly hatched *Artemia* showed the poorest survival, growth and stage index. The results suggested that enriched rotifer should be provided as a first feed to the newly hatched larvae.

Keywords: Mud crab larvae, Enriched rotifer, Newly hatched *Artemia*, First feeding

O-NF-E5

The Effect of Different Feed Types on Growth, Survival and Reproduction of Rotifer *Brachionus plicatilis*

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Abstract

Brachionus plicatilis are also called as 'living capsule', which can provide nutrient and act as one of the most important starter feeds use for proper development of marine fish larvae and crustacean. This study compared the effects of giving four different types of feed with microalgae as a control diet (yeast, palm kernel cake, chicken manure and *Nannochloropsis* sp.) with different levels of concentrations (0.004g/L, 0.008g/L and 0.012g/L) on the growth, survival and reproductive performance (offspring production, life span, pre-oviposition, oviposition, post-ovipostion, egg produced per female and production time of egg) of rotifer *B. plicatilis*. Each feeding treatment were tested with triplicates and the experiment were carried out for 10 days. The growth, survival and reproductive performance (e.g. offspring production) were evaluated to assess the responses of *B. plicatilis* to different feed types with different levels of concentrations. Population growth and survival of rotifers were not significantly affected ($P = 0.686$, $P = 0.340$; $P > 0.05$) when fed with all the diets with different amount of concentrations. The highest population growth (126.45 ± 84.53 ind mL-1; $P > 0.05$) and survival (23.9 ± 1.6 ind/mL; $P > 0.05$) of rotifer were recorded when fed with yeast at the concentration of 0.012g/L. The reproductive performance (offspring production) of rotifers depended on food type ($P = 0.003$; $P < 0.05$). Higher offspring production of rotifers was recorded when fed with chicken manure at the concentration of 0.008g/L (1.84 ± 0.10 egg/female/day; $P < 0.05$), followed with yeast, palm kernel cake and *Nannochloropsis* sp. (control diet) at the concentration 0.012g/L (1.83 ± 0.10 egg/female/day, 1.66 ± 0.35 egg/female/day, 1.78 ± 0.10 egg/female/day; $P< 0.05$).This indicates that, different types of feed and manipulations of concentration in the diets are effective strategies to replace microalgae in rotifer culture.

Keywords: marine zooplankton, *Bracionus plicatilis*, dietary treatments, feed concentrations, growth, survival, reproduction

O-NF-E7

Cannibalism and Naupliar Development of Marine Harpacticoid Copepod *Euterpina acutifrons*

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Abstract

The effect of adult density on cannibalism toward newly hatched nauplii and naupliar development of marine harpacticoid copepod *Euterpina acutifrons* were determined experimentally in laboratory conditions. The experiments were carried out under the conditions of 25±1°C and 12L: 12D light cycle. During the experiment, the culture vessels were added with mixed of *Isochrysis galbana* and *Chaetoceros calcitrans* at an initial concentration 3×10^5 cells•ml^{-1} (1:1 density/density) as feed for *E. acutifrons*. Seven adult densities (10^3, 2×10^3, 3×10^3, 4×10^3, 5×10^3, 10^4 and1.5×10^4 individuals·L^{-1}) were set for cannibalism experiment. Each treatment consisted of fives replicates. Cannibalism of adult toward nauplii was monitored over 8 hours. From experimentation, the results showed that the highest survival of nauplii *E. acutifrons* was found at the lowest adult density of 10^3 individuals•L^{-1} in comparison with other treatment ($p<0.05$). The naupliar development times of *E. acutifrons* varied from 9.93 to 5.96 days (mean±SD 4.60 ±0.53 days). Nauplii size was monitored over 5 days after hatched, ranged from 90.8 to 182.3 µm in length.

Keywords: Cannibalism, *Euterpina acutifrons*, Naupliar development

O-NF-E9

Enrichment of Freshwater Zooplankton *Moina micrura* with Probiont Isolated from Microalgae

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Abstract

A study was conducted to investigate the effects of different probiont concentrations consisting of *Lysinibacillus fusiformis* A1, *Bacillus* sp. A2, *Lysinibacillus fusiformis* Cl3, and *Bacillus pocheonensis* S2 on the enrichment of tropical cladoceran, *Moina micrura*. Population density, specific population growth rate and mean body size increment of *Moina* were studied. The highest population growth rate was produced in culture supplemented with CFU ml^{-1} of probiont S2 when the population density reached > 260 individuals $30ml^{-1}$. Similarly, the highest population growth rate of *Moina* produced by probiont A1 and A2 were at CFU ml^{-1} when population density reached > 160 individuals $30ml^{-1}$. In the case of probiont Cl3, the highest growth rate was produced in culture supplemented with CFU ml^{-1} when the population density reached > 240 individuals $30ml^{-1}$. The growth rate in culture supplemented with CFU ml^{-1} of probiont A1, A2 and S2 were significantly lower than the control group (no probiont added). These results suggested that the increased in population density of *Moina* does not depend on the concentrations of probiont supplied and high amount of probiont supplementation is unnecessary for *Moina* enrichment.

Key words: probiont, *Moina micrura*, zooplankton, enrichment

O-NF-D9

Haloarchaea as Dietary Source for the Brine Shrimp *Artemia*

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Abstract

Archaea have been the most overlooked and enigmatic of the three domains of life for decades. It was not until recently that their extremely rich diversity and widespread distribution began to be recognized. Knowledge of key ecological interactions such as trophic links between this domain and higher-level organisms remains extremely limited. The co-occurrence of halophilic Archaea (haloarchaea) and the non-selective filter feeder, the brine shrimp *Artemia*, a universally used live food organism in larval aquaculture, constitutes an excellent opportunity to unravel the ecological role of the Archaea domain as a source of food to metazoans. In the present study, we combine the use of haloarchaea biomass assimilation experiments using ^{13}C stable isotope labelling as biomarker, with gnotobiotic *Artemia* culture tests using haloarchaea mono-diets to investigate potential trophic links. Our results demonstrated the ability of *Artemia* to assimilate nutrients from mono-diets of haloarchaea and is therefore the first to prove the role of Archaea in the diet of a filter-feeding zooplankton organism. This suggests that Archaea are part of the food web of hypersaline aquatic ecosystems where *Artemia* lives. Moreover, it suggests that, in addition to phytoplankton and bacteria, this group of microorganisms may be taken up and assimilated by higher organisms in other aquatic ecosystems, which has direct relevance for especially larval stages in aquaculture.

Keywords: *Artemia*, Haloarchaea, larval aquaculture

O-NF-C3

Utilization of Bio-Organic Fertilizer and Agro-Industry Residue for Culture of Cladocerans, *Moina macrocopa* and a Copepod, *Oithana* sp. as a Potential Live Food Species

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Abstract

In aquaculture, the advantages of using live feed include their superior dietary value, elevated digestibility, motion patterns that cause powerful feeding reaction, tiny size, and merely being part of the natural food chain. The objective of this study was to determine the enhancement of nutrient quality and production of cladocerans (*Moina macrocopa*) and copepod (*Oithana* sp.) using various algae, bio-organic fertilizer and agro-industry residue as culture medium for cultivation. This study was conducted using completely randomized experimental design with five treatments (*Chlorella*, soybean meal, rice bran, swiftlet waste and unenriched live feed) and three replications. Bio-organic fertilizer used were: swiftlet waste; agro-industry residue (rice bran and soybean meal) was cultured for 15 days. The growth of population density and survival rate of *Oithana* spp. and *M. macrocopa* were significantly affected by different enrichment used ($P = 0.016$, $P = 0.011$; $P < 0.05$), ($P = 0.001$, $P = 0.004$; $P < 0.05$). In terms of productivity, the hatching time and hatching rate of *Oithana* spp. and *M. macrocopa* were also significantly affected by the different diet used ($P = 0.006$, $P = 0.008$; $P < 0.05$), ($P = 0.055$, $P = 0.094$; $P < 0.05$). The fastest hatching time and the highest hatching rate were recorded by *Oithana* spp. and *M. macrocopa* when fed with rice bran (1.90 ± 0.02 days; 84.01 ± 6.02%), (1.57±0.10 days; 90.84±5.63%). The present results indicated that different food types provided to *Oithana* spp. and *M. macrocopa* in this study are comparable to other food commonly given to these zooplanktons as all dietary treatments yield beneficial outcomes on development, growth, survival, and reproduction. Thus, the present results revealed that *Oithana* spp. and *M. macrocopa* cultured on bio-organic fertilizer and agro-industry residue which invariably reduces the high cost of expensive algae feed for live feed has an outstanding food potential and a probable substitute for *Artemia* in aquaculture industry.

Keywords: *Oithana spp., Moina macrocopa,* live food, bio-organic fertilizer, agro-industrial residue, growth, productivity.

O-NF-A5

Effect of Salinity and Nutrition on the Development of Wild Algae in *Artemia* Production Site at the Mekong Delta-Viet Nam

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Abstract

This study was conducted with aim to determine the best salinity and nutrition for optimum growth of wild algae for Artemia farming in Vinh Chau salt-field (Mekong Delta, Vietnam). The experiment was designed with two factors and 9 treatments and three replicates each under laboratory condition, including three salinities (i.e. 20‰, 40‰, 60‰, respectively) and three culture media i.e. (1) Traditional fertilizer as control (Urea: 3 mg/L and DAP: 1 mg/L); (2) recommended fertilizer (Urea: 39,6 mg/L and DAP: 1 mg/L); (3) Walne medium: 2ml/L, respectively. After 7 days of the experiment, the result showed that in salinity of 20‰ and recommended fertilizer treatment (Urea: 39,6 mg/L and DAP: 1 mg/L) showed the best growth and density of 10,1±1,8 x 10^6 tb/mL algae and statistically significant differences compared to other treatments.

Keywords: algae, salinity, traditional fertilizer, formulated fertilizer, Walne medium.

O-NF-D4

An Investigation on Morphology, Daily Growth Form and Life Cycle of Brine Shrimp *Artemia* sp. using Different Kinds of Feeding

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Abstract

The morphology, daily growth form and life cycle of brine shrimp, *Artemia* sp. were determined by using different kinds of feeding such as dried algae, yeast, rice bran and formulated diet (shrimp meal) in the laboratory culture conditions. As the results, the optimum survival rate for *Artemia sp.* was observed in feeding of rice bran followed by some other feeds such as *Spirulina* dry powder, yeast and formulated diet (shrimp meal). However, that of high fraction of water-soluble components cannot be ingested by the brine shrimp *Artemia* sp. and interfere with the water quality of culture medium as well. The effects of feeding on the morphology and daily growth forms of brine shrimp were also presented.

Keywords: *Artemia* sp., brine shrimp, *Spirulina*,

O-NF-B2

The Effect of Nutrition Quality and Growth Performance of Nile Tilapia With Natural Feeding of *Daphnia magna* Mass Cultured using Organic Wastes Based on Fermentation Time Difference

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Abstract

Daphnia magna is the best natural feed for Nile tilapia larvae aquaculture. Its nutrition quality and production depend on culture media. The purpose of this study was to find an increase in production and nutritional quality of tilapia fed by *D. magna* based on organic waste fermentation time in culture media. This study was conducted by using completely randomized experimental design with five treatments and three replications. Feeding treatment was using *D. magna* mass-cultured in culture media contained chicken manure, quail manure, goat manure, rejected bread, and tofu waste fermented by probiotic bacteria which cultured for 0, 7, 14, 21, and 28 days. Providing *D. magna* feed mass-cultured using 50g/L of chicken manure, 100g/L of rejected bread, and 50g/L of tofu waste fermented for 28 days and given four times a day on tilapia larvae giving final weight of 2.58 g, relative growth rate of 19.98%, biomass weight of 2.72 g; survival rate of 98.55%; NPU of 1.90% and protein efficiency ratio of 2.95%.The best nutritional quality was in the same treatment with the highest value on fatty acid profile at linoleic acid which was 9.36%, and amino acid profile at lysine which was 32.19ppm. In general, the content of ammonia, Dissolved Oxygen, temperature, and pH value during the study were in the good range for *D. magna*. The conclusion is the provision of mass-cultured *D. magna* feed using 50g/L of chicken manure, 100g/L of rejected bread and 50g/L of tofu waste fermented for 28 days giving the best results.

Keywords: *D. magna*, Fermentation time, Larvae, Nutrient value, Production

O-NF-D2

Microbial Community Diversity Associated with the Shrimp Gut in Relation to the Melanin as a Feed Additive by the *in vitro* Growth

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Abstract

In order to better understand microbial changes within the shrimp gut system as determined at the dietary level, the microbial community diversity was assessed within a simple in vitro growth model system. In this system the growth and composition of bacteria were monitored within diet slurries held under aerobic and anaerobic conditions inoculated with shrimp faecal samples. This system was assessed using total viable bacteria counts (TVC), culture-dependent microbial enumeration and 16S rRNA gene sequencing analysis. A total of 2 complete diets of melanin added (ML) and commercial standard (CS) were tested, and the in vitro model cultures were incubated at 30˚C to simulate tropical water temperature. TVC data indicated that most bacteria that grew were marine bacteria and normally associated with the shrimp gut system. While, microbial identification and 16S rRNA sequencing data revealed there was clear separation between the commercial diet and melanin added diet suggesting bacteria that grew were distinct. The sequencing analysis showed in the case of the commercial diet, the genera of *Micrococcus*, *Enterobacter*, *Vibrio* and *Photobacterium* became greatly predominant. While, for melanin added diet as feed additive was shows that the genera of *Micrococcus*, *Yersinia*, *Photobacterium* and *Arthobacter* were dominant. Based on replicated experiments conducted in this study, there was evident stochasticity of what exact specie became dominant. *Micrococcus* and *Vibrio* may have become predominant due to their rapid growth capacity and normally found in shrimp gut system. The clear separation of microbial community diversity between commercial standard and melanin added diet suggesting there is a potential for melanin as shrimp feed additive. Furthermore, the in vitro model system could be used to test impact of feed additives formulations on shrimp gut system as well as fish gut microbial communities.

Keywords: in vitro model, 16S rRNA sequencing, melanin, shrimp, microbial diversity

O-NF-E4

Characterization of the Relationships between Dietary Taurine and Physiological Response of Juvenile Totoaba Using Saturation Kinetic Model

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Abstract

Although many aspects of the role of taurine on physiology and metabolism remain to be elucidated in fish species, several studies describe that taurine-deficient diet induces physiological abnormality. Taurine deficiency occurs in fish species because of the limited ability to synthesize it and the lack of natural taurine sources from the diet. In order to interpret the nutrient-response relationship, it is necessary to use an appropriate statistical model. Saturation kinetic model (SKM) has been proposed to describe the nutrient-response relationship to overcome the limitations of linear model. The objective of this study was to evaluate an appropriate statistical model which represents the relationship between dietary taurine and physiological response of juvenile totoaba. Experimental diets consisting of the graded levels of taurine were formulated. Response data were evaluated using five regression models, including three linear models (linear, logarithmic and quadratic) and two nonlinear models (4-SKM and 5-SKM). The accuracy of fitting nonlinear models were applied and the curves were fitted using NLIN Procedure of SAS University Edition. Model selection was performed using the coefficient of determination statistics (R^2) and sum of square error (SSE). Interesting results were observed that apparent digestibility coefficient (ADC) of lipid and gallbladder-somatic index showed the same trend. Both response parameters were best modeled by 4-SKM. Saturation kinetic model is the most suitable model to describe nutrient-response relationships in juvenile totoaba fed with different taurine levels.

Keywords: dietary taurine; lipid digestibility; saturation kinetic model (SKM); nonlinear model; juvenile totoaba

Growth Performance of Koi-carp (Cyprinidae) under Probiotic-based Culture System

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Abstract

Koi-Carp is of economically important species of ornamental fish in Indonesia. Because of its numerous colors and color combinations, the koi has grown into one of the most popular pet hobbies in the world. Feed is a limiting factor as the operational cost of this reaches almost 60%. Therefore, the increasing price of commercial feed will narrow the business margin. This objective of this activity was to improve the efficiency of feed by using probiotics as a starter in the carp culture under bio-floc system and to reduce the high cost of commercial feed. Aquaculture activities were undertaken at 15 ponds (the average area of 32 m^2) with stocking density of 30 fish per m^2. The 15 ponds were divided into three treatments i.e. two types of probiotics and control (without probiotic). Probiotic used in this study were single and consortia of microbes. During the 60 days culture period, fish fed with 3-5% pelleted feed per day. Water qualities were monitored bi-weekly. Survival rate, growth performance, production (fish grade based on body shape, brightness and pattern), and feed efficiency, were calculated at the end of the culture period. The result of the experiment such as average survival rate ranging from 90-95%, growth rate 2.5 to 4.4%bw d^{-1}, production (fish grade: A, B and C) were ranging from 3-7%, 10-20% and 70-80%, respectively. Feed efficiencies 50-80%. Under the experimental conditions, consortia probiotic had a synergistic effect on enhancing SR and grade of koi ($P<0.05$). The consortia of probiotic gave the best performance based on growth, feed efficiency and grade quality of fish.

Keywords: ornamental fish, fish grade, feed efficiency, biofloc

O-NF-B5

Survival and Expression of Immune Related Gene in Rainbow Trout, *Oncorhynchus mykiss* Pre-fed Dietary Arginine, Ornithine, and Citrulline Supplementation upon Challenge with *Vibrio anguilarum*.

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Abstract

Previously, rainbow trout fed dietary supplemented arginine demonstrated higher plasma ornithine, and lower plasma citrulline after 18 hours post-prandial. However, arginine degradation through urea cycle is also reported and consequently reduce arginine availability. Thus, to avoid excessive arginine degradation and to better understand the role of arginine metabolites, this research was aimed to evaluate the effect of dietary supplementation of ornithine and citrulline on resistance of rainbow trout against Vibrio anguillarum. Juvenile rainbow trout was reared in 60 L recirculating system equipped with central thermostat. Dietary treatment was consisted of control diet (CTRL), formulated to have 47 % protein and 15 % lipid level, while treatment diets were made by supplementing control diet with 2% l-arginine (ARG), l-ornithine (ORN), and l-citrulline (CIT). Fish fed twice a day, 6 days a week, for 30 days feeding period. After 30 days, fish were then injected peritoneally with of Vibrio anguillarum that was diluted with phosphate-buffered saline at 3.0 x 106 CFU per fish. At 1-day post injection, RNA of 5 fish per tanks was extracted for quantitative-real-time PCR analysis. Result demonstrated a better growth performance in ARG compared to CIT, while there is no significant difference found between CTRL with other treatments. Higher iNOS expression along with higher arginine availability in plasma and kidney was found in CIT treatment. Furthermore, a better survival respond was observed in CIT treatment compared to CTRL.

Keywords: iNOS, Arginase, functional amino acids, postprandial plasma, renal arginine

O-NF-A3

Comparison of the Growth Performance and Survival Rate of Empurau Post Fries Mixed with Hoven's Carp and Silver Barb Post Fries in Different Aquaponics Systems using Lacto-sacc Supplemented Feed

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Abstract

Inappropriate knowledge, technology and feeding management practice are the constraints in sustainable empurau fish production in Sarawak. This study was designed to compare the growth performance and survival rate of empurau (***Tor tambroides***) post fries mixed with hoven's carp (***Leptobarbus hoevenii***) and silver barb (***Barbonymus gonionotus***) in individual and combined three aquaponics (e.g. nutrient film technique, media bed and deep water) systems using lacto-sacc(R) AllTech supplemented feed. A total 75 fish post fries (15 empurau - mean initial weight 16.22 g± 0.17; 30 hoven's carp- mean initial weight 9.46 g± 0.05; 30 silver barb- mean initial weight 12.26 g± 0.11) were raised in each aquaponic system (total 8) on a 40% protein and 12% lipid containing 1% Lacto-Sacc(R) AllTech supplemented diets with a non-supplemeted control for 12 weeks while the post fries were fed to satiation two times daily. The growth performance was significantly ($P<0.05$) highest in individual nutrient film technique followed by individual deep water, combined three aquaponics and individual media bed aquaponic system. In these aquaponics systems, the post fries of all the studied fishes in lacto-sacc supplemented diets were significantly ($P<0.05$) were better than control. No mortality was recorded in lacto-sacc supplemented feed. Feed conversion ratio and protein efficiency ratio were differ in species-wise but signifcantly ($P<0.05$) lower than the control. This study was first time attempt to indicate the suitability of different aquaponics systems and lacto-sacc supplemented feed for the growth performance and survival rate of empurau post fries mixed with other two fishes post fries.

Keywords: Aquaponics, Empurau, Hoven's carp, Lacto-sacc, Silver barb

O-NF-A4

Effect of Various Media on the Spore Production of *Bacillus* sp. Indigenous Aquatic

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Abstract

This research was aimed to evaluate the effect of various media on the spore production, sporulation efficacy and spore germination of *Bacillus* sp indigenous aquatic. Various media used in this study were *Difco Sporulation Medium* (DSM), *Chemically Define Sporulation Medium* (CDSM), *Double* DSM, *Synthetic Replacement Sporulation Medium* (SRSM 1), SRSM 2 dan dextrose media. Fermentation was carried at 37^{o}C in a 120 rpm incubator shaker for 120 hours. The C:N ratio of various medium used ranged from 1-20. The results of this study showed that the various medium effected the spore production, sporulation efficacy and spore germination of *Bacillus* sp. The highest growth rate of vegetative cells was found in Double DSM medium, while the lowest one was in SRSM 1 medium. The production of *Bacillus* spore was in line with the number of their vegetative cells. During the fermentation period, the first spore production was revealed at the thour of 12. The highest production of *Bacillus* spore ($2.23x10^{8}\pm$ 0.03 spore.ml^{-1}) was also found in double DSM medium. On the other hand, the lowest *Bacillus* spore production was also detected in SRSM1 medium ($0.28x10^{8}\pm$ 0.03 spore.ml^{-1}). The best sporulation efficacy in this study was about 73% with Double DSM medium. Spore of *Bacillus* sp germinated without delay in all media.

Keywords: C:N ratio, sporulation efficacy, spore germination, probiotic.

O-NF-A2

Chlorella Addition Affects Bioflocs Physical and Biochemical Characteristics and its Utilization by African Catfish and Giant Prawn

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Abstract

The utilization of bioflocs as a food source for aquaculture species is one of the factors that determine the success of nutrient utilization efficiency in biofloc systems. The level of bioflocs nutrient utilizations is determined by the level of consumption and the level of nutrients retained by the cultured organisms. The consumption of bioflocs particles strongly depends on its physical characteristics such as its particle size and settleability, whereas the retention of bioflocs nutrients is affected by the nutritional profile of the bioflocs. Thereby, more efforts should be made to improve the functionality of biofloc as a food source for the cultured organisms in order to optimize overall nutrient utilization efficiency in biofloc systems. This study reported the effect of *Chlorella* addition on bioflocs physical and biochemical characteristics and bioflocs utilization by African catfish *Clarias gariepinus* and freshwater prawn *Macrobrachium rosenbergii*. The addition of *Chlorella* resulted in different biofloc characteristics. Floc volume, settleability and particle size were significantly increased by the addition of *Chlorella*. Furthermore, the addition of *Chlorella* in biofloc-based African catfish and freshwater prawn nursery culture could improve the consumption of biofloc. The growth of these species were generally higher than that of the control with and without *Chlorella* addition. In conclusion, the addition of *Chlorella* could improve the physical and nutritional characteristics of bioflocs as a food source and could positively contribute to the growth performance of African catfish and freshwater prawn.

Keywords: African catfish, bioflocs, *Chlorella*, fatty acids, freshwater prawn

O-NF-D5

Evaluation of the Nutritive Value of Seaweed Protein Concentrate as a Sustainable Feed Ingredient in the Diets of *P. monodon*

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Abstract

To address the shortage of cheap and sustainable feed-protein ingredient for aquaculture, this study developed *Gracilariopsis heteroclada* protein concentrate (GHPC) and evaluated its nutritional value as a replacement to soybean meal protein in the diet of black tiger shrimp, *Penaeus monodon*. Five isonitrogenous and isolipidic diets were formulated replacing soybean meal protein at 0% (control), 12.5%, 25%, 50% and 75%. Results showed that the developed GHPC has a protein, lipid, fiber and carbohydrate content of 31.11±0.12%, 1.57±0.61%, 1.87±0.31% and 24.99±0.33%, respectively. The nutritional value of GHPC was found high, exhibiting an ingredient digestibility index of 91.84 ± 0.06% and Essential Amino Acid Index (EAAI) of 0.996. Feeding trial results revealed that the overall growth performance, feed assimilation efficiency and biochemical composition of the shrimp fed with the 50% GHPC diet were similar to the control group fed with full soybean meal based-diet. The high acceptability of this feed ingredient to *P. monodon* is attributed to its high digestibility and adequate content of essential amino acids. However, shrimps fed with replacement levels beyond 50% exhibited significant growth depression that might be due to the presence of antinutritional compounds as observed with the reduction of digestive enzyme activities and histomorphological changes (B-cell enlargement). Collectively, the findings suggest that GHPC has high nutritional value and could be used as a plant protein ingredient in the diet of *P. monodon*. Utilization of GHPC is a sustainable approach to meet the growing requirements of feed-proteins in the expansion of *P. monodon* aquaculture.

Keywords: *Gracilariopsis heteroclada*, macroalgae, growth performance, acceptability, Utilization

O-NF-E10

Effect of Algal Food and Salinity on the Spat Rearing of Hatchery-produced Green Mussel *Perna viridis*

Josel F. Cadangin[a]*, Fiona L. Pedroso[a], Mary Jane A. Amar[a], Donna C. Rendaje[a], Lily Anne G. Piñosa[a] and Jean Rose H. Maquirang[a]

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Abstract

Bivalve nursery permits gradual adaptation of newly-settled spats from the hatchery to the natural conditions of the grow-out culture causing a reduction on mortality from predation or dislodgement from the substrate. However, rearing should be done quickly as it increases production cost. Hence, in this study, two factors such as diet and salinity were evaluated to check their effects on growth and survival of spats. Three species of tropical microalgae fed either as single- or mixed-species were investigated to determine their food value for hatchery-produced green mussel spats. The haptophyte alga *Isochrysis galbana*, diatom *Chaetoceros calcitrans* ,and prasinophyte alga *Tetraselmis tetrahele* were used in this study. Green mussel is euryhaline in nature, however for effective spat rearing optimum salinity level should be determined, thus the effects of various salinity levels from 10-40 ppt were similarly investigated. The results showed that during the nursery stage *C. calcitrans* and *I. galbana* fed as single-species promoted significantly better growth than *T. tetrahele*. When fed with mixed-species, trialgal mixture resulted in a higher growth rate and survival compared to bialgal combinations. Among the bialgal mixtures, diets containing *C. calcitrans* exhibited better growth on mussel spats. This suggests that spats grew best when an EPA-rich algal food like *C. calcitrans* is provided in the diet.Further, it was revealed that spats had significantly better growth and survival when reared at 25-30 ppt. Overall, it is recommended to feed mixtures of algal food with *C. calcitrans* for the nursery culture of green mussel spats at 25-30ppt to achieve faster growth.

Keywords: algae, bivalve nursery, environmental factor, nursery culture

Session 4 : Aquatic Animal Health

Session 4 : Aquatic Animal Health

Ballroom A
**Oral session held at Bunga Raya Room concurrently with Antimicrobial Resistance special session in Ballroom A2*

November 19, 2019 (Tuesday)		
Time	**Title**	**Code**
Chairperson: Dr. Shumpei Iehata		
11:00-11:30	**Refreshment and Poster Viewing**	
11:30-11:45*	**White Syndrome Disease at Foliose Coral *Echinopora lamellosa* at Nature Reserve Island Sempu** Oktiyas Muzaky Luthfi[a*], Elda Pebrizayanti[a] and M. Arif As'adi[a]	O-AH-F1
11:45-12:00*	**First Report of *Pyragraphorus hollisae* On Silver Pompano *Trachinotus blochii* By Using Scanning Electron Microscope (SEM) In Indonesia** Nizar Ramadhan[a], Sri Subekti[a*] and Setiawan Koesdarto[a]	O-AH-E6
12:00-12:15*	**Morphometric and Molecular identification of *Gyrodactylus sprostonae* in warm water fishes of Guilan Province (North of Iran)** Javad Daghigh Roohi[a], Abdolhossein Dalimi[b*], and Mohammad Pourkazemi[c]	O-AH-E1
12:15-12:30*	**Epidemiological Studies of Parasites and Histopathology of Duck Grouper Cultivated in the Sunda Strait Waters** Muhammad Kholiqul Amiin[a], Hervina Benadzir Ardiyanti[a] dan Sri Subekti[b,c]*	O-AH-E2
12:30-12:45*	**Morphological Profile of L3 and L2 *Anisakis* on Little Tuna (*Euthynnus affinis*) and Indian Mackerel (*Rastrelliger***	O-AH-E4

	***kanagurta*) from Fish Auction Sedati, Sidoarjo using Scanning Electron Microscope (SEM)** Nikita Suryani[a], Sri Subekti[b]* and Setiawan Koesdarto[c]	
12:45-13:00*	**Probiotics Bacteria as Quorum Sensing Degrader in Controlling Pathogenicity of Bacteria in Aquaculture** Noor Syazwani Omar[a]*, Muhd Danish Daniel Abdullah[a], Natrah Fatin Mohd Ikhsan[b], Shumpei Iehata[a], and Sharifah Noor Emilia[a]	O-AM-D9
Chairperson: Assoc Prof. Dr. Natrah Fatin Mohd Ikhsan		
11:30-13:00	**Antimicrobial Resistance Special Session**	
13:00-14:00	**Lunch**	
Chairperson: Assoc. Prof. Dr. Ina Salwany Md Yasin		
14:00-14:15	**Growth-inhibiting Effect towards *Streptococcus agalactiae* Isolated from Red Tilapia (*Oreochromis* sp.) by Herbal Extracts** Nguyen Thi Ngoc Tinh[a*], Nguyen Thi Truc Quyen[b], Doan Van Cuong[a], Nguyen Diem Thu[1], Ma Tu Lan[a], Tran Hoang Bich Ngoc[a], and Nguyen Thanh Nhan[a]	O-AH-A1
14:15-14:30	**Oral Administration Of Na-Alginate Stimulates The Innate Immune System And Enhances The Resistance Of Catfish Against *Aeromonas hydrophila*** Alim Isnansetyo[a*], Ahmad Husein[a], Septiawan Dhani Anggoro[a] and Murwantoko[a]	O-AH-A2
14:30-14:45	**Virulence Genes Profiling and Pathogenicity of *Streptococcus agalactiae* Isolated from Tilapia *Oreochromis niloticus* Farms in Indonesia** Sukenda Sukenda[a*], Achmad Suhermanto[a,b], Muhammad Zairin Jr[a], Angela Mariana Lusiastuti[c], Sri Nuryati[a], and Dendi Hidayatullah[a]	O-AH-A3
14:45-15:00	**Dietary Application of Madeira Vine (*Anredera cordifolia*) Leaves Powder for the Prevention of Motile Aeromonas Septicemia in African Catfish *Clarias gariepinus***	O-AH-A4

	Dinamella Wahjuningrum[a*], Iqbal Wijaya[a], Julie Ekasari[a], and Shavika Miranti[b]	
15:00-15:15	**Dietary Supplementation of Fulvic Acid for the Prevention of Heavy Metals Accumulation in Nile Tilapia Fed with Diets Containing Green Mussel Meal** Dedi Jusadi*, Tulas Aprilia, Mia Setiawati, Muhammad Agus Suprayudi, and Julie Ekasari	O-AH-A5
15:15-15:30	**Current Status of Koi Herpesvirus (KHV) in Koi and Common Carp (*Cyprinus carpio*) in Northern Vietnam: Epidemiology, Diagnosis and Prevention Suggestions** Truong Dinh Hoai[a]*, Kim VanVan[a], Dao Le Anh[b], Nguyen Thi Huong Giang[b], Vu Duc Manh[a], Nguyen Van Tuyen[a], and Nguyen Thi Lan[b]	O-AH-A6
15:30-15:45	**Effects Of Dietary Supplementation Of Medical Herb Extracts On The Innate Immunity of Red Tilapia (*Oreochromis* sp.)** Nguyen Quoc Khanh[a], and Tran Thi Tuyet Hoa[b*]	O-AH-B1
15:45-16:00	**Effect of Sodium Chloride and Temperature on Biofilm Production of *Flavobacterium columnare* and Their Virulence to Striped Catfish (*Pangasianodon hypophthalmus*)** Nguyen Thi Kim My*, Dong Thanh Ha, and Tu Thanh Dung	O-AH-B2
16:00-16:15	**Estimation of Antibiotic Use, Diagnosis and Treatment Costs Due to Vibriosis in Asian Sea Bass Using Stochastic Model** Norhariani Mohd Nor,[a]* Siti Hajar Mohd Yazid[a], Hassan Mohd Daud[,b,c] , Mohammad Noor Amal Azmai[d,e] and Nurliyana Muhammad[e]	O-AH-E3
16:15-16:30	**Identification of Bacterial Isolates and Hematological Analysis of Catfish (*Pangasius pangasius*) of Manually and Hematology Analyzertools at Balai Benih Ikan Penataan, Pasuruan, East Java** Maftuch[a]*, Rifqi Dian Arianto[b], Moh. Awaludin Adam[b,c], A.	O-AH-B4

	Nurcholis[e], and Edy Wijayanto[f]	
16:30-17:00	**Refreshment and Poster Viewing**	
Chairperson: Dr. Sharifah Noor Emilia		
17:00-17:15	**Development of Indirect Enzyme-linked Immunosorbent Assay for Selection of Whole Cells Antigen of *Vibrio* and *Photobacterium* as Vaccine Cancidates in Mariculture** Indah Istiqomah*, Murwantoko and Alim Isnansetyo	O-AH-F2
17:15-17:30	**The Impact of the Catecholamine Stress Hormones Norepinephrine and Dopamine on the Virulence of Aquaculture Pathogenic *Vibrio campbellii*** Pande Gde Sasmita Julyantoro[*]	O-AH-F3
17:30-17:45	**Development of Multi-strain Probiotic as Disease Resistance Tools for Fish Culture** Puvaneswari Puvanasundram[a], Chong Chou Min [a,b], Suriana Sabri[c], Md. Sabri Yusoff [d] and Murni Marlina Abd Karim [a,b*]	O-AH-F4
17:45-18:00	**Antibacterial Activity of Some Herbal Extracts against Fish Pathogenic Bacteria** Le Kim Ngoc[a]* and Tran Thi Tuyet Hoa[b]	O-AH-B3

November 20, 2019 (Wednesday)		
Time	**Title**	**Code**
Chairperson:Assoc. Prof. Dr. Mohammad Noor Amal Azmai		
10:00-10:30	**Refreshment and Poster Viewing**	
10:30-10:45	**Effects of *Psidium guajava* Extract On Selected Enzymes and Stress Resistance of Striped Catfish Fingerling Stage *(Pangasianodon hypophthalmus)*** Dang Ngoc Lan Hoa*, Tran Thi Phuong Hang, Pham Ngoc Nhu, Nguyen Thanh Phuong and Do Thi Thanh Huong	O-AH-B5
10:45-11:00	**Morphological Variability and Molecular Prospecting Reveal Species Complexes of Subgenus *Acanthosentis* (Acanthocephala: Quadrigyridae) from Tinfoil Barb Fish, *Barbonymus schwanenfeldii* in Kenyir Lake, Terengganu, Malaysia**	O-AH-B6

	Surzanne, M.A[a*]., Tun Nurul Aimi, M.J.[b],Norainy, M.H.[a], Mohd Ihwan, Z.[a] Wahidah, W.[a] and Marina, H[a]	
11:00-11:15	**Maternal Immunity of Tilapia Broodstock Given Polyvalent Vaccine *Streptococcus agalactiae* and Resistance in Their Offspring** Fitriana Sari Nurani[a], Sukenda Sukenda[b*], and Sri Nuryati[b]	O-AH-B7
11:15-11:30	**Fungal Infection in Snakehead fish, *Channa striata* (Bloch, 1793)** Khin Mar Kyi[a*], Hendrik Stolz[b], Khin Thuzar Win[a], Saw Marlar Than[a], and Kay Lwin Tun[a]	O-AH-B8
11:30-11:45	**The New Pathogenic *Aeromonas diversa* Isolated from Walking Catfish** Dini Siswani Mulia[a], Alim Isnansetyo[b*], Rarastoeti Pratiwi[c], and Widya Asmara[d]	O-AH-B9
11:45-12:00	**Efficacy of Feed-based Polyvalent Vaccine against *Streptococcus agalactiae, Aeromonas hydrophila* and *Vibrios* spp. in Asian Seabass (*Lates calcarifer*)** Aslah Mohamad[a], Mohammad Noor Azmai Amal[a,b], Mohd-Zamri Saad[a,c] and Ina-Salwany Md. Yasin[a,d*]	O-AH-B10
12:00-12:15	**Effect of Temperature on the Activity of Crude Protease Enzymes *Bacillus pumilus* from Anchovy Isolates (*Stolephorus* sp.)** Dwitha Nirmala[a*], Happy Nursyam[b] and Dwi Cahyanto[b]	O-AH-E7
12:15-12:30	**Histopathology of *Vibrio alginolyticus* In Green Mussel, *Perna Viridis,* Treated with Phage** Laith A. A[a*], Nurhafizah W.W.I[a], Ros-Amira M. K[a], Hassan I. Sheikh[a], Effendy A.W.M[a,] and Najiah Musa[a]	O-AH-E8
12:30-12:45	**Histopathological Study in Green mussel (*Perna viridis*) Infected with *Vibrio aginolyticus* After Oral Introduction to Probiotic, *Pediococcus pentosaceus*** Ros Amira Farahana Mohd Khair[a], Mohammad Tajuddin Abdul Manaf[a], Najiah Musa[a],and Laith A. Abdul Razzak[a*]	O-AH-E9
12:45-13:00	**Culture-independent Detection and Quantification of *Vibrio cholerae* in Shellfishes** Sharon N. Nuñal[a*], Karmelie Jane Monaya[a], and Sheila Mae S. De Leon[b]	O-AH-E10

13:00-14:00	**Lunch**	
Chairperson: Assoc. Prof Dr. Murni Marlina		
14:00-14:15	***In vivo* Expression of Quorum Sensing Master Regulator *luxR* and AHPND Virulence Genes in *Vibrio parahaemolyticus* and *Vibrio harveyi* Concerning Their Virulence towards *Penaeus vannamei* (Boone, 1931)** Sarmila Muthukrishnan[a], I. Natrah[a,b] , Mohamed Shariff[b], Ina-Salwany M. Y[a,b], and Fatimah Md Yusoff[a,c]	O-AH-C3
14:15-14:30	**Occurrence of Microsporidian Parasite *Enterocytozoon hepatopenaei* (EHP) in Whiteleg Shrimp, *Litopenaeus vannamei* from North Region in Malaysia** Rohaiza Asmini Yahya*, Kua Beng Chu and Wan Muhammad Hazim Wan Sajiri	O-AH-D2
14:30-14:45	**Status of Acute Hepatopancreatic Necrosis Disease in *Litopenaeus vannamei* from the Northern States of Peninsular Malaysia** Padilah B.*, Kua B.C., Rohaiza, A.Y., Wan Rozana, W.A., Wan Hazim, W.S. and NurAshikin, A.	O-AH-D3
14:45-15:00	**Correlation between Blood Glucose Level and Ectoparasites Infestation Level of White Shrimp (*Litopenaeus vannamei*) on Culture System with Different Stocking Densities and Maintenance Time** Gunanti Mahasri[a*], Laksmi Sulmartiwi[b] and Siti Hamidah[c]	O-AH-D5
15:00-15:15	**Microbial Diversity of Shrimp Gut Harvested from Infected Pond and Uninfected Pond** Muhammad Faiz Abdul Kuthoose[a*] and Kamarul Zaman Zarkasi[a]	O-AH-D6
15:15-15:30	**Characterization of Bacterial Communities Associated with Black Tiger Shrimp (*Penaeus monodon*) at Early Life Stages** Pacharaporn Angthong[a], Tanaporn Uengwetwanit[a], Sopacha Arayamethakorn[a], Panomkorn Chaitongsakul[b], Nitsara Karoonuthaisiri[a] and Wanilada Rungrassamee[a*]	O-AH-D7
15:30-15:45	**Antiparasitic Activity of a Medicinal Plant against the Marine Leech *Zeylanicobdella arugamensis* (Hirudinea)** Balu Alagar Venmathi Maran*, Muhammad Dawood Shah, Ching FuiFui, Mohammad Tamrin Mohammad Lal, Raffidah Binti Othman and Rossita Shapawi	O-AH-D9

15:45-16:00	**Gills and Hepatopancreas Histopathological Evaluation in Giant Freshwater Prawn, *Macrobrachium rosenbergii* Exposed to Methanolic Extract of Gelam, *Melaleuca cajuputi* Leaves** Nur Amanina Hamdan[a], Mohamad Badrul Mohamad Khairul Sahimi[a], Mohd Effendy Abd Wahid[b,c], Anur Melad Nagi[d], and Marina Hassan[a,e*]	O-AH-D10
16:00-16:30	**Refreshment and Poster Viewing**	
Chairperson: Dr. Chong Chou Min		
17:00-17:15	**Application Probiotics Of *Bacillus* And *Pseudomonas* Towards Survival Rate And Total Vibrio In Digestive Tract And Culture Media Of White Shrimp (*Litopenaeus vannamei*)** Woro Hastuti Satyantini[a*], Rosyda Rizkia Budiarti[b], Adiana Monica Sahidu[c] and Daruti Dinda Nindarwi[a].	O-AH-C1
17:15-17:30	**Detection of White Spot Syndrome Virus (WSSV) from Wild Crustaceans in Myeik, Tanintharyi Region, Myanmar** Yu Wai Hlaing[a*], Hendrik Stolz[b] and Kay Lwin Tun[c]	O-AH-C2
17:30-17:45	**Microspordian Parasite *Enterocytozoon hepatopenaei* (EHP) Infection in Potential Animal Vectors from Shrimp (*Litopenaeus vannamei*) Cultivating Ponds** Wan Muhammad Hazim Wan Sajiri[b*], Muhammad Hafiz Borkhanuddin[a] and Kua Beng Chu[b]	O-AH-D1
17:45-18:00	**Diversity of *Vibrio* species' in *Penaeus monodon* Cultured in South-West Farming Region of Bangladesh and Their Antibiotic Resistance Patterns** Mohammad Shamsur Rahman*, Md. Mostavi Enan Eshik, Nusrat Jahan Punom and Mst Khadiza Begum	O-AH-C4

O-AH-F1

White Syndrome Disease at Foliose Coral *Echinopora lamellosa* at Nature Reserve Island Sempu

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Abstract

Coral reef at nature reserve Pulau Sempu has been provided food for marine biota and became of livelihood for fishermen who living at coastal nearby. Coral reef at this island can be found in periphery of island and concentrated on Sempu strait (north part area). Folious coral *Echinopora lamellosa* are distributed well in Sempu bay with local name Kondang Buntung (Depan). The previous study showed the coral percentage of NR Pulau Sempu was stagnant on 26-34% of average of their life coral cover. Coral disease has role to decrease of coral cover in the world one of them is white syndrome that only be reported from Indo-Pacific area. The aim of this research was to observe white syndrome disease growth rate at E. lamellosa which has degraded their coral cover at NR Pulau Sempu for 2 months. To calculate white syndrome rate we used sequence photographed that be taken twice (early and end of month) then calculated wide area using ImageJ. Growth rate of white syndrome was obtained from difference of width area. The result of this research showed the average of white syndrome disease was 0.077 cm^2/ day. Environment factor suggested have important role to increase growth rate of white syndrome in this island, increasing sea surface temperature triggered virulence bacteria in coral fast proliferation and caused increase of white syndrome growth rate. White syndrome in *E. lamellosa* from NR Pulau Sempu still on normal categorized compared by other Indo-Pacific area.

Keywords: Sendang Biru, nature reserve Pulau Sempu, foliouse coral, threat of coral reef, white syndrome

O-AH-E6

First Report of *Pyragraphorus hollisae* On Silver Pompano *Trachinotus blochii* By Using Scanning Electron Microscope (SEM) In Indonesia

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Abstract

This research aims to study the morphology of *Pyragaraphorus hollisae* infesting silver pompano (*Trachinotus bloch*ii) at Lampung Bay Waters by using Scanning Electron Microscope (SEM). This parasite was reported first in Indonesia. The samples of *Pyragraphorus hollisae* were obtained from gill of silver pompano (*Trachinotus bloch*ii). *Pyragraphorus hollisae* infesting silver pompano has an elongated body and fusiform. This parasite has a length of 1.1 - 1.4 mm and a width of 0.3-0.5 mm with a 1mm haptor length. Based on the results of SEM, there is a transversal wavy tegumental and fold structure on the surface of the body. Whereas, in the ventral third which leads to the anterior there is a transversal tegumental protrusion and there is a buccal sucker which is open in the anterior section. There is a papilla-like structure on haptor.

Keywords: *Pyragraphorus hollisae,* Scanning Electron Microscope (SEM), Monogenea

O-AH-E1

Morphometric and Molecular Identification of *Gyrodactylus sprostonae* in Warm Water Fishes of Guilan Province (North of Iran)

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Abstract

Gyrodactylus , a member of monogenea, is one of the most common external parasites on freshwater and marine fish. This parasite mostly appears on skin and fins but rarely on gills of fish. *Gyrodactylus* can causes disease and mortality in wild and domestic populations of fish. In this study *Gyrodactylus* specimens removed by wet mounts of skin and fins of *Cyprinus carpio*, Hypophthalmichthys molitrix and Aristichthys nobilis in Guilan Province fish ponds and analyzed by a light microscope. The morphometrical identification of *Gyrodactylus* specimens was performed using the measurements and drawing of opisthaptoral hard parts like as anchor, marginal hook, ventral bar and dorsal bar. The molecular species description was based on polymerase chain reaction (PCR) of partial sequence of the 5.8S region of ribosomal RNA, and a partial sequence of the internal transcribed spacer 2 (ITS2) of ribosomal RNA. The nucleotide sequences of the PCR products were compared with other sequences registered in GenBank. Based on the morphometric analysis and sequencing, the *Gyrodactylus* specimens were identified as *Gyrodactylus sprostonae*. The abundance of this parasite in investigated fish ponds of Guilan Province were 21.42, 6.17, 21.95 and zero for *C. carpio, H. molitrix, A. nobilis* and *Ctenopharyngodon idella* respectively.

Keywords: *Gyrodactylus sprostonae*, molecular, morphometrical, warm water fish, Iran

O-AH-E2

Epidemiological Studies of Parasites and Histopathology of Duck Grouper Cultivated in the Sunda Strait Waters

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Abstract

Duck grouper is an important commodity in Indonesian waters that has bright prospects in the future, especially for export, because the demand continues to increase. Therefore, groupers must be cultivated properly, one of which is to prevent the growth of parasites and other fish disease attacks. The purpose of this study is to determine the *histological pathogenesis*, species types and prevalence of ectoparasite worms that could attack duck groupers. This research was carried out in the Sunda strait waters using 80 duck groupers placed in eight floating net cages in May 2019. The method used in this study is the observation method. Sampling is done by purposive sampling method. The results showed that the ectoparasite worms found were *Neobenedenia girellae*, and *Haliotrema epinepheli*. The prevalence of gill ectoparasites by 100% in Lampung bay waters, Sumur, Pulau Panjang, and Banten bay and the highest intensity on average in Pesawaran District is 1.1 ± 2.4 parasites per host. There is a difference in prevalence and intensity between infecting ectoparasite worms in Lampung and Banten waters. Histopathological analysis showed interlamellar epithelial hyperplasia of secondary lamellae, partial fusion of secondary lamella, telangiectasia, justalamellar edema, and eosinophilic infiltrates. It is important to know the various parasites from the Sunda Strait waters and the pathogenesis caused by parasites to ensure host health and fish production. Parasitic knowledge and histopathological analysis can be used as important tools for the diagnosis of tissue lesions.

Keywords: Duck grouper, Epidemiology, Parasites, Histopathology

Morphological Profile of L3 and L2 *Anisakis* on Little Tuna (*Euthynnus affinis*) and Indian Mackerel (*Rastrelliger kanagurta*) from Fish Auction Sedati, Sidoarjo using Scanning Electron Microscope (SEM)

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Abstract

Anisakis is one of nematodes genus that spread widely all around the world. There are many fish species that play role as *Anisakis* host. Fish species that quite often known infected by *Anisakis* in Indonesia were little tuna fish (*Euthynnus affinis*) and indian mackerel fish (*Rastrelliger kanagurta*). This research aim was to determine whether there are morphological differences between *Anisakis* obtained from little tuna fish and indian mackerel fish when observed using SEM. *Anisakis* obtained from little tuna has an average body length about 12.02 mm, while *Anisakis* obtained from indian mackerel were 5.8 mm. Based on the body length, *Anisakis* from little tuna assumed as L3 *Anisakis*, while *Anisakis* from indian mackerel were still in L2 stage. The result of observation using SEM showed that *Anisakis* from little tuna and indian mackerel showed different morphological characteristics. The anterior part of *Anisakis* from little tuna showed double papillae, amphid, boring tooth, excretory pore and cuticle were clearly visible. The anterior part of *Anisakis* from indian mackerel had same characteristics as *Anisakis* from little tuna, but the papillae that found in this *Anisakis* were single papillae. In addition, the size of *Anisakis* papillae, amphid and boring tooth from little tuna tuna were larger. *Anisakis* body parts obtained from little tuna had a clearer cuticle and a larger deirid than indian mackerel. The posterior part of *Anisakis* body from little tuna had a larger phasmid and mucron than *Anisakis* from indian mackerel.

Keywords : L2 *Anisakis*, L3 *Anisakis*, SEM, Little tuna, Indian mackerel.

O-AM-D9

Probiotics Bacteria as Quorum Sensing Degrader in Controlling Pathogenicity of Bacteria in Aquaculture

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Abstract

Quorum sensing (QS) is a bacterial cell-to-cell communication process that based on the recognition, production and release of small signal molecules known as autoinducer. QS can regulate various bacterial process such as virulence, motility, bioluminescence, and biofilm formation. The interruption of QS has been suggested as an anti-infective strategy to control the pathogenic bacteria that cause the occurrence of diseases in fish culture. In this study, the potential probiotics that act as QS degrader were isolated from fish gut of tilapia. Five isolates were able to degrade QS signal, N-acyl homoserine lactones (AHL). By in-vitro assay, these isolates were co-culture with Aeromonas hydrophila for seven days. Results showed that three isolates identified as uncultured *Klebsiella* sp. (CPi12), *Enterobacter asburiae* (CBa5), and *Enterobacter* sp. (CBa7) were able to reduce the AHL production of *A. hydrophila* but did not affect the growth of the pathogen. In bio-control experiment, isolate CPi12 significantly reduced the pathogenicity of *A.hydrophila* upon the tilapia. It was observed that the survival rate of fish with CPi12 fed group was 100%. The growth and weight of fish with CPi12 fed group also showed high significant difference compared to control, CBa5 and CBa7 fed group. This results indicate that probiotics bacteria as QS degrader could control the fish diseases in a more bio-friendly manner in aquaculture.

Keywords: Acyl homoserine lactone, in vivo, aquaculture, quorum quenching, tilapia

O-AH-A1

Growth-inhibiting Effect towards *Streptococcus agalactiae* Isolated from Red Tilapia (*Oreochromis* sp.) by Herbal Extracts

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Abstract

This study was conducted to investigate the growth-inhibiting effect towards *Streptococcus agalactiae* isolated from diseased red tilapia (*Oreochromis* sp.) by herbal extracts, namely cinnamon (*Cinnamonum verum*), ginger (*Zingiber cassumunar*), king of bitters (*Andrographis paniculata*), fish mint (*Houttuynia cordata*), and perilla leaf (*Perilla frutescens*). The extracts of these herbs were prepared in ethanol 96% or methanol 99.8%, which were subsequently subjected to heat treatment and vacuum evaporation to remove the solvents. The final concentration of the herbal extracts was 2000 mg/ml. The results showed that, cinnamon extract in either ethanol 96% or methanol 99.8% showed the strongest growth-inhibiting effect towards *Streptococcus agalactiae* SA3 and SA4 isolates, with the diameters of bacteria-free halos 17.67 mm and 16.25 mm (for SA3), 33.42 mm and 32.75 mm (for SA4), respectively. Whereas ginger and king of bitters extracts showed a medium inhibition (diameters of bacteria-free halos were in the range of 9.50 – 13.08 mm), fish mint and perilla leaf showed a weak inhibition (diameters of bacteria-free halos were in the range of 2.92 – 7.42 mm). The MBC (minimal bactericidal concentration) and MIC (minimal inhibitory concentration) values of cinnamon extracts were 16 mg/ml and 8 mg/ml for SA3 isolate, respectively; and 8 mg/ml and 4 mg/ml for SA4 isolate, respectively. Cinnamon extract in ethanol 96% or methanol 99.8% can be considered a potential herbal extract for prevention of disease caused by *Streptococcus agalactiae* in tilapia.

Keywords: bacteria-free halos; herbal extracts; MBC; MIC; *Streptococcus agalactiae*

O-AH-A2

Oral Administration Of Na-Alginate Stimulates The Innate Immune System And Enhances The Resistance Of Catfish Against *Aeromonas hydrophila*

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Abstract

The purposes of this research were to evaluate the effect of Na-alginate from a tropical brown algae Sargassum sp. on the stimulation of innate immune system of catfish (Clarias sp.) and the improvement of its resistance against Aeromonas hydrophyla. The innate immune system was evaluated by measuring the Nitroblue tetrazolium (NBT) activity, phagocytic activity and phagocytic index (AF/IF), total plasma protein (TPP), WBC and leukocyte differentiation. Hematocrite dan leukokrit were also observed to evaluate the physiological condition of fish. The growth of length and weight were analysed. The results showed that administration of alginate from Sargassum sp. Improved the innate immune system parameters of walking catfish namely phagocytic activity/phagocytic index and total leukocytes count. The administration of alginate had no significant effect (P>0.05) on NBT, TPP, and hematocrite. The results suggested that oral administartion of alginate at 4 g/kg effectively increased non-specific immune system of walking catfish. Challenge test with A. hydrophila to fingerling of catfish (total length 5-7 cm) after oral administration of alginate for 10 days, revealed that alginate from Sargassum sp. increased the resistance of catfish against A.hydrophila indicating by the increase in the survival rate, relative percent survival and the mean time to death. Oral administration o alginate also improved the specific growth rate. The effective dose of alginate from Sargassum sp. to improve the resistance of catfish against A.hydrophila was 3 g/kg feed.

Keywords: Aeromonas hydrophila, alginate, catfish, innate immue, *Sargassum sp.*, immunostimulant,

O-AH-A3

Virulence Genes Profiling and Pathogenicity of *Streptococcus agalactiae* Isolated from Tilapia *Oreochromis niloticus* Farms in Indonesia

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Abstract

Streptococcosis caused by *Streptococcus agalactiae* has become a major problem which leads to great failure in tilapia culture in Indonesia. This study aims to detect virulence genes of *S. agalactiae* during streptococcosis disease outbreak from tilapia farms in Indonesia and to evaluate the correlation between biotype and virulence genes to bacterial pathogenicity. The presence of virulence genes was determined in 10 strains of *S. agalactiae* isolated from farm-raised tilapia. Polymerase chain reaction (PCR) protocols were used to determine the presence of genes for *cylE, hylB, lmb, bib A, PI-2b, fbs A, fbs B, gap, PI-1*, and *cfb* in the template DNA. Four isolates have seven of virulence genes (*cylE, hylB, bibA, PI-2b, fbs A, fbs B*, and *gap* genes) three isolates have six virulence genes (*hylB, bib A, fbs A, fbs B, gap, cfb* genes), one isolate has four virulence genes (*hyl B, bib A, fbs B*, and *cfb* genes), and one isolate has one virulence gene (*PI-2b* gene). None of the isolates contained *lmb* or *PI-1* gene. The results show that bacteria that have more virulence genes show higher pathogenicity. We conclude, that *S. agalactiae* with more virulence genes show high levels of pathogenicity.

Keywords: biotype, disease, isolates, *streptococcosis*, tilapia

O-AH-A4

Dietary Application of Madeira Vine (*Anredera cordifolia*) Leaves Powder for the Prevention of Motile Aeromonas Septicemia in African Catfish *Clarias gariepinus*

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Abstract

This study aimed to determine the optimal dose of madeira vine leaves powder to prevent *Aeromonas hydrophila* infection in catfish. African catfish with an average body length and weight of 10.32±0.07cm and 9.15±0.55g, respectively. Madeira vine powder was administrated by dietary supplementation at doses of 3, 4, and 5 g kg^{-1} feed and diet without madeira vine powder was used as a control. Each diet treatment was applied to 14 fish per aquarium and with three replicate aquaria for each treatment. Feeding of experimental diets was conducted for 14 days to apparent satiation and a challenge test was carried out on day 15. For the challenge test, the tested fish from each treatements were injected with 0.1 mL of *A. hydrophila* (10^7 CFU mL^{-1}) suspension. Dietary supplementation of madeira vine leaves could induce faster recovery of *A. hydrophila* infected fish and reduce the fish mortality. The present study demonstrated that dietary supplementation of madeira vine leaves powder at a dose of 3 g kg^{-1} effectively prevented *A. hydrophila* infection in African catfish.

Keywords: madeira vine, *Anredera cordifolia*, *Aeromonas hydrophila*, catfish, haematological parameters.

O-AH-A5

Dietary Supplementation of Fulvic Acid for the Prevention of Heavy Metals Accumulation in Nile Tilapia Fed with Diets Containing Green Mussel Meal

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Abstract

This study aimed to evaluate the effect of dietary fulvic acid supplementation on the body accumulation of Pb and Cd of Nile tilapia *Oreochromis niloticus* fed with diets containing green mussel with high Cd and Pb content. Nile tilapia juveniles with a mean body weight of 8.9±0.6 g was randomly distributed into 15 aquariums (100 L working capacity) at a density of 17 fish/aquarium (170 fish m^{-3}). Five treatments (in triplicates) of isonitrogenous and isoenergetic experimental diets were formulated to contain 10% mussel meal high in Pb and Cd concentration, and five levels of fulvic acid, i.e. 0, 0.17, 0.34, 0.68 and 1.36 mg kg^{-1} and offered to the tested fish to satiation level three times daily for a period of 60 days. The consumption of diet containing Pb and Cd resulted in the accumulation of these heavy metals in the fish meat. However, fulvic acid dietary supplementation, even at the lowest supplementation level tested, significantly reduced the accumulation of the heavy metals in the fish meat. Furthermore, dietary supplementation of fulvic acid up to 0.68 mg kg^{-1} also significantly improved the fish growth performance and feed utilization. The present study demonstrated that dietary supplementation of fulvic acid at a level of 0.34 mg kg^{-1} could be used to prevent Pb and Cd accumulation.

Keywords: fulvic acid, green mussel, growth, heavy metals, Nile tilapia

O-AH-A6

Current Status of Koi Herpesvirus (KHV) in Koi and Common Carp (*Cyprinus carpio*) in Northern Vietnam: Epidemiology, Diagnosis and Prevention Suggestions

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Abstract

Common carp is a traditional farming freshwater species in the northern Vietnam. Previously, carp were raised at a low rate in polyculture ponds and low production. However, the development of current feed technology and aquaculture system, Common carp were rising with high density in earth pond and cage culture with high production and become a main culture species in northern Vietnam. The challenges for carp culture are the diseases occurring, in which KHV (Koi Herpesvirus) is one of the most serious pathogens caused mass mortality for this species. In this study, we provided the information on epidemiological characteristics of KHV from the survey of 183 fish farmers with 263 carp ponds in 3 districts from 3 Northern Vietname provinces. Diseased fish were sampled, examined symptoms and detect the pathogen by PCR assay. The results revealed that polyculture are the main model of carp raised in northern Vietnam (accounted for 88.21%) with the proportion of carp in pond is made up 27.81-32.10 %. Diseased fish appeared the symptom such as disruption in breathing, lethargic swimming, viscous on the body, necrosis in the gills and skin, bleeding. Percentage of common carp infected by KHV was high (35.74%), the KHV infected fish also infected with other bacteria including *Aeromonas veronii*, *Aeromonas hydrophila*. The prevention was proposed and applied to fish farms, including water treatment (apply detergent, increase aeration), improve fish health (feed and vitamins), and antibiotic use.

Keywords: Carp, KHV, Epidemiology, Diagnosis, Vietnam

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O-AH-B1

Effects Of Dietary Supplementation Of Medical Herb Extracts On The Innate Immunity of Red Tilapia (*Oreochromis* sp.)

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Abstract

Red tilapia (Oreochromis sp.) is well known for its appealing taste, short cultured period, and high tolerance to adverse environmental stimulants. However, due to the intensification of aquaculture and environmental degradation, tilapia farming has been threatened by diseases such as Streptococcosis, which results in high mortality within days. Herbal extracts are now recognized for their medicinal activities in combating pathogens for both human and animals. Besides, due to the high availability in nature, ease of preparation and administration, and role as immunostimulants, these herbs can be considered as antibiotics alternatives. This study was carried out to determine the effectiveness supplemented schedule of Punica granatum L. and Alpinia officinarum extracts in order to improve the innate immunity of red tilapia. The experiment lasted for eight weeks and was divided into five treatments with three replications each. In these treatments, P. granatum L. and A. officinarum extract were mixed separately with commercial pellets then fed for two weeks intervals (T1 and T2), four weeks (T3 and T4), and commercial feed without additives (Control diet). Fish of each treatment was sampled for blood, plasma at the 2nd, 4th, 8th week to check for the immune responses of experimental fish. Of these responses, haematological parameters (total red blood cells, white blood cells, lymphocytes, monocytes, and neutrophils), lysozyme activity and disease resistance against Streptococcus agalactiae would be determined.

Keywords: *Punica granatum L.*, *Alpinia officinarum*, *Streptococcus agalactiae*, haematological parameters, lysozyme activity

O-AH-B2

Effect of Sodium Chloride and Temperature on Biofilm Production of *Flavobacterium columnare* and Their Virulence to Striped Catfish (*Pangasianodon hypophthalmus*)

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Abstract

Bacterial isolated from striped catfish (*P. hypophthalmus*) at Cantho University was identified as yellow- filamentous gliding bacteria, known as *Flavobacterium Columnare*, which was used to investigate the effects of various salt concentrations and temperatures on biofilm formation of this typical bacteria. The study was tested biofilm formation on microtiter plates at different salt concentrations and temperatures during 48 h. In addition, virulent study was conducted for 10 days of challenge by immersion method. The result showed that biofilm formation of *F.columnare* on microtiters was significant inhibited at 9, 12 and 15ppt. At lower salinities, biofilm formation decreased. In the same trend, the higher temperature the lower biofilm formation but at 35°C the formed biofilm was greatly reduced and it was strongly produced at 25°C. Interestingly, there are not significant difference between 28 and 31°C statistically. The virulent study found that 100% fish died after 1 day post challenge at 0 ppt. There are 10% and 25% of fish died at 3 and 6ppt respectively. No dead fish was found at 9 and 12ppt. Besides, all of the fish were died at all various temperature after 2 days post challenge and it was not correlated with the result of biofilm formation on microtiter plates. Conclusion, biofilm formation was inhibited at 3ppt and totally controlled at 9 and 12ppt on microtiter plates and was also inhibited at 35°C.

Keywords: Biofilm formation, *Flavobacterium columnare*, gliding bacteria, immersion, salinity.

O-AH-E3

Estimation of Antibiotic Use, Diagnosis and Treatment Costs due to Vibriosis in Asian Sea Bass Using Stochastic Model

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Abstract

With intensification of farming systems, Asian sea bass can be affected by infectious diseases such as vibriosis. To improve awarenes, the objective of this study is to estimate the costs of Vibriosis in Asian Sea bass using stochastic bio-economic model. Inputs of the model were from farmer, records at Aquatic Animal Health Unit (AAHU), UPM, literatures and internal validation by experts. Data for prevalence of Vibrio spp was from a farm in Selangor sampled monthly for a year, where Vibrio spp found were V. alginolyticus, V. vulnificus and V. harveji. Diagnosis probability was based from data year 2013-2017 on the number of Asian Sea bass case submitted to AAHU, UPM and was confirmed positive with Vibrio spp (5 from 756 cases). The diagnosis costs included pricing at AAHU for gram staining (RM11.66), TSA plate (RM10.60) and API (RM84.80). The model showed 78.7% of simulated Asian Sea bass survived and reached 210 days post stocking with average bodyweight of 1,079g. The mortality rate due to Vibriosis was 6.89%. Based on our assumption that all clinical vibriosis will be treated with Oxytetracycline, the average antibiotic use was estimated as 1.84g/tail (0-16g/tail), and where in total 3.6kg of antibiotics was used per cycle (20,000 tails simulated fish). Total vibriosis costs (RM0.994)/tail is sum of mortality due to vibriosis (RM0.77)/tail, treatment costs (RM0.21)/tail and diagnosis costs (RM0.014)/tail. Farmer should make better decision for example improving biosecurity to lower antibiotic use and disease costs and improving feed conversion ratio using probiotics.

Keywords: Aquaculture, Asian Seabass cage farms, antimicrobial use, stochastic model, Vibriosis costs

Identification of Bacterial Isolates and Hematological Analysis of Catfish (*P. pangasius*) of Manually and Hematology Analyzertools at Balai Benih Ikan Penataan, Pasuruan, East Java

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Abstract

Catfish (*Pangasius pangasius*) has the potential to be developed in the field of cultivation. Improper management can lead to disease by pathogenic bacteria. Fish health checks were carried out by bacterial idenfication and blood cell count (hematology). Hematological analysis was performed using hematology analyzertools. The study aims to identify the bacteria that cause fish pain and find out the differences in the results of blood cell calculations using hematology analyzertools and handtally counters, a description of the differential components of leukocytes, hematocrit and hemoglobin in tilapia. The method used is the experimental method and descriptive method. The results showed that bacterial isolates were 659×107 CFU/ml. The coccus and basil bacteria have a flat, curved morphology and are milky white. Round morphological forms including gram-positive, while curved morphology includes gram-negative. Calculation of erythrocyte cells and leukocyte cells that use hematology analyzertools is more accurate than using handtally counter because the results of t count are greater than t table 1% or t table 5%. As well as the description of the differential components of leukocytes, hematocrit and hemoglobin show that tilapia is still in the normal range. observations of water quality in tilapia ponds were 290C, pH 8.4 and DO 4.78.

Keywords: Hematology Analyzer Tool, bacterial isolates, fish health, P. pangasius

O-AH-F2

Development of Indirect Enzyme-linked Immunosorbent Assay for Selection of Whole Cells Antigen of *Vibrio* and *Photobacterium* as Vaccine Cancidates in Mariculture

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Abstract

Antigenicity and immunogenicity are important criteria for antigen selections in vaccine developments. Excessive use of serum antibody in the conventional serum agglutination for antibody titer assay drive the idea of developing a more efficient method. In the present study, we develop an optimum indirect Enzyme-Linked Immunosorbent Assay (ELISA) system for whole cell antigen screening of vaccine candidate based on the antigenicity and immunogenicity by using the antigens, whole cell antigen-induced mice serum and antibody anti-mice with the alkaline phosphatase yellow substrate. Total of 97 antigens were evaluated. Total of 3 antigens, namely SB25, SB01, and GD05 prepared from *Vibrio harveyi* and *Photobacterium damsela* subspecies *piscicida* cells respectively, were selected and then evaluated on the efficacy as vaccine candidate in grouper against artificial infection of homologous strain. Protection based on the relative percentage of survival conferred by the selected antigen cocktails were more than 60 revealed the potential as a vaccine candidate in grouper. Further investigation on the effective dose and longevity of the protections conferred by the antigens in grouper are our ongoing subjects.

Key words: indirect Enzyme-Linked Immunosorbent Assay, whole cells antigen, Vibrio, Photobacterium, grouper, vaccination

O-AH-F3

The Impact of the Catecholamine Stress Hormones Norepinephrine and Dopamine on the Virulence of Aquaculture Pathogenic *Vibrio campbellii*

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Abstract

Along with the massive development of the aquaculture industry worldwide, this sector still faces important challenges with respect to controlling infectious diseases. The frequent use of antibiotics in attempts to control problems caused by pathogenic bacteria has led to the development of antibiotic resistance, and as a consequence, new strategies to control bacterial infections in aquaculture animals are urgently needed. Host stress has been known for a long time to influence the outcome of host-microbe interactions, and this has been associated with a decreased activity of the host defense system. In this study, we investigated the impact of catecholamine stress hormones on growth and virulence factors production of aquaculture pathogenic *Vibrio campbellii*. Both norepinephrine and dopamine (at 100 µM) significantly induced growth in media containing serum. The compounds also increased swimming motility of the tested strains, whereas they had no effect on caseinase, chitinase, and hemolysin activities. Further, pretreatment of pathogenic *V. campbellii* with catecholamines significantly increased its virulence toward larvae of the commercially important giant freshwater prawn *Macrobrachium rosenbergii*. In summary, our results show that – similar to enteric pathogens – catecholamines can also increase the virulence of aquatic pathogens such as *V. campbellii*.

Keywords: host-microbe interaction; microbial endocrinology; vibriosis

O-AH-F4

Development of Multi-strain Probiotic as Disease Resistance Tools for Fish Culture

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Abstract

Usage of multi-strain probiotic containing different species of beneficial bacterial were proven to have more potential on aquatic organism as opposed to using single probiotic solely. The present study was conducted to produce multi-strain probiotic as disease resistance tool against fish disease causing pathogen, *Streptococcus agalactiae* and *Aeromonas hydrophila*. Three potential probionts isolated from various host were selected to produce multi-strain probiotic. These probionts are *Enterococcus hirae* (LAB3) isolated from seabass, *Bacillus amyloliquefaciens* (L11) isolated from crab as well as *Lysinibacillus fusiformis* (A1) which was isolated from the microalgae. The probionts were tested in *in vitro* as a combination of multi-strain probiotic against *Streptococcus agalactiae* and *Aeromonas hydrophila.* Inhibition zones were observed which indicated antimicrobial activity of the probiotic combination against both pathogens. The biofilm formation measured in the form of absorbance (OD) for the multi-strain probiotic was measured. In the first 10 hours, the OD of multi-strain probiotic was higher (2.053) compared to the constituent single strain (0.148 - 0.406) as well as the pathogen (0.698 -1.219). This showed that the multi strain probiotic could compete with the pathogen for adhesion site in order to colonize the host. These preliminary results indicate that a probiotic combination consisting of beneficial bacteria from different genus or strain could be used in combating disease in aquaculture.

Keywords: Multi-strain probiotic, fish disease, antimicrobial activity, biofilm formation

O-AH-B3

Antibacterial Activity of Some Herbal Extracts against Fish Pathogenic Bacteria

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Abstract

The study was conducted to determine the antibacterial activity of some herbal extracts *(Psidium guajava, Eclipta prostrata, Houttuynia cordata, Andrographis paniculata, Couroupita guianensis, Elsholtzia ciliata, Artemisia vulgaris, Terminalia catappa, Wedelia chinensis, Alpinia officinarum)* against fish pathogenic bacteria including *Streptococcus agalactiae*, *Edwardsiella ictaluri* and *Aeromonas hydrophila*. The antibacterial acitivity was evaluated using agar disc diffusion method. Amongst tested herbal extracts, several extracts which show highly antibacterial activity would be determined minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) using broth dilution method. The expected results would be recorded to evaluate the effect of herbal extracts on each kind of bacteria. The high antibacterial activity extracts would be good candidates for further studies in order to find out an alternative method for antibiotics in prevention and treatments in fish disease.

Keywords: *Aeromonas hydrophila, Edwardsiella ictaluri, Streptococcus agalactiae,* antibacterial activity, herbal extract

O-AH-B5

Effects of *Psidium guajava* Extract On Selected Enzymes and Stress Resistance of Striped Catfish Fingerling Stage *(Pangasianodon hypophthalmus)*

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Abstract

This study examined the effects of *Psidium guajava* extract on selected enzymes and stress resistance of striped catfish fingerling *(Pangasianodon hypophthalmus).* Fish was fed in diets without the extract (control) and containing extracts from leaves of *Psidium guajava* for 42 days. Then, fish were designed in different temperatures as 27°C, 31°C and 35°C at 14 days. Every treatment was 3 replicates. The first 42 days of experiments was carried out to investigate the effects of *Psidium guajava* on the selected digestive enzyme (in intestine and stomach), cortisol and glucose in blood samples of the fish. The second 14 days of study was conducted to investigate effects of the different temperatures or the interaction between *Psidium guajava* and temperature on the selected digestive enzyme, cortisol and glucose in blood samples of the fish. The results showed that after 42 days feeding with *Psidium guajava* the plasma concentration of glucose of fish (40.30 mg/100mL) was significant different if compared to control group (51.09 mg/100ml). At 35°C, glucose level of the fish eaten *Psidium guajava* also show the lower value (63.68mg/100ml) than those of the control group (69.47mg/100ml). Regarding to the digestive enzyme activity after 42 days feeding by *Psidium guajava* was decreasing and not significant different from control group. It was found that the pepsin (0.22 mU/mL/mg protein) and trypsin (1.52 mU/min/mg protein) activities were significant differences ($p<0.05$) with the control group (0.36 mU/mL/mg protein) for pepsin and (2.39 mU/min/mg protein) for trypsin after 14 days observed at 35°C. Therefore, it can be concluded that using herbal extract in feed diet reduced the glucose level to limit stress and positive to effect on digestive activities.

Key words: Psidium guajava, extract, temperature, glucose, trypsine, pepsin, digestive enzymes

O-AH-B6

Morphological Variability and Molecular Prospecting Reveal Species Complexes of Subgenus *Acanthosentis* (Acanthocephala: Quadrigyridae) from Tinfoil Barb Fish, *Barbonymus schwanenfeldii* in Kenyir Lake, Terengganu, Malaysia

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Abstract

This study was to identify acanthocephalan species complexes based on morphological variability and molecular prospecting in *Barbonymus schwanenfeldii* (Bleeker, 1854) fish host. Kenyir Lake is a new geographical locality reported for these species. Acanthocephalan was studied morphologically using light microscope. Variation in morphological traits of proboscis, proboscis receptacle, egg, testes shape and location, number of hooks and cement gland has been used to diagnose acanthocephalans species but the actual structure to delimitating between closely related species are still confusing and always questionable. Morphological and molecular prospecting reveal the present of three different species from subgenus *Acanthosentis* by referring to the taxonomic key, monophyly and genetic distance between species. New species were distinguished from the other 46 described species by having six unique structure; the presence of anterior parareceptacle structure, vaginal sleeve structure, circular collar ring and muscular-like structure on the proboscis, alternating pattern and size of proboscis hooks, variation in proboscis size and shape. Internal transcribed spacer gene were analysed to discriminate among species complexes. Specimens form a monophyletic group indicated that they are sister species to *Acanthosentis cheni*. Results of maximum-likelihood tree analyses showed Quadrigyridae were closed to Neoechinorhynchidae (supported >60%). Genetic distance between new species was ranged from 0.18-0.43 among ITS sequence. Large genetic distances between individuals indicated that the presence of species complexes because high levels of divergence is unlikely to occur among individuals of a single species. Integrated taxonomy approach contributed to an accurate identification and differentiation of species. New species, named *Acanthogyrus* (*Acanthosentis) kenyirensis* n.sp., *A.* (*A.) terengganuensis* n.sp. and *A.* (*A.) tembatensis* n. sp.

Keywords: *Barbonymus schwanenfeldii*, morphological variability, Internal Transcribed Spacer (ITS) gene, molecular prospecting, species complexes

O-AH-B7

Maternal Immunity of Tilapia Broodstock Given Polyvalent Vaccine *Streptococcus agalactiae* and Resistance in Their Offspring

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Abstract

This study aimed to examine the use of *Streptococcus agalactiae* polyvalent vaccine in tilapia broodstock and the effect of maternal immunity and resistance of their offspring against different of *S. agalactiae* strain. The study consisted of two treatments with three replicates. The broodstock was injected using polyvalent vaccine of *S. agalactiae* at a dose of 10^8 CFU mL^{-1} at 2nd gonadal maturity. The broodstock was left until maturation. Challenge test was carried out on the offspring at the 5, 10, 15 and 20 days after hatching using NK_1, $N_{17}O$, $N_{14}G$, N_3M, N_4M strain respectively and combination of them. We observed is immunological parameters in broodstock, eggs and larvae and relative percent survival (RPS) of larvae after infection. The results showed that the leukocytes, phagocyte activity, respiratory burst, lysozyme activity and antibody levels of broodstock after vaccination have high level compared to control broodstock. The high level of the lysozyme activity, antibody levels and *recombination activating gene 1* (*RAG1*) were also observed in eggs and larvae of vaccination broodstock. As well as RPS of larvae produced from vaccinated broodstock has higher than larvae produced from nonvaccinated broodstock. In conclusion, *S. agalactiae* polyvalent vaccine has improved the immune system in broodstock and their offspring with mortality level at larvae above 50% until the 20th day of post-hatching.

Keywords: maternal immunity, polyvalent vaccine, *Streptococcus agalactiae*, tilapia

O-AH-B8

Fungal Infection in Snakehead fish, *Channa striata* (Bloch, 1793)

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Abstract

The snakehead fish *Channa striata* (Bloch, 1793) is an economically important fish in Myanmar. Nowadays, **s**nakehead are produced in Myanmar using artificial breeding methods and cultured in semi-intensive pond. In March 2018, a number of snakehead fish was found showing lesion in their skin. Healthy (10 individual, 4.8±2 cm) and fish with skin lesion (10 individual, 4.9±2 cm) of were collected from a fish farm in Pathein, Ayeyarwady Region.The infected fish were identified on visible indications of red spots, cotton wool likes spot on their body, skin damages and their sluggishness. Traces of fungal infection and lesion were found near the dorsal fins. Infected tissue was sampled and inoculated on the Sabouraud Dextrose Agar (SDA) culture medium. The development of fungus was studied and recorded under a light microscope. The white colonies were at first granular to cottony, most commonly a blue-green with a white apron at a margin. The fungi was survive at 27 ˚C until 4 weeks while the conidia appeared when temperatures was up to 37˚C. According to morphology and life cycle development, the fungus was identified as *Aspergillus* species.

Keywords: *Channa striata***,** fungal infection, healthy and infected fishes, *Aspergillus*

O-AH-B9

The New Pathogenic *Aeromonas diversa* Isolated from Walking Catfish

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Abstract

Aeromonas spp. are pathogenic bacteria which potentially cause fish disease and mass mortality. Pathogenicity of Aeromonas spp. determined by virulence factors controlled by virulent genes. This study aimed to isolate and identify, evaluate the pathogenicity, and determined their virulent genes. The sampling was conducted by purposive sampling method to obtaine disease walking catfish. The identification of bacteria was carried out molecularly based on 16S rDNA. The virulent factors were detected on aer/haem, alt, flaA, lafA, and fstA genes. One of the isolates was BC-01-1 caused 20% of walking catfish mortality. The results of molecular analysis showed that isolates BC-01-1 closed to A.diversa (identity 88.46%, query 99%). This isolate harboured virulence genes of aer/haem, flaA, and lafA genes, but alt and fstA genes were not detected. It is the first report on the Aeromonas species closed to A. diversa isolated from walking catfish in Indonesia.

Keywords: *Aeromonas diversa*, walking catfish, molecular identification, 16S rDNA

O-AH-B10

Efficacy of Feed-based Polyvalent Vaccine against *Streptococcus agalactiae*, *Aeromonas hydrophila* and *Vibrios* sp. in Asian Seabass (*Lates calcarifer*)

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Abstract

Vaccination is an important strategy to prevent diseases in aquaculture. This research attempts to evaluate a polyvalent vaccine that can be used to treat multiple infections by *Streptococcus agalactiae*, *Aeromonas hydrophila* and *Vibrios* spp. simultaneously. A total of 270 Asian seabass, *Lates calcarifer* of 15.8 ± 2.6 g were separated into 3 groups, in triplicate. Fish of Group 1 was not vaccinated, Group 2 was vaccinated with monovalent *Vibrio harveyi* vaccine, while Group 3 was vaccinated with a polyvalent mixture of *V. harveyi*, *S. agalactiae* and *A. hydrophila* vaccine. Vaccinations were done on days 0, 14 and 42 orally using the feed-based bacterin vaccine at 4% bodyweight. Samples of serum for antibody study were collected at 7-day intervals throughout the 6-week study period. Following vaccination by the polyvalent vaccine, IgM antibody levels showed significant ($p<0.05$) increase in serum as early as week 2 and peaked at week 6. This resulted in a significantly higher protection ($p<0.05$) following challenge with 2.3×10^7 CFU mL^{-1} of live *S. agalactiae*, *A. hydrophila* and Vibrio species such as *V. harveyi*, *V. parahemolyticus* and *V. alginolyticus* than monovalent and unvaccinated groups. This feed-based polyvalent vaccine offers an opportunity for a comprehensive immunization regime.

Keywords: Polyvalent vaccine, Feed-based, *Streptococcus agalactiae*, *Aeromonas hydrophila*, Vibrio sp.

O-AH-E7

Effect of Temperature on the Activity of Crude Protease Enzymes *Bacillus pumilus* from Anchovy Isolates (*Stolephorus* sp.)

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Abstract

Proteolytic bacteria that have the potential to produce protease enzymes that are widely used in food processing can be isolated from various parts of fish and from various processing processes, among others, can be isolated from fish entrails, fresh fish and processed fish such as anchovy, and fish canning process waste. The study of proteolytic bacteria in anchovy has great biotechnology potential to be investigated because bacteria that can grow in anchovy are bacteria that can live in extreme environments. Given the great potential of the *Bacillus pumilus* bacteria, research can be carried out on enzyme activity from bacteria that grow in the isolation of anchovy. The purpose of this study was to obtain *Bacillus pumilus* protease enzyme activity from anchovy isolates which included temperature. The method in this study used the experimental method, namely Complete Random Design (CRD) with different temperature treatments including *Bacillus pumilus* 20^{o}C, 30^{o}C, 40^{o}C, 50^{o}C. Based on the results of the study, it was found that the crude extract of the protease enzyme anchovy isolate in *Bacillus pumilus* was 50^{o}C at 1.2589 u/ml. The results of the analysis show that the same temperature gives an influence between *Bacillus pumilus* on enzyme activity carried out to determine the optimum condition of the enzyme in degrading the substrate.

Keywords: Activity, Protease enzyme, *Bacillus pumilus*, Anchovy, Temperature

O-AH-E8

Histopathology of *Vibrio alginolyticus* In Green Mussel, *Perna viridis,* Treated with Phage

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Abstract

Vibrio alginolyticus, is become more prevalent globally in recent years. Control measurements are crucial for disease prevention. One promising alternative approach that emerges using lytic bacteriophages. This work aimed, to isolate and characterize lytic *V. alginolyticus* phages, PhVa, and to evaluate its potential against *Vibrio alginolyticus*, based on hisotopathological lesions in *P.viridis*. Hence, *V. alginolyticus* (GenBank accession nos. MH879822.1) was previous isolated from, *P. viridis,* indicated as preference host for bacteriophage isolation. The Exponential growth of bacterial strain was determined at 6 h cultured, 3.86 x 10^6 CFU mL^{-1} equal to OD_{600} 1.456 for bacteriophage isolation. Lytic bacteriophage, PhVa was isolated and purified for morphological identification confirm with using transmission electron microscope (TEM). Antibacterial activity of PhVa was carried on *in vitro*. Efficacy of phage therapy against Vibrio infections was conducted by, *in vivo,* experimental, *P. viridis,* were divided into 4 groups. Immersion bath challenge with pathogenic *V. alginolyticus* and PhVa were administer to treatments groups. The observation under transmission electron microscope (TEM) revealed that PhVa was grouped under Caudoviral order, subfamily of *Siphoviridae* phage. PhVa showed significantly higher antimicrobial activity. The lethal dosage was determined to be at 2.5 x 10^8 CFU mL^{-1}. Survival rate of PhVa treated group was 90% and 20% in untreated group. Hemocytic infiltration, with severe vacuolation and demolition in hepatopancreas cells shown in untreated group. These results demonstrated that the PhVa therapy might be provides excellent protective effects on *P.viridis* against *Vibrio alginolyticus* infection.

Keywords: *Vibrio alginolyticus*, bacteriophage, LC_{50}, *in vivo*, histopathology, Immersion

O-AH-E9

Histopathological Study in Green mussel (*Perna viridis*) Infected with *Vibrio aginolyticus* After Oral Introduction to Probiotic, *Pediococcus pentosaceus*

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Abstract

*G*reen mussel, *Perna viridis* is an important species as edible and cheap protein source for coastal community. Currently, *P. viridis* is facing high mortality due to pathogenic bacteria infection. Thus, the aim of the study was to evaluate the efficacy of probiotic bacteria previously isolated from green mussel on its resistance against *Vibrio alginolyticus* infection via histopathological parameter. *Pediococcus pentosaceus* (GenBank accession no. KY780507) was previous isolated from *P. viridis* and supplemented with the food as probiotic in order to compact *V. alginolyticus* infection. The clinical symptoms, mortality rate and histopathological examination were carried on in present. Experimental mussels were divided into 3 groups; control only fed with *Nannochoropsis* spp. while Treatment 1 and 2 were fed with *Nannochloropsis* spp. supplemented with *P. pentosaceus* with bacterial density 1.5 x 10^8 CFU/ml for 2 weeks. Acute 1 hour immersion bath challenge was carried out with *V. alginolyticus* (LC_{50}= $3.5x10^9$ CFU/ml) for 120H. The result showed changing in physical colour of outer shell from dark green to pale brown periostracum due to infection. Histolopathology examination showed lesions in hepatopancreas tissues, sloughed epithelial cells in the tubule lumen, vacuotion of F-cells and B-cells, degeneration of lumen necrotic foci and karyomergally in F-cells. Besides, cumulative mortality was higher in control compared to probiotic treated treatment with 24.47±0.05%. The results demonstrated that probiotic *P. pentosaceus* might be potential enough as bio-control agent for the infection of *V. alginolyticus.*

Keywords: Probiotics, *Perna viridis*, green mussel, histopathology, challenge test

O-AH-E10

Culture-independent Detection and Quantification of *Vibrio cholerae* in Shellfishes

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Abstract

Shellfishes such as oysters and mussels are filter-feeders that can accumulate and concentrate biological particles from their culture environment into their tissues. This could lead to accumulation of bacteria that may lead to food poisoning if consumed raw or partially processed. Thus, accurate detection of these pathogens is necessary. *Vibrio cholerae* is one of the pathogens often implicated in shellfish-related illness. Its detection mainly involves conventional culture method that only determines its absence or presence but not its quantity. This study therefore aims to develop a real-time polymerase chain reaction (PCR) protocol for a more rapid, sensitive, and accurate detection of *V. cholera* in mussel, oyster and its culture environment. Primers were designed to amplify the 137 bp fragment of the *hylA* gene, a species-specific hemolysin gene of *V. cholerae*. End-point PCR revealed that the primer and the amplification protocol was specific to *V. cholerae*. Real time PCR was done to detect and quantify the bacterial load expressed as log number of gene copies and was able to detect even the lowest concentration (10^1 to10^2 gene copies) of *V. cholerae* from the mussel, oyster, and environmental samples. Melt curve analysis and gel electrophoresis also indicated its specificity.

Keywords: foodborne pathogen detection, shellfishes, oyster, mussel, real-time PCR

O-AH-C3

In vivo Expression of Quorum Sensing Master Regulator *luxR* and AHPND Virulence Genes in *Vibrio parahaemolyticus* and *Vibrio harveyi* Concerning Their Virulence towards *Penaeus vannamei* (Boone, 1931)

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Abstract

Acute hepatopancreatic necrosis disease (AHPND) recently escalate into panzootic, leading to severe losses to shrimp industries. In this study, we evaluated quorum sensing regulation of the virulence factor by determining the expression levels of these genes in *P. vannamei* shrimp challenged with AHPND positive strains (*V. parahaemolyticus* strain BpShHep31 and *V. harveyi* strain BpShHep24). The challenged shrimp showed a significant increase in expression levels of the quorum sensing master regulator *luxR* when compared with the control shrimp (unchallenged group). There was also a substantial difference in *pirA*, *pirB* and *toxR* expression in challenged and unchallenged shrimp. The expression of *pirA*, *pirB* and *toxR* genes in challenged group increases from 0 h to 36 h. However, there was no significant difference in expression levels of *pirA*, *pirB* and *toxR* in unchallenged shrimp from 0 h to 48 h. Shrimp challenged with AHPND positive strains showed a significant increase of relative superoxide dismutase (SOD) activity at 12 h and 24 h. There was no difference in SOD activity from 0 h to 48 h in unchallenged shrimp indicating no oxidative stress has been induced. The protein content in challenged shrimp demonstrated significant reduction from 12 h to 48 h. In summary, this study suggests that the AHPND virulence are regulated by quorum sensing through a signal transduction cascade
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Keywords: Acute hepatopancreatic necrosis disease (AHPND), Gene expression, Quorum sensing (QS), Superoxide dismutase (SOD) and Protein content.

O-AH-D2

Occurrence of Microsporidian Parasite *Enterocytozoon Hepatopenaei* (EHP) in Whiteleg Shrimp, *Litopenaeus vannamei* from North Region in Malaysia

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Abstract

Microsporidian parasite, *Enterocytozoon hepatopenaei* (EHP) infestation is one of the shrimp diseases that been identified which can affect shrimp growth. Since 2011, the shrimp farms in the Southeast Asia have been reported affected by the microsporidian parasite, The targeted organ for EHP was hepatopancrease which when affected by will lower digestive and absorptive rate and ultimately result in poor growth and immunity. EHP causes growth retardation in shrimp and huge economic losses to shrimp culture. Hence, this study was carried out to determine the current status of microsporidian parasite EHP in early culture period of shrimp culture from three states (Kedah, Perlis and Penang) at North region in Malaysia. Shrimp culture less than 30 days in the pond were sampled and amplified through polymerase chain reaction (PCR) assay targeting gene encoding spore wall protein (SWP) of EHP (SWP-PCR). A result from PCR analysis showed a prevalence of microsporidian parasite from Perak and Kedah were 100% (30/30) and 86% (26/30) respectively while no infestation was detected from Penang (0/10). The results showed high infestation of EHP for a month culture period at the pond and continuous culture will increase the risk of having stunted shrimp. This scenario will pose a big challenge for shrimp farmers as it will increase the operating cost throughout the culture period.

Keywords: Microsporidian parasite**,** *Enterocytozoon hepatopenaei*, *Litopenaeus vannamei*, hepatopancrease

O-AH-D3

Status of Acute Hepatopancreatic Necrosis Disease in *Litopenaeus vannamei* from the Northern States of Peninsular Malaysia

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Abstract

The prevalence status of AHPND in white shrimp culture *Litopenaeus vannamei* in Kedah, and Perak, the Northern State of Peninsular Malaysia were determined from various stages of post-larvae, day of culture (DOC) and broodstocks. The objective of this study is to determine the prevalence status of AHPND infection in white shrimps and it's relation to the occurrence of bacteria *V. parahaemolyticus* in their culture systems. The plasmid and Toxin 1 from AHPND *V.parahaemolyticus* bacteria were determined using Polymerase Chain Reaction (PCR) method and their correlations with Vibrio spp. in the culture systems were determined. About 1.3% prevalence of toxin 1 AHPND was detected in white shrimp culture in Kedah and zero case in Perak. Slightly higher prevalence of plasmid AHPND detection, 7.1% was found in Perak with somewhat similar prevalence percentage of *V. parahaemolyticus* bacteria , 7.1% occurred in white shrimps cultured in Perak and Kedah, 5% and 5%, respectively. High prevalence of *V. vulnificus* was isolated from hepatopancreas of *L. vannamei* in Kedah and Perak, 32.5% and 14.3% respectively.

Keywords: AHPND; Vibrio parahaemolyticus; Toxin 1; plasmid; white shrimp

O-AH-D5

Correlation between Blood Glucose Level and Ectoparasites Infestation Level of White Shrimp (*Litopenaeus vannamei*) on Culture System with Different Stocking Densities and Maintenance Time

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Abstract

This study aims to determine the correlation between blood glucose level and ectoparasites infestation level of white shrimp which are cultured at different stocking densities and maintenance time. This research was experimental using Factorial Completely Randomized Design (CRD) consists of two factors namely factor A stocking densities which consists of A1, A2, A3 and factor B maintenance time which consists of B1, B2, B3, B4, B5 with six replications. Each maintenance tank was filled with 10 shrimps (A1), 15 shrimps (A2) and 20 shrimps (A3) in 15 L of brackish water. The highest blood glucose level was 63.83 ± 3.71 mg/dL occurred in white shrimp with a high infestation level was 116.17 ± 3.71 zooid on the 0th day of maintenance with a stocking density of 20 shrimps/15 L. While the lowest blood glucose level was 31,50 ± 4.85 mg/dL occurred in white shrimp with a medium infestation level was 44.50 ± 3.08 zooid on the 28th day of maintenance with stocking density of 10 shrimps/15 L. There was a correlation between blood glucose levels and ectoparasite infestation level in all stocking densities which show a positive correlation (r=0.9). Positive correlation shows that the higher the blood glucose level, the higher the level of ectoparasite infestation.

Keywords : stocking densities, maintenance time, white shrimp, blood glucose level, infestation ectoparasites level

O-AH-D6

Microbial Diversity of Shrimp Gut Harvested from Infected Pond and Uninfected Pond

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Abstract

Aquaculture production of the *Penaeus vannamei* and *Penaeus monodon* is one of the largest in Malaysia for crustacean species. However, shrimp industry in Malaysia has been reported with early mortality syndrome (EMS) since 2010 and affected in the big market lost. Studies of microbial diversity is the best approach in order to distinguish the infected shrimp and the normal shrimp. Unfortunately, aquaculture-related microbiome studies impact of early mortality syndrome outbreaks on shrimp production in the region are not well documented. In this study, 16S DNA metagenomics analysis method were used to investigate the microbial diversity of shrimp guts from infected EMS shrimp pond and uninfected shrimp pond. Microbial diversity of the normal shrimp gut was found to be generally lower than infected shrimp with a few ubiquitous genera representing a majority of the shrimp gut microbial diversity such as *Vibrio* and *Photobacterium, Pseudomonadaceae , Moraxellaceae* and *Rhodobacteraceae*. These findings provide valuable information on the microbial community and contribute to control the diseases in shrimp farms.

Keywords: EMS, Microbiome studies, Metagenomic, *Vibrio*, Diseases

O-AH-D7

Characterization of Bacterial Communities Associated with Black Tiger Shrimp (*Penaeus monodon*) at Early Life Stages

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Abstract

Gut microbiota is known for their important benefits to their host such as enhancing nutrient absorption, metabolism, immune response and disease resistance. Establishment of bacterial in a host has been studies in many animals, however, there has not been studied to reveal bacterial community associated to early developmental stages of black tiger shrimp (*Penaeus monodon*). We aimed determine bacterial community associated to the early life stages, which were nauplius, zoea, mysis and postlarvae using amplicon sequencing of 16S rRNA gene. We found that the dominant bacterial phyla were *Proteobacteria*, *Bacteroidetes* and *Planctomycetes*, and these phyla were also found as core microbiota associated through developmental stages. Moreover, bacterial communities associated with black tiger shrimp were different from their rearing water, and bacterial profiles had more similar pattern when shrimp developed to postlarva. These results suggested that the differences of shrimp physiology, morphology, diets and immune level could influence on bacterial profiles of black tiger shrimp at different developmental stages.

Keywords: Black tiger shrimp, Microbiota, Early developmental stages, Core bacteria

O-AH-D9

Antiparasitic Activity of a Medicinal Plant against the Marine Leech *Zeylanicobdella arugamensis* (Hirudinea)

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Abstract

Zeylanicobdella arugamensis, a marine parasitic leech is currently affecting different species of cultured groupers in southeast Asian countries by sucking the blood and cause lesions on the body surface of groupers. The objectives of the present study were to reveal the antiparasitic activity of *Dillenia suffruticosa* (Dilleniaceae), a medicinal plant found in Sabah against the *Z. arugamensis* and also to determine its phytochemical composition. The leech infested hybrid groupers were collected from aquaculture facilities and the isolated leeches were challenged against *D. suffruticosa* leaves extracts. The experiment was carried out using various concentrations of the methanol extracts of *D. suffruticosa*. The methanol extract of *D. suffruticosa* showed significant antiparasitic activity against *Z. arugamensis* with 100 % mortality. The phytochemical composition of the methanol extract was determined using GC-MS analysis to understand the nature of the principal compounds responsible for its anti-parasitic properties. Thus, it could be revealed that the methanol extract of *D. suffruticosa* leaves mainly contain vital phytochemical compounds and showed an effective antiparasitic activity against the harmful leeches of hybrid groupers. The obtained positive results would be highly beneficial to fish farmers of Southeast Asian countries to control the parasites.

Keywords: Antiparasitic activity, Hybrid Grouper, Leech, *Zeylanicobdella arugamensis*, Phytochemicals

O-AH-D10

Gills and Hepatopancreas Histopathological Evaluation in Giant Freshwater Prawn, *Macrobrachium rosenbergii* Exposed to Methanolic Extract of Gelam, *Melaleuca cajuputi* Leaves

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Abstract

The tissue damage induced by a variety of organic pollutants in aquatic animals is well documented. There is a dearth of information related to histological alterations induced by medicinal plants in giant freshwater prawns of the genus *Macrobrachium.* In the present study, giant freshwater prawn, *Macrobrachium rosenbergii* (5.98 ± 0.54 cm length; 2.45 ± 0.75 g weight) were exposed to three different concentrations of methanolic extract of *Melaleuca cajuputi* (0.283 g/L, 0.566 g/L and 0.849 g/L) for 24 h exposure period as an endpoint of treatment. The median lethal concentration (96 h LC_{50}) of the *M. cajuputi* extract was 2.83 g/L. The *M. cajuputi* extract caused several histopathological lesions in the gills and hepatopancreas of *M. rosenbergii*. The histopathological lesions in gills included accumulation of hemocytes in the hemocoelic space, swelling and fusion of lamellae, abnormal gill tips, necrotic and clavate-globate lamellae, while lesions in hepatopancreas such as thickening of basal laminae and necrosis of the tubules. The results attained suggested that the gills and hepatopancreas of *M. rosenbergii* exposed to *M. cajuputi* extract were structurally altered. Such alterations possibly will affect the vital physiological functions in gills, for instance respiration, osmotic and ionic regulations role, absorption, storage and secretion in hepatopancreas. These possibilities will lead to the declination of survival and growth of *M. rosenbergii* and amplified the mortality. The *M. cajuputi* extract was less toxic to the *M. rosenbergii*, but at the same time can gives significant histopathological effects.

Keywords: *Macrobrachium rosenbergii*, *Melaleuca cajuputi*, Histopathological, Gills, Hepatopancrea

O-AH-C1

Application Probiotics Of *Bacillus* And *Pseudomonas* Towards Survival Rate And Total Vibrio In Digestive Tract And Culture Media Of White Shrimp (*Litopenaeus vannamei*)

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Abstract

Intensive culture of white shrimp increased feed residues and shrimp feces, so it makes water quality decreased and increased diseases on shrimp. Vibriosis is one of the bacterial disease of shrimp caused by *Vibrio*. The study aims to know the effect of probiotics in culture media to decrease total *Vibrio* and increase survival rate of white shrimp. Experiment designed in a completely randomized design (CRD), which consisted of 4 treatments and 4 replicates. The treatment consisted of *B. subtilis, B. mycoides, and P. diminuta* with a dose of 10^6 cells / ml, 10^7 cells / ml, 10^8 cells / ml , and control (0 cells / ml). The statistic analysis results showed that the application of probiotics *Bacillus* and *Pseudomonas* had a significant effect on total *Vibrio*. Based on Duncan's test, the results were significantly different from the total *Vibrio* in the digestive tract and culture media of white shrimp, but not significantly different from the survival rate of the white shrimp. The results showed that the optimal dose for white shrimp was 10^8 cells / ml with a survival rate of 89.06%, total *Vibrio* in the digestive tract 1.51 x 10^4 CFU / ml and total *Vibrio* in maintenance media 1.50 x 10^3 CFU / ml. This shows that the application of probiotics in culture media can decreased total *Vibrio* in digestive tract and water, and increased the survival rate of white shrimp.

Keywords: White Shrimp, Probiotics, Vibrio, Survival Rate

O-AH-C2

Detection of White Spot Syndrome Virus (WSSV) from Wild Crustaceans in Myeik, Tanintharyi Region, Myanmar

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Abstract

Study on crustacean viruses have been conducted throughout the world. However, only few studied are published on this in Myanmar. Many viruses and bacteria caused pandemics adversely affected the global crustacean farming industry. The socioeconomic impact of the diseases caused by these have been so severe in some crustacean producing countries of Asia and the western hemisphere (Americas) that they were listed by the World Animal Health Organization as posing a significant disease threat to cultured and wild crustaceans as a consequence of international trade or movement of infected crustaceans. The aim of the present study was to investigate the presence of white spot syndrome virus (WSSV) in crustacean from Tanintharyi Region, South of Myanmar. A total of 25 individuals from study site were collected. The present study was carried out at Laboratory of Aquatic Bioscience, Department of Zoology, University of Yangon. Pleopods from the mantis shrimp *Harpiosquilla sp.* (n=2) and gills from the mud crab *Scylla sp.* (n=23) were collected separately from each individual and fixed in ethanol. WSSV was then detected by single PCR method. For DNA extraction, the Qiagen blood and tissue kit was used according to manufacturer's protocol. According to OIE (World Organization for Animal Health) list primer WSI3 and WSI4 were used. Two samples of mantis shrimps and ten samples of mud crabs were found positive for WSSV.

Keywords: White sport syndrome virus, mantis shrimp, mud crab, PCR

O-AH-D1

Microspordian Parasite *Enterocytozoon hepatopenaei* (EHP) Infection in Potential Animal Vectors from Shrimp (*Litopenaeus vannamei*) Cultivating Ponds

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Abstract

Infection of microsporidian parasite, *Enterocytozoon hepatopenaei* (EHP) became a major problem faced by shrimp cultivating industry in Asia countries including China, Malaysia, Thailand, Indonesia, and Vietnam. The outbreak of this microsporidian parasite is related to the existence of living host/s of EHP that acts as the vector. However, the potential vector host/s of EHP in rearing ponds is still unknown. In this study, screening of EHP on possible vectors was conducted from cultivating ponds of *Litopenaeus vannamei* in Penang, Kedah, and Johor, Malaysia. A total of 92 specimens (class: Malacostraca, Polychaeta, Bivalvia, Gastropoda, Actinopterygii, Insecta) were amplified through polymerase chain reaction (PCR) assay targeting gene encoding spore wall protein (SWP) of EHP (SWP-PCR). The results show high infection of EHP from Penang, Kedah, and Johor with 100% (Malacostraca, Actinopterygii, Insecta), 82.76% (Malacostraca, Bivalvia, Gastropoda) and 86.96% (Malacostraca, Polychaeta, Bivalvia, Gastropoda) respectively. This finding suggested that some species of aquatic animals that co-inhabited with *L. vannamei* could be a potential transmission vector and must be eradicated from the cultivating pond. However, further investigation of the infected aquatic animal with EHP needs to be carried out to determine whether they were also susceptible to EHP infection or acts as a mechanical carrier.

Keywords: *Enterocytozoon hepatopenaei* (EHP), microsporidian parasite, Spore wall protein (SWP), *Litopenaeus vannamei*, parasites – vector

O-AH-C4

Diversity of *Vibrio* species' in *Penaeus monodon* Cultured in South-West Farming Region of Bangladesh and Their Antibiotic Resistance Patterns

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Abstract

The shrimp aquaculture is rapidly expanding; but diseases have contributed to billions of dollars of economic loss in this industry. To date, about 130 species of Vibrios have been described and some of the *Vibrio* species causes diseases of aquatic animals, including *V. parahaemolyticus* as pathogenic agent of EMS/AHPND and *V. harveyi* responsible for luminous vibriosis. This study was conducted to identify the species of *Vibrio* prevail in the shrimp farming of Bangladesh using 16S rRNA gene sequencing. The samples were collected from Bagerhat and Satkhira districts. Different *Vibrio* selective agar media were used for the primary isolation. Chromosomal DNA of the selected isolates were extracted followed by amplification of the 16S rRNA gene by PCR. Amplicons were sequenced followed by phylogenetic analysis. The *Vibrio* strains were tested against 12 commonly available antibiotics. The studied V32 and V38 strains showed 99% similarity with *Vibrio azureus*. V9 and V33 strains showed 100% identity with *Vibrio fluvialis*. Comparison of gene sequence of V37 with sequence from GenBank showed that the strain is *Vibrio xuii*. The phylogenetic tree indicates that V24, V26, V34 and V35 were closely related with *Vibrio parahaemolyticus*. V28 and V31 were found to be as *V. vulnificus*. One strain of *V. cholerae* was also identified. Moreover, V22 was identified as *Photobacterium damselae*, V25 as *Aeromonas hydrophila*. Twelve strains (V9, V22, V24, V26, V28, V32, V33, V34, V35, V36 and V37) of *Vibrio* spp. were resistant to Amoxycillin (10µg) whereas all 16 strains of *Vibrio* spp. showed sensitivity to Nitrofurantoin, Sulphamethoxazole, Chloramphenicol, Ciprofloxacin and Tetracycline.

Keywords: 16S rRNA; AHPND; Black Tiger Shrimp; Antibiotics susceptibility; *Vibrio parahaemolyticus*

Session 5 : Fisheries Socioeconomies,Gender, Education and Extension

Session 5 : Fisheries Socioeconomies,Gender, Education and Extension

Bunga Anggerik Room A

November 19, 2019 (Tuesday)		
Time	**Title**	**Code**
Chairperson: Dr. Sarawuth Chesoh		
11:00-11:30	**Refreshment and Poster Viewing**	
11:30-12:30	EURASTiP Special Session	
12:30-14:00	**Lunch**	
14:00-14:15	**Marine Biodiversity and Tourism Development in Sensitive Ecosystems: Lessons learned and Experience from Thailand** Chesoh Sarawuth[a*], and Amornsakun Thumronk[a]	O-FS-B8
14:15-14:30	**Community-based Environmental Education in Coastal Regions and its Role in the Conservation of Fishery Resources (Case Study in Southern Coastal of West Java, Indonesia)** Atikah Nurhayati[a*], Isah Aisah[b], and Asep K Supriatna[b]	O-FS-B10
14:30-14:45	**Development of BSc and MSc Fisheries and Aquaculture Degree Programs in Myanmar** Kay Lwin Tun[a*], Kevin Fitzsimmons[b], Hillary Egna[c], Hendrik Stolz[b], Uwe Scholz[b], and Peter Buri[b]	O-FS-C1
14:45-15:00	***LakbayTuro*: A Public Service Engagement on Fisheries Education for Sustainable Management and Conservation** Genna D. Serofia[a*], Liberty N. Espectato[a], and Ruby P. Napata[a]	O-FS-C2
15:00-15:15	**Enhancing Standard of Andaman Local Fisherman to be Smart Fisherman** Ananya Jarernpornnipat[a], Suneeporn Suwanmaneepong[a], Soraya Kerdpiboon[b], and Panvit Tuwanut[c]	O-FS-C3
15:15-15:30	**Analysis of Ecological Structures and Functions for Management on Landing Fishes of Andaman Sea Ecosystem, Thailand** Nichakan Srithong[a] and Ananya Jarernpornnipat[a*]	O-FS-B7
15:30-15:45	**Public Perception in General and Students Perception Toward Marine Debris in West Aceh**	O-FS-B9

	Ika Kusumawati[a*] and Mita Setyowati[b]	
15:45-16:00	**Comparative Headwater Land Use Base on Biotic Index to Assess Status of Cisadane's River Headwater** Majariana Krisanti[a*], Yunita Magrima Anzani[b], and Yusli Wardiatno[a]	O-FS-C4
16:00-16:15	**Wave Heights Analysis with Different Return Periods for Sailing Safety in Jakarta Water** Nurin Hidayati[a*]; Haris Rifqi Maulana[a]; Dhira Kurniawan Saputra[a], and Hery Setiawan Purnawali[b]	O-FS-B2
16:15-16:30	**Design of Eco-friendly Fishing Gear in Marine Area of Tuban District, East Java** Faizal Rachman[a*], Eko Setyobudi[a], Supardjo S.D[a]., and RizaYuliratno Setiawan[a]	O-FS-B3
16:30-17:00	**Refreshment and Poster Viewing**	
Chairperson: Dr. Sarawuth Chesoh		
17:00-17:15	**Effects of Coastal and Fisheries Tourism to Local Fishers of Small Islands : The Case of Isla Gigantes, Philippines** Cherry Pilapil Añasco[a*], Harold M. Monteclaro[a], Joy C. Lizada[b], Liah Catedrilla[a], and Carlos Baylon[a]	O-FS-B4
17:15-17:30	**Are Farmers Willing to Implement for Traceability? Evidence from Double-Bound Choices Experiment of Vietnamese Shrimp** Khuu Thi Phuong Dong[a,b*], Nguyen Thi Ngoc Hoa[a], Yoko Saito[c] and Takashi Matsuishi[d]	O-FS-B5
17:30-17:45	**Assessments of Fisheries Management in Small-Scale Fisheries - Evidence from Blue-Swimming Crab Fisheries in Kep, Cambodia** Takano Keiko[a*], Jariya Sornkliang[b], and Matsuishi Takashi Fritz[c]	O-FS-B6
17:45-18:00	**The Education Status of Fishermen Family and the Impact to the Socio Economy of Coastal Community in Merchang Lagoon, Terengganu, Malaysia** Alfian Zein[a*], Nurul Amalina binti Amaludin[a], and Nurul Syafiqah binti Suhairi[a]	O-FS-B1

O-FS-B8

Marine Biodiversity and Tourism Development in Sensitive Ecosystems: Lessons learned and Experience from Thailand

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Abstract

Attractive tourism destination usually occupies various spectacular ecosystem that consists of interesting and amazing places. Biodiversity provides different roles in different types of tourism. Over 50% of global tourist prefer to travel outdoor recreation of natural environments. Therefore, "Biodiversity and Tourism hotspots" are predominant unseparated components for socio-economic development. To sustain healthy biodiversity, growing tourism and local poverty reduction, functions must be planned, directed and managed together. Moreover, sensitive ecosystem, ecologically fragile, rare or at-risk ecosystems in the region, needs more strengthening both law enforcement and network collaboration between community and official authorized agents. In Thailand, revenues from tourism made up 12.3% of Thailand's GDP in 2016. Thailand is one of Southeast Asia that is true biodiversity hotspot from the top of mountains in the North to the deep of the ocean in the South. A total of 147 national parks, 58 wildlife sanctuaries, 67 non-hunting areas, and 120 forest parks, covering 20% of the Kingdom's territory, were announced. Outdoor tourism highlights strongly on popularity and recreational opportunities. However, marine biodiversity in sensitive ecosystems is under pressure, devastating, damaging and environmental deterioration. Several tourism-related activities have been recognized to assert the negative impact on wildlife habitat, threatened species and its community. Overcapacity and volatile demand are currently happening. Seasonal closure, quota and limited entry were regulated. From experience, we strongly request for (1) clearly establishing of strictly conservation zoning, (2) stop deforestation and encroachment, (3) public participation, (4) creation and sharing of environmental knowledge and sustainable tourism across communities and networks and (5) strengthening of law enforcement. Finally, Best Practice Benchmarking of sustainable tourism for marine biodiversity protection is required.

Keywords: Abundance, Ecosystem services, Outdoor recreation, Adventure tourism, Southeast Asia

O-FS-B10

Community-based Environmental Education in Coastal Regions and its Role in the Conservation of Fishery Resources (Case Study in Southern Coastal of West Java, Indonesia)

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Abstract

The southern coastal regions of West Java in Indonesia has the potential of fisheries and conservation of fisheries resources. Most of the people living in coastal areas, of livelihood as a fisherman. Fishermen have an important role as an actor in environmental conservation protected, managed by the zoning system for the sustainability of fisheries resources. This research aims to analyze factors that influence the level of community-based environmental education in coastal regions and their role in conservation of fisheries resources. The method used in this research is a case study using primary and secondary data. The number of respondents used in this research was 30 respondents, with a purposive sampling technique of taking respondents. The analysis tool used in this research is multiple linear regression. Based on the results of this research, factors that influence the level of community-based environmental education in coastal areas, namely internal and external factors of coastal communities, especially fishermen. Internal factors include age, education, experience as fishermen, income level, type of vessel, type of fishing gear. External factors include local and central government policy, the role of education in the conservation of fisheries resources, enforcement of the rules of conservation of fisheries resources, the role of stakeholders concerned with conservation of fishery resources.

Keywords: Education, Coastal areas, Environment, Conservation, Fisheries resources

O-FS-C1

Development of BSc and MSc Fisheries and Aquaculture Degree Programs in Myanmar

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Abstract

Myanmar is one of the top fifteen countries on fisheries and aquaculture production and it has considerable future aquaculture potential due to its geography and abundance of natural resources. However, *traditional* extensive *farming* methods are practiced and the production is generally low when it is compared to neighboring countries. In 2014, USAID's project 'Developing a Sustainable Seafood Industry Infrastructure in Myanmar' had been launched at University of Yangon (UY) to expand the capacity of higher education institutions in Myanmar to support the development of an intensive marine and inland fisheries sector. During the three years of the project, we developed a Seafood Safety Laboratory in UY. More than 450 faculty members and students from 44 universities have been trained in the laboratory. In 2017, according to the country needs, Ministry of Education and Ministry of Agriculture, Livestock and Irrigation selected UY to establish a new undergraduate study program for Bachelor of Science (BSc) in Fisheries and Aquaculture within the Academic Year 2018. Based on the needs of Government and private sector, Deutsche Gesellschaft für international Zusammenarbeit (GIZ) launched the 'Myanmar Sustainable Aquaculture Programme (MYSAP)'. MYSAP has invited international experts to develop the competency based curriculum together with faculty members from UY. In December 2018, the first bachelor degree program (BSc Fisheries and Aquaculture) was launched in University of Yangon with 40 students. The curriculum in the new courses has been based on competency which is divergent from our traditional teaching methods. The MSc will be launched in 2020-2021 academic.

Keywords: Fisheries and Aquaculture, Education, Myanmar, University of Yangon, USAID, MYSAP

O-FS-C2

LakbayTuro: A Public Service Engagement on Fisheries Education for Sustainable Management and Conservation

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Abstract

The university play a vital role in advocating for marine environment protection and conservation in all educational levels especially to "disadvantage" public schools. The aim of *LakbayTuro* activity is to develop the understanding and appreciation of elementary and high school students on the importance of protecting the marine environment. Participants of the activity are the Grades 5 and Third year high school students from the different public schools in the municipalities of Miagao and San Joaquin, Iloilo, Philippines. Since its implementation in 2011, there were already 16 *LakbayTuro* activities conducted. Short lecture-orientation, video/film showing, several creative art activities were the methods used. Pre and post evaluation was administered to the students and results showed considerable increase in their mean scores. Teachers-in-charge did an evaluation of the activity and results showed a rating of Very Good to Excellent.This paper presents the experiences in conducting *Lakbay Turo (LaRo)* as a public service program of the Institute. The best practices and challenges learned from LaRo as a non-formal channel of environmental education are also presented.

Keywords: Public service, Marine environment literacy, Environmental protection, sustainable management, Fisheries education

O-FS-C3

Enhancing Standard of Andaman Local Fisherman to be Smart Fisherman

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Abstract

The importance of maintaining the environment and sustainability of marine aquatic resources may concern. According to the degradation of fisheries resources and coastal ecosystems along Andaman coast which may affected from overfishing and intensive tourism. To solve these problems, resource users capacity building is one of the appropriate options enhancing the Andaman local fisherman to be smarter fisherman, which may contribute to reach sustainable development. The objectives of the Andaman local fisherman capacity building were 1) to increase their income and quality of their life, and 2) to combine innovation and new technology with their conventional fishing activities. The strategies to enhance the Andaman local fisherman's living standard was done by providing a series training programs which were cooperated with provincial fishery officers from Phuket Phangnga and Krabi Provinces.; The first training program, responsible fishery, aimed to educate the trainees to clearly understand the suitable fishing tools, legal mesh size of trawl nets, fishing methods, legal registration of fishery boat, legal fishery of sustainable environment responsibility. The second program was fishing gears construction/production, based on the fishing law and regulations. The third program was about fishery product, which focused mainly on the fish freshness assessment, primary preservation techniques and value-added fishery product. This program was conducted to ensure consumers about product cleanliness. The last program was about smart phone applications for smart fisherman. Two major applications were Smart fisherman application and Saphan Pla. The 420 smart fishermen were passed these programs and upgraded to be mart fisherman following MOAC criteria of smart farmer. Project evaluation was done based on some parameters including fishing income, economic value of fishery resources in the study area and socio-economic impact assessment. The implementation of this project encourages local fisherman participation, increase their living standard and also promote sustainable resource use.

Keywords: Enhancing, Local fisherman, Smart fisherman, Andaman, Fisheries management

O-FS-B7

Analysis of Ecological Structures and Functions for Management on Landing Fishes of Andaman Sea Ecosystem, Thailand

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Abstract

The productivity of marine ecosystems, habitats, and Andaman coastal fisheries have been deteriorated; overfished, overexploited and several sources of pollution from tourism activities may cause a decline to fishery production. It might be affected to ecosystem structures and functions. This study aimed to investigate trophic structures and ecosystem functions of fishes from fisheries by using Ecopath mass balance model to estimate important biological parameters. The model simulation was based on the data; length, weight and diet composition. These were collected from artisanal fisheries and commercial fisheries in Krabi, Phuket and Phangnga provinces. Furthermore computed data for ecopath model were biomass, trophic level and ecotrophic efficiency that estimated of structures and functions along Andaman sea coast of Thailand. The analyses of Ecopath model have determined the impacts on different functional groups divided into 55 groups. The estimated mean trophic level of catch was 2.68. This result has shown that the average values of Ecotrophic Efficiency (EE) were high (>0.6) indicated excessive exploitation of fisheries resources in this area. A top predator in food web was trophic levels at 3.66 for *Istiophorus platypterus*. Phytoplankton and detritus have a positive impact on most groups especially Planktivorous fishes played an important role for linking between the lower trophic organisms and top predators. The mixed trophic impacts pointed to the importance of top-down control influence of high trophic level fishes are the target of fisheries in the Andaman Sea. This present study can serve as support data for Fishery Improvement Projects (FIPs) in order to achieve management the sustainability of marine resources utilization.

Keywords: Ecopath mass balance model, Trophic level, Structures, Andaman Sea

O-FS-B9

Public Perception in General and Students Perception Toward Marine Debris in West Aceh

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Abstract

Marine debris is any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment. in 2010, Indonesia is the second highest contributor of marine litter as 1.29 million tons of plastics ended in marine ecosystem. One of the contributing factors on marine litter is the lack of understanding within the community and the community behaviour which reflected to public practices in littering. Children are social capital for community and the essential agents of social change. Students are sensitive to every issue that viral around the world such as environmental problem like marine litter. It was shown that many social movements are run by young people. However, they have issues in recognising the foundation and the explanation of environmental problem. Therefore, the purpose of this study is to enhance the public awareness and millennial generation on marine litter issue. The research objective is to evaluate societal perception and millennial generation towards marine litter. This study will employ a survey approach by distributing questionnaires to 300 respondents from general public and several senior high schools. It was found that respondents show low awareness on marine litter according to statistical data, but there are some rooms to manage in order to raise the level of awareness. It concludes that sense of responsibility could be enhanced by involving public in any activities for preventing and eradicating marine litter. Education aspect is also important to increase public understanding about the threats of marine debris on environment.

Keywords: Public Perception, Students Perceptions, Marine Debris, West Aceh

O-FS-C4

Comparative Headwater Land Use Base on Biotic Index to Assess Status of Cisadane's River Headwater

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Abstract

Monitoring of water quality in an aquatic ecosystem can be done in various ways, such as with the physical and chemical analyses of water and biological analysis. The use of biological materials as bioindicators in the management of aquatic ecosystem is needed, because the aquatic community composition and abundance are directly related to the ecological conditions or the health of aquatic ecosystems. The aim of this study is to analyse the benthic community with the SingScore biotic index to reveal the ecological status of Cisadane River's headwater. The research was conducted in the headwaters of Cisadane River located in Mount Halimun-Salak National Park. Macroinvertebrates were collected from four sites, i.e. inside the park (station 1, 2, 3, and 4) and from two sites outside the park (station 5 and 6). Collections were made once a month (April to October 2015) by using Surber sampler (frame area 30x30 cm). The results showed that based on SingScore, ecological status of Cisadane River's headwater was fair to excellent. Stations located outside national park were ecologically better than inside national park. Singscore index doesn't seem very suitable, if used in Cisadane's River's headwater. Previous study that was conducted using other indexes (LQI, FBI, SIGNAL 2) show quite different result. This is presumably because, Singscore cannot give the entire score value for benthic macroinvertebrate organism.

Keywords: Bioindicator, Benthic Macroinvertebrate, Ecological status, River,

O-FS-B2

Wave Heights Analysis with Different Return Periods for Sailing Safety in Jakarta Water

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Abstract

Sea waves is one of the important parameters in the field of fisheries and marine. Information on sea waves is essential for sailing safety and shipping activities. Therefore, required a study of hydro-oceanography especially waves characterictics to support fisheries and marine activities.The wave data used is time series wave data for several years as well as large wave data. The data of large waves occurring in a waters are obtained from the forecasting of the return period using the Weibull distribution. Extreme wave forecasting conducted in this study is located in the vicinity of Waters of Jakarta. The aims of this research are to know the waves characteristics and to analyze waves forecasting with return period of Northern Waters of Jakarta. This study was conducted using *The European Centre for Medium-Range Weather Forecasts* (ECMWF) waves data for the last 15 years (2003-2017) and wave height data obtained from BMKG Indonesia during the last 10 years (2008-2017) as comparison data. The results obtained from this research are wave characteristics data in Jakarta Water such as significant wave data (Hs), maximum wave data (Hmax), and wave period return data over 100 years. The highest wave height in the waters of North Jakarta takes place in the Sunda Strait in the West season, especially in January. The wave height of the return period occurring around the North Jakarta Waters has varying values. The value of the wave length of the return period in the Sunda Strait waters ranged from 1.97 to 2.49 meters for a return period of 10 - 100 years. The re-wave wave heights in the waters of Tanjung Kait and Teluk Jakarta have elevation values ranging from 1.54 - 1.88 meters for repeated periods of 10 - 100 years. Based on the calculation of the return period wave, wave height of 2 meters can endanger the safety of fishing boats and barges sailing around the waters of North Jakarta.

Keywords: Waves, Jakarta Waters, Return period, Sailing safety

O-FS-B3

Design of Eco-friendly Fishing Gear in Marine Area of Tuban District, East Java

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Abstract

The research about design and application of eco-friendly fishing gears was conducted in the marine area of Tuban, East Java comprising Jenu and Glondong gede sub-districts. The method used in this study was modelling and application design of eco-friendly fishing gear in the form of longline fishing, fish pots, gill nets, and fish pots in the waters. In each type of fishing gear, the design was made by forming a new model or modification of what has been widely used by the community. The fishing gear then applied to fish activities directly. Data observed included catch rate, composition, and size of the catch. The data obtained were analyzed quantitatively and descriptively to determine the type of fishing gear that provides maximum results and does not have an environmental impact. The selected fishing gear then will be repaired and modified in the term of the design and operational techniques so that the eco-friendly fishing gear is more applicable and efficient. The design of eco-friendly fishing gear tested in the marine area of Tuban included 3 types of fishing gear, namely fish pots with modifications to the shape of the mouth and the design of fish pots, gill nets with variations in mesh sizes i.e. 2, 3 and 4-inch, and vertical longline fishing hooks with differences the size of the fishing hook. The fish pots design obtaining the most catch was fish pots with a cube design and square-shaped opening, while in gillnets it was gillnets with 3-inch mesh size. Meanwhile, observation on vertical longline fishing hooks showed that hook size of 7 and 8 was able to get the most catch. Based on the results of the study, it is known that the fishing gear design effectively capturing the catch was fish pots with a cube design and square-shaped opening, and gillnets with 3-inches mesh size. Whereas, the vertical longline fishing hooks were less effective to be applied in the marine area of Tuban.

Keywords: Fish pots, by-products, Eco-friendly, Gillnets, Java sea, Vertical longline

O-FS-B4

Effects of Coastal and Fisheries Tourism to Local Fishers of Small Islands : The Case of Isla Gigantes, Philippines

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Abstract

In an archipelagic country like the Philippines, small islands are becoming popular destinations for recreation by mainland inhabitants. However, local fishing operations are affected by tourism activities such as swimming, snorkelling, diving and even establishment of MPAs for tourism purposes. Yet coastal and fisheries tourism (CFT) attractions like these can be a potential strategy for coastal resource management. This paper analyzed the effects of CFT on the livelihood of small island fishers particularly in Isla Gigantes, Philippines. Using simple random sampling, a Delphi survey of 102 fishers was conducted to determine significant difference in income before and after the introduction of CFT in the island and whether there is significant number of fishers benefitting from CFT. Statistical techniques such as paired t-test and Chi-square test were performed. Results showed that at $\alpha = 0.05$, the estimated present monthly income is significantly higher ($t = 2.277$; degrees of freedom, $df = 101$, p-value = 0.025) compared to the income prior to the introduction of CFT in Isla Gigantes. Interestingly, t-test further showed that there is no significant difference in income between fishers whose livelihood is solely fishing and those fishers with supplemental/alternative livelihood (e.g. carpentry, fish trading or vending, small variety store owner, farming, shell fish shucking and driving a motorcycle that cater passengers). Moreover, the number of fishers who benefited from CFT is significantly higher (X-square = 25.118, $df = 2$, p-value = 0.000). These findings are crucial in making informed decisions for the effective management of marine fisheries in small islands and for a sustainable CFT. Tourism in small islands like Isla Gigantes will benefit both fishers and the fishery resources since CFT activities become sources of supplemental or alternative livelihoods that will hopefully lead to reduction in fishing efforts in waters off small islands. CFT, therefore, indirectly becomes an enticing CRM strategy.

Keywords: Coastal and fisheries tourism, Coastal resource management, Small island, Supplemental livelihood

O-FS-B5

Are Farmers Willing to Implement for Traceability? Evidence from Double-Bound Choices Experiment of Vietnamese Shrimp

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Abstract

This study aimed to investigate willingness to implement (WTI) and the expected farm-gate price for traceability implementation by using double bound choices experiment methods. Besides that, Censored Regression Model (CRM) was explored to estimate the factors influencing to the expected price of shrimp farmers for implementation of traceability. Interview survey was conducted to collect information of 114 farmers in Ca Mau province, Vietnam. The samples included 32 certified Aquaculture Stewards Councils (ASC) farmers and 82 non-certified ASC farmers. Found result indicated that, 32 of 32 (100%) ASC certified farmers in the samples were WTI for traceability. In order to implement traceability, *Penaeus monodon* shrimp farmers expected the minimum farm-gate price at 10.2 USD per kg, while *Litopenaeus monodon* shrimp farmers supposed at 6.2 USD per kg for shrimp products. Based on the estimated results of CRM, the application of ASC certificates negatively influenced to the expected price of shrimp farmers for traceability implementation, confirmed that ASC certified shrimp farmers were more WTI for traceability, comparing to non-certified ASC farmers. Found results suggested that the application of ASC certificates might involve the implementation of traceability for shrimp products. However, in the future, the increases in farm-gate price for certified shrimp products should be considered to enhance for the application of ASC towards to implement traceability.

Keywords: Vietnamese shrimp, Traceability, Aquaculture stewards councils (ASC), Double-bound choices, Willing to implement

O-FS-B6

Assessments of Fisheries Management in Small-Scale Fisheries - Evidence from Blue-Swimming Crab Fisheries in Kep, Cambodia

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Abstract

Small-scale fisheries play an important role for food security, nutrition, poverty erudition and livelihood for all over the world. Especially in Southeast Asia, it has a quarter of global fish production and large number of people are engaging fisheries. In Cambodia, 670 thousand people are engaging fishing, and most of them are small-scale fisheries. In Kep province, Cambodia, main product is blue-swimming crab which is one of the valuable and vulnerable resources. Kep can be an exemplary of small-scale fisheries. To establish sustainable use of fish resources, appropriate fisheries management is required. Fisheries management aspects can be classified into 8 categories such as 1. Basic information of current situation, 2. Maintenance/Rehabilitation of the Ecosystem, 3. Management of efforts, 4. Management of harvest, 5. Business improvement 6. Post-harvest treatment/processing, 7. Human and organizational capacity, 8. Assessment and analysis capacity. Four actions will be conducted in each category such as Monitoring, Control, Surveillance and Activities (MCSA). This study assesses the fisheries management of blue-swimming crab in Kep province, Cambodia from categories l actions matrix by using Fishery Management Assessment Tool (FishMAT) which enable to conduct a qualitative interview survey systematically in data poor situation. From comprehensive survey, it was suggested that, among fairly good fisheries management performance, surveillance in most of the categories and all actions in category 4. (Management of harvest) are poorer. Further considerations on the background of the weakness could contribute for the future better fisheries management of small-scale fisheries in Southeast Asia and world.

Keywords: Evaluate fisheries management, Fisheries Management Assessment Tool

O-FS-B1

The Education Status of Fishermen Family and the Impact to the Socio Economy of Coastal Community in Merchang Lagoon, Terengganu, Malaysia

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Abstract

The objective of study is to analyse the impact of education status in fishermen family to the socio economy of coastal community. This study has been conduct in Merchang Lagoon, Terengganu, Malaysia since February until April 2019. The sample of fishermen has been collected by Slovin's Formula through 65 fishermen. The data has been used by descriptive and quantitative analysis. To analysis the factors that children motivation going to school by using path analysis. The result of study shows that the education level of fishermen have majority (58%) senior high school and only 40% primary school, with experiences as fishermen between 11-20 years (28%). Fishermen in Mercang Lagoon using gill net, trap net and hook and line in fishing activity. The income of fishermen from fishing activity is RM. 1,179.- / month, or around 65% from total household income. Fishermen household have less than 3 children per family (47%) and 4-5 children (29%). From 65 of fishermen family as sample, they have total children 156 persons. Around 32% the children are finish Primary school, 44% senior high school, and 24% academy/university. The level of fishermen education have a significant and positive relationship to the fishermen income (α=1%). As well as that fishermen income have a significant and positive relationship to the children education (α=1%). The factors that influence into the children motivation going to school are age of fishermen, fishermen income and distance of education facility. This study recommends that motivation for children to improve their studies must always be supported.

Keywords: Socio-economic of fishermen, Education, Children motivation

Session 6: Information Technology and Engineering

Session 6: Information Technology and Engineering

Bunga Anggerik Room A

November 20, 2019 (Wednesday)		
Time	**Title**	**Code**
Chairperson: Prof. Dr. Yukinori Murai		
17:00-17:15	**Site Site Suitability Assessment using Geographic Information System (GIS) to Increase Mussel Production in the Philippines** Dominique P. Mediodia[a*], Sheena Gweyn M. Maurin[a], Armi May T. Guzman[a], and Carlos C. Baylon[b]	O-IT-A1
17:15-17:30	**Development of LED Fishing Lamp Technology with Seawater Batteries System for Fixed Lift-net Fisheries in Banten Bay** Sugeng Hari Wisudo[a*], Adi Susanto[b], and Mochammad Riyanto[a]	O-IT-A2
17:30-17:45	**Monitoring Mangrove Forest Changes in Bengawan Solo River Delta, Indonesia Using Multi-temporal Satellites Imagery from 1972 to 2018** Mochamad Arif Zainul Fuad[a*], M. Arif Rahman[b] and Sri Cempaka Prima[a]	O-IT-A3
17:45-18:00	**High growth rate using new type demand feeding system with image processing program and fish behavior.** Yukinori Mukai[a*], Zahari Taha[c], Shahbudin Saad[a], Nai Han Tan[b], Khairul Muttaqin Ismail[b], Jessnor Arif[c], Mohd Azraai Mohd Razman[c] and Faeiz Azizi Adnan[c]	O-IT-A4

O-IT-A1

Site Suitability Assessment using Geographic Information System (GIS) to Increase Mussel Production in the Philippines

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Abstract

Sustainability of the culture site is critical to the success of the green mussel industry. Thus, it is important to identify potential areas where both hydrographic and biophysical conditions favor mussel growth. With the aide of geospatial technologies such as Geographic Information System (GIS) the present study was done to determine areas in the Philippines suitable for green mussel culture based mainly on the physico-chemical parameters. *In situ* water quality parameters (temperature, salinity, pH and dissolved oxygen) were measured from November 2016 – August 2017 and analyzed using weighted overlay analysis in ArcGIS 10.1 to evaluate its suitability. Thirty four (34) sites were validated. Eight sites were identified as existing mussel culture areas, 12 sites as less suitable and 14 sites as suitable. A total of 5,636.05 hectares were identified suitable for mussel culture which include Hagnaya, Cebu (32.85 ha), Calape, Bohol (446 ha), Misamis Occidental particularly in Murcielagos (365 ha) and Panguil Bay (237 ha), Placer, Surigao del Norte (71.5 ha), Sagay (32.5) and Hinigaran (36.6 ha) in Negros Occidental, Bais, Negros Oriental (1,300), Marinduque (1,480.2 ha), Buguey, Cagayan (36.3 ha), Mati (310 ha) and Panabo City (236 ha) in Davao, Bislig, Surigao del Sur (98.1 ha), Barotac Viejo, Iloilo (820 ha) and Lawi, Guimaras (134 ha). With proper coordination of different government agencies and local government units, suitable sites identified in this study could provide impetus for expansion of mussel culture leading to increased mussel production in the Philippines.

Keywords: Geospatial technologies, Green mussel, Aquaculture management

O-IT-A2

Development of LED Fishing Lamp Technology with Seawater Batteries System for Fixed Lift-net Fisheries in Banten Bay

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Abstract

Lift-net is one of the light fishing technologies which is spread in various coastal areas of Indonesia. There is an assumption that the application of brighter light will increase the catch. It hypothesis has encouraged fishermen to use large amounts of light and power, thus increasing the operational cost of fishing. The unavailability of fishing lamp that specifically designed for lift-net fishery caused fluorescent lamps to become the main choice, although it has high fuel and energy consumption and has a short technical life. The development of the light emitting diode (LED) technology has stimulated various studies to produce the effective, efficient and environmentally friendly of fishing lamp for lift-net fisheries.LED lamps require low power, so they can be combined with renewable energy sources (RES), one of them with a seawater battery. However, the use of seawater batteries on fishing activity is still limited, because of the high price of electrodes and limited availability. The purpose of this study is to produce technology of LED fishing lamp with energy sources from effective, efficient and environmentally friendly of seawater batteries for fixed lift-net fishery in Banten Bay.Research of Laboratory and fishing trial were conducted to determine the type and performance of LED fishing lamp technology with seawater battery system. Design engineering produces the best LED fishing lamp design having a main cross section length of 600 mm which is installed with a parallel configuration. Sea water batteries with spiral arranged Cu-Zn electrodes have a better technical performance so they can be used as an energy source for the LED fishing lamp. The results showed that the arrangement of 5 seawater battery cells in series connection was able to produce stable electricity with an average voltage of 4.01 V and a current output of 646.92 mA. The intensity of LED fishing lamp with seawater battery for two hours observation has averaged of 8 $\mu W/cm^2$. The response of fish to green LED fishing lamp is faster, more stable and more consistent both on a laboratory scale, research cages and during fishing trial with the fixed lift-net. The results of fishing trials indicate that the use of LED fishing lamps on the fixed lift-net has a higher effectiveness compared to fluorescent lights. The response of fish is faster and fish that have been concentrated in the main zone survive with a stable and consistent swimming behavior pattern especially on green LEDs. Fishing productivity with the LED fishing lamp is also higher than fluorescent lights.

Keywords: Banten bay, effectiveness, LED fishing lamp, lift-net, seawater batteries system,

O-IT-A3

Monitoring Mangrove Forest Changes in Bengawan Solo River Delta, Indonesia Using Multi-temporal Satellites Imagery from 1972 to 2018

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Abstract

Mangrove ecosystems provides ecological benefits, both for society and environment. However, the threat to changes in mangrove ecosystems is quite high due to illegal logging activities and conversion to aquaculture and industrial areas. This study aims to analyze the changes in distribution and density of mangrove in the Bengawan Solo Delta, Gresik East Java Indonesia in the period from 1972 to 2018 by using Remote Sensing and Geographic Information Systems. Image interpretation method is carried out by analyzing vegetation Index ; Normalized Difference Vegetation Index (NDVI) from Landsat Imagery. The results showed that the pattern of mangrove distribution in the period 1972 to 2017 varied, from those concentrated on the coastline, estuary and ponds edges to those that spread throughout the area. The highest total mangrove area in 2017 was 1400 ha and the lowest in 1994 was 590 ha. The classification of mangrove density levels consists of three classes: dense, medium and sparse mangroves. The most dominant density level is sparse mangrove at 68.51%; whereas medium mangrove is 10.51%; and dense mangroves at 20.98%. NDVI values range from -0.72 to 1. In general, changes in mangrove have additional extents, but the drastic reduction occurred in 1994. It is mostly caused by the extentification of tiger shrimp (Penaeus monodon) cultivation that opens large areas in the mangrove area.

Keywords: Monitoring, Mangrove Forest, NDVI, Landsat Imagery

High Growth Rate using New Type Demand Feeding System with Image Processing Program and Fish Behavior.

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Abstract

Demand feeding system serves feeds to fish, when fish switch on feeders. Although demand feeding system has advantages, it still has problems, e.g. hierarchy problem of fish school and system learning period problem for fish. New type of demand feeding system was developed to solve these problems using fish behaviour and image processing system. At first, behaviour experiment was conducted using the image processing software Roborealm to obtain the optimum parameter for computer program. Through the behaviour experiment, two typical behaviour patterns were detected. When fish was hungry, fish group came to the water surface (H: parameter >63%), and when fish was not hungry, fish came to bottom (L: <45%) of fish tank. These two parameters were obtained and were put into the computer program in the workstation. HD Wi-Fi camera continuously recorded the real time fish behaviour in fish tank, and when fish group came to above the "H", then the command was sent from workstation to microcomputer to send the order to feeding device to feed on. The results of feeding experiment showed this system could provide pellets to fish day and night time equally following fish behaviour. This feeding system could provide the pellets to fish based on fish requirements. The growth rate was higher than other feeding system (timer feeder and demand feeder using an infrared light sensor).

Key words: Demand feeder, behaviour, image processing system, computer program

Session 7: Postharvest, Fish Product and Food Safety

Session 7: Postharvest, Fish Product and Food Safety

Bunga Anggerik Room A

November 20, 2019 (Wednesday)		
Time	**Title**	**Code**
Chairperson: Dr. Indun Dewi Puspita		
10:00-10:30	**Refreshment and Poster Viewing**	
10:30-10:45	**Growth Rate and Histamine Production of Histamine-producing Bacteria Isolated from Skipjack Tuna** Indun Dewi Puspita[a*], Aldino Dityanawarman[a], Dicky Putra W. [a], Akhmad Awaludin Agustyar[a], Susana Endah Ratnawati[a] and Mark Tamplin[b]	O-PH-B7
10:45-11:00	**A Study on Agriculture Effluent's: A Havoc to Water Bodies.** Subodh Pokhrel	O-PH-B2
11:00-11:15	**The Effect of Various Traditional Indonesian Seasoning Medium on the Sterilization Value (F0) of Smoked Catfish Canning Process** Asterina Wulan Sari[a], Wahdan Fitriya[a*], Siti Ari Budhiyanti[a], and Asep Nurhikmat[b]	O-PH-B3
11:15-11:30	**Mercury Contamination in Muscle of Wallago Catfish from Ayeyarwady River Segment between Singu and Sagine Townships, Mandalay Region, Myanmar** Soe Soe Aye[a*], San San Myint[a], Khin Khin Lay[a], Ni Ni Ko[b], and Ei Ei Ko[c]	O-PH-B4
11:30-11:45	**The Growth of *Morganela morganii* as Histamine Producer in Skipjack at Various Storage Temperatures** Susana Endah Ratnawati* and Indun Dewi Puspita	O-PH-B5
11:45-12:00	**Production and Determination of the Antioxidant Activity of Tissue Hydrolysates from the Head of Bester Sturgeon** Md. Rashidul Islam[a, b*], Naoya Terauchi[a], Wen Li[a], Makito Kosugi[a], Kazuhiro Ura[c], Yasuaki Takagi[c]	O-PH-B6
12:00-12:15	**Isolation and Identification of Mold from Smoked Ariid Catfish and it's Potential as Protease Producers**	O-PH-B1

	Isnin Dwi Saputri, Indun Dewi Puspita, Amir Husni and Ustadi*	
12:15-12:30	**Development and Quality Monitoring of Marinated Bigtooth Pomfret (*Brama orcini* Cuvier, 1831) Fillet Stored in Chilled Condition** Lyneth R. Espinosa and May Flor S. Muegue*	O-PH-B8
12:30-12:45	**Safety Hazards along the Sardine Value Chain in the Philippines** Encarnacion Emilia S. Yap*, Angelea Revantad and Tabitha Anne Famatid	O-PH-B9
12:45-13:00	**Antioxidative Activities and Lactic Acid Bacteria Composition of Fermented Frigate Tuna (*Auxis thazard* Lacepéde, 1800) at Different Salt-Fish Ratio** Rhessa Grace G. Ortizo and *Encarnacion Emilia S. Yap	O-PH-B10
13:00-14:00	**Lunch**	
Chairperson: Prof. Dr. Ustadi		
14:00-14:15	**The Effect of Alginate Concentration For Quality of Artificial Pulpy Orange by Sensory Test** Ellya Sinurat[a*] and Helen Hayasidarta[b]	O-PH-A1
14:15-14:30	**The Addition of Carotenoid Nanocapsules from *Spirulina platensis* Increases Performance of Local Milk and Dark Chocolate Bars** Nurfitri Ekantari*, Gisela Karina Asti, Rika Karunia Laring Dina, Wahdan Fitriya and Siti Ari Budhiyanti	O-PH-A2
14:30-14:45	**The Effect of *Spirulina Platensis* Carotenoid Concentration to the Characteristics of Nanocapsules Encapsulated with Whey Protein Concentrate and Gum Arabic** Aprilia R. Kumalasari, Siti A. Budhiyanti*, Amir Husni, and Nurfitri Ekantari	O-PH-A3
14:45-15:00	**Changes in quality characteristics during ice storage of heat-sealed green mussel (*Perna viridis*)** Christian Paul L. Caluba, Lhumen A. Tejano and Loda M. Nacional*	O-PH-C1
15:00-15:15	**Extraction and evaluation of potential antioxidant compounds**	O-PH-C2

	from Philippine oyster (*Crassostrea iredlei*) residue Margell Ann G. Nombre, May Flor S. Muegue* and Ernestina M. Peralta	
15:15-15:30	**The Potential of Comb-Pen Shell (*Atrina pectinata*) as Chitosan Raw Material Source** Diandra Hartono[a*], Laksmi Sulmartiwi[b*], Eka Saputra[b] and Juni Triastuti[b]	O-PH-C4
15:30-15:45	**Selection of Natural Polymers for Nano-Chitosan Particle Size Stabilizer using Polyelectrolyte Complexes Interaction** Prihati Sih Nugraheni[a,b] , Alexander H. Soeriyadi[c], Wahyudi Budi Sediawan[a], Ustadi[b] and Wiratni Budhijanto[a]	O-PH-A4
15:45-16:00	**Sustainable Aquaculture for Food Security and Nutrition: The Malaysian Perspective** Hassan. Anuar	O-PH-A5
16:00-16:15	**Analysis of Potential Bioactive Peptides from *Chlorella sorokiniana* Proteins Using Proteomic Methods Coupled With Bioinformatics Analyses** Lhumen A. Tejano[a], Jose P. Peralta[a], Encarnacion Emilia S. Yap[a], Fenny Crista A. Panjaitan[b] and Yu-Wei Chang[b*]	O-PH-A6
16:30-17:00	**Poster Viewing**	

O-PH-B7

Growth Rate and Histamine Production of Histamine-producing Bacteria Isolated from Skipjack Tuna

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Abstract

This study aimed to isolate histamine-producing bacteria (HPB) from skipjack tuna landed in Sadeng Fisheries Port, Yogyakarta, and to measure the bacterial growth rate and histamine production at various incubation temperatures. Fresh and spoiled fish (kept for 2 days at room temperature) were used as samples. Isolation was carried out with Niven's agar (selective medium). All positive colonies were tested for Gram staining. TSBH cultures were incubated at 5, 20, and 37°C. Culture turbidity (OD_{600}) was measured periodically to obtain bacterial growth curve using the DMFit program. TLC was used to detect the histamine formation in the culture medium. The results show that the positive HPB obtained from the fresh and spoiled sample was 29 and 30 isolates, respectively. Most of HPB positive isolates were Gram-positive bacteria (46 isolates). However, only 6 isolates from spoiled sample showed positive histamine formation in culture medium detected by TLC. All 6 isolates, namely CK01, CK02, CK03, CK04, CK05, and CK06, belonged to Enterobacteriaceae group as confirmed by biochemical test. The highest growth rate at 20 and 37°C were showed by isolate CK04, while the growth of all isolates at 5°C were inhibited. The highest histamine production was shown by isolates CK06 at 37°C.

Keywords: Histamine, Histamine-producing bacteria, skipjack, growth rate, DMFit

O-PH-B2

A Study on Agriculture Effluent's: A Havoc to Water Bodies.

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Abstract

Agriculture production has been amplified to overcome the threat of global food security caused due to burgeoning population growth. Agriculture intensification has led to the intensive use of inputs such as pesticides and chemical fertilizers. Large quantities of agrochemicals, organic matters, drug residues, sediments have been transferred to water bodies through strategic irrigation and rainwater runoff. The trending excessive use of synthetic chemicals by unskilled practitioners in agriculture especially in the case of rural areas of developing countries has resulted in deleterious effects to water bodies. The escalating rate of environmental pollution and pesticide poisoning has engendered dreadful complication in the aquatic ecosystem, which corroborates the loss of the primary producers like phytoplankton, zooplankton and biotopes equilibrium. The convergence of pesticides and different chemicals are detrimental in bio-concentration and biomagnification. The judicious use of agricultural inputs has been the matter of prime concern to prevent the incurring impacts in the lentic and lotic water bodies. The possible menace, causes and preventive measures of the threats caused due to haphazard use of chemicals in agriculture, inflow to water bodies and their cumulative effects is presented in paper. An attempt is also made to emphasize on rational use of synthetic chemicals to mitigate the devastating impact on water bodies.

Keywords: Agriculture intensification, synthetic chemicals, aquatic ecosystem, biomagnification, water bodies

O-PH-B3

The Effect of Various Traditional Indonesian Seasoning Medium on the Sterilization Value (F0) of Smoked Catfish Canning Process

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Abstract

The research aimed to determine the effect of various traditional seasoning medium on the sterilization value (F0), changes in physical properties of the cans and sensory in the canning process of smoked catfish during the research period. The skinless catfish fillets which have 2x3 cm² size and it was smoked using 10% of liquid smoke. Traditional seasonings used as a medium are rendang, sambal balado, and sambal goreng. The sterilization process was conducted with temperature 121ºC and the variation of time (30 and 40 min), the texture of traditional-seasoned smoked catfish were analyzed as well to determine the quality degradation due to the sterilization process. The observation for physical of cans, sensory descriptive and scoring were carried out every two weeks during eight weeks period of storage. The F0 calculation of traditional-seasoned smoked catfish used the general method which ranged from 4,83 to 7,66 minutes. The result showed that the chosen time for the sterilization process was 30 minutes at 121ºC because the value of F0 ≥ 3 minutes, and the texture were not different compared with the unsterilized canned product. The physical damage of cans was not found, but the vacuum degree of cans was not in accordance with the Indonesian National Standard (SNI). The characteristics of the organoleptic quality of canned traditional-seasoned smoked catfish tend to decline during the storage period, but the indication of spoilage was not found. The sensory value of canned traditional-seasoned smoked catfish is above the standard (SNI) and still be accepted by the panelists until the 8th week of storage.

Keywords: Seasoning medium, fish canning, liquid smoke, sterilization process, organoleptic quality

O-PH-B4

Mercury Contamination in Muscle of Wallago Catfish from Ayeyarwady River Segment between Singu and Sagine Townships, Mandalay Region, Myanmar

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Abstract

Mercury concentration in the muscle of Wallago catfish, *Wallago attu* (Bloch & Schneider, 1801) captured from Ayeyarwady River between Singu and Sagine townships, Mandalay Region, Upper Myanmar was analyzed during June 2017 to December 2018. Mean mercury concentration in fish muscle was 0.62±0.23 ppm on a dry weight basis, and 0.14±0.05 ppm on a wet weight basis. Mercury concentrations in fish muscle on the wet weight basis were found to be 0.22 ppm in maximum and 0.09 ppm in minimum. Mercury concentration was negatively correlated with the condition factor of fish. It was found that the higher the mercury concentration in the fish muscle, the lower the condition factor value of the fish. The contamination of mercury in fish muscle reflected obviously to their ecosystem as bio-indicator for pollution assessment. Average mercury concentration in the fish muscle of the studied samples showed lower than the WHO limit for human safe consumption (<0.5µg/g). The value of mercury concentration in the fish muscle was about five times decreased than last five years record (>0.5µg/g) at the downstream of the present study area in Ayeyarwady River. Mercury from illegal gold mining has been threatening the wellbeing of the aquatic ecosystem so as education program to local people and regular monitoring about the hazard of mercury are essential for the conservation of vulnerable aquatic organisms. This finding provided the information for assessing the impact of the mercury pollution on biodiversity in the Ayeyarwady River of Myanmar.

Keywords: Ayeyarwady River; bio-indicator; mercury contamination, *Wallago attu*.

O-PH-B5

The Growth of *Morganela morganii* as Histamine Producer in Skipjack at Various Storage Temperatures

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Abstract

The purpose of this study was to analyze the growth model and histamine production of *M. morganii* at various temperatures. *M. morganii* were inoculated in fish cube media, then incubated at 4 °C and 15 °C for 7 days and at 30°C and 40°C for 24 hr. The primary model was measured from growth data (log CFU/ml) plotted with incubation time using DMFit program, whereas secondary model was fitted from the conversion of growth rate by Ratkowsky-square root model. The results show that the highest resistance at the low temperature indicated by the lowest Tmin, which means that they revealed a minimum growth at 4 °C, during seven days by 4.10 – 6.94 Log CFU. The paramount growth rates of M. Morganii at 40 °C was 0.234 hr-1. The growth logarithmic phase revealed from hr-0 to hr-24 at 30 °C by 9.98 Log CFU. Meanwhile, at 40 °C, the phase was occurred from hr-0 to hr-18 by 8.03 Log CFU. The secondary model shows that the higher temperature, the more growth rate increased. During 24 h, the maximum histamine produced by 200 ppm at 15 °C.

Keywords : growth, model, *Morganella morganii*, skipjack, temperature

O-PH-B6

Production and Determination of the Antioxidant Activity of Tissue Hydrolysates from the Head of Bester Sturgeon

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Abstract

Head is the major by-products of commercial sturgeon (> 2 kg) constituting ca. 17.1% and ca. 37.5% against their total body weight and by-product weight, respectively. Due to hardness and complexity, still sturgeon head has no commercial utilization. In this study, a simple and novel method was developed to produce hydrolysates from the head of Bester sturgeon after autoclaving, blending, and enzymatic hydrolysis. Four conditions were considered: pre-autoclaving in DW and hydrolyzed with papain (DW-P) or papain and bromelain (DW-P+B), and pre-autoclaving without DW and hydrolyzed with papain (NDW-P) or papain and bromelain (NDW-P+B). The yields and low molecular weight fragments (< 3 kDa) were higher in the P+B samples than in the P samples. The amount of collagenous peptides, which was obtained from the hydroxyproline content of each sample, was higher in the NDW than DW samples and the P than P+B samples. The DW-P+B sample showed slightly but significantly higher $OH^{\bullet}$, DPPH, and ABTS scavenging activity than others. Moreover, the DW-P+B sample showed two-times higher anti-oxidant activities than skin tissue hydrolysates. Besides, all samples contained low endotoxin content (< 1 EU) suitable for cell culture experiments; their effects on cellular oxidative stress are under investigation using the mouse fibroblastic L929 cells. This is the first report to utilize the sturgeon head for peptide production that would be a promising product for cosmetics and food industries.

Keywords: Sturgeon head, hydrolysate, anti-oxidant activity, cellular oxidative stress

O-PH-B1

Isolation and Identification of Mold from Smoked Ariid Catfish and it's Potential as Protease Producers

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Abstract

This research aims to explore the species of mold from smoked Ariid Catfish and to know its potential as a protease producer. Sample which used in this research is smoked Ariid Catfish from traditional market in Yogyakarta (Kranggan). The molds were isolated by spreading method using PDA (Potato Dextrose Agar) as a medium. Then, the obtained isolates were identified macroscopically, microscopically and molecularly. The activity of protease from identified isolates was done by observing the formed clear zone and then calculating the proteolitic index of isolates in SMA (Skim Milk Agar) medium. The results showed that 5 molds were isolated and identified successfully which coded as A11, B21, C23, D22 dan E13. The obtained isolates were identified as *Aspergillus flavus*, *Aspergillus fumigatus*, *Rhizopus stolonifer*, *Aspergillus niger* dan *Penicillium sp*. respectively. A11 (*Aspergillus flavus*), D22 (*Aspergillus niger*) and E13 (*Penicillium* sp.) can produce protease which shown in the formation of clear zone and have proteolitic index of 1.18; 0.77 and 1.36 respectively. Meanwhile, B21 (*Aspergillus fumigatus*) and C23 (*Rhizopus* sp.) did not show any clear zone so that their proteolitic index cannot be calculated.

Keywords : isolation, identification, smoked Ariid Catfish, protease.

O-PH-B8

Development and Quality Monitoring of Marinated Bigtooth Pomfret (*Brama orcini* Cuvier, 1831) Fillet Stored in Chilled Condition

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Abstract

This study developed marinated *Brama orcini* fillet and monitored the effects of marinating on the physico-chemical, microbiological and sensory quality of the product stored at chilled condition. The fish samples were divided into two lots; marinated lot and untreated or control lot. The samples were stored for 14 days at 4°C. Sample fillets were withdrawn every two days for sensory, microbiological, and chemical tests. At the end of the study, the acceptability scores of the raw control sample, steamed control sample, raw marinated sample, and the steamed marinated sample were 2.30 ± 0.95, 3.20 ± 1.62, 5.90 ± 1.66, and 6.70 ± 1.16, respectively. An Estimated Aerobic Plate Count (EAPC) of 1.5×10^7 cfu/g was obtained for the control sample on the last day of storage, while the marinated sample obtained an EAPC of 1.6×10^5 cfu/g. In addition, at day 14, the control sample had a recorded pH of 6.88 ± 0.07, TVBN of 45.42 ± 7.18 mg/100g sample, and TBARS value of 3.04 ± 0.06 mg MDA/kg sample. The marinated samples got lower values with pH of 6.71 ± 0.03, TVBN of 21.01 ± 2.53 mg/100g sample, and TBARS value of 1.51 ± 0.34 mg MDA/kg. The results show that the control sample was considered acceptable until the 10^{th} day of storage based on the sensory, microbiological, and chemical analyses while the marinated sample remain acceptable until the end of the storage period. The study shows that marinating can delay the spoilage and improve the shelf life of *Brama orcini* fillets stored at chilled condition. Further, this work present potential use of low value species, *Brama orcini* as raw material in the development of an improved product that could assist in the wide acceptance and maximum utilization of the species.

Key Words: *Brama orcini*, marinating, chilled storage, Sensory evaluation, TBARS, TVBN, EAPC.

O-PH-B9

Safety Hazards along the Sardine Value Chain in the Philippines

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Abstract

Sardines are commercially important aquatic resources in the Philippines. It constitutes a major industry that provides economic value both for the small-scale and the large-scale fisheries sectors. In fact, sardines are considered as one of the most important locally and internationally traded fishery commodities in the Philippines, marketed as fresh or in dried, smoked, fermented, canned, and bottled forms. However, just like any other seafood commodities, the economic opportunities derived from the sardine industry are highly dependent on the state of the resource, the sustainability of its fisheries, the practices of the key players of the industry, and the distribution of benefits along the entire sardine supply chain. This study specifically focused on the mapping of the sardine value chain networks in the Philippines to determine the practices along the chain that affect the final sardine products and to identify the safety hazards in each of the nodes along the chain. In this study, the main actors in the value chain of sardines were identified and profiled and their practices were recorded. Potential safety hazards, such as the histamine levels and the presence of pathogenic microorganisms and other histamine-forming organisms were monitored. Results revealed major issues and concerns that affect the sardine value chain maps in the different study sites. In particular, practices that are associated with different food quality and safety hazards vary in the different study sites. Histamine and microbial analyses likewise revealed significant variations along the different nodes of the value chain maps, indicating non-standardized handling and processing methodologies and practices in the different study sites. These findings are useful in the identification of intervention measures that are necessary to improve the quality and safety of the sardine products in the country.

Keywords: sardines, value chain, safety hazards, Philippines

O-PH-B10

Antioxidative Activities and Lactic Acid Bacteria Composition of Fermented Frigate Tuna (*Auxis thazard* Lacepéde, 1800) at Different Salt-Fish Ratio

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Abstract

The antioxidative activities and lactic acid bacteria (LAB) composition of fermented frigate tuna (*Auxis thazard,* Lacepéde 1800), locally known as *tinabal* at different salt-fish ratios were investigated. Fresh frigate tuna were degutted and cleaned before the addition of salt at different salt-fish ratio (w/w), (1:3), (1:4), (1:5), (1:6) and fermented at ambient temperature. LAB viable count increased, and the pH levels decreased with increasing % titratable acidity. Isolated LABs were presumptively identified as *Lactobacillus casei, Lactobacillus delbrueckii* subsp. *delbrueckii, Pediococcus pentosaceus, Leuconostoc* spp., *Lactobacillus fermentum,* and *Streptococcus* spp. Ethanolic extracts from F3 (1:6) showed favorable antioxidative activities against $ABTS^{+}$ radical and H_2O_2 radical. Sample F1 (1:4) showed high reduction of ferric ions, while F2 (1:5) showed favorable activities against $^1O_2$ radical. In general, F2 (1:5) has favorable LAB composition with wide range of LABs and high LAB counts. Also, F2 (1:5) has favorable scavenging activities coupled with increasing DH during fermentation. Results showed increasing activities in *tinabal* during fermentation process, making it a potential source of antioxidants for industrial uses. Additionally, the LABs in F2 (1:5) indicates its usefulness as a viable source of LAB for applications in other fermented products as starters for improved product quality. These results make *tinabal* a possible functional food product that could benefit consumers.

Keywords: Frigate tuna, antioxidative activity, lactic acid bacteria, Degree of Hydrolysis, *tinabal*

O-PH-A1

The Effect of Alginate Concentration For Quality of Artificial Pulpy Orange by Sensory Test

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Abstract

Artificial orange pulpy is drink is preferred especially children. The artificial ingredient of orange pulpy is made from alginate. Alginate derived from brown seaweed Turbinaria sp. In this study, a sensory test was conducted on the effect of alginate concentration on the manufacture of artificial orange pulpy. The type of sensory test was hedonic test, which measured the panelists' preference and acceptance of the samples. The parameters that were being tested were color, taste, aroma, texture, and overall acceptance. The samples that were included in this sensory test are artificial pulpy orange made up in various concentration of alginate (0.4%, 0.6%, 0.8%, 1%, and 1.2%) and the real pulpy orange obtained from Pontianak orange and real pulp from Minute Maid as the controls. In total, there were seven sample for the sensory test. The least preferred samples were artificial pulpy orange made from 0.4% alginate and pulpy orange from Minute Maid.

Keywords : alginate, artificial orange pulpy, sensory test

O-PH-A2

The Addition of Carotenoid Nanocapsules from *Spirulina platensis* Increases Performance of Local Milk and Dark Chocolate Bars

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Abstract

This study was conducted to investigate consumer acceptance of local chocolate bar products added with spirulina platensis carotenoid nanocapsules. Spirulina platensis nanocapsules carotenoid were added at 0.372% (w/w) into the product. The previous study revealed the taste of local chocolate bar were rich in sweet, sour, bitter, and milk. Through the testing of qualitative descriptive analysis, it was revealed that the chocolate bar product from this research was almost similar to commercial chocolate Lyndt, Delicacao and Monggo 77% (dark chocolate), Monggo milk and Delfi (milk chocolate). Chocolate milk has the dominant characteristic sweet taste, while dark chocolate bitter and sour. Paired comparison test was carried out on milk or dark chocolate, each type of chocolate was paired between the product with or without fortification. In this method, the judgment is asked to choose one of the stimulus in pairs. A total of 200 panelists join in the test. The results showed the preference for fortified milk chocolate 55% and dark chocolate 73% were preferred over products without fortification. The results for testing chocolate showed that bitter taste was more dominantly shown by chocolate without fortification, fortified chocolate had superior texture and benefits, good texture and sweeter taste (dark chocolate), while fortified milk chocolate though had the dominant milk taste and easy to detect, also has the original bitter taste of chocolate. Only 2% (dark) and 7% (milk) of judments states chocolate without fortification is the same as fortified. Some positive correlations were found between age, income and gender determined spirulina chocolate preferences.

Keywords: preference, chocolate bar, nanocapsules carotenoid, *Spirulina platensis*, paired comparison

O-PH-A3

The Effect of *Spirulina Platensis* Carotenoid Concentration to the Characteristics of Nanocapsules Encapsulated with Whey Protein Concentrate and Gum Arabic

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Abstract

This study aims to determine the effect of *Spirulina platensis* carotenoid concentration to characteristics of nanocapsules that encapsulated with whey protein concentrate and gum arabic. Preparation of carotenoid nanocapsule started with formation of nanoemulsion with the ratio of oil fraction and water fraction of 1 : 10; arabic gum and whey protein concentrate (2:1) as encapsulating materials. Oil fractions were prepared by dissolving carotenoid extracts into Virgin Coconut Oil up to volume of 10 ml. Water fractions were prepared by dissolving encapsulated materials into aquabidest up to volume of 100 ml. Nanocapsules were obtained by homogenized the oil and water fractions at 24,000 rpm, than spray dried. The research used completely randomized design (CRD) experimental methods with five treatments of carotenoid extract concentrations 0.09 ; 0.18 ; 0.27 ; 0.36 and 0.45%. The characteristics of carotenoid nanocapsules were analyzed based on parameters of yield, moisture content, water activity, total carotenoid, surface carotenoid, encapsulation efficiency, carotenoid retention, solubility, particle size and *Scanning Electron Microscopy*. The best treatment was nanocapsule that had carotenoid extract of 0.36%, with yield, encapsulation efficiency, water content, solubility, and particle size were 14.34%, 66.24 %, 3.92%, 86.31 % and 743.3 nm, respectively.

Keywords: *Spirulina platensis*, carotenoid, nanocapsule, whey protein concentrate, gum arabic

O-PH-C1

Changes in Quality Characteristics During Ice Storage of Heat-Sealed Green Mussel (*Perna viridis*)

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Abstract

Green mussel is one of the most popular mussel species being consumed in the Philippines and considered an extremely perishable commodity. However, little research is available on its shelf-life and quality changes. In the present study, microbial, physico-chemical, and sensory characteristics in mussel were investigated to determine its quality changes during ice storage. Results showed that the total viable count (TVC) of the mussels significantly increased (P<0.05) from 0 log cfu/g at day 0 to 3.07 log cfu/g by the 7th day of storage, which is below the suggested limit of acceptability of 7 log cfu/g. Similarly, results for TVB-N and TMA-N contents of mussel increased from 3.77 mg N/100g and 1.10 mg N/100g to 20.86 mg N/100g and 5.45 mg N/100g, respectively by the end of storage, which is also below the limit of acceptability for mussel. On the other hand, the pH of mussel samples at day 0 was initially reported at 6.60, which decreased to 6.32 by the end of storage period. Moisture content and water holding capacity of the samples decreased during the storage period, although these showed no significant differences (P>.0.05). Sensory scores for all parameters indicate shelf-life of stored mussels exceed 7 days of storage. In general, results suggest that mussel samples remained acceptable after 7 days of ice storage. Furthermore, following the methods employed, mussels can be stored in ice for up to 7 days.

Keywords: *Perna viridis*, quality changes, shelf-life, microbiological, physico-chemical, sensory

O-PH-C2

Extraction and Evaluation of Potential Antioxidant Compounds from Philippines Oyster (*Crassostrea iredlei*) Residue

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Abstract

Oyster (*Crassostrea iredlei*) is one of the important commercial bivalves in the Philippines. It is an excellent source of quality protein, saturated fat, sodium, essential vitamins, minerals, and bioactive compounds such as antioxidant compounds. Antioxidants are radical scavengers that prevent free radical proliferation in the body brought by stresses from diseases, detrimental lifestyle, aging and environment. In this study, natural antioxidants were extracted from oyster processing by-product, the residue. Extraction of antioxidants from oyster residue was carried out using ethanol, methanol and water as solvents. The antioxidant activities of the extracts from each solvent were evaluated by DPPH (2, 2-diphenyl-1-1picryl hydrazyl), ABTS (2, 2'-azino-bis (ethylbenzthizaoline-6-sulfonic acid) and FRAP (Ferric reducing antioxidant power) assays. After extraction and evaluation, it was deduced that methanol extracts have the highest radical scavenging activities in both DPPH and FRAP assays. In ABTS assay evaluation, ethanol extracts showed the highest activity at 25mg/mL (87% activity) however, increasing the concentration to 50mg/mL, no notable change in the activity was observed (89% activity). Methanol extracts on the other hand showed 58% activity at 25mg/mL concentration and doubling the concentration also increased the activity to 89%, almost equal to the activity of ethanol at the same concentration. This shows that methanol extracts scavenging activity can be dependent on the concentration of the extracts while ethanol extracts activity is not affected by concentration. Based on the results of the assays, methanol was found to be the most efficient among the solvents used in extracting antioxidant compounds from oyster.

Keywords: *Crassostrea iredalei*, antioxidant, DPPH, ABTS, FRAP, methanol, ethanol, water

O-PH-C4

The Potential of Comb-Pen Shell (*Atrina pectinata*) as Chitosan Raw Material Source

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Abstract

Chitosan is a biological material that has the potential as an environmentally friendly coagulant material. A. *pectinata* has 95% aragonite ($CaCO_3$) which might be possessed chitin. Based on its chemical structure, chitosan has an active group of amines (NH_2). Deproteinization is the process of separating proteins from chitin which uses strong bases as solvents. The dilute alkaline solution used are NaOH and KOH. The aim in this research is to know the influence of potassium hydorxide in deproteinization processing to chitosan characteristics. The yields value of comb-pen shell chitosan are 13.55% to 28.42%. The deacetylation degree value of comb-pen shell chitosan ranges from 64.82% to 77.86%. Total water content of the comb-pen shell *Atrina pectinata* are ranges from 0.46% to 2.68%. Total ash content value are ranges from 80.84% to 88.12% with pH on the each chitosans are neutral. Comb-pen shell chitosan *A. pectinata* has good results on the water contents and part of deacetylation degrees shows that are fulfilled the chitosan standards from Indonesian National Standards (SNI). The substitution of potassium hydroxide in the deproteinization processed have an effect on the comb-pen shell chitosan characteristics.

Keywords : Deproteinization, potassium hydroxide, chitosan, *Atrina pectinata*

O-PH-A4

Selection of Natural Polymers for Nano-Chitosan Particle Size Stabilizer using Polyelectrolyte Complexes Interaction

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Abstract

Bacterial activity is known to contribute to the deterioration of fish quality, so inhibition on it needed. Chitosan has potential as a natural antibacterial agent due to its amine group reactivity. Performance chitosan in the size nanoparticle indicate higher antibacterial activity due to the particles charge more concentrated and surface areas are wider. So far, ionic gelation methods have been developed to produce nano-chitosan with high antibacterial activity and stability. However, the utilization of tripolyphosphate/TPP in the ionic gelation method as cross-linker of chitosan leads to economical fraud when applied to fishery products. Polyelectrolyte complex is an alternative method to produce nano-chitosan through the mixing of oppositely charged polyelectrolytes with strong and reversible electrostatic links. Chitosan is able to form polyelectrolyte complexes interaction with a poly-ion group of natural oligosaccharides. In this research, it was evaluated the possibility of some local oligosaccharides such as pectin, alginate, carrageenan, carboxymethyl cellulose, gum arabic, glucomannan and hyaluronic acid as cross-linker of chitosan. Based on the analysis of particle size, zeta potential and antibacterial activity, the chitosan-gum arabic complex produced nanoparticle with the same stability and antibacterial activity as the chitosan-TPP complex (particle size in the range 100-200 nm and zeta potential >30 mV). Nanoparticles formation of the chitosan-gum arabic complex does not require additional treatment such as pH adjustment as occurs in other oligosaccharides. The nanoparticle complex of chitosan-gum arabic generates opportunities for natural preservatives agent to preserve fish without inflicting a financial loss and has a simple production process.

Keywords: chitosan, polyelectrolyte complex, oligosaccharides, gum arabic, nanoparticle

O-PH-A5

Sustainable Aquaculture for Food Security and Nutrition: The Malaysian Perspective

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Abstract

Malaysia is a fish-consuming country with fish representing 60% of a total animal protein intake. Aquaculture is becoming important as a way of increasing local production for food security, eradicating poverty, as a source of cheap protein, reduce child mortality and improve maternal health as well as increasing export revenues. The nutritional benefits of fish consumption have a positive link to increased food security and decreased poverty rate in developing countries. Fish and fish-related products provide foreign exchange, income and livelihoods for numerous communities across the world. In Malaysia, fish contribute a significant amount of animal protein to the diet of people. Fish is a vital source of food for people. Food is very important and becomes very sensitive issue especially when there is a shortage of food to consume. The per capita consumption of fish and other seafood in the country in 2015 was about 56 kg with the average increment of about 1.6% yearly since the year 2000. The Government of Malaysia places high priority on aquaculture as indicated in the National Agro-food Policy (2011-2020) which estimated that the annual demand for fish will increase from 1.7 million tons in 2012 to 1.93 million tons by the year 2020. From the present annual aquaculture production of about 525,000 tons, this output would need to be increased up to 790,000 tons (a projected growth of 8.0%) in order to meet the targeted demand by 2020. Under the current agricultural policy, the National Agro-Food Policy 2011-2020, also has made sustainable agricultural developments as one of its key thrusts. The government through the Department of Fisheries has identified 61 areas covering 36,743 ha which suitable for aquaculture projects nationwide for the Aquaculture Industrial Zone (AIZ) Program which will be used for culturing of various types of high value aquatic species. The Department of Fisheries also has identified several strategic areas that would be develop for downstream activities such as fish seed production, feed mills, fish processing plants as well as other supporting industries. Sustainable aquaculture is also currently listed amongst the 16 Agro-food's Entry Point Projects (EPP) of the National Key Economic Area (NKEA).

Keywords: Sustainable aquaculture, aquaculture industry, capture fisheries, food security, nutrition.

O-PH-A6

Analysis of Potential Bioactive Peptides from *Chlorella sorokiniana* Proteins using Proteomic Methods Coupled with Bioinformatics Analyses

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Abstract

Chlorella is one of the most ecologically and nutritionally significant microalgae and a good source of beneficial substances like bioactive peptides. The present study isolated proteins from *Chlorella sorokiniana* and subjected it to in silico analysis to predict potential bioactive peptides. Molecular characterization of proteins was done by sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) in combination with proteomics techniques. The proteomics techniques identified 8 proteins from 10 protein bands of the SDS-PAGE. Results by BIOPEP's profile of bioactive peptides tools revealed that proteins of *C. sorokiniana* have the highest number of dipeptidyl peptidase-IV (DPP IV) inhibitors, with high occurrence of other bioactive peptides such as angiotensin-I converting enzyme (ACE) inhibitor, glucose uptake stimulant, antioxidant, regulating, anti-amnestic and antithrombotic peptides. In silico analysis of enzymatic hydrolysis revealed that pepsin (pH > 2), bromelain and papain were proteases that can release relatively larger quantity of bioactive peptides. In addition, combinations of different enzymes in hydrolysis were observed to release higher numbers of bioactive peptides compared to using individual proteases. In silico results indicate the potential of protein isolated from *C. sorokiniana* as a source of high value products with pharmaceutical and nutraceutical application potential.

Keywords: *Chlorella sorokiniana;* bioactive peptides; proteomics; in silico; BIOPEP-UWM database

Session 8 : Algae and Aquatic Plants

Session 8 : Algae and Aquatic Plants

Bunga Anggerik Room B

November 19, 2019 (Tuesday)		
Time	**Title**	**Code**
Chairperson: Prof. Dr. Lim Phaik Eem		
11:00-11:30	**Refreshment and Poster Viewing**	
11:30-12:25	Seaweed Special Session	
12:25-12:45	**Poster Viewing**	
12:45-14:00	**Lunch**	
Chairperson: Prof Dr. Liu Tao		
14:00-15:00	Seaweed Special Session	
Chairperson: Dr. Kukuh Nirmala		
15:00-15:15	**Effect of Different Light Color on Growth of Sea Grapes (*Caulerpa lentillifera*)** Manoch Khamcharoen[a*] , Preeda Kirdsook[a] , Putawan Kaewphumcuang[a] and Watcharapong Kongmeka[a]	O-AP-D1
15:15-15:30	**Evaluation of Cultivation Techniques, Growth and Semi-Refined Carrageenan Quality on *Kappaphycus* (Gigartinales, Rhodophyta) in Malaysia** Khaizuran Shahiran Mohd Izhan[a] and Gan Ming Herng[b*]	O-AP-D2
15:30-15:45	**Effects of Salinity, Light Intensity and Photoperiod on the Growth of *Gracilaria* (Gracilariales, Rhodophyta) from Malaysia** Mohd Fikri Zaidan[a] and Gan Ming Herng[b]	O-AP-D3
15:45-16:00	**Evaluation OF *Gracilaria* Cultivation Techniques in Malaysia** Gan Ming Herng[a*]	O-AP-D4
16:00-16:15	**Effect of Provasoli's Enriched Seawater (PES) Media with $MgSO_4$ Modification in Technical Culture Media on the Growth of *Sargassum* sp.**	O-AP-D5

	Rebica Gustin[a*], Eztin Permatadynda Zuniyanto[a], Boedi Setya Rahardja[b], Prayogo[b], Agustono[b], Mirni Lamid[b] and Moch. Amin Alamsjah[b]	
16:15-16:30	**The Effect of PES Media (Provasoli's Enriched Seawater Medium), SMW Media (West and McBride Media) and Modification of TSP (Triple Super Phosphate) in Technical Culture Media on the Growth of *Sargassum* sp.** Mira Adyla Anandasari[a], Jumaatus Sholehah[a], Mirni Lamid[b], Boedi Setya Rahardja[b] , Agustono[b], Prayogo[b], and Moch. Amin Alamsjah[b]*	O-AP-D6
16:30-16:45	**Effects of Different Organic Fertilizers Extracted from Brown Seaweeds on the Growth, "Ice-ice" Disease Occurrence, and Carrageenan Quality of *Kappaphycus striatus* (F. Schmitz) Doty ex P.C. Silva** Sitti Sheha Irin[a], Katrina Jumadil[a], Radzwina Muddihil[a], and Albaris Tahiluddin[b]*	O-AP-D7
16:45-17:00	**A Study of Antimicrobial Potency against Multi-Drug Resistant Microbes of The Symbiont Microbe of *Rhizopora mucronata* and *Achantus ilicifolius*** Delianis Pringgenies[a]* , Wilis Ari Setyati[a] and Ali Djenaedi[a]	O-AP-F1
16:30-17:00	**Refreshment and Poster Viewing**	

November 20, 2019 (Wednesday)		
Time	**Title**	**Code**
Chairperson: Dr. Norulhuda Mohamed Ramli		
10:00-10:30	**Refreshment and Poster Viewing**	
10:30-10:45	**Heavy Metal (As, Cd, Cu, Fe, Mn, Zn) Concentrations in Microalgae Biomass Cultured in Standardised Media** Ashley L. Wong[a], Su Chern Foo[a] & Nicholas M.H. Khong[b]* ***Recipient of ASEAN-FEN Young Scientist Award 2019**	OS-AP-A1
10:45-11:00	**Study on the Isolation of Pigmented Fungus from Brown Seaweed *Lobophora variegate* (J. V. Lamouroux) and Extraction of Antibacterial Activity against on *Micrococcus luteus* NITE83297**	O-AP-D9

	Khin Thandar Linn[a*]	
11:00-11:15	**Mangrove Macro-algae (*Bostrychia-Caloglossa* association) from Sarawak Coast: An Intensive Note on Diversity** Mohammad Nesarul Hoque[a], Abu Hena Mustafa Kamal[a], Amy Halimah Rajaee[a] and Mohd Hanafi Idris[b]	O-AP-D10
11:15-11:30	**Bioactivity and Photosynthetic Pigments Quantification of Non-Polar Extracts Marine Macro-algae** R. D. Kasitowati[a,b], M. N. Fitriane[a], A. W. Pangastuti[a], C. J. Lolitasari[a], F. Iranawati[a], Guntur[a,b], D. C. Pratiwi[a,b] and M. A. P. Panjaitan[a]	O-AP-E2
11:30-11:45	**Inhibition Acivity of α-Amylase and α-Glucosidase by *Sargassum hystrix* Extract and Its Ethyl Acetate Fractions** Amir Husni[a] and Shifa Aulia Rahma[a]	O-AP-E3
11:45-12:00	**Effects Of Seaweed Concentration on Physical And Chemical Characteristics Of Kombucha Seaweed (*Gracilaria verrucosa*)** Rafelia Nirmala Putri[a], Laksmi Sulmartiwi[b], Juni Triastuti[b], and Annur Ahadi Abdillah[b]	O-AP-E4
12:00-12:15	**Isolation and Identification of Seaweed Degrading Bacteria from Herbivorous Organisms** Tan Yen Zhen[a] and Shumpei Iehata[a*]	O-AP-E5
12:15-12:30	**Isolation of Endophytic Fungi and their Antifungal Activities against on *Candida albicans* NITE 09542 from *Cleistocalyx operculatus* Roxb, (Tha_Pyae-Gyin)** Toe Swe Zin Ei[a] *	O-AP-E10
12:30-12:45	**Studies on the Medicinal Algae from Coastal Region of Lower Rahine Coast** Kay Thi Mya[a*] , Wah Wah Lwin[a], and Khin Thida Aung[a]	O-AP-D8
12:45-13:00	**Effect of Brewing Temperatures and Times of Low Tannin Tea on Antioxidant Activity from Mangrove Leaves (*Rhizophora mucronata*)** Astuti Wijayanti Setyaningsih[a]* and Bambang Budi Sasmito[a]	O-AP-F2
13:00-14:00	**Lunch**	
Chairperson: Dr. Norulhuda Mohamed Ramli		

14:00-14:15	**Antimicrobial Activities of Various Extracts from the Blue Green Algae *Arthrospira platensis* (Gomont)** Khin Maung Naing [a*]	O-AP-C1
14:15-14:30	**Study on the Effects of Salinities and Light Qualities on the Growth Rate of Green algae *Chlorella* sp.** Paye Phyo Hein[a*] and Sit Thu Aung[a]	O-AP-C3
14:30-14:45	**Study on the Growth Rate of blue green algae *Spirulina platensis* (Geitler) in Natural Seawater by Using Different Media** Sit Thu Aung[a*]	O-AP-C4
14:45-15:00	**Biomass Production, Pigment Content and Fatty Acid Profiles of *Tetraselmis suecica* in An Outdoor Closed Photobioreactor with A Semi-Continuous Operation** Nawwar Z Mamat[a], Nur Leena Wong Wai Sin[a], Norio Nagao[b] and Natrah Fatin Mohd Ikhsan[a,b]	O-AP-E7
15:00-15:15	**Species Composition and Vegetative Structure of Mangrove Forests in Lower Rakhine Coast** Nay San Lin[a] and Aung Ye Yint Oo[a]	O-AP-E8
15:15-15:30	**Comparative Study on Mangrove Forest Diversity in Magyi Coastal Area, Shwe Thaung Yan Sub Township, Pathein Township, Ayeyarwaddy Region, Myanmar** Wah Wah Khaing[a*]	O-AP-E9
15:30-15:45	**Effects of blue and yellow LEDs for growth and proximate composition of *Isochrysis* sp.** Norhayati Binti Suhaimi[a], Penz Penz Kwan[b], Sanjoy Banerjee[b] and Mohamed Shariff[a]*	O-AP-F3
15:45-16:00	**Present Status and Prospects for Seaweed Production in Bangladesh** Ahasan Habib[a*]	O-AP-E1
16:00-16:30	**Poster Viewing**	

O-AP-D1

Effect of Different Light Color on Growth of Sea Grapes (*Caulerpa lentillifera*)

Manoch Khamcharoen[a*] , Preeda Kirdsook[a] , Putawan Kaewphumcuang[a] and Watcharapong Kongmeka[a]

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Abstract

Effect of different light color on growth of sea grapes (*Caulerpa lentillifera*).The experiment divided 4 Treatments were natural light in hatcheries (Control), light color white, red and blue respectively period of time 24 hours. Each treatment had 4 replications, 4 baskets/replication and put sea grapes 50 grams/basket. Initial experiment average length of talus were 2.60 ± 0.17 2.99 ± 0.14 2.86 ± 0.10 and 2.93 ± 0.06 centimeters respectively. The sea grapes were cultured in the plastic bowls, put sea water 30 ppt salinity, 12 centimeters depth and put urea fertilizers 5 ppm/replication 3 days/time after changed sea water. The experiment carried out 1 month in hatcheries. The end of experiment the growth of sea grapes had average weight were 53.62 ± 0.31 70.45 ± 2.46 56.62 ± 0.55 and 54.97 ± 0.31 grams. respectively and average length of talus were 2.68 ± 0.13 3.17± 0.09 3.06 ± 0.06 and 3.02 ± 0.01 centimeters respectively. When statistic significant analysis both average weight and average length of talus found that statistic significant ($P < 0.05$) by the growth of white color light treatment was the best.

Keywords: light color, *Caulerpa lentillifera*, sea grapes

O-AP-D2

Evaluation of Cultivation Techniques, Growth and Semi-Refined Carrageenan Quality on *Kappaphycus* (Gigartinales, Rhodophyta) in Malaysia

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Abstract

Kappaphycus is commercially farmed mainly in Semporna, Kunak, Lahad Datu and Tawau in Sabah, East Malaysia. Carrageenophyte, *Kappaphycus* is one of the high value export product from aquaculture subsector with contributing Balance of Trade for the country. In 2000's, government established Seaweed Industrial Zone to introduce seaweed planting as poverty eradication program. Limitation of the coastal region in Sabah which suitable for seaweed farming further encourage the Ministry of Agriculture to expanse the new farming site in Peninsular Malaysia. Cultivation trials on *Kappaphycus* were tested in different pilot scales in Terengganu (East coast Peninsular) and Perak (West coast Peninsular) as well a new farming area in Semporna, Sabah from 2000 to 2011. *Kappaphycus alvarezii* (var. '*tambalang'*), *K. alvarezii* (var. '*babaei'*) and *K. malesianus* (var. '*aring-aring'*) were cultured using long-line for 35 days in Tangal, Semporna showed promising growth rates, 3.47-3.68% day^{-1}, 3.96-4.06% day^{-1} and 4.49-5.18% day^{-1}, respectively. In Pangkor Island, Perak, *K. alvarezii* (var. '*tambalang'*) and *K. striatus* (var. '*sacol'*) were grew on multi-parallel long-line for 24 days given comparable growth rates with Semporna, 1.23-2.52% day^{-1} and 2.60-6.93% day^{-1}, respectively. Negative growth was obtained for *K. striatus* (var. '*sacol'*) in Kapas Island and Rhu Island, Terengganu using circular rigid cage except some growth (0.05-1.00% day^{-1}) during 21-35 days. Relatively low growth rates, 0.86% day-1 and 1.68% day^{-1} for *K. alvarezii* (var. '*tambalang'*) and *K. striatus* (var. '*sacol'*), respectively planted in Rhu Island and Rhu 10 beach, Terengganu using long-line method. Major constrains encountered during the culture period were biological factors like ice-ice infestation, herbivorous grazing, fouling organisms and epiphytism as well as physical factors like environmental condition and culture material. Gel strength of semi-refined carrageenan extracted for *K. alvarezii* (var. '*tambalang'* and var. '*babaei'*) in Semporna and *K. striatus* (var. '*sacol'*) in Pangkor Island were comparable to commercial grade κ-carrageenan (Tacara brand No. 130110). Based on the growth rate and phycocolloid quality obtained, the potential farming species or varieties, culture techniques and localities were suggested.

Keywords: cultivation, growth rate, *Kappaphycus*, long-line, semi-refined carrageenan

O-AP-D3

Effects of Salinity, Light Intensity and Photoperiod on the Growth of *Gracilaria* (Gracilariales, Rhodophyta) from Malaysia

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Abstract

Salinity, light intensity and photoperiod are among important abiotic environmental factors responsible for seaweed growth and species biogeographical distribution. Ion concentrations, density of seawater and the osmotic pressure are biological significance aspects of salinity. Osmoregulation of cell membrane is subjected to changing of salinity as physiological response towards growth performance. Qualitative and quantitative of visible lights as well as duration of photoperiod are responsible for the biomass production of photosynthetic organisms thru photosynthesis cycle. *Gracilaria changii*, *Gracilaria* sp., *G. edulis* and *G. manilaensis* were tested in different salinity range showed maximum relative growth rate (RGR) occurred in day 7, 2.40, 4.80, 5.22 and 0.91% day^{-1} in 20, 15, 10 and 20‰, respectively. Optimal salinity ranges for *G. changii*, *Gracilaria* sp., *G. edulis* and *G. manilaensis* were 10-20, 20-35, 10-20 and 15-30‰, respectively. For light intensity experiment, full light (14.26µmol $m^{-2}s^{-1}$) and half light (5.11µmol $m^{-2}s^{-1}$) were implemented for *G. changii* and *G. edulis* for 28 days. Highest RGR obtained were 1.26 and 2.63% day^{-1} for *G. changii* and *G. edulis*, respectively in full light condition during day 7. While the maximum RGR, 0.02 and 1.54% day^{-1} for *G. changii* and *G. edulis*, respectively in half light treatment were much lower. In photoperiod experiment, *G. manilaensis* was cultured under 12L:12D, 24L:0D and 0L:24D light cycle for 7 days. Highest RGR, 0.80% day^{-1} was recorded in 24L:0D cycle followed by 0.16% day^{-1} in 12L:12D cycle and negative growth in 0L:24D cycle. Optimal salinity range is considered species-specific but higher light intensity and longer photoperiod is promoting *Gracilaria* growth. The informations provided are advantageous to ensure sustainable commercial seaweed cultivation.

Keywords: *Gracilaria*, growth, light intensity, photoperiod, salinity

O-AP-D4

Evaluation OF *Gracilaria* Cultivation Techniques in Malaysia

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Abstract

Gracilaria has been harvested from the wild for a long time as raw sea vegetables and as important source for agar extraction for food industry. However, continuous collection and improper harvesting management may lead to over exploitation. Solely depending on *Gracilaria* biomass from the natural population is insufficient to support the commercial production of agar. Thus, the cultivation of *Gracilaria* should be undertaken. This is crucial for the sustainability of resources and to ensure the continuous production of agar for commercial purposes. In 1980's, experimental cultivation of *Gracilaria* was conducted by the Fisheries Research Institute, Batu Maung, in Middle Bank, Penang and Ban Merbok, Kedah through line-spore settling, pond and raft culture methods. A summary of cultivation trials done from 1997 to 2017 were documented here. Vegetative propagation method was applied in abandoned earthen pond and floating fish cage in Setiu Wetlands, Terengganu; coastal area of Rhu Island and Bidong Island, Terengganu; captive tank and pond of UMT; fish pond in Fisheries Research Institute of Gelang Patah, Johor; and IMTA system in UMT. Besides, natural spore-settling method was conducted in natural population of *Gracilaria* near mangrove area in Sandakan, Sabah. *Gracilaria changii*, *G. edulis*, *G. fisheri*, *G. manilaensis*, *G. tenuistipitata*, *Gracilaria* sp.1 and *Gracilaria* sp.2 were seven tested species. Evaluation of different culture techniques was based on growth rate, biomass production, epiphytism or fouling occurrence level as well as yield and quality of agar extracted from harvested *Gracilaria*.

Keywords: agar quality, *Gracilaria*, growth rate, spore-settling, vegetative propagation

O-AP-D5

Effect of Provasoli's Enriched Seawater (PES) Media with $MgSO_4$ Modification in Technical Culture Media on the Growth of *Sargassum* sp.

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Abstract

The types of seaweed studied were *Sargassum* sp. from the brown algae group. *Sargassum* sp. cultivated with fragmentation in engineered growing media resembling its natural habitat. Growing media commonly used in the cultivation of *Sargassum* sp. one of them is PES media (Provasoli's Enriched Seawater). The purpose of this study was to determine the effect of PES media with the modification of $MgSO_4$ on technical culture media on the growth of *Sargassum* sp. and the effect of different dosages of $MgSO_4$ on technical culture media with PES media on the growth of *Sargassum* sp. The method used in this study is an experimental method using a completely randomized design (CRD) with 4 treatments and 5 replications. The difference in dosage of $MgSO_4$ is used, namely P0 (PES), P1 (0.5gr $MgSO_4$), P2 (1gr $MgSO_4$), P3 (1.5gr $MgSO_4$). The parameters observed were the growth analysis of *Sargassum* sp., water quality and chlorophyll-a content. Data analysis using ANOVA and If there are real differences or very real differences in the data, the Duncan test will be conducted. The results showed that the growth of *Sargassum* sp. using technical culture media with modified $MgSO_4$ 1gr (P2) has better growth compared to other treatments. Data on specific growth rates in P2 were 0.9608%. Specific growth rate data for *Sargassum* sp. in all treatments (P0, P1, P2, P3) for 28 days there were no significant differences in all test parameters. Data on absolute growth of *Sargassum* sp. during maintenance 28 days in all treatments (P0, P1, P2, P3) also did not differ significantly for all test parameters. The absolute growth of *Sargassum* sp. the best in P2 is 0.7099 grams/day.

Keywords : PES media, technical culture media, modification of $MgSO_4$, *Sargassum* sp.

O-AP-D6

The Effect of PES Media (Provasoli's Enriched Seawater Medium), SMW Media (West and McBride Media) and Modification of TSP (Triple Super Phosphate) in Technical Culture Media on the Growth of *Sargassum* sp.

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Abstract

The purpose of this study was to determine the effect of PES media, SMW media and technical culture media with TSP modification on the growth of *Sargassum* sp. and to know the composition of technical media with TSP modification which can produce optimal growth in *Sargassum* sp. This research was conducted at the Faculty of Fisheries and Marine Affairs for 28 days. The method used in this study was a completely randomized design (CRD) with 8 treatments, each treatment was repeated 3 times with Duncan's further test. The materials used in this study are *Sargassum* sp. seaweed, sea water, PES media, SMW media and technical culture media (EDTA, urea, ZA, TSP, MgSO4, vitamin B12). The results of the research show that PES media, SMW media, and technical media with TSP modification were significantly different ($p<0.05$) on the Specific Growth Rate (SGR) and the Growth Rate (GR) value. The results of further tests using Duncan's Multiple Range Test showed that all treatments were significantly different ($p <0.05$) to the Specific Growth Rate (SGR) and Growth Rate (GR) of *Sargassum* sp. Chlorophyll a content based on one-sample analysis Kolmogorov-smirnov test and kruskal-wallis test showed that the data were normally distributed ($P> 0.05$). Technical culture media can be used as alternative media for Sargassum sp. culture. The best treatment that produces optimal growth in *Sargassum* sp. is P6 with TSP dose 0.33gr/l.

Keywords: *Sargassum* sp., PES Media, SMW Media, TSP, Growth

O-AP-D7

Effects of Different Organic Fertilizers Extracted from Brown Seaweeds on the Growth, "Ice-ice" Disease Occurrence, and Carrageenan Quality of *Kappaphycus striatus* (F. Schmitz) Doty ex P.C. Silva

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Abstract

Nutrient-enriched seaweeds (*Kappaphycus striatus*) using seaweed liquid extract (SLE) as organic fertilizers from brown seaweeds (T_1= SLE *Sargassum cristaefolium*, T_2= SLE *Turbinaria conoides*, T_3= SLE combination of *S. cristaefolium* and *T. conoides*, and T_4= control) with a concentration of 8.82 ml L^{-1} were cultivated using fixed-off bottom method at seaweed farm of Barangay Tongbangkaw, Panglima Sugala, Tawi-Tawi, Southern Philippines for 45 days. Results revealed that the specific growth rate of T_1 (3.43 % day^{-1}), T_2 (2.75 % day^{-1}), T_3 (2.48 % day^{-1}) were significantly higher (p<0.05) than T_4 (1.82 % day^{-1}) after 45 days of culture. Organic fertilizers did not significantly affect (p>0.05) the occurrence of "ice-ice" disease at the end of the period of culture. The enrichment did not significantly influence (p>0.05) the carrageenan quality such as carrageenan yield, viscosity, gelling temperature, melting temperature, and syneresis index. But T_1 and T_3 had significantly higher (p<0.05) moisture content at day 45. T_3 significantly lowered (p<0.05) the gel strength of cultured *Kappaphycus striatus*. *S. cristaefolium* and *T. conoides* can be used as organic fertilizers for cultured *K. striatus*. These can increase the growth but could not affect "ice-ice" disease occurrence and carrageenan quality of *K. striatus*.

Keywords: Carrageenan quality, "Ice-ice" disease, *Kappaphycus striatus*, Organic fertilizers, Seaweed liquid extract

O-AP-F1

Initial Investigation of Antimicrobial Potency against Multi-Drug Resistant Microbes of the Symbiont Microbe of *Rhizopora mucronata* and *Achantus ilicifolius*

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Abstract

This study aims to determine the potential of symbiont microbes from *Rhizopora mucronata* and *Achantus ilicifolius* as antimicrobial agents against multi-drug resistant (MDR) pathogenic microbes, The MDR bacteria are *Staphylococcus aureus, Escherichia coli* and *Vibrio harveyi* MDR test microbes. The symbiont microbes were identified through molecular analyses. Isolation of symbiont microbes from *R. mucronata* resulted in 16 isolates, While isolation from *A. ilicifolius* found 14 isolates. Based on the antimicrobial qualitative test against *S.aureus*, 8 out of 16 microbial isolates from *R. mucronata* were found to show antimicrobial properties.The testing of *A. ilicifolius* symbiont microbes against *S.aureus* showed 8 out of 14 isolates with antimicrobial properties. The test against *E. coli* resulted in 2 out of 16 microbial isolates from *R. mucronata* and 5 out of 14 isolates from *A. ilicifolius* with antimicrobial properties. The test against *V.harveyi* resulted in 2 out of 16 microbial isolates from *R. mucronata* and 4 out of 14 isolates from *A. ilicifolius* with antimicrobial properties. Based on their overall antimicrobial potential against the test microbes, four isolates were selected. Molecular analyses of RM12 isolate showed 95% homology with *Bacillus subtilis*, of RM 10 isolate showed 97% homology with *Bacillus oceanisediminis*, of AC isolate showed 96% homology with *Paracoccus caeni*, and of AC 5 isolate showed 89% homology with *Bacillus circulans.* The study found 4 isolates with antimicrobial potency against MDR pathogenic microbes. The symbiont microbes taken from *R. mucronata* and *A. ilicifolius* were determined to be of the genus *Bacillus* and *Paracoccus.*

Keywords: *R. mucronata* and *A. Ilicifolius,*, anti MDR microbe, genus *Bacillus* and *Paracoccus*

OS-AP-01

Heavy Metal (As, Cd, Cu, Fe, Mn, Zn) Concentrations in Microalgae Biomass Cultured in Standardised Media

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Abstract

The current global food situation demands for a sustainable form of food production which can produce an adequate volume of food to meet current requirements without compromising nutrient content. Microalgae is an aquatic, unicellular algae dense in protein and other nutrients at levels comparable to that of vegetables and meat; although it has yet to be incorporated into conventional food products, its potential for such has been explored. However, the safety of microalgae consumption is not extensively reported, and due to its rapid uptake and concentration of heavy metal ions which are found in their growth media, this is a concern. As consumption of heavy metal ions in excess is detrimental to human health, the levels of heavy metal in microalgae must be determined before it can be considered as a food product. The objective of this study was to evaluate the heavy metal content (As, Cd, Cu, Fe, Mn and Zn) in ten species of microalgae. Microalgae species were cultured under controlled conditions with growth media containing Cu, Fe, Mn and Zn and the biomass obtained was freeze-dried and digested via acid and heat. The solution obtained was diluted and assessed via flame-AAS for its heavy metal content and compared against standard curves constructed to determine the heavy metal concentration. Results indicated that the metals Cu, Fe, Mn and Zn were present in the microalgae, and that all microalgae species possessed a heavy metal content below the daily intake limits set by the Malaysian Food Regulations Act 1983. Statistical analyses such as ANOVA and post hoc Tukey's test were conducted and determined that heavy metal content varied amongst species but there was a significant difference between the highest heavy metal concentration in the microalgae and the lowest maximum daily intake limit of Mn, further validating the safety of microalgae consumption. Metal content ranged from 0.0087 to 3.87µg/g and daily biomass intake ranged from 524g to 24kg based on adult RDI values. On the basis of metal content alone, it can be concluded that the ten microalgae species analysed in this study are safe to be incorporated into novel food products or substituted into existing microalgae meals.

Keywords: microalgae, culture media, heavy metal content, safety, microalgae supplements.

O-AP-D9

Study on the Isolation of Pigmented Fungus from Brown Seaweed *Lobophora variegate* (J. V. Lamouroux) and Extraction of Antibacterial Activity against on *Micrococcus luteus* NITE83297

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Abstract

In this investigation, the isolation of pigmented fungus has been conducted from brown seaweed *Lobophora variegata* (J.V.Lamouroux). The samples were collected at the natural beds from the rocky shore of Minn-Land coastal area, middle region of Rakhine Coast. The isolation of pigmented fungus was carried out by using Washing method (Inaba and Ando 2002). During the preliminary study of antibacterial activity on *Micrococcus luteus* NITE83297, the paper disc diffusion assay method (Tomita, 1988) was used to check the activity of the fermented broth. The filter paper (Toyo Advantec, Japan) and four solvents such as 20% NH_4CL, water saturated n-butanol, n-butanol-acetic- water (3:1:1) and water saturated ethyl acetate were used for Paper chromatography according to the method of Tomita,1988. Antibacterial metabolite was extracted with ethyl acetate from the fermented broth based on the results (R_f value) of paper chromatography.

Key words: antibacterial activity, *Micrococcus luteus*, fermented broth, *Lobophora variegata*, pigmented fungus.

O-AP-D10

Mangrove Macro-algae (*Bostrychia-Caloglossa* association) from Sarawak Coast: An Intensive Note on Diversity

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Abstract

Mangrove-associated macro-algae of the world have been drawn special attention to the phycologist for its uniqueness, especially for the last few decades. Taking the hypothesis of remarkable diversity and considering the gap of research, the study on mangrove macro-algae exclusively the *Bostrychia-Caloglossa* association from Sarawak was carried out. An explorative field sampling was done throughout the coast of Sarawak, Malaysia, and an attractive number of species were identified following the morphological characteristics. From the genus *Bostrychia*; 9 species namely *Bostrychia anomala, B. binderi, B. calliptera, B. kelanensis, B. montagnei, B. moritziana, B. radicans, B. simpliciuscula* and *B. tenella* and from genus *Caloglossa*; 5 species specifically *Caloglossa adhaerens, C. adnata, C. leprieurii, C. ogasawaraensis*, and *C. stipitata* were identified that represent a high diversity compared to the world records. The macro-algal species were found dominated underneath the mangrove canopy compared with outside as epiphytic communities adhere to roots, stems, trunks, dead shells, etc as well as to sediments. Observation revealed that a number of environmental factors like salinity, temperature, desiccation, tidal inundation, wave action, wetting frequency, and light intensity are responsible for this macro-algal abundance. The study suggests that Sarawak coast is a rich diversity area for the genus *Bostrychia* and *Caloglossa.* The finding of this research contributes to the diversity info from Malaysia, related to two genera addressed and may lead for further attention to the researchers and explorers for new products as these algae are reported as a good source of pharmaceuticals ingredients like anti-aging and cosmetics one.

Keywords: *Bostrychia, Caloglossa,* mangrove macro-algae, mangrove canopy, Sarawak

Bioactivity and Photosynthetic Pigments Quantification of Non-Polar Extracts Marine Macro-algae

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Abstract

The aims of this study were to identify the bioactivities along with photosynthetic pigments quantification of non-polar extracts from three different species of marine macro-algae. The non-polar solvent (N-hexane) was used to extract the dried sample. Antioxidant activity was measured by the *Diphenyl picryhydrazil* (DPPH) method in four different concentrations (31.25; 62.25; 125; and 250 ppm). This analysis showed a moderate antioxidant activity from *E.cottonii* (IC_{50} 110.174 ppm), weak antioxidant activity of *P.australis* (IC_{50} 191.152 ppm) and very weak antioxidant activity of *S.polycystum* (IC_{50} 232.544 ppm). The photosynthetic pigments quantification represented the composition of chlorophyll a, b and carotenoid pigment in marine macro-algae. *S.polycystum* contained the highest amount of chlorophyll a, b and carotenoid (36.341 mg/g; 21.201 mg/g; 1.087 mg/g).

Keywords: organic solvent, antioxidant, maceration, carotenoid, Chlorophyll

O-AP-E3

Inhibition Acivity of α-Amylase and α-Glucosidase by *Sargassum hystrix* Extract and Its Ethyl Acetate Fractions

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Abstract

People with diabetes mellitus are continue to increase every year due to change in diet and way of life. It was reported that *Sargassum hystrix* has potent as antidiabetic by inhibit α-amylase and α-glucosidase. The aim of this research was to obtain active compound in ethyl acetate fraction of *S. hystrix* which inhibit α-amylase and α-glucosidase. Dried *S. hystrix* was extracted using methanol, then liquid partitioned by ethyl acetate. Ethyl acetate fraction then separated using column chromatography and preparative Thin Layer Chromatography (TLC). The content compounds were identified using Gass Chromatography-Mass Spectrophotometry (GC-MS). The results showed that inhibitory activity of *S. hystrix* extract and ethyl acetate fractions were higher compare to acarbose as standard drug, in inhibiting both α-amylase and α-glucosidase activity. The analysis of GC-MS showed that the suspected compound which which had ability to inhibit α-amylase and α-glucosidase were 1,2-Benzenedicarboxylic acid; 1,3,5-Benzenetriol; Flamenol; Eicosanoic acid; and Pentadecanoic acid.

Keywords: Antidiabetic, Ethyl acetate, *Sargassum hystrix*, α-Amylase, α-Glucosidase.

O-AP-E4

Effects Of Seaweed Concentration on Physical And Chemical Characteristics Of Kombucha Seaweed (*Gracilaria verrucosa*)

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Abstract

Gracilaria verrucosa concentration is expected to affect the kombucha due to the carbohydrates content of seaweed can be a factor formation of nata as a successful cultivate kombucha parameters. The aim of research is to determine the effect of seaweed concentration on physical and chemical characteristics of kombucha seaweed (*Gracilaria verrucosa*). The viscosity value of kombucha seaweed *Gracilaria verrucosa* is 0.3 dPas. The color value of L (brightness) ranges from 15,78 to 27,93, a (reddish) value ranging from 4,75 to 8,88 and B (yellowish) values ranging from 19,35 to 26,7. Total phenolic content of the seaweed kombucha *Gracilaria verrucosa* is 0,025 mg of GAE/ml to 0,75 mg of GAE/ml. Acid content is 0,09% to 0,88% with pH on the day 0 fermentation of 5,7 then down to 2,9 in fermentation day 12. Kombucha alcohol content of 0% to 0,65% and Vitamin C content of 0,04 to 0,07 mg/25ml. Kombucha Seaweed *Gracilaria verrucosa* has good results on the coliform test shows that is no bacteria or get negative results on every treatment in all fermentation days. The result showed that seaweed concentrations have an effect on kombucha's physical and chemical characteristics.

Keywords : effects, physical, chemical, kombucha, *Gracilaria verrucosa*

O-AP-E5

Isolation and Identification of Seaweed Degrading Bacteria from Herbivorous Organisms

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Abstract

Although seaweed is the important sources of polysaccharides for varies of application such as biofuel, pharmaceutical, and food industry, the highly utilization of seaweed has led to increasing of seaweed waste and causing environmental pollution. On the other hand, seaweed degrading bacteria has been proposed as biological control for seaweed waste by degrading their component polysaccharide such as agar, carrageenan, cellulose, xylan and fucoidan. The aim of this study is to isolate and identify seaweed degrading bacteria from herbivorous aquatic organisms such as sea urchin (*Diadema* sp.), nerites (*Nerita* sp.), sea cucumber (*Holothuria* sp.) and rabbitfish (*Siganus* sp.). We identified seaweed degrading bacteria using enrichment culture method with *Undaria*, then identified 16S rDNA sequences and analyse their degradability towards different type of seaweed species. Fifteen *Undaria* degrading bacteria were isolated and these isolates showed highly similarity with *Bacillus* sp., *Vibrio* sp., *Pseudomonas* sp., *Actinobacteria* sp., and *Pseudomonas* spp. Eight isolates (5 isolates from sea urchin, and one from nerites, rabbitfish, and sea cucumber) of these 15 isolates showed multi-seaweed degradability (*Undaria* sp., *Laminaria* sp., *Monostroma* sp., *Porphyra* sp. and *Gracilaria* sp.). In conclusion, this study showed a potential that these isolates can use as biological control for seaweed waste. However, further studies are required for identify enzymatic reaction produced by bacterial strains.

Keywords: Nerites, Rabbitfish, Sea cucumber, Sea urchin, Seaweed degrading bacteria

O-AP-E10

Isolation of Endophytic Fungi and their Antifungal Activities against on *Candida albicans* NITE 09542 from *Cleistocalyx operculatus* Roxb, (Tha_Pyae-Gyin)

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Abstract

The isolation of endophytic fungi and their antifungal activities against on *Candida albicans* NITE 09542 from traditional medicinal plants, *Cleistocalyx operculatus* Roxb., (Tha-pyae-gyin in Burmese) belonging to the family Myrtacea, were conducted at the Microbiology Laboratory at Pathein University. The samples plants were collected from Pathein Township, Ayeyarwady Region and identified. The isolation of microorganisms was carried out by Surface Sterilization Method. A total of ten endophytic fungi were isolated from the plants *Cleistocalyx operculatus* Roxb., (Tha-pyae-gyin). Among them, the fungi TT-03 was selected for further investigations based on the results of the antimicrobial activity especially against *Candida albicans* NITE 09542. Amylase enzymes activities of isolated endophytic fungi were tested by culturing in the Soluble Starch Liquid medium and Cassava Starch Agar medium. In the study of Liquid medium, TT-03can hydrolyzes the starch. According to the results of Cassava Starch Agar medium, the isolated fungi TT-02, TT-03 and TT-05 showed significant level than other strains.

Keywords: Antifungal Activities, *Candida albicans* NITE 09542, *Cleistocalyx operculatus* Roxb., Endophytic Fungi, Myrtacea

O-AP-D8

Studies on the Medicinal Algae from Coastal Region of Lower Rahine Coast

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Abstract

Morphological and pharmacological studies on some marine algae had been conducted within the period of 2013 - 2016. The samples were collected from the coastal areas of Lower Rakhine Coast especially on Chaung Tha, Ngwe Saung and Maw Tin which are well known for the plentiful of marine algae. A total of 20 species of marine algae including 3 species of Chlorophyta (Green algae), 8 species of Phaeophyta (Green algae), and 9 species of Rhodophyt (Red algae), a were recorded from these areas. The species list was presented in paper. Among the recorded species, the brown alga *Padina* spp. and Sargassium spp. are observed as the most seasonally abundance species. Both species are used as food for the local people. The identification and phyto-physiochemical analysis had been done at the Botany department Laboratory in Pathein University. The powdered *Padina* spp. was analyzed for moisture, ash, crude protein, crude fiber, crude fat, carbohydrate and energy, and other chemical composition at Food industries Development Supporting Laboratory (FIDSL) in Yangon. The qualitative and quantitative analysis of elements was carried out at the University research Center and Apply Geology Department in Yangon. According to the results of analysis of *Padina* spp., and Sargassium spp. it can be assumed that this species can be used as nutrition, medicine, and other purposes in daily life.

Keywords: Chlorophyta, *Padina*, *Sargassium*, Rhodophyta, Phaeophyta

O-AP-F2

Effect of Brewing Temperatures and Times of Low Tannin Tea on Antioxidant Activity from Mangrove Leaves (*Rhizophora mucronata*)

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Abstract

Rhizophora mucronata leaves contain phenolic compounds such as flavonoids, phenolic acids, dihydroflavonol, vanillic acid, p-hydroxy benzote acid, and tannins. The chemical compounds in this plant have the potential to become tea products. Tea contains antioxidants that are beneficial in preventing degenerative diseases such as cancer, stroke, and other chronic diseases. Tannin is useful for stopping bleeding and diarrhoea, but regular tea consumption with high tannin content can cause liver damage. The purpose of this research was to determine the antioxidant activity of tea in low-tannin mangrove leaves with various temperature and time of brewing. Antioxidant activity test using the DPPH (*1,1-diphenyl-2-picrylhydrazil*) method. Research design with Completely Randomized Design with 2 factors and 3 times replication; factor 1: brewing temperature in 70 ° C, 85 ° C, 100 ° C and factor 2: brewing time in 5 minutes, 10 minutes, 15 minutes. Data were analyzed using ANOVA (*Analysis of Variance*) with the F test at the level of 5% and if the results obtained were significantly different then continued with Tukey test. The best result was determined using the de Garmo test. The best combination of tea brewing in temperature of 70oC for 5 minutes with tannins values 10,7% and IC50 value of antioxidant activity 206,39µg /mL. For supporting the data, tea with best combination result tested for moisture content with the value 7%, 6,25% of ash content, 4,83% of crude fiber content and pH value 12,86. To validate the antioxidant activity tested with FRAP method and the value of FRAP 0,269 mg/g AAE. For catechin content of 0,456%, then total phenol test found with the range value of 32,61 mg/g GAE. Bioactive compounds detected using LC-MS in *Rhizophora mucronata* sample such *4-(4-{1-[1-(1H-Tetrazole-5-yl)ethyl]-1H-imidazol-2-yl}-1H-1,2,3-triazol-1yl)piperidine, Benzo[g]quinolin-4-yl-[3-(4-methyl-piperazine-1-yl)-propyl]-amine,N-[[3-(4,6-Diamino-2,2-dimethyl-1,3,5triazinel)phenyl]methyl]morpholine-4-carboxamide and 9-octadecenitrile.* The organoleptic test using a non-parametric analysis with Mann-Whitney U test and for the hedonic and scoring test were significantly different from the aroma and taste parameters but were not significantly different in color parameter. In the triangle test, the results were significantly different (P>0,05).

Keywords: *tea, mangrove leaves, Rhizophora mucronata, tannins, antioxidant*

O-AP-C1

Antimicrobial Activities of Various Extracts from the Blue Green Algae *Arthrospira platensis* (Gomont)

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Abstract

An investigation on the antimicrobial activities of various extracts from the blue green algae *Arthrospira platensis* (Gomont) have been carried out in the Marine Science Department Laboratory. In this study, antimicrobial effects of Deionized water, Ethyl acetate, n-butanol, Methanol, Acetone, Ethanol, n-Hexane, Benzene and Petroleum ether extract of *Arthrospira platensis* (Gomont) were tested. Six bacteria and two fungi were used as test organisms with paper disc diffusion assay method to investigate the effects of extracts on test organisms. Thin layer chromatography method was also used to choose the appropriate elutent solvents. Purification of extract was carried out by column chromatography method.

Keywords: antimicrobial, extract, elutent solvents, column chromatography.

O-AP-C3

Study on the Effects of Salinities and Light Qualities on the Growth Rate of Green algae Chlorella sp.

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Abstract

The effects of different ranges of salinity and light quality on the growth rates of green algae *Chlorella sp.* were determined at the Marine Science Laboratory in 2008. Three different salinities of 25‰, 30‰ and 35‰; and five different light qualities of blue light; 450 nm-500 nm, green light; 500 nm – 550 nm, yellow light; 550 nm -590 nm, red light; 610 nm – 700 nm and white light were used in the experiment under the modified F/2 medium at room temperature. The initial cells density was 1×10^6 cell/ml. From the experiment, the optimum culture conditions for best growth rate of *Chlorella sp.* , that is the maximum cell density 19.05×10^6 cell/ml, was observed at salinity 35‰ and yellow light; 550 nm -590 nm.

Keywords: *Chlorella sp.*, green algae, growth rate

O-AP-C4

Study on the Growth Rate of Blue Green Algae *Spirulina platensis* (Geitler) in Natural Seawater by Using Different Media

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Abstract

Blue green algae, *Spirulina platensis* (Geitler), is the most important microalga for production of biomass as health food and animal. The growth rates of *S.platensis* were determined at five pH values (8.5, 9.0, .9.5, 10.0 and 10.5) and two salinity values (30‰ and 35‰) with seven different media (F-2 with $CaCO_3$, F-2 with $NaHCO_3$, Z-1 with $CaCO_3$, Z-1 with $NaHCO_3$, Z-2 with $NaHCO_3$, urea and Triple super phosphate medium with $NaHCO_3$and PES with $NaHCO_3$). The culture was started at the optical density (OD) 0.20 and the experimental period was ended after 10 days in the laboratory room. Among the media urea and Triple super phosphate medium with sodium bicarbonaterecorded the best growth in all pH and salinity. The most suitable pH in *S. platensis* culture was 10.5 in all types of medium. The optimum i.e., OD 0.70 was achieved in urea and Triple super phosphate medium with sodium bicarbonate of pH 10.5 at salinity 30‰. In addition, urea and Triple super phosphate medium with sodium bicarbonate gave rise to the maximum growth of *S. platensis* and then followed by PES medium with $NaHCO_3$.The minimum OD 0.23 at the end of culture was recorded in F-2 medium by using $CaCO_3$. The results revealed the potential use of seawater with some nutrients for laboratory culture of *S. platensis* at different pH range.

Keywords: blue green algae, media, pH, *Spirulina platensis*

O-AP-E7

Biomass Production, Pigment Content and Fatty Acid Profiles of *Tetraselmis suecica* in An Outdoor Closed Photobioreactor with A Semi-Continuous Operation

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Abstract

The biomass production of microalgae in an open culture system is limited by contamination issues, which in turn affects the production rate and quality of harvested cells. Therefore, methods for microalgae cultivation has then shifted to application of closed devices such as photobioreactors. In the present study, the green alga, *Tetraselmis suecica* was cultivated in a closed outdoor photobioreactor on a semi-continuous mode for 21 days. The photobioreactor system was operated under controlled conditions (air flow, carbon dioxide, temperature). This study aimed to evaluate the effect of dilution rates, 0.10 (TT10) and 0.25 (TT25) day^{-1}, on total biomass, cell density, pigment content and fatty acid profiles of *T. suecica* cultivated in the photobioreactor system. Results show that microalgal productivity in both treatments varied throughout the cultivation period. The total biomass in TT10 reached a maximum value of 0.842 g L^{-1} (on day 10), while for TT25 the maximum value obtained was 0.456 g L^{-1} (on day 10). Cell densities increased rapidly from day 2 to day 6 (both TT10 and TT25) and later fluctuated from day to day. Full detail on pigment content and fatty acid profiles will be discussed later.

Keywords: Closed culture, Microalgae, Microalgal productivity, Outdoor photobioreactor, *Tetraselmis suecica*

O-AP-E8

Species Composition and Vegetative Structure of Mangrove Forests in Lower Rakhine Coast

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Abstract

The species composition and vegetative structure of Nga-Yoke-Kaung and Haing-Gyi mangrove forests from Lower Rakhine Coast had been investigated in 2018. The Point Centered Quarter Method (Dahouh-Guebas and Koedan, 2006) was used to determine the vegetative structure. A total of 15 species were observed in Nga-Yoke-Kaung and 5 species were in Haing-Gyi. In Nga-Yoke-Kaung, the total forest density and Important value (IV) are found to be 190.2 (trees/0.1 ha) and 36.89% respectively. Complexity index, total basal area and total frequency is 17.98%, 2.0631(m^2/0.1ha) and 43.5% respectively as well the forest type is Rank 5. The highest density and the Important value of *Rhizophora apiculata* were 92.38 (trees/0.1 ha) and 104.4% followed by *Nypa fruticans* 18.8 (trees/0.1 ha), 94.23% and the lowest tree density and Important Value of *Lumnizera racemosa* 2(trees/0.1 ha) and 5.3%. The total crown coverage of is 45.81% and the total sky appearance is 51.19%. In Haing-Gyi, the total forest density and Important Value (IV) are found to be 199.5 (trees/0.1 ha), and 83.34% respectively. Complexity Index, total Basal areas and total frequency are 1.56%, 0.4710 (m2/0.1ha) and 206.6% respectively and the forest type is Rank 2. The highest tree density and the Important Value of *Avicennia alba* were 123.27 (trees/0.1 ha), 173.13% followed by *Avicennia officinalis* were 45.13 (trees /0.1ha), 74.03% and the lowest tree density and the Important Value of *Excoecaria agallocha* were 2.7 (trees/0.1 ha), 8.2%. The total crown coverage is 31.06% and the total sky appearance is 68.94%.

Keywords: Complexity index, Important Value, Total Crown coverage, Total frequency, Total Sky appearance

O-AP-E9

Comparative Study on Mangrove Forest Diversity in Magyi Coastal Area, Shwe Thaung Yan Sub Township, Pathein Township, Ayeyarwaddy Region, Myanmar

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Abstract

The present study deals with the assessment of mangrove species diversity in the Magyi coastal area, Shwe Thaung Yan Sub Township, Pathein Township, Ayeyawaddy Region, Myanmar. To assess the mangrove species diversity nine transects with forty samples plots (10mx10m each); were set in series without interval from the bank to landward direction in two different sites (Santra *et al.*, 1999). In this study, a total of 974 individuals, representing 9 families, 13 genus and 18 species; (2.16, 0.70) diversity index were recorded in Udo tidal creek. A total of 841 individuals, representing 13 families, 18 genus and 23 species: (2.46, 0.71) diversity index were recorded in Magyi tidal creek by the method of Shannon-Wiener's Index (H) and Simpson's Index (D) respectively. Similarity of floristic compositions between Udo and Magyi tidal creek was 72.17% by the method of Sorenson index (1948). According to results Rhizophoraceae was the most dominant family in this area. The present data will give valuable information to conserve the mangrove forest biodiversity in Magyi coastal area.

Keywords: diversity, similarity, conserve biodiversity, coastal area

O-AP-F3

Effects of Blue and Yellow LEDs for Growth and Proximate Composition of *Isochrysis* sp.

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Abstract

Microalgae are photoautotrophic organisms that need light as their main energy source. In this study, the growth, proximate composition and morphology of marine microalga, *Isochrysis* sp., cultured under blue and yellow light-emitting diodes (LED) with fluorescent light as control were compared. Growth of the microalga was observed for 13 days and the effects of the three different light sources on cell count, optical density and specific growth rate were determined. At the end of the experiment, results showed that *Isochrysis* sp. cultured under fluorescent light had the highest specific growth rate (SGR), while yellow and blue LED cultures had similar SGR. Yellow LED and fluorescent light produced higher cell density in culturing *Isochrysis* sp. The cultures were harvested during the stationary phase and proximate analysis was performed. Lipid content was significantly higher in *Isochrysis* sp. grown under yellow LED, whereas, protein composition was significantly higher in blue and yellow LED cultures. Yellow LED and fluorescent light cultures also had significantly high carbohydrate composition compared to blue LED cultures. Thus, it can be concluded that yellow LED had the optimum wavelength for *Isochrysis* sp. culture.

Keywords: Microalga, *Isochrysis* sp., LED light, proximate composition

Present Status and Prospects for Seaweed Production in Bangladesh

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Abstract

Seaweeds, one of the most important marine living resources could be termed as the futuristically promising plants. These plants have been a source of food, feed and medicine since the ancient time. This study was conducted to review the diversity, distribution, abundance and potentiality of seaweed in respect of Bangladesh. As this is a review paper, so all the data were collected from secondary sources. Results found that, seaweeds are available along the whole Bangladeshi coast, mostly in St. Martin Island, Cox's Bazar and Sundarbans Mangrove forest. In Bangladesh about 193 seaweed species of 94 genera are available. Among them, 18 species of 12 genera are considered as economically important. Approximately, 5,000 metric ton of seaweed biomass is available. Due to seasonal variation in water quality parameters, generally seaweeds are available from October to April, but highest abundance occurs from January to March. Seaweed production in Bangladesh have a good prospect as it helps to rural development, women empowerment, disease prevention, proper use of our land and so on. Proper utilization of seaweed also helps us to achieve sustainable development goals. There need to be implement biotechnological tools for sustainable management of seaweed resources. Overall, an attempt has been made to highlights the prospects of seaweed in Bangladesh in the modern context.

Key words: Seaweed, Diversity, Distribution, Prospect, Bangladesh

Session 9 : Broodstock Culture, Larviculture and Hatchery Management

Session 9 : Broodstock Culture, Larviculture and Hatchery Management

Bunga Melur Room

November 19, 2019 (Tuesday)		
Time	**Title**	**Code**
Chairperson: Dr. Annie Christianus		
11:00-11:30	**Refreshment and Poster Viewing**	
11:30-11:45	**Comparisons on Some Reproductive Efforts of Three Freshwater Prawns in Ayeyarwady River, Myanmar** Myo Htet Htet Saung[a*], Sein Sein Win[a], and Nang Lao Kham[a], Khin Khin Lay[b]	O-BL-A1
11:45-12:00	**Acidic Water pH Disturb Feeding and Growth Performances of Giant Freshwater Prawn *Macrobrachium rosenbergii* Larvae** Siti Izzah Athirah Hamin[a*], Audrey Daning Tuzan[c], Leong Seng Lim[c] and Hon Jung Liew[a,b]	O-BL-A2
12:00-12:15	**Species composition of pueruli larvae of spiny lobsters caught at the South Sea of Lombok Island of West Nusa Tenggara, Indonesia** Arief Setyanto[a, b*], M.R. Fanshori[a], Soemarno[b], DGR Wiadnya[a], and C. Prayogo[b]	O-BL-A3
12:15-12:30	**Larval rearing and seed production of mud crab *Scylla* spp.** Sharr Wai Linn[a]	O-BL-A4
12:30-12:45	**Effect of Water Temperature on Growth Performance, Molting Cycle, Survival Rate and Gill Condition of Mud Crab, *Scylla paramamosain* during Nursery Phase** Muhammad Nur Syafaat[a,b*], Mohammad Asmat-Ullah[b], Mohamad Nor Azra[b], Che Zulkifli Che Ismail[c], Adnan Amin-Safwan[b], Mohammad Syahnon[b], Hongyu Ma[d,e], Ambok Bolong Abol-Munafi [2] and Mhd Ikhwanuddin[b,d]	O-BL-A5
12:45-13:00	**Growth Performance Studies of Two Strains of *Anabas testudineus* (Bloch, 1792) under Laboratory Conditions in Malaysia** Awawu Dasuki[a,b], Yuzine Esa[a*], Sarker Mohammad Nurul Amin[a], and Mohammad Fadhil Syukri Ismail[a]	O-BL-A6

13:00-14:00	**Lunch**	
Chairperson: Dr. Bambang Triyatmo		
14:00-14:15	**Artificial Induced Breeding of Climbing Perch (*Anabas testudineus*, Bloch, 1792) for Seed Production in Zoology Aquarium, Pathein University** Lei Lei Khaing [a]; Myo Naing Oo[a*], and Aung Swee Oo[b]	O-BL-B1
14:15-14:30	**Effects of Different Artificial Incubation Models and Temperatures on Embryo Hatching and Larvae Performances of Nile Tilapia (*Oreochromis niloticus*)** Akhmad Taufiq Mukti[a]	O-BL-B2
14:30-14:45	**Impact of Water pH on Physiological Responses and Reproductive Performances of Blue Gourami** Cha Kang Loong[a], and Hon Jung Liew[a*]	O-BL-B3
14:45-15:00	**Comparison of Different Doses of Hormone Provisions on the Reproductive Performance of *Prochilodus lineatus* (Valenciennes, 1837)** Kalayar Win Maung[a], Than Than Myint[a*], Thida Ei[b] and Kay Lwin Tun[c]	O-BL-B4
15:00-15:15	**Study on Sultan Fish, *Leptobarbus hoevenii* (Bleeker, 1851) Breeding** Thumronk Amornsakun[a], Sajeenuth Srithongthum[a*], Sarawuth Cheso Sitthisak Jantarat[c], Lim Leong Seng[d], Nobuo Suzuki[e] and Anuar Has san[f]	O-BL-B5
15:15-15:30	**Reproductive Characteristics of Matured Female Sultan Fish, *Leptobarbus hoevenii* (Bleeker, 1851) Spawner** Sajeenuth Srithongthum[a], Thumronk Amornsakun[a*], Sarawuth Cheso Sitthisak Jantarat[c], Lim Leong Seng[d], Nobuo Suzuki[e] and Anuar Hassan[f]	O-BL-B6
15:30-15:45	**Seasonal Abundance and Reproductive Condition of *Rhinomugil corsula* (Hamilton, 1822) in Bago River, Myanmar** Thida Ei[a*], Kalayar Win Maung[b], Than Than Myint[c], and Kay Lwin Tun[d]	O-BL-B7
15:45-16:00	**Induced Maturation of Female Eel (*Anguilla bicolor bicolor*) Gonad through Hormonal Injection and Dietary Supplementation of Turmeric Powder**	O-BL-B8

	Agus Oman Sudrajat[a*], Nurbambang Priyo Utomo[b],and Erizal[c]	
16:00-16:15	**Comparing Parental Reproduction and Larval Development From Different Broodstock Sources of Bighead Catfish (*Clarias macrocephalus*)** Duong Nhut Long[a*] , Duong Thuy Yen[b] and Tran Quoc Cuong[c]	O-BL-B9
16:15-16:30	**Induced Breeding, Embryonic and Larval Development of a Near Threatened Cyprinid *Osteobrama belangeri* (Valenciennes,1844)** Than Than Myint[a*], Kalayar Win Maung[b], Thida Ei[c], May Lei Win[d] and Kay Lwi Tun[e]	O-BL-B10
16:30-17:00	**Poster Viewing**	

November 20, 2019 (Wednesday)		
Time	**Title**	**Code**
Chairperson: Dr. Lim Leong Seng		
10:00-10:30	**Refreshment and Poster Viewing**	
10:30-10:45	**Study on Induced Breeding and Larval Rearing of Knifefish (*Notopterus notopterus*)** Manish Devkota[a*] and Bui Minh Tam[b]	O-BL-D1
10:45-11:00	**Effect of Dry *Temminalia catappa* Leaves on Sex Ratio and Growth Performance in Siamese Fighting Fish (*Betta splendens*) Larvae** Sooksakaow Rodpan[a], Nongnuch Laohavisuti[a*] and Uscharee Ruangdej[a]	O-BL-D2
11:00-11:15	**The Use of Different Aquatic Plants in the Cooking Oil Waste Management to the Survival and Growth of Carp (*Cyprinus carpio*) Larvae.** Kukuh Nirmala[a*], Eddy Supriyono[a] and Fahmi Rahma Tri Jaya[a]	O-BL-D3
11:15-11:30	**Sensory Development and Larval Behavior of Hybrid Malaysian Mahseer (*Barbonymus gonionotus* ♀ × *Tor tambroides* ♂)** Muhammad Azfar Ismail [a], Mohd Salleh Kamarudin [a*], F. Syukri [a], and L. Kamil.[b]	O-BL-D4

11:30-11:45	**Background color preference of juvenile marble goby, *Oxyeleotris marmorata*** Leong-Seng Lim[a*], Wenn-Kae Tiong[a], Audrey Daning Tuzan[a], Hon Jung Liew[b] and Gunzo Kawamura[a]	O-BL-D5
11:45-12:00	**Combined Effects of Temperature, Copper and Feeding Frequency on Survival, Growth Rate, Feeding Rate and Oxygen Consumption in Waigieu Seaperch (*Psammoperca waigiensis*) Larvae** Vo Thi Xuan[a*], Le Minh Hoang[a*] and Dinh Van Khuong[a]	O-BL-D7
12:00-12:15	**Larval Rearing of Asian Seabass Using Rotifer, Protozoa, and *Euplotes encysticus*** Syafiqah Hanani Mohd Shahidin[a], Normawaty Mohammad Noor[b], Shaharah Mohd Idris[c], Sufian Mustafa[c], and Yukinori Mukai[b]*	O-BL-D8
12:15-12:30	**The Influence of Light Wavelength and Intensity to the Survival Rates, Growth Rates and Production Index of Sutchi Catfish Larvae** Khairul Muttaqin Ismail[a] , Muhammad Khairulanwar Rosli[b], Tan Nai Han[b], Normawaty Mohammad Noor[b] and Yukinori Mukai[b]*	O-BL-D9
12:30-14:00	**Lunch**	
Chairperson: Dr. Bui Minh Tam		
14:00-14:15	**Indigenous Materials as Broodstock Conditioning and Settlement Substrates for Abalone *Haliotis asinina*** Lota A. Creencia[a*], Adzel Adrian G. Baldevieso[a,b], Argie L. De Guzman[b], Manuel N. Javarez[b], Amran S. Jaibe, Reymart S. Dagaraga[b], and Aldrin M. Gultian[b]	O-BL-C1
14:15-14:30	**Effects of Sperm to Egg Ratio, Stocking Density and Delay of Gamete Contact on Fertilization Success and D-larvae Production of Green Mussel *Perna viridis*** Lily Anne G. Piñosa[a*], Liberato V. Laureta[a], Mary Jane A. Amar[a], Fiona L. Pedroso[a], Thereze Pauline V. Capaque[a], Donna C. Rendaje[a], Josel F. Cadangin[a], and Jean Rose H. Maquirang[a]	O-BL-C2
14:30-14:45	**Induced Spawning and Larval Rearing for the Sea Cucumber *Holothuria nobilis* (Selenka, 1867)** Mariamu Ahsadi Bakari[a*] and Nguyen Van Hung[b]	O-BL-C3
14:45-15:00	**The Effect of Different Water System on Growth and Survival of Juvenile Spotted Babylon (*Babylonia areolata*)**	O-BL-C4

	Phuwit Naowarat[a], Worawut Koedprang [a], Suwat Tanyaros[b] and Supatcha Chooseangjaew [a,b*]	
15:00-15:15	**Study on Morphological Changes and First Feeding of Peacock Eel *(Macrognathus siamensis*)** Nguyen Hoang Sang[a]* and Bui Minh Tam [a]	O-BL-D10
15:15-15:30	**State of Korean Aquaculture Industry in 2015** Bongse Oh[a*]	O-AM-D7
15:30-16:00	**Poster Viewing**	

O-BL-A1

Comparisons on Some Reproductive Efforts of Three Freshwater Prawns in Ayeyarwady River, Myanmar

Myo Htet Htet Saung[a*], Sein Sein Win[a], Nang Lao Kham[a], and Khin Khin Lay[b]

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Abstract

The present study was carried out to analyze the reproductive biology of *Macrobrachium inflatum* Liang& Yan, 1985, *M. lanchesteri* (De Mann, 1911) and *M. idella* (Hilgendorf, 1898). Comparisons on some reproductive efforts of three freshwater prawns were conducted from April 2017 to March 2018. As regards the relative fecundity of these prawns, the values were significantly different among the groups, $F = 40.43$ ($p<0.05$) and the highest value is observed in *M. inflatum* (474.05± 181) followed by *M. lanchesteri* (344.76± 107) and *M. idella* (262.21± 140). With respect to the egg measurements, long axis is defined as the longest part of the egg and short axis the widest part of the egg. The largest egg size were observed in *M. lanchesteri* (0.859mm long axis, 0.701mm short axis and 0.226 mm^3 egg volume), the medium size in *M. idella* (0.781mm long axis, 0.587mm short axis and 0.150 mm^3 egg volume) and the smallest size in *M. inflatum* (0.715mm long axis, 0.598 short axis and 0.131 mm^3 egg volume). Knowing the reproductive features could help to culture potentially these prawns and to also manage the wild population of natural water body, which leads to conserve of Myanmar's aquatic fauna.

Keywords: Freshwater prawns, relative fecundity, egg size, egg volume, Myanmar

O-BL-A2

Acidic Water pH Disturb Feeding and Growth Performances of Giant Freshwater Prawn *Macrobrachium rosenbergii* Larvae

Siti Izzah Athirah Hamin[a*], Audrey Daning Tuzan[c], Leong Seng Lim[c] and Hon Jung Liew[a,b]

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Abstract

Giant freshwater prawn *Macrobranchium rosenbergii* is one of the most highly markets demand. To produce high quality and quantity post-larvae, early life performance is important to ensure successfully growth and molt into post-larvae stage. One of important factor affecting early life development is water pH. Small degree of water pH fluctuation is known to pose significant impact to biological processes of aquatic life that maybe cause by unintentional industrialize and agriculture pollution**.** Therefore, this study was planned to examine the effect of water acidification on early life performance of freshwater giant prawn with specifically focus on feeding, growth and molting performances. This study was designed with three different acidic water pH (neutral – 7.7±0.4; mild-acidic – 6.4±0.5 and acidic – 5.4±0.2) with triplication at stocking density of 50 larvae/L. Throughout the 30 days culture period, feeding rate, survival, growth and molting stage to post-larvae were monitored. As expected, giant freshwater prawn highly sensitive to acidic pH with no larvae survive after 48h exposure. Meanwhile, larvae exposed to mild-acidic pH significantly depressed feeding, growth and survival rates ($P<0.05$) as compared to neutral pH. Larvae exposed to mild-acidic water pH experiencing longer larvae period for 30 days before metamorphosed into post-larvae stage. Whilst under neutral water pH, larvae metamorphosed into post-larvae was first observed at day-22. Ultimately, this study proved that giant freshwater prawn *M. rosenbergii* is highly sensitive to acidification and farming of this species should be avoided from low water pH condition.

Keywords: Acidification; pH; Food security; Crustacean; Aquaculture; Molting.

O-BL-A3

Species Composition of Pueruli Larvae of Spiny Lobsters Caught at the South Sea of Lombok Island of West Nusa Tenggara, Indonesia

Arief Setyanto[a, b*], M.R. Fanshori[a], Soemarno[b], DGR Wiadnya[a], and C. Prayogo[b]

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Abstract

Indonesia has six species of tropical spiny lobster dispersed over its archipelagic waters. Species variation study through its life phase in space and time is necessary to ensure management effectiveness of lobster fisheries. Distribution of pueruli larvae of spiny lobster of *Panulirus* species was surveyed in the South Sea of Lombok Tengah West Nusa Tenggara in December 2018 to January 2019. The number of pueruli larvae caught were counted and compared among the species. Data analysis was performed using ANOVA test. There are four species lobster found. Dominant lobster species are phyllosomas and pueruli of *Panulirus homarus* (U. Pasir) dominated the *Panulirus spp.* larvae-trap catch. it is followed by *P. versicolor* (U. Bambu), *P. longipes* (U. Batik), and *P. ornatus* (U. Mutiara). Surviving pueruli was transferred to a laboratory aquarium to await confirmation of their identity. *P. homarus* pueruli were most abundant approximately along the south coast of the Lombok Island and adjacent to the Eastern Indian Ocean. The distribution of pueruli when compared to its adult in relation to larval dispersal may support connectivity hypotheses of lobster population in the region.

Keywords: composition, connectivity, dispersal, Indian Ocean, Indonesia, larvae, lobster, Lombok, management, pueruli, West Nusa Tenggara.

O-BL-A4

Larval Rearing and Seed Production of Mud Crab *Scylla* spp.

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Abstract

An investigation on larval rearing and seed production of mud crab *Scylla* spp has been done at Labutta, Ayeyarwady Region. Gravid specimens were collected from the market and local fishermen. The specimens are duly disinfected using 150 ppm formalin for 30 minutes and stocked individually into 120 liter capacity PE tanks. Twice a day, the broodstock are fed with natural food such as cockles to satiation. When the broodstock becomes berried, she is transferred into a clean tank. Water is exchanged 100% daily and the developmental stages of the eggs are monitored using a microscope until they hatch. The newly hatched Z1 larvae are selected by their active phototactic responses. After a 30 second disinfection dip in 200ppm formalin, the Z1 larvae is stocked at densities of up to 400 pieces per liter into 500L. The Z4 larvae stocking densities of up 41 pieces per liter into 2 tons. Throughout the rearing period from the Z1 to Z4 larval stages, the development status of the larvae is monitored visually in the culture tank and using the microscope. During the Z1 to Z2 stages, the larva is fed 8 times daily with *Artemia Umbrella*. At the Z3 stage, the larva is fed 7 times daily with *Artemia Umbrella* and once daily with Frippak formulated feed. During the Z4 and Z5 stages, the larva is fed with *Artemia Umbrella* (2 times per day), *Artemia* Nauplii enriched with SELCO, Artemia Nauplii and Lansy formulated feed respectively. The period of incubation was 13 days and the complete larval development took a span 22 days.

Keywords: *Artemia Umbrella*, *Scylla* spp, larval rearing, seed production, *Artemia* Nauplii

O-BL-A5

Effect of Water Temperature on Growth Performance, Molting Cycle, Survival Rate and Gill Condition of Mud Crab, *Scylla paramamosain* during Nursery Phase

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Abstract

This study was intended to determine effect of water temperature on growth performance, molting cycle, survival rate, and gill condition of mud crab *Scylla paramamosain* during nursery phase. The study was designed with a completely randomized design with 4 temperature treatments, i.e. 24 ^{o}C, 28 ^{o}C, 32 ^{o}C and ambient temperature (27-30 ^{o}C) as a control. The 5-6 days old of M was used as a animal test and it was kept individually in plastic cups with a bottom diameter of 6-9 cm. The plastic cups were placed into a rectangular fiberglass tank (70x117 cm) with 5-7 cm of water depth. Each temperature treatment had one tank with Recirculating Aquaculture System (RAS). A chiller was used to control temperature in Treatment 1 (24 ^{o}C) and Treatment 2 (28 ^{o}C) while in Treatment 3 (32 ^{o}C), a heater 300 W was used. Each treatment consisted three replicates and each replicate used 10 test animals. Nursery was started from megalopa (M) stage to several crablet stages within 45 days. Growth performance in this study, as measured by Carapace Width (CW), Body Weight (BW) at harvest, molting interval (intermoult duration), molting increament, Specific Growth Rate (SGR) in terms of CW and BW (SGR_{CW} and SGR_{BW}), and stages composition was influenced by different water temperature. Low temperature (24 ^{o}C) and high temperature (32 ^{o}C) had lower growth performance than temperature of 28 ^{o}C and ambient temperature (27-30 ^{o}C) as well as survival rate (P<0.05). Molting Interval (MI) mean between stage from M to C5 and C1 to C5 at 28 ^{o}C treatment was the fastest (P<0.05) while the longest was 24 ^{o}C treatment. Furthermore, the gill lamella size at 24 ^{o}C and 32 ^{o}C treatments look thinner

and paler than temperature 28 ^{o}C and ambient temperature. Based on this study, temperature of 28-30 ^{o}C was recommended as the optimal temperature for long term nursery phase of mud crab *S. paramamosain*.

Keywords : Aquaculture; crablet; environmental; portunid; seed

Growth Performance Studies of Two Strains of *Anabas testudineus* (Bloch, 1792) under Laboratory Conditions in Malaysia

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Abstract

A 56 days feeding experiment was performed to evaluate the growth and production performances of crossbred Thai koi and Malaysian strain *Anabas testudineus* (climbing perch) in 100l glass aquaria at the department of Aquaculture University Putra Malaysia. Juvenile climbing perch with an initial weight of 3.33±0.44g and initial length of 5.57±0.27cm were stock at 15 fish per treatment per tank represented as T1, T2, T3 and T4 respectively in triplicate. Feeding was achieved using floating commercial feed (40%) CP twice daily (8:00am – 5:00pm) for all treatments. The result indicates no significant difference ($p<0.05$) in the final length, weight gain (WG), specific growth rate (SGR) and food conversion ratio (FCR) among all the treatments. Water quality parameters were within suitable ranges for fish production and pH average range was 5.59±0.13 in all the treatments. Fish in T4 presented a higher growth in terms of final length (11.65 ± 0.14cm), weight gain (WG) of 33.04± 2.01g, specific growth rate (SGR) of 4.30±0.06 and food conversion ratio (FCR) of 1.06±0.02 respectively. T3 had the lowest harvest weight but reported a slightly higher FCR of 1.13±0.01 when compared to T1 and T2. The result shows that fishes in T4 have a good potential for fresh water aquaculture and could be recommended based on its growth performance indices to farmers.

Keywords: Aquarium; Commercial feed; Crossbreed; Feed conversion ratio; Thai koi

O-BL-B1

Artificial Induced Breeding of Climbing Perch (*Anabas testudineus*, Bloch, 1792) for Seed Production in Zoology Aquarium, Pathein University

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Abstract

An investigation on the induced breeding of *Anabas testudineus* (Bloch, 1792) using ovaprim hormone was conducted within the period of June - August, 2019 with the aim of to develop the artificial breeding technique and market demand under local condition for economy. Mature stocked male and female fishes were randomly selected at 2:1 ratio in order to study the possibilities of breeding. Further investigations were carried out by their induced breeding with Ovaprim hormone. In this work, the ratio of hormone to stimulate male and female reproductive activities was different according to the fish weight. A single intramuscular injection was taken for females and half of dose for male fish. Hormone treated fish were kept in aerated glass aquaria. It was observed that *A. testudineus* did not breed naturally under captive conditions. Successful ovulation was only obtained with ovaprim in the group treated with 0.5mL kg-1b.wt.

Keywords: *Anabas testudineus*, Ovaprim hormone, muscular injection, Ovulation

O-BL-B2

Effects of Different Artificial Incubation Models and Temperatures on Embryo Hatching and Larvae Performances of Nile Tilapia (*Oreochromis niloticus*)

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Abstract

Nile tilapia (*Oreochromis niloticus*) is considered to be the best model species for evolutionary developmental biology study in the cichlid. Artificial egg incubation has facilitated the observation and study of tilapia eggs, embryo, and newly hatched larvae. This study aimed to examine different artificial egg incubation model and temperature on both embryo hatching and larval performance in Nile tilapia. Adult broodstock was spawned in a 200-liters aquarium through the stripping of both eggs (female) and sperm (male). Artificial fertilization was done using a water temperature of 28.5±0.5°C. Dead or unfertilized eggs and fertilized eggs were calculated according to the needs for research. In the first experiment, 200 embryonic cells were incubated using different models, namely the tight-aerated stagnant water model (air discharge of 12 L min^{-1}), the slow-aerated stagnant water model (air discharge of 4 L min^{-1}), and the glass funnel to water circulation model using closed water recirculation system with water discharge rate of 0.12-0.14 L min^{-1}. In the second experiment, embryos were incubated in the glass funnel using closed water recirculation system at different temperatures. The results of the first experiment revealed that the water circulation model using closed water recirculation system was the best model for artificially incubating tilapia eggs. It also resulted in higher hatching rate and larvae performances compared to the stagnant water models ($P<0.01$). The incubation media at 29 and 30°C showed the best hatching and larvae performances compared to 28°C ($P<0.01$).

Keywords: artificial incubation model, Water temperature, Nile tilapia, Embryo hatching, Larvae performance

O-BL-B3

Impact of Water pH on Physiological Responses and Reproductive Performances of Blue Gourami

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Abstract

Gourami is a pelagic labyrinth fish found naturally in Southeast Asia and play an important role in both economically and ecologically. With current environmental changing scenario, this gourami experience fluctuation of water chemistry variation that may threatening their life. Therefore, this study was conducted to investigate the effect of water pH on physiological responses, feeding intake and reproductive performance of gourami. Gourami were subjected to three different water pH at acidic (5.0-5.5), neutral (7.0-8.5) and alkaline (9.0-9.5) for 5 weeks. Respirometry assay was applied to evaluate physiological responses. Our results showed that high MO_2 was observed in acidic and alkaline conditions compared to neutral condition. However, there is no significant different in ammonia excretion, but high ammonia quotient was noticed in neutral condition as the hyperventilation occurs. With high metabolic cost of living under acidic and alkaline conditions significantly increased the feed intake and depleted spawning performance of gourami. Thus, led to scatter bubble with smaller bubble size and bubble nest surface area under acidic and alkaline conditions. Consequently, reduces spawning frequency and rate. As a remark, changing of water pH either acidic or alkaline profoundly impairs physiological responses and reproductive performances of gourami.

Keywords: Gourami, Labyrinth fish, Water pH, Physiological responses, Reproductive performances

O-BL-B4

Comparison of Different Doses of Hormone Provisions on the Reproductive Performance of *Prochilodus lineatus* (Valenciennes, 1837)

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Abstract

The species *Prochilodus lineatus* , commonly known as Streaked prochilod in global and Taung paw nga tha lauk in Myanmar . This species was highly demand in Myanmar especially in Shan State, Southern Myanmar for their taste and delicacy. However, the induced breeding of this species was not conducted in Myanmar yet. In the present study, the different doses of suprefact and ovaprim hormone on induced breeding of *Prochiolodus lineatus* was conducted in Department of fishery, Talotehla Station Farm at Maubin Township, Ayeyarwady Division, Myanmar. The study period was lasted from January to June 2019. The breeder were collected from Southern part of Myanmar and kept in the Talotehla Station Farm at Maubin Township .The dosages of 0.3ml/kg, 0.5ml/kg for females and 0.1ml/kg for males of suprefact and ovaprim were used to stimulate for mating process. Latency period, fertilization rate, hatching rate and survival rate for each group were recorded and compared. Data analysis was calculated the relationship between body weight and body length in association with different doses and different hormones. Results of the present study would help the hatchery managers in managing the induced breeding programs of other ray fin fishes.

Keywords: *Prochilodus lineatus*, Suprefact, ovaprim, fertilization rate, survival rate

O-BL-B5

Study on Sultan Fish, *Leptobarbus hoevenii* (Bleeker, 1851) Breeding

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Abstract

The artificial breeding injection was carried out by using synthetic chemical (Suprefact 20 µg/kg and Motilium 5 mg/kg) for induced spawning, male and female brooders were done by once injection. The trials about hatching rate and hatching period were carried out in a 15-liter glass aquarium (water volume 12 liters), containing 1,000 eggs and there replications in each trial. It was found that the average of hatching rate was 82.6% and hatching out was 22 hours 44 minutes at 27-29 °C of water temperature.The newly hatched larvae were 4.05±0.24 mm in total length with yolk sac of 77.625 μm^3 in volume. The yolk sacs were completely absorbed within 108 hr after hatching. All the larvae opened their mouth at about 36 hr after hatching (4.42±0.20 mm TL) with mouth measuring 182.36 µm in height. A starvation of newly hatched larvae was studied in the 15-liter aquarium with 12 liters of water by three replications. In each replication contained 300 newly hatched larvae by without feeding, observed every 2 hours. This trial was found that totally larvae died within 112 hours after hatching at water temperature ranging between 27.0 and 29.5 °C.

Keywords: Breeding technique, Larvae, Hatching, Starvation, Sultan fish, *Leptobarbus hoeveni*

O-BL-B6

Reproductive Characteristics of Matured Female Sultan Fish, *Leptobarbus hoevenii* (Bleeker, 1851) Spawner

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Abstract

The sexual maturity of female sultan fish, *leptobarbus hoevenii* was studied and determined by measuring the fecundity and gonadosomatic index (GSI). It was found that sexual maturity size of female sultan fish was 40.85±3.80 cm. (Mean±SD, n=10) in total length and 783.00±217.46 g. (Mean±SD, n=10) in body weight. After stimulating injection could found abdomen increased was 3.38% which shows that cannot see the expansion of the abdomen clearly. The fecundity of fish was 76,414.69±36,586.61 oval/fish and GSI was of 8.14±2.61% (n=10). The both of total length (TL) and body weight (BW) of the matured fish were not linearly related with fecundity (Fe), and could be presented by the linear regression as: Fe = 5000.5 TL–127858, R^2 = 0.27, n=10 and Fe = 118.82 BW–16618, R^2 = 0.50 (n=10), respectively. Whereas the relationships between total length (TL) and body weight (BW) of female sultan fish spawner and male sultan fish spawner in the earthen pond were linearly related as R^2 = 0.54 and R^2 = 0.59 sequentially. The eggs were round shaped and semi-buoyant egg. The average diameter of the egg was 1,033.28±94.31 µm (n=10) and the ratio of eggs was divided into 5 groups. Group1 (400-700 µm), group2 (701-1,000 µm), group3 (1,001-1,300 µm), group4 (1,301-1,600 µm) and group5 (1,601-1,900 µm) were 1.12%, 35.19%, 50.01%,

12.90% and 0.69%, respectively. However, the eggs after process induced spawning by chemical injection, the size of the eggs are expanded approximately 173.07%.

Keywords: Fecundity, Diameter of egg, Gonadosomatic index (GSI), Enlargement abdomen, Sultan fish, *Leptobarbus hoeveni*

Seasonal Abundance and Reproductive Condition of *Rhinomugil corsula* (Hamilton, 1822) in Bago River, Myanmar

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Abstract

Rhinomugil corsula is one of the important food fish of the mullet family of Mugillidae and commonly known as grey mullet. In Myanmar, the grey mullet was found throughout the year from the segment of Bago river in 16 ° 49' N to 16 ° 51' N, and 96° 18' E to 96 ° 20' E. In the present study, seasonal abundance, sex ratio and reproductive condition of grey mullet were examined during the study period of May 2010 to November 2011. During the study period, the highest number of fish ,3178 individuals, was recorded in July, 2010 while the lowest individual ,526, was found in March, 2011. The sex ratio of *R. corsula* was 1 : 1.05 . The highest GSI value of male was (2.85 ± 0.94) in September with the testes weight of (0.96 ± 0.05) g and female was (11.43 ± 2.13) with the ovaries weight of (10.46 ± 3.04) g in September. Based on the gonad weight, gonadosomatic index (GSI) and hepatosomatic index (HSI) and histoogical study on gonads, the spawning season of *R. corsula* was determined from July to October.

Keywords: *Rhinomugil corsula*, grey mullet, seasonal abundance, sex ratio, spawning season

Induced Maturation of Female Eel (*Anguilla bicolor bicolor*) Gonad through Hormonal Injection and Dietary Supplementation of Turmeric Powder

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Abstract

This study aimed to evaluate the effectiveness of reproductive hormonal manipulation in combination with turmeric powder dietary supplementation as a strategy for acfcelerating gonadal maturation in eels *Anguilla bicolor bicolor*. In this study, the induction of maturation of female eel (average body weight of 700-1000 g) was performed by injection of a combination of hormones, i.e. Pregnant mare's serum gonadotropin (PMSG) + domperidone (OODEV) and steroid hormone, methyltestosterone (MT) and estradiol 17β, and by dietary supplementation of turmeric powder (T). The study was conducted using a (2x2) factorial experimental design with 2 variables, i.e. hormone combination and dietary supplementation level of turmeric. Hormone combination tested in this study were injection of 1 mL OODEV kg^{-1} fish + 300ug E2 kg^{-1} fish combination and 1 mL OODEV kg^{-1} fish + 300 ug MT kg^{-1} fish combination. Dietary supplementation level of turmeric were 0 and 2.5 g kg^{-1} feed. Each treatment was tested on 15 fish. Hormone injection was done every 3 weeks and feeding was given at a level of 3% body weight per day. The fish were kept in cages placed in concrete ponds with a water salinity of 27-28 g/L and equipped with recirculation system for 12 weeks of experimental period. The results showed that a combination of 1 mL OODEV kg^{-1} fish + 300 ug E2 kg^{-1} fish and dietary supplementation of turmeric powder of 2.5 g kg^{-1} feed resulted in the highest acceleration of female eel gonadal maturation by increasing plasma concentrations of estradiol, gonadosomatic index and ovulated eggs. Turmeric supplementation at 2.5 g kg^{-1} feed could also accelerate eel gonadal maturation as indicated by the plasma estradiol levels that was equally high with the fish injected with hormone combinations. This study is the first to report induced gonadal maturation that reached the final oocyte maturation within 12 weeks. In conclusion, the combination of PMSG and + antidopamine (OODEV), and dietary supplementation of turmeric powder accelerated eel gonadal maturation by increasing the plasma concentrations of estradiol and improving vitellogenesis process.

Keywords: Eel (*Anguilla bicocor bicolor*), maturation, gonad, OODEV, turmeric

Comparing Parental Reproduction and Larval Development From Different Broodstock Sources of Bighead Catfish (*Clarias macrocephalus*)

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Abstract

Bighead catfish, *Clarias macrocephalus*, is an important species for aquaculture. Nevertheless, there are few studies about their reproductive characteristics. In this research, reproductive performance and larval development in three broodstock sources of bighead catfis. Broodstock were collected from two wild populations in Ca Mau (CM) and Hau Giang (HG) provinces, and one domesticated population in Can Tho (CT) freshwater hatchery. Three groups of fish were cultured under optimal maturation conditions in a recirculating aquaculture system for three months. Then, 10-15 pairs from each broodstock source were artifically propagation. Their reproductive performance (i.e., relative fecundity, fertilization rate, hatching rate, deformity rate, egg diameter) and larval development (including parameters of yorksac and body length after hatch, survival and growth rates) were compared among three broodstock sources. Results indicated that domesticated broodstock showed a better reproductive performance in terms of fertilization rate, hatching rate, and total number of eggs produced. However, the larval size and survival rate of wild brood stock were higher than domesticated one. Furthermore, deformity rate and egg diameter did not show statistical significantly differences ($P > 0.05$) between three groups. The reproductive performance of different brood stock sources and quality of bighead catfish larvae analyzed in this study are important information for genetic improvement program and farming of this species.

Keywords: *Clarias macrocephalus*, reproductive performance, larval quality, wild population, domesticated broodstock.

O-BL-B10

Induced Breeding, Embryonic and Larval Development of a Near Threatened Cyprinid *Osteobrama belangeri* (Valenciennes,1844)

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Abstract

Osteobrama belangeri is an important medium carp endemic to Myanmar and Manipur state in India. The aim of the present study was to perform induced breeding and to observe embryonic and larval development stages of a near threatened Cyprinid *Osteobrama belangeri*. A total of ten females and ten males was collected from Twantay natural River population and kept in Hlawga hatchery, Department of fishery, Yangon, Myanmar. The experiment lasted from January to June, 2019. *Osteobrama belangeri* was done by administering the synthetic hormone ovaprim, in a single dose for males and females via an intramuscular injection. Spawning occurred between 6-7h at the temperature of 26-29 C. The fertilized eggs were strongly adhesive, transparent, and spherical with diameters ranging between 0.75-1.0 mm. The egg envelop is thick and transparent. First cleavage (two cells), four cells, eight cells, sixteen cells and multi cells stages were found 20,25,35-40,60 and 70 minutes after fertilization, respectively. The morula stage was visualized within 1.5 h of fertilization. The heart beat visible and the circulation system commenced after 16 h of fertilization. Embryos hatched 18-20 h after activation of egg. The newly hatched larva measured 2.82±0.03 mm in length and 0.32±0.06 mg in weight. The yolk sac was fully absorbed by the third day. Ten-day old post larvae had the pectoral spine become stout though the embryonic fin folds had to be disappeared. The length of fingerlings ranged from 25-30mm after 30 days.

Keywords: Induced breeding, embryonic development, larval development, *Osteobrama belangeri*

O-BL-D1

Study on Induced Breeding and Larval Rearing of Knifefish (*Notopterus notopterus*)

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Abstract

Knife fish (*Notopterus notopterus)* - a member of the family Notopteridae – is commonly known as grey featherback and bronze featherback. Rare and endangered fish species are conserved by the use of techniques like induced breeding and the release of captive-bred individuals into the wild. Studies on the effect of different hormones for ovulation and the effects of using different feed for nursing larvae were performed to understand induced breeding and larval rearing of *N. notopterus*. The study was carried out from the month of April to June 2019. Total number fish were 36 with sex ratio 1:3 (male to female). This experiment was conducted with three treatment and three replication; first treatment with Pituitary Gland Hormone with initial and final dose 2mg/kg and 8 mg/kg, second treatment with Human Chorionic Gonadotropin Hormone with initial and final dose 200, 1000 and 2000 IU/kg, and the final treatment was with Luteinizing Hormone-Releasing Hormone with initial and final dose 100 µg/kg and 200 µg/kg. The result showed that the LHRH dose gave the best result among different hormones. The latency period was 12 hours, the number of stripped eggs resulted 248, fecundity 2120eggs/kg, fertilization rate 87.7%, hatching rate 85.2% and eggs diameter 3.2±0.4mm. The larvae were reared in the tank with 0.5m³ with different treatments up to 35 days. The treatments used was T0 (Moina up to 35 days), T1 (Moina up to 18 days and Artificial feed), T2 (Moina up to 24 days and Artificial feed), T3 (Moina up to 9 days and from 10th day 30% Moina + 70% Artificial feed). Thus result shows that feeding with Moina up to 35 days gave the best result with a survival rate of 43.5 %, size 29±0.7mm.

Keywords: Featherback, Induced breeding, Hormones, ovulation, Moina.

O-BL-D2

Effect of Dry *Temminalia catappa* Leaves on Sex Ratio and Growth Performance in Siamese Fighting Fish (*Betta splendens*) Larvae

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Abstract

Tannin is a phytochemical that can be found in the leaves of *Terminalia catappa*. *T. catappa* leaves play a role as pH reduction. The objective of this research was to investigate sex ratio and growth performance of *B. splendens* larvae in water added with different quantity of dried *T. catappa* during breeding. Three experiments were conducts to find out the optimum breeding process for *B. splendens* breeding. The first experiment was to detect the amount of tannin in dried *T. catappa* leaves at 2.5, 5, 7.5 and 10 g. The increment of dried *T. catappa* leaves supplemented in the water tended to increase tannin ($P<0.05$). The second experiment was to observe the amount of *T. catappa* leaves that affects the pH in water until stability. The pH in water was significantly increased as the quantity of *T. catappa* leaves increased ($P<0.05$). Therefore, the constant pH at 15 hours was used for *B. splendens* breeding in the third experiment. It was found that the amount of dried *T. catappa* leaves at 2.5 g (pH 7.24) resulted 60 % male larvae and 55.73% survival rate. Recent studies have shown that tannin in *T. catappa* leaves affect the pH of water were used in *B. splendens* breeding. The number of male larvae and the survival rate of *B. splendens* larvae increases which the appropriate pH level must be above pH 6.7.

Keywords: *Betta splendens, Terminalia catappa***,** Tannin, pH

O-BL-D3

The Use of Different Aquatic Plants in the Cooking Oil Waste Management to the Survival and Growth of Carp (*Cyprinus carpio*) Larvae.

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Abstract

Cooking oil waste is one of organic waste which is currently a serious problem for the sustainbility of environment quality, especially in the aquatic environment. The use of plant root as the growth medium of bacteria has been widely used as a bioremidoator agent to reduce oil waste pollution in the aquatic environment. This study aims to determine the effectiveness of water hyacinth (Eichhornia crassipes), water fern (Salvinia natans) and water spinach (Ipomoea aquatica) on cooking oil waste management in the water to the growth and survival of carp (Cyprinus carpio) larvae. The study was conducted on cooking oil waste L-1, contaminated water in concentration of 10 mg using five different treatments, they were K- (control negative), K+ (control positive), Eg (water hyacinth), Ki (water fern), and Ka (water spinach) for 28 days, the water was taken every 7 days to be used as maintenance medium for carp (Cyprinus carpio) larvae to determine mortality and growth rate of carp. The use of aquatic plants in the management of cooking oil waste contaminated water had a significant effect on reducing of mortality rate and increasing of carp (Cyprinus carpio) larvae growth. The measurement of survival rate and growth rate showed that the best result in the use of water that has been treated by using aquatic plants was in duration time of 21 days (H21) with water hyacinth and water spinach plants as the best result for the survival rate and growth of carp larvae.

Keywords: aquatic plants, carp (Cyprinus carpio) larvae, cooking oil waste, growth, survival rate.

O-BL-D4

Sensory Development and Larval Behavior of Hybrid Malaysian Mahseer (*Barbonymus gonionotus* ♀ × *Tor tambroides* ♂)

Muhammad Azfar Ismail [a], Mohd Salleh Kamarudin [a*], F. Syukri [a], and L. Kamil.[b]

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Abstract

Sensory organs are important in early larval fish stages to modulate the presence of predators and food, and food acquisition. This study was carried out to examine the sensory organ development and behavior among the hybrid Malaysian mahseer throughout its larval stage. Hybrid Malaysian mahseer, a crossbreed between male Malaysian mahseer, *Tor tambroides* and female silver barb, *Barbonymus gonionotus*, was an effort to produce better tropical carp strains for aquaculture purposes. Newly hatched larvae were reared in twelve 7 L glass aquaria and fed with microworms, *Panagrellus redivivus* at first feeding (3 DAH). Thirty fish larvae were randomly sampled from 1 DAH to 7 DAH and thereafter at 2-day intervals up to 25 DAH for the measurement and observation on sensory organs through histology, and light and electron microscopy. The sensory organs generally started to function as early as 3 DAH in detecting the presence of foods for the first feeding. The taste buds and neuromasts were the first to well function in early larval stage, and followed by eyes, inner ear and olfactory as the fish grew. The cone cells in the retina began to develop at the pigmented epithelium by 6 DAH followed by the development of the rod cells in the next days. Free neuromasts submerged under the skin surface at 19 DAH and a complete lateral line was visible by 23-25 DAH. Unlike the parents, barbels were absent in the hybrid mahseer. It seemed that the abundance of large taste buds at the lips compensated this absence.

Keywords; Hybrid Malaysian mahseer, sensory organ development, larval behavior, histology, feeding.

O-BL-D5

Background Color Preference of Juvenile Marble Goby, *Oxyeleotris marmorata*

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Abstract

Marble goby, *Oxyeleotris marmorata* is an expensive freshwater fish cultured in the Southeast Asian countries. In this study, background colour preference of the early juvenile *O. marmorata* (total length 6.0 ± 0.6 cm) was examined through behavioural assay. Totally six background colors (black, white, green, blue, yellow, and red) were pair-tested, and the fish frequency to stay in each color was analyzed using the Thurstone's Law of Comparative Judgment. Significant difference was assumed when $P < 0.05$. At the end of this test, it was found that the fish preferred the black background the most, followed by the green, red and blue, yellow, and lastly the white background (black> green> red, blue> yellow> white). It was speculated that the background colors may affect the physiology then the selection outcome of the fish. Therefore, osmorespiratory assays were conducted to measure the oxygen consumption and ammonia excretion rates of *O. marmorata* kept under the black, green, or white background environment, and these data were statistically analyzed using One-Way ANOVA test. It was found that both oxygen consumption and ammonia excretion rates of the *O. marmorata* under these 3 colors background were not significantly different ($P>0.05$), respectively. These results indicated that the background color preference of *O. marmorata* was not due to their physiological change; suggesting that the fish may possess color vision and they chose the background color based on their innate preference. Color vision of *O. marmorata* should be confirmed in the future study to elucidate this hypothesis.

Keywords: *Oxyeleotris marmoratus*, Behavior, Physiology, Welfare, Color vision

O-BL-D7

Combined Effects of Temperature, Copper and Feeding Frequency on Survival, Growth Rate, Feeding Rate and Oxygen Consumption in Waigieu Seaperch (*Psammoperca waigiensis*) Larvae

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Abstract

The objective of the present study was to evaluate the effects of temperature, copper and feeding frequency on growth, feeding rate and oxygen comsumption in the larvae of Waigieu seaperch *Psammoperca waigiensis*. Fish larvae were exposed for 10 days to one of the eight combinations of 2 temperatures (28 and 32ºC), 2 copper levels (0 and 100 µg/L) and 2 feeding frequency (50 and 100%). Subsequently, larvae were tested for the ability to recover from stressful conditions by rearing at the control temperature (28ºC) without copper treatment for 10 days. The larvae of Waigieu seaperch (BW: 0.16±0.01 g; TL: 2.53±0.11 cm) were used for all treatments. The glass bottles with volume 1L were used and the density of fish was 10 larvae/L. Each treatment had three replicates. Survival, feeding rate, oxygen consumption and growth rate were determined at the exposure period (10 days) and after 10 days during the recovery period. The results showed that the combination of high temperature, copper and feeding frequency were significantly reduced survival, feeding rate, growth and oxygen consumption of larvae of Waigieu seaperch. There were significantly interactive effects of temperature, copper and feeding frequency on all measured response variables, namely the effects of coppers and feeding frequency were more pronounced at higher temperature. Delayed effects of copper, temperature and feeding frequency were also significantly decreased survival, feeding rate, growth and oxygen consumption of larvae of Waigieu seaperch. These results shed lights on how two global stressors that are extreme temperature and a common metal may interact to affect larvae production of Waigieu seaperch.

Keywords: Waigieu seaperch, *Psammoperca waigiensis*, temperature, copper, feeding frequency

O-BL-D8

Larval Rearing of Asian Seabass Using Rotifer, Protozoa, and *Euplotes encysticus*

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Abstract

Seed production of marine finfish in Malaysia is still facing problem particularly live feed for starter diet. Currently, aqua culturists use S or SS type rotifers, which have sizes from 100 to 200μm. Early stage larvae of some marine finfish species select feeds less than 100 μm. Protozoa is a collective term of aquatic microorganism that has been identified to be suitable live feed, as their body sizes are less than 100μm. Thus, the objective of this experiment is to compare the survival rates of Asian seabass larvae using four types of live feeds. Four types of live feed; rotifer, protozoa, *E. encysticus*, and mixed (rotifer, protozoa, and *E. encysticus*) were used in this experiment. The larvae were fed from 2 to 10 day-after-hatching. Asian seabass larvae were given the same amount of live feed in each larval rearing tank; twice a day. The feeding densities were 20 individual / mL for rotifers, protozoa, *E. encysticus*, and mixed group. Number of seabass larvae in each group was counted every day and their survival rates were determined. Starting from 3 DAH until 10 DAH, mixed group showed the higher survival rates than other groups. The most recommended live feed was mixed group.

Keywords: live feed, starter diet, Asian seabass, protozoa, *Euplotes encysticus*

O-BL-D9

The Influence of Light Wavelength and Intensity to the Survival Rates, Growth Rates and Production Index of Sutchi Catfish Larvae

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Abstract

Sutchi catfish *Pangasianodon hypophthalmus* (Sauvage, 1878) is one of the most important freshwater fish species cultured in Southeast Asia. Artificial seed production of sutchi catfish is very important in aquaculture industry. However, the larval survival rates were low when reared in the hatchery. Providing optimum rearing condition for sutchi catfish larvae in the hatchery can increase the seeds production. Light conditions was reported to influence the survival and growth of fish. Hence, this study was conducted to examine the optimum light conditions in term of light wavelength and light intensity for rearing of sutchi catfish larvae. The sutchi catfish larvae were reared under five different light wavelengths (white, blue, green, yellow and red lights) and four different light intensities ($1.40\ 10^{-4}$, $1.40\ 10^{-3}$, $1.40\ 10^{-2}$, and $1.40\ 10^{-1}$ µmol/m²/s). The results showed that, the survival rates (SR), growth rates (SGR_{TL} and SGR_{BW}) and Production Index (PI) were higher in red light than other wavelengths. For light intensity, only PI shown significant effect to the larvae. Light intensity of 1.40×10^{-3} µmoles/m²/s was significantly higher than 1.40×10^{-1} µmoles/m²/s intensity. Apart from that, there were tendency for high SR, SGR_{TL} and SGR_{BW} under low light intensities ($1.40\ 10^{-4}$ and $1.40\ 10^{-3}$ µmoles/m²/s) when compared to high light intensities ($1.40\ 10^{-2}$, and $1.40\ 10^{-1}$ µmol/m²/s). Therefore, red light wavelength and low light intensities ($1.40\ 10^{-4}$ and $1.40\ 10^{-3}$ µmoles/m²/s) were recommended when rearing sutchi catfish larvae.

Keywords: Sutchi catfish larvae, aquaculture, light wavelength, light intensity

O-BL-C1

Indigenous Materials as Broodstock Conditioning and Settlement Substrates for Abalone *Haliotis asinina*

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Abstract

This study aimed to determine the spawning performance, batch fecundity, fertilization, hatching performance, and settlement of abalone using coconut leaves (CL), banana leaves (BL), bamboo "buho" (BB), Bamboo "kawayan" (BK) as broodstock conditioning and settlement substrates as compared to the corrugated plastic plates (CCP). Materials had fabricate ito plates with a dimension of 40 cm x 25 cm for broodstock conditioning and 5 x 5 cm for settlement. Result showed that the average number of spawned individuals, batch fecundity, fertilization and hatching rate has no significant difference ($P>0.05$) among the treatments. On the other hand, settlement is significantly higher ($P<0.05$) on CL compared to the other treatments. These suggest that the indigenous materials used in this study could be a good alternative broodstock conditioning and settlement substrates for abalone culture.

Keywords: Abalone, spawning, fertilization, hatching rate, settlement

O-BL-C2

Effects of Sperm to Egg Ratio, Stocking Density and Delay of Gamete Contact on Fertilization Success and D-larvae Production of Green Mussel *Perna viridis*

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Abstract

Green mussel (*Perna viridis)* is an important fishery resource in the Philippines, however, mariculture of this species was hindered by the reliance of seed produced from the wild. Hatchery production of mussel spats will help increase the mussel seed stock, but little is known about the factors involved in the hatchery practices of this species, thus, optimization of hatchery protocols is needed for sustainable production. Fertilization success (FS) and survival at D-hinged (SD) are limiting factors influencing hatchery production in some bivalves. This study performed three laboratory experiments employing critical variables affecting FS and SD namely, the effect of sperm to egg ratio using 10:1, 50:1, 100:1 and 1000:1; best time for gamete contact with 1-4 hours monitoring after liberation; and egg stocking density using 20, 30, 40 and 50 eggs mL^{-1}. Results indicated that maximum fertilization rate and highest D-hinged larvae produced were achieved at 50:1 sperm to egg ratio. The stocking density of 20-50 eggs mL^{-1} had no significant effect on FS, however, the effect was observed from fertilized egg to D-hinged stage, with significantly higher survival observed at a stocking density of 20 eggs mL^{-1} followed by 30-40 eggs mL^{-1} and lowest at 50 eggs mL^{-1}. Delayed of gamete contact has a significant effect on FS but not with SD. FS was significantly high one hour after gamete liberation but reduces when gamete contact was delayed of more than one hour.

Keywords: bivalve, gamete, gamete liberation, hatchery production, mussel seed

O-BL-C3

Induced Spawning and Larval Rearing for the Sea Cucumber *Holothuria nobilis* (Selenka, 1867)

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Abstract

Holothuria nobilis is one of the economically important species for livelihoods in tropical and subtropical regions such as Vietnam. However, an increase in demand of the species due to their economic value have led to depletion of the stocks in the wild. Apparently, some studies have reported that holothurian populations take long time to recover up to 50 years without fishing pressure hence this species have been categorized as endangered species. In order to reduce fishing pressure of this species, introduction of aquaculture production is required but the knowledge of induced spawning and larvae rearing techniques is still limited. Therefore, the study aims to assess spawning induction technique (using thermal shock with and without adding dry algae spirulina) and larval rearing techniques by evaluating the effect of mixture of microalgae as feed and larval density on survival and growth performance of *H. nobilis* in pelagic larvae stage. The study will be conducted in Research Institute for Aquaculture No.3 (RIA 3), Khanh Hoa province, Nha Trang city. The results of this research will be presented at the conference. Findings from this study will help to establish baseline for the development of its breeding program and aquaculture production for the sea ranching, restocking and to improve livelihoods of the farming communities.

Keywords: Breeding technique, echinodermata, larviculture, sea ranching, teat fish sea cucumber

The Effect of Different Water System on Growth and Survival of Juvenile Spotted Babylon (*Babylonia areolata*)

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Abstract

This study was carried to evaluate growth and survival of juvenile babylon with 3 different water system. The experiments were comprised 1) semi - closed system, 2) closed system, and 3) closed system with sea grapes (*Caulerpa lentillifera*). Growth and survival of spotted babylon were monitored over 10 weeks in black and round plastic containers in the density of spotted babylon at 300 individuals m^{-2}. Water temperature, salinity, Nitrite and ammonia were also determined. At the end of the experiment, the results showed that the mean final body weight, width, length and average daily growth rate were not significant ($P>0.05$). Survival rate, specific growth rate and percentage weight gain of spotted babylon were found significant differences ($P<0.05$) in among treatment. The best survival rate (100%), specific growth rate (0.43±0.11 % per day) and percentage weight gain (35.24±10.43 %) were showed in closed system with sea grapes (*C. lentillifera*). The results suggest that it is feasible to use closed system with sea grapes (*C. lentillifera*) for juvenile spotted babylon cultured.

Keywords: spotted babylon (*Babylonia areolate*), water system, growth, survival

O-BL-D10

Study on Morpholo gical Changes and Firs t Feeding of Peacock E el (*Macrognathus si am ensis*)

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Abstract

This research was carried out to examine morphological changes and the feeding behavior of peacock eel *(Macrognathus siamensis*) at the larval stage. Fish was stocked in nylon line 4 m^3 tank (with the water from natural pond and the environment in tank was created in a way imitated natural ponds) at a density of 2000 fishes/tank. Phytoplankton, zooplankton and fish samples were collected daily for analyzing of food composition and quantity beside the observation on morphological changes. The results showed that mouth size peacock eel larval had average size 0.44 ±0. 01 mm in the first day of stocking (3 days after hatching). Peacock eel larvae had carnivorous feeding habit (Li/Lt<1). From 20th day onward, external morphology of the peacock eel was nearly the same as adult fish. Peacock eel from 3th day to 5th day of age chose nauplius to feed on. From the 6th day to the 8th day, fish chose rotifera. Peacock eel chose cladocera and copepoda from the 9th day to the 23th day. From the 24th day onwards, fish can feed on blood worms. There was no selected phytoplankton for feeding

Keywords: Peacock eel, morphological change, feeding behavior, digestive tract, food composition, food selectivity.

O-AM-D7

State of Korean Aquaculture Industry in 2015

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Abstract

The history of Aquaculture in Korea as follows, Laver culture had a long history since the mid-1800s. The modern Seaweed culture began in the 1960s, shellfish culture began in the 1970s, and fish culture began in the mid 1980s. Korea shrimp culture started in 1975, after Fleshy prawn cultured from 1977 until 2015, Nowadays we have cultured white leg shrimp since 2005. The area of South Korea has owned 100,000 square kilometers. The Sea area of S. Korea is about 350,000 square kilometers. Coastline is 2,413km (S. Korea), The number of islands is about 3,000. Sea water temperature is low at Feb. which reaches 5℃. The highest one is in Sept. around at 26℃, and It is around 15℃ to 20℃ from June to December. In 2015, Korea's total production of aquaculture was 1,662,035 tons. It included fish (85,308 tons), shellfish (342,972 tons) and seaweed (1,197,844 tons). The three main cultured fishes were occupied 89.5% of total amount. It consists of olive flounder (36,944 tons), rock fish (23,757 tons) and mullets (4,788 tons). The production of aquaculture shellfish consist of oyster (266,786 tons), sea mussel (53,879 tons), Manila clam (10,276 tons), abalone (7,114 tons) and the seaweed production consist of *Laminaria* (442,801 tons), laver (390,314 tons) and sea mustard (322,061 tons).

Keywords: Korean, Aquaculture, Fish, Shellfish, Sea weed, Industry

Session 10 : Genetic and Biotechnology

Session 10 : Genetic and Biotechnology

Tanjung Room

November 19, 2019 (Tuesday)		
Time	**Title**	**Code**
Chairperson: Dr. Wahyu Endra Kusuma		
11:00-11:30	**Refreshment and Poster Viewing**	
11:30-11:45	**The Importance of Morphological Characters in Horseshoe Crab Identification for Citizen Science Frontier** Naila K. Aini[a], Erwyansyah[b], Rahmat Kurnia[c], Nurlisa A. Butet[c] Ali Mashar[c], and Yusli Wardiatno[c]	O-GB-A1
11:45-12:00	**Identification of Genes Involved in Sesquiterpenoid and Ecdysteroid Pathway and Their Expressions in Diploid and Triploid Black Tiger Shrimp, *Penaeus monodon*** Wanita Semchuchot[a], Wanida Santimanawong[c], Charoonroj Chotwiwatthanakun[c,d], Pattira Pongtippatee[e], Boonsirm Withyachumnarnkul[e], and Rapeepun Vanichviriyakit[b]	O-GB-A2
12:00-12:15	**Histological Analysis on Ovarian Maturation Stages of Wild Female Banana Shrimp, *Panaeus merguiensis* (De Man, 1888) for Broodstock Management and Selection Purpose** Hidayah Manan[a*], Irma Wahida Shakri[b], Adnan Amin-Safwan[a], and Mhd Ikhwanuddin[a]	O-GB-A3
12:15-12:30	***In Vivo* and *In Vitro* Effect of Peri-vitelline Fluid on 3T3 Cell and Rat Study** Faizul MIM[a], Christianus A[b*], and Yazan LS[c]	O-GB-A4
12:30-12:45	**Morphometric Comparison of Periphyton and Non-periphyton Nursery Culture of Giant Malaysian Freshwater Prawn (*Macrobrachium rosenbergii*)** David Marioni[a*], Mohd Kamruzaman Hossain[a], and Mhd Ikhwanuddin[a]	O-GB-D10
12:45-14:00	**Lunch**	
Chairperson: Prof Dr. Siti Azizah Mohd Nor		
14:00-14:15	**Studies on Taurine Synthesis in Common Carp; Nutritional Regulation, and Gene Expression of Taurine Synthesizing**	O-GB-B1

	Enzymes Maria Mojena Gonzales-Plasus[a,b], Tomoko Itoh[b], Hidehiro Kondo[b], Ikuo Hirono[b], Shuichi Satoh[b], and Yutaka Haga[b]	
14:15-14:30	**Effect of Exogenous Antioxidants Supplementation on Post-thaw Sperm Quality in Malaysian Mahseer, Tor tambroides (Bleeker, 1854)** Chew Poh Chiang[a,b*], Annie. Christianus[a,c], Chong Chou Min[a,c], and Ina-Salwany Md. Yasin[a,c]	O-GB-B2
14:30-14:45	**The Complete Mitochondrial DNA Sequences of Three Indonesian Rasboras (*Rasbora aprotaenia, Rasbora lateristriata* and *Rasbora argyrotaenia*)** Wahyu Endra Kusuma[a*], and Yoshinori Kumazawa[b]	O-GB-B3
14:45-15:00	**DNA Barcoding for Effective Fish Diversity Assessment in Merbok River: Contributing to the Development of Local Database for Metabarcoding Study** Noor Adelyna Mohammed Akib[a,b*], and Danial Hariz Zainal Abidin[a]	O-GB-B4
15:00-15:15	**Genetic Diversity of *Channa lucius* in the Mekong Delta, Viet Nam** Sawasawa Wilson[a*], and Thuy Yen Duong[b]	O-GB-B5
15:15-15:30	**Effect of Banana Stem *Musa sp*. During Transportation on Mortality, Stress and Immune Gene Expression of Juvenile African Catfish *Clarias gariepinus*** Alimuddin[a*], Hasan Nasrullah[a], Dian Hardhianto[b], Dwi Hany Yanti[b], Yanti Inneke Nababan[a], Sri Nuryati[a], and Muhammad Zairin Junior[a]	O-GB-B6
15:30-15:45	**Fish Transient Receptor Potential Melastatine 2 Channel - The Environment Pollutant Sensor** Ha Nam Tran[a*], Nam Quang Nguyen[a], Ngoc Phuoc Nguyen[a], Thi Hoa Truong[a], and Khanh Van Tran Quang[a]	O-GB-B7
15:45-16:00	**Development of PCR Method for Detection of *Aeromonas schubertii* in Farmed Snakehead Fish (*Channa striata*)** Lam Pham Yen Nhi[a*], Ha Thanh Dong[b], and Tu Thanh Dung[a]	O-GB-B8
16:00-16:15	**Genetic Diversity Inferred from Inter-simple Sequence Repeat**	O-GB-B9

	Markers of Black Sharkminnow (*Labeo chrysophekadion*) in the Mekong River Basin Nguyen Thi Ngoc Tran[a*], Anicet Mashyaka[b] and Duong Thuy Yen[a]	
16:15-16:30	**Morphology and DNA Barcoding of Fish Species of Genera *Henicorhynchus, Labiobarbus* and *Cirrhinus*** Tran Anh Khoa[a*], and Duong Thuy Yen[b]	O-GB-B10
16:30-17:00	**Poster Viewing**	

November 20, 2019 (Wednesday)		
Time	**Title**	**Code**
Chairperson: Dr. Zarirah Zulperi		
10:00-10:30	**Refreshment and Poster Viewing**	
10:30-10:45	**Genetic Diversity in the Domesticated and Wild-Type Barramundi (*Lates calcarifer*) Based on Mitochondrial COI Gene** Irmawati Madeali[a*], Asmi Citra Malina A.R. Tassakka[a], and Alimuddin Alimuddin[b]	O-GB-D1
10:45-11:00	**Seed Production Technology of Golden Trevally (*Gnathanodon speciosus*)** Pham Quoc Hung[a], and Le Thi Nhu Phuong[b]	O-GB-D2
11:00-11:15	**Biomonitoring of Estuarine Fish Community Utilising Environmental DNA Metabarcoding** Danial Hariz Z.A.[a*], Siti Azizah M.N.[b], and Noor Adelyna M.A.[a]	O-GB-D3
11:15-11:30	**Phylogenetic Relationships of *Lethrinidae* Species in Spermonde Inferred from Mitochondrial COI Gene Sequences** Muhammad Afrisal[a*], Irmawati[a], and Andi Iqbal Burhanuddin[b]	O-GB-D4
11:30-11:45	**Population Genetics of Brushtooth Lizardfish, *Saurida undosquamis* (Richardson, 1848) From East Coast of Peninsular Malaysia Based on 16S rRNA Gene Marker** Revarunan Sammogam[a], Sharifah Norazma binti Sayed Mohamed Zain[a], Tun Nurul Aimi Mat Jaafar[a], Rumeaida Mat Piah[a], Siti Azizah Mohd Nor[b], Muhd Danish-Daniel[a,b], Yeong Yik Sung2[b], and	O-GB-D5

	Tan Min Pau[a,b,c]	
11:45-12:00	**DNA Barcoding and Phylogenetic Relationship of Species Belonging to Ariidae Family** Le Ngoc Son[a*], and Duong Thuy Yen[b]	O-GB-D6
12:00-12:15	**Development of real-time PCR assay for simultaneous detection of Anisakis species nematode in fish and fish canned products** Seyed Mahmoud Sadjjadi[a*] , Mohsen Najjari[a], and Hossein Khodadadi[a]	O-GB-D7
12:15-12:30	**Recent Population Expansion of Longtail Tuna *Thunnus tonggol* (Bleeker, 1851) Based on Mitochondrial DNA D-loop and ND5 Gene Markers** Noorhani Syahida Kasim[a], Tun Nurul Aimi Mat Jaafar[a], Rumeaida Mat Piah[a], Wahidah Mohd Arshaad[b], Siti Azizah Mohd Nor[c], Ahasan Habib[a,d], and Tan Min Pau[a,b,e*]	O-GB-D8
12:30-12:45	**Metagenomics Analysis of bacterial Community in a Tropical Marine Fish Hatchery** Jumria Sutra[a], Mohammad Noor Amal Azmai[a,b*], Amalia Hashim[c], Mohd Zamri-Saad[a,d], Azila Abdullah[e], Sufian Mustafa[f], Nik-Haiha Nik Yusof[f], Shaharah Mohd Idris[f], and Ina-Salwany Md Yasin[a,g]	O-GB-D9
12:45-13:00	**Use of Mitochondrial Gene COI in Identification of Pure Breeds and Crossbreed of Fishes; Potential as Cost Effective Methods of Intra-specific Hybrid Detection** Imran Parvez[a*], Tanjiba Mahajebin[a], Rukaya Akter Rumi[a], and Shirin Sultana[b]	O-GB-E3
13:00-14:00	**Lunch**	
Chairperson: Dr.Tun Nurul Aimi Mat Jaafar		
14:00-14:15	**Molecular Identification of Commercially Important Trevallies, *Carangoides* sp. (Perciformes: Carangidae) in Malaysia** Salwani Abdullah[a], Seah Ying Giat[a], Tan Min Pau[a], Siti Azizah Mohd Nor[b], and Tun Nurul Aimi Mat Jaafar[a*]	O-GB-C3
14:15-14:30	**A Preliminary Study of Population Genetic Structure of Spotted Sardinella, *Amblygaster sirm* in Malaysian Waters** Noorul-Azliana Jamaludin[a,b*], Wahidah Mohd Arshaad[c] , Lavoué Sebastien[d], and Noor Adelyna Mohd Akib[a]	O-GB-C2

14:30-14:45	**Characterization of Finfish Hatchery Waste for Value Added Product** Sujjat Al Azad[a*], Mohammad Tamrin Bin Mohamad Lal[a], and Al-Najib Bin Benjamin[a]	O-GB-C4
14:45-15:00	**Microsatellite and Morphometric Association in Slipper Shaped Oyster, *Crassostrea iredalei,* from Visayas, Philippines** Ma. Ramela Angela C. Bermeo[a*], and Philip Ian P. Padilla[a]	O-GB-A5
15:00-15:15	**Reproductive Biological Characteristics of Short Necked Clam *Paphia undulata* (Born, 1778) in Khanh Hoa Province, Vietnam** Vu Trong Dai[a*], Ngo Anh Tuan[a], and Ngo Thi Thu Thao[b]	O-GB-A6
15:15-15:30	**Exploration of Antibiotic-producing Bacteria Isolated from Marine Organisms** Desy Putri Handayani[a], Alim Isnansetyo[a*], and Indah Istiqomah[a]	O-GB-C1
15:30-16:00	**Poster Viewing**	

O-GB-A1

The Importance of Morphological Characters in Horseshoe Crab Identification for Citizen Science Frontier

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Abstract

Main morphological characters are one of the ways that can be used in practical species identification. Population size of horseshoe crabs in Indonesia is lacking, and one method to obtain it can be done through voluntary monitoring program. East Balikpapan coastal is one of the locations where *Tachypleus tridentatus* and *T. gigas* are presence. These two species for ordinary people will be morphologically look the same. This study was to determine the morphometric characters for practical identification of *T. tridentatus* in voluntary monitoring program. In this study two phenotype forms of tiny spines were found in posterior of opisthosoma. 5.29% of the total samples had one tiny spine and 84.71% of the samples had three tiny spines. In most cases, three spines in posterior of opisthosoma have been used in practically identification of *T. tridentatus*. However, analysis of blood samples collected from specimens with one spine and three spine in posterior of opisthosoma using CO1 gene. This study confirmed that number of tiny spine in posterior of opisthosoma could not be used as morphological characters for *T. tridentatus* identification. Yet, triangular cross section of telson and relatively much small spines on opisthosoma are seems to be good characters for voluntary monitoring program. These characters use for monitoring program are the practical characters. As much 27 of 27 students say that the characters is easy to understand and all successful to identify correctly. As much three of 27 students failed to determime male and female in *T. gigas* and *Carcinoscorpius rotundicauda*.

Keywords: Eastern Balikpapan, Practical identification, Small spines on opisthosoma, *Tachypleus tridentatus*

O-GB-A2

Identification of Genes Involved in Sesquiterpenoid and Ecdysteroid Pathway and Their Expressions in Diploid and Triploid Black Tiger Shrimp, *Penaeus monodon*

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Abstract

The black tiger shrimp, *Penaeus monodon*, is an economically important penaeid shrimp species being farmed in many countries including Thailand. However, since early 2000 the production of *P. monodon* dramatically decreases due to the diseases outbreak and slow growth problem. In order to improve the production of shrimp, several researches have occurred and triploid *P. monodon* has developed. Diploid (2n) *P. monodon* have been successfully induced to become triploid (3n) shrimp using cold shock. The triploid shrimp grow faster than diploid *P. monodon* resulting in the triploid shrimp will bigger than diploid shrimp in the same age. However, little is known about gene expression in triploid and how triploid growth rate higher than diploid. In this study, sesquiterpenoid and ecdysteroid pathway-related genes were identified by transcriptomic analysis of the central nervous system of *P. monodon*. The putative genes involved in sesquiterpenoid and ecdysteroid pathway were first identified in *P. monodon* using bioinformatic tools such as blastp, expalsy translated tools, amino acid multiple alignments, and phylogenetic tree construction. RT-PCR results showed that *PmMFE*, *PmJHEH*, and *PmJHE* were expressed in several larval stages. The *PmMFE* and *PmJHE* were strongly expressed in the mandibular organ and in the pre-vitellogenic ovaries but not in vitellogenic ovaries, suggesting a role in oocyte growth. *PmMFE* was found to be down-regulated in the ovaries and muscle of triploids when compared with diploids. Future studies may confirm the possibility of using *PmMFE* as a marker to distinguish between these diploid and triploid shrimp.

Keywords: Sesquiterpenoid, Ecdysteroid hormone pathway, Transcriptome analysis, *Penaeus monodon*, Triploid shrimp

O-GB-A3

Histological Analysis on Ovarian Maturation Stages of Wild Female Banana Shrimp, *Panaeus merguiensis* (De Man, 1888) for Broodstock Management and Selection Purpose

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Abstract

Study on the ovarian maturation stages of female Banana shrimp, *Penaeus merguiensis* was carried out to identify the ovarian maturation stages using external morphology of (ovarian colouration & Gonadosomatic Index) and through histological assessment of shrimp ovary (Oocyte structure). 12 female shrimps consists of three samples per ovarian stages were sampled from Kuala Muda, Kedah water and were dissected out. Through the identification, there were four obvious colouration of ovary stages were identified which are; yellow (Stage 1), green yellowish (Stage 2), light greenish (Stage 3), and dark green (Stage 4). Analysis on the Gonadosomatic Index (GSI) shows significant increment as reached advances stages. Through the histological assessment of Stage 1 ovary shows present of Perinucleolar Oocyte (PO) and small size oocytes. Stage 2 ovaries were identified with Yolkless Oocyte (YO) from the sectioning part, and Stage 3 ovaries were identified with late stage of yolky globules. Fully matured of Stage 4 ovaries appeared with fully yolky globules through the histological analysis. As a conclusion, the ovarian colouration and GSI can be applied to identify the ovarian maturation stages but conversely, the histology assessment was the most precise method to determine the ovarian maturation stages. Thus, present study on histological analysis of ovarian maturation stages is more accurate in identifying the ovarian maturation stages of female shrimp broodstock and this study contributed as an additional knowledge for broodstock management and selection purpose in the future.

Keywords: Banana shrimp; Broodstock selection; Oocyte; ovarian maturation stage; *Penaeus merguiensis*; Yolky globules

O-GB-A4

In Vivo and *In Vitro* Effect of Peri-vitelline Fluid on 3T3 Cell and Rat Study

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Abstract

Horseshoe crab species widely used for pharmaceutical and biomedical in few years ago. The used of blood such as amebocytes from *Limulus* (LAL) and *Tachypleus* (TAL) studies have been carried out on this species. In this study focuses on the less studied aspect, the peri-vitelline fluid (PVF) of its eggs. Void of parental care, the horseshoe crab embryo developed with nourishment solely from PVF. This observation suggests that this PVF may contain beneficial property towards tissue regeneration. Hence, PVF of a local horseshoe crab, *Tachypleus gigas* was investigated for its wound healing ability. Studied on the *in vitro* was to determine the viability of 3T3 (mouse skin fibroblast cell) cells using MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) tetrazolium and migration assay. Experiments were conducted using eight concentrations (1.56 to 200 µg/mL) of PVF for 72 hours. Then, *in vivo* study was carried out on *Sprague dawley* rats. Experiment on rats was conducted with treatment consisted of 0.9% saline, petroleum jelly, Solcoseryl jelly 10%, PVF of 3rd embryonic stage 100 and 200 mg/g, PVF of 4th embryonic stage 100 and 200mg/g. Rats inflicted with wound then treated with the above treatments for 15 days. Rats were then euthanized and sacrificed, skin, liver and kidneys collected for histological study. Results on the *in vitro* study, PVF was found to be non-toxic to 3T3 cells with 80% viability for all the tested concentrations. In the migration assay, PVF dosages of 100 and 200 µg/ mL for the two embryonic stages (3rd and 4th) showed 100% migration of 3T3 cells after 24 hours as compared to positive control (0.5% silver sulfadiazine). While the rats treated with PVF from the 3rd embryonic stage at 100 mg/g and 4th embryonic stage at 200 mg/g showed accelerated healing, earlier by 3 days as compared to positive control (Solcoseryl gel 10%). While, the wounds treated with PVF at 200 mg/g from the 3rd and 4th embryonic stages healed well internally without abnormal effect on the livers and kidneys. The finding of this study showed that the PVF extracted from the *T. gigas* eggs has beneficial property to support the rapid healing of wound without adverse effect on the rat. As conclusion, the PVF of *T. gigas* has potential to be used as treatment to accelerate healing of wound particularly in patients with slow recovery.

O-GB-D10

Morphometric Comparison of Periphyton and Non-periphyton Nursery Culture of Giant Malaysian Freshwater Prawn (*Macrobrachium rosenbergii*)

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Abstract

Two nursery recirculating aquaculture systems (RAS), in triplicate, were stocked with *Macrobrachium rosenbergii* of 20 to 25 days post naupili age, hatched from broodstock obtained from an oxbow lake at Terengganu, Malaysia. Culture was continued in parallel for 40 days. One aerated system was provided with high specific surface area periphyton layers at 300% of tank area and, stocking density of 0.5/L in 1.5 cubic meter tanks. A second aerated system used conventional tanks of 0.5 cubic meters, stocking density of 1/L, a recirculating sand filter bed and, net screen substrate. Measurement of the PL at start, intermediate 20 days and final 40 days were conducted inclusive of photography with computer microscope where the full data is compiled for submission as a separate data publication. Periphyton RAS exhibited lower survival but higher total produced mass which was correlated with ratios of morphometric characteristics, total produced mass and, weight distributions of harvested individuals.. This paper acknowledges inconsistencies of the two treatments while focusing on examination and comparison of morphometric ratios, e.g., CM, CL, etc. for the individuals measured from each system. The periphyton system is under development and the comparison supports indicated potential to improve both product output and quality. The study impacts separate study of the evaluation of the broodstock, which was anticipated to reveal signs of inbreeding. Application of alternative culture technology, under development in separate study shows potential to exert a radical effect on commercial potential of the broodstock larvae

Keywords: Nursery, *Macrobrachium rosenbergii*, Periphyton, Morphometric, Broodstock, Inbreeding, Commercial

O-GB-B1

Studies on Taurine Synthesis in Common Carp; Nutritional Regulation, and Gene Expression of Taurine Synthesizing Enzymes

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Abstract

Taurine plays a role in osmoregulation, bile salt conjugation, early growth, vision, neurotransmission, and cardiac function and is considered as conditionally essential nutrient for fish when dietary methionine and cysteine are deficient. Hence, it is important to have an depth understanding on nutritional regulation and gene expression level of taurine synthesizing enzymes in juvenile common carp. Cysteine, the precursor for cysteine sulfinic pathway and cysteamine for cysteamine pathway was injected to juvenile common carp at dose of 0, 0.25, 0.5 and 1 mM, and fish samples were collected at 0, 2, 4, 8, 12, and 24 hours. Plasma taurine level reached maximum level at 2-8 hours after injecting L-cysteine and then decreased onwards. When injecting higher level of L-cysteine, time to reach maximum level of plasma taurine level tended to delay. No increase in hepatic taurine level was observed when injecting L-cysteine. Plasma taurine level in fish injected cysteamine reached maximum after 8-12 hours post injection and increase in hepatic taurine level was observed in cysteamine injected fish. Juvenile common carp were fed one of nine diets: a basal diet supplemented without sulfur compound (control); a basal diet supplemented with 1.0% or 1.5% cysteamine hydrochloride (CSH); 1.5% or 3.0% cysteine; 1.0% or 1.5% methionine; and 0.5% or 1.0% taurine for 30 d. The 1.0% and 1.5% CSH supplementation caused growth retardation and deformities in the fish. All treatments increased carcass taurine levels (18.5-86.9 g/kg). Expression of cysteine dioxygenase gene was down regulated by cysteine and 0.5% taurine but upregulated by 1.5% CSH. Expression of cysteine sulfinic acid decarboxylase was down regulated by cysteine, methionine, and CSH. The present study suggests that the cysteamine pathway is mainly responsible for taurine synthesis in common carp.

Keywords: Taurine, Cysteine dioxygenase, Cysteamine

O-GB-B2

Effect of Exogenous Antioxidants Supplementation on Post-thaw Sperm Quality in Malaysian Mahseer, Tor tambroides (Bleeker, 1854)

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Abstract

The effects of antioxidants supplementation on sperm quality of *Tor tambroides* sperm was investigated in this study. Four types of exogenous antioxidants, namely ascorbic acid, α-tocopherol, trolox (vitamin E analogue) and reduced glutathione (GSH) were used in the cryopreservation media and tested in different concentrations; i.e. ascorbic acid (0.005 - 1.0 mM); α-tocopherol (0.005 - 1.0 mM); Trolox (0.005 - 1.5 mM) and GSH (0.005 - 2 mM). Post-thaw sperm quality of all treatments was quantified and compared with the control treatment for sperm motion characteristics, viability, morphology and sperm plasma membrane integrity. Results of the study showed that addition of ascorbic acid, α-tocopherol, trolox and GSH in the cryopreservation media had significantly improved post-thaw sperm motion parameters. This was revealed in the significantly ($p<0.05$) higher total motility, progressive motility and rapid cell percentages. The concentration of each antioxidant that gave the best post thaw sperm motility were 0.1 mM ascorbic acid, 0.025 mM α-tocopherol, 0.025 mM Trolox and 0.5 mM GSH, i.e. with sperm motility ranged between 70-80% compared to 53% in the control treatment. Ascorbic acid and trolox had also significantly improved the average path velocity (VAP), straight-line velocity (VSL) and curvilinear velocity (VCL) of the post-thaw *T. tambroides* sperm. Results of the study also indicated that the cryopreservation procedure applied on the *T. tambroides* sperm did not cause cryo-damage to the sperm morphology and sperm membrane integrity. However, the use of antioxidants has no significant effect on sperm viability in all treatments.

Keywords: Antioxidant; Cryopreservation; Malaysian Mahseer; Sperm Quality

O-GB-B3

The Complete Mitochondrial DNA Sequences of Three Indonesian Rasboras (*Rasbora aprotaenia*, *Rasbora lateristriata* and *Rasbora argyrotaenia*)

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Abstract

The complete mitochondrial genomes of three rasboras, *Rasbora aprotaenia*, *Rasbora lateristriata* and *Rasbora argyrotaenia* from Java Island, Indonesia were completely sequenced. These mitogenomes are 16,541 bp, 16,539 and 16,740 bp, respectively with the identical gene arrangement as in most other vertebrates. They had 37 genes consisted of 13 protein-coding genes, 2 ribosomal RNA genes, 22 transfer RNA genes and a major non-coding region. All protein genes start with ATG start codon except for the cytochrome oxidase subunit I which use GTG as the initiation codon. Seven protein genes were terminated with TAA stop codon, whereas the remaining six genes required polyadenylation for the creation of stop codons in mRNAs. All tRNA genes can be folded into the standard cloverleaf secondary structures. The phylogenetic tree constructed by the maximum likelihood method suggested with strong bootstrap probabilities that *R. aprotaenia* is closely related to *R. lateristriata* but distantly related to another Javanese rasbora, *R. argyrotaenia*. This result implies that Java Island was colonized by rasboras at least two times independently by ancestors of *R. lateristriata* and *R. argyrotaenia*.

Keywords: East Java, Phylogenetic tree, Cyprinidae, Mitochondrial genome

O-GB-B4

DNA Barcoding for Effective Fish Diversity Assessment in Merbok River: Contributing to the Development of Local Database for Metabarcoding Study

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Abstract

The performance of DNA barcoding method was tested to assess the species diversity of local fish catches in Merbok River, located in Kedah, Malaysia. The aimed of this study was to examine the utility of DNA barcoding for species level identification as compared to conventional identification through morphological characters. This is of critical importance due to the fairly limited taxonomic studies on fish diversity in this country. This study also would greatly be contributing to the development of a local barcode database that can be utilized in sympatric metabarcoding analysis. Preliminary data analyses revealed a total of 11 orders, 44 families, and 54 species that were sequenced (barcoded) for a 655bp region of the mitochondrial cytochrome oxidase subunit I gene (COI). Most species were represented by multiple specimens with sample mean of 3 samples per species, and a total of 154 sequences were generated. In addition to the barcode-based species identification system, phylogenetic relationships among the species identified have also been attempted. The present study revealed that fish species can be effectively identified through the use of DNA barcoding and that the present COI library can be used for subsequent applications in metabarcoding studies.

Keywords: DNA Barcoding, Merbok River, Fish Assessment, Metabarcoding, COI

O-GB-B5

Genetic Diversity of *Channa lucius* in the Mekong Delta, Viet Nam

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Abstract

In Mekong delta, *C. lucius* is one of endangered and economically important species in Channidae family with high potential for domestication in aquaculture and postoperative medicinal applications in wound healing and reducing discomfort. In the wild, population sizes of this species have been declined due to overfishing, habitat loss and degradation because of human activities. In order to effectively conserve and manage this species, vital information on relevant population genetics is required to provide spatial conservation value of the species to prevent the species extinction. On the contrary, in spite of their economic and scientific importance to date, studies are limited on the genetic diversity of *C. lucius*. Therefore, the study aims to assess genetic diversity of *C.lucius* by using ISSR markers (Inter-Simple Sequence Repeats). Through optimization of ISSR markers, six highly polymorphic markers will be used to quantify levels of genetic diversity of different *C. lucius* populations in the Mekong delta. Samples will be collected from four locations (Ca Mau, Can Tho-Hau Giang, Kien Giang and Long An) purposively, 20 individuals per location totaling to 80 individuals. The study is expected to estimate average heterozygosities, percentage of polymorphic loci, and genetic distances between the populations and construct dendrogram of *C.lucius* populations. Findings of the study will provide genetic information for genetic improvement and conservation of this species.

Keywords: Channidae, Conservation, Dominant markers, Freshwater fish, Population genetics

O-GB-B6

Effect of Banana Stem *Musa sp*. During Transportation on Mortality, Stress and Immune Gene Expression of Juvenile African Catfish *Clarias gariepinus*

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Abstract

This study investigated the potential of banana stem *Musa* sp. during transportation of African catfish *C. gariepinus* juvenile. Fish were transported for 5 hours in plastic bags with a loading density of 62 fish/L; and 1:3 of the water-oxygen ratio. The dice-chopped banana stem (2 × 3 × 0.5 cm) were added into the plastic bags during the transportation in four triplicated concentration treatments: 0 g/L (control), 5 g/L, 10 g/L, and 15 g/L. After transportation, fish from each treatment was kept in separate tanks for 24 h. Fish mortality, water quality, stress-immune gene expression (*viz.* IL1β, SOD1, HSP70, HSP90, LYSC, LYSG) in the gill, liver and head-kidney were compared among the treatments. After transportation, the banana treated fish showed a significant elevation in stress and immune-related gene expression, and the levels were significantly higher than control fish in the all tested tissues. Cumulative mortality was significantly lower in banana treatments than control after transportation. The dissolved oxygen of 15 g/L banana treatment was the lowest. TAN, and Ammonia was not significant among treatments after 5-hr of transportation. Overall, the present results revealed that the application of banana stem treatment during transportation could elevate the immune and stress-related genes in African catfish juvenile, resulted in the lower mortality after transportation.

Keywords: Transportation, Banana stem, Gene expression, Mortality, African catfish

O-GB-B7

Fish Transient Receptor Potential Melastatine 2 Channel - The Environment Pollutant Sensor

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Abstract

Pollutants such as reactive oxygen or nitrogen spices (ROS or RNS) in wastewater released into the aquatic environment cause serious impacts on fish health. In different animal species, transient receptor potential (TRP) proteins have been well known to form sensor cation channels for detection of a variety of environmental stimulants. To elucidate sensing mechanisms that allow fish to avoid pollutants in the environment, we here characterize the zebrafish (*Danio rerio*) homologue of TRPM2, whose mammalian homologue has been reported to show prominent sensitivity to ROS, especially to hydrogen peroxide (H_2O_2). Our results showed that the zebrafish TRPM2 (drTRPM2) protein forms a Ca^{2+}-permeable cation channel activated by H_2O_2. Strikingly, in contrast to mammalian TRPM2, drTRPM2 responds to nitric oxide (NO) and nitrite (NO_2^-). This distinctive RNS sensitivity of drTRPM2 channels is mediated by cooperative action of ADP ribose (ADPR) and cGMP-dependent protein kinase (PKG), and sensitivity is mediated mainly by ADPR. In addition, homozygous TRPM2 knock out zebrafish generated using the CRISPR/Cas9 system fails to show repellent behaviors against H_2O_2 and NO. Thus, TRPM2 channel plays an important role for fish to sense to the polluted environment.

Keywords: TRPM2, Fish, Functional

O-GB-B8

Development of PCR Method for Detection of *Aeromonas schubertii* in Farmed Snakehead Fish (*Channa striata*)

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Abstract

Visceral white spot disease is a severe disease that causes high mortality, yield reduction and great economic losses in snakehead farming in Mekong Delta of Vietnam. The aims of the study were to evaluate a new PCR protocol that can detect *Aeromonas schubertii* bacteria, which is the causative agent of this infection. A set of primers (ASH-F, ASH-R), targeting a part of the thermostable hemolysin gene was designed, displaying a better performance in sensitivity. The amplification result gave a band of 413bp, positive with *Aeromonas schubertii*. The specificity of this primer pair was carried out and showed no amplicon with other common bacterial pathogens in aquaculture such as *Aeromonas hydrophila*, *Aeromonas veronii*, *Edwardsiella ictaluri*, *Edwardsiella tarda*, *Streptococcus agalactiae*, *Streptococcus iniae*, *Flavobacterium columnare* and *Francisella noatunensis*. Sensitivity testing using 10-fold serial dilutions revealed a detection limit of 2pg DNA. Positive results were also obtained when applied this protocol to detect *Aeromonas schubertii* in infected tissues of diseased snakehead. The entire amplification time was almost 2 hours. This research provides fundamental information for diagnosis as well as further study in prevention and treatment of snakehead diseases.

Keywords: *Aeromonas schubertii,* PCR, *Channa striata,* Snakehead

O-GB-B9

Genetic Diversity Inferred from Inter-simple Sequence Repeat Markers of Black Sharkminnow (*Labeo chrysophekadion*) in the Mekong River Basin

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Abstract

Black sharkminnow (*Labeo chrysophekadion*), is one of important Cyprinidae species widely distributing in Asia through Mekong and Chao Phraya Basin. This fish has a large size and has a potential for aquaculture. Information about genetic diversity of this species is necessary for management and farming activities. This study evaluated levels of genetic diversity of *L. chrysophekadion* in the Mekong River using Inter-Simple Sequence Repeat (ISSR) markers. Fish samples were collected from four populations comprising three populations in the Mekong Delta of Viet Nam (An Giang, Can Tho and Dong Thap province) and one population in Laos as an outgroup comparison. Seven ISSR primers were selected to analyze 90 individuals (19-24 individuals/ population), yielding 275 bands with the size ranging from 400 bp to 2900 bp. Results showed that four population of *L. chrysophekadion* had high levels of genetic diversity with expected heterozygosity from 0.276 – 0.306, number of effective alleles from 1.465 – 1.542, Shannon index from 0.415 – 0.451 and percentage of polymorphic loci from 81.69 – 85.92%. The highest genetic diversity measurements were found in An Giang and the lowest ones were in Dong Thap populations. Nei's genetic distance and principal coordinates analysis (PCoA) revealed that four populations had low genetic differentiation (0.026 - 0.063) and were not separated into different clusters. Low genetic differences among populations probably result from migratory behavior of the species and geographical features due to the connection of the rivers and canals along the Mekong River Basin.

Keywords: Heterozygosity, Genetic differentiation, Genetic variation, Migration

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O-GB-B10

Morphology and DNA Barcoding of Fish Species of Genera *Henicorhynchus, Labiobarbus* and *Cirrhinus*

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Abstract

"Ca linh" (Vietnames common name) are important economic fish species, which are abundant during the flood season in the Mekong Delta. In the region, there are currently five species belonging to two groups of short and long dorsal fin bases. Short dorsal fin group includes *(Henicorhynchus lobatus)*, *(Henicorhynchus siamensis)* and *(Cirrhinus jullieni)*. Long dorsal fin group includes *(Labiobarbus siamensis)* and *(Labiobarbus leptochiela)*. Meanwhile, short dorsal fin groups are relatively similar in their morphology. Particularly the identification of two species *(H. siamensis and H. Lobatus)* based on external morphological parameters is extremely difficult and confused. The research aimed to combine morphology characteristics and DNA barcoding for accurate species identification of "ca linh" in Mekong Delta basing on COI (Cytochrome C Oxidase Subunit I) gene and better understand phylogeny relationship among "ca linh" species. Fish samples were collected along the Mekong River. Initially, fish samples were classified based on morphological keys reported in previous documents. Morphological parameters (countable and morphometric traits) of each species were measured. Then, six samples from each species were amplified COI gene. The gene sequences were compared with Genbank and BOLDsystems databases. Preliminary results based on principal component analysis (PCA) of morphometrics showed that three species *(H. siamensis, H. lobatus and L. leptochiela)* relatively separated. Main morphometric characteristics that discriminated among three species included dorsal fin base, caudal peduncle depth, pre-dorsal distance, head length, head depth, distance between anal and caudal fin, head width and pectoral fin length. Discriminant analysis based on morphometric parameters could classified correctly 100% individuals as *L. leptocheila*, 68.8% as *H. siamensis* and 71.8% as *H. lobatus*. The phylogenetic tree based on COI gene indicates two clusters including (i) short dorsal fin group (with only one species *H. Siamensis)* and (ii) long dorsal fin group *(L. leptocheila)*. They differ 15.75% COI sequences based on Kimura-2P genetic distance. Results also showed relatively high levels of within-group genetic distance (0.35-0.7%). These results provide important information for fish species identification of "ca linh" species in Mekong Delta and contribute to the DNA barcoding databases of freshwater species.

Keywords: COI gene, Genetic distance, Species identification, Taxonomy

O-GB-D1

Genetic Diversity in the Domesticated and Wild-Type Barramundi (*Lates calcarifer*) Based on Mitochondrial COI Gene

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Abstract

Information on population structure and genetic diversity are essential for association mapping studies and genomic selection. Genotyping by sequencing (GBS) represents an innovative method for SNP detection. Herein we used the GBS approach for the identification of SNPs in mitochondrial COI gene and for the assessment of the level of genetic diversity in six wild types and seven domesticated genotypes of barramundi, Asian seabass (*Lates calcarifer*). Thirteen specimens of barramundi were identical in the 98.90% of the mitochondrial COI gene sequence. This sequence was identical to the homologous sequence of the three genbank-registered specimens. A total of six SNPs was discovered, including four single-base changes and two indels for an average nucleotide diversity of $\theta = 0.00273$. One specimen of wild type and three specimens of domesticated have differed a single nucleotide, 0.16%, from others. Wild types of barramundi were closely related to the domesticated barramundi, 0.0%-0.6% of divergence. The phylogenetic analyses showed two independent phylogenetic groups: one including all domesticated sequences and the other including both domesticated and wild type sequences.

Keywords: Asian seabass, Genotyping, Mitochondrial COI gene, Nucleotide diversity, SNP

O-GB-D2

Seed Production Technology of Golden Trevally (*Gnathanodon speciosus*)

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Abstract

Golden trevally (*Gnathanodon speciosus*) is a tropical marine finfish species present in coastal waters of the Asia-Pacific region. This fish species has high potential for both marine seacage culture and earthern pond in coastal aquaculture because of good meat and fast growth rate. The fish has been considered as a highly valued table fish in the tropical areas. They have been paid more attention for aquaculture when the fingerling have been artificially produced in captivity since 2016 in Nha Trang (Phuong Hai Co. LTD, Nha Trang, Vietnam). This is for the first time seed production of this species was sucessful and commercial. Broodfish of 1 year old or more than 500 gram of body weight can be matured in captivity. The spawning season lasts from late Feb to October. Induced spawning with hormones LHRH-A at a dose of 25-35 µg or hCG at a dose 1000-1500 IU/kg can be applied with latent period ranged between 30 -36 h. The fertilization and hatching rate were 70% and 90%, respectively. Survival rate from hatching to fry (1-2 cm) was 1-3%, while the survival rate from fry to fingerling (5cm) was 70-80%. As other marine finfish, food for the larvae and fry during nursing period are rotifer, copepod, artemia and commercial pellet.

Keywords: Golden trevally, Nha Trang, Vietnam, Marine fish, Seed production

O-GB-D3

Biomonitoring of Estuarine Fish Community Utilising Environmental DNA Metabarcoding

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Abstract

Environmental DNA (eDNA) metabarcoding, the combination of high-throughput sequencing and DNA-based species identification from environmental samples is emerging as a non-invasive method for the detection and identification of common, rare, and elusive species in a wide range of ecosystems, including aquatic environments such as marine, freshwater, and coastal ecosystems. In order to assess the ecological status of these ecosystems, for example in estuaries, fish communities monitoring is one of the most widespread and established approach, but the conventional method of fish surveys are invasive, time-consuming and financially expensive. In the present study, we investigate the potential of using eDNA metabarcoding to assess fish diversity, based on the analyses of water samples collected from Merbok Estuary using both 12S and COI markers. Our study demonstrates the utility of eDNA metabarcoding for recovering fish diversity in the studied site as compared to the traditional net surveys. However, the successful detection of species and biodiversity retrieved in this study depends on the available comprehensive reference database. Our study offers a powerful tool for future large-scale biomonitoring research and provide paramount information of which is essential for effective long-term monitoring of aquatic habitats.

Keywords: Environmental DNA, Metabarcoding, Estuaries, Fish community, Biomonitoring

O-GB-D4

Phylogenetic Relationships of *Lethrinidae* Species in Spermonde Inferred from Mitochondrial COI Gene Sequences

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Abstract

Spermonde Achipelago is one of the Coral Triangle that has highly diversity of marine species. Indentification of Emperor fish in Spermonde Achipelago South Sulawesi waters has never been done. In several studies, molecular tools, used for the identification of the presence of cryptic and undescribed species especially. In this study, we analyzed the mitochondrial DNA cytochrome oxidase I (COI) gene sequences of 8 species within the Lethrinidae family present in Spermonde and determined their phylogenetic relationships. The varieties of nucleotide between every species are around 0.1432 ± 0.0125. Phylogenetic analyses of the COI dataset revealed four different monophyletic separate clades within three major cluster. Interspecific overlap has been identified between L. *lentjan* dengan *Caesio caerulaurea* (KF009569.1); L. *obsoletus* with L. *lentjan* (JQ350087.1); L. *harak* with *Zerynthia rumina* (GU674160.1); L. *microdon* with L. *lentjan* (KU317872.1) and *L. rubrioperculatus* with *Satyrus actaes* (GU674049.1). Morphologically specimen 3 were identified as L. l*entjan* were suspected as a new species / vague species in family Lethrinidae. The results of this study emphasize the applicability of COI sequences as a diagnostic marker for differentiating Lethrinidae species and revealing cryptic species.

Keywords: Environmental DNA, Metabarcoding, Estuaries, Fish community, Biomonitoring

O-GB-D5

Population Genetics of Brushtooth Lizardfish, *Saurida undosquamis* (Richardson, 1848) From East Coast of Peninsular Malaysia Based on 16S rRNA Gene Marker

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Abstract

We explored the genetic diversity and structure of the brushtooth lizardfish, *Saurida undosquamis* along east coast of Peninsular Malaysia, Malaysia using the 16S rRNA gene marker. Seventy individuals collected from six sampling localities were sequenced and analysed for their genetic variation and distribution. DNA sequences were aligned using MEGA X software and characterization of DNA polymorphism by calculating the haplotype and nucleotide diversity were conducted in Arlequin 3.5.2.2. There were twenty-six haplotypes in total. The molecular diversity index showed that the haplotype diversity of all six populations were relatively high, while their nucleotide diversity were averagely low. The populations probably underwent expansion after a period or could have undergone bottleneck effect. Analysis of molecular variance (AMOVA) exhibited that the percentage of variation within population was significantly higher than that of among population. Population pairwise F_{ST} values were relatively low and indicated that there was no significant population fragmentation within east coast of Peninsular Malaysia ($p > 0.05$). Absence of limited gene flow was also corroborated in the phylogenetic tree where no distinct pattern of genetic segregation was observed. Data obtained in this study provide first hand information on the genetic distribution of the *S. undosquamis* inhabits east coast of Peninsular Malaysia and it will be useful for the fishery resource management and conservation strategy.

Keywords: *Saurida undosquamis*; Genetic diversity; Population structure; 16s rRNA

O-GB-D6

DNA Barcoding and Phylogenetic Relationship of Species Belonging to Ariidae Family

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Abstract

Ariidae family is one of the economically valuable families of Siluriformes , which are widely distributed in both fresh and brackish water. Currently, there are 153 species belonging to Ariidae in the world but only seven species were reported distributing in the Mekong Delta. Some species have diverse morphology that can be difficult to identify. This study aimed to identify DNA barcoding and comprehend the phylogenetic relationship among these species in the Mekong Delta. Six species (of 5 genera) consisting of *Sciades sagor* (n=2), *Arius maculatus* (n=10), *Arius nenga* (n=3), *Cryptarius truncatus* (n=1), *Cephalocassis borneensis* (n=11) and *Osteogeneiosus militaris* (n=3) were collected from natural water bodies in different provinces (Can Tho, Soc Trang, Tra Vinh and Ca Mau) of the Mekong Delta, Vietnam. Firstly, fish samples were identified by morphological methods based on previous documents. After that, DNA was extracted, and the mitochondrial gene Cytochrome C oxidase subunit I (COI) was amplified using a universal primer pair F2-t1 / R2-t1. Results of genetic distance and phylogenetic tree based on Kimura 2-parameter revealed that these six species were clusted into 2 main groups. Typically, *S. sagor* is in an isolated cluster, ranging 11.4 to 14% genetic distance distinguished from the others. This species is uniquely characterized by broad-round head bony shield and some of discontiunous short yellow-brown vertical bars on its body. The next cluster includes two smaller clusters. The first one is the presence of two *Arius* species (*A. maculatus* and *A. nenga*), which has smallest genetic distance (6%) to each other. The second clade is constructed by all remaining species with the range of genetic distance from 6.1 to 9.2%, in which *C. borneensis* and *C. truncatus* are genetically closed (6.1%). Furthermore, intraspecific genetic distances vary from 0% to 0.4%. The highest diverse values (0.4 ± 0.2%) are from *O. militaris* and *A. maculatus* while no intraspecific genetic variation is found in *S. sagor*. In brief, the phylogenetic relationship between Arridae species is consistent with their current taxonomic levels.

Keywords: Intraspecific genetic distance, Mitochondrial gene, Phylogenetic, Sequencing

O-GB-D7

Development of Real-Time PCR Assay for Simultaneous Detection of Anisakis species Nematode In Fish and Fish Canned Products

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Abstract

Anisakis species are a group of zoonotic fish born nematodes causing gastro-intestinal lumen anisakiasis in human or systematic allergic reaction. The aim of study was to develop a quantitative real-time PCR (qPCR) for monitoring and detection of *Anisakis spp.* DNA in fish and fish derived products, including canned fish to help manufacturers to establish new concepts of safety in fish products and consequently improvement of consumers' health, preventing different types of human anisakiasis. Native *Anisakis typica* l_3 larvea were collected from *Psettodes erumei* from Persian Gulf, Iran. *Anisakis simplex* and *Anisakis pegreffi* l_3 larvea was donated by Sapienza Universty (Italy). DNA from the sample larva as well as 50 canned fish samples from 9 different brands was extracted using a commercially available kit or Cetyl Trimethyl Ammonium Bromide CTAB method. The nuclear ribosomal internal transcribed spacer (ITS1, 5.8S, ITS2) region of the worms was targeted for real-time PCR A 86 bp target of ITS_1 gene of *Anisakis spp* amplified. Melting curve analysis showed a specific peak temperature around 80° C. Ten-fold serial dilutions of DNA from of 1×10^5 to 1×10^1 resulted in low detection limit about (0.0007ng/u1) DNA with an *R*2 value equivalent to 0.988. The two assays did not amplify DNAs from *Toxocara cati, hydatid cysts, Fasciola hepatica, Dicrocoelium dendriticum, Hysterthylacium amoyense* and DNA-free samples (negative controls). A total of 26(52%) out of 50 samples were found to be positive for Anisakid DNA using Pananisakid primers. The developed qPCR could be used as a rapid and reliable assay for detecting of *Anisakis spp.* larva in fish and fish canned products.The method not only may help to monitor the safety of sea food products but also could improve the methods for screening of infected persons with the nematode.

Key word: Anisakis, Diagnosis, Real time PCR, Persian Gulf.

O-GB-D8

Recent Population Expansion of Longtail Tuna *Thunnus tonggol* (Bleeker, 1851) Based on Mitochondrial DNA D-loop and ND5 Gene Markers

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Abstract

Present study describes the genetic diversity and population structure of the longtail tuna *Thunnus tonggol* in Malaysian waters using mitochondrial DNA partial D-loop region and NADH dehydrogenase subunit 5 (ND5) gene. A total of 203 and 209 samples were respectively analysed, reveal 180 and 61 haplotypes respectively for d-loop and ND5 gene markers. High haplotype diversity (D-loop = 0.989 – 1.000; ND5 = 0.889 – 1.000) and low to moderate nucleotide diversity (D-loop = 0.019 – 0.025; ND5 = 0.003 – 0.013) were identified. The phylogenetic analysis using maximum likelihood (ML) tree method displayed no obvious separation pattern for all localities. Analysis on partition of genetic variation using Analysis of Molecular Variance (AMOVA) suggest absence of limited gene flow among study sites. In addition, low pairwise genetic differentiation (F_{ST}) among populations (D-loop = -0.023 – 0.148; ND5 = -0.006 – 0.343) also indicate that the populations within this region are essentially panmictic. However, *T. tonggol* in Malaysia showed significant genetic differentiation from those in Indian waters (GenBank sequences). The populations of *T. tonggol* in Malaysia also demonstrate recent demographic expansion supported by Fu's Fs and Tajima's D neutrality tests and the unimodal pattern of mismatch distribution. The present study has provided new genetic data of *T. tonggol* in Malaysia and future research involving samples from adjacent political boundaries and the use of parental markers would help to improve its conservation and management effort.

Keywords: Genetic diversity, Longtail tuna, *Thunnus tonggol*, Mitochondrial DNA control region (D-loop), NADH dehydrogenase subunit 5, Population structure

O-GB-D9

Metagenomics Analysis of bacterial Community in a Tropical Marine Fish Hatchery

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Abstract

Metagenomics is one of the fields to study the genetic contents of the microorganism communities directly from the environment by combination of genomic technologies and bioinformatics tool. This present a study was conducted to determine the bacterial diversity and the functional annotation in the ecosystem of tropical marine fish. The DNA was extracted from feces (combined of intestinal content and mucosa) of tiger grouper (*Epinephelus fuscoguttatus*) (n = 9) and Asian seabass (*Lates calcarifer*) (n = 9) as well as the water samples (3 L) using commercial kit. All the extracted DNA were subjected to the 16s rRNA amplicon sequencing using the Illumina Miseq platform. Results revealed that gut microbiota of the Asian seabass were dominated by phylum Proteobacteria and order Vibrionales during both season where it found more abundantly during the dry season. Meanwhile, gut microbiome in tiger grouper were shifted from phylum Firmicutes and order Clostridiales during the dry season to Proteobacteria and Lactobacillales during the wet seasons. Water samples dominated by Proteobacteria and Vibrionales in dry season and shifted the order to Rhodobacterales. PICRUSt revealed functional genes that dominantly present in the tropical marine fish hatchery were gene encoded for metabolism, genetic information processing, environmental information processing and followed by cellular process and human diseases.

Keywords: Metagenomics, Illumina Miseq, Asian seabass, Tiger grouper

O-GB-E3

Use of Mitochondrial Gene COI in Identification of Pure Breeds and Crossbreed of Fishes; Potential as Cost Effective Methods of Intra-specific Hybrid Detection

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Abstract

The occurrences of intra and inter species crossbreeding are frequently observed in hatchery populations of Bangladesh. Mostly it's happening when exotic strains of the same species and/or genus are introduced in the country's aquaculture systems. By considering the larger size and growth rate of *Clarias gariepinus* introduced from Africa and *Anabas testudineus* initially from Thailand and later from Vietnam. After introduction in the country's aquaculture system, the consumer's preferences sharply decreased due to larger size and less taste. Moreover, the high predatory nature of *C. gariepinus* was suspected for the destruction of small indigenous species (SIS) that's why the culture of this species was banded by the Bangladesh government. Later, the hatchery operators started to produce inra-species (native *A. testudineus* with exotic) and inter-species (n*C. batrachus* with *C. gariepinus*) crossbreed which threatening the native pure breeds. Therefore, the study aimed to detect the crossbreeds and purebreds of *C. batrachus* and *A. testudineus* by using mitochondrial cytochrome c oxidase subunit I (COI) and cytochrome b (Cytb) genes. Both genes were amplified and the DNA sequences were submitted to the NCBI Genbank database as well as the nucleotide sequences of same genes were retrieved from the database. Finally the selected sequences were analyzed by using MEGA software (Version 7.01). The transition/transversion bias (R), nucleotide divergences, phylogenetic trees and time trees showed the separate cluster formations and times of divergences from the native pure breeds to the intra-species and inter-species crossbreeds of *A. testudines* and *C. batrachus* respectively. Further investigation by involving more genes and samples are highly recommended for conserving the gene pool of native pure breeds for sustainable aquaculture.

Keywords: *Aanbas testudineus*, Clarias, COI, Cytb, Phylogenetic tree

O-GB-C3

Molecular Identification of Commercially Important Trevallies, *Carangoides* sp. (Perciformes: Carangidae) in Malaysia

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Abstract

Carangoides spp. or also known as trevallies is one of the commercially exploited fish group in Malaysia. Genus *Carangoides* consists of fishes with mixed morphological and meristic characteristics. In this study, the mitochondrial Cytochrome c oxidase-I (COI) gene was analyzed for genetic identification of 271 samples representing 13 species of *Carangoides* from Malaysia waters. The average within species K2P distance was 0.4% with *C.oblongus* and *C.praeustus* showed the lowest intraspecific divergence (0%) and *C.coeruleopinnatus* showed the highest (1.3%). Neighbour-joining tree generated from haplotype sequences clearly grouped all 13 putative species into their own clade. However, two species (*C.coeruleopinnatus* and *C. gymnostethus*) which showed deep intraspecific divergence (9.1% and 3.5%) formed three and two clusters within their own taxa respectively. A more detailed analysis of the taxonomic status of some of the individuals within the taxa is required. Additionally, a total of 108 COI sequences from other countries were later included in the phylogenetic analysis to test the accuracy of *Carangoides* identification in GenBank. Based on NJ tree constructed, there were 25 sequences which did not cluster in their own taxa. These findings showed that taxonomic confusion may occur between species in genus *Carangoides*.

Keywords: Carangidae, Carangoides, Cytochrome c oxidase I, Malaysia, Trevallies

O-GB-C2

A Preliminary Study of Population Genetic Structure of Spotted Sardinella, *Amblygaster sirm* in Malaysian Waters

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Abstract

The information on the current fish stock resources is essential in order to get an effective fisheries management and policy development at the national or regional level. Genetic data such as mitochondrial DNA has become a crucial tool in assessing fish stock structure and to assist fisheries managers for optimum stock management. The aim of this study is to assess the genetic diversity, population structure and phylogeographic pattern of the most abundant sardines species landed in Malaysia, spotted sardinella, *Amblygaster sirm* (local name: tamban beluru) inferred from mitochondrial DNA Cytochrome *b* (mtDNA Cyt b) as the targeted gene. Six locations of sampling areas were selected to represent South China Sea and Sulu Sea namely Kuching, Kuantan, Pulau Kambing, Kudat, Kota Kinabalu and Semporna. Results revealed all 143 individuals sampled, amplified successfully for the Cyt *b* gene with a final sequence length of 1013 bp consisted of 98 haplotypes. The high haplotype diversity ranging from 0.909 to 1.000, while low nucleotide diversity ranging from 0.002 to 0.008 was also observed. In addition, no obvious geographical structure was evident resulted from the phylogeographic relationships among all localities tested. This can conclude that the sampled *A. sirm* populations in Malaysian waters showed no genetic differentiation with high genetic variation as inferred from mtDNA Cyt *b*. Therefore, the preliminary data here suggested *A sirm* populations in Malaysian waters can be regarded as a single stock unit for management purposes.

Keywords: *Amblygaster sirm*, Genetic connectivity, Phylogeography, Genetic distance, Malaysian waters

O-GB-C4

Characterization of Finfish Hatchery Waste for Value Added Product

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Abstract

Commercial fish hatchery generate waste both organic and inorganic, the sources are primarily from uneaten food and fish feces. Conventional methods of treating hatchery wastes will increase the operating cost and become extra burden in production. It is necessary to develop new research application of this nonconventional resource and reduce the negative impacts of hatchery waste on the environment. The whole project is to utilize hatchery waste through bioprocess for probiotic fortified live feed production. In this study the chemical composition of hatchery waste was determined to understand the suitability waste to get value added derived product through bioprocess. Composite samples were collected everyday and dried in an oven at a temperature of $65^{O}C$ until complete dryness. Dried samples were mixed well and grinded into fine powder. The analytical parameters like total solids, ammonium nitrogen, nitrite, nitrate and phosphate were determined from the freshly collected samples. Total nitrogen, total phosphorus and total potassium were determined from the dry samples. Total solids, ammonium nitrogen, nitrite, nitrate and phosphate-phosphorus were observed in the ranged from 75 -82 mg/L, 0.25–8.5 mg/L, 0.05–1.9 mg/L, 0.04–6.7 mg/L and 4.1–16.7 mg/L respectively. On the other hand the mean content of 3.75% total nitrogen, 1.80% total phosphorus and 0.15% potassium were determined in dry hatchery wastes. The analytical parameters are useful and demonstrate that the nutrients in both fresh and dry waste will be supportive for the growth of microbes in the bioprocess system.

Keywords: Hatchery waste, Nutrients, Bioprocess, Microbe and value added product

O-GB-A5

Microsatellite and Morphometric Association in Slipper Shaped Oyster, *Crassostrea iredalei,* from Visayas, Philippines

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Abstract

The slipper shaped oyster *Crassostrea iredalei* in the Philippines are one of the economically important species in the country marketed due to its tasty creamy meat. Oyster production are targeting on marketable morphometric traits including meat quality coupled with associations on the genetic characterization to assist culture technology advancements. Microsatellite analysis of the previously optimized five loci (CI.H09, CI.A08, CI.H10, CI.D01, and CI.B07) were examined for genetic characterization from eight oyster populations in Visayas, Philippines. Morphometric traits particularly condition index as a measure of meat quality was determined to associate with the genetic characterization. Results from microsatellite analysis showed all loci departed from Hardy-Weinberg equilibrium due to heterozygote excess. The expected and observed heterozygosities ranged from 0.2096 to 0.7065 and 0.2333 to 0.9286 respectively. The negative *FIS* values in particular loci were revealed in seven populations with high observed heterozygotes implying an increase in heterozygosity and is more likely to outbreed. However, little genetic divergence (0.0037–0.0247) was found among all populations with a global *FST*=0.0086. These findings revealed a positive correlation between the condition index and the observed heterozygosity of each population while a negative correlation was shown with its observed homozygosity. The study reflects heterozygosity can be a factor of coping mechanism of oysters as affected by their changing habitat to attain fitness. Overall, the study highlights the application of condition index association with the microsatellite analysis as potential marker-assisted selection tool in improving oyster culture management practices that could influence better economic production in the country.

Keywords: *Crassostrea iredalei*, Microsatellites, Condition index, eterozygosity, Homozygosity

O-GB-A6

Reproductive Biological Characteristics of Short Necked Clam *Paphia undulata* (Born, 1778) in Khanh Hoa Province, Vietnam

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Abstract

Short-necked clam (*Paphia undulata*) belongs to bivalve class, is delicious food with full of nutrition and high commercial value. However, due to a new species in Vietnam, a production of this species is absolutely exploited from the sea; therefore, the yield of this species is being depleted because of over catching. This paper presents a result on some reproductive biological characteristics of *P. undulata* in Khanh Hoa province, Vietnam. The result showed that, short-necked clam is a sex distinction species, in which a gonadal organ colour is milky white for both male and female. The average of male and female ratio of this species was 57% and 43% in the group of 37 to 42 mm of length, however, occasional presence of hermaphrodite gonads was observed. Five gonad stages were described based on histological examinations: normal, developing, mature, partially spawned and spent. The gonadal development of *P. undulata* underwent 5 stages. The absolute fecundity (F_a) was 1.964.475 eggs/female. Sexual maturity is attained at 43 mm. *P. undulata* have continuous breeding season, but peak of spawning was from July to December.

Keywords: *Nerita balteata*, Reproductive biology, Gonadal organ, Fecundity**.**

O-GB-C1

Exploration of Antibiotic-producing Bacteria Isolated from Marine Organisms

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Abstract

The irresponsible usage of antibiotics is suspected as the main cause of increasing pathogenic and commensal bacteria resistant. Alternative ways to face the global crisis as a result of this problem is the discovery of new antimicrobial compounds. This research were to screen antibiotic-producing bacteria isolated from marine organisms, to identify based on morphological and molecular properties. The marine organisms were collected from coastal area of Batam island, Kepulauan Riau. Bacteria were isolated and subsequently subjected for antibacterial activity test. The bacteria were cultured on Zobell agar 2216 medium and incubated at 30 °C for 24 hours. Antibacterial activity test was performed againts *Aeromonas hydrophila*, *Aeromonas veronii*, *Vibrio harveyi*, *Vibrio parahaemolitycus*, and *Staphylococcus aureus*. The bacterial isolates obtained were as many as 44 strains in which 4 isolates namely KRS C3.1, STKMTI.2, STKMTI.3, STKMTI 4 showed antibacterial activity. The four isolates were Gram negative bacteria. The molecular analyses indicated that isolate KRS C3.1 as *Pseudoalteromonas* sp. (92,77%), STKMTI.2 as *Atlantibacter hermannii* (89,74%), STKMTI.3 as *Pseudoalteromonas piscicida* (88,43%), and STKMTI.4 as *Pseudoalteromonas maricaloris* (99,58%). The low identity of molecular identification suggested that KRS C3.1, STKMTI.2, and STKMTI.3 were new antibiotic-producing marine bacteria.

Keywords: Antibacterial, Bacteria, Batam, Marine organisms, Resistant

Session 11 : Aquaculture System and Management

Session 11 : Aquaculture System and Management

Bunga Lili Room

November 19, 2019 (Tuesday)		
Time	**Title**	**Code**
Chairperson: Dr. Julie Ekasari		
11:00-11:30	**Refreshment and Poster Viewing**	
11:30-11:45	**Effects of water depth on performance indicators of Asian swamp eel (*Monopterus albus*) reared in water pond system** Y. Hadiroseyani[a*], T. Budiardi [a], and Y.Husen[a]	O-AM-A1
11:45-12:00	**Bacterial contamination from selected catfish pond farming at Sungai Kesang, Melaka and its susceptibility to antimicrobial agents** Siti Shahara Zulfakar[a*], Siti Aida Abd Azman[a], Nur Faizah Abu Bakar[a], Farah Diyana Ariffin[a] and Azhar Abdul Halim[b]	O-AM-A2
12:00-12:15	**Effects of dam construction and ENSO on the relationship between hydrology, sediment transport, and fisheries in the Lower Mekong River basin** Nguyen Quoc Khanh[a,b], Vu Ngoc Ut[a], and Yadu Pokhrel[b]	O-AM-A3
12:15-12:30	**Results of Sea bass Pond Polyculture in Haiphong Province, Vietnam** Kim Van Van[a*], Tran Anh Tuyet[a] and Nguyen Thi Dieu Phuong[b]	O-AM-A4
12:30-12:45	**Effects of water quality on the plankton abundance in selected brackishwater fishpond of southern part of Surigao del Sur, Philippines** Jaynos R. Cortes[a*], Ruby L. Ordoña[a], and Jonah M. De Jesus[a]	O-AM-A5
12:45-13:00	**Structural and operational changes in Mechanized Fishing fleet along the East coast of India** Raghu Prakash R[a*], Sreedhar U[a], and Kamei G[a]	O-AM-A6
13:00-14:00	**Lunch**	
Chairperson:Dr. Mohammad Fadhil Syukri Ismail		
14:00-14:15	**The Different Addition Frequency of Calcium and Magnesium in Recirculation System for increasing physiological responses**	O-AM-B1

	of Mud Crab *Scylla serrata* Wildan Nurussalam[a*], Kukuh Nirmala[a], Eddy Supriyono[a], and Yuni Puji Hastuti[a]	
14:15-14:30	**Risk Management Strategies and Mechanisms for Small-scale Shrimp Farming;** **A Case Study in East Java, Indonesia** Riski A. Lestariadi[a]*, Lina Asmarawati[a], and Mariyana Sari[a]	O-AM-B2
14:30-14:45	**Transplantation of green mussel from traditional to non-traditional culture sites using off-bottom and bottom methods** John Ray N. Moleño[a*], Dave Dominic F. Teruel[a], Dominique P. Mediodia[b], Catherine May E. Erazo[a], Neredith Jan E. Sonza[a], Kaycelle F. Dalumpines[a], and Carlos C. Baylon[a]	O-AM-B3
14:45-15:00	**Behavioral Response of Squid *Uroteuthis duvaucelli*, Orbigny 1835** **to Different Light Color and Intensity** Mochammad Riyanto[a*], Denta Tirtana[a], Sugeng Hari Wisudo[a], and Adi Susanto[b]	O-AM-B4
15:00-15:15	**Farmers' perspective on the causes of Green Mussel (*Perna viridis*) mass mortalities in mussel producing provinces in the Philippines for sustainable aquaculture management** Catherine May E. Erazo-Malones[a*], John Ray N. Moleño[a], Dave Dominic F. Teruel[a], Neredith Jan E. Sonza[a], Karen A. Felarca Erlinda Lacierda[a] , Carlos C. Baylon[a] and Dominique P. Mediodia[b]	O-AM-B6
15:15-15:30	**The Role of Seaweed (*Gracilaria sp*) as a Biofilter to Absorb Nitrogen from the Effluent of Tiger Shrimp Culture with different stocking densities** Sri Rejeki [a] , Lestari Lakshmi Widowati[a] , Alfabetian Harjuno Condro Haditomo[a] , Restiana Wisnu Aryati[a] , Tita Elfitasari[a,] Roel H Bosma[b] and Ichwanus Sofa Alkisai[a]	O-AM-B7
15:30-15:45	**The Role of Seaweed (*Gracilaria* verucosa) and Green Mussel (*Perna viridis*) in Various Density to Reduce Organic Waste in Shrimp Culture Water** Lestari L. Widowati[a*] , Sri Rejeki[a], S. Budi Prayitno[a], Restiana W Ariyati[a] , and Roel H. Bosma[b]	O-AM-B8
15:45-16:00	**Nitrogen waste management through integration of algae in recirculating aquaculture systems**	O-AM-B9

	Norulhuda Mohamed Ramli[a*], Fatimah Md Yusoff [b,c], Nurulhuda Khairudin[a], Norio Nagao[c], Marc Verdegem[d], and Johan Verreth[d].	
16:00-16:15	**Application of Phytoremediation Technology with Seaweed *Gracilaria* sp. on The Performance of Aquaculture Environmental Parameters and Growth of Sea Cucumber *Holothuria scabra*** Yuni Puji Hastuti[a], Ridwan Affandi[b], Kukuh Nirmala[a], Burhanuddin Mahmud [a*] and Umi Soleha[a]	O-AM-D2
16:15-16:30	**Biomass Production of Green Beans (*Phaseolus vulgaris*) Cultured with GIFT (Genetically Improved Farmed Tilapia) in Media-Filled Aquaponic Systems** Syafiqah Saufie[a*] , Saleem Mustafa[a] and Abentin Estim[a]	O-AM-D3
16:30-17:00	**Refreshment and Poster Viewing**	

November 20, 2019 (Wednesday)		
Time	**Title**	**Code**
Chairperson: Dr. Mok Wen Jye		
10:00-10:30	**Refreshment and Poster Viewing**	
10:30-10:45	**The Effect of Derris Root Doses on Copepod and Artemia Population in Coexistence at Different Salinities** Tan Dat Duong [a*]	O-AM-D4
10:45-11:00	**Water purification properties of selected culinary herbs in an aquaponic system** Samuel Ijabo Ogah[a], Mohd Salleh Kamarudin[a *], S.M. Nurul Amin[a], and M. W. Puteri Edaroyati[b]	O-AM-D5
11:00-11:15	**The Effectivity of Sand Filter and Red Tilapia *(Oreochromis sp.)* Culture on Nitrogen and Phosphor Content of Waste Water from *Vannamei S*hrimp *(Litopenaeus vannamei)* Ponds** *Rustadi*[a*], *G.M. Samadan*[a] , *Djumanto*[s] *and Murwantoko*[a]	O-AM-D6
11:15-11:30	**Mangrove Forest Damage Analysis due to illegal logging and its effect on carbon stock and absorption in East Java Province** Rudianto[a*], and Rina Yulianti [b]	O-AM-D8
11:30-11:45	**Combined Effects of Global Warming, Microplastics and Pah Pyrene on Waigieu Seaperch (*Psammoperca waigiensis*) Larvae**	O-AH-E5

	Minh Hoang Le[a]* and Khuong Van Dinh[a]	
11:45-12:00	**Aquaculture Technology Development in the iFishIENCi Project** Tamás Bardócz[a]*, Shane A. Hunter[a], Lars Ebbesson[b] and Dominique Durand[b]	O-AM-D1
12:00-12:15	**The Hatch Aquaculture Accelerator and 2020 funding opportunities for innovative aquaculture technology start-ups** India Boyer	O-AM-D11
12:15-12:30	**Bioassimilation of Spiny Oyster (*Spondylus sp.*) in Polyculture System with Milkfish (*Chanos chanos*) and Siganid (S*iganus fuscescens*)** Pablo S. Ronquillo*	O-NF-A1
12:30-14:00	**Lunch**	

O-AM-A1

Effects of Water Depth on Performance Indicators of Asian Swamp Eel (*Monopterus albus*) Reared in Water Pond System

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Abstract

Water shortages could impact on inland aquaculture. This problems usually overcome by using appropriate systems or technologies, but it is generally costly and not affordable to rural farmers. Limited water availability to grow fish could be solved by rearing air-breather species due these fishes are well adapted to poor condition. Asian swamp eel which naturally inhabit a shallow water associated with its respiratory system as an air breather obligate fish, could be cultured in a limited water. This study was aimed to evaluate the effects of low water depth on performance indicators of Asian swamp eel reared using water pond system. The juvenile Asian swamp eels were caught from rice field areas using electrofishing devices in a night capture activity. The catches were land transported at a distance of 90 km to the research site. The water-pond system rearing unit were filled with water at 4 levels of low water depth, each with triple replication. The eels each individual weight of 10.97±1.15 g and length of 26.81±1.31 cm were stock at 120 fish m^{-1}. The water was change at 100% every day. Rearing period was 60 days and the eels was fed on fresh minced catfish (*Clarias* sp.) flesh at feeding rate of 5% biomass. The results show that the eel could reared in water pond system at low water depth which benefit to reduce the volume of water usage.

Keywords: air breather fish, blood pictures, growth, salinity, survival

O-AM-A2

Bacterial Contamination from Selected Catfish Pond Farming at Sungai Kesang, Melaka and its Susceptibility to Antimicrobial Agents

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Abstract

The aquaculture industry has been identified as one of the sources for the emergence of antimicrobial resistant bacteria. This study aimed to determine the level of bacterial contamination from selected catfish pond farming at Sungai Kesang, Melaka and its susceptibility to antimicrobials agents. The correlation between the sampling points' Water Quality Index and the level of bacterial contamination was also determined. Sampling was carried out at six sampling points of the river as well as selected catfish pond farming. Microbial counts were assessed using the membrane filtration whereas antimicrobial susceptibility tests were carried out using the disk diffusion method. Results showed that the total bacterial count obtained was not significantly different ($p>0.05$) between sampling points with an average of 4.47 ± 0.41 log cfu/ml. A total of 66 different bacterial isolates were obtained where 73% were identified as Gram-negative bacteria. Antibiotic susceptibility test indicated that only 2 isolates showed resistance to antimicrobials tested. A medium negative correlation ($r = -6.16$, $p<0.01$) was found between the sampling points' Water Quality Index and the level of bacterial contamination. The study found that catfish pond farming in Sungai Kesang, Melaka were contaminated with high bacterial contamination that could also include antimicrobial-resistant bacteria. Thus, public health concerns are tangible.

Keywords: antimicrobial resistant, aquaculture, catfish pond farming, microbial contamination.

Effects of Dam Construction and ENSO on the Relationship between Hydrology, Sediment Transport, and Fisheries in the Lower Mekong River Basin

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Abstract

The Mekong river is one of the largest and most complex rivers in the world, which originates in the Tibetan, flows through China and five countries in Southeast Asia, and drains to the ocean in the Mekong Delta in Vietnam. Two of the most crucial concerns besides climate change, sedimentation, biodiversity, and the livelihood of inhabitants are the accelerating anthropogenic activity (especially dam construction) across the river basin and the impacts of El Niño–Southern Oscillation (ENSO) on hydrologic variability, especially rainfall patterns. Studies on the adverse impacts of hydroelectric dams have shown that both main stem and tributaries dams could permanently alter the hydrology that governs the amount of sediment generated and distributed across the basin. Extreme weather alteration has been proved to link with ENSO cycle which reduces the amount of rainfall for the Lower Mekong River basin. Further, irrigation activities within the basin also contribute to the fluctuation of hydrology and sediment transport. Sediment is one of the most critical factors that contribute to the fertility and stability of soils for agriculture across the Mekong river basin, especially the coastal areas in Cambodia and Vietnam. Sediment dynamics influence nutrient availability which determines the productivity of the region by impacting its ability to carry phosphorus and nitrogen for primary producers such as algae, an important food source for any natural fish population; this is especially critical in the Tonle Sap Lake in the Lower Mekong. This study examines the effects of dam construction and ENSO on the relationship between sediment, hydrology, and fisheries by using observed data on sediment and fishery, and hydrologic model simulations. The results presented have important implications for the sustainable development of the entire Lower Mekong region.

Keywords: Dam construction, ENSO, hydrology, sediment, fisheries

O-AM-A4

Results of Sea bass Pond Polyculture in Haiphong Province, Vietnam

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Abstract

From April, 2017 to February, 2019, under the cooperation between Vietnam National University of Agriculture; Research Institute for Aquaculture No. 1 and Fish farmers in Lap Le, Thuy Nguyen, Hai Phong, Vietnam. Sea bass semi-intensive culture was carried out in 6 earthen ponds of 3 households in two stages. The fish were stocked at stage 1 with densities (sea bass : black carp : tilapia = 1.5 : 0.3 : 1 fish/m^2, stocking sizes of 10 cm, 80-100 and 5 g/fish), at stage 2 with stocking densities (sea bass : black carp = 1 : 0.22 fish/m^2). The fish were fed commercial pellet containing 40% crude protein in stage 1 and 35%.in stage 2 for black carp and wild fish was used for Sea bass. The Tilapia was cultured as a cleaning environmental species. The experimental fish were fed twice daily at 8:00 and 16:00 at a feeding rate of 3 - 5% of body weight/day. Results showed that fish growth rate was good (3.18 - 8.17 g/fish/day), high survival (90 - 97%) and Lernosis disease occurred during the fresh water period, high ammonia, nitrite and sulfua hydro were treatmented immediately. No antibiotics or chemical was used in the system excepted parasite drug. The sea bass integrated culture was better in growth, higher survival and more economic efficacy (≈40.000 USD/ha/year) than other cultured systems in northern Vietnam.

Key words: Black carp, Haiphong, Marketable fish, Polyculture, Tilapia, Sea bass.

O-AM-A5

Effects of Water Quality on the Plankton Abundance in Selected Brackish Water Fishpond of Southern Part of Surigao del Sur, Philippines

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Abstract

This study aimed to determine the effects of water quality on the plankton abundance in selected brackish water fishpond in southern part of Surigao del Sur, Philippines namely Lingig, Bislig, and Hinatuan. This was conducted to identify which of the selected brackish water fishpond has the highest and least productivity of plankton. All the water quality parameters such as the temperature, dissolved oxygen, pH, ammonia, salinity, and nitrite were within the optimal ranges for plankton productivity in all selected stations. A total of four (4) groups of phytoplankton; Cyanophyceae, Bacillariophyceae, Dinophyceae and Chlorophyceae and six (6) groups of zooplankton; Rotifer, Copepad, Cladoceran, Tintinnid (Ciliate), Protozoa and Pelecypod larva were identified. The phytoplankton comprised of 33 genera in which Cyanophyceae was recorded the most abundant followed by Bacillariophyceae, Dinophycea and Chlorophyceae. The zooplankton comprised of 16 genera in which Copepod was recorded the most abundant followed by Rotifer, Pelecypod larva, Tintinnid and Protozoa. The most abundant in terms of phytoplankton was recorded in Hinatuan followed by Lingig, and lastly, Bislig. In zooplankton, the most abundant was recorded in Bislig followed by Hinatuan, and Lingig. The most diversed phytoplankton was recorded in Lingig followed by Hinatuan, and Bislig. In the case of zooplankton, the most diversed was recorded in Bislig followed by Lingig, and lastly, Hinatuan. It was concluded that the phytoplankton groups provide the main support for earthen fishpond aquaculture compared to zooplankton group.

Keywords: Plankton, Physico-chemical, Water quality, Abundance, Diversity

O-AM-A6

Structural and Operational Changes in Mechanized Fishing Fleet along the East Coast of India

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Abstract

Increasing fishing pressure and dwindling marine resources in the coastal waters of Bay of Bengal has caused livelihood concerns for the fishermen forcing them to venture in to deeper waters in search of newer fishing grounds and resources in order to maintain their livelihood. Marine fisheries have undergone significant operational charges and structural changes in terms of the fleet size number and capacities of fishing vessels, resource specific fishing methods based resources availability. Since trawling alone is not economically viable due to escalating fuel prices and decline in trawling resources, fishers are targeting on unexploited resources like Tuna and allied species based on seasonal abundance of resources. There has been a shift in trend from a single fishing method to multiple fishing methods from a single craft accord to season. This paper attempts to compare the structural changes in terms of length overall (LOA) and engine horsepower and fishing practices among three commercially important fishing practices viz., trawling, and gillnetting and long lining along the east coast of India over the last decade. The results reveal large scale changes in the structure of the fishing fleet in terms of size and engine horsepower among trawlers, long liners and gillnetters operating in Bay of Bengal. The study indicated and exponential growth in engine horsepower among trawlers above 18m in LOA, in recent years and suggests the need for optimizing fleet size and need for regulating capacities of the fishing vessels in order to conserve fuel and reduce greenhouse gas emissions.

Keywords: Structural changes, Fishing, trawling, longliners, Gillnetting, Mechanised fishing, Bay of Bengal, India

O-AM-B1

The Different Addition Frequency of Calcium and Magnesium in Recirculation System for increasing physiological responses of Mud Crab *Scylla serrata*

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Abstract

The calcium ions needed by the crab in the shell formation. The major part of the crab body is carapace. The high calcium requirement of the crab can not be fulfilled only by environment and feed in the recirculation system. The additions from the outside to increase the amount of calcium in the environment is necessary. Calcium is important for bone carapace formation of the crustacean. The purpose of this study was to determine the optimum dose and frequency of calcium and magnesium addition in a recirculation system to increase the production and accelerate the shell formation of mud crab (Scylla serrata). The treatments addition of Ca and Mg with each dose was 30 mg L-1, the additions frequency were A (without the addition of Ca and Mg), B (once in 5 days), C (once in 10 days), and D (once in 15 days). The results showed that the best value for following key parameters, were 14.0667± 0.4233 µmol L^{-1} for glucose, 7.233±0.058 for pH hemolymph, 6.33±0,462 10^3 cells mL^{-1} for total hemocytes counts, 18.67±1.15 shells for number of moulting, 86.67±5.77% for survival rate, and 1054.41±73.54 grams for total biomass. The best results were obtained in D treatment (15 days with the addition of 30 mg L^{-1} Ca and 30 mg L^{-1} Mg). It were significantly different from other treatments ($p<0.05$). It can be concluded that optimum frequency of Ca and Mg addition in a recirculation system to increase the production and accelerate the shell formation of mud crab (*Scylla serrata*) was every 15 days with 30 mg L^{-1} for each concentration.

Keywords: mud crab, recirculation, calcium, magnesium, moulting.

O-AM-B2

Risk Management Strategies and Mechanisms for Small-scale Shrimp Farming; A Case Study in East Java, Indonesia

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Abstract

The fast growth of Indonesian shrimp production has caused many challenges. Shrimp diseases, environmental degradation, and price fluctuation were some few issues that affected Indonesian shrimp production during a couple of years. Hence, risk management strategies in shrimp farming are needed to cope with inherent risks to enhance the sustainability of shrimp farming. This study analyzed the risk management strategies and mechanism to deal with the risk in small-scale shrimp farms in East Java, Indonesia. A series of field survey of 166 shrimp farmers was conducted in the North and South coast of East Java. Results revealed that small-scale shrimp farmers developed several strategies to manage risk in their shrimp farms. Those strategies are distinguished between ex-ante and ex-post risk management strategies, and between formal and informal mechanisms. The findings showed that the family labor was the common informal ex-post strategy to reduce expenses in their business, while sharecropping was the primary ex-ante strategy to mitigate risk. Regarding risk mechanism, requesting for government technical assistance was the common formal on-farm risk management strategy used by the shrimp farmers. Moreover, the shrimp farmers tended to avail of informal loans that resulted in loss of savings in their business.

Keywords: Ex-ante; Ex-post; Management mechanism; Shrimp farming; Small-scale

O-AM-B3

Transplantation of Green Mussel from Traditional to Non-Traditional Culture Sites using Off-Bottom and Bottom Methods

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Abstract

Production of mussels in the Philippines has become unstable due to limited knowledge on site selection and innovations on mussel farming that could determine expansion areas which include transplantation method. Sites were selected based on selection criteria for mussel farms. Bottom transplantation using bamboo poles was done in Iloilo, Philippines with three stocking densities; 1,000, 2,000 and 4,000 adult mussels/m^2. Off-bottom transplantation using the longline method was conducted in the two sites in Guimaras, Philippines to compare the effect of different primary productivity levels (low and high) and different stocking densities (50% thinned and unthinned) on the growth of mussels. Periodic histological analysis were also conducted to monitor mussel gonadal maturity using both transplantation procedures. In off-bottom transplantation, growth differences were not significant between two stocking densities but only at different primary productivity levels. Mussel male gonads matured from initial to 6th month but female gonads already became mature on the 3rd month as observed in histological analyses. Generally, no early active stage was recorded during the initial transplantation period but development of gonads was only observed before the end of culture period. This would indicate that transplanted broodstocks could spawn and become a new source of mussel spats in the area. Using these transplantation procedures, expansion of mussel culture farms can become possible from the new generation of spats and with evident good growth of mussels.

Keywords: aquaculture, bivalve; gonadal maturity, longline culture method, *Perna viridis*

O-AM-B4

Behavioral Response of Squid *Uroteuthis duvaucelli*, Orbigny 1835 to Different Light Color and Intensity

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Abstract

Squid is one of the main targets of light fishing in Indonesia. The squid fishing relies on the sense of sight i.e. light stimulus so that the squid comes near to the fishing gear. The response of the light reception by squid eyes is affected by many factors, i.e. color and intensity. This study aimed to determine response of fish behavior and eye adaptation of the squid with the difference of color, i.e. blue, white, and red that had low intensity ($1.1 \times 10^{-4} - 2.3 \times 10^{-4}$ W/cm2), medium intensity ($9.6 \times 10^{-4} - 2.0 \times 10^{-3}$ W/cm2) and high intensity ($9.4 \times 10^{-3} - 1.2 \times 10^{-2}$ W/cm2). To know the retina adaptation of squid was observed by histology approach for every treatment. The response of squid behavior was observed with 4-40 squids on the size 4-10.5 cm on the treatment tub. The response of squid behavior observed was zone preference, the number of jetting and Nearest Neighbor Distance (NND). The retina adaptation of squid that had the highest ratio value was a blue lamp with 74.54%. The squid was on the dim zone for almost of treatment, except on the blue lamp with low intensity (the squid on the clear zone). The intensity addition increased the number of jetting on all of the treatment. The gap inter-individual on the blue lamp caused the individual far away, the gap inter-individual on the white lamp caused the individual closer in the medium intensity.

Keywords: black screening pigment, cephalopod, jet propulsion, LED, light intensity

O-AM-B6

Farmers' Perspective on the Causes of Green Mussel (*Perna viridis*) Mass Mortalities in Mussel Producing Provinces in the Philippines for Sustainable Aquaculture Management

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Abstract

Occurrences of mass mortalities in mussel growing areas have become a problem resulting to low production and loss of income to mussel growers in the Philippines. Thus, identifying possible causes of these mortalities in order to formulate remedial measures and management strategies is deemed necessary. Nine mussel producing areas in the Philippines namely Pangasinan, Bataan, Cavite, Sorsogon, Aklan, Capiz, Negros Occidental, Samar and Davao were identified as study sites. A total of 273 respondents were interviewed including mussel farmers, officials of Local Government Units (LGUs) and representatives from different government agencies. GIS-based maps were also developed showing the geographical location and size of areas affected by mass mortalities. Result showed that abrupt change in salinity/temperature/turbidity caused by heavy rains (27%), high water temperature (18%), domestic wastes (11%), bad waters (alig, gataw, alingatong) (9%) and industrial wastes (8%), exposure during low tide (3%), high stocking densities (2%) and presence of invasive species (1%) were identified as major causes of mass mortalities. Other causes mentioned were illegal fishing, oil spill, manifestation of the end of the world, oversized mussels, poor water quality, strong water current, natural calamities, forestry wastes, predation, poor water current, ashfall, spawning of mussels, ballast waters and presence of pathogens. Causes reported were due to environmental and man-made practices. GIS-based maps generated in this study were effective in showing the location of existing mussel farms and the areas where mass mortalities occurred. A total of 4, 6313 ha of existing mussel farms in 9 provinces were recorded and all experienced mass mortalities. Largest was in Cavite (1,597 ha) followed by Samar and Sorsogon with 980.9 ha and 758.34 ha, respectively. Thus, these findings are viewed to provide baseline information to initiate further studies and guide in policy formulation to increase mussel production in the country.

Keywords: aquaculture management, ballast waters, GIS-based maps, green mussel, mass mortalities

O-AM-B7

The Role of Seaweed (*Gracilaria sp*) as a Biofilter to Absorb Nitrogen from the Effluent of Tiger Shrimp Culture with Different Stocking Densities

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Abstract

Gracilaria sp. is one of seaweed tthat has agood economic value. Agar content in the Gracilaria is useful as raw materials various industries, with a contribution of (> 90%). Cultivation of *Gracilaria sp*. developing by utilizing seaweed to become an integrated component of cultivation, especially in a shrimp farming. This is because *Gracilaria sp*. can absorb nitrogen inorganic materials from the cultivation medium and acts as a biofilter, therefore it can reduce the risk of increasing inorganic materials. The study was conducted using an experimentally A completely randomized design (CRD) with 3 treatments and 3 repetitions was applied. The treatments were water used from shrimp culture with different stocking densities: A: 20 shrimps/ m^2 ; B: 60 shrimps / m^2 ; C: 100 shrimps / m^2 Density of seaweed *Gracilaria* sp. used in the study was 100 g / m^2 approximately. The average initial shrimp body weight was 0.4 ± 0.1 g. The study was conducted for 28 days. The data observed included nitrogen absorption rate, nitrogen retention, nitrogen content in water, and specific growth rate of *Gracilaria* sp. The results showed that media for tiger shrimp cultivation at different stocking densities significantly affected the nitrogen absorption rate and specific growth rate (SGR), but not affected the nitrogen retentio. n. The value of the coefficient of determination r^2 of the effect of nitrogen absorption rate on SGR *Gracilaria* sp. at 0.7189, the variation of nitrogen absorption rate (X) can be explained by variations in SGR (Y) by the regression equation Y = 0.1578x + 0.414. The best treatment in the study was C (100 individuals/ m^2) with absorption rate (11.36 ± 0.77 mg dw / m2 / d), nitrogen retention (3.39 ± 0.09 g), and SGR (2, 24 ± 0.08% / day).

Keywords : *Gracilaria* sp., N, absorbtion, effluent

O-AM-B8

The Role of Seaweed (*Gracilaria* verucosa) and Green Mussel (*Perna viridis*) in Various Density to Reduce Organic Waste in Shrimp Culture Water

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Abstract

Seaweed and green mussel proved as co culture species since they have capability to reduce the organic waste. To be considered, the low density does not give any significant effect in reducing the waste. However, too high in density even more contributes to increase the organic waste. Thus, the appropriate density should be determined to get the advantage in reducing organic waste. The 36 fiber tanks with volume 800L installed semi outdoor which 7 cm substrate was added. As treatment, the various density of *G. verucosa* were 50, 100, 150, and 200 $g.m^{-2}$ and for *P. viridis* were 60, 90, 120 and 150 $g.m^{-2}$. The experimental set-up was a completely randomize design of 4 replications. Organic waste was determined by observing Total Organic Matter (TOM), Total Amonia Nitrogen (TAN), Nitrite (NO2), and Nitrate (NO3). This study showed that *P. viridis* was more effective in reducing TOM than *G. verucosa*, 40% and 10% respectively, due to the physiological activity of *P. viridis* as a filter feeder. However, *G. verucosa* was more effective in removing TAN and NO_3 (about 60% and 50%, respectively), while, *P. viridis* recorded about 50% and 30%. In terms of NO_2 content, in the highest densities, both of *G. verucosa* and *P. viridis* supplied NO_2 rather than removed it. Overall, *P. viridis* was more effective for removing TOM and *G. verucosa* for removing TAN.

Keywords: Integrated-aquaculture, Indonesia, nutrient removal, zero waste, sustainable

O-AM-B9

Nitrogen Waste Management Through Integration of Algae in Recirculating Aquaculture Systems

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Abstract

Algae are efficient for nitrogen removal in aquaculture system. However, the application of algae is limited to outdoor system due to the large area required for algae tank/pond. In this study, ammonia and nitrate removal by algae in recirculating aquaculture system (RAS) are reviewed. Three different configurations of RAS integrated with algae tank/pond are identified. The configurations influence nitrogen loading rate and waste composition in algae tank which determine performance of algae. Besides, the performance of algae is determined by algae species, environmental parameters (e.g., light, temperature, and CO_2), algae cultivation method (suspended versus attached), and hydraulic retention time of the algae reactor/pond.

Keywords: recirculating aquaculture system, algae, ammonia, nitrate, water quality

O-AM-D2

Application of Phytoremediation Technology with Seaweed *Gracilaria* sp. on The Performance of Aquaculture Environmental Parameters and Growth of Sea Cucumber *Holothuria scabra*

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Abstract

Sea cucumber *Holothuria scabra* is one of the fisheries export products that continues to developed. Application of the phytoremediation technology using seaweed *Gracilaria* sp., can control aquaculture environmental performance (physical, chemical and biological) and can support the growth of sea cucumber. This research aims are to evaluate the aquaculture environmental performance and the growth of sea cucumber with seaweed *Gracilaria* sp. phytoremediation technology. Sand sea cucumber size used is 5 ± 0.09 cm long and weight 7.6 ± 0.2 g maintained in the phytoremediation system with *Gracilaria* sp. This study consisted of four treatments and three replications, ie: control treatment (0g); A (15g); B (30g); C (45g) of weight *Gracilaria* sp. The density of sea cucumber is 10 tails in each aquarium (20 × 30 × 20) cm^3 with 15 cm of water height for four weeks cultivation. Based on the results, the performance of nitrite concentrations in the environment culture ranged from 0.02 $mg.L^{-1}$ to 0.7 $mg.L^{-1}$. The highest reduction of nitrite was found in the C treatment (45 g) of *Gracilaria* sp. Biochemical test showed of the nitrifying bacteria was dominated by the group of *Pseudomonas* sp. and denitrification bacteria is dominated *Achromobacter* sp. The specific growth rate of the weight of sea cucumber at maintenance ranges from 0.32 ± 0.08% to 0.59 ± 0.2%, the best growth in C treatment (45 g) and the lowest in the control. Application of *Gracilaria* sp. as a phytoremediator can give better environment performance and growth of *Holothuria scabra*.

Keywords: Environmental, Phytoremediation, *Gracilaria* sp., Growth, *Holothuria scabra*

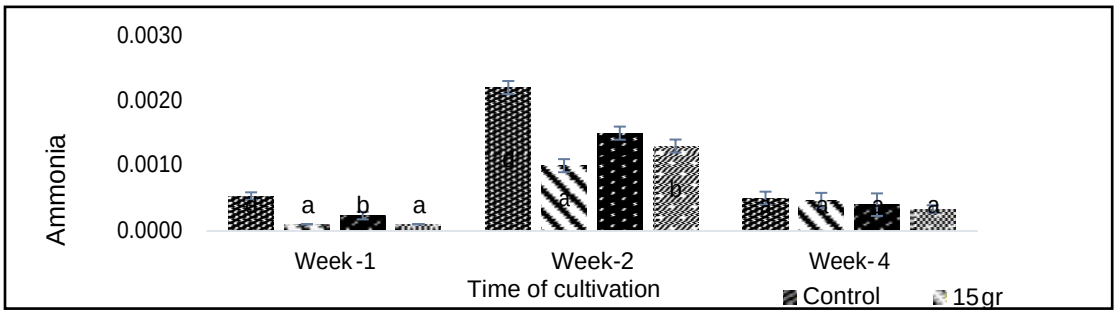

Figure 1. Ammonia concentration in the environment of sea cucumber *Holothuria scabra* culture with seaweed *Gracilaria* sp. phytoremediation technology. Weight of seaweed treatment, ie: 0 g, 15 g, 30 g and 45 g.

Biomass Production of Green Beans (*Phaseolus vulgaris*) Cultured with GIFT (Genetically Improved Farmed Tilapia) in Media-Filled Aquaponic Systems

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Abstract

This research was done to evaluate the biomass production of Green bean (*Phaseolus vulgaris*) in media-filled aquaponic system together with GIFT (Genetically Improved Farmed Tilapia). The trial involved modulating and optimizing the density of extractive species (plants) in the hydroponic tank (55 cm x 35 cm). There were five treatments: T0 (control - without plant), T2 (2 plants), T4 (4 plants), T8 (8 plants), T12 (12 plants) where the stocking density of GIF was 30 tails (identical in all the treatment sets). Water volume in each treatment was 800 L and the set up was closed recirculating type. The experimental trial was carried out over a period of 90 days. Analysis of the data at the end of the treatments showed no significant differences in growth performance of GIFT that was assessed by several parameters, including specific growth rate (SGR), daily growth rate (DGR), survival rate (SR), feed conversion ratio (FCR), average body weight (ABW) and total weight gain (TWG). This indicated that the presence of green bean did not affect the growth of GIFT despite manipulation of the stocking density. Treatment T4 yielded significantly higher biomass production of green beans (1556.4 ± 88.8) g, compared to T2 (1083.6 ± 86.9) g, T8 (404.63 ± 47.9) g, and T12 (407.84 ± 98.1) g. There were noticeable fluctuations in the concentrations of NH_3-N (ammonia), NO_2-N (nitrite), NO_3-N (nitrate) and PO_4-P (phosphate) over the 90 days of the experimental period that demonstrated the process of nitrification and absorption of nutrients but the range of variations were within the permissible limits. The results suggested that the nitrogenous waste produced by the fish supported the biomass of the green beans in the aquaponic system and the waste uptake of this extractive species is effective enough for reuse of the water for rearing of GIFT.

Keywords: Aquaculture, aquaponic, media-filled aquaponic system, GIFT, green beans (*Phaseolus vulgaris*)

O-AM-D4

The Effect of Derris Root Doses on Copepod and Artemia Population in Coexistence at Different Salinities

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Abstract

The research will aim to assess the effect of derris root doses on copepod and Artemia population in coexistence at different salinities of Artemia franciscana (Vinh Chau strain) under experimental condition. Experiment will be carried out with a two-factorial experiment with derris root dose (0.5 mg/L, 1 mg/L, 2 mg/L) and salinity levels (40 ppt, 50 ppt, 60 ppt). Experiment has 9 treatment each treament had 3 replicates. Artemia and copepoda will be cultured under the density of 120 ind and 100 ind per liter in the same plastic bottle in 7 days to take data on the survival and growth of both species. Artemia and copepod will be fed with Chaetoceros. The predictive result of seventh day, copepod will be almost killed. Artemia density will most decreased in 2 mg/L derris root dose and 40 ppt. Artemia will not effected in 0.5 mg/L derris root dose and 60 ppt.

Keywords: *Artemia*, copepod, Derris root doses, different salinity, survival

O-AM-D5

Water Purification Properties of Selected Culinary Herbs in an Aquaponic System

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Abstract

This study was conducted to determine the water purification capabilities of some culinary herbs co-cultured with lemon fin barb hybrid in a recirculating aquaponic system. Lemon fin barb hybrid (*Hypsibarbus wetmorei* ♂ × *Barbonymus gonionotus* ♀) fingerlings were stocked in twelve 2-tonne fiber-glass tanks at 25 fish per tank and co-cultured with Chinese celery, coriander and peppermint for seven weeks. The impacts of the waste generated by the fish on the water quality and the filtration capability of the herbs were measured. The ability to retain nutrients (NPK) of fish and herbs were also estimated. The quality of the water was improved by the herbs to varying degrees. Significantly lower levels of nitrogenous compounds (NH_3, NO_3, NO_2) after the herbal filtration were observed. The plant growth seemed to be affected by their ability to absorb nutrients and consequently purify the culture medium. However, lemon fin barb hybrid did not show significant differences in terms of growth performance and nutrient retention among treatments. The plants absorbed less phosphorus and potassium than the fish. Nitrogen was the most retained and recovered nutrient across the board. The peppermint showed superiority in terms of yield, general plant health and cleaning properties compared to the Chinese celery and coriander.

Keywords: Lemon fin barb hybrid, water purification, peppermint, celery, coriander, NPK removal, aquaponic

O-AM-D6

The Effectivity of Sand Filter and Red Tilapia (*Oreochromis* sp.) Culture on Nitrogen and Phosphor Content of Waste Water from *Vannamei* Shrimp (*Litopenaeus vannamei*) Ponds

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Abstract

The vannnamei shrimp (*Litopenaeus vannamei*) aquaculture along sandy coast of south Java has been grown very fast since 2010. Ponds are constructed at sandy land with plastic mulch and water uptake from well water drill. The rapid development of shrimp aquaculture due to high yield and high profitability, but due to water waste disposal in their environment it cause pollution and stimulate to outbreak white feces disease. Nilasa strain is one of superior of red tilapia that withstand to water salinity up to 18 ppt and consumpt bio-floc in reservoir ponds of waste water from vannamei culture. The objective of this study is to know the effectivity of sand thickness and stocking density of red tilapia culture to reduce waste water vannamei shrimp culture in the basis of total Nitrogen (N) and total Phosphor (P). The experimental research was done in the study. Different sand thickness of 30 cm, 60 cm and 90 cm were tested to filtered water waste of vannamei culture. The reduction of total N and total P after filtering was evaluated. Other experiment, nine small ponds sizing of 2x1m with water depth of 0.8m were used for red tilapia culture that flowed with water waste of vannamei culture. Stocking density of fish were 40, 50 and 60 fish/m^3 with three replications each. Fish growth and water qualities (temperature, TSS, salinity, dissolved oxygen, free CO_2 and alkalinity) were monitored be-weekly, fish yield, survival rate, total N and total P were recorded at the end of experiment. N and P load were calculated with input and output method. Data were analyzed descriptively and statistically with significant difference of 95%. Result of the experiment showed that: reduction percentage of total P and TSS filtered by thickness of sand higher as the thicker sand (Table 1); the same trend that higher reduction percentage as higher stocking density of fish. Sandy filter more effective to total P, meanwhile fish culture more effective to total N.

Keywords: effectivity, sand filter, red tilapia, N and P, vannamei culture

Mangrove Forest Damage Analysis due to Illegal Logging and its Effect on Carbon Stock and Absorption in East Java Province

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Abstract

This research is designed to restore the condition of mangrove forests that have been damaged by anthropogenic processes through mangrove forest restoration activities. This recovery is intended so that mangrove forests can absorb and store blue carbon optimally. For this reason, mangrove forests were selected in 2 (two) locations in the East Java province as the research location. The reason for choosing East Java province was based on that almost half of the mangrove forests located on the coast of East Java were damaged. Of the 18,500 hectares of mangroves in East Java in 2016, the damage rate reached 45 percent. The cause of damage to mangrove forests is caused by the conversion of mangrove land, such as needs for ponds, settlements, plantations, industries, and ports. For this reason, Partial Least Square (PLS), Analytical Hierarchy Process (AHP) and Multi-use Planning (MSP) methods will be used. Whereas, the method of the law aspect in this reserach is non-doctrinal or socia legal reserach. It is because law is conceptualized as the manifestation of symbolic meaning of social performs as apparent in their interaction. The reserach employed case approach related to illegal logging. The research results of Aldus (2017) in Penunggul village, Pasuruan Regency showed that the study of carbon stocks and carbon dioxide absorption in Penunggul village showed that the total carbon content of the soil surface was 868.98 Mg C Ha^{-1}, while the lowest soil carbon content was 49, 06 Mg C Ha^{-1}. Research by Fikri (2017) in Lamongan Regency states that carbon stocks in natural mangrove forests were 477.82 M C Ha^{-1}. The Usmawati study (2015) in Tambak Rejo village, Malang Regency showed that the carbon stock at Clungup beach was 50.71 Ton Ha^{-1}. The low absorption of mangroves in several sample locations in East Java province shows that there needs to be co-management based mangrove restoration including consistency in law enforcement against anyone who damages the environment.

Keywords: Environmental degradation, Environmental Restoration, PLS, AHP, MSP

O-AH-E5

Combined Effects of Global Warming, Microplastics and Pah Pyrene on Waigieu Seaperch (*Psammoperca waigiensis*) Larvae

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Abstract

Global warming, microplastics, and pyrene - a polycyclic aromatic hydrocarbon (PAH) caused by anthropogenic activities, are three of major stressors for marine organisms. However, it is not known how these three stressors may reinforce each other effects, especially on the early life of fish of tropical marine ecosystems where they are living close to their upper thermal threshold. To address this issue, we experimentally studied the single and interactive effects of global warming, microplastics and pyrene on Waigieu seaperch (*Psammoperca waigiensis*) larvae. Larvae (22^{+} days post hatch) were exposed for 14 days to one of the eight combinations of 2 temperatures (28 and 32ºC), 2 plastic treatments (0 and 100 particles.L^{-1}) and 2 pyrene treatments (0 and 100 nM). After that, they were raised in uncontaminated water and control temperature for 14 days to assess the recovery. The survival, growth rate, feeding rate, plastic ingestion, and oxygen consumption of larvae of two periods were analyzed. Results revealed that survival, growth rate, feeding rate were negatively affected by temperature, microplastics and pyrene. These effects were mostly stronger with the combination of two stressors (two-way interactions). The addition of the third stressor did not exacerbate the negative effects of two stressors (three-way interaction was not significant). After 14 days rearing in the control environment, the effects of pyrene and microplastics were no longer present, but previously exposure to pyrene or extreme temperature resulted in lower growth and feeding rate (delayed effect of temperature). The results will provide a scientific base for ecological risk assessment of tropical marine ecosystems in Vietnam.

Keywords: Waigieu seaperch, *Psammoperca waigiensis*, PAH, global warming, microplastic

O-AM-D1

Aquaculture Technology Development in the iFishIENCi Project

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Abstract

Today the majority of aquaculture production is done in land-based flow-through or pond systems, marine cages or recirculating aquaculture systems (RAS) with a range of production costs and environmental impacts. The increasing demand for fish has resulted in more costly, intensive fish aquaculture solutions with increasing sizes in rearing environments on land (RAS), coastal (semi-closed containment systems) and off-shore systems. This leads to new challenges to reduce stress for maintaining fish health and welfare in these systems. Reducing stress will reduce its deleterious effects on fish behaviour, development, feeding, growth, reproduction, and immune function, improving overall health and welfare (Ebbesson and Braithwaite 2012). The iFishIENCi EU funded project is bringing together 16 partners in a trans-disciplinary effort towards making genuine improvements to fish farming worldwide. Fish aquaculture is essential for providing healthy food to a growing world population, but its success depends upon our ability to find more sustainable farming practices. This means more effective ways of monitoring fish-health and welfare, as well as more efficient ways of feeding fish that reduce pressure upon the source of fish-feed ingredients, such as agricultural crops and wild-caught fish for fishmeal and oil. The ambition of iFishIENCi is developing and demonstrating disruptive IoT/AI based innovations, considering the feeding value chain as a whole, and addressing four commercially-important species, with fish quality as focus.

Through close collaborations between engineers and fish biologists, the smart feeding and monitoring systems will be more elaborate and precise. We will identify new value chains for the valorisation of specific waste (dirty water, sludge) from different production systems, leading to zero-waste target and value creation. We will also demonstrate how strain selection and smart breeding can support optimizing the feeding efficiency for alternative feeds in African catfish where cheap and sustainable feed ingredients would be essential to ensure the growth of EU production and fulfil the protein needs of the developing countries.

Keywords: Aquaculture, Recirculating Aquaculture System, Emerging Aquaculture Technologies, IoT and AI in Aquaculture, Fish Feed

O-AM-D11

The Hatch Aquaculture Accelerator and 2020 Funding Opportunities for Innovative Aquaculture Technology Start-Ups

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Abstract

Hatch is the world's first sustainable aquaculture accelerator program seeking to find, develop and scale disruptive aquaculture startups. We host a world class mentor-driven 15-week program across the USA, Norway and Singapore. The program is designed to fast-track the development of pre-seed to seed stage startups with innovative and scalable solutions that solve significant problems in the aquaculture industry in order to enable its long-term sustainability. Furthermore, through financial investment, global aquaculture network, team and product development, office space and fund-raising expertise, Hatch supports the teams to develop their maximum potential as a startup via introductions to potential strategic partners, aquaculture-specific marketing exposure, peer-to-peer learning and legal support.While we focus on startups with nutrition, health, genetics, biotechnology or novel production strategy solutions, we also look for farm services and other advanced aquaculture solutions. Hatch has made 29 investments in 2018 and 2019 and will look to make additional investments into 10 new startups in 2020. In 2019 our typical deal was 100,000 EUR investment (50,000 EUR in cash, 50,000 EUR in kind), for 8% equity. We would like to see more startups coming from Asia and encourage aquaculture universities to start preparing to commercialize current IP.

Keywords: Sustainable Aquaculture, Mentoring, Commercialization

O-NF-A1

Bioassimilation of Spiny Oyster (*Spondylus sp.*) in Polyculture System with Milkfish (*Chanos chanos*) and Siganid (S*iganus fuscescens*)

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Abstract

Spiny oyster (*Spondylus sp.)* has the capacity to filter different food items from the natural environment but not all found in their gut are assimilated for their growth. Food items found from the gut of spiny oysters from the polyculture system with fish and from the reference site (without the influence of commercial feeds for fish) were compared. Food items assimilated by *the spiny oyster were verified* through fatty acid profiles as tracers. The growth, survival and yield performance of spiny oyster and fish species were also compared. Results revealed that spiny oyster as filter feeder, foraging mainly on taxa of phytoplankton, POM (Particulate Organic Matter from fish feeds and feces), minor preys, detritus, sand grains and zooplankton. Fatty acids of fish feeds and feces are nearer to the fatty acids of the tissue of oyster reared with fish in a polyculture system. The growth and yield performance of spiny oyster (*Spondylus sp.*) grown with *Chanos chanos* and with *Siganus fuscescen* in circular fish pen are much better than the growth and yield of oyster from the reference site. A 0.29 ROI of the polyculture system was achieved in one cycle. This study gives quantitative and qualitative information on the feeding ecology of *Spondylus sp.* reared with *Chanos chanos* and *Siganus fuscescen* in circular fish pen. Aside from phytoplankton, fish feeds and fish feces are potential food sources for spiny oyster. Thus, *Spondylus sp*. assimilated fish feeds and fish feces as sources of food for their growth.

Keywords: Fatty Acid (FA) profile, food items, Particulate Organic Matter (POM), culture technology, food items

Poster Presentation

Fisheries Biology and Resource Management

Session: Fisheries Biology and Resource Management

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P-FR-A01

Seasonal Changes of Environmental Conditions and Reproductive Cycle of Mangrove Clam *Geloina sp*. Original from U Minh Thuong, Kien Giang Province, Vietnam

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Abstract

The present study investigated seasonal changes in gonad development of the mud clam, *Geloina* sp. in U Minh Thuong district, Kien Giang province, Mekong Delta of Vietnam. Our findings showed that gametogenesis of Geloina sp occurred year around with gonadal index varied from 2.75 to 3.70, however, the major spawning peaks were observed in March, May and in December. The highest spawning synchrony was observed in February-March, April-May and in December with >50% collected individuals in spawning stage. The results also showed that egg diameter of mud clam were from 15µm to 41µm with highest value in March (40.8 µm) and December (41.4 µm). Results from this study provide detail information on the reproductive biology of mud clam at the studied area and it could be useful for resource management, bio-conservation and sustainable aquaculture of this clam species in the near future.

Keywords: *Geloina* sp., Gonad index, Egg diameter, Reproductive cycle

P-FR-A02

The Abundance and Diversity of Sea Urchin (Echinoidea) on Intertidal Zone of Sepanjang Beach Gunungkidul Regency

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Abstract

This research aims to determine the diversity and abundance of sea urchin (Echinoidea) on intertidal zone of the Sepanjang Beach Gunungkidul Regency. The study was conducted for four months from January to April 2018. Field observations were conducted during the lowest tide. The method used in this research was the transect quadrate method. The study sites were divided into three stations base on horizontale transect. Each quadrate plot was performed to observe the diversity, abundance and environment factor of Echinoidea such as salinity, temperature, and pH. The data were analyzed descriptively in graph and tables. Analyze of data include the abundance, diversity index, dominance index, important value index and distribution pattern of each species of Echinoidea. The types of Echinoidea found during the study were *Echinometra* sp., *Echinometra mathei*, *Heterocentrotus trigonarius*, and *Stomopneustes variolaris*. The total abundance of Echinoidea in the intertidal zone of Sepanjang Beach was 29,74 individu/m^2 with the diversity index of species was 1.80 and the dominance index was 0.93. Distribution patterns of *Echinometra* sp. is clumped while *Echinometra mathei*, *Heterocentrotus trigonarius* and *Stomopneustes variolaris* are regular. Diversity of Echinoidea in the intertidal zone of Sepanjang Beach is low. The highest abundance of Echinoidea is found in station 3. *Echinometra* sp. is the dominant species in the intertidal zone of Sepanjang Beach.

Keywords: Abundance, Diversity, Echinoid, Intertidal

Depth Effect on Growth of Green Mussel (*Perna viridis*) in Trang Province, Thailand

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Abstract

The effect of depth viz; 30, 60 and 90 cm. of mussels on growth were conducted in Sikao canal, Trang Province, Thailand. This study was carried out from March to June 2019. The effect of depth on growth and all parameters were monitored every 15 day during the experimental period. The average initial weight and final were measured as 386.00±70.57 – 1,342.00±118.83 g, 382.00±21.68 – 1,304.00±144.50 g and 410.00±70.71 – 1,262.00±131.80 g (p>0.05). The average initial length and final were recorded as 2.57±0.55 – 3.19±0.13 cm., 2.43±0.46 – 2.99±0.09 cm. and 2.47±0.39 – 2.91±0.20 cm. (p>0.05), respectively. The specific growth rate and average daily growth rate in each the depth were determined as 2.79±0.30, 2.72±0.30 and 2.52±0.35 % per day, 22.37±1.77, 21.73±2.41 and 21.03±2.20 g/day (p>0.05), respectively. Throughout the experiment period were showed the cumulative mortality range from 0.31±0.29 - 0.67±0.53 % (p>0.05), respectively. Cumulative mortality was highest in the depth at 90 cm. and the mortality was found maximus in early June. Environmental parameters were also recorded, where the salinity range 28-33 ppt, Temperature of 30-32 °C, pH of 7.0-8.5, DO of 6.0-7.5 mg/L and Transparency of 30-57 cm. respectively.

Keywords: Depth, Green Mussel (*Perna viridis*), Growth

P-FR-A04

Preliminary Result of the Reproductive Phenology of Cupped Oyster *Crassotrea sp*. Collected from Sungai Muar, Johor, Malaysia

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Abstract

Current study was undertaken to investigate the reproductive phenology of the cupped oyster, *Crassostrea* sp. collected monthly from November 2018 to April 2019 from Sungai Muar Johor estuary, Malaysia (1°29'02.3"N, 103°49'02.4"E) using biometry and histology methods. To determine the level of gonadal maturation, 2- to 3-mm thick slices of dorso-ventral section from 30 oysters each month were removed from the middle of the oyster gonad for histological analysis. The overall male-female sex ratio, 1.41:1.0 analysed through histology, deviates from the 1:1 ratio as expected (χ^2-test). Histology results revealed that the oyster has a spawning period in April 2019. Oogenesis occurred throughout the research period although majority of the oysters were in early and late developing stages during November and December 2018. Ripe oysters dominate in the samples collected during February, March and April 2019. One distinct peak in maturity indices (MIs) of the oyster was noted during April 2019, when most of the oysters were ripe and ready for spawning. Condition index (CI) as the dry tissue wet weight (g) was divided by the difference between the whole live weight (g) and the shell dry weight (g) then multiply by 1000 ranged from 85.76±6.35 (November 2018) to 31.89±1.25 (April 2019) exhibiting single peak over the 6-month study period. The study is continuing in order to find out the complete ovarian development cycle for this cupped oyster species.

Keywords: Cupped oyster, Reproductive phenology, Histology, Maturity Index, Condition Index

P-FR-A05

The Ecosystem Services of Bernam River, Selangor Darul Ehsan: Stock Assessment on the Fisheries Resources and its Economics

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Abstract

Inland capture fisheries known to provide good ecosystem services – fish for food, livelihoods and recreation to people living alongside rivers. Stock assessment on the fishery resources and economic valuation can provide sustainable management plans on their ecosystem services and livelihood. Bernam River, one of many rivers in Peninsular Malaysia that is known to harbour the giant freshwater prawn, Udang Galah, *Macrobrachium rosenbergii* is currently studied. The fisheries dependant and non-dependant data were collected to evaluate the biological resources and economic potential. Fisheries resources and economics were evaluated from the monthly landings and catch per unit effort. From this early data collection from the upper reach of Bernam River, we found a unique combination of landings, dominating by Udang Galah as the main species landed in quantity, followed by the least important Glass catfish, then another important riverine species Ikan Baung and Ikan Lais. The gigantic predator species Ikan Tapah is also a species of interest in this region. Our findings reinforce the observation that Bernam River habitat supports production of valuable fish species that provide good ecosystem provision in terms of food production, recreational fishing, and nutrient cycling services.

Keywords: Ecosystem services, Fisheries resources, Stock assessment, Economics, livelihood

P-FR-C01

Effect of Salinity Shock on Survival, Growth and Reproduction Characteristics of *Artemia franciscana* Vinh Chau,Vietnam

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Abstract

The study was conducted at four stages of *Artemia franciscana*, Vinh Chau (Nauplius, Juveniles, Pre-adults and Adults) aiming to collect information on salinity shock of each stage, especially on survival and growth rate as well as their reproduction characteristics; which is served for *Artemia* farmers to cope with climate change during recent year in the Mekong delta. *Artemia* at all stages was shocked to a decreased amplitude of salinity levels (treatments, three replicates each) in turn of 0‰, 20‰, 30‰, 40‰ compared to standard culture environment (80‰; control) in 2 hours then continuing to culture in 1Lplastic cones at a densities of 200 ind./L for naupliar stage and 120 ind./L for other stages. Results showed that the different shocking salinity levels did not play strong effect on growth ($p>0.05$); except in juvenile stage which was slower in growing when the shock increasing ($p<0.05$); but it affected on survival of all stages ($p<0.05$). The most loss was seen at Naupliar stage (26.1%) meanwhile other stages were in range of 64.4-68.7%, when culture salinity dropped down from 80‰ to 40‰. The results also found that even thought salinity shock did not participate much on *Artemia* fecundity but it effected on their reproductive pattern and reproductive cycle (time between broods). The more shock amplitude, the longer in time between broods and higher in oviparity was recorded. In short, the salinity downed 30‰ to 40‰ from initial culture of 80‰ did not influence on *Artemia* growth but it was rather concerned to their survival and reproduction.

Keywords: *Artemia*, Salinity shock, Survival, Growth, Reproduction

P-FR-C02

The Diversity of Species Composition of Shrimp (*Penaeidae* Family) in Coastal Region of Cu Lao Dung District, Soc Trang Province, Vietnam

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Abstract

The study to identify species composition of shrimp on Penaeidae family in the coastal region of Cu Lao Dung district of Soc Trang province. This family has highest economic value and large distributed in the coastal region with high fluctuated salinity. The purpose of the study is to evaluate the status of fishing, production, and income contribution of this fishing activity in each household of the coastal community in the study region. Besides, the study also identifies biodiversity index of shrimp in this in this family. The sampling collected 8 times from April to July, 2019, the sample schedule was twice a month (on 15th and 30th lunar calendar). Sampling sites were 5 stations belong to 2 communes with different habitats and fishing gears. The study also surveyed on 30 households, who are being lived in the study region and have participated fishing activities. Results found that fishing is a traditional major and, there are 5 fishing gears popularly used by fisherman includes: fence trap net (36.7%), bag net (16.7%), trawl net (26.7%), barier net (20%). In which, the composition of Penaeidae family had a high rate in fence trap and trawl net, contributed 15 - 30% to daily economic income of households. It found 8 species of this family, includes: *Metapenaeus ensis* (29.9%), *Metapenaeus lysianassa* (46.2%), *Metapenaeus monodon* (2.1%), *Metapenaeus affinis* (0.6%), *Metapenaeus tenuipes* (14.3%), *Parapenaeopsis cultrirostris* (5.1%), *Metapenaeopsis gracillima* (1.4%), *Metapenaeus brevirconis* (0.5%), the common species such as: *Metapenaeus ensis* (29,9%), *Metapenaeus lysianassa* (46.2%). However, these species are distributed unevenly among the habitats, the reasons for less diversity of this family will be discused in the research, diversity index Shannon was shown in Fig. 1.

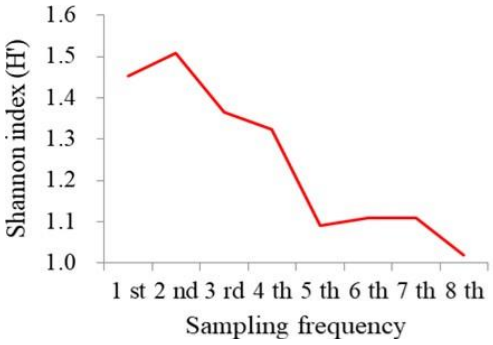

Fig1: Diversity Shannon index about compostion species of shrimp belong to Penaeidae family in thes coastline of Soc Trang province (Apr-Jul, 2019)

Keywords: Diversity, Cu Lao Dung, Penaeidae family, Shannon index

P-FR-C03

Influence of Salinity on Distribution of Penaeidae and Palaemonidae Families on My Thanh River, Soc Trang Province

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Abstract

The research to determine species composition and diversity of penaeidae and palaemonidae families and their distribution according to salinity in My Thanh river, it is a large river longer than 25km in Soc Trang province, Vietnam. The study was collected at 6 locations, each location was about 5km apart. The study was conducted from April to September (lunar calendar) in 2019, once a month collected on the first day of the month according to the lunar calendar. Sampling is based on the fishing gear of the people there and the salinity is taken at the time of collection and It is measured immediately afterward. In addition, this study also surveyed 30 households who fishing here about their exploitation situation. All the data of sample collection will be saved, processed by Shannon index to calculate species composition diversity and correlation chart of the distribution of these shrimp species according to salinity variation. The expected results of this study will show the situation of fishermen exploitation here, their number of species, species composition, and biodiversity according to the variation of salinity

Keywords: Shrimp, Diversity, Species composition, My Thanh river, Soc Trang, Salinity, Fishermen, Fishing situation

P-FR-C04

The Effects of Total Ammonia Nitrogen and Nitrite Concentration on Moulting and Surviving of White Leg Shrimp (*Litopenaeus vannamei*)

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Abstract

White leg shrimp (*Litopenaeus vannamei*) known as Pacific white leg shrimp is presently the most important cultivated shrimp species in the world. They can tolerate in low salinity waters, grow faster than another species. However, in low salinity waters, toxicity of ammonia nitrogen and nitrite concentration will be increased. This study was conducted to investigate the effects of total ammonia nitrogen (TAN) and nitrite (NO_2^--N) concentration on moulting and mortality of *L. vannamei* juvenile (0.5-1g) at 15 ppt. The experiment was carried out with three concentration of TAN (2.21 mg/L, 6.63 mg/L, 11.04 mg/L) and three concentration of NO_2^--N (9.33 mg/L, 27.95 mg/L, 46.59 mg/L), corresponding with 5%, 15%, and 25% of 48h LC50, respectively. The results showed that in high TAN and NO_2^--N concentrations may deteriorate water quality resulting in high mortality and low growth rate. Nitrite is more toxic than TAN. The moulting cycle was prolonged and dead shrimps have soft shell and unsuccessful moulting symptoms

Keywords: *Litopenaeus vannamei*, TAN, Nitrite, Moulting

P-FR-C07

Nursery of White Leg Shrimp (*Litopenaeus vannamei*) Combined with *Artemia franciscana* Biomass According Biofloc Technology

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Abstract

Research on the nursery of white leg shrimp (*Litopenaeus vannamei*) in combination with *Artemia franciscana* biomass according to biofloc technology, to evaluate the growth rate and feed conversion ratio (FCR) of white shrimp. The experiment was arranged by two factors, mature *Artemia* biomass supplemented at 3 levels of 5g; 10g; and 20g. 1) Drop in the net (N) and place in the nursery tank, mesh size 1000 µm, so that shrimp can only use small size *Artemia* to escape from the net. and 2) *Artemia* biomass was directly stocked (D) into the rearing tank as feed for shrimp culture at the same dose (5g; 10g; and 20g). PL10 shrimp is used to arrange for experiment, density of 1000 PL / m3, with volume of 0.1 m3 / tank, 4-week nursery period, Grobest No.0 shrimp feed is used for feeding 4 times / day and combination of fertilizing C: N (15: 1) biofloc using molasses. The results showed that when using biomass stocked in the net, nauplii *Artemia* was born as supplementary feed for the shrimp until the end, the average weight of shrimp: 1.14 g; 1.31 g; and 1.51 g, depending on the amount of additional *Artemia* biomass (N5, N10 and N20); While releasing *Artemia* directly into the nursery tank, all *Artemia* was consumed after 4; 5 and 7 days, and the average weight of shrimp obtained: 1.34 g; 1.35 g; 1.45 g (D5, D10 and D20). Shrimp growth was lowest in control treatments (0.91 g, Control) without *Artemia* biomass supplementation. The results showed a significant difference in feed conversion ratio (FCR) among treatments: N5- 1.37; N10-1.35; N20-1,27; D5- 1.37; D10-1.20; D20-1,36; Control- 1.56. The combination with 20g *Artemia* biomass showed the fastest growth (N20-1.51 g), with a low FCR of 1.27 and the best developed biofloc

Keywords: *Litopenaeus vannamei*, *Artemia Franciscana*, Combination, Biofloc

P-FR-F01

Performance Blue Dark and Brown of Bicolor Eel in Indoor Culture

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Abstract

The purpose of this study is to know the performance (growth, survival rate,) 2 types of eels, whether the color change in the eel is permanent, and as well as whether the 2 types of eels have differences genetic. this study also looked for the cause why brown eels appeared. The study was conducted by cultivating eels in a fibre tank. Complete randomized design was used in this experiment, with 2 treatments and 3 replications. During the cultivating eel is fed 3% biomass 2 times a day and cultivation carried out for 3 months . Brown and normal eel seeds are obtained from farmer in Banyuwangi. The results showed that normal colored bicolor eel had better growth, than the brown bicolor eel. Both types of eels have survival rate not significantly different. The brown color of the eel is not permanent, and at the end of the cultivation the eel changes its color to normal (blue dark). DNA sequence analysis results showed that both eels contained DNA sequence similarities (99%) with Anguilla bicolor bicolor species. Discoloration allegedly due to environmental and food factors.

Keywords: Eel. Color, Grwoth, Indoor.

P-FR-F02

A Small Cladoceran, *Ceriodaphnia cornuta* Dominates a Tropical Shallow Hypereutrophic Lake

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Abstract

Zooplankton community structure is often shaped not only by environmental factors, but also by food types and their availability. Cyanobacterial species that dominate in eutrophic waters are considered inadequate food for aquatic planktonic consumers and some are toxic to animals including zooplankton. This study was conducted to assess how zooplankton community responds to a hypereutrophic condition associated with cyanobacterial dominance, and vast areas of a floating macrophyte, *Eichhornia crassipes*. Samples were collected from Sembrong Lake, a shallow lake with a mean depth of 5.1 meter which was surrounded by agricultural area. Physicochemical parameters were recorded *in situ* using a YSI multiparameter probe (model 556 MPS) and water transparency was measured using a Secchi disc. Water samples for nutrients and chlorophyll-a analyses were collected using a Van Dorn water sampler and immediately analyzed following the standard method (APHA). Zooplankton samples were collected for identification and enumeration. High concentration of total phosphorus (0.14±0.01 mg/l), chlorophyll-al (97.19±4.70 mg/l) and low water transparency (0.3 meter) in Sembrong Lake categorized this lake as hypereutrophic lake with trophic status index (TSI) value of 71.1. For the zooplankton community, a small cladoceran, *Ceriodaphnia cornuta* was dominant, accounting for 63.3 % -87.3 % of the total zooplankton density throughout the sampling period. Meanwhile, phytoplankton community in this lake was dominated by *Planktothrix agardhii*, a filamentous cyanobacteria which accounted for 74.8 % - 99.0 % of the total phytoplankton density. The dominance of this small cladoceran could be due to the fact that *C. cornuta* could exploit the bacterial and other small organisms resulting from decomposition of high cyanobacterial and macrophyte biomasses. In addition, *C. cornuta* is less susceptible to the harmful effects of *P. agardhii* due to its small opening of carapaces which prevent *P. agardhii* from being filtered. This study illustrated that a small zooplankton such as *C. cornuta* could thrive well in hypereutrophic condition.

Keywords: Cladoceran, *Ceriodaphnia cornuta*, Cyanobacteria, *Planktothrix agardii*, Hypereutrophic lake

P-FR-F03

Diversity of Fish and Water Quality of Sungai Semadang, Downstream of Bengoh Dam, Sarawak, Malaysia

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Abstract

This study was conducted from September 2018 to March 2019 to find out the fish diversity and water quality parameters of Sungai Semadang, a river below Bengoh Dam, Sarawak. Stream that flows down from the Bengoh Dam also flows into Sungai Semadang forming the Upper Sarawak Kiri River. Due to the lack of information of fish diversity in the areas below this dam, the objective of this study was to document the fish diversity of Sungai Semadang and its relationship with water quality parameters. Fish samples were collected using scoop net, 3-layered net and gill nets while *in-situ* water quality parameters were conducted on site. A total of 80 individuals consists of 13 species from 5 families were caught from Sungai Semadang. Cyprinidae dominating the area with 91.25% followed by Bagridae (5%), Channidae (1.25%), Sisoridae (1.25%) and Eleotridae (1.25%). The most dominant species were *Barbonymus schwanenfeldii* (N=48), followed by *Barbonymus collingwoodi* (N=10), *Cycloceilichthys apogon* and *Hampala macrolepidota* with 4 individuals respectively. The diversity indices recorded which includes Shannon-Wiener's diversity index (*H*) = 1.675, Pielou's evenness index (*J*) = 0.9828 and Mergalef's species richness index (*d*) = 1.846. Water quality analysis showed that Sungai Semadang has higher value of turbidity (74.66 ± 25.26 NTU) and conductivity (46.20 ± 17.10µS/cm) while lower value of pH (6.95±0.60), dissolved oxygen (7.83±0.36 mg/L), salinity (0.00 ppt) and biochemical oxygen demand (0.94±1.07 mg/L). Based on Water Quality Index (WQI), this river is categorized under Class II and is considered clean.

Keywords: Freshwater fish diversity, Sarawak, Water quality, Below dam

P-FR-F04

Fish Fauna and Water Quality of Sungai Lupa, Upstream of Bengoh Dam, Sarawak, Malaysia.

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Abstract

A study on freshwater fish composition and water quality was conducted at Sungai Lupa, upstream of Bengoh Dam, Sarawak. Samplings were conducted twice on 22nd January 2019 and 10th May 2019. The objective of this study was to determine the diversity of fish fauna at Sg. Lupa with relation to its water quality parameter. The fish samples were collected by using an electroshocker. During the study period, the water was clear with slightly fast flow moving water through rocky and sandy substrate river. A total of 40 individuals consists of 9 species from 3 families were recorded during sampling period. The study area was dominated by Cyprinidae (N= 38). The most dominant species were *Barbodes binotatus* (N=15), followerd by *Rasbora sarawakensis* (N=7), and *Hampala macrolepidota* (N=5). Based on the calculation of diversity t-test, Shannon-Wiener's Diversity Index *(H)* = 1.757 and Margalef's Species Richness Index (D) = 1.898. The results on selected water parameters showed that the dissolved oxygen (DO) ranged from 6.9 to 7.9 mg/L, pH ranged from 6.43 to 6.93, temperature ranged 25.8 to 26.9 °C, turbidity ranged from 21.81 to 57.27 NTU, conductivity ranged from 9.0 to 13.0 µSiemen/cm, salinity 0 to 3.0 ppt and biological oxygen demand (BOD) ranged from 0.0035 to 0.0024 mg/L. Based on the water quality analysis showed that, pH, dissolve oxygen and biological oxygen demand were significantly low. Hence, the river was considered as clean and the environmental condition are normal for the fish community

Keywords: Freshwater, Fish fauna, Water quality, Sarawak,

P-FR-F05

River Status of Sungai Bong, Tringgus, Bau, Sarawak Indicated by Fish Composition and the Water Quality.

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Abstract

A study on freshwater fish composition and water quality was conducted at Sungai Bong, Kampung Tringgus, Bau, Sarawak with four samplings performed from December 2017 to January 2019. Information of fish fauna in this area is still scarce in literature. Therefore, the objective of this study was to assess the status of Sungai Bong based on the fish composition and its water quality. Fish samples were collected using electrofishing technique while *in-situ* water quality parameters was conducted on site. A total of 122 individuals consists of 17 species from 6 families were recorded in this study. The study area are dominated by Cyprinidae (N= 103). The most dominant species were *Rasbora caudimaculata* (N= 50), followed by *Crossocheilus elegans* (N= 13) and *Rasbora sarawakensis* (N= 9). The diversity of fish encountered in this study was based on their diversity indices recorded which includes Shannon-Wiener's diversity index (*H*) = 1.4408 , Pielou's evenness index (*J*) = 0.8785, and Margalef's species richness index (*d*) = 1.9403. Water quality results showed that the value of dissolved oxygen ranged from 5.30 to 10.5 mg/L, pH ranged from 7.45 to 7.71, temperature ranged from 25.30 to 26.70 ˚C, turbidity ranged from 12.54 to 25.74 NTU, conductivity ranged from 14.00 to 33.00 µSiemen/cm, salinity 0.00 ppt and biochemical oxygen demand ranged from 1.08 to 2.4 mg/L. The study area was deduced as clean and the environmental condition are normal for the fish community

Keywords: Diversity, Fish fauna, Freshwater, Sarawak, Water quality

P-FR-F06

Study on the Growth Parameters and Mortality Rates of Spotted Catfish *Arius maculatus* (Thunberg, 1792) in the Lower Areas of Hau River, Mekong Delta Vietnam

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Abstract

This study has been carried-out from March, 2019 to December, 2019 in the lower areas of Hau River, Mekong Delta, Vietnam. The study focused on the growth parameter and mortality rates of spotted catfish (*Arius maculatus*). Samples have been collected all every two month analyzed in laboratory of College of Aquaculture and Fisheries- Can Tho University. Spotted catfish is a benthic species in tropical waters, inhabiting the bottom of estuaries, rivers and coasts in Mekong Delta but studies on the biology characteristics are still scarce. The study on the population characteristic, growth performance and mortality rates of spotted catfish need to be done for management, protection and development of the aquatic resources. Length frequency data of the *A. maculatus* will be analyzed using the FISAT II software for estimation the parameters of von Bertalanffy growth equation and mortality rates.

Keywords: Spotted catfish (*Arius macultus*), Von Bertalanffy growth equation, Mortality rates; Mekong Delta.

P-FR-F07

Length-Weight Relationship of Asian Swamp Eel, Monopterus albus (Zuiew, 1793) from Sabah.

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Abstract

Asian swamp eel or locally known as "belut sawah" is native to Asian countries and economically important as local delicacies. This eel is rich in protein, iron, and calcium and also valued as traditional medicines to treat asthma, impotence, and healing. However, due to over exploitation such as high exportation and overfishing, this population showed a decline and could be potentially classified as threatened species in IUCN red list in future. An attempt had been made to develop a comparative relationship between the length and weight of *M. albus* populations. A total of twenty five swamp eels were collected by using fish traps from three locations in Sabah. The average standard length of *M. albus* from Papar, Tuaran and Kota Marudu were 63.60±8.13 cm, 60.61±6.61 cm and 66.81±7.21 cm, respectively. Meanwhile the average weights of *M. albus* were 272.83±87.96 g, 179.81±70.33 g and 341.70±99.03 g. The b value ranged from 2.29-2.56 indicating negative allometric growth in all populations.

Keywords: Swamp eel, Length, Weight, *Monopterus*, Overfishing, Allometric growth

P-FR-F08

Study on Some Biological Characteristics of a Freshwater Rotifer Species (*Brachionus rubens*)

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Abstract

The research was performed with the aim to determine the life cycle, fecundity, suitable environment parameters (temperature and pH) for development of Brachionus rubens. From that assessing the mass cultured of rotifers in aquaculture in order to attend the demand about natural food in aquatic breed production in the Mekong Delta. The aims of this study were to determine (1) Effects of pH on the life cycle of B.rubens; (2) Effects of temperature on the life cycle of B.rubens and (3) The reproductive characteristics of Brachionus rubens. The study was implemented in laboratory condition containing 1 rotifer in a small cup 30 mL with prepared water and 10 replicates. The results showed that the life cycle of B.rubens could increase to 5 days and carried 5.9±1.20 eggs at pH = 8. The life cycle of B.rubens was 5.9±1.52 days and carried 8.6±3.81 eggs at 26℃. The life span was 6.9±1.79 days. Mean maturation duration was 38.25±18.19 hours, embryonic development duration was 19.25±1.77 hours, spawning interval was 14.12±13.61 hours and mean fecundity was 11±6.50 eggs.

Keywords: Life cycle, Temperature, pH, Fecundity, Rotifera

P-FR-F09

Effects of Carotenoids on Growth and Colour of Bighead Catfish (*Clarias macrocephalus*)

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Abstract

This study was included 2 experiments: the first experiment was conducted to find out the optimal dietary pigmentation in terms of the growth performance, skin colour and muscle colour enhancement of bighead catfish *Clarias macrocephalus*. The first experiment was set up with 7 dietary treatments1g Astaxanthin (Ast), 1g Cantaxanthin (Can), 5g Xanthophyl (Xan), 0,5g Astaxanthin+0,5g Cantaxanthin, 0,5g Astaxanthin+ 2,5g Xanthophyll, 0,5g Cantaxanthin+2,5g Xanthophyll equivalent kg^{-1} diet and one treatment without pigmentation,. Bighead catfish (47,5 ± 1,47g/individual) were assigned randomly in 21 composite tanks (60 individuals/tank with $0,4m^3$). After 30 days, there were differences in muscle color and skin color of bighead catfish among 7 treatments, The fish skin color had the yellow strongest in treatment 4 , treatment 6and treatment 7 which supplied Xan in feed. However, in the treatment of 0,5g Ast + 2,5g Xan kg^{-1} diet, the yellow colour (value b*) in the muscle and skin were greatest while this colour was weakest in the confront treatment. Growth rates were not different among treatments. Survival rates were about 85% for all experiment. The second experiment was set up with five diets containing 25%, 50%, 75%, and 100%of of mix 0,5g Ast + 2,5g Xan kg^{-1} diet, and without pigmentation diet . Fish growthout and colour were evaluated.

Keywords: Bighead catfish, *Clarias macrocephalus*, Carotenoids, Growth performance, Pigmentation.

P-FR-F10

Water Pollution Level Analysis of Code River In Yogyakarta, Indonesia Based on The Family Biotic Index of Macrobenthos

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Abstract

This study aims to determine the water pollution levels of Code River based on the Family Biotic Index of Macrobenthos. The study was conducted in June-July 2016 on the Code River in the Special Region of Yogyakarta, Indonesia. Data was taken 4 times at 6 stations. Makrobenthos was taken using surber net with a size of 30 x 30 cm. Samples in each station was taken in 5 difference places. The data then analyzed to know the density, diversity index, dominance index, and macrobenthos Family Biotic Index (FBI). Water quality data includes air temperature, water temperature, current velocity, water depth, substrate type, water pH, dissolved oxygen, and organic matter were taken. The results showed that the air temperature ranged from 29–31 ^{o}C, water temperature 28–30 ^{o}C, water depth 0.16–0.26 m, current speed 0.28–0.44 m / sec, pH of water 6.8– 6.88, dissolved oxygen content (DO) 5.66–6.77, and organic matter (BO) 7.07–13.27 ppm. The substrate of the six stations consists of mud, rocky mud and rocky sand. Macrobenthos density ranges from 131-382 ind / m^2 which consists of 3 phyla, 19 families, and 26 species. The value of diversity is 0.31-0.90 and the dominance index value is 0.19-0.62. Based on the measurement of the Family Biotic Index, the level of organic pollution in the Yogyakarta Code River ranges from 5.35 to 7.56 which indicates that the waters included in the category of moderate contamination to very polluted waters.

Keywords: Family biotic index, Diversity, Macrobenthos, Pollution, Code River

P-FR-F11

Comparison of Climate Change-Related Risk Adaptation in Striped Catfish, Tilapia and Shrimp in the Mekong Delta, Vietnam

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Abstract

This study aims to determine climate-related risk impacts, responses of farmers, and assistant activities in tilapia cage culture (TC), striped catfish nursery (SCN), striped catfish production (SCP), improved extensive (IES) and intensive shrimp (IS) farming systems. A survey with 601 farmers in the Mekong Delta (MKD), Vietnam, was conducted. Intense rainfall events and rapid changes in temperature affected all five surveyed systems. Extreme high temperature impacted TC (35.9%), IES (32.2%) and IS (28.8%). On the other hand, extreme low temperature impacted the striped catfish groups (SCN: 54.36% and SCP: 54.2%). Striped catfish systems were more sensitive to low temperature in comparison to shrimp and tilapia. Increase of dyke height was applied in SCN and SCP, which is significantly higher if compared to the remaining systems ($p<0.05$). Increase of pond depth was the response of SCN, SCP and IS systems with high frequency compared to TC and IES ($p<0.05$). The IS and SCN had higher counts of additional pond construction. Monitoring water quality and use feed supplements/medicines were implemented by farmers in all five systems; however, these were higher for SCN, SCP and IS than TC and IES. The percentage of farmers reducing stocking density such as TC (30.3%), SCN (60.8%), SCP (34.6%) and IS (33.8% were significantly higher than that of IES (0%) ($p<0.05$). In IS systems, 49.6% farmers will prepare aerators or mixers for pond, significantly greater that of TC, SCN, SCP and IES systems ($p<0.05$). Television was the most important source of information; neighboring farmers and Department of Fisheries (DOF) were also important. Price of marketable size fish, diseases, feeds and fingerlings were high concerned issues that related cost-benefit efficiency. Rapid change temperature, high and low temperature were the main environment parameters that had high concerned level. When asked what features should be included in a mobile application (app) for fish farmers, respondents replied market price, disease outbreak and advice on disease.

Keywords: Climate change, Adaptation, Striped catfish, Tilapia, Shrimp, Vietnam

P-FR-F12

Fishing Activities in the Mekong Delta, Vietnam

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Abstract

A study of fishing activities was conducted from July to December 2017 in coastal provinces of the Mekong Delta. Results show that the gill nets, trawl nets, bag nets, and cage traps were main fishing gears and had highest number of fishing boats and yields. All of fishing gears can capture whole year round. Gill nets had largest scale, but the yield of trawlers was highest. Gill nets were most effective with highest profit achieved (298 million VND per year). Trawlers had highest yield (20.42 tons/year), but they had highest ratio of trash fish (38.4%) and lowest benefit ratio (0.45 times). Although the bag nets had highest benefit ratio (1.41 times), they had lowest yield (7.17 tons/year) and highest ratios of trash fish so they affected fisheries resources. Cage traps had highest ratio of trash fish (23.8%). For the sustainable development of fishing, management of fisheries resources should be promoted, supporting fishermen to access low interest rates to invest in capture production, and training them to use advanced fishing gear to increase their fishing efficiency.

Keywords: Advantages and disadvantages, Finance, Fishing, Mekong Delta, Technique

P-FR-F13

Species Composition and Diversity of Fish Population in Central Wetland (South) of Lake Putrajaya, Malaysia

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Abstract

Reservoir is one of the examples of water bodies that play important roles in providing sources of different types of fish species, other than for water supply, hydroelectric power, flood prevention, aquaculture activities and recreation activities. However, human activities can be considered as threats to the aquatic environment. Previous studies showed that human activities resulted in deterioration of aquatic environment, such as habitat losses, over exploitation and extinction of fish species. Understanding on species diversity of fish populations in a lake is important to ensure the sustainability of the fisheries resources. This study was conducted to determine the species composition and diversity of fish population in the central wetland (south) of Lake Putrajaya, Malaysia. Fish sampling was conducted for seven months from March to September 2019. Four sampling stations were designated and named as station A, B, C and D. The sampling were conducted using gills nets with different mesh size (6.35 cm, 8.89 cm and 11.43 cm), and fish traps. As results, a total of 263 individual fish from 11 species were recorded during the study period. The most abundant species was *Notopterus* sp. (knife fish) (45.63%), and this were followed by *Oxyeleotris marmorata* (marble goby) (14.07%), and *Oreochromis* sp. (black tilapia) (12.17%). Meanwhile, results for the fish diversity indices indicated that, the Shannon-Wiener Index value was at 0.76, Menhinick's Index value was 0.68, Margalef's Richness Index value was 4.13, and Pielou Evenness Index value was 0.32. The results obtained in this study are believed to provide some baseline data for the managers, to sustainably manage the fish resources in the central wetland (south) of Lake Putrajaya, Malaysia.

Keywords: Species composition, Species diversity, Lake Putrajaya Malaysia

P-FR-F16

Preliminary Study on Species Composition and Diversity of Fish Population in Lake Muda, Kedah, Malaysia

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Abstract

Different types of fish species supported by different types of freshwater habitats in Malaysia ranging from small torrential streams, rivers, lakes to estuarine habitats. The freshwater fishes inhabit diverse type of habitats with some species flourishing, specifically in lentic water bodies, including lakes and reservoirs. A preliminary study was conducted in Lake Muda, Kedah. Fish sampling was conducted in ten stations at various locations within the lake. Different types of fishing equipment were used for the sampling process such as gill nets (mesh size of 1.5, 2.5, 3.5 and 4.5 inches, with 100-feet long and 10-feet deep), and fish traps (30-feet long). The sampling equipment were set up in the late evening and haul in the next morning (estimated of 12 hours duration). Upon collection all fish samples were preserved in ice. The samples were identified into species and grouped according to the gear type used. The number of fish individual and fish species were recorded. Station nine (9) recorded with the highest percentage of fish landings during the study period (17.27%), while station six (6) was the lowest (2.84%). Station one (1) recorded with the highest number of species landed (12 species), while station eight (8) showed the lowest, with only 5 species landed. In terms of the percentage composition of fish species, *Osteochilus hasseltii* was recorded with the highest proportion, followed by *Barbonymus schwanenfeldii* and *Notopterus* sp., with 21.39%, 12.63% and 11.34% respectively. This study indicated that Lake Muda comprises of several types of fish species, and their existence can be varied between locations within the lake areas.

Keywords: Species composition, Species diversity, Lake Muda Kedah Malaysia

P-FR-M01

Experimental Assessment of Heterotrophy on High Irradiance Stress Recovery of the Scleractinian Coral *Galaxea fascicularis* (Linnaeus, 1767)

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Abstract

This study examined the changes of polyunsaturated fatty acid (PUFA) composition of the scleractinian coral *Galaxea fascicularis* when exposed to high irradiance stress in laboratory conditions. The effects of heterotrophy on coral recovery after the high irradiance stress were also investigated. Thus far, it is still not well known if heterotrophy could supply adequate PUFAs to help the corals overcome stress. In this study, the corals were fed with PUFA-enriched *Artemia* for 5 weeks. After that, the fed corals were put into high irradiance stress test (~2600 µmol quanta m^{-2} s^{-1}) for four days before the application of post-stress feeding (5 weeks). Results revealed that the significant PUFAs found in this study were 18:3ω3, 18:3ω6, 20:3ω3, 20:5ω3 and 22:6ω3. Unfed corals had low lipid concentration and saturated fatty acid content. An increased of fatty acid content in high irradiance stress treatment were observed for unfed corals. All corals had lower zooxanthellae densities and chlorophyll concentrations in high irradiance stress. Fed corals had shown higher concentrations of zooxanthellae and chlorophyll compared to unfed corals. This indicates that heterotrophy was inadequate to boost positive feedback on coral resilience during high irradiance stress.

Keywords: Coral resilience, Heterotrophy, High irradiance stress, Polyunsaturated fatty acids, Zooxanthellae

P-FR-M02

Study on eproductive Biological Characteristics of Tank Goby (*Glossogobius giuris* Hamilton, 1822) in Tra Khuc River, Quang Ngai Province, Vietnam

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Abstract

A total of 325 Tank goby (Glossogobius giuris Hamilton, 1882) samples were collected in the Tra Khuc River (Quang Ngai) to study the biological characteristics. The data showed that tanks goby are mature early, they can start to laying eggs after one year old. Spawning time lasts from April to August every year. The sex ratio is varies between age groups, in general, male fish is higher than female. The absolute fertility ranges from 14,874 to 33,235 eggs, depending on the age. Relative reproduction of fish populations 231.9 eggs / g body weight. The big size fish and high age have higher reproductive capacity than small fish.

Keywords: Glossogobius giuris, Quang Ngai, Reproductive biological

P-FR-M03

Morphological Variations of *Carangoides spp*. (Perciformes: Carangidae) in Malaysia

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Abstract

Genus *Carangoides* comprises fishes with diverse morphological characters. Their body shapes vary from elongate and fusiform to deeply ovate and strongly compressed. Certain species in this genus are superficially resembles between each other and may be easily confused, which often resulted in species misidentification. A detail observation is very important during the species level identification of *Carangoides* species. In this study, a total of 395 specimens from 13 *Carangoides* species were collected around Malaysia waters. Morphometric data were based on 35 measurements using more than 30 specimens for dominant species and as per availability for rare species. Most of the species in this genus can be easily differentiate from each other through their external morphological characteristics. However three species which are *C. coeruleopinnatus*, *C. talamparoides* and *C. malabaricus* were very similar to each other. They always mixed up in local market and sold up as one component. These species were further analysed using a multivariate technique of principle component analysis (PCA). Result showed that, a few characters such as interorbital width and body depth can be used to partially differentiate these species. However these character still unable to clearly separate all three species. We observed the best character that can be used to differentiate these three species was gill raker counts. Total gill rakers for *C. coeruleopinnatus*, *C. talamparoides* and *C. malabaricus* were 21-25, 28-32 and 31-37 respectively.

Keywords: Carangoides, Principle component analysis, Taxonomy

P-FR-M04

Effects of Thermal Effluent to the Abundance and Composition of Zooplankton in Iloilo Strait

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Abstract

Iloilo strait is among the major breeding and nursery sites for aquatic organisms in Panay region where a coal-fired power plant was operating since 2009. To discern the effects of thermal effluent to the abundance and composition of zooplankton in Iloilo strait, numerous sampling were conducted from January to March of 2017. Samples were collected in triplicate and transported to the laboratory for assessment. Physico-chemical parameters such as temperature, salinity, and total dissolved solids were additionally monitored during the sampling periods. Results showed that temperatures near the point of discharge were higher ranging from 0.5 ºC to 1.8 ºC as salinity and total dissolved solids associated a decreasing outcome. Zooplankton samples were classified into five groups: cyclopoida, calanoida, cnidaria, decapoda, and fish. Cyclopoida which is believed to tolerate an increase in water temperature consistently emerged with the highest count, comprising 73.23% of the total zooplankton population while fish yielded the lowest count, constituting 0.28% of the population. Statistical analyses revealed that there was no significant difference on zooplankton population in sampling periods nor between sampling stations (ANOVA, $p>0.05$; Tukey HSD, $p>0.05$; DMRT, $p>0.05$). Further investigation confirmed that elevated water temperatures did not primarily affect the decline or proliferation of zooplankton as supported by Pearson test results that suggested a positive correlation among the variables (Pearson, $p>0$). In conclusion, thermal effluent from the PEDC coal-fired power plant had minimal influence to zooplankton composition but will dwindle the count over long exposure to the environment with extreme temperature exceeding the optimal level.

Keywords: Thermal effluent, Coal-fired power plant, Iloilo strait, Zooplankton

P-FR-M05

Behavioral Responses of Two Rockfishes to Different Percent Covers and Layouts of Artificial Reefs in a Reef Unit

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Abstract

The objective of this research is to discuss whether and how rockfish assemblages will change with the amount, layout of unit reefs. In this paper, the relationship between aggregation rate of *Hexagrammos otakii* and percentages of ladder reefs quantities. The aggregation rate of *H.otakii* was increased slowly at 0-50% of ladder reefs quantities, but it was decreased exponentially at 60% of reefs quantities. The layouts experiment to examine the interaction of reef arrangement with rockfish assemblage. The aggregation rate was influenced significantly by the spatial reef configuration when reefs quantities range from 10% to 40%. However, there is not significant difference at the reefs quantities of 50% and 60%. Those results demonstrate that the ladder reefs quantities was greatly influenced by the rockfish abundance and richness. The optimum percentage of ladder reefs quantities was 50%, and the layout of cross shaped hollow modular was optimum layout. Base on optimum layout, we were discussed relationship between density, body lengths of fish and aggregation rate. The average aggregation rate of *Sebastes schlegelii* (90.8%) was significantly higher than that of *H.otakii*. It had no significant influence on fish density and body lengths. Consequently this pilot study indicated that suitable space configuration combined with certain amount of reef is important to construct off-shore artificial reef.

Keywords: Ladder reefs; Aggregation rate; Deployment; Density; Body lengths

Age of Sediment in the Bay of Jakarta in Indonesia

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Abstract

This study aims to determine the age of sediments located in the waters of the Jakarta Bay far from the coast. In carrying out reconstruction of changes in the marine environment by using seabed sediment samples, the samples used must come from sediments which are deposited continuously without interference. Sampling of sediments in the waters of Jakarta Bay is TJ-11 core. TJ-21 and TJ-89 are carried out using Geomarine I ships, and tools for sediment extraction are gravity cores. Core samples are stored in cold storage in Cirebon, where storage of submarine sedimentary rocks belongs to the Marine Geological Research and Development Center. The research material is sediment that has been taken from the waters of Jakarta Bay. Based on the yield of 210Pb age conducted on 37 samples consisting of; 14 samples from TJ-89 sediment cores, 9 samples from TJ-11 sediment cores and 14 samples from TJ-21 sediment cores, the age of sediments was determined. The results of this analysis show that the sediments formed at a certain time in the western and eastern waters of the Jakarta Bay are thicker than in the central part. This is because the pile of sediment is formed due to sediment carried by the Citarum River in the east, and the Cisadane River in the west.

Keywords: Age, Jakarta Bay, Sedments and Waters

P-FR-M07

Variation of Macrobenthic Community Structure in Relation to Land Reclamation Activities with Application of Abundance Biomass Comparison (ABC) Curve in Merambong Shoal, Johor

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Abstract

Merambong Shoal seagrass bed is heavily impacted by reclamation activities that has been ongoing since 2014. A monitoring survey was conducted to observe the variation of macrobenthos community structure in this seagrass bed due to possible environmental disturbance or habitat alteration caused by reclamation activities. Macrobenthos and sediment samples were collected bi-monthly from five transects on the seagrass bed using PVC hand corer from December 2015 to June 2018. It was recorded that there was significant difference ($p<0.05$) in silt percentage between different transects where T1, T2 and T3 were found to have higher silt percentage (2.10% - 3.01%) than T4 and T5 (0.96% - 1.12%) suggesting higher sedimentation in this part of the shoal. It was also found that macrobenthos dominant groups inhabiting the seagrass bed have shifted and there was obvious decline in total mean density (33 ind per m^2 – 73 ind per m^2) compared to other previous studies in the same area. Abundance-Biomass Comparison (ABC) curve showed that the macrobenthos community in the seagrass bed to be "moderately" to "grossly" disturbed and as according to Bray-Curtis similarity analysis the reclamation activities might also even created two distinctly different cluster originated from one single shoal. These results suggested that the reclamation activities might have damaging effects on macrobenthos community which also significantly altered its community structure in that area.

Keywords: Macrobenthic Community, Seagrass ecosystem, Coastal reclamation, ABC curve, Sediment particle size

P-FR-M08

Catch Composition of Fishes by Different Types of Fishing Gear in Andaman Coastal Area

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Abstract

Andaman coastal area is a rich ecosystem of life diversity and various habitats of economically important fish communities, provide significant ecosystem goods and services for people livelihood in coastal area. There have excessive fisheries activities by commercial and artisanal fisheries with different fishing methods appropriate for the species and habitats. The aim of this study was assessed catch composition of economically important finfish on landing by fishing gears operated in Andaman coastal sea of Thailand. This study was investigated on the catch composition and lengths of landing fish in Andaman coastal fisheries (Krabi, PhangNga and Phuket provinces) explain the trend of stock. The primary and secondary data of landed catch of finfish were gathered since December 2016 to May 2019. The results shown that a total catch landing of commercial fisheries gears during 2016 to 2019 were 4.2, 4.49, 4.68 and 4.98 tons/years respectively, and artisanal fisheries gears were 1.12 , 1.13 , 1.19 and 1.14 tons/years respectively. The total number of species were found 44 species and 9 species of economically important fishes in the catch, the dominant species group were pelagic and demersal group from artisanal fisheries gears and commercial fisheries gears were dominant pelagic, epipelagic and demersal fish species group and most dominant adults fish that were caught except to fisheries trawl the juvenile fish of the catch, because of non-selective gears. The length of economically important fishes for artisanal and commercial fisheries gears were no significant different ($P>0.05$). Understanding the operation of fishing gears, catch composition and the size frequencies of target species could be particularly important for stock assessment because gear would be influent catch composition. The selection process appropriate of fishing gear bring to sustainable utilization in fisheries resources stock.

Keywords: Andaman coastal area, Commercial fisheries gears, Artisanal fisheries gears, Landing fish, Finfish, Stock assessment

P-FR-M09

Potential and Constrains of Far Eastern Catfish, Silurus asotus Production in Tropical Region

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Abstract

Far eastern catfish, *Silurus asotus* is a species from the family of *Siluridae*. The freshwater fish appearance is typical of a large silurid catfish. It can be found in slow-flowing rivers, lakes and irrigation canals of continental East Asia and Japan. It has a valuable nutritious food source and as a sport fish since it can grow about 20 cm until 50 cm per a year, it became the means of introduction of Far eastern catfish production expanded to tropical region. The growth rates of this species are expected as similar to *Clarias* sp. The success rate of the production in East Asian region is remarkable high in captivity but undocumented scientifically. This species is considered as a warm water fish as it inhabits 20 °C until 27 °C and spawning season is known to be mainly from early summer and in captivity, they are mainly harvested late May until middle of September. In temperate region, this species only spawn once a year, hence the scarcity level remain high. By taking constant higher temperature in tropical region, it might offer higher spawning chances of Far eastern catfish. The concerns of difficulties and social problem in attempt of this species mainly focused on the escape or illegal release to wild since this species is not a native species in tropical region except those documented in Vietnam. Hence, it is necessary to create an official manual rearing for this species to be in controlled condition and a strictly protective documentation for edible size only.

Keywords: Far Eastern Catfish, Production, *Siluridae, Silurus asotus*, Tropical region

P-FR-M10

Temporal Distribution of Zooplankton Community in Batang Lupar Estuary : A Toli Shad Breeding Habitat, Sarawak

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Abstract

The river ecosystems of Sarawak have been identified as important breeding ground for culturally and economically valuable toli shad (*Tenualosa toli*) fisheries. In these riverine ecosystems, zooplankton serve as secondary producer to the different types of fish larvae including toli shad. The productivity and biomass of zooplankton is an important factors in controlling the production of higher trophic level organisms like fish larvae and fishes in different stages. In this view point, the composition and abundance of zooplankton were investigated at Batang Lupar estuary (considered to be spawning and nursing areas of toli shad) from July 2016 to June 2017. A total of 29 zooplankton taxa were identified during study period belonging to 14 major groups of zooplankton comprised of Copepoda, Crustacean nauplii, Fish larvae, Mollusca, Luciferidae, Cnidaria, Ostracoda, Cirirrpedea, Polychaete larvae, Chaetognatha, Appendicularia, Amphipoda, Echinodermata larvae and Cladoceran. The most dominant group of zooplankton was copepod (82.40-94.41%) in all stations, contributing about 477.37-25921.89 ind/m^3 and 88.38% of total zooplankton abundance. The second higher group was for crustacean larvae (2.45-9.38%) in all station, contributing about 0-2391.7 ind/m^3 and 5.88% of total zooplankton abundance. The total number of zooplankton density was found higher in station 1 (8460.72 ind/m^3) followed by station 2 (5479.80 indi/m^3), station 3 (4571.95 ind/m^3), station 4 (4394.2 ind/m^3) and station 5 (4156.73 ind/m). Monthly variations of zooplankton abundance were presented. Temperature, Salinity and Conductivity were found to be positively correlated with maximum and minimum abundance of zooplankton. The findings of this research may help to management the sustainable toli shad fishery resources in Sarawak waters, Malaysia.

Keywords: Zooplankton, Toli shad, Sarawak, Tropical Borneo, Malaysia

P-FR-M11

Mathematical Model to Estimate the Toxicity of Ionic Liquids Against Zebrafish (Danio rerio)

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Abstract

In recent years, ionic liquids have enjoyed plethora as "green" solvents for extraction of value-added compounds from marine biomass, such as seaweed and microalgae. Despite the "green" solvent label, ionic liquids have been exposed to have notable toxicity against aquatic organism. For example, it is known that ionic liquids cause acute toxicity against zebrafish (Danio rerio) leading to extensive damage to gill secondary lamellae and increasing membrane permeability. With large number of cation and anion, simple model that can predict the toxicity of ionic liquids against aquatic organism is highly advantageous. Therefore, in this work, the toxicity of large number of ionic liquids against aquatic organism, namely zebrafish, was modelled using group contribution method based on Van't Hoff equation. The model was developed using reported log LC_{50} as training data sets that cover wide range of ionic liquids. The result showed that the developed mathematical produced reliable prediction, with R^2 is higher than 0.90. Thus, the developed mathematical model in this work can be used as platform for selecting proper ionic liquids as solvent for extraction of value-added compounds from marine biomass.

Keywords: Danio rerio; Ionic liquids; Mathematic equation; Toxicity; Zebrafish

P-FR-M13

A New Species of a Beaked Whale (Berardius) and Role of a Stranding Network for the Discovery

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Abstract

A new species of a beaked whale Berardius was reported (Yamada et al. (2019) Scientific Reports doi: 10.1038/s41598-019-46703-w). This species distributes on Okhotsk sea, and local whalers recognized as a different “type” of species in Berardius. Since the new species is much smaller comparing to the conventional beaked whale B. bairdii, it was not targeted from whaling. Stranding Network Hokkaido (SNH) is a local stranding network in Japan established on 2007, and collecting information and samples of the stranded cetaceans all over the Hokkaido Island, Japan. SNH has collected more than 740 cases of stranding information from the establishment, and various samples for providing to universities, research institutes, and specimen banks without any conditions or compensations. In the activities, samples of the new species have been collected from 8 cases. On the poster, the role of the stranding network for the discovery and the description of the new species will be presented.

Keywords: New species, Berardius, Local stranding network

P-FR-Q01

Species Richness and Diversity of Benthic Diatom Communities in Tram Chim National Park, Dong Thap Provinces, Viet Nam

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Abstract

Benthic diatom know as biological indicator for water quality, In aquatic and marine ecosystems, diatoms frequently form the base of the food chain and, thus, have a tremendous impact on the ecosystem as a whole. A study on the diversity of benthic diatoms in Mekong River and its tributaries in Dong Thap province was carried out 2002 with more than two hundreds species. This study was conducted to investigate the number benthic diatom species in Tram Chim national Parks. In this study, the diversity of benthic diatoms in 15 habitals of Dong Thap provinces during two seasons , rainy season (9-10/2018) and dry season (3-4/2018). The detailed descriptions of these new records were reported.

Keywords: Diatom benthic, Species richness, Diversity, Dong Thap provinces

Nutrition and Feed

Session: Nutrition and Feed

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2	**Toxic Elements Contamination in Trash Fish and Fish Pellets for Aquaculture** Wen Jye Mok[a*] and Rozila Binti Muhamad Zaini[a]	**P-NF-03**
3	**Nutritional Compositions and Paralytic Shellfish Poisoning Toxins of Cockle (*Anadara granosa*) from Cockle Farms in Peninsular Malaysia** Mohd Nor Azman Ayub[a]*, Fisal Ahmad[b], Roziawati Mohd Razali[a] and Ku Kassim Ku Yaacob[a]	**P-NF-C01**
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5	**Comparison on Natural Diets Dietary Composition and Foregut Fullness between Sexes of Crenate Swimming Crab, *Thalamita crenata* (Rüppell, 1830) from Setiu Wetlands, Terengganu Coastal Waters, Malaysia** Adnan Amin-Safwan[a*], Azman Nurazira[b], Khairul Salleh Syafiqah-Nurain[b], Mohd Pauzi Mardhiyyah,[a], Harman Muhd-Farouk[a,c], Hairul Hafiz Mahsol[a,d], Mohammad Syahnon[a] and Mhd Ikhwanuddin[a*]	**P-NF-C03**
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P-NF-02

Effects of Salinity on Reproduction and Naupliar Mortality of Marine Harpacticoid Copepod *Euterpina acutifrons*

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Abstract

The effect of salinity on reproduction and naupliar mortality of marine harpacticoid copepod *Euterpina acutifrons*, were studied under controlled laboratory condition. Four salinity levels (20, 25, 30, and 35 psu) were used in this experimentation. The experiments were carried out under the conditions of 25±1°C and 12L: 12D light cycle. The culture vessels were added with mixed of *Isochrysis galbana* and *Chaetoceros calcitrans* at an initial concentration 50,000 cells ml-1 (1:1 density/density) as feed for *E. acutifrons*. Five replications were conducted in each treatment. From experimentation, the results revealed that *E. acutifrons* female produced higher egg sac number at 25 psu in comparison among four salinity levels. Mean total number of offspring was significant higher at 25 psu (154 ±45 nauplii female-1), while female produced lowest number at salinity 20 psu. (46 ±31 nauplii female-1). The daily mortality rates of *E. acutifrons* nauplii were not significantly difference among treatments ($p>0.05$). This study demonstrated that cultured *E. acutifrons* at 25 psu shown suitable salinity for reproduction. However, survival rate, longevity and population growth should be concerned for further studies to indicate this species candidate for commercial live feed purposes.

Keywords: Euterpina acutifrons, Reproduction, Naupliar mortality

P-NF-03

Toxic Elements Contamination in Trash Fish and Fish Pellets for Aquaculture

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Abstract

It is important to identify toxic element contents in fish feeds to ensure the feed fish would pose no health hazards to the fish. The objectives for this study were to assess and compare the toxic elements in fish feeds which were fish pellets and trash fish. Toxic element contents in the fish feeds were determined using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and Direct Mercury Analyser (DMA). Standard Reference Material (SRM) 2976 was used in trace element recovery and method validations. Kruskal-Wallis Test (Non Parametric ANOVA) indicated significant differences in Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Cd, Pb, and Hg ($P < 0.05$). The concentration of toxic elements for fish feeds were compared with Association of Feed Control Officials guideline (AFCO) and European Union (EU) upper tolerable limits to ensure the safety of the fish feeds for the fish to consume. The range for the toxic elements in all the fish feeds were low, hence it was safe to feed the fish with the fish feeds.

Keywords: Toxic elements, Trash fish, Fish pellet

P-NF-C01

Nutritional Compositions and Paralytic Shellfish Poisoning Toxins of Cockle (*Anadara granosa*) from Cockle Farms in Peninsular Malaysia

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Abstract

Cockle is a popular high protein seafood which commercially important in Malaysia. This study was conducted to determine the proximate composition of protein, fat, fibre, ash, moisture and concentrations of PSP toxins in the tissues of cockles obtained from cockle farms at Kuala Juru (Penang), Kuala Gula, Kuala Sepetang, Kuala Terong, Sg Jarum Mas (Perak) and Pontian (Johor) for the purpose of examining the safe level of PSP and the nutritional contents. In general, the moisture contents were ranging between 74.9% and 85.6%. Concentrations of protein, fat, fibre and ash in the tissues of cockles were in the range of 49.1 – 64.6, 4.1 – 10.4, 0.56 – 20.94 and 7.17 – 15.74 % dry weight respectively. Overall, the PSP level in all samples was below the allowable limit of 80 µg STX equivalent/100 g of tissue. This indicates that the shellfish landed from these areas are safe for human consumption and contained good source of nutritional value.

Keywords: Proximate analysis, Seafood poisoning, Shellfish, tissue, Cockle farms

Effects of Temperature and Salinity on Growth and Feed Utilization of Giant Freshwater Prawn *(Macrobrachium rosenbergii)*

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Abstract

The study aims to evaluate the combined effects of salinity and temperature on growth and feed utilization of giant freshwater prawn to contribute for development the prawn farming under the impact of climate change in the Mekong Delta of Vietnam. The experiment was conducted with two factors. The first factor was the temperature - ambient temperature (not adjusted); 31ºC and 34ºC (using heater). The second factor was salinity at 3 levels of 0‰; 5‰ and 10‰. The experiment consisted of 9 treatments and each treatment was triplicated. The treatments were randomly designed. Prawn were stocked at a density of 14 inds/tank with male : female ratio of 1:1 (7 males and 7 females) and each were kept separately in a cylindrical cage (d = 20 cm, h = 35 cm), plastic, with numbered on each cage. The results will be presented in the full paper.

Keywords: Temperature, Salinity, Feed ultilization, Giant fresh water prawn

Comparison on Natural Diets Dietary Composition and Foregut Fullness between Sexes of Crenate Swimming Crab, *Thalamita crenata* (Rüppell, 1830) from Setiu Wetlands, Terengganu Coastal Waters, Malaysia

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Abstract

This study describes the natural diets of the crenate swimming crab, *Thalamita crenata* through observation on parameters for dietary composition between different sexes. Total of 30 pairs of *T. crenata* males and females were sampled from Setiu Wetlands, Terengganu, Malaysia. A significant difference ($\rho < 0.001$) was observed between body weight and the sexes of *T. crenata*. Foregut fullness analysis revealed that male has higher percentage of index score 4 than female (36.66% and 26.67%, respectively). A total of 12 different dietary items were identified in both sexes of *T. crenata*. Fish (male: 18.8%; female: 16.7%) and bivalve (male: 14.6%; female: 16.7%) were recorded as the most abundant in foregut content of both sexes of *T. crenata*. Gut content analysis reveals that *T. crenata* is a generalistic predator, cannibalism and omnivorous as its diet mainly composed of fishes, bivalves, slow-moving crustaceans, and plants like seagrass. This indicates those as their main food source. Overall, male possessed higher mean frequency of BW compared to female with 78.47 ± 17.66 g and 55.86 ± 14.48 g respectively, and there is no significant difference of food preferences between the different genders and between the size of the crab (BW) with the mean fullness and dietary composition of *T. crenata.* This finding helps in understanding the dietary composition on different sexes of *T. crenata*, thus can be a reference focusing on this species population dynamics and ecology study mainly for management purposes and artificial diet development for near future.

Keywords: Aquaculture, Body weight, Foregut contents, Nutrition, *Thalamita crenata*

Seafood or Pellet Diet?: An Investigation Into the Growth Performance and the Health of Hepatopancreas of Whiteleg Shrimp *Penaeus vannamei*

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Abstract

Shrimps are carnivorous scavengers in nature. In farms, shrimps are either fed with seafood or pellets, depending on the investment in production cost; pellets are generally more expensive. However, the choice between these two diets for shrimps is also a concern in terms of nutritional value, food quality and safety. Shrimps fed with poor feed are potentially more susceptible to viral or bacterial infection with subsequent health risks for humans upon consumption. Hence, an investigation into the effects of seafood and pellet diets on growth performance and the health of hepatopancreas in whiteleg shrimps *Penaeus vannamei* were initiated. The weight and length of seafood-diet shrimps generally declined, whereas those of pellet-diet shrimps generally increased over an 8-week study. There was a higher mortality rate in seafood-diet shrimps, primarily due to cannibalism in the event of molting. No molting event was observed in the pellet-diet shrimps. Using semi-quantitative analysis, the histological examination of the hepatopancreas of shrimps in both diets showed similar distribution of clusters of the elongated, small and round tubules. However, generally there was a higher prevalence of B-cells and bacterial/ haemocyte infiltration in the hepatopancreas of pellet-diet shrimps. Metagenomics analysis further supported the presence of bacterial species in the hepatopancreas of shrimps fed with the two diets. Results from this study has provided some insight into the type of diets that can be fed to shrimps in terms of profit-gaining (i.e. for larger biomass) or broodstock production (i.e. molting for reproduction) while identifying the potential food safety risks that could arise.

Keywords: Food safety, Histology, Metagenomics, Moulting, *Vibrio*

Population Characterization and Reproductive Performance of *Moina micrura* Fed with Fermented Organic Wastes

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Abstract

Fermented food has gained the popularity due to its nutritional and therapeutic benefits to human health. However, there is a limited study reported on the utilization of fermented feed in aquaculture, especially culturing live feeds such as zooplankton. Hence, the present study aimed to investigate the effect of fermented rice bran (FRB) and soybean meal (FSB) in feeding *Moina micrura*. Population density, population growth rate, longevity, age at first reproduction, productive capacity (mean neonates/female) and fecundity (mean neonates + eggs/female) were determined. The highest mean population density of *M. micrura* was observed in FRB treatment, 3573 individuals/L. In addition, FRB demonstrated a significantly higher ($P < 0.05$) population growth rate, 0.61 μ compared to the other treatments. On the other hand, *M. micrura* that was fed with *C. vulgaris* demonstrated a significantly higher mean longevity (9.5 days) compared to the other treatment. FSB and *C. vulgaris* treatments showed significantly faster ($P < 0.05$) reproduction (4.0 days) than FRB. Furthermore, the highest mean number of offspring of *M. micrura* was observed with those fed with *C. vulgaris* (14 neonates) than FRB and FSB. *Moina micrura* that fed with *C. vulgaris* showed significantly higher ($P < 0.05$) number of fecundity (20.0 neonates + eggs/female) than FSB and FRB. The present findings suggested that FRB could be a potential feed in addition to *C. vulgaris* for the enhancement of zooplankton population growth.

Keywords: Population characterization, Reproductive performance, *Moina micrura*, Fermented organic wastes

Effect of Different Diets on the Growth of Population Density, Survival and Productivity of *Moina macrocopa*

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Abstract

Cladoceran, which is a water flea plays a crucial role in aquatic ecosystem as a nutrient and energy transmitter in larval feeding of freshwater fish and crustaceans. *Moina* sp. are the most effective freshwater zooplankton that have a good potential to be cultured. This study examined the efficiency of different nutritious diets on the population density, growth, survival and productivity of *M. macrocopa*. The experimental diets for *M. macrocopa* consisted of seven diets, which is *Chlorella* sp. as a control, agro-industrial residue (rice bran and soybean meal), bio-organic fertilizer (chicken manure and swiftlet waste), canola oil and fish pellets. The diets were given at the concentration of 500 mg L^{-1} for each diet. In this experiment, the population density and survival rate of *M. macrocopa* were not significantly affected ($P = 0.191$, $P = 0.893$; $P > 0.05$), however *Moina* sp. fed with rice bran gives the highest result in the growth of population density (70.88 ± 4.24 ind mL-1) and survival rate (93.33 ± 6.80%) compared with other diets. In terms of examination on productivity, the hatching time and hatching rate of *M. macrocopa* is significantly affected by the different diet used ($P = 0.003$, $P = 0.014$; $P < 0.05$). The fastest hatching time and the highest hatching rate were recorded by *M. macrocopa* fed with rice bran (1.87 ± 0.04 days; 91.17 ± 3.87%). The generation time of *M. macrocopa* from neonates until juvenile and from neonates until adult were significantly affected by the diet used ($P = 0.001$, $P = 0.001$; $P < 0.05$). However, the generation time from juvenile until adult were not significantly affected by the diet used ($P = 0.060$; $P > 0.05$). Rice bran give the best result for the development time of *M. macrocopa* from each generation compared with other dietary treatments. Lifespan, number of spawning per lifetime and the number of offspring production of *M. macrocopa* were not significantly affected ($P = 0.432$, $P = 0.319$, $P = 0.649$; $P > 0.05$). The longest lifespan, the highest spawning number and the highest offspring production were recorded by *M. macrocopa* fed with soybean meal (14.67±0.58 days; 12.00±1.00; 8.67±0.57) compared with other diets. In short, this study covered the most important aspects in terms of nutritional requirement to produce live feed organisms, which would provide a comprehensive dataset for an alternative solution of the best feed for *M. macrocopa* propagation and utilization in hatchery.

Keywords: *Moina macrocopa*, Freshwater, Live food, Bio-organic fertilizer, Agro-industrial residue, Emulsified oil, Fish pellet, Growth, Productivity

P-NF-C09

Effect of Various Media on the Spore Production of *Bacillus* sp Indigenous Aquatic

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Abstract

This research was aimed to evaluate the effect of various media on the spore production, sporulation efficacy and spore germination of *Bacillus* sp indigenous aquatic. Various media used in this study were *Difco Sporulation Medium* (DSM), *Chemically Define Sporulation Medium* (CDSM), *Double* DSM, *Synthetic Replacement Sporulation Medium* (SRSM 1), SRSM 2 dan dextrose media. Fermentation was carried at 37^{o}C in a 120 rpm incubator shaker for 120 hours. The C:N ratio of various medium used ranged from 1-20. The results of this study showed that the various medium effected the spore production, sporulation efficacy and spore germination of *Bacillus* sp. The highest growth rate of vegetative cells was found in Double DSM medium, while the lowest one was in SRSM 1 medium. The production of *Bacillus* spore was in line with the number of their vegetative cells. During the fermentation period, the first spore production was revealed at the thour of 12. The highest production of *Bacillus* spore ($2.23x10^{8}\pm$ 0.03 spore.ml^{-1}) was also found in double DSM medium. On the other hand, the lowest *Bacillus* spore production was also detected in SRSM1 medium ($0.28x10^{8}\pm$ 0.03 spore.ml^{-1}). The best sporulation efficacy in this study was about 73% with Double DSM medium. Spore of *Bacillus* sp germinated without delay in all media.

Keywords: C:N ratio, Sporulation efficacy, Spore germination, Probiotic

Nursery of White Leg Shrimp (*Litopenaeus vannamei)* Combined With *Artemia franciscana* Biomass According Biofloc Technology

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Abstract

Research on the nursery of white leg shrimp (*Litopenaeus vannamei*) in combination with *Artemia franciscana* biomass according to biofloc technology, to evaluate the growth rate and feed conversion ratio (FCR) of white shrimp. The experiment was arranged by two factors, mature *Artemia* biomass supplemented at 3 levels of 5g; 10g; and 20g. 1) Drop in the net (N) and place in the nursery tank, mesh size 1000 µm, so that shrimp can only use small size *Artemia* to escape from the net. and 2) *Artemia* biomass was directly stocked (D) into the rearing tank as feed for shrimp culture at the same dose (5g; 10g; and 20g). PL10 shrimp is used to arrange for experiment, density of 1000 PL / m3, with volume of 0.1 m3 / tank, 4-week nursery period, Grobest No.0 shrimp feed is used for feeding 4 times / day and combination of fertilizing C: N (15: 1) biofloc using molasses. The results showed that when using biomass stocked in the net, nauplii *Artemia* was born as supplementary feed for the shrimp until the end, the average weight of shrimp: 1.14 g; 1.31 g; and 1.51 g, depending on the amount of additional *Artemia* biomass (N5, N10 and N20); While releasing *Artemia* directly into the nursery tank, all *Artemia* was consumed after 4; 5 and 7 days, and the average weight of shrimp obtained: 1.34 g; 1.35 g; 1.45 g (D5, D10 and D20). Shrimp growth was lowest in control treatments (0.91 g, Control) without *Artemia* biomass supplementation. The results showed a significant difference in feed conversion ratio (FCR) among treatments: N5- 1.37; N10-1.35; N20-1,27; D5- 1.37; D10-1.20; D20-1,36; Control- 1.56. The combination with 20g *Artemia* biomass showed the fastest growth (N20-1.51 g), with a low FCR of 1.27 and the best developed biofloc.

Keywords: *Litopenaeus vannamei*, *Artemia Franciscana*, Combination, Biofloc

P-NF-F01

Utilization of Fermented Maggot Meal in Artificial Feed for Fish Meal Substitution to Production and Nutrition Quality of Carp (*Cyprinus carpio*)

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Abstract

Maggot meal has a high protein content that can be used as an alternative substitution to fish meal in artificial feed. The objective of this study was to find and analyze the substitution of fish meal with fermented maggot meal in artificial feed to increase production and nutritional quality of carp (Cyprinus carpio). This study was conducted by experimental method using completely randomized design design with four treatments and three repetitions. The treatment applied in this study is the difference in dose of fish meal substitution with fermented maggot meal: A (0%); B (12.5%); C (25%); and D (37.5%). The primary data observed was Total Feed Consumption (TFC); Feed Utilization Efficiency (FUE); Protein Efficiency Ratio (PER); Specific Growth Rate (SGR); Survival Rate (SR); and nutritional quality. The highest results on substitution of fish meal with maggot meal in artificial feed had given a significant effect ($P < 0.05$) on FUE; PER; and SGR but had no significant effect ($P > 0.05$) on TFC and Survival Rate. The best dosage composition was in the treatment of 37.5% (D) of fermented maggot meal substitution which resulting in feed utilization efficiency of 75.66%, PER of 2.13%, SGR of 2.83% and the highest SR value of 91.11 ± 3.85%. The best nutritional quality was also in the treatment (D) at amino acid lysine, the highest amino acid lysine value was 36.52% and the highest linolenic fatty acid value was 23.06%.

Keywords: Artificial feed, Carp, Fermentation, Maggot meal, Nutrition quality

P-NF-F02

Effects of nucleotides inclusion in diet for Snakehead (*channa striata*)

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Abstract

This study was designed to determine the effects of nucleotides on growth, survival rate, feed utilization efficiency, immunology and stress response of snakehead (*Channa striata*). Snakehead fingerlings (~4 g/fish) were randomly distributed into 15 tanks (500 liters/tank), 50 individuals per tanks. Fish was fed with diets containing nucleotides. Experiment lasted for 8 weeks. Growth performance, feed utilization, immune and response parameters were investigated. After 8 weeks of feeding, the inclusion of nucleotides improved the growth performance. There was no significant difference in survival rate. Immunology, stress response and digestive enzyme were recorded. Primary findings reveal the application of nucleotides in diet for snakehead.

Keywords: Nucleotides, Snakehead, C*hanna striata*, Fermented soybean meal

P-NF-F03

Effects of Heat-killed *Lactobacillus plantarum* L-137 Supplemental Diets on Growth Performance and Immune Response of Striped Catfish (*Pangasianodon hypophthalmus*) in Fingerling Stage

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Abstract

This study was conducted to determine the effects of supplemental LP20 on growth performance and immune response in fingerling stage of striped catfish, Pangasianodon hypophthalmus. The LP20 contains 20% heat-killed Lactobacillus plantarum strain L-137 (HK L-137) and 80% dextrin in dried-weight basis. This experiment was conducted in Dong Thap province. The experimental period is 2 months. The experiment design was completely randomized with three feed treatments, three times replicated with difference LP20 concentrations: (i) 0 ppm of LP20; (ii) 100 ppm of LP20 (decreasing 50 ppm of LP20 at the beginning of second month); (iii) 100 ppm of LP20. Feed size was changed to suitable for fish, as a following: 0.8 mm (from 1^{st} to 10^{th} days); 1mm (from 11^{th} to 21^{th} day); 1.2 mm (from 22^{th} to 44^{th} day); from 45^{th} day use feed 1.5 mm. Fry catfish were randomly distributed into 12 hapas ($27m^2$/ hapa) in earthen pond with natural condition at a stock density of 300 ind/m^2 (2.1g/ind). Fish were fed adlibium all diets twice a day, feed were recorded to calculate FCR. Death fish were weighed and recorded for calculation Survival rate (SR) and Feed conversion ratio (FCR). Water be changed every day. Temperature is stable 30.4°C to 32.5°C, Oxygen and pH were measured by oxygen and pH meters. $N\text{-}NH_4$ and $N\text{-}NO_2^-$ also were measured every 2 weeks. All parameters were measured twice time a week in the same day (morning and afternoon). During culture period, data were collected 2 times. First time after 1 month and at the end of experiment. Final weight, specific growth rate (SGR), survival rate (SR), erythrocytes (RBC), leukocytes (WBC) and lysozyme were collected and analysed at the end of experiment period.

Keywords: *Lactobacillus plantarum* L137, Heat-killed, Fingerling, Growth rate, Immune

The Effects of Different Feed to Reproduction of Dwarf Snakehead *(Channa gachua)* (Hamilton, 1822)

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Abstract

The study on the effects of different feed on reproduction of dwarf snakehead *Channa gachua* (Hamilton, 1822) is carried out at Aquaculture Department in Can Tho University from April-November 2019. The objective of thesis is to find the kind of feed that is the best suits of the reproduction process of dwarf snakehead. The study was carried out on efffect of diets on snakehead spaning. The first experiment consisted with 3 treatments including different feed: Commercial feed with 40% crude protein, freshwater prawn, Commercial feed combined Prawn. Spawing parameters were counted with the number of eggs per spawn, fertilization rate, hatching rate and the number of days the broodstock recrudescence. The result when using prawn for feeding fish, the fecundity of *Channa gachua* was 398±126 eggs per spawned and the fertilization rate was 67.1%. At temperature 26.6-28.3^{o}C, the hatching rate was 52.1% and the broodstock recrudescence after 17±5 days.

Keywords: Dwarf snakehead, *Channa gachua*, Reproduction

P-NF-F06

Effect Of Live Feed (Catfish And Shrimp) On Growth *Hampala macrolepidota* Kuhl and Van Hasselt, 1823 From Sumedang District Jatigede Reservoirs Treated Recirculated

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Abstract

Hampal is a wild fish, with river habitat, a carnivore from the family cyprinidae, including a protected fish by the Least Concern criteria. Currently these fish are rarely found in several rivers of West Java, especially in the Citarum River, but in the upriver of the Cimanuk River there are relatively many and can adapt to the Jatigede Dam. The research aims to find the type of feed that produces the highest growth of fish and efficient feed, in order to preserve species through domestication with a recirculation aquaculcure system. The research was conducted from November 2017 to June 2018 at the Aquaculture Laboratory of the Faculty of Fisheries and Marine Sciences, Universitas Padjadjaran. Experimental research method with three treatments and three replications, feed given as much as 3% of fish biomass. The treatment consisted of: a combination of 50% shrimp and catfish, 100% catfish, and 100% shrimp, a completely randomized research design. Data were analyzed using quantitative descriptive analysis. Tools: fiber pool, case net and liftnet measuring mesh size 1.5 - 2 cm, the sum of fish caught were 115. Parameters measured include: daily growth, growth patterns, and feed efficiency.
The results showed that all types of feed influenced the growth of fish, the feed that produced the highest growth was catfish, which produced a growth rate of 2,070 □ 0.028%, feed efficiency 47.77 ± 0.468, and feed conversion 2.17 ± 0.01. Conclusion The

live catfish is the best type of feed for the growth of Hampala that is practically recirculated.

Keywords: Feed efficiency, *Hampala macrolepidota*, Daily growth rate, Recirculation, Jatigede reservoir

P-NF-M01

Effect of Different Diets on Growth of Sea Bass (*Lates calcarifer*) in Net Cage at the Palian Basin, Thailand

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Abstract

The experiment was aimed to compare on growth of sea bass with two difference diet viz; trash fish and commercial floating diet. The fish were reared in 2.25 m^2 net cage at the density 35 fish/m^2 at Palian Basin, Trang Province, Thailand from February – May 2019. After 3 months of feeding, the results showed that the sea bass fed on trash fish obtained better growth than fed with commercial floating diet (p<0.05). The final mean weights were 352.75±12.49 and 288.58±19.73 g. Mean lengths were 29.24±0.63 and 27.27±0.37 g. Specific growth rate were 1.81±0.03 and 1.58±1.27 % per day. Daily weight gains were 3.15±1.27 and 2.43±0.24 g. per day. Moreover, the water quality parameters during seabass culture in floating cage area comprised; transparency 80.0-197.5 cm, salinity 25-26 ppt, DO 4.5 - 9.5 ppm, Temperature 30-32 °C and pH 7.4-8.0 were recorded. However, all parameter showed the optimal level for aquaculture and the normal growth of seabass.

Keywords: Sea bass (*Lates calcarifer*), Diets, Growth

P-NF-M02

Rearing of Pompano (*Trachinotus blochii*) in Recirculating System at Different Diets

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Abstract

Pompano (*Trachinotus blochii*) rearing applying different diets in recirculating system was conducted in college of Aquaculture and Fisheries, Can Tho University from 11/2018 to 12/2018. The experiment was completely randomized with three treatments of different diets (trashfish, artificial feed and the combination of trashfish and artificial feed), each treatment consisted 4 replicates. Pompano (3.96 g/ind) were stocked at 30 ind/tank in recirculating system 500 liters/composite tank, salinity of 20‰. After 30 days of rearing, the growth rate of treatment fed artificial feed (0.24 g/day and 0.77 %/day) and combination diet (0.21 g/day and 0.42 %/day) were significant higher than growth rate of treatment fed trashfish ($p<0,05$). However, the survival rate reached 100% in three treatments.

Keywords: Rearing of *Pompano, Trachinotus blochii.* Recirculating system, Diet

P-NF-M03

In Silico Analysis of Bioactive Peptides Released from Giant Grouper (*Epinephelus lanceolatus*) Roe Proteins Identified by Proteomics Approach

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Abstract

Major proteins contained in dried giant grouper roe (GR) such as vitellogenin (from Epinephelus coioides; NCBI accession number: AAW29031.1), apolipoprotein A-1 precursor (from Epinephelus coioides; NCBI accession number: ACI01807.1) and apolipoprotein E (from Epinephelus bruneus; NCBI accession number: AEB31283.1) were characterized through compiled proteomics techniques (SDS-PAGE, in-gel digestion, mass spectrometry and on-line Mascot database analysis). These proteins were subjected to in silico analysis using BLAST and BIOPEP-UWM database. Sequence similarity search by BLAST revealed that the aligned vitellogenin sequences from Epinephelus coioides and Epinephelus lanceolatus share 70% identity, which indicates that the sequence sample has significant similarity with proteins in sequence databases. Moreover, prediction of potential bioactivities through BIOPEP-UWM database resulted in high numbers of peptides predominantly with dipeptidyl peptidase-IV (DPP-IV) and angiotensin-I-converting enzyme (ACE-I) inhibitory activities. Pepsin (pH > 2) was predicted to be the most promising enzyme for the production of bioactive peptides from GR protein, which theoretically released 82 DPP-IV inhibitory peptides and 47 ACE-I inhibitory peptides. Overall, this work highlighted the potentiality of giant grouper roe as raw material for the generation of pharmaceutical products. Furthermore, the application of proteomics and in silico techniques provided rapid identification of proteins and useful prediction of its potential bioactivities.

Keywords: Angiotensin-I converting enzyme (ACE-I), Giant grouper roe, In silico, Proteomic

P-NF-M04

Palm Oil-based Microdiets for Early Weaning of Asian Seabass *Lates calcarifer* Performances

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Abstract

Palm oil was incorporated in the microdiets formulated for Asian seabass larvae to replace dietary fish oil at 25%, 50% and 75% replacement levels with crude palm oil, CPO (CPO25, CPO50 and CPO75) and 50% and 75% with refined bleached deodorized palm olein, RBDPO (RBDPO50, RBDPO75). A fish-oil based microdiet was used as a control diet (FO100). Triplicate groups of fish larvae with initial length and weight of 5.54±0.34mm and 1.71±0.13 mg, respectively were fed with the .microdiets for 33 days. The growth performance of fish fed palm oil-based diets were significantly better than the control diet, with RBDPO75 yielded the best growth performance and feed conversion ratio. Nevertheless, the body proximate and fatty acid profile of the larvae were significantly affected by the dietary treatments. Considering the local availability of palm oil and its competitive price compared to fish oil, it is suggested that diets for Asian seabass larvae can be developed using palm oil as a source of dietary lipid.

Keywords: Microdiets, Weaning diet, Palm oil, Fish oil replacement, Asian seabass

Preliminary Study of Different Dietary Fat on Survival and Growth of Mangrove Crab

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Abstract

The effect of different dietary fat on survival and growth of mangrove crab, *Episesarma s*p., was evaluated. Formulated diets which contained various fat levels, 8%, 10%, and 12% were fed to the crabs. Each diet was randomly assigned to those crabs that were reared in plastic containers. The results indicated that there were no significant differences in the survival rate of the crab that fed with different fat levels (P>0.05). But, the high trend of survival was recorded when fed the crab with 12% fat formulated diet. When considering to growth, the growth rate of the crab was not significantly affected by the different dietary fat level (P>0.05). However, the better trend of growth rate was found in the experiment that fed with 10% fat diet. In summary, formulated diet with 8-12% fat can be used as a diet of this crab species.

Keywords: mangrove crab, *Episesarma sp.*, Fat level, Formulated diet

Aquatic Animal Health

Session: Aquatic Animal Health

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P-AH-A02

Low Density Polyethylene (LDPE) Degradability of Marine Polychaete Gut Derived Bacteria

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Abstract

Plastic is one of the important material for our daily life. It became high demand for consumer, which lead high quantities production of plastic in a factory. Polyethylene (PE) is one type of plastic/microplastic that has contributed to the ocean pollution. Since some marine invertebrate such as polychaete, which are belonging to lower trophic level, are indiscriminate feeders including microplastic, it is possibility that their gut bacteria have the ability to degrade the microplastic. The aim of this study is to isolate and identify the PE degrading bacteria from gut of polychaete, and evaluate the potential PE degradability based on physicochemical analysis such as Scanning Electron Microscope (SEM) and Fourier Transform Infrared Spectroscopy (FTIR) comparison of before and after cultivation with the degrading bacteria. There are two different bacterial species (Bacillus sp. PCA and Gebacillus sp. PC1) found two different genus of polychaetes (Namanereis sp and Namalycastis sp.) with degradability of polyethylene. Weight loss of PE sheet after 2 month culture was 9.8 ± 4.1% for PC1 and 14.0 ± 8.2 % for PCA. The SEM result showed both bacterial colonization on PE surface with rupture of the polyethylene. The FTIR result showed that there are differences of carbonyl group between control and bacterial treatment. These results suggest that that bacteria colonized on PE surface and degraded of PE as carbon source for growth.

Keywords: Bacillus, Geobacillus, Low Density Polyethylene (LDPE), Polychaete, Scanning Electron Microscope (SEM)

P-AH-A03

Impact of Bioencapsulated-Quorum Sensing Inhibitor Bacteria and Microalgae in *Artemia* towards White Shrimp *Penaeus vannamei* postlarvae

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Abstract

In our previous study, *Vibrio campbellii*, a common pathogenic bacterium in aquaculture was found to be virulent towards white shrimp *Penaeus vannamei* postlarvae. Furthermore, the virulence is also regulated by quorum sensing (QS), a bacteria cell-to-cell communication with Autoinducer-2 (AI-2) and Cholerae Autoinducer-1 (CAI-1) as the QS signal molecules that lead to the mortality of *P. vannamei* postlarvae. Since the uses of antibiotics in aquaculture greatly introduce new resistant bacteria, therefore quorum sensing inhibitor (QSI) is suggested as alternative probiotics through inhibition of QS signal molecules. This research was conducted to investigate the effectiveness of different probiotic bacteria (BpRotSA) and microalga (Chlorella) as QSI for *P. vannamei* postlarvae culture using the brine shrimp *Artemia* as live carrier. Four different feeding treatments (*Artemia* only-control, *Artemia-Chlorell*a, *Artemia*-BpRotSA, *Artemia-(Chlorella*+BpRotSA)) were conducted for 25 days using *Artemia* through bioencapsulation. The *Artemia* was then feed to 300 of *P. vannamei* postlarvae in 100L glass aquarium containing 12L seawater with aeration. Next, a challenge test was done using *V. campbellii* BB120 challenged to 50 of *P. vannamei* postlarvae in 7L aquariums with 3L of seawater. The survival of the *L. vannamei* was observed daily and the experiment was stopped when the control challenged with *V. campbellii* BB120 reached 50% mortality. The samples were then collected for gene expression study and histopathology analysis. The results showed that during the feeding trial, *Artemia* fed with BpRotSA showed increased in size and weight of *P. vannamei*. Higher survival was observed in *Artemia* fed with *Chlorella*. The combination treatment of *Chlorella* + BpRotSA showed high survival and increased in size of *P. vannamei* throughout the experiment. In challenge test survival showed all treatments significantly protected the *P. vannamei* compared to control leaded by Artemia-BpRotSA (72%), Artemia-(Chlorella+BpRotSA) (70%) and Artemia-Chlorella (66%). Expression of immune related gene showed prophenoloxidase I (ProPO I) was highly expressed in *P. vannamei* fed with Artemia-(Chlorella_BpRotSA) whereas gluthathione peroxidase (GPx) was highly expressed in *P. vannamei* fed with Artemia-BpRotSA. Overall, the results suggested that BpRotSA and *Chlorella* sp. can increase the size and improve survival of

P. vannamei postlarvae and in addition, BpRotSA can protect the postlarvae during the pathogenic infection. This study showed *Bacillus sp*. BpRotSA and *Chlorella* sp. can effectively be a potential QSI probiotic to improve the live feeds and aquaculture production.

Keywords: *Penaeus vannamei*, quorum sensing, quorum sensing inhibitor, probiotic, aquaculture, immune response.

P-AH-C01

Histopathology Study on Horseshoe Crab *Tachypleus gigas* Under Prolonged Captivity

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Abstract

Horseshoe crab's populations around the world are declining mainly due to habitat loss and production of *Limulus/ Limulus* Amoebocyte Lysate (LAL/TAL). Restocking horseshoe crab by captive breeding and rearing is considered as the most viable conservation approach. However, the main challenges in captive rearing and breeding are diseases caused by pathogens and parasites. During our captive and rearing activities, *Tachypleus gigas* kept in captivity for more than one year started to show clinical symptoms. Hence, this study aimed to investigate the pathological lesions in horseshoe crab, *Tachypleus gigas*. Three *T. gigas* with clinical signs were collected from captive breeding aquariums for histopathological studies. *T. gigas* were dissected and infected gill tissues were fixed in 10% (v/v) neutral buffered formalin. Tissues were stained using Hematoxylin - eosin (H&E) and examined under advanced microscope. Behavioural signs observed in infected *T. gigas* included lethargy and lack of appetite. Clinical signs observed on the body of captive *T. gigas* were mainly necrosis in the form of whitish and incomplete tissues. Histopathological examination revealed the presence of Protozoa in the digestive glands. Cytoplasmic vacuolization and hyperplasia were also observed. The histopathological findings explained the behavioural and clinical signs observed. The results also revealed that the health of our captive *T. gigas* are compromised and might die soon. Identifying these horseshoe crabs diseases in captivity and finding their causes is crucial in determining better husbandry conditions to breed and rear horseshoe crabs.

Keywords: Horseshoe crab, *Tachypleus gigas*, Captive breeding, Histopathology, Protozoa

P-AH-C02

Characterization and Identification of Probiotic Bacteria from the Gastrointestinal Tract of Whiteleg Shrimp *Litopenaeus vannamei*

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Abstract

Sabah has the highest annual whiteleg shrimp (*Litopenaeus vannamei*) aquaculture production in Malaysia. However, disease infection is one of big problem to whiteleg shrimp aquaculture. One of the promising control strategies is the usage of probiotic. Currently, the study on probiotic in Sabah is very limited. Therefore, this study aimed to characterize and identify potential probiotic bacteria from the gut of pond-cultured whiteleg shrimp in Tuaran, Sabah. Eight out of a total of twenty one isolates from TSA, Rogosa and MRS agar were screened out and designated as GS4, GS11, GS12, GS14, GS15, WS1, WS3 and WS5. However, only GS15 showed antagonistic activity to pathogen *Vibrio harveyi* and was selected as potential probiotic bacteria. GS15 was catalase positive, oxidase negative, had medium adhesion and aggregation activity that were crucial to colonize gut of whiteleg shrimp, was able to tolerate wide range of ammonia concentrations, salinity and pH and showed proteolytic activity, which may indicate bacteriocin production or help in protein digestibility in whiteleg shrimp. 16S rRNA gene sequencing revealed GS15 was *Bacillus cereus*. Besides being used to support disease management of *L. vannamei* aquaculture in Sabah, GS15 might help other penaeid shrimp species aquaculture or non-penaeid shrimp species as well.

Keywords: Preventive Strategies, Aquaculture, Shrimp Disease, Probiotic, Disease Management

P-AH-C03

The Stability of DnaK upon Encapsulation on Pellets and the Effects on the White Leg Shrimp *Penaeus vannamei* Immune Response and Tolerance against *Vibrio* challenge

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Abstract

Vibriosis, a disease caused by bacteria Vibrios affect many aquatic organisms used in aquaculture, including the White leg shrimp *P. vannamei*. Feeding aquatic organisms with bacterial heat shock proteins (Hsps) represents a new method to combat Vibriosis in aquaculture. In this study, *Escherichia coli* cells referred to as P3+, were grown and induced to produce DnaK-DnaJ-DrpE, the eukaryotic equivalent of Hsp70-Hsp40-Hsp20 prior to feeding them to *P. vannamei* via encapsulation in pellets. The efficacy of DnaK enriched shrimp feed to enhance survival and shrimp immune response were determined. Approximately $1x10^7$ cells/ml, $1x10^8$ cells/ml and $1x10^9$ cells/ml P3+ were sprayed on formulated pellets and the concentration of DnaK were determined upon storage at room temperature (RT). As revealed by Western immunoblotting, DnaK were present on pellets, with densitometry analysis revealed that DnaK concentration was 41.7ug for $1x10^9$ cells/ml, 34.8ug for $1x10^8$cells/ml and 11.64ug for $1x10^7$ cells/ml. Feeding Pellet P3+, as opposed to the control treatment, promoted the tolerance of *P. vannamei* against *Vibrio parahaemolyticus*. Survival was about 50-60% in control shrimp while *P. vannamei* fed with pellet containing DnaK has a survival of 86% on the first week of feeding and 83% on the second week of feeding. Quantitation by qRT-PCR revealed that crustin and prophenoloxidase mRNA increased upon feeding with pellets P3+, with these immune proteins stayed elevated for two weeks. Taken together, these results indicated that ingestion of bacterial Hsps, particularly DnaK, influences the immune status of *P. vannamei* and protection was perhaps regulated by the enhanced accumulation of these immune proteins. This study revealed that DnaK is potentially useful to enhance shrimp against bacterial infection, and this method serves as a useful alternative to the use of antibiotics in aquaculture.

Keywords: *P. vannamei*, *Vibrio Parahaemolyticus*, DnaK, Crustin, Prophenoloxidase

P-AH-C04

The Effects of Turmeric *Curcuma longa* On The Vibrio Load In Adult Brine Shrimp *Artemia*

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Abstract

The brine shrimp *Artemia* are the most widely used life food organisms in aquaculture. All life stages of *Artemia* can be used as feed, namely decapsulated cysts, nauplii, juvenile and adult. Adult *Artemia* are superior food for ornamental fish, seahorse and the Penaeid shrimp. But they are often contaminated by various pathogens such as Vibrios. Methods to produce Vibrio-free *Artemia* include the application of ozone gas and antibiotics but they are costly. In this study, the aqueous extract of turmeric, a medicinal plant known to possess anti-microbial and antioxidant properties, was tested for its efficacy to reduce vibrio load in adult *Artemia*. Incubation in 10g/L resulted in mortality, indicating that turmeric was toxic to *Artemia* at this concentration and beyond. Several bacteria other than *Vibrio* grew on TCBS agar. The number of bacterial growth (CFU/ml), isolated both from *Artemia* and the rearing water, did not reduce upon tumeric exposure, indicating that turmeric was ineffective in attenuating *Vibrio* growth during *Artemia* culture.

Keywords: *Artemia* biomass, *Curcuma longa*, Vibrio, Palm kernel cake, Antioxidant

Effects of Ozonation on The *Vibrio* Load of Adult *Artemia*

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Abstract

Artemia, commonly referred as brine shrimp, are important live food used in aquaculture. Though *Artemia* are superior, some disadvantages occur when using them as food. The typical feeding characteristics of *Artemia* by way of non-selective filter feeding, allows the uptake of bacterial *Vibrios* which are harmful to aquatic organisms. In this context, it is important to find an effective sterilization method to remove and reduce *Vibrio* load in *Artemia*. To date, several disinfection methods have been tested and these include the use of UV irradiation, formaldehyde and bioactive compounds. In this study, the efficiency of ozone gas to decrease *Vibrio* load in *Artemia* was examined, work which included investigating their effect on survival. Mortality was not observed upon ozone exposure, indicating that this gas was not toxic to *Artemia*. As revealed by agar plating, a 5 min exposure was sufficient to reduce 61.0x CFU to 3.5x CFU *Vibrio* load in *Artemia*. The increase in exposure time enhanced further the removal of *Vibrio*, with 1.0x remained upon 30 min exposure, the longest time tested in this study. These results indicated that ozone gas exposure is a potential method to reduce *Vibrio* load in *Artemia*, and further optimization on the protocol may assist in the development of a *Vibrio*-free *Artemia* product for use in aquaculture.

Keywords : *Artemia* biomass, Ozonation, Palm kernel cake, *Vibrio*

Antibacterial Effect of Postbiotic From Gut Bacteria of Whiteleg Shrimp *Litopenaeus vannamei* Against Aquaculture Bacterial Pathogens

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Abstract

Aquaculture is an important industry. However, it is susceptible to disease outbreak. Although antibiotic, phage therapy, vaccination, passive immunization and probiotic have proven effective in disease control, they all have limitations and disadvantages. Postbiotic is metabolite secreted by living bacteria or released after bacterial lysis that benefit the host physiologically. The application of postbiotic in aquaculture as disease control agent is still limited. Therefore, an experiment was designed to evaluate the antibacterial effect of postbiotic extracted from bacteria isolate from the gastrointestinal tract of *Litopenaeus vannamei* against aquaculture bacterial pathogens. Postbiotic was extracted from the cell-free supernatant of isolates P17 (*Enterobacter* sp.), P18 (*Bacillus thuringiensis*), P19 and P20 (*Lactobacillus plantarum*), P21 (*Staphylococcus* sp.) and P22 (*Bacillus cereus*) using ethyl acetate. The postbiotic from organic, interphase and aqueous layers were tested on aquaculture bacterial pathogens *Vibrio parahaemolyticus*, *V. harveyi*, *V. alginolyticus*, *V. anguillarum* and *Photobacterium damselae*, using agar well diffusion. Postbiotic from P20 showed the best antibacterial activity with postbiotic from organic and aqueous layers showed intermediate to strong inhibitory activity against *V. parahaemolyticus*, *V. alginolyticus*, *V. anguillarum* and *P. damselae*, whereas postbiotic from interphase layer inhibited *V. anguillarum* and *P. damselae*. Therefore, postbiotic extracted from P20 could be employed for disease control in aquaculture.

Keywords: Antibacterial, Aquaculture, Disease, Pathogens, Postbiotic

P-AH-C07

Application of *Bacillus* sp. NP5 and Honey through Feed to Increase Growth and Immune Response of White Shrimp *Litopeanaeus vannamei* against *White Spot Syndrome Virus* Infection

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Abstract

White spot disease caused by *White Spot Syndrome Virus* (WSSV) has a major impact on the decline of white shrimp production. Improving the immune response through the application of probiotic, prebiotic and synbiotic is expected to be one of the enviromentally friendly alternatives to prevent the disease. Therefore, this study aimed to evaluate the effect of *Baccillus* sp. NP5 probiotic, honey prebiotic and a combination of both (synbiotic) on growth enhancement and immune response of white shrimp upon WSSV infection. This study consisted of five treatments and three replications: positive control (control diet then challenged against WSSV), negative control (control diet, then injected with PBS), probiotic (feeding with the addition of *Bacillus* sp. NP5 probiotics then challenged against WSSV), prebiotic (feeding with the addition of honey prebiotic then challenged against WSSV), and (feeding with the addition of synbiotic then challenged against WSSV). White shrimp (average weight of 1.8±0.06 gram/shrimp) were reared at a density of 15 shrimps per aquarium (60 cm x 30 cm x 30 cm and water height of 20 cm) for eight weeks before challenged with WSSV at lethal dose (LD_{50}) dose of 0.1 ml per shrimp. The results showed that the growth and immune response of white shrimp after treatments of probiotic, prebiotic, and synbiotic were better than those in controls. The immune response and resistance of white shrimp after being challenge tested against WSSV also showed that probiotic, prebiotic and synbiotic treatments were better than controls, with the best results found in prebiotics treatment.

Keywords: *Bacillus* sp. NP5, Honey, Immune response, White shrimp, WSSV

Isolation and Characterization of Acute Hepatopancreatic Necrosis Disease (AHPND) Pathogen, *Vibrio* sp. From the Same Affected Shrimp Farm in Malaysia

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Abstract

Acute hepatopancreatic necrosis disease (AHPND) is one of the fastest emerging disease in shrimp aquaculture industry. AHPND imposed a serious threat to the shrimp production and globally it has been reported to caused USD 1 billion loss in the shrimp industries. Based on a recent AHPND case reported in our local shrimp farm located at Terengganu, Malaysia, we aimed to isolate, identify and characterize the causal agent of AHPND. The Vibrio isolates were first screened with AP4 primers, then identified based on phenotypic observations and molecular characterization. Screening of selected virulence genes, antibiotic susceptibility test, and virulency study of the isolates using Artemia sp. as challenge model were carried out to further distinguish each isolates. Six positive AHPND isolates were found in this study where four of them were identified to be *V. harveyi* and another two were *V. parahaemolyticus*. All the isolates appeared to be susceptible against tetracycline. *V. parahaemolyticus* (C2A, C4B) showed higher virulency than *V. harveyi* (CIB, C2B, C4A, D5) when tested in Artemia sp. challenge study. This study hinted that, in Malaysia, both *V. parahaemolyticus* and *V. harveyi* could both be the pathogen that caused AHPND outbreak in local shrimp farm.

Keywords: *Vibrio parahaemolyticus*, *Vibrio harveyi*, AHPND, Shrimp, Isolation, Characterization

P-AH-F01

Prevalence of Tilapia Lake Virus (TiLV) in Wild Tilapia (*Oreochromis* sp.) and Other Wild Species at a Man-Made Lake in Malaysia

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Abstract

Malaysia is rich with wild freshwater fish species that inhabit all the lakes, rivers and ex-mining pools. Most of these fish, such as black tilapia (*Oreochromis spp.*), catfish (*Clarias spp.*), snakehead (*Channa spp*), river catfish (*Mystus spp.*), river carps (*Puntius shwanenfeldii*) and climbing perch (*Anabas spp.*), are being caught for self-consumption. In June 2017, a report of mass mortality was received by the fisheries authority involving wild fish in a man-made lake at northern part of Malaysia. The mortality rate was highest in black tilapia, followed by river carps. Other species such as catfish, shrimp and peacock bass were also affected but at a very low rate. The diagnosis revealed that the mortality especially in tilapia and river carps were caused by TiLV. Hence, a one year monitoring period (March 2018 – March 2019) was set up to look for the exposing or risk factors involved in the occurrence of TiLV in this lake. The RT-PCR results showed that the prevalence of TiLV in tilapia and river barbs were consistent throughout one year period. The samples of other species such as java barb (*Puntius gonionothus*) were also positive, whereas the samples of freshwater crustaceans found in this lake were negative until this report is made. TiLV is an emerging disease in aquaculture and here we reported the TiLV detection in a non-tilapia species, the river carp and java barb, thus, further epidemiology study is being conducted to confirm the TiLV in other wild species at this lake.

Keywords: Tilapia Lake Virus (TiLV), Man-made lake, *Oreochromis* sp

P-AH-F02

Condition of Red Tilapia Broodstock After One-year Post-infection With Tilapia Lake Virus (TiLV)

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Abstract

Tilapia aquaculture has been affected by many pathogenic diseases, mainly caused by bacterial diseases (Streptococcosis) and recently by viral disease known as Tilapia Lake Virus (TILV). In February 2018, during fish health monitoring of red tilapia broodstock at one earthen pond showed 50% of broodstock were infected with TiLV and 80% in the following month. Both of broodstocks were also found to have co-infected with bacteria, *Aeromonas hydrophila* and parasite, *Trichodina* sp. Sub-clinical signs with no mortality were reported throughout the culture period until October 2018. Four incidences of fish mortalities were recorded within 2 weeks in the month of October with 40% of the broodstock detected positive with TiLV and co-infection of bacteria *Aeromonas hydrophila* & *Plesiomonas shigelloides* and parasite, *Trichodina* sp. Clinical signs were observed on the broodstock with 60% having scale drop and hemorrhage in the pond with low dissolved oxygen (2.0ppm) and temperature of 29-29.6^{o}C. After October 2018, no mortality was reported. However, the broodstock was reported TiLV positive with a prevalence of 10 in March 2019.

Keywords: Tilapia Lake Virus (TiLV), *Aeromonas hydrophila*, Red Tilapia, Broodstock, Mortality

P-AH-F03

Effects of Guava Extract (*Psidium guajava*) Some Hematological Parameters and Survival Rate Under Elevated Temperature of Striped Catfish *(Pangasianodon hypophthalmus)*

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Abstract

This research was carried out to evaluate the temperature tolerance of striped catfish fingerlings (Pangasianodon hypophthalmus) through the survival rate and some hematology parameters such as red blood cells (RBCs), Hemoglobin, Hematocrit, MCV, MCH, MCHC when supply extract of guava leave (Psidium guajava) in feed. (1) Study on the effect of the extract of guava leaves (Psidium guajava) was supplied in feed on the growth and some hematology parameters of striped catfish fingerlings (Pangasianodon hypophthalmus), including 2 treatments 0% and 0.2%; blood samples were collected on days 0, 21 and 42 to measure some hematology parameters; (2) Study on temperature tolerance through some physiological parameters in the blood of striped catfish fingerlings (Pangasianodon hypophthalmus) was fed guava extracts (Psidium guajava) at 0.2% concentration, including 6 treatments at 27; 31; 35^{o}C with 2 supplemental dietary of guava extracts (0% and 0.2%), blood samples were collected at day 0, day 1, day 3, day 7 to measure hematology parameters. The result indicated that after 42 days, fish used feed that supplied guava extract 0.2% had survival rate higher than in control experiment ($P<0.05$). RBCs ($3.02\pm0,74x\ 10^6$ cells/mm^3), hematocrit (35.76±7.07%), hemoglobin concentration, MCV MCH, MCHC higher than control treatment ($p>0.05$). In terms of leucocytes, treatment with 0.2% guava extract ($221.2\pm87.07\ 10^3$ cell/mm^3) was significant difference ($p<0.05$) with control treatment. When being challenged by elevated temperature, treatments that supplied 0.2% guava extracts in feed with erythrocyte density, hematocrit, MCV, MCH was not significantly different in the control treatments ($p> 0.05$) at each sampling time. On day 7, the hemoglobin concentration of the guava treatment at 0.2% at three temperatures of 27, 31, 35°C was significant difference with guava treatment 0%-27°C (3.54±0.64 mmol/L; MCHC in the feed of the control experiment at 27^{o}C (11.54±3.04%) was significant difference with at 35^{o}C (18.34±1.94%) ($p<0.05$). Therefore, dietary supplemental guava extract have effects on hematology parameters of striped catfish under elevated temperature.

Keywords: *Psidium guajava, Pangasianodon hypophthalmus*, Hematological parameters, Temperature, Survival rate

Range Findings of Zinc Sulphate Heptahydrate ($ZnSO_4.7H_2O$) Lethal Concentration for Acute Toxicity Studies of Zinc to Juvenile Red Tilapia

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Abstract

A study is conducted to determine the ranges of lethal concentration of Zinc Sulphate Heptahydrate (ZnSO4.7H2O) for acute toxicity of zinc to juvenile red tilapia. Zinc stock solution was prepared from dissolving salts Zinc Sulphate Heptahydrate ($ZnSO_4.7H_2O$) with deionized water and diluted to desire concentration (0, 1, 3, 5, 7, 10, 20, 30, 40, 50, 60, 80 mg/L). Six fish used for each concentration and the mortality of the fish is recorded at 24, 48, 72 and 96 hours of study. The In-situ water parameter is measured using analytical probes and recorded for every 24 hours. The determination of lethal concentration is done using Probit Analysis using IBM SPSS Statistic software. Lethal concentration of $ZnSO_4.7H_2O$ that cause 50% mortality (LC_{50}) is determined to be 48.710, 39.989, 34.580 and 33.057 mg/L for 24, 48, 72 and 96 hours respectively. Meanwhile, the lethal concentration that causes 99% mortality (LC_{99}) is determined to be 116.704, 108.689, 76.158 and 69.868 mg/L for 24 24, 48, 72 and 96 hours respectively. Therefore, for 100% lethal concentration is assumed to be around the lower and upper boundary of the LC_{99} value. The relationship between concentration of zinc and In-situ water parameter is analyzed using correlation analysis. Significant negative correlation is shown with pH while for significant positive correlation is shown with conductivity and turbidity. The relationship with dissolved oxygen is shown is negative correlation but it is not significant while there is no relationship with salinity of the water. The result shows that the lethal concentration of $ZnSO_4.7H_2O$ is decreased over time indicate the low concentration could become lethal to juvenile red tilapia is exposed for longer period of time.

Keywords: Zinc sulphate heptahydrate, Acute toxicity, Red tilapia

Prevalence of *Anisakis* Infection on Bigeye Scad (*Selar crumenophthalmus*) at Indian Ocean Southern Coast of East Java

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Abstract

This study aims to determine the prevalence, the intensity of infection and target organ infection anisakis in the fish bigeye scad (*Selar crumenophthalmus*) from the Indian Ocean Southern Coast of East Java. A total of 114 samples were collected in March-April 2018. Each sample was measured its length and weight, and then examined for anisakis larval observation in the abdominal cavity, gastrointestinal tract, internal organs and muscle. The results showed that the bigeye scad was susceptible to be infected by anisakis nematodes with relatively high in prevalence and mean intensity (P=75.44%, I= 10.38 larvae per-individual). Mostly of anisakis larvae were found in the body cavity (71.44%), whereas in other organs were found in relatively low prevalence, i.e. digestive tract (10.30%), gonads (8.96%), liver (5.15%) and muscle (4.14%). The presence of anisakis larvae with high prevalence and intensity might be indicates a considerable risk of decreasing product quality, economic impact and implications for human health.

Keywords: Prevalence, Infection, *Anisakis*, *Selar crumenophthalmus*, Indian Ocean

P-AH-M02

Infection of Anisakis on Belanger's Croaker (*Johnius belangerii*) at Southern Coast Yogyakarta Special Territory

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Abstract

Anisakis nematodes belonging to the Anisakidae family are frequently found in marine fish. This study aimed to determine the prevalence an mean intensity of Anisakis larvae infection on Belanger's croaker (*Johnius belagerii*) on Southern Coast of Yogyakarta Special. In total, 125 fishes were collected from fisherman. Each fish sampled was measured for total length and body weight, then examined for Anisakis larvae infection at abdominal cavity, gastrointestinal tract, gonad, liver, and muscle. The results showed that Belanger's croaker was susceptible to infection by *Anisakis* larvae at moderate level (49,6%), with the mean intensity was 6,0 larvae/individual. All of larvae were found in the abdominal cavity (100%) and was not found in other parts of the body. The presence of Anisakis with a relatively moderate prevalence and low intensity indicates a relatively small risk to economic impact and human health implication.

Keywords : Anisakis, Belanger's croaker, Intensity, Prevalence, Yogyakarta

Prevalence and Infection Intensity of *Anisakis* in Shortfin Scad (*Decapterus macrosoma*) on the Southern Coast of Yogyakarta Special Territory

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Abstract

This study aims to determine the prevalence, the mean intensity, and the target organ of infection of anisakis larvae in the shortfin scad (*Decapterus macrosoma*) from the Southern Coast of Yogyakarta Special Territory. In total, 106 fishes were collected from the fisherman, during May-June 2019. Each fish sample was measured for total length and body weight. Anisakis larvae examination was conducted at abdominal cavity, digestive tract, gonad, liver, and muscle. The result showed that the shortfin scad was infected by anisakis larvae with low prevalence and mean intensity of infection (P= 19,81%, MI= 2,19 larvae/individual). All of the larvae were found in the digestive tract (100%).

Keywords: *Anisakis*, Fish, Infection, Prevalence, Shortfin scad

P-AH-M04

Javanese medaka (*Oryzias javanicus* Bleeker, 1854) as Potential Model Organism for Aeromoniasis and Vibriosis study in fish

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Abstract

Javanese medaka is a small tropical fish that has been widely used as a test organism in ecology, toxicology and ecotoxicology, but less in fish-pathogen related study. This study evaluates the capability of Javanese medaka as an alternative model organism for aeromoniasis and vibriosis study in fish. Javanese medakas were infected with different concentrations of *Aeromonas hydrophila*, *Vibrio alginolyticus* and *V. harveyi* via intraperitoneal (IP) and immersion (IMM) routes. Following the infections, the $LD_{50\text{-}240h}$ of all bacteria to Javanese medaka were observed lower in IP, compared with IMM route. In IP route, the $LD_{50\text{-}240h}$ ranged from 2.1×10^4 CFU/mL for *V. harveyi* to 2.5×10^7 CFU/mL for *A. hydrophila*. However, for IMM route, the range was from 6.6×10^7 CFU/mL for *V. harveyi* to 1.1×10^9 CFU/ mL for *V. alginolyticus*. The clinical signs, gross lesions and histopathological changes of Javanese medakas infected by either IP or IMM routes of all the pathogens were similarly observed in the real host of the pathogen. Moreover, in IP route, most of the fish mortalities (88.9%) were observed within ≤ 120 hours post infection (hpi), while for IMM, most of the mortalities (50.6%) were witnessed beyond 120 hpi, indicating the acute infection for IP compared to IMM route. This study highlights the potential utilization of Javanese medaka as another valuable in vivo model organism for bacterial diseases study in fish.

Keywords: Aquaculture, Fish diseases, Javanese medaka, Test organism

Effect of DNA Vaccines on the Immune Genes Expression of Koi Fish *Cyprinus rubrofuscus*

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Abstract

Koi carp is an ornamental fish that has a high demand in the world, but its production is experiencing obstacles that are one of which is caused by an infectious disease of Koi Herpesvirus (KHv). Diseases caused by KHV can be prevented by vaccination, one of which is by using a DNA vaccine. This study aims to evaluate the use of anti-KHV GP-11 and GP-25 vaccines against the expression of immune genes and white blood cell counts with different doses. The vaccine and dosage used in this study were GP-11 with a dose of 7.5 µg / 100 gr fish (A), 12.5 µg / 100 g fish (B) and GP-25 vaccine with a dose of 12.5 µg / 100 g fish (C). The fish used were koi with an average weight of 28.55 ± 0.98 g. Fish were kept for 28 days after vaccination. Genes that measured their expression levels after vaccination were IgM, IFNγ, and TNFα genes. Immune genes isolated from kidney organ. Gene isolation and blood sampling were carried out on day 0, day 7, day 14, and day 28 after vaccination. The results showed that all vaccination treatments can increase the number of white blood cells until the 7th day post-vaccination. TNFα and IFNγ gene expression increased after administration of anti-KHV DNA vaccines both GP-11 and GP-25. In general, both of them produced the highest expression on the 14th day post-vaccination in all treatments. The GP-11 DNA vaccine with a dose of 7.5 µg / 100 g was able to increase the highest IgM expression at the end of the observation, on the 28th day. Immune gene expression is synergistic, which begins with the activation of non-specific immune genes represented by TNF and IFN. After the expression of the two genes it decreased, followed by an increase in the expression of specific IgM genes.

Keyword: DNA vaccine, Koi, Immune gene

P-AH-V03

Efficacy of Feed-based Bivalent Vaccine Against Streptococcosis and Motile Aeromonad Septicemia (MAS) in Red Tilapia, *Oreochromis* spp.

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Abstract

Streptococcosis and Motile Aeromonad Septicemia (MAS) are important diseases of tilapia, *Oreochromis* spp. and causes huge economic losses throughout the world. This study aimed to evaluate a feed-based formalin-killed cells (FKCs) bivalent vaccine against *Streptococcus* sp. and *Aeromonas* sp. in red tilapia. In this study, a total of 1,050 red tilapia of 61.23 ± 4.95 g were divided into 5 groups with triplicates. Five groups of tilapia were vaccinated orally with bivalent mixture of *S. iniae* and *A. hydrophila* vaccine sprayed on feed (Divalent Spray, DS group), divalent vaccine incorporated in feed (Divalent Formulate, DF group), monovalent *S. iniae* vaccine incorporated in feed (MS group), monovalent *A. hydrophila* vaccine incorporated in feed (MA group) and non-vaccinated as a control group. The vaccine was orally administered on weeks 0, 2 and 6 applied feed-based bacterin at 5% bodyweight. During the course of experiment, serum, mucus and gut lavage fluid were collected on weekly basis up to 16 weeks to evaluate the antibody levels via indirect ELISA. The results showed that tilapia immunized with bivalent formulate (DF group) achieved a strong and significantly ($P<0.05$) higher IgM antibody response in serum, gut lavage fluid and mucus samples compared to the control group. After bacterial challenge through *intraperitoneal* (ip), a relative percent survival (RPS) of $80.00 \pm 9.43\%$ (challenged with *S. iniae*), $76.67 \pm 4.71\%$ (challenged with *A. hydrophila)* and $76.67 \pm 4.71\%$ (challenged with both bacteria) were observed in the group immunized with bivalent formulate (DF group), which were significantly higher ($P < 0.05$) than RPS obtained in the other groups. Results show that feed-based bivalent vaccination is an efficacious treatment for the prevention of Streptococcosis and MAS outbreaks throughout the tilapia culture period.

Keywords: Red tilapia (*Oreochromis* spp.), Bivalent vaccine, Feed-based, *Streptococcus iniae*, *Aeromonas hydrophila*

P-OT-06

Preliminary Study on the Antimicrobial Activities of Soil Fungi and Identification of Fungus MP-09 from Kyaungon Township, Ayeyarwady Region, Myanmar

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Abstract

Antimicrobial activities of soil fungi were determined at the Microbiology Laboratory of Botany Department, Pathein University. A total of five different soil samples were collected from five different villages at Kyaungon Township, Ayeyarwady Region. The isolation of soil fungi were carried out by using Direct inoculation method and Physical treatment dilution method. In this study, a total of ten soil fungi were isolated from five different soil samples. Based on the results of antimicrobial activities, fungus MP-09 was selected especially against on *Salmonella typhi*. This fungus MP-09 was then identified based on the methods of Corlett, M. (1995): and Taxonomic studies of fungi, Mycotaxon, 31, Domsch, K. H., W. Gams., and T. H. Adserson. (1993): Compendium of fungi, vol 1,Hanlin, T. Richard. (2001): Combined keys for fungi, Ando and Inaba (2004). Taxonomy of fungi andBarnett, H. L. (1956): Imperfect Fungi. According to the results from analysis, this fungus MP-09 was identified as fungi imperfect *Cladosporium herbarum.*

Keywords: Antimicrobial activities, *Cladosporium herbarum,* Soil fungi, *Salmonella typhi*

Fisheries Socioeconomies, Gender, Education and Extension

Session: Fisheries Socioeconomies, Gender, Education and Extension

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2	**Financial Benefits in the Development of Shrimp Pond in Coastal Area of Kulonprogo District Daerah Istimewa Yogyakarta** Sukardi[a*], Bambang Triyatmo[a], and Rustadi[a]	**P-FS-C01**
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4	**Climate Change and Coastal Resiliency: Millennials Shoring Up Stakeholders' Positive Behaviors Towards Marine Sanctuaries' Conservation and Protection in San Joaquin, Iloilo, Philippines** Ma. Novem Grace Ylayron[a*], Jose Rene M. Sansait[b], and May M. Sansait[c]	**P-FS-M01**

P-FS-A01

Assessing Response and Preparedness of Local Communities in the Philippines to the Occurrence of Invasive Mussel Species

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Abstract

In recent years, two mytilid species have started to emerge particularly in Luzon Island, Philippines. One of the species seemed to be more successful in colonizing new habitats and appeared to have competitive advantage over other bivalves that were traditionally farmed. As a result, green mussel and oyster farmers complained that the invasive species had taken over their culture systems resulting to reduction of shellfish harvests. This study aimed to examine the response of local communities towards the occurrence of new mussel species through site surveys, focus group discussions and key informant interviews conducted from April 2018 to June 2019. Results showed that response of local communities varied. In non-traditional culture sites, the new species was generally welcomed by local fishers as it provided food and livelihood opportunities. In traditional culture sites, response of local communities was generally negative as the new species is not regarded as food potential and livelihood from culture of green shells and/or oysters were affected. Preparedness of local officials appeared to be low probably as a result of lack of policies and coordination among appropriate authorities. A review of the legal framework that governed the issue of invasive species was also performed. Gaps in the legal framework and relevant institutions were identified. These results provide useful information to address the invasive nature of the new mytilid species and other potential invasive species.

Keywords: Aquaculture; Fisheries management; Governance; *Mytella charruana*; Shellfish

P-FS-C01

Financial Benefits in the Development of Shrimp Pond in Coastal Area of Kulonprogo District Daerah Istimewa Yogyakarta

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Abstract

Study on the financial benefits in the development of shrimp ponds in coastal Kulon Progo district has been done on April to June in 2017. The purpose of research is to know the income of the farmer, the cost structure and revenue and the cost of the production. Descriptive method is done in this research, and the location of research is determined by purposive. Location of research is determined by purposive that is at Galur and Temon sub district. Respondents were determined by stratified sampling method, with 3 strata of pond, each less than 1000 m^2, 1000-1500 m^2 and more than 1500 m^2. The conclusions of this studi indicated that the income of shrimp pond farmers with an area of less than 1,000 m2 or an average area of 684 m^2 is Rp 27,954,747,- ; with 1,000-1500 m^2 or with an average of 1,180 m^2 of Rp 65,699,625,- and ponds with an area above 1,500 m^2 or an average of 1,940 m^2 of Rp 111,306,955,- .The cost of production from small to large strata amounted to Rp36,236,359,- ; Rp 61,633,527, - and Rp 79,506,021,- . Production cost per 1 kg of shrimp from small to large strata of Rp 48,410,- ; Rp 41,707,- and Rp 34,409,- respectively.

Keywords: Farmer, Income, Pond, Shrimp

P-FS-F01

Eel Ecosystem Conservation in Cimandiri Watershed, Indonesia

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Abstract

Indonesia has nine species out of a total of 18 species of eel (*Anguilla* spp.). One area that has the potential and high activity of catching eel is Pelabuhan Ratu Bay, Sukabumi District at South Coast of Java Island especially in Cimandiri Watershed. However, the results of glass eel capture in estuary area of the Cimandiri River during its peak season have been decrease since 1995 due to changes in the dry and rainy season, the construction of the power plant, the condition of the river estuary due to pesticides and increased fishing activities. This study will therefore support development and/or improvement of land management plan, specifically Land-Use Plan at District level or Regency for incorporation of biodiversity concerns for (critical) inland aquatic ecosystems (eel fisheries) in Cimandiri Watershed. By using stakeholder analysis and identication of suitable area of eel ecosystem, the classification of area that need to be protected can be known. The result showed some subdistricts that need to be protected for eel ecosystems conservation.

Keywords: Eel, Fisheries, Cimandiri Watershed, Land management, Sukabumi District

P-FS-M01

Climate Change and Coastal Resiliency: Millennials Shoring Up Stakeholders' Positive Behaviors Towards Marine Sanctuaries' Conservation and Protection in San Joaquin, Iloilo, Philippines

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Abstract

Contrary to the conventional preconception associated with the millennials, here they are at the forefront of coastal protection, gearing their energies towards the sustainability of 24 marine sanctuaries in San Joaquin, Iloilo – thus, enabling fisher folks to become resilient before climate change and other vulnerabilities. This report is an output of one of the many activities done by the UP Ichthyophilic Society, a college-based organization, and UP San Joaquinhons, a university-wide organization that seeks to engage the youths to care and to protect their environment. At the core was the two-day workshop of the stakeholders who were mainly the millennials as well, from whom behavioral patterns, knowledge and different levels of perceptions were sought. Research implications point to the need to improve the stakeholders' understanding of the interrelated concepts that define coastal ecology. Similarly, educational inputs and workshops should include understanding of the precariousness of coastal resources and their real immediate effect to marine sanctuaries and to livelihood in order to increase levels of sensitivity and cooperation.

Keywords: Marine sanctuary, Resiliency, Millennials, Coastal resources, Fishing village

Postharvest, Fish Product and Food Safety

Session: Postharvest, Fish Product and Food Safety

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13	**Solar Irradiation as an Alternative Bleaching Process for Agar Extracted from *Gracilariopsis heteroclada* in Iloilo, Philippines** Leonilo F. Endoma Jr.[a,b*]; Loda M. Nacional[a], and Ma. Rovilla J. Luhan[c]	**P-PH-S01**

P-PH-A01

Real Time PCR Assay for the Detection of 4 Foodborne Pathogens in Mussels and Oysters and its Culture Environment

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Abstract

Shellfishes such as mussels and oysters, are known to be filter feeding organisms. They can accumulate and concentrate pathogenic microorganisms which are present in its culture environment. The ingestion of raw or undercooked contaminated shellfish poses a public health concern to consumers. Some of the most common foodborne pathogens associated with illnesses related to shellfishes are *Escherichia coli*, *Salmonella typhi, Vibrio cholerae,* and *V. parahaemolyticus.* The microbiological standard methods for detection of these bacteria are time-consuming, labor intensive, and sometimes unreliable. Consequently, there is a need for an alternative rapid, culture independent, and reliable method for their detection. In this study, real time PCR protocols have been developed with designed primers based on specific genes for the detection of the *V. parahaemolyticus*, *V. cholerae, S. typhi*, and *E. coli.* The assays target to amplify the 137 bp fragment of hylA gene, 135 bp ttr gene,125 bp tlh gene, and 144 bp gene, respectively. The results indicate that the real time PCR assays were able to amplify the target genes from the all the tested mussels, oysters, and environmental soil and water samples ranging from 10^1 to 10^4 gene copies. Furthermore, the melt curve analysis and gel electrophoresis confirmed the specificity of the assays. Thus, this protocol can be used as a tool for the fast and reliable detection of pathogens to ensure safe consumption of shellfishes.

Keywords: Food safety, Foodborne pathogens, Real time PCR, Seafood

P-PH-A02

Isolation and Identification of Bacteria in Low-Salt Fermented Green Mussel *(Perna viridis)*

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Abstract

Fermented seafood products are widely produced and consumed in Asia. The use of green mussel (*Perna viridis)* as raw material for this process is currently given much attention in research due to its high protein content, potential of extracting bioactive compounds and isolation of bacteria strains with potential biotechnological applications. This study aims to identify the bacterial strain isolated from low-salt fermented green mussel (*Perna viridis)* using various morphological and biochemical tests. Further, this work will determine the generic distribution of bacteria in low-salt fermented mussel during 30-day fermentation. Fermented mussel sauce was made with a mussel-to-salt ratio of nine is to one (9:1 by weight). Results showed that isolates obtained from low-salt fermented mussel were *Corynebacterium sp.*, *Staphylococcus sp.*, *Micrococcus sp.*, *Pseudomonas sp.*, *Streptococcus sp.* and *Lactobacillus spp* throughout the 30- day fermentation period. Furthermore, *Staphylococcus sp.* and *Corynebacterium sp.* were the dominant genus throughout the 30-day study period, which could be attributed to their ability to tolerate high salt medium. These results give information on the occurrence of bacteria overtime or throughout the fermentation period.

Keywords: Fermentation, *Perna viridis*, Low-salt fermented mussel, Biochemical test, *Lactobacillus spp.*

P-PH-A03

Effects of Hydrogen Peroxide Washing on Chemical and Microbiological Properties of Squid (*Loligo* spp.)

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Abstract

The whole squids (*Loligo* spp.) were washed with different hydrogen peroxide (H_2O_2) solutions. The effects of 0.25%, 0.5%, 1% H_2O_2 and no-H_2O_2 solutions on washing the total volatile basic nitrogen (TVB-N), triethylamine (TMA-N), total bacteria count and pathogenic bacteria (coliform bacteria and *Escherichia coli*) of raw and cooked squids were evaluate during a cold storage for 20 days. Washing with H_2O_2 reduced noticeable changes in TVB-N, TMA-N, total bacteria count, especially when compared with no-H_2O_2 washing. The shelf-life of raw squid washed with 0.25%, 0.5%, 1% H_2O_2 were 6, 8 and 12 days, respectively and that of cooked squid washed with H_2O_2 was at least 16 days, based on the microbiological test results. In comparison, the shelf-life of raw and cooked samples washed by no-H_2O_2 solution were 2 and more than 16 days, respectively. In terms of the enhancement of chemical and microbiological properties, H_2O_2 washing was the most effective in controlling quality changes in raw and cooked squids and washing with 1% H_2O_2 could bring high effectiveness when applied to the aquatic industry with lowest TVB-N, TMA-N and total bacteria count.

Keywords: Squid, Washing, Hydrogen peroxide, Chemical properties, Microbiological properties

P-PH-C01

The Utilization of Giant Fresh Water Prawn Shell from Local Restaurant Waste as Source of Chitosan

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Abstract

Giant fresh water prawn (*Macrobrachium rosenbergii*) is one of Indonesian fresh water fisheries commodity with Yogyakarta as one of its farming center. The main utilization of this prawn is for culinary with utilize only meat so the shell becomes waste. This research was done to observe the production process to produce chitosan from giant fresh water prawn shell (*Machrobrachium rosenbergii*). Chitosan was made through four steps which were demineralization, deproteinization, decoloration and deacetylation. Demineralization was done using 2N HCl at room temperature with 7 treatments on HCl changing which were 1 to 7 times. The demineralization steps resulted on decreasing of calcium content from 34.55±5.8% to 0.071±0.07% by 7 times HCl changing. The resulted chitin then continued to deacetylation process by using 1:20 (w/v) 50% NaOH at 100^{o}C with 10 treatments which were 1 to 10 times NaOH changing. The degree of deacetylation (DD) of chitosan was measured by using Fourier-transform infrared spectroscopy (FTIR). Results showed that the optimum DD was achieved by 8 times NaOH changing with value of 92.75%. This high DD chitosan could prove particularly suitable for wide range of application especially for industrial and medical/analytical applications.

Keywords: Chitosan, Degree of deacetylation, Giant fresh water prawn shell

Chemical Use and Farming Practice of Intensive White-leg Shrimp (*Litopenaeus vannamei)* Aquaculture in Ca Mau, Vietnam

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Abstract

The study was done through interview of 133 whiteleg shrimp farmers in Phu Tan Cai Nuoc and Dam Doi District, Ca Mau province, Vietnam in order to investigate the chemical use, disease occurrence and farming practice. The interviewed farms divided as earthen ponds (58) and supper intensive system with pond liner (75). Pond liners are characterized with high stocking density (>150 shrimp/m^2), high water exchange rate and possession of a series of water treatment system ponds. Results showed that the most common shrimp disease are liver disease (56.9 and 38.7% farmers reported) and white feces disease (41.4 and 25.3% reported). The commonly used antimicrobials were ciprofloxacin (17.2 and 14%), cotrim (22.4 and 17.3%) and oxytetracycline (18.9 and 22.7%). Most of used antimicrobials were belonged to the allowed listed issued by Ministry of Agriculture and Rural Development, except enrofloxacin banned in 2012 and ciprofloxacin banned in 2016. Thus, there is an urgent need to provide training to shrimp farmer to enhance knowledge on effectiveness use of chemicals, guarantee the food safety for the final product.

Keywords: Antimicrobial, Chemical, Intensive, Whiteleg shrimp

P-PH-F01

Effect of Guava Leaves *Psidium guajava* Extracts on the Quality of Snakehead (*Channa striata*) Fillets During Ice Storage

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Abstract

The effect of guava leaves *(Psidium guajava)* extracts on the quality of snakehead *(Channa striata)* fillets during iced storage was investigated. The study included three treatments: (i) 32 fillets (80-90 g) were soaked in cold water (control sample), (ii) the fillets were treated with guava leaves extract at concentration of 5.04 µg/mL, and (iii) guava leaves extract of 312 µg/mL. All treatments were soaked for 30 minutes at 4^{o}C. Fish fillets were stored with fish and ice ratio of 1:1. Sampling was done at 1, 4, 8 and 12 days of storage. Changes in fish quality were evaluated through total aerobic bacteria count, sensory property, texture, moisture, color, water holding capacity, total volatile base nitrogen, peroxide value, thiobarbituric acid reactive substances, temperature and pH during storage. Results showed that, adding guava leaves extract, the sensory value of the product was improved compared to that of the untreated sample during cold storage. In addition, guava leaves extracts effectively reduced lipid oxidation. In terms of microbiology, fish fillets treated with guava leaves can be stored for 8 days. While, the control sample can be stored less than 8 days.

Keywords: Fillet, Guava leaves, Ice storage, Snakehead, Sensory property

P-PH-M01

Development of the Method to Recover Protein from Japanese Horse Mackerel *Trachurus japonicus* Fish Meat by Saltwater Treatment

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Abstract

Nowadays, fish meat already has a lot of application for producing various products around the world. However, scientists want to improve the method to recover protein from fish meat to satisfy consumer demand. In previous study, the protein was recovered by isoelectric solubilization/precipitation (ISP) treatment (Sun et al., 2013). In addition, acid and alkaline treatments cause protein denaturation and decrease the functionality of the protein. Therefore, the alternative method to recover fish protein is needed. In this study, protein was recovered from horse mackerel *Trachurus japonicus* meat by saltwater treatment. Then, difference in gel-forming ability among recovered protein, washed meat and unwashed meat was evaluated. The results of the study showed that the gel-forming ability of 3 different kinds of fish meat was induced by heating at 30° and 40°C and declined at 60° and 70°C. Recovered protein from fish meat and washed meat resulted in better gel-forming ability regardless of heating time (20 min. and 120 min.). For the whiteness index, recovered protein and washed meat also showed the white appearance compared to unwashed meat.

Keywords: Recovery protein, Saltwater treatment, Gel-forming

P-PH-M02

Isolation of Hyaluronic Acid from Yellowfin Tuna (*Thunnus albacares*) Eyeball

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Abstract

Hyaluronic acid (HA) is commonly extracted from terrestrial and bacterial sources. However, due to the risk associated with either animal- and/or bacterial-derived contaminants and the laborious production processes that tend to compromise the quality of HA, research studies have recently shifted to the exploration of the presence of this polymer in marine resources and the enhancement of the protocols for HA production. Hence, this study focused on the isolation of HA from yellowfin tuna eyeballs. Results of the study showed that the optimum conditions for the isolation of HA from yellowfin tuna eyeballs are as follows: pretreatment of the raw material (acetone, formaldehyde and sodium acetate solution) prior to water extraction and incubation of the mixture for 24 h; tissue hydrolysis for a maximum of 6 h; a 3% CPC: 3M NaCl concentration for recovery and fractionation; and the use of 1:3 v/v supernatant: ethanol ratio for alcoholic precipitation. These results are expected to help maximize the benefits of the utilization of the tuna processing wastes in the country. Likewise, these findings may open a new opportunity for more cost-effective production of a valuable bioactive compound from marine source.

Keywords: *Thunnus albacares*, Hyaluronic acid, Waste utilization

P-PH-M03

Effect of Asthma Plant (*Euphorbia hirta* L.) Extract on the Quality of Cobia (*Rachycentron canadum*) Fillets During Ice Storage

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Abstract

The study was conducted to evaluate the quality changes of cobia fillets treated with asthma plant (*Euphorbia hirta L.*) extract solution 0.06% in ice storage condition. The experiment consisted of two treatments. Treatment 1 (NT1), 16 cobia fillets (0.8-1.2 kg) soaked in cold water for 30 minutes, drained, then placed in PE bag, with ratio ice : fish of 1: 1. Treatment 2 (NT2), 16 cobia fillets (0.8-1.2 kg) were soaked in asthma extract 0.06% for 30 minutes and similarly preserved as NT1. Samples were taken on days 1^{th} , 5^{th}, 10^{th}, and 15^{th}. The analyzes included temperature, pH, moisture, water holding capacity (WHC), texture, total volatile base nitrogen (TVB–N), peroxide value (PV), Thiobarbituric acid reactive substances (TBARs), color, sensory property, total aerobic bacteria count (TVC). Results showed that cobia fillets treated with asthma plant (0.06%) extract solution showed significantly higher sensory property compared to control treatment during storage. Based on the sensory property and total aerobic bacteria count, cobia fillets can be stored up to 10 days under two types of treatments remained good quality.

Keywords: Asthma plant, Cobia, Cold ice storage, Sensory property

Bioetechnoeconomics of Waste of Black Tilapia and Stingray Skin as Export-Based Commercial Leather Products

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Abtract

The objectives of the study were to assess the added value, total economic value and the level of consumer demand of commercialy black tilapia and mondol stringray leather products (wallet for man and ladies, 2-in-1 type, handle model and accesories/kay chain). The economic value of fresh black tilapia skin (medium size) is IDR 3,500 per sheet, tanned leather is IDR 10,000, main commercial leather product (wallet) is IDR 350,000 and key chain is IDR 100,000 (added value is IDR 450,000). The economic value of mondol fresh stingray skin is IDR 50,000 per sheet, tanned leather is IDR 125,000, wallet is IDR 400,000 and key chain is IDR 125,000 (added value is IDR 520,000). The difference in the added value of creative products from black tilapia to the stingray skin products is IDR 70,000. The consumer preferences from black tilapia leather product are: models (85% said a very interesting and interesting enough of 15%) ; color (85% said a very interesting and interesting enough of 15%) ; quality (85% said is very goods and goods is 15%) ; price (20% said quite expensive, 30% said very expensive and 50% said reasonably priced) ; purchasing power (45% said affordable, 40% said reasonably priced and 15% of limited). The consumer preferences from stringray leather product are: models (80% said a very interesting and attractive of 20%); color (85% said a very interesting and attractive of 15%) ; quality (80% said very high and high of 20%) ; price (25% said quite expensive, 60% said very expensive and 15% is limited) and purchasing power (40% said affordable, 40% said reasonably priced & 20% of unreachable).

Keywords: Economic value, Consumer preferences, Creative product, Skin, Tilapia, Stringray

Biomass and Carotenoid Production of *Rhodobacter sphaeroides* in Enriched Culture Media with Fish Processing Wastes

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Abstract

This study describes the development of an enriched culture media for growth, biomass and carotenoid production of the photosynthetic bacteria Rhodobacter sphaeroides PSB1 through supplementation of fish processing wastes in the Acetate Yeast Extract (AYE) medium. Proximate compositions of the fish processing wastes were determined prior to supplementation. Cultures were incubated and analyzed for growth, biomass and carotenoid production after 14 days. Results showed that addition of fish viscera yielded significantly higher ($P<0.05$) growth (2.75 x105 ml^{-1} cells), protein content (71.37 µg mL^{-1}) and carotenoid production (22.11 mg L^{-1}) than supplementation of fish frames and control which may be attributed to the high protein and lipid content of the viscera. Biomass production was however higher in cultures supplemented with fish frames (22.67 g L^{-1}) which showed higher ash content than the viscera. Findings of this study showed that fish processing wastes may be used as supplemental nutrient source to promote the growth, biomass, protein and carotenoid production of R. sphaeroides, an industrially-important photosynthetic bacterium.

Keywords: Photosynthetic bacteria, *Rhodobacter sphaeroides*, Fish processing wastes, Biomass, Carotenoid

P-PH-P03

Designing the Survey for Consumer's Willingness to Pay for Blue Swimming Crab Digital Traceability in Thailand

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Abstract

Until now, conventional traceability system of food needs several days to trace back the origin of the food, but with a digitalized system, same can be traced in a few seconds. The use of digital recording and tracing approaches can also have a positive effect on transporting confidence-based parameters, for example, conservation, eco-friendly production, animal welfare, working condition, carbon dioxide emission footprint, and so on. Unfortunately, digital traceability usage needs cost and specialist to set up, so established area is very limited, especially in developing countries. This research is focusing on consumer willingness to pay for digital traceability system which uses private blockchain data recording in a mobile application platform with 3 aspect of quality parameters including, safety, consumers, and environment. Thailand has been developed decent infrastructures for further potentials in installing the system, which became the reason to choose as a research site. Blue swimming crab Portunus armatus caught in south part of Thailand is a high-value product collected by smalls scale fisheries contrasted with total volume which may need for traceability not only for the food safety but also the conservation and sustainable usage of the stock, which can be a candidate to apply the traceability system. To stimulate stakeholders, this survey will focus on the consumer's willingness to pay from both end-consumer and middlemen. On the presentation, based on the literature survey, a research proposal for the interview designing will be discussed.

Keywords: Traceability, Willingness to pay, Food safety, Thailand, Seafood

P-PH-S01

Solar Irradiation as an Alternative Bleaching Process for Agar Extracted from *Gracilariopsis heteroclada* in Iloilo, Philippines

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Abstract

The current industrial practice of using chemical bleach to achieve the pure white colour of agar is deleterious to both human and environmental health. This study evaluates the potential of solar irradiation as an alternative bleaching process for agar extracted from *Gracilariopsis heteroclada* in Iloilo, Philippines. The physico-chemical properties of agar obtained from alkaline-treated seaweed after exposure to different bleaching conditions (e.g., solar irradiation, hypochlorite solution, and ultraviolet and fluorescent lights) were examined and compared with commercial bacteriological agar. Photobleaching through solar irradiation produced agar with superior gel strength (1,038.61 g cm^{-2}), high 3,6-anhydrogalactose content (41.44%) and low total inorganic sulphate content (1.87%) without compromising agar yield (19.37%). Solar irradiation offers very promising results as a simple, low-cost, environmentally friendly alternative to the chlorine bleaching process for agar extraction.

Keywords: Agar extraction, Low-cost and environmentally friendly, Photobleaching, Chemical bleaching, *Gracilariopsis heteroclada*

Algae and Aquatic Plants

Session: Algae and Aquatic Plants

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	Farahin A.W[a]; Norio Nagao[a]; Natrah I.[a,b]; Fatimah Md. Yusoff[a,b]; Mohamed Shariff[c]; Sanjoy Banarjee S[a]; Yuki Imaizumi[a]; Nur Laishatulaini Latib[b]; Tomoyo Katayama[d], and Tatsuki Toda[e]	
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18	**Screening of Endophytic Fungi from *Eclipta Prostrata* (L.) and Their Antimicrobial Activities** Pan Ei San[a]*	**P-OT-03**
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20	**Antimicrobial Study of *Enterolobium saman*, Prain** Moe Moe Khaing[a]*	**P-OT-05**

P-AP-E01

Seagrass Ecosystems in Coral Triangle Initiative Area: Status and Threats

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Abstract

Area of coral triangle comprises 5.7 million km^2 of the Pacific Ocean with most marine bio-diverse eco-region on planet earth including global hotspot of seagrass species. Many sea creatures of this eco-region are relied on seagrass ecosystem mainly dugong species (total number 2279), sea turtle (4 to 6 species depends on country), micro-macro benthos and fishes. Apart from these ecological services, carbon sequestrations (2.6 billion Mg CO_2 storage) by seagrass ecosystem is also noticeable compared to mangroves and terrestrial vegetative species. This review work scrutinized previously acknowledged seagrass species distributions, species diversity, carbon sequestration, past and present research, and major threats of seagrass ecosystems in this biogeographic region. Depending on different locations six coral triangle initiative countries namely Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste have 9 to 19 seagrass species, belongs to four distinct families (Hydrocharitaceae, Cymodoceaceae, Zosteraceae, and Ruppiaceae), which covers almost 58,550.63 km^2. A total 21 species of seagrass were found throughout this eco-region, however very few number of research works were conducted to assess the overall status of this eco-regions ecosystems. Seagrass diversity of the coral triangle is also associated with 100 million inhabitants, who are being supported directly or indirectly by the resources of this ecosystem. These inhabitants may cause some disturbance to seagrass ecosystems. For long run sustainable management and conservation of these ecosystems, two types of threat are identified which is needed to take into consideration. Local threats are included, water quality deterioration by sewage and pollutant discharge, anthropogenic and agricultural activities, over-exploitation of seagrass associated resources, sediment runoff and destructive fishing. Global threat comprises, sea level rise, macro and micro plastic, global warming, and acidification. Social, cultural, and economic interaction study with seagrass ecosystems and local inhabitants are highly recommended for further study. Globally seagrass ecosystems and coral triangle initiative area are concerned due to human activities though it contains potentially importance on food services and maintain food web for animals.

Keywords: Coral triangle, Seagrass ecosystems, Blue carbon, Threats, Interactions

P-AP-E02

Trophic Biological Communities from Seagrass Habitat in Sarawak

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Abstract

The largest seagrass bed in Malaysia is in Lawas, Sarawak. The seagrass habitat functions as important habitat for economic fishes, invertebrates and other animals. Dominant seagrass species were *Halodule pinifolia and Cymodocea rotundata.* Macroinvertebrates comprised of Veneridae, Neritidae, Terebidae, Vitrinellidae, Olividae, and Polychaetes were recorded. Terebidae and Veneridae were the dominant mollusk family. Fish families were dominated by Gerreidae, Lethrinidae, Leiognathidae, Carangidae, and Engraulididae. The zooplankton communities were dominated by Copepoda, Bivalvia, and Mysidacea. The phytoplankton communities were comprised of Bacillariophyceae, Dinophyceae and Cyanophyceae. Dominant phytoplankton was comprised of Ceratiaceae and Coscinodiscaceae. This paper presents the important groups of trophic biological communities which form important trophic linkages in the seagrass ecosystem. This project is an ongoing effort to establish the biodiversity of marine flora and fauna of the seagrass ecosystem in Lawas.

Keywords: Seagrass, Fish, Plankton, Invertebrates, Fish, Tropical

P-AP-G01

Optimization of Freezing and Thawing Processes in Extracting Phycobiliproteins from Filamentous and Unicellular Cyanobacteria

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Abstract

Cyanobacteria are commonly utilized to obtain phycobiliproteins as a source of organic food colorant, antioxidant and pharmaceutical products. The global market of cyanobacterial phycobiliproteins was estimated to reach approximately US$60 million in 2019. Freezing and thawing extraction method have been reported to be the best phycobiliproteins extraction method. However, the best parameters of freezing and thawing extraction method still remains unclear. Hence, this study aimed to optimize the freezing and thawing extraction method for filamentous and unicellular cyanobacteria. Two filamentous (*Spirulina subsalsa* and *Limnothrix planktonica*) and two unicellular cyanobacteria (*Microcystis aeruginosa* and *Chroococcus minutus*) were identified using morphological and molecular methods. Bradford analysis was used to estimate the total extracted protein content. The optimization of freezing and thawing method was conducted using different solvents, volume of solvents, temperature, time interval, cycle of freezing and thawing. The extracted phycobiliproteins were quantified using spectrophotometric assay. Using 40 mg cyanobacteria dry biomass, one mL distilled water (pH 7) was the most efficient solvent in terms of extracting high concentration and purity of phycobiliproteins. In addition, combination of freezing at -80 and thawing at 25 appeared to be the best temperature to obtain the highest amount of phycobiliproteins for all of the cyanobacterial species. A minimum of six cycles of freezing (60 min) and thawing (120 min) found to be the optimum time interval to extract high yield of phycobiliproteins. Findings of this study could reduce cost and time in extracting phycobiliproteins, while harvesting a high amount and quality of valuable phycobiliproteins.

Keywords: Cyanobacteria, Phycobiliproteins, Optimization, Extraction, Freezing and Thawing method

P-AP-G02

Isolation, Identification and Characterization of Microalgae-associated Bacteria

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Abstract

Microalgae generally grow in the presence of bacteria, of which some are found to significantly promote microalgal growth and survival. The use of microalgae growth promoting bacteria (MGPB) could enhance bacteria-microalgae interactions, therefore has the potential to improve the live-feed in aquaculture. The present study was aimed to isolate, identify and characterize bacteria that associated with four xenic microalgae species (*Cyclotella* sp., *Pavlova* sp., *Chlorella* sp., *and Chlamydomonas* sp.). Bacteria were isolated from these microalgae using five different agar media: Z8, Mueller Hinton (MH), De Man Rogosa and Sharpe (MRS), Alkaline nutrient, Glucose Peptone Water agar and identified based on 16S rRNA molecular approach. They were characterized based on their growth promoting ability including phosphorus solubilisation (spectrophotometric method), indole-3-acetic acid (IAA) production (spectrophotometric method) and nitrogen fixation (spectrophotometric method). A total of 50 bacteria were isolated from these microalgae. The phylogenetic tree of the isolated bacteria demonstrated the dominant bacteria associated with green algae were *Betaproteobacteria* phyla, while brown algae appeared to be associated with *Proteobacteria and Bacteroidetes* phyla. This indicated that the bacterial compositions are strictly group specific. Pseudomonas sp. showed the highest IAA production, phosphorus solubilising and nitrogen fixing activity, hence suggesting this bacterium possibly improve the growth of microalgae. The findings of this study revealed the bacteria composition in related with microalgae and these bacteria could be employed in enhancing the growth of microalgae as live-feed in aquaculture.

Keywords: Microalgae, Bacteria, Isolation, 16S rRNA molecular identification, Characterization

P-AP-G03

Effects of Red and Yellow LEDs on the Growth and Proximate Composition of *Tetraselmis* sp.

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Abstract

The importance of microalgae is increasing in various sectors. Depending on the purpose and expected end product, microalgae can be cultivated to meet the needs of the producer. Since microalgae respond to light differently, this study evaluates the growth and proximate composition of marine microalga, *Tetraselmis* sp. cultured using red and yellow LEDs, and fluorescent as a control. Results showed that cell and optical density of *Tetraselmis* sp. were higher (p>0.05) under fluorescent light on day 12 and 13. Lipid and protein content was observed to be higher (p>0.05) under red LEDs, whereas, higher carbohydrate composition was recorded under fluorescent light. The results prove that proximate composition of microalgae biomass can be regulated using different light color.

Key words: Growth, Proximate composition, *Tetraselmis* sp., Light wavelength, Morphology

P-AP-G04

Interactive Effect of Nitrogen Sources on the Uptake by Diatom Isolated from Shrimp *Litopenaeus vannamei*

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Abstract

Aquaculture is among the fastest growing industry due to significant demand for seafood supply throughout the world. Excessive nitrogenous compounds (ammonium, nitrite and nitrate) due to high feed loads and high stocking density can affect animal growth and decrease its survivality. Microalgae are able to assimilate various types of nitrogen. A more efficient use of nitrogen by choosing the appropriate nitrogen source may lead to a more efficient and economical use of microalgae as bioremediator. In this study, a diatom isolated from the shrimp *Litopenaeus vannamei* culture ponds were tested for nitrogen uptake by cultivating in media containing different concentrations of ammonium and nitrate. The diatom showed more preferences towards ammonium as higher biomass and higher uptake is achieved compared to when cultured in nitrate. As ammonia are the principle nitrogenous wastes excreted by shrimps, the diatom are potential to be used as bioremediator to effectively removing ammonia for a more sustainable aquaculture industry.

Keywords: Microalgae, Bioremediator, Nitrogen, *Litopenaeus vannamei*

P-AP-G05

Effects of Bacterial Co-culture on *Chlorella* Growth Performance and Quorum Quenching Activities in Small (100 ml) and Photobioreactor (100 l) Scale

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Abstract

Research in microalgae has increased due to the interest in biofuels and bioproducts, including its ability to inhibit quorum sensing of pathogenic bacteria for diseases control. In this study, the co-culture between *Chlorella* and quorum quenching (QQ) bacteria was carried out to evaluate the growth effects including the production of QQ activities in small (100 ml) and bioreactor (100 l) scales. Three selected bacterial quenchers, BpChlAY, BpNofAY and BpSpiAY were first co-cultured with *Chlorella* in 100 ml media conical flask with five replicates within two weeks. Prior to this, the optimization of antibiotics concentration to obtain an axenic *Chlorella* culture was conducted. The results showed that different effects was observed in the algal cell density in which BpChlAY improved *Chlorella* density, BpNofAY showed no effect while BpSpiAY suppressed *Chlorella* density in comparison to the axenic *Chlorella* monoculture. The growth of all bacterial quenchers was also observed to be significantly suppressed in the presence of *Chlorella* in comparison with bacteria solely during the first 11 days. However, the growth started to increase from day 12 onwards for BpChlAY and BpSpiAY. There was also no detectable QQ activity from the *Chlorella* extracts in both monoculture and co-culture with bacterial quenchers on the last day of experiment (Day 14). The bacterium BpChlAY was then further selected for co-culture with *Chlorella* in 120 l annular photobioreactor up till 45 days. It was observed in the presence of BpChlAY, the growth performance of *Chlorella* improved, including its dry weight, cell density and chlorophyll fluorescence, respectively. In comparison to *Chlorella* monoculture, BpChlAY significantly improved the dry weight of *Chlorella* especially at day 9, 15, 21, 27, 33 and 45. BpChlAY also improved *Chlorella* density at day 15, 33, 39 and 45, and improved chlorophyll fluorescence of the alga throughout the entire culture period. Moreover, BpChlAY also enhanced the QQ activity of the alga especially in the late stationary (day 45) growth phase, in comparison to *Chlorella* culture alone. In summary, the interaction between *Chlorella* and bacteria varied within culture volume and period, bacterial strains and was intraspecies-specific. Bacteria did affect the growth of *Chlorella* either in positive, negative or no effect at all. However, the QQ activity of *Chlorella* was not influenced by all bacteria when cultured together in small volume culture and short period of time, suggesting that higher volume and prolong cultivation

time is needed in order to evaluate the effect of bacteria towards QQ activity produced by *Chlorella.*

Keywords: Quorum quenching, Microalga-bacteria interaction, Co-culture, *Chlorella,* Photobioreactor

P-AP-G06

Effect of Light Intensity on Growth Rate and Metabolites of Marine Microalgae, *Tetraselmis terathele*

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Abstract

Microalgae have the potential to revolutionize biotechnology in a number of areas including nutrition, aquaculture, pharmaceutical and cosmeceutical. Microalgae biomass and biochemical components obtained can be changed by environmental factors such as light. Phototrophic organism like microalgae need light and dark regime for effective photosynthesis process. To maximize the production rate of *Tetraselmis tetrathele*, different light intensities 300, 1500, 2000 and 2500 $\mu molm^{-2}s^{-1}$ under 40 days semi-continuous culture was operated. The cell density and volumetric production rate were increased without photo inhibition under high light condition 1500 $\mu molm^{-2}s^{-1}$ which reached 3.34 g-dw L^{-1} and 0.97 g-dw L^{-1} respectively. These maximum values were higher than any previous photoautorophic culture study with *Tetraselmis* sp. Accumulation of metabolites such as chlorophyll, pigments and fatty acids were also evaluated using High Performance Liquid Chromatography (HPLC) and Gas Chromatography Mass Spectrometry (GCMS). This range of light intensities suggest that *T. tetrathele* can be maintained under outdoors culture with very strong light intensity.

This useful information will help future efficient commercialization in selecting high quality biomass production with specific metabolite interested in *Tetraselmis tetrathele*.

Keywords: Microalgae, Light Intensity, *Tetraselmis tetrathele*, Growth, Metabolites

P-AP-G07

Effect of High Temperature on Cell Growth and Fucoxanthin Production on An Unicellular Marine Microalga, *Isochrysis galbana*

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Abstract

Microalgae have been known that they lives in hydrosphere and can grow by oxygen-generating photosynthesis. Among pigments produced by microalgae, fucoxanthin has attracted attention due to its high potential for the applications of nutraceutical, cosmeceutical and phamaceutical products. The unicellular microalga, *Isochrysis galbana*, is well-known for accumulating fucoxanthin, and is one of a candidate for mass culture of fucoxanthin. Since the growth rate and pigment accumulation of microalgae can be affected by water temperature, it is necessary to clarify the fucoxanthin production characteristics of this strain under high temperature for the mass production of fucoxanthin in the tropics. The purpose of this study was to investigate the effects of high temperature on cell growth and fucoxanthin production of *I. galbana*. 1-liter cylindrical bubble column reactors were used in this experiment, and the specific growth rate and fucoxanthin content were measured at different water temperature of 25.0°C, 27.5°C, 30.0°C, 32.5°C, and 35.0°C, respectively. Sampling was conducted every day and then diluted with a new medium to adjust the optical density (750nm) to 0.100 ± 0.002. The other operating conditions were as follows: light intensity of 300 μE m^{-2} s^{-1}, light/dark cycle of 12 hours-light/12 hours-dark, CO_2 concentration of 1% and aeration rate of 1 vvm. It was shown that the specific growth rates were equal to

or greater than that of previous studies on *I. galbana*, indicating that the cell growth was operated under favourable conditions without any growth limitations. More details are shown in the poster.

Keywords: Microalgae, Fucoxanthin, High Temperature, Cell Growth, *Isochrysis galban*

Micropropagation of Aquarium Plant, *Anubias congensis* using Thidiazuron (TDZ) and Indole-3-acetic acid (IAA)

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Abstract

Effect of thidiazuron (TDZ) and indole-3-acetic acid (IAA) on multiple shoot induction of aquarium plant, Anubias congensis was investigated. An experiment with 5x5 factorial in CRD was conducted. The combination of TDZ at 0, 0.01, 0.02, 0.03 and 0.04 mg/L and IAA 0, 0.10, 0.15, 0.20 and 0.25 mg/L were supplemented in Murashige and Skoog (MS) medium. After 8 weeks, it was found that the explants cultured by the addition of TDZ 0.04 mg/L and IAA 0.25 mg/L in MS medium induced 7.20±0.25 new shoots ($P<0.01$). The increment of TDZ supplemented in the medium tended to increase shoot number ($P<0.01$). There is no interaction between TDZ and IAA to induce the number of the shoot ($P>0.05$). For multiple shoots, the combination of TDZ and IAA treatments produced 100 % of multiple shoots while the control did not generate multiple shoots at all. There is interaction between TDZ and IAA to induce multiple shoots 100 % ($P<0.05$). A large amount of TDZ or IAA tended to decrease shoot length ($P<0.01$). After 2 weeks of culture, all explants in TDZ treatments occurred swelling with greenish shoots until the end of the experiment. However, the most effective treatment of all was a combination of 0.04 mg/L TDZ and 0.25 mg/L IAA, producing as many as 7.20±0.25 shoots per explant and the shoot length 20.17±0.67 mm.

Keywords: *Anubias congensis*, Micropropagation, thidiazuron (TDZ), Indole-3-acetic acid (IAA)

P-A P-N01

Efficiency of Nutrient Removal with Different Commercial Plants and its Combination for Water Quality Improvement

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Abstract

Aquaculture has been recognised as an important sector for income generation and economic development for many countries, especially in Asia. While aquaculture is the fastest growing food sector worldwide, its activities are associated with nutrient rich discharges that can cause eutrophication in public waters. This study aimed to reduce nutrients in aquaculture systems by enhancing the nutrient (inorganic nitrogen and phosphorus) uptake rate using commercial plants. A total of three commercial plants were utilized: water spinach, lemon basil and aromatic basil. These three different single plants and combination of each plant were cultivated in 6 L aquaria for 30 days. Water quality (soluble reactive phosphorus (SRP), nitrite and nitrate nitrogen (NO_2+NO_3-N), total ammonia nitrogen (TAN), temperature, pH, dissolved oxygen, electrical conductivity) and chlorophyll-a were measured at five-day intervals. Physico-chemical parameters (pH: 6.8-7.6; DO: 5.2 mg/L; temperature: 29°C; electrical conductivity: 290 µS/cm) of this study showed the optimal range for the growth of these commercial plants. Chlorophyll-a was absent in the culture water, indicating that that no phytoplankton was present in this study. The combination of plant treatments showed the most efficient nutrient removal (85% of SRP, 50% of NO_2+NO_3-N, 89% of TAN) compared to the single plant treatments. These results suggest that combination of commercial plants, especially lemon basil and water spinach could be utilized in improving the quality of water system in aquaculture production systems.

Keywords: Commercial plants, Nutrient removal, Improvement of water quality, Aquaculture production system

P-AP-S01

Effect of Bio-fermentation Water on Growth of Sea Grapes (*Caulerpa lentillifera*)

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Abstract

Effect of different bio-fermentation on growth of sea grapes (*Caulerpa lentillifera*) the experiment had 4 treatments were treament1 bio-fermentation water formula: ish scraps, molasses, water 4:1:1, treatment 2 bio-fermentation water formula: water melon, molasses, water 4:1:1, treatment 3 bio-fermentation water formula: fish scraps, water melon, molasses, water 2:2:1:1 and treament4 urea (control) respectively each treatment used 5 ppm./replication, 3 days/time after changed sea water. Each treament had 4 replications, 4 buskets / replication and put 50 grams sea grapes/busket the experiment carries out 5 weeks in hatcheries at Natural research environment institute. Finally the experiment the growth of sea grapes (*Caulerpa lentillifera*) average weight were 84.37±7.74 44.68±1.79 48.75±1.97 and 107.81±4.40 gram respectively. When statistically analysis the result showed that significant ($P < 0.05$) by the urea treatment affected on growth of sea grapes (*Caulerpa lentillifera*) was the best.

Keywords: Bio-fermentation water, *Caulerpa lentillifera,* Sea grapes

P-AP-S02

Effect of Inorganic Nutrient Enrichment on the Nitrogen Assimilation of *Kappaphycus striatus* (F. Schmitz) Doty ex P.C. Silva

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Abstract

Seaweed farmers in Tawi-Tawi, Southern Philippines are practicing inorganic nutrient enrichment of *Kappaphycus striatus* using various concentrations. To standardize the concentration used, this study determined nitrogen assimilation using four concentrations of inorganic fertilizer (T_1 = 0 g L^{-1}, T_2 = 3 g L^{-1}, T_3 = 6 g L^{-1} and T_4 = 9 g L^{-1}) following the Kjeldahl method. Results revealed that the percentage of total thallus nitrogen in T_4 (0.68±0.01%) and T_3 (0.59±0.07%) were significantly higher (p<0.05) than T_2 (0.48±0.02%) and T_1 (0.46±0.02%). This indicates that farmers' practice of inorganic nutrient enrichment using high concentration of 9 or 6 g L^{-1} showed high nitrogen assimilation which is crucial for the growth of *K. striatus* in nutrient-depleted farm.

Keywords: Inorganic nutrient enrichment, *Kappaphycus striatus*, Kjeldahl method, Nitrogen assimilation, Seaweed farmers

Effect of the Dry Season on Growth, Production of Seaweed *Kappaphycus alvarezii* in Hansisi Semau Waters, Kupang Regency, East Nusa Tenggara, Indonesia

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Abstract

Kapaphycus alvarezii is red seaweed (Rhodophyceae) which is a superior commodity of aquaculture in Indonesia. The development of seaweed cultivation areas can be influenced by the biophysical environmental conditions of the waters and climatic conditions. One limiting factor in the cultivation of *Kappaphycus alvarezii* is the time of cultivation. The purpose of this study is the influence of the dry season on the growth and production of *Kappaphycus alvarezii* seaweed. Primary data collected in this study include data on seaweed cultivation patterns and cultivation time, namely growth and production data of *Kappaphycus alvarezii*. Secondary data were obtained from various related agencies including the Climatology Meteorological Agency and the Office of Maritime Affairs and Fisheries. The collected data is analyzed and discussed descriptively accompanied by pictures. The results of this study indicate that the productivity of seaweed development land is strongly influenced by climatic conditions. The existence of climate change both nationally and globally (El Niño and La Niña) greatly affects the time pattern of marine culture in Tesabela. *Kapapphycus alvarezii* cultivation time generally occurs in months where rainfall is low, namely air temperature (27 - 29 ^{0} C), salinity 29-31 ppm, pH 7-7.5. The average relative growth rate for 29 ^{0} C: 55.7 gr /week%. temperature of 31^{0}C: at 50.9 gr / week%, temperature at 32 ^{0}C – 33 ^{0} C at 40.6 gr / week%, while at temperature 34 – 35 ^{0} C at 29.7 gr / week%. while production at 29 ^{0}C water temperature is 72.4kg gr / m^2 /6week, temperature 31 ^{0} C is 70 kg / m^2 /6week, temperature 32^{0}C, temperature 33 ^{0} C is 67.8 kg / m^2 / 6week, while temperature is 34 – 35 ^{0} C is 31.7 kg / m^2 / 6 weeks.

Keywords: *Kappaphycus alvarezii*, Growth, Production, Climate change

P-AP-S04

Dynamics on *Kappaphycus* spp. Farming in Western Visayas, Philippines

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Abstract

This study describes the underlying features of Kappaphycus spp. (guso) farming in Western Visayas, Philippines. Primary data were gathered through workshops, Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) across different seaweed-producing areas in the region: Antique, Guimaras, Iloilo, and Negros Occidental. Secondary data were sourced out from various literature and reports related to the commodity. Results showed that majority of the seaweed farms in Western Visayas demonstrate a family-based farming system. Seaweed farms are mostly open access and can usually accommodate 100 lines of seaweeds (0.25 ha). The most common method utilized in the region is the simple longline. Other culture methods are also practiced, depending on the farming site. With the presence of external support from different enabling groups, seaweed farming has provided a steady income to emerging farming sites in Iloilo, Guimaras and Negros Occidental. Further, the presence of a lead firm in the province of Antique has also improved the living conditions of households in several island barangays in the area. However, despite the optimism contributed by 'guso' farming in the region, inconsistent quality and quantity of seaweeds produced are prevalent due to varying farm management and practices. Moreover, unstable production, lack of capital investment, logistical issues, and limited market linkages and information flow remains a challenge to the regional seaweeds industry. Formation of seaweed clusters, presence of industry champions, strong support services among others will aid in the improvement of the processes and governance structure of the 'guso' industry in Western Visayas region.

Keywords: Aquaculture, Fisheries management, Gap analysis, *Kappaphycus* spp

P-AP-S05

Elucidating the Photobleaching Process of Agar from *Gracilariopsis heteroclada*

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Abstract

Photobleaching promotes green technology by reducing or eliminating chlorinated wastewater discharge and effluents from agar chemical bleaching process which cause pollution problems and ill-effects to the worker's health (Li *et al.,* 2009, 2008; Jin *et al.,* 2006; Warburton, 2005) and could economize energy input or cut manufacturing costs by reducing or replacing high-priced chemical oxidants with the readily available solar irradiance. Photobleaching technology produced agars with good rheological properties from *Gracilariopsis heteroclada*. And to understand photobleaching process, this study aims to elucidate the effects of various photobleaching agents on the following physical and chemical properties: irradiance, water and air temperature, relative humidity, convective heat transfer rate, total chlorophyll, chlorophyll α, phaeophytin α, leaching of total inorganic sulfate, and 3,6-anhydrogalactose content). Moreoever, all of these parameters correlates to identifying the most suitable photobleaching method for agar extraction from *Gracilariopsis heteroclada*.

Keywords: Agar extraction, Low-cost and environmentally friendly, Photobleaching, Chemical bleaching, *Gracilariopsis heteroclada*

P-AP-S06

Commercial Grade of Sea Grape, *Caulerpa lentillifera* (Chlorophyceae) Selling Production in Thailand

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Abstract

The study on characterization of sea grape or green caviar, *Caulerpa lentillifera* on two grades of selling production were done in the seaweed from the earthen pond farms in Phetchaburi Province. Ten times of the 50 g product were sampling to conduct for the quality improvement of the sea grape in the future. The blade length and stolon were measured and the ramulus diameter and the colour were investigated. The result showed that selling character of general grade provides frond of 3.2±0.25 cm long and mostly in single frond with of 696, 661, 653 um in diameter at the tip, middle and basal of frond, respectively. The colour in L*, a*, b* of general grade were 23.22, 0.57, 4.97 and ΔE was 48.25. For the premium grade, the blade showed longer than another. In the premium grade, the frond were 4.80±0.35 cm long and the number of ramuli at the tip, middle, and basal were 24±1, 26±1 and 18±1 per cm, respectively. The frond diameters were 722, 731, 676 μm at the tip, middle and basal, respectively. The colour in L* a * b * were 16.69, -0.09, 3.89 and ΔE was 17.14. The premium grade showed longer in ramuli but clear and more yellowish in colour than the normal grade.

Keywords: Sea grape, Green caviar, Growth, Selling product, Ramulus

P-OT-03

Screening of Endophytic Fungi from *Eclipta Prostrata* (L.) and Their Antimicrobial Activities

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Abstract

Plants and soil can be considered as the favorable isolation sources for microorganisms. This means that there is much possibility of new findings of new microorganisms. Some fungal and bacterial endophytes have proven to increase plant growth and improve overall plant hardiness. Microorganisms which are very diverse include all bacteria, some species of fungi, algae, and certain microscopic animals. Each of these groups includes organisms which can be useful and others which are harmful. Plantcompounds produced by endophytes have been shown to combat pathogens and even cancers in animals including humans.In this research, a total of twelve endophytic fungi were isolated from *Eclipta prostrate* (L.). Among those, the fungus PS-10 was selected for further investigations based on the results of the antimicrobial activity especially against *Agrobacterium tumefaciens*. And then starch hydrolyzing activity, age, size and fermentation condition of selected fungus were continued to be studied.

Keywords: *Agrobacterium tumefaciens*, Endophytic Fungi, *Eclipta prostrate* (L.)

P-OT-04

Isolation and Identification of *Azotobacter* spp. from Soil and their Effects on Green Peas from Ayeyarwady Region

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Abstract

Soils are one of the favorable sources for isolation of *Azotobacter* spp. The soil samples were collected from two selected sites such as silty soil and garden soil from Ayeyawady Region. Silty soil samples were collected from field cultivated with soya-bean crops near the Ngawon River at Ngathaing gyaung Township and garden soil was obtained from Vegetable Fruit Research and Development (VFRDC), Hlagu Township. The samples were cultured on four selective media such as *Azotobacter vinelandii* medium, N_2 free glucose medium, *Azotobacter chroococcum* medium and *Azotobacter paspali* medium. Nine strains of *Azotobacter* spp. were isolated from these soil samples including one strain from Hlagu and eight strains from Ngathaing gyaung. These strains were characterized by morphological, cultural and biochemical tests. All strains showed slimy, glistening, smooth, whitish, convex, ovoid rods, motile or nonmotile, gram negative, no endospore forming and cyst formation. In the biochemical tests, all strains were aerobes, catalase positive, acid and gas produced from glucose, sucrose, dextrose, starch hydrolysis positive, could tolerate 6.5% of NaCl concentration. According to the results, four strains were identified viz., *Azotobacter paspali, Azotobacter chroococcum, Azotobacter vinelandii and Azotobacter beijerinckii*. Moreover, *Azotobacter* spp. plays as an important role in the fertilizer. Therefore, germination tests were undertaken by green peas. In germination tests, seeds of green peas soaking in broth culture increased significantly seed's germination. Fresh and dry weights of shoot and root of seeds compared to the control and there were significant increases in root depth, shoot length.

Keywords: Soil bacteria, *Azotobacter spp.*, Fertilizer, Green Peas

P-OT-05

Antimicrobial Study of *Enterolobium saman*, Prain

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Abstract

Phytochemical studies of *Enterolobium saman* were performed by extraction using organic solvents. It was observed that the leaf, bark, root, flower, fruit, and seed contained tannins, alkaloids, glycosides, flavonoids and steroids quantitatively. The presence of alkaloid was also indicated by TLC. In the study of antimicrobial activities, the test organisms bacteria were isolated from soil, sauerkraut and meat by serial dilution techniques of pure culture isolation. The isolated bacteria from the soil was tentatively identified as the genus *Pseudomonas* and those from sauerkraut meat were as *Leuconostoc* and *Bacillus* respectively. Three different fungal strains are also used as test organisms. They are isolated from the soil samples of Mawlamyine area. The isolates were partially identified according to their morphological, cultural, and some biochemical characteristics. These three isolated fungal test organisms are identified as *Aspergillus niger, Aspergillus terrus,* and *Penicillium* spp. The antimicrobial activity on the growth of different test organisms was tested by treating the isolated cultures with various solvent extracts of different parts of *Enterolobium saman*. The 70 % ethanolic extract from different parts was tested by antimicrobial activity.

Keywoards: Alkaloids, Test organisms, *Aspergillus niger, Aspergillus terrus, Penicillium* spp

Broodstock Culture, Larviculture and Hatchery Management

Session: Broodstock Culture, Larviculture and Hatchery Management

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2	**Spawning Induction of Banded Sea Urchin *Echinothrix calamaris* (Pallas, 1774)** Luong Thi Yen Nhi[a], and Hua Thai Nhan[a]*	**P-BL-A02**
3	**Study on the Effects of Temperature on Growth Performance, Survival Rate and Digestive Enzyme Activities of Crab Seed (*Scylla paramamosain*)** Do Thi Thanh Huong[a]; Le Nhut Kieu[a]; Le Thanh Dang[a]; Nguyen Tinh Em[a], and Nguyen Thanh Phuong[a]	**P-BL-C01**
4	**Rearing Larvae of White-leg Shrimp (*Litopenaeus vannamei*) by Biofloc Technology with Different Carbon Sources** Chau Tai Tao[a]; Nguyen Van Hoa[a], and Tran Ngoc Hai[a]*	**P-BL-C02**
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6	**The Crab Bank Project: A study of Blue Swimming Crab Larval (First Crab Stage) Behaviour After Release to the Sea** Vutthichai Oniam[a]; Wasana Arkronrat [a]; Rungtiwa Konsantad[b]; Thanakron Yamphan[b]; Thanayut Punchoosri[b], and Anurak Sookdara[b]	**P-BL-C04**
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8	**Study on Nursery of White-leg Shrimp (*Litopenaes vannamei*) at Different Salinity Applying Biofloc Technology** Nguyen Van Hoa[a]; Chau Tai Tao [a], and Tran Ngoc Hai [a]*	**P-BL-C06**

9	**Supper-intensive Culture of White Leg Shrimp (*Litopenaeus vannamei*) Applying Biofloc Technology in Bac Lieu province, Vietnam** Nguyen Thanh Dat[a]; Chau Tai Tao[b], and Tran Ngoc Hai[b*]	**P-BL-C07**
10	**Effects of Salinity on Selected Reproductive Physiological Parameters of Striped Snakehead (*Channa striata*)** Le Thi Ngoc Thuy[a]; Ngo Minh Nhut [a]; Nguyen Tinh Em [a]; Nguyen Thi Kim Ha [a]; Nguyen Thanh Phuong [a], and Do Thi Thanh Huong [a]*	**P-BL-F01**
11	**Evaluation of Reproductive Development of Striped Catfish (*Pangasionodon Hypophthalmus*) in Salinity Condition** Le Hong Phuc[a]; Dao Minh Hai [a], and Bui Minh Tam [a]*	**P-BL-F02**
12	**Rearing Striped Catfish *(Pangasianodon hypothalamus)* From Fry to Fingerling Stage at Different Densities in Green House Condition** Le Thi Thu Thao[a]; Hua Quy Binh[a]; Nguyen Tinh Em[a]; Nguyen Thi Kim Ha[a]; Do Thi Thanh Huong[a]; Vo Nam Son[a], and Nguyen Thanh Phuong[a]*	**P-BL-F03**
13	**Larval Rearing of Striped Catfish *Pangasianodon hypophthalmus* in Oligohaline Water at Different Stocking Densities** Truong Quoc Huy[a]; Pham Thanh Liem[a], and Truong Quoc Phu[a]*	**P-BL-F04**
14	**Effects of *Phyllanthus amarus* Extract on Selected Enzymes and Stress Resistance of Striped Catfish Fingerling Stage *(Pangasianodon hypophthalmus)*** Huynh Quyen Nhi[a]; Tran Thi Phuong Hang[a]; Pham Ngoc Nhu[a]; Bui Thi Bich Hang[a]; Patrick Kestemont Nguyen Thanh Phuong[a], and Do Thi Thanh Huong[a]*	**P-BL-F05**
15	**The Effect of Salinity and Temperature on Growth Performance and Digestibility of Red Tilapia (*Oreochromis sp.*)** Dao Thi Ngoc Linh[a]; Tran Minh Phu[a]; Tran Le Cam Tu[a]; Nguyen Thi Nhu Thuy[a], and Tran Thi Thanh Hie [a]*	**P-BL-F06**
16	**A Review on Hybridization and Backcross Breeding of Groupers in Malaysia**	**P-BL-M01**

	Sari Asfarina Sariat[a]; Ching Fui Fui[a], and Shigeharu Senoo[b]	
17	**Development of Larval Morphology, Sensory Organs and Changes in Behaviour of the Clark's Anemonefish, *Amphiprion clarkia*** Joyce Supang Y. Murang [a,b]; Annita Yong[a], and Ching Fui Fui[a]*	**P-BL-M02**
18	**Artificial Seed Production of Phu Quoc Clariid Catfish (*Clarias gracilentus*)** Pham Thanh Liem[a], and Nguyen Hong Quyet Thang[a]*	**P-BL-M03**
19	**The Effect of Salinity on Maturation of Striped Snakehead *(Channa striata)* Cultured from Fingerling Stage** Nguyen Thi Kim Ha[a]; Ngo Minh Nhut[a]; Nguyen Tinh Em[a]; Nguyen Thanh Phuong[a], and Do Thi Thanh Huong[a]*	**P-BL-P01**
20	**Effect of Thyroxine Hormone Towards Growth and Survival of Climbing Perch (*Anabas testudineus*) Larvae** Mohamad Afuan Nazrin Alang[a] and Zarirah Zulperi[a,b]*	**P-BL-MO4**

P-BL-A01

Spawning Induction and Larval Development of Asiatic Hard Clam, *Meretrix meretrix* in Hatchery

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Abstract

Being a highly sorted seafood delicacy, Asian hard clam, *Meretrix meretrix* is facing extensive economic exploitation. Prolong and uncontrolled harvesting activity could lead to the extinction of this vulnerable species. Hence, a sustainable aquaculture activity is urgently needed to compensate the extensive exploitation of this species. In this study, clam broodstocks (50 individuals;size range: 5.00 – 6.99 cm) were acquired from a natural habitat in Marudu Bay and induced to spawn by three methods which are air-dry, heat shock and natural spawning (control). The larval development was monitored daily up to stage D-shape. During the experiments, salinity and pH were recorded to around 28 – 30 ppt and 6.00 – 7.99, respectively. As for ration, both broodstocks and larvae were given of equal ratio of *Isochrysis* spp.: *Nannochloropsis* spp.: *Chaetoceros* spp. with ratio of 1:1:1 but different food concentration; broodstocks: 7×10^7/individual, larvae: 3.5×10^6 cells/ml. The result of experiment showed that the air-dry method induced the clam broodstock to produce an average of 423 eggs ml^{-1} followed by natural spawning (control) and heatshock methods at 407 eggs ml^{-1} and 224 eggs ml^{-1}, respectively. Time taken by the larvae to develop into D-shape stage was 24 hours. This study has shown that spawning of Asian hard clam can be induced by air-dry method and the larval development up to D-shape can be supported by combination of commonly available phytoplankton. The target for future studies should be on the determining diets for broodstock maturation in hatchery condition and for larval rearing.

Keywords: Asian hard clam, Induce spawning, Larval development

P-BL-A02

Spawning Induction of Banded Sea Urchin *Echinothrix calamaris* (Pallas, 1774)

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Abstract

Banded sea urchin *Echinothrix calamaris* is one of the most commercial market value in Viet Nam. However, there is a lack of study on reproductive biology as well as seed production of this species in Viet Nam and Global. This study aimed to compare the performance of four different spawning induction methods on banded sea urchin. The experiment was conducted with four methods including of 1) injection of potassium chloride (KCL, 2.0M) at different doses of 2M (0.5ml, 1ml, 1.5ml, and 2ml), 2) thermal shock, 3) hydrogen peroxide (H_2O_2, $0.6x10^{-2}$%) and 4) Ultra violet method, triplicates per spawning induction method and 10 individuals per replicate. Results indicated that there was no spawning induction by using thermal sock, H_2O_2 and UV methods, whereas the only affective method of injection 2.0 mL KCl (2M). The spawning, fertilization and hatching rate of injecting 2ml KCl 2M method were found at 60.43±4.87%, 65.5±5.77%, 80.6±5.3%, respectively. Time at first spawning of using KCl method was about 3 – 10 min after injection. Larvae hatched after 27-30h hours at 27.5-29^{0}C. The results suggested that injection of 2.0 mL KCl (2.0 M) method could be used for spawning induction of banded sea urchin.

Keywords: Banded sea urchin, *Echinothrix calamaris*, Potassium chloride (KCL, 2.0M), Seed production, Spawning induction methods

P-BL-C01

Study on the Effects of Temperature on Growth Performance, Survival Rate and Digestive Enzyme Activities of Crab Seed (*Scylla paramamosain*)

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Abstract

This study was conducted to investigate the effects of temperature on growth performance, survival rate and digestive enzyme activities of crab *(Scylla paramamosain)* seed. The experiment consisted of four treatments such as 27-28℃, 30-31℃, 33-34℃ and 36-37℃, each treatment has three replicates, stocking density of 100 crabs/ m^3 in composite tanks and the salinity of water was 25‰. The experiment lasted for 20 days. The result show that growth of crab (length and weight) at 27-28℃ treatment was lowest significant difference ($p<0,05$) compared to the remaining treatments. The weigh and length of the crab at 30-31℃ treatment was no significant difference ($p>0,05$) if compared to those of 33-34℃ treatment but it was a significant difference ($p<0,05$) with 36-37℃ treatment. There was found that the survival rate of crabs at 27-28℃ and 30-31℃ treatments was statistically significant difference ($p<0,05$) if compared to other treatments. Digestive enzyme activities (chymotrypsin, α-amylase, trypsine) increased as temperature increased, the highest activities was at 33-34℃ and no significantly different if comparison with 27-28℃. It is suggested that temperature affected on the growth performance, survival rate and digestive enzyme activities of the crab.

Keywords: Crab, Temperature, Growth, Survival rate, Digestive enzyme

P-BL-C02

Rearing Larvae of White-leg Shrimp (*Litopenaeus vannamei*) by Biofloc Technology with Different Carbon Sources

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Abstract

The study aimed to find out an appropriate carbon source for biofloc system to be conducted for white leg shrimp larvae and PL's in hatchery. The experiment included five treatments: (i) no additional carbon source (control), (ii) additional different sources of carbon as from wheat flour (ii), rice bran (iii) , combination of wheat:rice bran in a ratio at 50:50 (by weight) (iv) and sugar (v), and three replicates each. Tank volume was 500 liter and salinity of 30‰. Stocking density of 150 larvae/liter The results of the experiment showed that the length of Postlarvae 12 in applied molasses was larger (i.e. 10,18±0,15mm) and significant difference ($p<0,05$) compared to the control and but insignificant difference compared to other treatments. Survival rate in Postlarvae 12 was 52±5,1% and productivity reached 78±8 PL/liter), in additional carbon from the sugar treatments highest, difference was statistically significant ($p<0.05$) compared with the other treatments. Therefore, it is recommended that additional molasses to white-leg shrimp larvae culture using Biofloc technology is the best.

Keywords: Biofloc, Larvae, Sugar, White-leg larvae and Pl's

Larval Rearing of Giant Freshwater Prawn (M*acrobrachium rosenbergii*) in Bioflocs Systems Supplemented with Different Carbon Sources

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Abstract

The study was carried out to evaluate the effects of three carbon sources (sugar, rice flour and wheat flour) added at C:N ratio of 15 on growth and survival rates of larvae and postlarvae of giant freshwater prawn (*Macrobrachium rosenbergii*), in comparison with a control treatment of no carbon source added. The larvae were cultured at the density of 60 individuals/litter in 500 litter composite tank with the salinity of 12‰. Larval prawn were fed with *Artemia nauplii* for the first 4 days, and supplemented with artificial feed (Lansy and Fripak) from day 5 onward. After 30 rearing days, prawn in the treatment with sugar addition had the highest growth (body length of PL_{10} was 1.32 ± 0.08 cm), survival rate (59.3±17.6) and yield (36.0±11.0 individuals/L), which were statistically different from other treatments ($p<0.05$). Growth and survival rates of prawn in treatments of rice flour and wheat flour addition were higher but not significantly different compared with the control treatment.

Keywords: Giant freshwater prawn, *Macrobrachium rosenbergii*, Biofloc, Carbon sources, Larval rearing

P-BL-C04

The Crab Bank Project: A study of Blue Swimming Crab Larval (First Crab Stage) Behaviour After Release to the Sea

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Abstract

The crab bank project has been implemented in many coastal provinces in Thailand. The project aims to conserve and sustain crab (blue swimming crab, *Portunus pelagicus*) resources and enhance the awareness of local fishers on the importance of their involvement in fisheries management. It involves fishers releasing berried female crab in rearing crab bank, where the crabs are raised until they spawn. Crabs larval (zoea stage) are then released to the sea to enhance crab recruitment. Unfortunately, up to now the knowledge of crab larval released from crab bank to the sea is very limited, and more knowledge about behaviour of crab larval after release to the sea is essential for conserve and sustain crab resources. The objective of this study was to investigated behaviour of first crab stage after release to the sea. The experiment of this study was conducted at the laboratory of the Klongwan Fisheries Research Station, Thailand. The ten experimental crabs were released in simulated sea conditions in glass aquarium tank (12" length × 6" width × 8" height) with different substrates. The two treatments were sand (T1) and sand combinated with seaweeds (T2) as substrates. Both treatment had three replicates. The results showed that the average percentage of crab larval moving to the sand for hide after release into T1 (83.3, 93.3 and 100% in 1, 2 and 3 minute periods, respectively) and T2 conditions (76.6, 83.3. 86.6, 96.6 and 100% in 1, 2, 3, 4 and 5 minute periods, respectively) in each minute periods were not significantly different (*t*-test, $P>0.05$). This study demonstrated that if release first crabs stage from crab bank to the sea maybe crab has a high survival because of it has moving behaviour to a bottom area of the sea for hide from predators within a short time.

Keywords: Crab bank, Blue swimming crab, Crab larval behavior

Techniques and Productivity of *Litopenaeus vannamei* Shrimp Culture Brackishwater Pond on Coastal Sandy Soil Area in Bantul Regency

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Abstract

Most of coastal area in Bantul Regency, Yogyakarta Special Region is sandy soil area or sand dunes. This marginal lands are not suitable for crops because it is watering only from rain water. Since 2013, along the sandy coastal have been developed brackishwater ponds for intensive culture of *Litopenaeus vannamei* shrimp. This research has purpose to know feasibility of techniques and productivity of *Litopenaeus vannamei* shrimp culture in sandy area. Survey study was conducted in this research. Respondents of shrimp culturists were determined stratified sampling methods based on brackishwater pond area: less than 1,000 m^2; range 1,000-2,000 m^2; range > 2,000-3,000 and more than 3,000 m^2. Data were collected with observation and interviews using questionnaire. Seventy seven brackishwater pond area were collected, consist of 24 plots of less than 1,000 m^2; 33 plots of 1,000-2,000 m^2; 10 plots of > 2,000-3,000 and 10 plots of more than 3,000 m^2. The results show that *Litopenaeus vannamei* shrimp culture is technically feasible to practice in sandy coastal area, with productivity: 18.6 ton/ha/cycle in area of < 1,000 m^2 (average area 690 m^2); 18.8 ton/ha/ cycle in area of 1,000 – 2,000 m^2 (average area 1,470 m^2); 16.5 ton/ha/cycle in area of > 2,000-3,000 m^2 (average area 2,411 m^2) and 13.0 ton/ha/cycle in area of > 3.000 m^2 (average area 3,600 m^2). The highest productivity were obtained from pond area of 1,000 – 2,000 m^2, in average area of 1,470 m^2. Technically, shrimps culture practices on coastal sandy area: the brackishwater ponds linned with HDPE (high density poly etilyn plastic with water level around 120 cm; stocking density about 173 larve/ m^2; use paddle wheel 33 unit/ha (1 HP per unit) with 6 wings; application of dolomite and 1.4 tons/ha and calcite 908 kg/ha, and probiotics 216 kg/ha and feed conversion ratio (FCR) 1.46.

Keywords: Brackishwater pond, *Litopenaeus vannamei* shrimp, Techniques, productivity, Sandy soil area

P-BL-C06

Study on Nursery of White-leg Shrimp (*Litopenaes vannamei*) at Different Salinity Applying Biofloc Technology

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Abstract

This study aimed to determine the suitable salinity on survival rate and growth of white-leg shrimp postlarvae applied biofloc technology. The experiment included four treatments at different salinity as follow: (i) 10‰, (ii) 15‰, (iii) 20‰ and (iv) 25‰. Each treatment was consisted 3 replicates and were randomly set up. Rearing shrimp juveniles based on biofloc technology with the ratio of C/N= 15:1 by using additional molasses. The nursing tank was 500L in volume and stocking density of 2000 inds/m^3. The average weight of shrimp juveniles in experiment was 0,006g. After 30 days of rearing, there was significantly different ($p < 0,05$) in terms of the growth rate of shrimps among treatments. The results of the experimet showed that the length (4,54 ± 0,06 mm), weight (0,79 ± 0,04 g) and survival rate (91,5 ± 1,0 %) at treatment of 15‰ significant different ($p<0,05$) compared to the other treatments. Therefore, salinity of 15‰ was recommended for rearing of White-leg shrimp postlarvae using biofloc technology.

Key words: Biofloc, Salinity, Survival rate, White-leg shrimp

P-BL-C07

Supper-intensive Culture of White Leg Shrimp (*Litopenaeus vannamei*) Applying Biofloc Technology in Bac Lieu province, Vietnam

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Abstract

Supper-intensive culture of white leg shrimp (*Litopenaeus vannamei*) is increasingly important in the Mekong Delta of Vietnam. The study was conducted at Long Manh Company in Bac Lieu province with aims at evaluating the efficiency of technology, environment and financial aspect of supper-intensive culture of white leg shrimp at commercial scale. Shrimp were cultured at three-phases with HDPE tanks under net houses. Shrimp postlarvae were nursed in two 100-m^3 circular tanks at stocking density of 200 PL/m^3 for 20 days, juvenile were then transferred to the second phase with two 500-m^3 tanks at 500 shrimps/m^3 for 45 days, and finally transferred to four 500-m^3 tanks at 200 inds/m^3 for 45 days. Molasses was added daily to the culture tanks at C/N ratio of 15:1. Culture water is rarely exchanged during culture and salinity were maintained at around 20ppt. Water quality, biofloc index were recorded weekly. Efficiency in shrimp growth performance, shrimp survival rates, production as well as financial aspects will be analyzed and discussed in detail.

Keywords: Biofloc, *Litopenaeus vannamei*, Supper intensive shrimp culture, White leg shrimp

Effects of Salinity on Selected Reproductive Physiological Parameters of Striped Snakehead (*Channa striata*)

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Abstract

The aim of this study was to investigate the effect of salinity on reproductive physiological parameters of striped snakehead (*Channa striata*). Striped snakehead with the body weight of 400 g were cultured in three salinities including 0‰ (control), 3‰ and 6‰ with three replicates. A recirculating culture system was used for each treatment, that consists of two 500L-biofilter tanks and three $1m^3$ rearing tanks. Thirty fish were stocked in each tank. After 4 months of culture, the growth of fish was highest in the control treatment (279±165 g/fish) and the lowest was at 6‰ treatment (196±142 g/fish). Physiological parameters such as haemoglobin, haematocrit were significantly higher in 6‰ treatment if compared to 3‰ and control treatments. Red blood cells ranged between $3.07±0.3x10^6$ and $3.44±0.3x10^6$ cells/mm^3. Osmolality and Cl^- ion concentration in 6‰ treatment (301±5.5 mOsm/kg and 104±3.86 mM, respectively) were higher than that of 3‰ treatment (294±6.20 mOsm/kg and 99.9±3.23 mM) and the control treatment (287±6.9 mOsm/kg and 95±5.31mM). The results also showed that the highest of gonadosomatic index of female (5.8±2.62%) was in the 3‰ treatment, while the lowest (3.85±1.95%) was in the control. The vitelline concentration was highest in the 6 ‰ treatment, and lowest in the control. The absolute fecundity and the relative fecundity were highest at 3‰ treatment and the lowest were in 6‰ for absolute fecundity and in the control for relative fecundity.

Keywords: Striped snakehead, Salinity, Reproductive physiological parameters

P-BL-F02

Evaluation of Reproductive Development of Striped Catfish (*Pangasionodon Hypophthalmus*) in Salinity Condition

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Abstract

Pangasianodon is one of the major freshwater fish species harvested across the Mekong River Basin and this species provides one of the largest and most important inland fisheries in the world (FAO, 2010). However, there are not many published papers on the effects of salinities on the physiological characteristic of the stripped catfish while the sea water levels is predicted to increase. This paper was studied on the Evaluation of growth reproductive capacity of striped catfish (*Pangasionodon Hypophthalmus*) in salinity condition (5‰). 40-day-old fingerling of striped catfish is reared in earthen ponds. The fish are artificially produced and the result of cross-breeding between 30 broodstocks from 3 farms in 3 different provinces (An Giang, Can Tho and Vinh Long). Striped catfish is domesticated and selected at 5‰ salinity in recirculating system 700 m^3 and cage culture 50 m^3 for freshwater catfish. Striped catfish after being domesticated and selected at 5‰ salinity for 1 year with initial weight of 1022 ± 271 g/fish with a total of 1046 initial fish. In freshwater, the total fish is 197. Collecting fish samples 3 times. Samples after collection bring away histology analysis and processing. Fish is raised from June 2018 to June 2019. The result is fish with ovaries, sperm and can be reproduced.

Key words: Freshwater, *Pangasianodon*, Brackish water, Salinity condition, Growth, Reproduction

P-BL-F03

Rearing Striped Catfish *(Pangasianodon hypothalamus)* From Fry to Fingerling Stage at Different Densities in Green House Condition

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Abstract

The study was conducted to evaluate the effect of densities on striped catfish *(Pangasianodon hypothalamus)* from fry to fingerling rearing in green house condition for 60 days. The reasearch were consisted of three density treaments such as T_1-800, T_2-1200 and T_3-1600 inds/m^3. The circulating system in the green house were set up with 3 tanks (2 m^3/tank) for each treatment as three replicates. The fish with the initial body mass (4.42± 2.06g) were used for this experiment. The fish were fed twice daily with commercial feed (40% protein). The weight, length and survival rate of the fish were collected after 30 days and 60 days and the digestive enzyme activites in the stomach and intestine of the fish also were sampled at the end of the experiment. The first result show that the weigh gain was significantly different among treatments ($P<0.05$) at 30 days of experiment, the highest weight gain in T_3 was 9.28±0.67g. The length gain reached the highest in T_3 (3.63±0.02cm) and lowest in T_2 (2.96±0.16cm). This result indicates that stocking density has significant influence on growth and weight of striped catfish. The final result will be present at the conference.

Keywords: Stocking densities, Striped catfish, Green house, Weight gain

P-BL-F04

Larval Rearing of Striped Catfish *Pangasianodon hypophthalmus* in Oligohaline Water at Different Stocking Densities

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Abstract

This study aims to determine the capability of rearing striped catfish (*Pangasianodon hypophthalmus*) larvae in areas that are affected by seawater intrusion. Two experiments were carried out in a Recirculating Aquaculture System (RAS) with 150-L fiberglass rearing tanks, using one-day-old larvae. The larvae were fed on rotifer on the first 3 days, followed by Artemia nauplii up to day 7th, then the larvae were fed with concentrated feed (powder, 40% protein) and commercial pellet (35% protein, diameter of 0.1mm) at the day 21st. In the first experiment, larvae were stocked at the density of 5 fish.L^{-1} in salinities of 0, 3 and 6 ppt. After 30 days of rearing period, result revealed that survival rate of striped catfish larvae was not affected if salinity raise up to 6 ppt. Growth rates of larvae reared in 3 and 6 ppt (specific growth rate, SGRs of 18.2 and 17.9%.day^{-1}, respectively) was significantly higher than those of larvae reared in freshwater (SGR of 16.6%.day^{-1}). Length increases of striped catfish larvae nursed in 3 and 6 ppt was significantly different with those of larvae nursed in 0 ppt, but there was not significant difference of length increase between the larvae reared in 3 and 6 ppt. In the second experiment, larvae was reared in water salinity of 6 ppt, at 3 different stocking densities of 5, 10 and 15 fish.L^{-1}. Results will indicate that cannibalism stills the main factor causing high mortality in the first few days of rearing period. Effects of high stocking density on survival, growth of fish and water quality are also discussed.

Keywords: Larval rearing, *Pangasianodon hypophthalmus*, Oligohaline water; Recirculating Aquaculture System (RAS), Stocking density

P-BL-F05

Effects of *Phyllanthus amarus* Extract on Selected Enzymes and Stress Resistance of Striped Catfish Fingerling Stage *(Pangasianodon hypophthalmus)*

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Abstract

This research was carried out to determine the effects of *Phyllanthus amarus* extract on selected enzymes and stress resistance of striped catfish fingerling stage *(Pangasianodon hypophthalmus).* The study included two experiments in which fish was fed in diets without the extract (control) and containing extracts 0.5% *Phyllanthus amarus* in 42 days then observed in different temperatures as 27°C, 31°C and 35°C during14 days. The first 42 days of experiments was carried out to examined the effects of *Phyllanthus amarus* on the selected digestive enzyme, cortisol and glucose of the fish. Particularly, fish were designed in different 300-L tanks during 42 days. After 42 days, respectively, 0,3 – 0,5 mL blood of three fish per each experiment was sampled. The second 14 days of study was conducted to investigate effects of the different temperatures and the effect of *Phyllanthus amarus* on the selected digestive enzyme, cortisol and glucose of the fish. The selected enzymes such as pepsin, trypsin, chymotrypsin and amylase of the experimented fish were observed. The results showed that glucose levels decrease in fish fed by herbal extracts groups, the lowest glucose concentration of fish was found significantly in the treatment of 0.5% *P. amarus* extracts groups (47.57 mg/100mL) compared to the control (69.47mg/100mL) at 35°C. The activity of chymotrypsin were 62.21 mU/mL in control group was not significantly different with *Phyllanthus amarus* extracts groups 64.46 mU/mL after 42 days. In conclusion, by using this herbs there will be reduce glucose content and the activity of digestive enzymes of striped catfish.

Keyword: Striped catfish, *Phyllanthus amarus*, Extract, Glucose level, Activity of digestive enzymes

P-BL-F06

The Effect of Salinity and Temperature on Growth Performance and Digestibility of Red Tilapia (*Oreochromis sp.*)

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Abstract

The study was conducted to evaluated the effects of temperature and salinity on growth performance and nutrients digestibility of red tilapia. The experiment included 12 treatments which was combined by different levels of salinity 0‰, 6‰, 9‰, 12‰ and temperature (28 ^{o}C, 31^{o}C and 34^{o}C). Each treatment was triplitcated. The experimental feed contained 35% crude protein, 5% crude lipid was mixed with Cr_2O_3 at 1% as marker for determine the digestibitlity. Red tilapia 11.5±0.13g in initial weight was stocked into 100 L tanks at the density of 30 individuals per tank. Results showed that there was no interaction between temperature and salinity on survival rate, growth and feed utilization efficiency of red tilapia. At the ambient temperature (28^{o}C), fish daily weight gain was significantly higher than fish reared at high temperature (34^{o}C). Fish reared at 34^{o}C had significant higher FCR compared to the 28^{o}C treatment. Moreover, the significant lower FI was found in the treatment with the temperature 34^{o}C compared to 31^{o}C treatment ($P<0.05$). Fish body composition had not affected by temperature and salinity. The apparent digestibility coeficient (ADC) of protein, ash, and energy were individually affected by the combination of temparature and salinity. Lipid were solely affected by the salinity. The highest ADC of feed in dry matter, ADC protein, ADC lipid and ADC energy was found in treatments at 34^{o}C. In conclusion, the temperature and salinity did not affect to survival rate, fish proximate composite of red tilapia. Fish digestibility tends to increase with increase of temparature and salinity.

Keywords: Red tilapia, Digestibility, Temperature, Salinity, Climate change

P-BL-M01

A Review on Hybridization and Backcross Breeding of Groupers in Malaysia

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Abstract

Groupers are distributed worldwide in tropical and subtropical seas and are one of the most popular food fish in the live reef food. Groupers culture has been an important sector in the aquaculture production in Asian region. The most popular cultured groupers are the tiger grouper (TG; *Epinephelus fuscoguttatus*), orange-spotted grouper (OG; *Epinephelus coioides*) and giant grouper (GG; *Epinephelus lanceolatus*) and hybrid of TGxGG. In Malaysia, there are many constraints in groupers production which results a heavy dependency on the wild seed which put a large pressure on its population in the natural marine ecosystem. Hence, innovation through hybridization has recently been practices in aquaculture in the hope of producing valuable traits where offspring carries the characteristics of hybrid vigor. First hybrid grouper recorded in Malaysia is the hybrid TGGG, a crossbreed between tiger grouper (E. fuscoguttatus) and giant grouper (E. lanceolatus). This novel hybrid grouper has gained immediate popularity by aquaculturists and seafood consumers owing to its production success and premium organoleptic properties that had led to high commercial value. To date, there are more than ten hybrid groupers have been produced and subjected to various scientific studies worldwide. With the advancement in science and technology, backcross breeding of grouper has been conducted to further produce species perhaps with better growth performance, environmental resilience and nutritional flexibility, improve flesh quality and increase the survival rate. This paper will reviews the recent hybridization and backcross breeding of groupers in Malaysia.

Keywords: Backcross- breed, Hybrid grouper, Hybridization

P-BL-M02

Development of Larval Morphology, Sensory Organs and Changes in Behaviour of the Clark's Anemonefish, *Amphiprion clarkia*

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Abstract

This study investigated the relationship between the development of morphology and sensory organs of *A. clarkii* larvae to its behaviour. Larvae were sampled daily from 1dph (day post hatching) to metamorphosis stage to identify morphological changes and measurement of body length. Larval behavior was observed in acrylic aquarium with sides darkened out until metamorphosis stage. Newly hatched larvae had transparent body, large eyes and small yolk sac. The larvae were able to swim and feed immediately after hatching. The behaviour of clownfish staying at the bottom and sticking to aquarium walls during 1 and 2dph indicated that they are sensitive to light. On 4dph, larvae had higher preference to stay at the brighter area of the tank indicating positive photoaxis. The behaviour of swimming to the surface and back down to the water column on 5dph might be an indication of the inflation of swim bladder of the larvae as the yolk sac of the larvae is usually exhausted by 3dph. By 13dph, most larvae have attained its stripes signifying the metamorphosis stage. The detailed analysis of development of larval morphology, sensory organs and changes in behaviour of the *A. clarkii* will contribute to better understanding of the early life cycle in the wild and to the development of more efficient larval rearing techniques.

Keywords: *Amphiprion clarkii*, Larvae, Morphology, Sensory organs, Behaviour

P-BL-M03

Artificial Seed Production of Phu Quoc Clariid Catfish (*Clarias gracilentus*)

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Abstract

The study aim to establish the techniques for seed production of *Clarias gracilentus* an endemic clariid catfish distributed in Phu Quoc Island, Vietnam. Broodfish fed with commercial pellet (41% protein) or in combination with trash fish reached full sexual maturity and can be induced breeding in captive conditions. Results on induced breeding showed that fish received 2 successive injections at 8 hours interval, a preliminary dose with 2 mg of carp PG.kg^{-1} and decisive dose with 4,000 IU hCG.kg^{-1} of female body weight, gave the best results with highest fertilization (61.3±12.6%) and hatching rate (63.9±11.7%). Embryonic development taken place about 25 hours at water temperature of 28-30^{o}C. Larvae totally absorbed their york sac at the 9th day after hatching (DAH), but they started exogenous feeding at the 5th DAH. Stomach had full functional at the 10th DAH with the appearance of gastric glands. Larvae was weaned to commercial diets at day 10th, 13th, 16th, and 19th DAH by replacing 25% of live feed by commercial diets per day. Results after 45 days of rearing showed among weaning treatments, the larvae weaned to commercial diets at the 19th DAH gave the best growth rate, but was not comparable to that of larvae fed continuously on live feed. However, weaning time was not effects on survival of experimental fish, which ranged from 74.0 to 77.4%. More study on nutrition requirement need to carry out in order to improve the growth of this larvae.

Keywords:Induced breeding, *Clarias gracilentus*, Digestive tract development, Weaning time

P-BL-P01

The Effect of Salinity on Maturation of Striped Snakehead *(Channa striata)* Cultured from Fingerling Stage

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Abstract

The aim of the study was to assess the effect of salinity on the maturation of striped snakehead (*Channa striata*) cultured from fingerling stage. The striped snakehead 5 g/fish was cultured at 3 different salinity treatments (0‰, 3‰ and 6‰) with triplicated. The density was 30 individuals/2 m^3 tank. The results showed that, the number of red blood cells at 6‰ were significantly higher than 0‰ and 6‰. The hemoglobin and the hematocrit slightly increased as salinity increase ($p>0.05$). The plasma osmolality significantly elevated at 3‰ and 6‰ treatment (296±5.10 and 304±7.40 mOsm/kg, respectively) compared to the control treatment (289±6.90 mOsm/kg). [Na^+] and [Cl^-] plasma at two salinity treatments were significantly higher than the control treatment ($p<0.05$). The result of observation and histology of the gonads showed that almost female were able to mature after 7 months cultured in the salinity. However, the maturation of the male could not found in this study. The ovary of the female developed to III and IV phase, the plasma vitelline content of the female was 3.02±0.44 µg ALP/mg protein at III phase, this value increased of 4.20±0.51 at IV phase ($p<0.05$). The gonadosomatic index (GSI) of the female increased at 3‰ treatment (9.14±1.01%) but it fell at 6‰ treatment (6.33±2.15%). In conclusion, the striped snakehead was able to mature at salinity up to 6‰, this plays an important role for saline intrusion under climate change in the Mekong Delta.

Keywords: Maturation, *Channa striata*, Histology, Physiological parameters, Salinity

Effect of Thyroxine Hormone Towards Growth and Survival of Climbing Perch (*Anabas testudineus*) Larvae

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Abstract

Climbing perch (*Anabas testudineus*), locally known as "ikan puyu" is a very popular fish among Malaysian. However, the long culture period and the slow growth of the species made it unpopular among fish farmers. Thyroxine (T4) is a hormone that function as growth precursor in all mammals including teleost. The application of T4 has widely used around the globe for growth enhancer and other function in the body. This research aimed to study the effect of T4 on growth and survival of climbing perch. Larvae of climbing perch were used to perform the experiment at different frequencies of T4 treatments (Group 1: 1X0.5ppm T4, Group 2: 2X0.5ppm T4, Group 3: 3X0.5ppm T4 and Group 4: control, 0ppm T4), by using immersion technique for 30 minutes. Treatments were performed once a week for three continuous weeks, and the observation data was taken for seven weeks. The survivability of the fish larvae showed a difference between T4 and non-T4 treatment, with 65.0% (Group 1), 66.7% (Group 2), 65.8% (Group 3) and 52.5% (Group 4, control). The length and weight of the fish that treated with T4 also showed significant differences ($p<0.05$) compared to the control group, where the highest length and weight were recorded at Week 7, with length at 43.87±1.56cm, 41.75±1.48cm, 43.04±1.86cm and 33.46±0.93cm, and weight at 1.34±0.27g, 1.47±0.03g, 1.26±0.16g and 0.71±0.04g, for Group 3, Group 2, Group 1 and Group 4 (control), respectively. From this study, the use of T4 hormone at 0.5 ppm for two times treatment were sufficient to increase the growth rate of climbing perch larvae, thus should reduce the cost of hatchery time for the species to reach the market size.

Keywords: *Anabas testudineus*; climbing perch; immersion; thyroxine

Genetic and Biotechnology

Session: Genetic and Biotechnology

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2	**Validate and Stock Comparison of Tri-spine Horseshoe Crab from some Asian Countries: A Biomolecular Approach** Naila K Aini[a]*, Erwyansyah[a,b], Rahmat Kurnia[a], Nurlisa A Butet[a], Ali Mashar[a], and Yusli Wardiatno[a]	**P-GB-C01**
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6	**Morphometric Assessment of Asian Swamp Eel, *Monopterus albus* (Zuiew, 1793)** Nurul Ily Izyan Raduan[a*], Ching Fui Fui[b], and Nazia Abdul Kadar[b]	**P-GB-M01**
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8	**Optimization of Carbon, Nitrogen and Colloidal Sources for Production of Chitinase *Streptomyces* sp** Anandita Perwita K[a], Indun Dewi Puspita[a]*, and Amir Husni[a]	**P-OT-02**

P-GB-A01

"Phylogenetic Analysis of Slipper-shaped Oyster (*Crassostrea iredalei*) Inferred from COI, ITS, and 18S rDNA."

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Abstract

This study analyzed *Crassostrea iredalei* population from Aklan, Capiz, Negros, Samar and Sorsogon in a phylogenetic framework using the sequence data from COI, ITS, and 18S rDNA genes. Alignments of generated sequences of *C. iredalei* revealed highly similar sequences to sequences in GenBank with few nucleotide substitutions. Phylogenetic tree of *C. iredalei* population for all three markers showed clustering of sampled sequences into the same subgroup against GenBank sequences with high bootstrap support value for COI and ITS (100%) and moderate support value (64%) for 18S rDNA. Genetic diversity analysis revealed little to no genetic (18S rDNA H=0.000, COI H=0.205, ITS=0.585) and nucleotide diversity (18S rDNA μ=0.000, COI μ=0. 005, ITS μ=0.027) for C. iredalei population. The AMOVA using COI (ΦST= -0.099) and ITS (ΦST = 0.034) gene fragments revealed absence of genetic structure. Pairwise ΦST values were not significant (ΦST<0.05) for both markers but suggests that gene flow was ongoing for *C. iredale*i population. Results of Tajima's D in COI (-1.86122*) and ITS (-2.2885**) supported by Fu's FS values (COI Fu's FS = -0.567; ITS Fu's FS = -0.308) were significant and is indicative of previous bottleneck event(s) followed by population expansion. Overall, phylogenetic and statistical analysis inferred from COI, 18S rDNA and ITS gene fragments revealed genetic homogeneity among populations. The genetic data obtained in this study highlights the importance of a regulated aquaculture program based on genetics information in order to maintain stock diversity of *C. iredalei* in the Philippines.

Keywords: *Crassostrea iredalei*, Phylogeny, Genetic diversity, Genetic structure

P-GB-C01

Validate and Stock Comparison of Tri-spine Horseshoe Crab from some Asian Countries: A Biomolecular Approach

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Abstract

Previous genetic studies on Asian horseshoe have increased in several countries such as USA, Korea, Japan, and China. Studied about horseshoe crab in Indonesia is still limited. Balikpapan and northern Java coastal waters as the locations known for the existence of horseshoe crab but do not have adequate information. This study aims to validate horseshoe crabs based on 16S rRNA gene and examine the population stock of *T. tridentatus* from Indonesia and East Asia. Molecular identification was conducted by DNA barcoding method. Amplification used specific primer of 16S rRNA and CO1 gene fragment. Results show that thirty-two sequences of partial 16S rRNA gen confirmed as *Carcinoscorpius rotundicauda* (98.44-99.03%), while eleven sequences confirmed as *Tachypleus gigas* (98.92-99.35%). There were 10 specific nucleotide bases of *C. rotundicauda* and 5 specific nucleotide bases of *T. gigas* in Indonesia. Genetically *T. tridentatus* in Balikpapan have a close relationship with Malaysia compared with Korea, Japan, and China population stock. Although five populations (Indonesia, Malaysia, Korea, Japan, and China) as a whole have close relationships, there is one specific nucleotide base site (in site 475th). This lead to population *T. tridentatus* in Balikpapan and Malaysia can be distinguished from population *T. tridentatus* in East Asia (Korea, Japan, dan China). The specific nucleotide site is a substitution mutation. *T. tridentatus* in Balikpapan can also be distinguished from *T. tridentatus* from Malaysia at the 111th and 533th nucleotide base sites. Thus the population of *T. tridentatus* in Indonesia and Malaysia are different from *T. tridentatus* in East Asia.

Keywords*:* East Asia, Eastern Balikpapan, Horseshoe crab, Nucleotide base, Population stock

P-GB-F01

Ontogenetic Development of Immune-related Genes and its Expression in African Catfish *Clarias gariepinus* After Challenged with *Aeromonas hydrophila*

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Abstract

The study of ontogenetic development of immune-related genes and its expression after the bacterial infection is still scarce in African catfish *C. gariepinus*, an important aquaculture species in Indonesia. The current study aimed to evaluate the ontogenetic development of the immune-genes, and evaluate its expression after *A. hydrophila* infection in the African catfish, and searched the potential DNA marker for bacterial resistant strain. The specific, and non-specific immune related genes were expressed in the eggs, indicating their maternal mRNA transfer from the mother. Their expression was modulated with different patterns through the developmental stage. The specific immunity began to be developed after 20−60 days post-hatching. After *A. hydrophila* infection, non-specific immunity and stress-related genes were rapidly modulated after infection. After 24 hours postinfection, fish were divided into two population: resistant and susceptible according to their clinical signs. The resistant population has higher lysozyme expression in several tissues. Lysozyme gene also potentially used as the markers in the further *A. hydrophila* resistant-strain selection of African catfish.

Keywords*:* African catfish, Bacterial infection, Gene expression, Immune responses , Ontogenetic development

P-GB-F02

Food Selectivity by Striped Catfish (*Pangasianodon hypophthalmus*) from Hatching to 30 Days Old

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Abstract

The aim of the study was to investigate the pattern of food selection by striped catfish *Pangasianodon hypophthalmus* larvae reared in earthen pond in order to find the suitable food supplying throughout rearing period and improving survival of this larvae. The study was based on the gut content analysis of striped catfish larvae from hatching to 30 days old. Gut contents were compared to the natural food presented in pond and *Ivlev's* electivity indexes were calculated. Two days after hatching, the larvae commenced exogenous feeding and showed slight selectivity on zooplankton. Gut contents analysis showing there are 4 groups of zooplankton including rotifers, cladocerans, copepods, and nauplii of copepods; in which rotifers was the most favorite food in first 4 days of the nusery stage and then replaced with large sized foods like cladocerans and copepods. However, from 21 days old, fish preferred copepods to cladocerans. In particular, the electivity index of *Moina macrocopa* ranged from 0.3 to 0.95 indicating that this is the most favorite food from the 4th to the 18th day old. Although, this fish started feeding on commercial diets from 14th day old, they continued selection of live food organisms. That showed the need of maintaining live food in rearing conditions after weaning to artificial diets.

Keywords*:* *Pangasianodon hypophthalmus*, Food selection, Electivity index

P-GB-F03

Molecular Characterization of Gonadotropin Hormones in *Pangasionodon hypophthalmus* (Sauvage, 1878)

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Abstract

Pangasionodon hypophthalmus is one of the most cultured fish in the world aquaculture sector. The demand of this species soared up due to its remarkable growth rate, exquisite taste and the nutritional values it contained. Numerous studies have been conducted covering their diets, growth rates, breeding and stocking density for instance. However, the genetic information about the culture stock is unavailable for breeding improvement purposes. Therefore, this study will focus on gonadotropin (GtH) hormones, follicle-stimulatinghormone (FSH) and luteinizing hormone (LH), extracted from the pituitary as it acts as the main controller of the reproduction system. The GtH subunits (α, FSHβ, and LHβ) will be detected and characterized to acquire the complete sequence of the subunit genes as a useful resource for marker-assisted of reproduction. Results obtained from molecular detection *via* Polymerase Chain Reaction (PCR) are as following: α=180bp, FSHβ= 443bp, LHβ= 151bp. The similarity value scored in the range of ~99-94% in percentages, whereas molecular phylogeny confirmed that *P. hypophthalmus* is a member of Pangasiidae family. The results obtained from this study should contribute as an initial step for a development of a better reproductive strategy in *P. hypophthalmus* and other *Pangasionodon* spp. to increase the production in Malaysia and Asia Pacific region.

Keywords*:* Follicle-stimulating Hormone, Gonadotropin, Luteinizing Hormone, *Pangasius hypophthalmus*, Reproduction

P-GB-M01

Morphometric Assessment of Asian Swamp Eel, *Monopterus albus* (Zuiew, 1793)

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Abstract

Asian swamp eel *Monopterus albus* (Zuiew, 1793) or also known as rice field eel or belut in Malaysia that native to Asia country such as India, southern China, Malaysia and Indonesia. Swamp eel is really popular as traditional medicines practices to treat asthma, impotence, and healing. Now a days, this population showed a decline such as high exportation and overfishing. The preliminary study was conducted to clarify their taxonomic status, morphological characteristics of the Swamp eels were analysed by using morphometric analysis such as total length, body weight, length caudal peduncle, body depth , head width, head depth, pre- orbital length, post orbital length, upper jaw length, lower jaw length, gape of mouth and inter orbital length. A total of 25-30 Swamp eels were collected at each place in Sabah. The average standard length of *M. albus* from Papar, Tuaran and Kota Marudu (Mean $\pm$ SD) were 63.60 $\pm$ 8.13, 60.61 $\pm$ 6.61 and 66.81 $\pm$ 7.21 cm, respectively. While for average weight of *M. albus* were 272.83 $\pm$ 87.96, 179.81 $\pm$ 70.33, 341.70 $\pm$ 99.03.

Keywords*:* Morphometric, *Monopterus albus*, Morphometric, Population, Swamp eel, Freshwater fish

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P-GB-M02

Population Genetic Structure of *Eleutheronema tetradactylum* (Shaw 1804) in Coastal Waters of Malaysia Inferred from Microsatellites

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Abstract

The four finger threadfin, *Eleutheronema tetradactylum* (Shaw, 1804) is a species of the Polynemidae family that can be found in Malaysian waters. *E. tetradactylum* is one of very high commercial and important fisheries species in Malaysia There have been no population genetic studies in this species in Malaysia, which are important to provide genetic information for sustainable fisheries management of the species. Therefore, thus study aims to investigate the genetic variation and population genetic structure in *E. tetradactylum* along the Malaysian coastal waters by using five pairs of microsatellite loci. A total of 94 of *E. tetradactylum* samples were collected from six different coastal areas of Malaysia. Muscle tissue were taken and stored in a 95% ethanol. Total DNA was extracted. The amplification five microsatellite loci were analyzed. Four out of five microsatellite primers revealed polymorphic loci in *E. tetradactylum* sampled. Microsatellites analyses for *E. tetradactylum* also indicated low levels of genetic variation and high degree of population structure among the *E. tetradactylum* populations. The average observed heterozygosity (H_O = 0.5191) obtained was lower than the standard heterozygosity found in most marine populations (H_O = 0.79). Through assignment test all samples were assigned to their respective populations. The outcome of this study showed low genetic variation and high degree of population genetic structure in *E. tetradactylum* along the Malaysian coastal waters. Thereby, this study provide the important amplifications for the conservation and fisheries management of the four finger threadfin fish and species harboring similar biological attributes.

Keywords*:* *Eleutheronema tetradactylum*, Microsatellite, Population genetic, Genetic structure, Conservation

P-OT-02

Optimization of Carbon, Nitrogen and Colloidal Sources for Production of Chitinase *Streptomyces* sp

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Abstract

Chitin is a non-branched polysaccharide compound consisting of N-acetylglucosamine which is associated with β-1,4-glycoside bonds, Chitin has a hydrophobic, insoluble water and alcohol and is insoluble in almost all organic solvents. the chitin properties cause obstacles in the application process. Enzymatic degradation of chitin is carried out by using chitinolytic microorganisms, namely microorganisms that are capable of producing the enzyme chitinase. The purpose of this study was to determine the source of carbon and nitrogen against bacterium chitinase *Streptomyces* sp. Methods include the manufacture of liquid chitin medium, bacterial rejuvenation, loading of carbon and nitrogen inoculums, and calculation of N-acetylglucosamine and chitinase activity. The results of the study show that carbon sources are suitable for *Streptomyces* sp. in the form of lactose with the results of an NAG concentration of 86 µg/ml 0.039 U/ml chitinase activity and an appropriate nitrogen source in the form of yeast extract for 38 µg/ml chitinase activities 0.017 U/ml and peptone with NAG concentration of 36 µg/ml chitinase activities 0.016 U/ml on day 2. Based on these studies the appropriate carbon source for *Streptomyces* sp is lactose and an appropriate nitrogen source in the form of yeast extract and pepton.

Keywords*:* Chitin, *Streptomyces* sp, Carbon, Nitrogen, Chitin colloidal

Aquaculture System and Management

Session: Aquaculture System and Management

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15	**Microplastics in Aquatic Systems–genuine Threat or Over Exaggeration?** Eoghan M. Cunningham[a,b] and Julia D. Sigwart [a,b]*	**P-AM-P03**
16	**Applications of Gis for Evaluating the Cage Culture in Long Xuyen City, an Giang Province, Vietnam** Tran Van Viet[a], and Ngo Huynh Nhat Toan[a]*	**P-AM-P04**

P-AM-A01

The Influence of Physicochemical Water Parameters on the Total Weight of the Philippine Slipper Shaped Oyster, *Crassostrea iredalei* (Faustino, 1932)

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Abstract

The influence of environmental conditions through physicochemical water parameters including temperature, salinity, dissolved oxygen and pH on the total weight of the slipper-shaped oyster, *Crassostrea iredalei* were investigated over time across ten sites in Visayas, Philippines. Both models of Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) were used to distinguish site differences with and without the effect of the physicochemical water parameters as covariates on the total weight of *C. iredalei*. Results from the ANOVA model revealed significant differences in the mean log total weight between sites even without taking into account the effects of the water parameters. Among the measured water parameters, the ANCOVA model showed the significant positive covariate effect of temperature above and beyond the significant differences in the mean log total weight between sites. These observed variations in the total weight of oysters is most likely due to the varied underlying internal and external factors that affect oysters' individual physiological functions in their respective ecological habitat. The findings could also provide significant insights on the varying environmental conditions of which the oyster thrives. The study reflects both vulnerability and coping mechanism of the Philippine *C. iredalei* with the variations in temperature as a critical factor for developing tolerance for positive growth and survival, hence influencing economic production. Overall, the study could promote patterns of culture management practices and harvest for better understanding of the changing environmental conditions operating in the different culture sites.

Keywords: Physicochemical water parameters, *Crassostrea iredalei*, Oyster total weight, ANOVA

P-AM-A02

Depth Effect on Growth of Green Mussel (*Perna viridis*) in Trang Province, Thailand

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Abstract

The effect of depth viz; 30, 60 and 90 cm. of mussels on growth were conducted in Sikao canal, Trang Province, Thailand. This study was carried out from March to June 2019. The effect of depth on growth and all parameters were monitored every 15 day during the experimental period. The average initial weight and final were measured as 386.00±70.57 – 1,342.00±118.83 g, 382.00±21.68 – 1,304.00±144.50 g and 410.00±70.71 – 1,262.00±131.80 g (p>0.05). The average initial length and final were recorded as 2.57±0.55 – 3.19±0.13 cm., 2.43±0.46 – 2.99±0.09 cm. and 2.47±0.39 – 2.91±0.20 cm. (p>0.05), respectively. The specific growth rate and average daily growth rate in each the depth were determined as 2.79±0.30, 2.72±0.30 and 2.52±0.35 % per day, 22.37±1.77, 21.73±2.41 and 21.03±2.20 g/day (p>0.05), respectively. Throughout the experiment period were showed the cumulative mortality range from 0.31±0.29 - 0.67±0.53 % (p>0.05), respectively. Cumulative mortality was highest in the depth at 90 cm. and the mortality was found maximus in early June. Environmental parameters were also recorded, where the salinity range 28-33 ppt, Temperature of 30-32 °C, pH of 7.0-8.5, DO of 6.0-7.5 mg/L and Transparency of 30-57 cm. respectively.

Keywords: Depth, Green Mussel (*Perna viridis*), Growth

P-AM-C01

Guidelines on the Long-term Implementation of the Crab Bank: A case Study of Crab Bank in Ta Mong Lai Fishing Village, Prachuap Khiri Khan Province, Thailand

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Abstract

The crab bank is a sustainable crab conservation project making fishing village a pilot scheme for marine resources conservation. The objectives of this study were to clarify changes of blue swimming crab (*Portunus pelagicus*) production after crab bank implementation and participation level of fishers in crab operation, including guidelines for long-term crab bank implementation. The study was conducted at the crab bank of Ta Mong Lai fishing village near Prachuap Khiri Khan Bay (11 50 N, 99 49′E) Muang district, Prachuap Khiri Khan province, Thailand during the period of January to April, 2019. The study revealed that after crab bank implementation; production of crab (*P. pelagicus*) juveniles in Prachuap Khiri Khan Bay has increased and participation in operation of fishers in crab bank was in medium level (41-60%). In addition, for long-term crab bank implementation, the success of a crab bank is primarily dependent on the local communities and thus the local government officers should use all means available to encourage higher program participation by the fishers (e.g. promotional activities) and to support maintenance of the crab bank.

Keywords: Crab bank, Ta Mong Lai fishing village, Prachuap Khiri Khan Bay

P-AM-C02

Investigation the Use of Various Pest Control Products for Removing Copepod in Artemia Pond at Different Salinities

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Abstract

The brine shrimp Artemia is a well-known organism used as live feed for fish and shrimp larvae. Nowadays, Artificial feed formulation is not available to completely substitute for Artemia, feeding live prey to larvae still remains essential in the commercial hatchery. Copepods is the main competitive enemy of Artemia, reducing density and difficult to maintain population. Artemia culture study has been setting-up in plastic cones 1.5L contained 1L culture medium with different salinities (40, 50, 60ppt). Two days after copepod removing by derris root and saponin and 15 days from KILLER. Artemia will be stocked into treated culture medium for checking the effect of product persistency on Artemia performance and the recovery ability of copepod population. To find out the best pest control products that can permanently remove copepod population from intake water for Artemia culture at different salinities.

Keywords: Artemia, Brine shrimp, Copepods, Derris root, Saponin, KIILER

P-AM-C03

Culture White Leg Shrimp *(Litopenaeus vannamei)* in Combination with Common and All Male Giant Freshwater Prawn *(Macrobrachium rosenbergii)*

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Abstract

The study aims to find out the suitable stocking density per species in a combined culture of the white leg shrimp (WLS; Litopenaeus vannamei) and giant freshwater prawn (GFP; Macrobrachium rosenbergii), and also to evaluate the culture efficiency when combination either all-male or common giant freshwater prawn in the culture. In the first trial, there were 3 combined densities (i.e. treatments) involving of 78 WLS+ 2 GFP (treatment 1: NT1), 76 WLS+ 4 GFP (NT2), 74 WLS+ 6 GFP (NT3), and 3 replicates each; shrimp and prawn were cultured in $2m^3$ composite tanks at salinity of 5‰. Result showed that, with the initial weight and length of WLS and GFP were 0,46g; 3,95cm, and 0,73g; 4,22cm, respectively, after 60 days of culture period, NT2 gave the best result in term of harvested biomass ($0,58kg/m^3$); FCR (1,36) although there were not significant difference among treatments ($p>0.05$). And thus, NT2 was selecled to performed the second trial in which the WLS was combined with either all-male (NT1) or common giant freshwater prawn (NT2) and 3 relicates per treatment. The initial (in weight and length) shrimp and prawn used in this trial were recording for WLS as 0,33-0,39g, 3,56-4,3cm, while all-male GFP with 0,74-0,80g; 4,2-4,25cm and, common GFP:0,56-0,65g; 4,2-4,6cm. After 60 days of culture, although the survival in NT1 was lower than in NT2 (73 versus 75%; but not significant difference ($p>0,05$) the combination of all-male GFP with WLS gave better scores interm of harvested biomass and FCR ($0,47kg/m^3$ versus 0,46 and 1,19 Vs 1,20, respectively) comparing to the treatmeant of WLS with common GFP.

Keywords: White leg shrimp, Giant freshwater prawn, *Litopenaeus vanamei*, *Macrobrachium rosenbergii*

P-AM-C04

Screening for Potential Bioremediators in Reducing Total Ammonia Nitrogen (TAN) in Shrimp Pond Sludge

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Abstract

Sludge is a major critical factor in shrimp culture ponds and has been a long term problems in aquaculture. Excessive feed, metabolic wastes and feces results in the accumulation of ammonia content in the sludge. Sludge needs to be removed frequently from the culture water in order to maintain optimum water quality of the ponds and must be treated properly before final end disposal to the environment. Bioremediation is one of the interesting and promising methods in reducing total ammonia nitrogen level in sludge. In this research, a total of 53 bacteria were used to screen for total ammonia nitrogen reduction. Three bacteria effectively showed significant reduction in total ammonia nitrogen; *Bacillus amyloquefaciens* strain L11, *Enterococcus hirae* strain LAB3 and *Bacillus subtilis* strain DF8. The percentage of ammonia reduction achieved in 24 hours for *Bacillus amyloquefaciens* strain L11, *Enterococcus hirae* strain LAB3 and *Bacillus subtilis* strain DF8 were up to 64%, 53% and 51% respectively. These bacteria showed definite potential in the preliminary screening as bioremediators for reducing total ammonia nitrogen and deserved to be further tested and optimized to be used in treating aquaculture wastes.

Keywords: Total ammonia nitrogen, Bioremediation, Shrimp pond sludge

Transportation of Striped Catfish *(Pangasianodon hypophthalmus)* Fingerling in Low Temperature Condition

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Abstract

The study was conducted to evaluate the effects of the low temperature and transportation time on survival and physiological parameters of striped catfish (*Pangasianodon hypophthalmus*). The experiment was designed as 9 treatments and triplicates for each treatment. The treatments were consisted of three temperatures (15, 18, 21^0C) in combination with three transportation times (2, 4 and 6 hrs.). After transportation period (2, 4 and 6 hrs.), fish were stocked in 500-L tanks with normal temperature for 72 hrs to monitor the recovery (mainly, survival rate). The blood sample of 5 randomly selected fish were collected for haematological parameter analysis just before transfered to normal temperature and after 72 hrs. The dead fish were removed and recorded during and after transportation. The results showed that the highest of erythrocytes was found in the treatment 18^oC-4 hrs. ($2.91\pm0.4x10^6$ cell/mm^3), 15^oC-6 hrs. ($2.9\pm0.39x10^6$cell/mm^3), and the lowest was in the 18^oC-2 hrs. ($2.06\pm0.28x10^6$cell/mm^3), significantly different if compared to other treatments ($p<0,05$). Haemoglobine levels in treatments of 6 hrs. was significantly higher than of the treatments of 2 hrs. and 4 hrs. ($p<0,05$). Haematocrit in the treatments of 15^oC was higher if compared to the 18^oC and 21^0C treatments ($p<0,05$). The plasma glucose level increased in the treatment of 15^oC (76.73±12.29 mg/100mL), was significantly different in comparison with the 18^oC treatment (59.8±9.66 mg/100 mL) ($p<0,05$). The survival rates of fish at 72 hrs. stocked in normal condition were significantly different among treatments ($p<0,05$). The survival rate in 21^oC treatment was highest.

Keywords: Temperature, Striped catfish fingerling, Transportation, Low temperature

P-AM-F02

Effects of Combined Temperature and Salinity on Growth, Survival and Selected Physiological Parameters of Striped Snakehead, *Channa striata* (bloch, 1793) at Fry Stage

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Abstract

Triped snakehead, *Channa striata* (Bloch, 1793) is the most popular freshwater culture species in Mekong delta. However, the saline water intrusion has been occured in the Mekong delta due to climate change impact. This study aimed to find the effects of combined temperature and salinity on growth, survival and selected physiological parameters of this species. The experiment was set up in 500L composite tanks containing 200L. The experiment was conducted using completely randomized design with 3 replicates including three elevated temperatures (27^0C, 30^0C and 33^0C) in combination with 3 salinities (0‰, 5‰ and 10‰). Each tank was stocked 300 individuals. Striped snakehead at hatching stage were used for this study. Salinity and temperature of the water in the treatments were increased to 2‰ and 2^oC per day respectively. The experiment was lasted for 90 days. The body mass of fish was monitored at 30, 60 and 90 days for calculating the growth and survival rate. Blood was collected at 90 days to measure hematocrit, hemoglobin, red blood cells, white blood cells, osmotic pressure, [Na^+], [Cl^-]. The results showed that the interaction of temperature and salinity did not affect growth and survival rate, but the salinity affected both growth and survival rate with the highest weight gain and survival rate in treatment 27^0C combined with 5‰ (7.53±0.12 g) and treatment 30^0C combined with 0‰ (7.88±4.71 g), respectively. The plasma osmolality was changed, but the number of red blood cells, white blood cells, hematocrit, hemoglobin, [Na^+], [Cl^-] were not changed. The plasma osmolality was highest (409±71.8 mOsm/kg) in treatment 30^0C combined with 5‰ and the lowest (283±5.72 mOsm/kg) in treatment 33^0C combined with 0‰. In conclusion, hemoglobin, hematocrit and number of blood cells decreased at elevated temperature and high salinity. Ion [Na^+] and [Cl^+] levels increased with the increased of salinity.

Keywords: salinity, temperature, interaction, survival rate, growth, selected physiological parameters

P-AM-F03

Effect of Stocking Density on Growth Performance of Asian Swamp Eel *Monopterus albus* (Zuiew, 1793) Reared in Recirculation Aquaculture System

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Abstract

This study aims to determine the carrying capacity of the recirculating aquaculture system (RAS) for rearing Asian swamp eel (*Monopterus albus*). The experiment was carried out in RAS with 250-L culture tanks for culture period of 2 months. Eel having size of 20.7 g was randomly stocked in 16 culture tanks at 4 different stocking density of 300, 400, 500 and 600 eel/m^3. Eel was fed twice a day with 40% protein pellet (Mirco 8, Tomboy) at *ad libitum* rate. Results showed that during the experiment, water quality (temperature, pH, DO, TAN) had slight fluctuation but still in suitable range for eel in all treatments. NO_2^- increase throughout the culture period and had highest level in treatment 400 (0.3 ± 0.16) and 600 eels/m^3 (0.3 ± 0.17). Growth rates are not differences between treatments, but survival of eel had significantly affected by stocking density. The lowest survival found in treatment 300 eel/m^3 may be due to reducing feeding activities. The density of 400 eels/m^3 gave the best survival rate (75%) but there was no significant differences with those of treatment 500 (69%) and 600 eels/m^3 (70%). Low FCR was found in treatment 400 and 500 eel/m^3 (1.85 and 1.88, respectively), however, there was no significantly differences between treatments ($p>0.05$). The density of 400 eel/m^3 is recommended for swamp eels culture in RAS.

Keywords: *Monopterus albus*, Recirculating aquaculture system, Stocking density

P-AM-M01

Quantifying the Extent of Mesopredator Release in a Marine Protected Area

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Abstract

Extirpation of apex predators from a system can lead to catastrophic changes in trophic cascades. The increase in mesopredator abundance and density puts significant strain on the basal species in the system, leading to multiple negative outcomes, e.g. output reduction in bivalve fisheries, or even collapse. Current management plans often use 'no-take' zones to protect historically degraded areas, but research into their efficacy for reducing the effects mesopredator release is currently limited. Recent studies suggest a more proactive approach to MPA design is needed. The first step in a proactive management strategy is to assess the current mesopredator populations and their movement patterns. This study used a mark-recapture technique to track movement of mesopredators (crabs) in relation to a no-take zone. The mark-recapture data, combined with historical catch data can be used to investigate population densities. Combining these data can inform future management strategies at the study site (Strangford Lough, N.I.) and elsewhere. These techniques are applicable to myriad fisheries associated with Marine Protected Areas and those thought to be suffering from mesopredator release.

Keywords: Mesopredator release, Population estimation, Mark-recapture, Movement tracking, Decapod crustaceans

P-AM-M02

Rearing of Seabass, *Lates calcarifer* Bloch Juvenile with Two Different Economic Seaweeds

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Abstract

Co-culture of sea bass, *Lates calcarife*r with different two algae was aim to find the maixmal production. The experiment was done in the 0.85 x 0.65 x 0.45 m^3 of plastic tank with 100 L sea water of 25 ppt in outdoor. Sea bass in the size of 0.36 ± 0.01 g weight and 2.11 ± 0.08 cm long was used for initial with of 100 individuals of each tank. Two different taxons of algae: red, *Gracilaria fisheri* and filamentous green, *Ulva intestinalis*. After 4 weeks of the culture, the sea basses cultured with *Ulva intestinalis* showed a highest weight and length with 1.85±0.91 g and 3.86±1.16 cm, respectively and showed no significantly affect ($p > 0.05$) with those of the others. Growth rate sea basses in control, *Gracilaria fisheri* and *Ulva intestinalis*, and were 2.10, 2.16 and 2.28 % per day respectively. The weight of *Gracilaria fisheri* was decreased to 138.24 ± 33.19 g m^{-2} while weight of *Ulva intestinalis* was increased to 225.76 ± 31.81 g with the growth rate of -0.02, 5.08, and 4.56 % day^{-1}. Water quality parameters were not statistically significant ($p > 0.05$) among the treatments. An average total survival rate of sea basses cultured with no algae showed better than the both of the two algae.

Keywords: Co-culture, *Gracilaria fisheri*, *Ulva intestinalis*, Growth rate, Survival rate

P-AM-M03

Development of Community-based Mariculture Toward Agro-maritime 4.0

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Abstract

Mariculture is production system that has an important role in providing food now and especially in the future, together with agriculture and animal husbandry in the agro-maritime context. The system that can apply in brackish water and sea waters is predicted will supprass the production of capture fisheries in providing fish for the community. In line with the development of industry 4.0, mariculture began to developing an instrumentation, integration and automation strategy that leads to smart sea farming, both on-farm and off-farm levels, as mariculture 4.0. At the on-farm level, mariculture 4.0 can apply to the entire production process since site selection, pond or cage construction and preparation, seed stocking, feeding, water quality management, biomass monitoring, harvesting and postharvest handling, and integrating them with off-farm levels such as marketing, processing, financing, develompement and so on. On a broader scope can be created integration between mariculture with community development and environment management as integrated coastal zone management. This paper discusses the concept, implementation and future development of mariculture 4.0 in responding to the challenges of the times that is increasing productivity and production efficiency as well as market demand suitability and competitiveness, in order to improve the welfare of mariculture actors and the community.

Keywords: Aquaculture, Coastal, Efficiency, Production, Productivity

P-AM-P01

Study on Biomass Culture of *Brachionus rubens* Ehrenberg 1838

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Abstract

Rotifers are the favourable live food for almost fish larvae. A steady supply of rotifers is key factor for successful larviculture. Objective of this study to develop a process for biomass culture of freshwater rotifer *Brachionus rubens* to provide crucially initial feed for fish larvae. *Brachionus rubens* were cultured in 0.8L plastic bottle with the inoculation density of 200 inds/ml. This study consisted of three experiment to determine algae, algae density and the combination of yeast and algae most suitable for the development of *B. rubens*. Rotifers were fed twice daily with *Chlorela spp* (NT1), *Nanochloropsis* (NT2) and *Chaeto* (NT3) to find the most suitable algae for *B.rubens*. Experiment 2 was carried out based on Experiment 1 to find the density of algae suitable for the development of the rotifer (40 000, 60 000 and 80 000 cells/ml). In Experiment 3, the results from experiments 1 and 2 were applied in this experiment and combined with the ratio of yeast and algae to 0: 1; 3: 1; 1: 1; 1: 3. The number of rotifers were check daily. Water is changed 30% every day to ensure the best environment for the growth of rotifer populations.

Keywords: Brachionus rubens, Chlorela, Nanochoropsis, Chaeto, Biomass of rotifer, Freshwater rotifer

P-AM-P02

Screening Natural Prebiotic Extracts for Development of Synbiotic for Aquaculture Uses

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Abstract

White shrimp, *Litopenaeus vannamei*, are among the most widely cultivated shrimp in the world. Currently, due to the increase of serious endemic diseases and feed ingredients costs in white shrimp culture, most studies have focussed supplements or replacement of feed ingredients to reduce feed costs and impact of diseases. In particular, the supplement, including immunostimulants, probiotics, or synbiotics, are widely used. Especially, synbiotic is one of biological control strategies to improve growth and disease resistance in aquaculture in recent years. Therefore, it appears that numerous researches have been interested in incorporating synbiotic for improving growth performance and disease resistance in white shrimp culture. In this research, we will screening for natural prebiotic extracts, and testing for prebiotic utilization by probiotic bacteria, evaluation of growth stimulation of *Lactobacillus* by prebiotic extracts, examination for inducing growth of pathogenic bacteria by prebiotic extracts, assessment of prebiotic scores and evaluation of the effect of prebiotic on enzyme activity of *Lactobacillus*. After this research, we will have a synergistic synbiotic, in which a slected natural prebiotic product can specifically stimulate growth of indigenous probiotic *Lactobacillus* strain (isolated in white shrimp intestine) in order to improve the survivability and implantation of the probiotic after oral administration, thereby propose application of synbiotic in intensive white shrimp culture in Mekong Delta (MD) region.

Keywords: *Litopenaeus vannamei*, Serious endemic diseases and feed ingredients costs, Synergistic synbiotics, Natural prebiotic extracts, *Lactobacillus*, Intensive white shrimp culture

P-AM-P03

Microplastics in Aquatic Systems–genuine Threat or Over Exaggeration?

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Abstract

Microplastics (synthetic polymers, <5 mm) are ubiquitous, in the environment and in the news. The potential effects of microplastics on flora and fauna are currently only established through laboratory-based exposure trials; however, such studies have come under scrutiny for employing excessive concentrations with little environmental relevance. A meta-analysis of results from published experimental (n = 128) and environmental (n = 180) studies allowed us to compare the reported impacts on organisms, and the concentrations of microplastics found in the wild. Our results highlight three issues that should be modified in future work: (1) use of extreme dosages, (2) incompatible and incomparable units, and (3) the problem of establishing truly informative experimental controls. We found that 5% of exposure trials did not use any control treatment, and 82% use dramatically elevated dosages without reference to environmental concentrations. Early studies in this field may have been motivated to produce unequivocal impacts on organisms, rather than creating a robust, environmentally relevant framework. The existing literature on the extent of plastic pollution also has limited utility for accurately synthesizing broader trends; environmental extraction studies use many different units, among which only 76% (139/180) could be plausibly converted for comparison. Future researcher should adopt the units of microparticles/kg (of sediment) or mp/L (of fluid) to improve comparability. Now that the global presence of microplastic pollution is well established, with more than a decade of research, new studies should focus on comparative aspects rather than the presence of microplastics.

Keywords: Plastic pollution, Meta-analysis, Microplastic extractions, Microplastic impacts

P-AM-P04

Applications of Gis for Evaluating the Cage Culture in Long Xuyen City, an Giang Province, Vietnam

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Abstract

The study on application of GIS to evaluate the status of cage culture in Long Xuyen city, An Giang province, the purpose of research is to identify technical and financial status of the study area, to help the managers have solved to sustainable development on this activity in the region, it included different features as creating regional culture map, density stocking, volume cage and production on each cultured species. The study was carried out from June 2018-June 2019 by surveying on 80 households, who are being cultured cage in the region by questionaires, and also secondary data from publication, and annual report of the fisheries management organization, databased used from 2015-2017. Results found that cage volume and cage density have exchanged from 2015-2017, there are 4 species are cultured in cage in this area, red tilapia (*Oreochromis spp*) is the most popularly in the region, there are 2 crops per year, production was 22kg/m^3/crop, and giant pacu *(Colossoma brachypomum*) was less abundant in the region, there are 3 crops per year, survival rate was 74% on this species, production was 20kg/m^3/crop, whereas red tailed tinfoil (*Barbodes altus)* and red tail catfish (*Mystus wyckioides*) are rarely in the region. Productions have relative to density stocking and survival rates, seedling quality and technical culture, this system culture had high cost and depend on market demand and and enviroment water quality. most of farmer culture on red tilapia had profits (average 4.43 USD/m^3/crop and farmers cultured on Giant Pacu had average profit 3.6USD /m^3/crop since 2015-2016. However, in 2017 price of red tilapia was decreased by supplying is over demanding, there were 60 % household was lost, semilarly on giant pacu , many household was also got low income and lost.

Keywords: My Hoa Hung commnune, Long Xuyen city, An Giang province, Red tilapia, giant pacu, Red tailed tinfoil, Red tail catfish