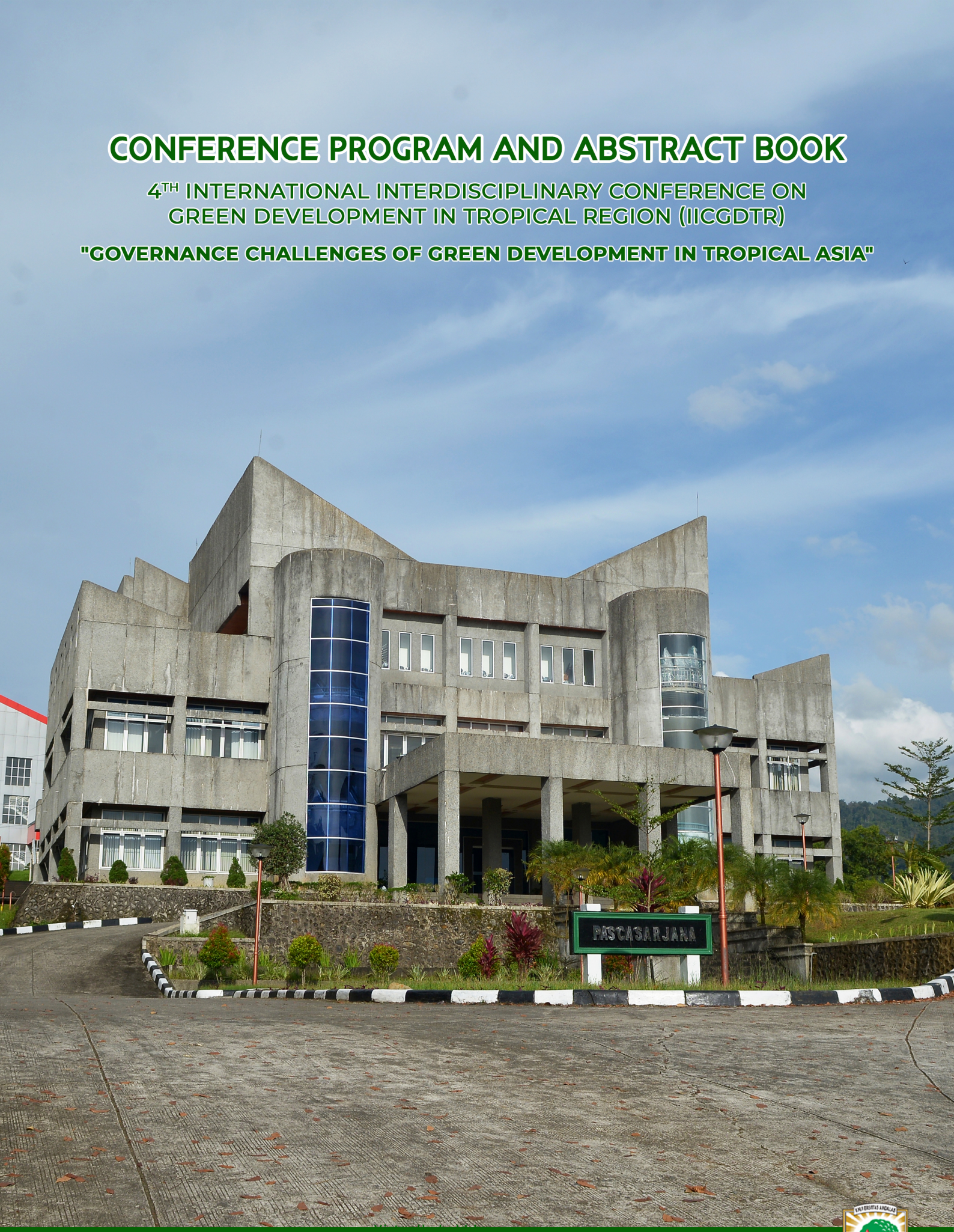
CONFERENCE PROGRAM AND ABSTRACT BOOK

4TH INTERNATIONAL INTERDISCIPLINARY CONFERENCE ON GREEN DEVELOPMENT IN TROPICAL REGION (IICGDTR)

"GOVERNANCE CHALLENGES OF GREEN DEVELOPMENT IN TROPICAL ASIA"



Virtually held by Graduate Program Universitas Andalas - 7 & 8 July 2021

4th International Interdisciplinary Conference on Green Development in Tropical Region (4th IICGDTR)

Theme:
Governance Challenges of Green Development in Tropical Asia

07-08 July 2021

CONFERENCE PROGRAM AND ABSTRACT BOOK

The Graduate Program, Universitas Andalas
Padang, Indonesia
2021

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Welcome Remarks

Good morning everyone

To all our distinguished guests and participants,
On behalf of the organizing committee, let me welcome you and express my sincere gratitude you're your participation in the 4th International Interdisciplinary Conference on Green Development in Tropical Regions (4th IICGDTR). This conference is organized by the Graduate Program of Universitas Andalas in collaboration with our ten partner institutions, namely: An Giang University, Adikavi Nannaya University, Dwijendra University, Presidency University, Building Universities in Leading Disaster Resilience (BUiLD) Project, International Islamic University Malaysia, Mar Athanasius College, India, Universitas Dharma Andalas, Indonesia, Hud Institute, Indonesia and Niagara University.

The Graduate Program of Universitas Andalas has sparked the discussion concerning various aspects of green development, particularly in tropical regions. One of such forums is the biannual International Conference on Green Development in Tropical Regions (ICGDTR). The 1st ICGDTR was held in 2015, the 2nd ICGDTR was carried out in India in 2017 with our partner organization, Adikavi Nannaya University. The 3rd ICGDTR was held in collaboration with Sustain in 2019 here in Padang. This 2021 conference is the 4th ICGDTR, with a specific emphasis on using an interdisciplinary approach, thus we named it the 4th International Interdisciplinary Conference on Green Development in Tropical Regions. The theme of our virtual conference is "Governance Challenges of Green Development in Tropical Asia". The main objective of this international conference is to enhance the discourse and discussion on various aspects of green development in tropical regions, especially on the issue of governance challenges of green development in tropical regions.

I would like to take this opportunity to convey my great appreciation to all parties supporting this event. Special thanks goes to our respected keynote speakers: Dr. Ir. M. Basuki Hadimuljono, M.Sc, (Minister of Public Work and Housing) and Prof. Juan Pulhin (Regional Coordinator IASC Asia, Professor and Former Dean, College of Forestry and Natural Resources, University of the Philippines Los Banos). Our deep appreciation also goes out to the 25 invited speakers from various institutions around the globe.

164 papers will be presented orally by participants from various countries including Indonesia, India, Japan, Malaysia, Philippines, Singapore, Thailand, UK and Vietnam. In addition, there are three online pre-conference workshop conducted as side events to this conference; a workshop on how to publish a paper in international journals, a workshop on social choice theory and finally, a workshop on mastering structural equation modeling with SmartPLS 3.0. We also expect to provide forums for sharing knowledge along with numerous opportunities for networking.

The insight and hard work of the committee has made this conference possible. Each member of the committee has made a significant contribution toward the success of this event, and we thank everyone involved for their valuable support. Finally, on behalf of the conference advisory board and organizing committee, I would like to express our sincere thanks and appreciation to the Rector of Universitas Andalas, all the participants, colleagues, keynote speakers, as well as partnering institutions, you're your indispensable support of this event.

Yuerlita
Conference Chair of the 4th IICGDTR

The Committee

Advisory Board:

- Prof. Dr. Yuliandri, SH, MH (Rector of Universitas Andalas, Padang, Indonesia)
- Prof. Dr. rer.soz. Nursyirwan Effendi (Director of Graduate Program, Universitas Andalas, Indonesia)
- Assoc. Prof. Dr. Vo Van Thang (An Giang University, Long Xuyen-An Giang, Vietnam)
- Dr. I Ketut Wirawan, SH, M.Hum (Dwijendra University, Denpasar Bali, Indonesia)
- Dr. G. Rajender Prasad (Adikavi Nannaya University, Andhra Pradesh, India)
- Prof. Dr. Ganesh Shivakoti (Founder and Director of OCeAN, Arizona State University, USA)
- Prof. Dr. Juan Pulhin (Regional Coordinator of IASC ASIA, UPLB, Philippines)
- Dr.-Ing Uyung Gatot S Dinata (Head of LPPM, Universitas Andalas, Indonesia)

Scientific Committee:

- Assoc. Prof. Dr. Irina Safitri Zen (International Islamic University Malaysia, Kuala Lumpur, Malaysia)
- Dr. Pham Huynh *Thanh Van* (An Giang University, Long Xuyen-An Giang, Vietnam)
- Prof. Dr. Teki Suraiyya (Adikavi Nannaya University, Andhra Pradesh, India)
- David Elijah Bell, Ph.D (Niagara University, New York, USA)
- Prof. Dr. Erwin van der Krabben (Radboud University, Nijmegen, Netherlands)
- Prof. Dr. Rudi Febriamansyah (Universitas Andalas, Padang-West Sumatera, Indonesia)
- Prof. Dr. Yonariza (Universitas Andalas, Padang-West Sumatera, Indonesia)
- Dr. Gede Sedana (Dwijendra University, Denpasar Bali, Indonesia)
- Dr. Rosewine Joy (Presidency University, Bangalore, India)
- Dr. M.S Vijayakumary (Mar Athanasius College, Kothamangalam, India)

Organizing Committee

Organizing Chair	: Yuerlita, Ph.D
Vice Chairman	: Dr. My Syahrawati
Secretary	: Dr. Sri Setyawati, MA
	: William Edward Maxey, BA
	: Novi Elian, M.Si
Treasurer	: Dr. Rusda Khairati
	: Rika Hariance, M.Si
Live Event	: Dr. Elita Amrina
	: Rafnel Azhari, M.Si
Abstract	: Dr. Fadjar Goembira
	: Prof. Dr. Nilda Tri Putri
	: Dr. Devi Analia
Publication	: Prof. Dr. Ir. Rudi Febriamansyah, M.Sc
	: Cindy Paloma, M.Si

Welcome Speech
Director of the Graduate Program of Universitas Andalas

Assalamu'alaikum wr.wb

Good day
Dear Rector of Universitas Andalas, Keynote Speakers: Prof. Juan Pulhin from University of the Philippines, Dr. Ir. Basuki Hadimuljono, M.Sc. Minister of Public Works and Housing or his representative, all 25 invited speakers, distinguished participants, and all committee member of the 4th International Interdisciplinary Conference on Green Development in Tropical Regions (the 4th IICGTR).

Today and tomorrow (7-8 July 2021) are special days for the Postgraduate Program, Universitas Andalas because we can hold an online international conference amid the covid-19 pandemic, which has not subsided to this day. Our attendance at this conference can indicate the spirit to develop, and the exchange of ideas of science is a never-ending effort dealing with the pandemic. Therefore, I appreciate and thank the speakers and conference participants for being able to attend this event.

This conference is considered exceptional because this conference attract the attention of 164 participants from 9 countries. I note them from India (39 people), Japan (1 person), Malaysia (6 people), Philippines (1), Singapore (1 person), Thailand (1 person), United Kingdom (3 people), Vietnam (13 people), and the host, Indonesia (99 people). In addition, the committee have invited 25 invited speakers from various institutions and countries, namely the USA, the Netherlands, Pakistan, Malaysia, Thailand, Myanmar, Japan, India, and China. For me, with the participation of speakers and participants from many countries in the world, on the behalf of the Postgraduate Program, I feel happy and proud of it. I consider that the linkage between countries through this online media conference provides evidence of the shared spirit of sharing knowledge.

This conference is also notable because it carries many themes, five themes, and 19 topics. These many areas of discussion indicate that the issue of Governance Challenges of Green Development in Tropical Asia is of a great concern, important, and strategic issue.

Finally, I congratulate you all on joining this conference. I hope that this conference will build a fruitful exchange of ideas and build a network of friends among scientists in the world.

I specially thank all participants for your participation, the willingness of the speakers being attendance. I also express my appreciation and gratitude to all committee members chaired by Mrs. Dr. Yuerlita, M.Si, who has worked hard together with the team to make this international conference happen.

Padang, 07 July 2021
Prof. Dr. rer. soz. Nursyirwan Effendi
Director of the Graduate Program, Universitas Andalas

Welcome Speech
Rector of Universitas Andalas

Assalamu'alaikum wr.wb.

Good morning to all our honorable keynote speakers, invited speakers, partners, participants, and to the committee of the **4th Interdisciplinary International Conference on Green Development in Tropical Regions (4th IICGDTR)** held by the Graduate Program of Universitas Andalas, Padang, Indonesia. I welcome you all virtually.

As the Rector of Universitas Andalas, I personally, and on behalf of the university, support this event. I greatly appreciate the collaboration and cooperation between the Graduate Program of Universitas Andalas with various parties in the Asian region in discussing different points of view related to green development and for organizing the **4th IICGDTR**.

As we know, Tropical Asia is a region with a large population, rich biodiversity, and high growth. Most of the economic growth in this area is supported by the exploitation of natural resources such as forests, land, and water. This area also utilizes ecosystem services for the tourism sector to diversify livelihoods. Rural and urban development is still unbalanced and the construction of housing settlements in urban areas sometimes threatens agricultural land. Climate change and social injustice have also become major problems, affecting agriculture, transportation, tourism, energy, industry, and society. Some efforts are now starting to lead towards green development. Green development is a multi-disciplinary endeavor and requires further synchronization and coordination to achieve maximum effect. Green development has several challenges at the governance level. I hope this conference will significantly impact and contribute to the future of green development in Tropical Asia.

At this time, I would like to thank our two keynote speakers: Dr.Ir. M. Basuki Hadimulyono, M.Sc (Minister of Public Works and Housing) and Prof. Juan Pulhin (University of The Philippines Los Banos), along with the 25 invited speakers and 9 partner organizations from several institutions and countries for supporting and contributing to the implementation of this conference. I extend my warmest greetings to all the researchers who have kindly joined to share their experience and expertise at the 4th IICGDTR conference. Finally, I would like to congratulate the organizing committee for their tremendous efforts in organizing this conference well.

I wish you all a very successful conference.

Wassalamu'alaikum wr.wb.

Padang, 07 July 2021
Prof. Dr. H. Yuliandri, S.H., M.H.
Rector of Universitas Andalas

Keynote Speaker

Dr. Ir. M. Basuki Hadimuljono, M. Sc
(Minister of Public Work and Housing, Indonesia)

Prof. Juan Pulhin
(Regional Coordinator IASC Asia, University of the Philippines Los Banos)

Invited Speaker

Dr. Arifin Rudiyanto

Deputy for Maritime Affairs and Natural Resources, BAPPENAS, Indonesia

Dr. Fadjar Goembira

Faculty of Engineering Universitas Andalas, Indonesia

David Elijah Bell, Ph.D

Niagara University, Niagarra County New York, USA

Prof. Dr. Ganesh P Shivakoti

Asian Institute of Technology, Thailand

Dr. Defriman Djafri

Faculty of Public Health, Universitas Andalas, Indonesia

Dr. Ir. Gede Sedana, M.Sc, MMA

Dwijendra Universisty, Indonesia

Prof. Erwin Van Der Kraben

Radboud Unviersity, Netherlands

Prof. Ir. Helmi, M.Sc, Ph. D

Faculty of Agriculture, Universitas Andalas Indonesia

Dr. Farhad Zulfikar

COMSATS University Islamabad, Pakistan

Assc. Prof. Irina Safitri Zen

International Islamic University Malaysia

Invited Speaker

Prof. Dr. Iza Fadri

Ambassador of Indonesia for Myanmar

Prof. Dr. rer. soz. Nursyirwan Effendi

The Graduate Program, Universitas Andalas, Indonesia

Dr. Juthathip Chalermphol

Chiang Mai University, Thailand

Oktomi Wijaya, SKM, M.Sc

Ahmad Dahlan University, Indonesia

Dr. Khalawi, M.Sc, MM

Directorate General of Public Works Housing, Indonesia

Dr. Raza Ullah

University of Agriculture Peshawar, Pakistan

Marissa Bell, Ph.D

Cornell University, USA

Dr. P.K. Viswaanathan

Amrita Vishwa Vidyapheetam University, India

Michael Fuller MBE, MBA, MA, F ISRM
Chief of staff public health in England
Project BUILD Erasmus

Prof. Ir. Yonariza, M.Sc, Ph.D

Facultry of Agriculture, Universitas Andalas, Indonesia

Dr. Mubariq Ahmad

Conservation Strategy Fund, CSF Indonesia

Dr. Nao Tanaka

Executive Director Asian People's Exchange/APEX

Dr. Nuki Agya Utama

Executive Director of the ASEAN Center for Energy

Dr. Ram Chandra Bastakoti

Asian Institute of Technologu, Thailand

Conference Agenda

Day 1: Wednesday, 07 July 2021

Time*	Program	Person in charge	Room/ Meeting ID
08.30 – 09.00	**Opening Ceremony** - National Anthem; "Indonesia Raya" - Remarks from Organizing Committee - Speech from Director of Graduate Program - Speech from Rector of Universitas Andalas - Profile Video of Graduate Program	MC Operator Yuerlita Ph.D Prof. Dr. Nursyirwan Effendi Prof. Dr. Yuliandri, **Session Host:** Sirajul Fuad Zis, S.I.Kom Sari Mulyadi, M.Kom	**Zoom Meeting:** https://zoom.us/j/94708130626?pwd=TkhiK0pMVmgzYWVwSkpOMnIxa3FVUT09 **Meeting ID:** 947 0813 0626 **Passcode:** 541706
09.00 – 09.25	**Keynote Speech**: Dr. Khalawi, M.Sc - Directorate General of Housing, Ministry of Public Works and Housing	**Session Chair:** Prof. Dr. Melinda Noer **Session Host:** Yosritzal, Ph.D Sirajul Fuad Zis, S.I.Kom Sari Mulyadi, M.Kom	**Zoom Meeting:** https://zoom.us/j/94708130626?pwd=TkhiK0pMVmgzYWVwSkpOMnIxa3FVUT09 **Meeting ID:** 947 0813 0626 **Passcode:** 541706
09.25 – 09.30	Appreciation and Photo Session	Committee	Main room
09.30 – 12.00	**Plenary I:** **Governance Challenges on the Future of Asian Irrigation and Water Resources Management** ▪ Prof. Dr. Ganesh Shivakoti - OCeAN ▪ Prof. Helmi, Ph.D - Universitas Andalas ▪ Dr. Juthathip and Dr. Sukit Kanjina - Chiang Mai University ▪ Dr. Ram Chandra - Asian Institute of Technology ▪ Dr. P. Viswaanathan - Amrita Vishwa Vidyapheetam University ▪ Prof. Pampa Mukherjee – Panjab University ▪ Dr. Raza Ullah – University of Agriculture, Peshawar, and Dr. Farhad - COMSATS University Islamabad	**Session Chair:** Prof. Dr. Rudi Febriamansyah **Session Host:** Yuerlita, Ph.D Sirajul Fuad Zis, S.I.Kom Sari Mulyadi, M.Kom	**Zoom Meeting:** https://zoom.us/j/94708130626?pwd=TkhiK0pMVmgzYWVwSkpOMnIxa3FVUT09 **Meeting ID:** 947 0813 0626 **Passcode:** 541706
12.00 – 13.30	Break		
13.30 - 15.00	**Plenary II:** **Natural Resources and Environmental Management** • Dr. Mubariq Ahmad - CSF Indonesia • Dr. Gede Sedana - Dwijendra University • Prof. Yonariza, Ph.D - Universitas Andalas	**Session Chair:** Dr. M. Zainora Bt Asmawi **Session Host:** Dr. Ifdal, M.Sc Nugraha Ramadhan, MP	**Room 1** **Zoom Meeting:** https://zoom.us/j/94708130626?pwd=TkhiK0pMVmgzYWVwSkpOMnIxa3FVUT09 **Meeting ID:** 947 0813 0626 **Passcode:** 541706
	Plenary III: **Sustainable Energy Development** • Dr. Nao Tanaka – APEX • Dr. Andy Tirta - ASEAN Center for Energy	**Session Chair:** Dr. Wilson Novarino	**Room 2** **Zoom Meeting:** https://zoom.us/j/92346876793?pwd=Qm8yM

	• Dr. Fadjar Goembira - Universitas Andalas	**Session Host:** Dr. Aadrean Ryan Setiawan, MP	ElrdVZ4b21zOGw5cEFleHkzUT09 **Meeting ID:** 923 4687 6793 **Passcode:** 364586
	Plenary IV: **Sustainable Housing and Settlement** • Prof. Erwin Van Der Kraben - Radboud University • Dr. Khalawi, M.Sc - Directorate General of Housing, Ministry of Public Works and Housing • Prof. Iza Fadri - Ambassador of Indonesia for Myanmar	**Session Chair:** Ahmad Suradji, Ph.D **Session Host:** M. Fadly, M.Biotek Rachmad H Martinsyah, MP	**Room 3** **Zoom Meeting:** https://zoom.us/j/92944857193?pwd=OTRMc2RHamRUKzNiT0l0WEl1STk1dz09 **Meeting ID:** 929 4485 7193 **Passcode:** 757271
15.00-15.15	Break		
15.15–17.50	Parallel Sessions	Committee	**Room 1-8**

***The time is based on Western Indonesia Time, GMT +7 Jakarta**

Conference Agenda

Day 2: Thursday, 8 July 2021

Time*	Program	Person in charge	Room
08.15 – 09.00	**Keynote Speech:** Prof. Juan Pulhin (Regional Coordinator IASC Asia)	**Session Chair:** Prof. Yonariza, Ph.D **Session Host:** Dr. Mahdi Sirajul Fuad Zis, S.I.Kom Sari Mulyadi, M.Kom	**Zoom Meeting:** https://zoom.us/j/94294427636?pwd=N3l4VVRGUGprYXFBM1JWOGpBTzNBdz09 **Meeting ID:** 94294427636 **Passcode:** 163679
09.00 – 09.15	Appreciation and Photo Session	Committee	Main Room
09.15 – 12.00	**Plenary V:** **Sustainable Development Issues: Sustainable Development Goals; Extension, Communication and Community Empowerment** • Marissa Bell, Ph.D - Cornell University • Dr. Arifin Rudiyanto, M.Sc - Deputy for Maritime Affairs and Natural Resources, BAPPENAS • Asst Prof. Irina Safitri Zen - The International Islamic University Malaysia • Prof. Helmi, Ph.D - Universitas Andalas	**Session Chair:** Dr. Akhila R. Udupa **Session Host:** Hasnah, Ph.D Ryan Setiawan, MP	**Room 1** **Zoom Meeting:** https://zoom.us/j/94294427636?pwd=N3l4VVRGUGprYXFBM1JWOGpBTzNBdz09 **Meeting ID:** 94294427636 **Passcode:** 163679
	Plenary VI: **Regional Development Issues** • Prof. Zhang Nan - Chongqing University • Prof. Dr. rer.soz. Nursyirwan Effendi - Universitas Andalas	**Session Chair:** Prof. Dr. Teki Suraiyya **Session Host:** Dr. Sri Setiawati Muhammad Yusra, MA	**Room 2** **Zoom Meeting:** https://zoom.us/j/96849831951?pwd=VGt1aDh5TDRNbGpLMDUwSnNnR1JCZz09 **Meeting ID:** 968 4983 1951 **Passcode:** 141906
	Plenary VII: **Disaster Resilience and Public Health** • David Elijah Bell, Ph.D. MPH - Niagara University • Defriman Djafri, S.K.M, M.K.M, Ph.D - Universitas Andalas • Michael Fuller, MBE MBA MA F.ISRM - Chief of staff public health in England/ Project BUiLD Erasmus • Oktomi Wijaya, S.K.M, M.Sc - Coordinator of PRBK PSMPB, Ahmad Dahlan University	**Session Chair:** Dr. Rosewine Joy **Session Host:** Vonny Indah Mutiara, Ph.D Rachmad H Martinsyah, MP	**Room 3** **Zoom Meeting:** https://zoom.us/j/99107630266?pwd=Q0oxRTFWMVdWSnpqajE4NDVZOUl4dz09 **Meeting ID:** 991 0763 0266 **Passcode:** 885003
12.00 – 13.30	Break		
13.30 – 15.50	Parallel Sessions	Committee	**Room 1- 8**
15.50 – 16.15	Break		
16.15 – 17.15	**Closing Ceremony** - Best Presenter Announcement - Report from Organizing Committee - Speech from Director of Graduate Program	MC Committee Yuerlita, Ph.D Prof. Dr. Nursyirwan Effendi	Main room **Zoom Meeting:** https://zoom.us/j/94294427636?pwd=N3l4VVRGUGprYXFBM1JWOGpBTzNBdz09 **Meeting ID:** 94294427636 **Passcode:** 163679

***The time is based on Western Indonesia Time, GMT +7 Jakarta**

Parallel Schedule

Day 1: Wednesday, 7 July 2021

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Room 2	B11-B14	B15-B19	Prof. Dr. Erizal Mukhtar	Winda P Sari
Room 3	Bw1-Bw5	Bw6--Bw9	Dr. Elita Amrina	Rachmad HM
Room 4	D1-D6	D7-D12	Dr. Rani Wulandari	Ryan Setiawan
Room 5	D13-D19	P1-P5	Dr. Hasmiandy Hamid	Joko Prasetyo
Room 6	P6-P10	P11-P15	Dr. Eka Candra Lina	Rolis Eka Putra
Room 7	S1-S5	S6-S10	Prof. Dr. Hermansah	Riza W Siregar
Room 8	S11-S15	S16-S20	Dr. Gusmini	Tuty Hardianti

Day 2: Thursday, 8 July 2021

Room	Presenter		Session Chair	Session Host
	Session 1: 13.30 – 14.40	Session 2: 14.40 – 15.50		
Room 1	SEM1-SEM6	SEM7-SEM12	Dr. Mahdi	Dede Suhendra
Room 2	SEM13-SEM18	SEM 19-SEM23	Dr. Ifdal	Rolis Eka Putra
Room 3	SEM24-SEM29	T1-T6	Vonny Indah Mutiara, Ph.D	Rafnel
Room 4	H1-H6	H7-H13	Prof. Dr. Sumaryati Syukur	Riza W Siregar
Room 5	Ed1-Ed5	Ed6-Ed9	Dr. Gunjeet Kaur	Dr. Dodi Devianto
Room 6	C1-C5	C6-C9	Dr. dr. Hirowati Ali	Tuty Hardianti
Room 7	R1-R7	-	Prof. Dr. Rudi Febriamansyah	Cindy Paloma
Room 8	SD1-SD5	SD6-SD9	Yosritzal, Ph.D	Dr. Aadrean

***The time is based on Western Indonesia Time**

Parallel Session

Day 1: Wednesday, 7 July 2021

Room 1

Topic : **Biology, Agriculture and Forestry (B)**
Link : https://zoom.us/j/94708130626?pwd=TkhiK0pMVmgzYWVwSkpOMnIxa3FVUT09
Meeting ID : 947 0813 0626 Passcode: 541706
Session Chair : Dr. Irawati **Session Host: Nugraha Ramadhan**

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B3	004	Yulnafatmawita, Syafrimen Yasin, Zainal A.Haris	Organic Carbon Stock at Different Slope Level Under Tea (*Camelia sinensis*) Plantation in Wet Tropical Region, West Sumatra, Indonesia	Universitas Andalas	30
B4	032	Biny NB, RN Binitha	Histopathology as a tool for studying the reproductive effect of Butylated Hydroxytoluene in a fresh water teleost, *Anabas testidineus*	Mar Athanasius College	31
B5	308	Duc Ngoc Huynh, Van Huynh Thanh Pham, Nha Van Duong, David J.H. Blake	Changing Agricultural Pratices Facing to Variable Water Resource in Hilly Area, An Giang Province, Vietnam	An Giang University	31
B6	050	Duong Van Nha, Nguyen Thi Thanh Xuan, Le Huu Phuoc, Pham Van Quang, Nguyen Thi Thuy Hang	Effect of Accumulated Growing Degree Days (GDDs) on Seasame *(Sesamum indicum)* Growth and Yield under Greenhouse Condition in The Mekong delta, Vietnam	Kien Giang University	33
B7	051	Duong Van Nha, Tran Huynh Thanh Nghia	Effects of Urea Types Combination With Alternate Wetting and Drying Irrigation (AWD) on Rice Yiled in the Vietnam Mekong Delta	Kien Giang University	34
B8	075	Reki Hendrata, Damasus Riyanto	The Effect of Application Root Growth Regulator Dosage and Environmental Sanitation on Salacca Edulis Seedings in Tempel District-Sleman	Yogyakarta AIAT	35
B9	076	Damasus Riyanto, Reki Hendrata	The Implementation of Organic Fertilizer on Soil properties, Level of Heavy Metals, Growth and Yield of Rice on rice irrigation field of Sleman Regency	Yogyakarta AIAT	36
B10	103	Nguyen Thi Minh Chau, Khưu Van Min	Effect Of Organic Substracts On Growth, Yield And Quality Of Spinach (*Spinacia oleracea* L.)	An Giang University	37

Parallel Session

Day 1: Wednesday, 7 July 2021

Room 2

Topic : **Biology, Agriculture and Forestry (B)**
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Meeting ID : 923 4687 6793 Passcode: 364586
Session Chair : Prof. Dr. Erizal Mukhtar **Session Host: Winda Purnama Sari**

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B14	162	Baharudin	The Production and Productivity Development of Pepper Indonesia On Level Regional, Asean and the World	South East Sulawesi AIAT	41
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B18	077	Henny Herwina, Muhammad Nazri Janra, Mairawita, Jasmi, Siti Salmah, Yaherwandi, Nurainas	Assessing the Relationships between Plants and Stingless Bees (Hymenoptera: Apidae: Meliponini) within the Settlement Area	Universitas Andalas	45
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Parallel Session

Day 1: Wednesday, 7 July 2021

Room 3

Topic : **Biotechnology and Waste Management (Bw)**
Link : https://zoom.us/j/92944857193?pwd=OTRMc2RHamRUKzNiT0l0WEl1STk1dz09
Meeting ID : 929 4485 7193 Passcode: 757271
Session Chair : Dr. Ellita Amrina **Session Host: Rachmad H Martinsyah**

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Biology, Agriculture, and Forestry (B)

B1

Growth and Results of Some Local Rice Genotype on New Opening Land in Kuantan Singingi Treatment of Organic Fertilizer (Pim)

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ABSTRACT

Soils that are reddish to red in color have high levels of Fe and Al oxides in new open rice fields. Soil that is brightly colored is synonymous with a lack of organic matter. To improve the fertility of the soil, need to provide organic material derived from organic fertilizers, by providing PIM organic fertilizer. Other efforts to maximize the use of new open rice fields are, tested the local genotype of Kuantan Singingi. This research aims to know the response of local rice genotypes to, applying PIM organic fertilizer on new open rice fields. The method used was a factorial Randomized Block Design (RBD) consists of 2 factors, namely factors P (PIM organic fertilizer) consists of 4 levels, namely P0 (control), P1 (3.5 g / plot), P2 (7.07 g / plot).), P3 (10.60 g / plot), and factor V (Local rice genotype) consists of 3 levels, namely V1 (Padi putih), V2 (Padi kuning), V3 (Padi merah). The results showed that environmental factors were more influential, whereas single genotype and interaction treatments did not show any effect on the observed parameters. However, from the results of research and based on observational data, it was found that the interaction treatment showed the best growth and yield.

Keywords : Local rice genotype, new open rice fields, organic PIM

B2

Estimation of Biomass and Carbon Stock of Vegetation for Industrial Plantation Forest and Bush Forest on Dry Land in Aceh Besar District

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ABSTRACT

Nowadays, the issue of climate change is always echoed by all countries, both developed and developing countries. Forests play an important role in maintaining climate stability on the earth's surface. Forests store a lot of carbon reserves which can reduce CO2 emissions in the air and neutralize the earth's surface temperature. This research was conducted on dry dry land vegetation in Aceh Besar district. Sampling was done randomly on purpose based on a map of dry land vegetation in Aceh Besar district. Samples taken in the field were measured based on SNI provisions concerning the measurement and calculation of carbon stocks. In general, the vegetation of industrial plantations is dominated by eucalyptus plants. This research is to assess how much biomass and carbon stock are in the vegetation of industrial plantations and shrubs. And how is the difference from the above study between industrial plantations and shrubs. The results showed that the diameter of the stems and the number of crowns on plants in industrial plantations had a greater value of biomass and carbon stock than shrubs.

Keywords: Biomass, carbon stocks, forests, dry land, climate change

B3

Organic Carbon Stock at Different Slope Level Under Tea (*Camelia sinensis*) Plantation in Wet Tropical Region, West Sumatra, Indonesia

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ABSTRACT

Organic carbon is considered as an indicator of soil quality and environmental sustainability. In agricultural soil, it mainly improves soil physical properties besides soil chemical dan biological properties. The objective of the research was to determine organic carbon (OC) accumulated in soil at different slope under tea plantation in Nagari Batang Barus, Solok Regency, West Sumatra Indonesia. The area is located on the slope of Mt.Talang having mean annual rainfall >3000 mm. The soil samples were taken from 5 different slopes (0-8, 8-15, 15-25, 25-45, and >45%) under the same crop age (36 years old) and soil order (Inceptisols) at 1400 – 1700 m *asl*. Soil was sampled for 100 cm depth with 20 cm increment for soil BD, hydraulic conductivity, total soil porosity, OC, texture, and aggregate stability index. Based on the research conducted, SOC content and stock under 36-years old tea plantation in wet tropical region was found to be the highest at 15-25% slope. The SOC stock within 100 cm soil profile was 202.98, 241.19, 256.42, 231.79, and 187.79 Mg Ha^{-1}, respectively as the slope level increases from 0-8% to >8-15%, >15-25%, >25-45%, and >45%. Within each slope, SOC stock decreased by soil depth until 100 cm. Compared to the secondary forest nearby, SOC stock under 36-years old tea plantation was higher by 2.02 until 2.76 times. Then, the physical properties of soil under tea plantation were improved, especially soil BD, aggregate stability, hydraulic conductivity, and total porosity which were better than those under the secondary forest. It is suggested to keep the the OC stock of the soil to avoid land and environmental degradation.

Keywords: OC stock, slope, tea plantation, wet tropical area

B4

Histopathology as a Tool for Studying the Reproductive Effect of Butylated Hydroxytoluene in a Fresh Water Teleost, *Anabas testidineus*

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ABSTRACT

BHT (Butylated Hydroxytoluene) is a food preservative with E Number (204-881-4) is a commonly used antioxidant in food and cosmetic preparations. It has been reported as a category I endocrine disrupting compound by European Commission of Endocrine Disruption. It has been reported that similar compound BHA can cause reproductive impairment in fishes, aquatic organisms and other vertebrates including human. BHT and its pair compound BHA can be accumulated in the aquatic system and can cause reproductive impairment in fishes. In this study we have used *Anabas testidunes* as model organism to study the impact of BHT in vertebrates. Histopathology is used as the tool for studying the impact of BHT in the gonad. Here we have used two concentrations of BHT 3mg/Kg body weight and 12 mg /kg body weight. It is injected into the fish by intraperitonial injection on the alternate days. Period of exposure with BHT was for 21 days and male gonad found to be much effected compared to the female

Keyword: Butylated Hydroxytoluene, Endocrine Disruption, *Anabas testidineus*.

B5

Changing Agricultural Practices Facing to Variable Water Resource in Hilly Area, An Giang Province, Vietnam

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ABSTRACT

The Mekong Delta is Vietnam's largest granary of the country providing food for domestic needs and export. Locating in the South West of the Mekong Delta, An Giang province is well known as one of the biggest producers of agricultural production. Recently, changing weather condition has affected water resource used for agriculture. Adaptive solutions are necessary to be fulfilled to respond to the present conditions lacking water supply. Drawing from a social-ecological approach, this study explores the differences of principal hydro-meteorological factors that affect water resource available in agricultural production. The study was carried out in Tinh Bien highland district in An Giang province from October 2020 to May 2021. Hydro-meteorological data (temperature, humidity, rainfall and flood level) were collected from 1996 to 2020, together with the In-Depth Interview method (both local authorities at levels of province and district, and farmers) to explore local inhabitants' awareness about the change of weather conditions and adaptive strategies. Research results note that over 25 years, these weather factors have turned differently (temperature increased, humidity and rainfall decreased, the highest water level in the Mekong River decreased). These conditions lead to that the water supply for agriculture is decreasing especially in highland area. Faced with that situation, hard-option (mainly provided by the Government) and soft option (from households' side) solutions are parallel existence to maintain agricultural production efficiency. The structures of crops, drought-tolerant varieties, and irrigation projects that suitable for every geographical area have been conducted. It is important to contribute to maintaining food production in the region. In fact, in the agricultural aspect water saving is an essential issue both to maintain agricultural production and protect the environment for now and in the future.

Keywords: Climate change, Rice production, the Mekong Delta, Variable water resource, Water saving

B6

Effects of Accumulated Growing Degree Days (Gdds) on Seasame (*Sesamum Indicum)* Growth and Yield Under Greenhouse Condition in The Mekong Delta, Vietnam

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ABSTRACT

Sesame has high nutritional value, in sesame seeds contain oil, protein, sugar, water, ash and two kinds of oleic acid and linoleic acid ; sesame is commonly used in the diet or as a vegetable oil. Seasame is grown in many tropical countries, the optimun temperature for growth of sesame is in the range of 25-30^{0}C and GDDs about 2700^o. Due to climate change, the temperature is increasing, in the Mekong Delta of Vietnam, the temperature in summer can reach nearly 35^{o}C. The research question is whether GDDs can affect on growth and yield of sesame or not?. To answer the above question, the study was conducted in greenhouse conditions in An Giang province with different GDDs conditions including 4 chambers from 32, 33, 34 and 35^{o}C; automatic fan and misting system for to control temperature. One tinytag was installed in each chamber to record air temperature and humidity. Black seasame plants were grown 42 pot (34 x 28 x 28cm) each chambers with 4 plants per a pot. All pots were filled with the same amount of alluvial soil (*Fluvi Mollic Gleysols*). Results showed that GDDs in chamber 1, 2,3 and 4 were 2246^o, 2177^o, 2104^o and 2022^o respectively. There was not much differrent in humidity among 4 chamers, ranging from 79-84%. At 2177^o gave highest value og fresh biomass (0.85kg/plant), dry biomass (100.3g/plant), fruit weight (0.21kg/plant), dry seeds (31g/plant) while the chamer with 2246^o showed the lowest value of those. Regarding harvest index, chamber with 2025^o gave the highest harvest index (0.27) while this parameter from the other chambers ranged from 0.22 to 0.24. In conclusion, black seasame significantly responded to various of GDDs under greenhouse condition; 2177^o is ideal for growth and yield performance of black seasame.

Keywords: Sesame, growth, yield, GDDs, greenhouse.

B7

Effects of Urea Types Combination With Alternate Wetting and Drying Irrigation (AWD) on Rice Yiled in the Vietnam Mekong Delta

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ABSTRACT

Rice provindes food for over 50% of the world population. The Vietnam Mekong Delta (VND) is the country's rice bowl, providing more than 50% of rice production for domestic consumption and export. However, this area is facing with two main issues including watershortage issue due to climate change and degraded soil quality by rice intensification. The study was conducted to investigate the effects of white Urea, Urea black fertilizer combination with alternate wetting and drying irrigation on OM18 rice variety yield in the Winter-Spring season of 2019 in Thoai Son district, An Giang province, VND. Field experiment was arranged split-split-plot design with 3 replications, 2 irrigation methods (continuous flooding – CF and Alternate Wet Drying (AWD)) combination with 6 fertilizer formulas (120N – 80 P_2O_5 – 60K_2O –white Urea, 100N – 80 P_2O_5 – 60K_2O –white Urea, 80N – 80 P_2O_5 – 60K_2O –white Urea, 120N – 80 P_2O_5 – 60K_2O – black Urea , 100N – 80 P_2O_5 – 60K_2O – black Urea, 80N – 80 P_2O_5 – 60K_2O –black Urea). Actual yield, yield components and leaf N content and leaf chlorophyll index (SPAD) were investigated. The results showed that AWD application saved by 9.5% freshwater. In comparison with FC, OM18 did not respond to AWD combination with white and black urea. Applying 100 or 120N of both nitrogen types gave better performances in panicles, filled grain and yield under both FC and AWD as well. Regarding OM 18 yield, formula of 100N (Urea black) –CF showed the best yield (8.0 tons/ha) but this formula showed non-significant differences from 120N (Urea black) –AWD as well as 120N (Urea black) –CF (7.2 tons/ha). In general, OM 18 responded to Urea black better than Urea under both of AWD and FC. Two treatments with different purposes were found, 100N (Urea black) –CF yield while 120N (Urea black) –AWD for water saving.

Key words: AWD, OM18, white and black urea, rice yield, Thoai son district.

B8

The Effect of Application Root Growth Regulator Dosage and Environmental Sanitation on *Salacca Edulis* Seedings in Tempel District-Sleman

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ABSTRACT

Indonesia is a tropical country that is rich on various fruits, some of which are superior fruits whose taste and aroma meet the favorite of many people. One of the fruits favored by the wider community is *Salacca edulis*, whether eaten fresh, or processed into sweets and pickles. The use of growth regulating substances has often been done by Salacca farmers to accelerate the root of plants, however the exact dosage is not yet known for its application in Salacca grafts. The purpose of this study was to determine the effect of rootone Growth Regulator Liquid dosage and environmental sanitation on the success of the graft method to obtain good salacca seeds. The research was conducted on land owned by farmers in Merdikorejo village, Tempel district, Sleman in 2018, with an altitude of 543 m above sea level. The experimental design used Randomized Completely Block Design with 10 treatments and 3 replications. The treatments applied were: C0: Sanitation application without RGR (Root Grwoth Regulation), C1: Sanitation application and RGR apply at a dose of 1000 ppm, C2: Sanitation application and RGR apply at dose of 2000 ppm, C3: Sanitation application and RGR application at a dose of 3000 ppm, C4: Application Sanitation and RGR apply at a dose of 4000 ppm, C5: Non-sanitary and without giving RGR at any dosage, C6: Non-sanitation and giving RGR at a dose of 1000 ppm, C7: Non-sanitation and giving RGR at a dose of 2000 ppm, C8: Non Sanitation and giving RGR at dose 3000 ppm, C9: Non Sanitation and giving RGR at a dose of 4000 ppm, The results shown thatt the application of sanitation and the RGR liquid for roots at a dose of 3000 ppm had a significant effect on plant height, salak weevil diameter, number of leaf midribs, root infection and leaf P nutrition content compared with control treatment. Whereas with the application of 4000 ppp RGR, there is no significant effect on the observed Salacca parameters. The optimum dose for Rootone-F application and gives the highest yield is a concentration of 3000 ppm on rice field with adequate sanitation applications.

Keywords: Growth regulators, salacca grafts, environmental sanitation, root infections

B9

The Implementation of Organic Fertilizer on Soil properties, Level of Heavy Metals, Growth and Yield of Rice on rice irrigation field of Sleman Regency

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ABSTRACT

Sustainable agriculture is an important aspect on global issue. The use of organic fertilizers can enhance soil properties, reduce the hazardous heavy metal and crop yield while restraining pests and diseases. These products are made from natural plant and animal materials or from mined rock minerals. Typical organic fertilizers include mineral sources, all animal waste including meat processing, manure, slurry, and guano, plant based fertilizers, such as compost, and biosolids. The aim of research was to determine the effect of Lumbung Mas organic fertilizers on soil soil properties, heavy metal reduction, growth plant and rice yield. The study was conducted on irrigated rice field of Pandowoharjo village, Sleman district – Sleman Regency during planting season II 2019. The research design was used a Randomized Complete Block Design with 8 treatments and 3 replications. Each treatment was applied in a plot size 5 m x 5 m and rice seeding planted as tajarwo 2:1 system (40x12,5x25 cm). The kind of treatments are P0 : control / without organic and anorganic fertilizer, P1 : Standard treatment, which application by anorganic fertilizer according to the recommended dosage, P2 : Fertilization uses organic fertilizer of Lumbung Mas at a dosage of 375 kg / ha and inorganic fertilizers followed the recommended dosage, P3: used organic fertilizer at a dosage of 565 kg / ha, P4 : used organic fertilizer at a dosage of 750 kg/ ha, P5 : used organic fertilizer at a dosage of 980 kg / ha, P6 : used organic fertilizer at a dosage of 1125 kg / ha and P7 : used organic fertilizer at a dosage of 1313 kg / ha and inorganic NPK fertilizers followed the recommended dosage. The result of study was shown that application of organic fertilizer Lumbung Mas at a dose of 980 kg / ha and 1313 kg / ha plus Urea fertilizer as much as 150 kg / ha and NPK Phonska 150 kg / ha has not significant effect on rice harvesting yield, while compare to the standard and control treatment have significant effect on the number of tillers, number of grain per panicle ,weight of 1000 grains, the number of filled grains and weight of rice biomass. The results of soil analysis were gave a positive trend that were an increase of the levels C-organic, available P and K, Kdd and Na dd, CEC and decreased the levels of heavy metals, suh as Pb and Hg compare to the Standard and Control treatment.

Key words: Organic fertilizer, soil properties, level of heavy metals. rice productivity

B10

Effect of Organic Substracts on Growth, Yield and Quality of Spinach (*Spinacia oleracea* L.)

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ABSTRACT

In order to increase the efficiency of the reuse of organic waste in the cultivation of spinach, which has many nutritional and medicinal values, the experiment was conducted to determine the substract suitable for the growth, formation of productivity, quality and high economic efficiency on spinach. The result was recorded that treatment 2 (the formula of the base of coffee grounds and cow manure, abalone mushroom residue and rice husk ash), treatment 3 (coffee grounds, cow manure, and rice husk ash), treatment 6 (coffee grounds, abalone mushroom residue, cow manure, rice husk ash, and soil) are the best results in 9 experimental treatments on agronomic, yield, quality and economic efficiency indicators. The results of nutritional analysis showed that these substrates had total N > 0.11%, P_2O_5 > 0.22%, K_2O > 7.39%. Treatment 2 had tree height reached 25,0 cm), number of leaves / tree 29,1 leaves, leaf length, leaf width (23,8 cm - 8,3 cm), canopy diameter (23,9 cm), chlorophyll 39,6 SPAD Units and root length 14,3 cm, stem diameter 0,8 cm). The average tree weight, theoretical yield, actual yield, weight and yield continued to record the highest results in treatment 2 (76,0 g - 2,50 tons/1000 m^2 - 2,20 tons/1000 m^2). The dry matter percentage recorded at 12,9%. There was no difference in Brix between treatments. Treatment 6 was the treatment with the highest Vitamin C content (0,12%). On the economic efficiency indicator, the results of profit, capital efficiency and marginal income index of treatment 2 was recorded (VND 45,3 million VND/1000 m^2- 2,2 - 21,6). Treatment 2 with the potting formula including coffee grounds, cow manure, abalone mushroom residue and rice husk ash was the treatment that had the best prospects for application in production practices.

Keywords: Abalone mushroom residue, coffee grounds, cow manure, rice husk ash, spinach *(Spinacia oleracea* L.)

B11

Estimating the Peat Thickness and Carbon Stock in Peatlands of North-Western Part of West Sumatera

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ABSTRACT

Peatlands are the largest and important carbon stock in the world. In Indonesia, peatlands cover an area of 20-21 million ha while peatlands in West Sumatera is about 117,500 ha. Starting in mid-1980 to date, peatlands in this region are being converted from natural peat forest to oil palm plantations. These conversions release greenhouse gases (CO_2 and CH_4) to atmosphere and soon natural peatlands rapidly damaged, declined and at the end vanished. Then, accurate estimation of the peat thickness and carbon stock are necessary to mitigate climate change. This information is limited for peatlands in West Sumatera. Normalized Difference Vegetation Index (NDVI) was used as a proxy to determine the vegetation cover and changes on carbon balance in peatlands. This study aims to determine the peat thickness and spatial distribution of soil carbon stocks and their correlation with the vegetation index in West Pasaman and Agam Districts in West Sumatera. A total of 135 soil samples were collected according to a 2 x 2 km grid from peatlands and covering an approximately 18,300 ha of peatlands (0°0'44,883"-0°21'12,652"S and 99°45'33,831"-99°57'48,915"E). Peat thickness was measured in the field, total soil and organic carbon, bulk density were analyzed in the laboratory. Results showed peat thickness from shallow to very deep (10.5 to 750 cm). Organic carbon on peat soil has a high value (1.41-55.81%), bulk density ranges from low to high in mineral soils (0.13-1.38 Mgm^{-3}). The carbon stock range from 12,532-25,444,072 Mg/ha. The NDVI value found in this study ranges from 0.332 to 0.796 but lower correlation (r = 0.085) exists with stock carbon. The still high carbon stock found in West Sumatera peatlands suggest it is necessary to maintain peatlands as they are. Peatlands conversion impact climate change and deteriorate our precious and fragile environment.

Keywords: Carbon pool, Climate change, Normalized difference vegetation index (NDVI), spatial distribution

B12

Effects of Temperature and CO_2 on Growth and Yield of Corn under Climate Change Scenarios in Vietnam

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ABSTRACT

At the present time, climate change causing increasing temperature, and dryness and CO_2 has exposed negative impacts on crops. In this study, 4 independent chambers were built to establish the expectation of different temperatures between the chambers. The experiment was carried out from January to March 2021 at An Giang University experimental area. Corn variety "Gold 58" was grown in 42 pots (34x28x28cm), 2 plants/pot. Temperature and CO_2 were hourly recorded, plant height and biomass were measured every 10 days period. The results showed that days to maturity (DTMs) in 4 chambers ranged from 62 to 67 days and cumulative temperature requirement from sowing to maturity (T_{sum}) varied from 2026 to 2190 ^{0}C d. The number of T_{heat} hours (≥ 38^{0}C) were in the range of 185 to 288 hours. The average of CO_2 concentration of 10 days period in the chambers varied from 559.9 to 640.5ppm. Plant height at 60 days after planting (DAP) in chamber 1 was 301 ± 11.5 cm, while it was decreased by 7.7%; 6.8% and 12.6% respectively in chambers 2, 3, and 4. Total fresh biomass above the ground in chamber 2, 3, 4 also significantly declined by 13.2%; 38.8% and 52.0% respectively. Fresh fruit yield also reduced by 14.3%, 34.9% and 34.1% correspondingly compared to chamber 1. Biomass of dried fruit and dry leaves in chamber 1 was higher the others from 34.1-34.9% and 22.5-25.4% respectively. Observed versus simulated comparison by the AGU-crop-model (based on R language programing) resulted in RRMSE value less than 8.2%. NSE index (Nash Sutcliffe Efficiency) of the models greater than 0.75 show that the models have high reliability.

Keywords: Biomass, carbon dioxide, corn, crop model, Vietnam Mekong Delta, yield

B13

Performance of M1 and M2 Genotype from Gamma-Ray Irridiation on Kota Padang Yam Bean (*Pachyrhizus erosus* L. Urban)

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ABSTRACT

Mutation breeding is one of the efforts in expanding genetic diversity and improving the character of plants. Irradiation of mutations with gamma rays in the variety Kota Padang yam bean is done to obtain plants that have a semi-dwarf performance and less inflorescence. Yam bean seeds are irradiated with gamma rays at 0, 100, 200, 300, 400 and 500 Gy. Radiosensitivity tests showed that LD50 was at a dose of 150 Gy, while high variability was obtained at 200 Gy. M1 mutant showed a decrease in plant height and pollen viability, simultaneously with increased doses of irradiation. Evaluation of mutant M2 plants derived from irradiation at doses 150, 200 and 300 Gy showed high variability in character of height and number of inflorescences, and heritability was high and very high for both characters. The selection results obtained 14 genotypes of mutant with semi-dwarf and fewer inflorescences criteria recommended to be further evaluated in the M3 generation.

Keywords: mutation breeding, M1, M2, semi-dwarf, less inflorescence,

B14

The Production and Productivity Development of Pepper Indonesia on Level Regional, Asean and the World

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ABSTRACT

Pepper are mostly exports and Indonesia occupying the world number two after Vietnam. The development of pepper plant is very fast followed by increased productivity and production good in national and international. The development of pepper Indonesia exports through projection to the high supply and demand enough to needs in hotel, restaurant and industry of pepper, and rise in the income of farmers and foreign exchange the state. The availability of pepper Indonesia to reach 3.28% per year, of 173.61 thousand tons in 1980 to be 409.52 thousand tons in 2012 and on the highest in 2007 by 444.23 thousand tons and to increased 145.000 tons in 2017. The price of pepper both in national market and in the world to increased. Projection of pepper Indonesia in 2015-2019 to demand of 3.03% with growth rate average 1.10%, Asean 0.56% and in the world of 2.03%. On international trade, the volume exports of pepper Indonesia still to be less competitive with pepper in Vietnam, although volume import are much smaller than the volume exports, but are rapidly increasing. Trade balance of pepper Indonesia in 2014 up to the year 2020 continues to increased. The development of pepper in Asean and in the world is a tendency for almost equal to pepper national, especially on growth rate sprawling plant, while productivity and production tended to increased. The state of Vietnam and Indonesia occupying producers and exporters of pepper largest in Asean and in the world. To increase the competitiveness of pepper Indonesia commodities in the export market, the government has to be active as facilitator, dinamisator and regulators.

Keywords: Pepper, development, productivity, production, Indonesia, Asian, in the World

B15

On the Home-visiting Dragons: A Year-round Observation of Dragonflies (Insecta: Odonata) at an Urban Residence

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ABSTRACT

The intrusion of wildlife into human settlement and residency has been long viewed as disturbance rather than regarded from other perspectives, such wildlife welfare or conservation. Insects were part of those wildlife that were considered more as pest or nuisance whenever their existence intersected with human livelihood. In this study we documented a year-round (August 2019 to August 2020) observation of dragonflies intruded into a residence located in the urban settlement of Padang City, West Sumatra, Indonesia. The study used descriptive method, where the data was recorded from any occasion an individual or more of dragonfly seen entered the house. The observation recorded date and time of entering, species identification and sex which later analyzed. During the observation, we recorded 41 individuals enter the resident. They were classified into two damselfly species (Zygoptera) and ten true dragonfly species (Anisoptera). *Orthetrum sabina*, *Tholymis tillarga* and *Gynacantha dorhni* became the most recorded species with 8, 7 and 7 total individuals respectively. With 12 individuals recorded in a month, February 2020 was the most dragonfly-intruded period. Dragonflies were observed entering resident at midday (10 individuals), afternoon (12 individuals), evening (11 individuals) or night (8 individuals); this might suggest that night lighting was not what probably attracted them getting into the residence. Both sexes were found in almost equal number (18 females, 20 males and 3 unsexed). The availability of small prey insects within the settlement area is presumably thought attracted the incoming of these dragonflies.

Keywords: Anisoptera, *Gynacantha dohrni*, *Orthetrum sabina*, *Tholymis tillarga*, urban area, Zygoptera

B16

Ecological of Otter' Prey in an Asynchronous Paddy Field Landscape

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ABSTRACT

Otters are the top predator in wetland habitat as well as in the paddy field landscape. As the top predator, otters have important ecological functions in maintaining species diversity of its food web. Prey selection of otters is influenced by the availability of prey species in the habitat. Paddy fields in the tropical region have unique temporal seasonality because of the cultivation stage. Therefore, information on the temporal availability of the otters' prey species in Paddy field landscapes is valuable to design wildlife-friendly farming practices. The study on the otters' prey ecological of paddy field in West Sumatra has been conducted from January until April 2020. We examined ecological indexes of otters' prey and examined whether otters' prey availaibility is influenced by cultivation stages. We surveyed various otters' prey species including fishes, snails, frogs, and water insects in four different cultivation stages: preparation, vegetative stage, generative stage, and post-harvest. The prey species were collected in paddy fields adjacent to latrine sites of small-clawed otter (*Aonyx cinereus*). The results of ecological indexes, such as diversity index, evennes index, and species richness index were obtained variated of each category otters' prey. The highest water insect indexes found the vegetative stage. The highest snails indexes found preparation stage. The highest fishes indexes found generative stage. However, the highest diversity and species richness indexes of frogs was generative stage, while the uniformity index was vegetative stage. The results of the ANOVA test the abundance of snails, the number of snails and the abundance of *Oreochromis niloticus* were significantly different in the cultivation stage ($p < 0.05$). Asynchronomous paddy field system is very suitable in maintaining the abundance of otter' prey throughout the year, so it can be considered to create paddy field landscape friendly for small-clawed otters.

Keywords: Diversity; abundance; latrine site; top predator

B17

Invader at the Height: *Paratrechina longicornis* (Hymenoptera: Formicidae), an Invasive Ant Species, across elevational gradients on Marapi Mountain, West Sumatera

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ABSTRACT

The diversity of ants along elevational gradients has become a topic in many scientific researches, while the information regarding patterns of, and processes that shapes, ant community structure across different elevations is considerably lacking. Therefore, the study about ants (Hymenoptera: Formicidae) at Mount Marapi, Agam Regency, West Sumatra, had been conducted at three elevations (low elevation at 0-1200 m, mid elevation at 1200-2100m and high elevation at 2100-3000 m) and by applying *Quadra Protocol* (honey bait trapping, soil sampling, leaf litter sifting and hand collecting). It focused on *Paratrechina longicornis* that is known as invasive species. A total of 144 ant individuals from this species was collected, detailed as follow; 13 individuals from low elevation, 144 individuals from mid elevation and 127 individuals from high elevation. *Paratrechina longicornis*, also names as 'crazy ant', became the only species observed to be present along the whole study transects. Its ability to adapt in many artificial environments could explain its successfulness as an invasive species; its reproduction mode, on the other hand, may also be contributing factor. The distributions of this invasive ant at elevational gradient of Mount Marapi discussed in this paper.

Keywords: Ants, crazy ants, Formicidae, invasive

B18

Assessing the Relationships between Plants and Stingless Bees (Hymenoptera: Apidae: Meliponini) within the Settlement Area

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ABSTRACT

Aside from being the source of honey, bee pollen and propolis, the stingless bees also play an important role as a significant pollinator in the world. The quality and quantity of bee products from a bee colony depend on the availability of surrounding plants as the source for nectar, pollen or resin that supply the colony. A study had been conducted from March 2020 to May 2021, aimed to record the visitation of stingless bees to certain vegetation, fruit and flower plants within a settlement area located in adjacent to Universitas Andalas Campus Complex (UACC) in Padang City. Eight colonies of *Heterotrigona itama,* two colonies of *Geniotrigina thoracica* and 10 colonies of *Tetragonula* species were observed in this study; they were either bred or naturally existing within the settlement complex. Their activities and visitation to plants were purposively recorded, with observation was emphasized to the foraging activities of the stingless bee worker on the plants. A total of 60 fruit, flower and ground covering plants were found to be visited by the stingless bees. The observation noticed some patterns regarding stingless bees' timing to visit certain plant and number of foraging individual during the stingless bee-plant feeding interaction. *Lepidoptrigona nidriventris*, stingless bee species which identified as unique to UACC, was also recorded foraging on Cosmos flower (*Cosmos bipinnatus*, Asteraceae) within the settlement area. It might sign the previously unsighted existence or extension of this species beyond the UACC area.

Keywords: Foraging, Plant Resources, Settlement, Stingless bee

B19

Maintaining Ecosystem Services Through Restoring Floating Rice-Based Farming Systems Promoting Sustainable Agriculture Toward Achieving Sustainable Development Goals (SDGS)

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ABSTRACT

Ecosystem services play an important role in generating income for rural people and supporting their livelihoods. However, government intervention, agricultural intensification and climate change increase pressure on livelihoods and reduce the benefits of ecosystem services. This study aims to identify the ecosystem services and livelihoods and which ecosystem services could positively contribute to the attainment of specific SDG targets in floating rice-based farming systems in An Giang province of the Vietnamese Mekong Delta, which is severely affected by the impacts of climate change and development of dams, high dikes and the focus on the intensification of rice production the past few years. The study employed a mixed-methods research by conducting in-depth interviews and focus group discussions with key informants who are government officials, environmental experts, and farmers in the study areas. Especially, the study applied tried test InVEST (Integrated Valuation of Environmental Services and Tradeoffs) tool to evaluate ecosystem service value and its change through different scenarios. The findings show that the floating rice ecosystem is classified into four types of services: (1) provisioning services, (2) regulatory services, (3) cultural services and (4) Support Services. Ecosystem services provide substantial benefits to agricultural systems for improving rural livelihoods and adaptation to climate change. It positively contributes to the attainment of specific SDG targets. Restoring the agroecological and natural-based solution farming systems not only helps increase the benefits of ecosystem services but also brings about desirable economic, social, and environmental benefits. This study suggests that agriculture development solutions based on natural, livelihood and knowledge of the local people need to be considered to advance local capacities to deal with climate change effects and improve future livelihoods of local communities and toward achieving the Sustainable Development Goals (SDGs).

Keywords: Ecosystem services, Livelihood, Sustainable Development

Biotechnology and Waste Management

Bw1

'Inflows'-only of Material at the Kuang Si Waterfall in Lao PDR: A Case Study of Waste Management in Rural Tourism

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ABSTRACT

The Kuang Si Waterfall is an iconic tourism destination in the Lao PDR, one not to be missed by any visitor to Lao PDR's historical capital Luang Prabang. In 2017, visitorship to the Kuang Si Waterfall drew in a revenue of more than 4 billion Lao kip (about US$0.5 million), proving to be the most attractive tourist destination in Luang Prabang province. However, with increasing visitorship, waste management in Thapene village, the village where the Kuang Si Waterfall is located, has become a challenge. In end-2019, we conducted fieldwork in Thapene village to understand their existing waste management system and the drivers for their increasing waste production. Methods included interviews with villagers and business owners, as well as following the rubbish collector to weigh and observe the types of rubbish produced. The fieldwork at Thapene village culminated in workshop-cum-exhibition that renewed the links between the village leadership and the relevant government department, and that raised awareness about waste management (e.g. about the non-biodegradability of plastic) amongst villagers and children. This case study reinforces the need for a multi-pronged approach in waste minimisation and management in rural tourist destinations, which lack the municipal waste management infrastructure of cities, yet continuously have 'inflows' of materials to service the visiting tourists.

Keywords: Lao PDR; plastic waste; traditional alternatives; rural tourism; waste management

Bw2

Sustainable Energy Development Using Space-Based Solar Power

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ABSTRACT

Progressive degradation of the environment due to the intervention of humans in the natural processes brought into light the need and the concept of sustainable development. The three pillars of sustainable development are Economical, Social, and Environmental. Sustainability has become one of the important tools to overcome the threats and is the dire need of the hour. This paper illustrates the detailed concept of Space-based solar power (SBSP) which is the collection of solar power in outer space and distribution of the same to earth. The major advantages of collecting solar energy from space and not by the conventional methods include the higher collection rate and a longer collection period. This is mainly because of the absence of the earth's atmosphere that consists of a lot of external impurities and the decreased effects of reflection and absorption on solar energy on its way to earth. The aim of the paper is establish how space-based solar power is one of the solutions of sustainable energy development for a better future. The study is based on secondary data. The findings indicate the need for sustainable energy development and the effective use of space-based solar power that can be the answers to the never-ending demands of human beings in near future. The article also delineates the opportunities of space-based solar power as well as the challenges that might be faced while building the system.

Keywords: Sustainable energy development, Space-based solar power, Solar panels, Zero emission, Sunlight

Bw3

Effect of Biopore Infiltration Hole on Surface Runoff Using the Storm Water Management Model

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ABSTRACT

The topographical conditions are mild enough and infiltration is not too large, resulting in greater surface runoff. The runoff or flow on the surface (surface run off) is highly dependent on the coefficient of flow, rainfall and duration of rain that falls on the soil surface. The greater the flow coefficient, the larger the surface flow, thus forcing the channel to accommodate the flow rate with a large capacity. The possibility of land use change from garden / garden land to watertight concrete / asphalt with a flow coefficient close to 1.0 is very likely to occur in the city of Padang. The increase in the coefficient is caused by urban development and population growth of 0.84% / year. Good for residences, school offices and other facilities. Apart from the infiltration factor, the slope of the land contributes to the inundation. The city of Padang is located in a very steep area upstream and sloping downstream. The city center, offices and dominant activity centers are located in the downstream area and near the coast so that there is often inundation on highways and connecting roads. However, temporary inundation or flooding can be overcome by making biopore infiltration holes. Biopores have a role as a means of increasing surface water infiltration (infiltration) in the land. Biopori uses small shallow holes and deep wells with a large diameter. This study aims to analyze the effect of using biopore holes on water absorption in the campus area of Dharma Andalas University. This research method was carried out by varying the location of the biopore wells and the average rainfall intensity with variations in the annual return period, the design rain hyetograph, the infiltration rate using the Storm Water Management Model (SWMM) Software. The results showed that the comparison of the infiltration rate before and after using biopores is quite good and can be developed for a larger land area. Also as input for the city government in preparing infiltration areas per building location.

Keywords: Biopore, Infiltration, Surface Runoff, Intensity, SWMM.

Bw4

Utilization of Banana and Cassava Peel as Local Microorganism Materials in Household Organic Waste Composting by Takakura Method

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ABSTRACT

This research compares household organic waste compost results with the addition of local microorganism activator (MOL) from banana peel and cassava peel waste with Effective Microorganisms (EM_4). The composting method used is aerobic composting with the Takakura composting technique. This composting is carried out in 5 variations consisting of variation 1 (50% organic waste: 50% compost), variation 2 (50% organic waste: 50% finished compost: EM_4), variation 3 (50% organic waste: 50% finished compost: MOL banana peel), variation 4 (50% organic waste: 50% compost made: MOL cassava peel), variation 5 (50% organic waste: 50% finished compost: MOL banana peel and cassava peel). The results showed that all variations of composting had met the maturity standard for parameters of temperature, pH, material reduction, texture, color, and smell had met the SNI 19-7030-2004 standards. Analysis of all compost quality, including C-organic, nitrogen, C / N ratio, phosphorus, and potassium, has met SNI 19-7030-2004 standards. From a total of 4 kg of raw material produced solid compost ranges at 2.7-3 kg. The use of activators in the composting process can speed up the composting time by 8-12 days. Compost variations by scoring results in the compost consisting of 50% organic waste and 50% finished compost with 5 ml of MOL activator banana peels and cassava peels is the best variation in compost maturity quality.

Keywords: Compost, maturity, quality, quantity, local microorganisms (MOL)

Bw5

Study of Sustainable Solid Waste Management System of Carocok Painan Beach Tourism Area Using The Life Cycle Assessment Method

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ABSTRACT

This study aims to assess the environmental impact and compares three scenarios for the solid waste management system of Carocok Painan Beach Tourism Area using the Life Cycle Assessment method. System boundaries include the energy required and emissions generated on solid waste management practice. The functional unit is 30,546 kg/day of waste managed. Three scenarios were analyzed. Scenario 1 is the existing conditions using a city-scale approach, 1% reduction of waste at the source by scavengers, a collection using motorized pedicabs, transportation to landfills using the arm roll truck, processing at Integrated Solid Waste Treatment Station (ISWTS) by composting method, and landfilling at a controlled landfill. Scenario 2 uses an area scale, collecting it to the Solid Waste Treatment Station with Reduce-Reuse-Recycle (3R) approach (SWTS3R) using a motorized tricycle, processing at SWTS3R composting method and handicrafts production, transportation, and landfilling option similar with scenario 1. Scenario 3 is the same as scenario 2 with an increase of waste reduction at the source by 1% by scavengers, composting processing at SWTS3R, recycling using plastic chopping machines, and applying sanitary landfill. The impact assessment method uses the CML-IA. The impact categories studied are Global Warming Potential (GWP), Acidification Potential (AP), and Eutrophication Potential (EP). Scenario 3 is the best because it has a low impact category value compared to other scenarios, namely GWP of 463,000 kg CO_2 eq, AP of 1,060 kg SO_2 eq, and EP of 881 kg PO_4 eq. However, to become a more sustainable management system, scenario 3 can still be improved by applying the substitution of fossil fuel of collection and vehicle fuel into more environmentally friendly fuel and improve the compostable solid waste processing using the takakura method.

Keywords: Carocok Painan Beach Tourism Area; Impact Assessment; Global Warming Potential; Life Cycle Assessment; Sustainable Solid Waste Management System

Bw6

The Effects of Crude Glycerol Addition into Biogas Production

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ABSTRACT

Crude glycerol is a byproduct of biodiesel production in which the number increases every year and is quite an expensive purification process to meet the technical standards required by consumer industries. To overcome this, it is important to find alternatives for crude glycerol utilization to increase the economic feasibility of the biodiesel industry. This study was aimed to evaluate the technical feasibility of biogas production with the addition of crude glycerol from a Palm Oil Plant. The glycerol was introduced into 500 mL Anaerobic Digester (AD) as a carbon source and energy source for the growth of methanogenic bacteria along with cow dung and distilled water with a ratio of 1:1. The addition of crude glycerol was 5% wt (GL5), 10% wt (GL10) dan 15% wt (GL15), and one control reactor without crude glycerol addition (GL0). AD was operated in a batch system at mesophilic conditions for 30 days. The highest biogas yield was obtained in the experimental set GL10 as much as 380 mL/g Volatile Solid (VS) and was formed on the 3rd day but the highest percentage of methane gas (CH4) was obtained from the control set GL0 as much as 60.2%. In addition to the identification of bacteria, it was found that the type of Bacillus sp in the GL10 treatment was the most biogas producer, and based on the results of its bio-slurry analysis it could be used as organic fertilizer and soil improvement for agriculture and degraded soil.

Keywords: Biogas, Crude Glycerol, Cow Dung, Bacillus sp, Bio-slurry

Bw7

The Analysis of Sustainable Energy of Natural Gas with Hidden Markov Model as the Predictive Time Series Price Movement

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ABSTRACT

Natural gas is a vital component of the world's energy supply, so it's no wonder that the price of energy commodities, especially natural gas, has a huge impact on economic growth. Analysis of natural gas price movements and their volatility is very important for world economic actors. The price movement of natural gas cannot be observed directly (hidden), therefore this study focuses on predicting the probability for an increase in natural gas prices within a certain time series data using the Hidden Markov Model (HMM). In the HMM method, there are three fundamental problems to be solved, the first is calculating the probability of observation using the Forward-Backward Algorithm, the second is determining the hidden state sequence using the Viterbi Algorithm, and the third is predicting HMM parameters using the Baum-Welch Algorithm. This study uses monthly natural gas price data for the period of 2011-2020. The results showed that the most optimal observation sequence prediction for Natural Gas prices is around March 2020. Meanwhile, natural gas prices are predicted to fluctuate around April and May 2020. In general, based on HMM analysis in the long term, there will be an upward trend in the price of natural gas in the future. This is presumably due to limited resources and increasing demand. These results can be considered on the analysis of sustainability energy for natural gas demand in the future in the aspect of time series price movement.

Keywords: Hidden Markov Model, Natural Gas Price Movement, Sustainable Energy

Bw8

An Analysis of the Future Prospects of Solar Energy in Kerala: A Leap Towards Sustainability

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ABSTRACT

From the time immemorial, human beings depend on various sources of energy for household and commercial activities. According to UN estimates, energy is the dominant contributor to climate change, accounting for around 60 per cent of total global greenhouse gas emissions. The Sustainable Development Goals (SDG) set in 2015 by the United Nations General Assembly incorporates the goal of 'Ensuring access to affordable, reliable, sustainable and modern energy by 2030'. Solar electric or photovoltaic technology is one of the biggest renewable energy resources to generate electrical power and the fastest growing power generation in the world. There is a popular perception that solar energy could be a key part of the solution to the energy crisis in the State of Kerala. It also supports the government's agenda of sustainable growth. Owing to the above reasons the Government of Kerala propounded 'Kerala Renewable Energy Policy' in 2013 for the development, propagation and promotion of solar energy. In the context of the above this paper envisages studying the household solar energy consumption pattern of Kerala and making a prediction of future energy scenario. It also examines whether 'Kerala Solar Energy Policy 2013' has been effective in promoting the use of solar energy among household sand barriers faced by households in adapting to the new technology. The study has been conducted with special reference to Kothamangalam municipality of Ernakulam district of the state of Kerala backed up with factual data and quantitative evaluations including student t-test and trend analysis. It has been found that the policy has not yet produced a much favourable repercussion. Much more effort and radical policy changes have to be made in order to foster a culture of solar power consumption.

Keywords: Sustainability, solar photovoltaic power, Kerala Renewable Energy Policy

Bw9

Investigation of the Variability of Dry / Wet Meteorological conditions using the SPEI / SPI Index in the Selo Watershed, Period 1981-2020

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ABSTRACT

The significant impact of climate change is high variability in rainfall and an increase in extreme rainfall events. These two impacts resulted in severe dry/wet conditions. Severe dry conditions can lead to crop failure due to lack of water availability, while severe wet conditions can indicate flooding. This paper aims to investigate the variability of dry/wet meteorological conditions in the Selo watershed, Tanah Datar Regency in the 1981-2020 period. Investigations were carried out using a standardized Precipitation-Evapotranspiration Index (SPEI) and a Standardized Precipitation Index (SPI) using validated reanalyst temperature and rainfall data. The SPEI and SPI indexes are calculated using the SPEI package in the R program by using a multitimes scale over that time period. The results of the SPEI and SPI index calculations show the variability of dry/wet events in the Selo watershed area, where extreme wet conditions were more prevalent in the 2001-2021 period, while dry extreme conditions occurred mostly in the 1981-2000 period. Using a 3-month lagtime, extreme drought events (index value ≤ -2) occurred in 1994 and 1997 with drought durations of 4 and 5 months respectively. Meanwhile, extreme wet conditions (index value ≥ 2) occurred in 2005 and 2010 with duration of extreme wet conditions for 3 and 4 months. The results of the analysis show that there is no significant difference in the index in the upstream, middle and downstream parts of the Selo watershed. The results of the comparison between the SPEI and SPI indices show that the index value of the SPI calculation is generally higher than that of the SPEI calculation. The conclusion is that the application of dry/wet index analysis is useful as a consideration for methods of climate change adaptation in the Selo watershed area.

Keywords: SPEI, SPI, Selo watershed

Diversity of Plant and Animal (D)

D1

Morphological Characters of Lokal Rice of Deli Serdang Regency North Sumatra

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ABSTRACT

Landrace is a valuable genetic asset that needs to be preserved to avoid genetic drain. Deli Serdang Regency in North Sumatra is high in local rice. This study had collect and characterize local rice from Deli Serdang from October 2019 to March 2020. Twenty-three local rice has been collected from various elevation ranging from coastal areas to highland, to be characterized ex situ and will be used as genetic resources in the assembly of local superior varieties that are resistant to drought and shade stress. Quantitative and qualitative morphological characterization was conducted in line with the book of Descriptors for wild and cultivated Bioversity International, IRRI dan WARDA 2007. This study also determined by the kinship of the local rice studied. Results of quantitative and qualitative characterization showed that most organs had broad genetic variability. In contrast, only some characters had narrow genetic variability. Wide range of genetic diversity shows the differences in ability to adapt to various environmental conditions. Cluster analysis based on morphological markers at 32.12% of similarity scattered all local rice into five groups. Genotype 9 falls into the first group whilst genotype 18 is in the second group. The third group has seven genotypes namely 4,7,11,12,14,16, and 22. The fourth group consists of six genotypes, namely 3,5,6,8,10 and 21 and the fifth group consists of eight genotypes namely 1,2,13,15,17,19,20 and 23. The genetic relationship is determined by the similarity in characters.

Keywords: local rice, Deli Serdang, characteristics, quantitative, qualitative

D2

Analysis of Phenotypic Variety of Five Clones of Ramie (*Boehmeria nivea* L. Gaud) Plants in the Experimental Farm Agricultural Faculty, Universitas Andalas

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ABSTRACT

The efficiency of plant breeding activities can be increased by taking into account the value of phenotypic diversity. Phenotypic variance analysis is carried out to see the phenotypic diversity of the qualitative characters of plants, so that it can be seen whether a plant has a narrow or broad diversity. The size of the area of diversity is expressed by the variation, namely the size of the average deviation. The emergence of variations is caused by the presence of genetic factors or heredity and environmental influences. The purpose of this study was to determine the value of the phenotypic diversity of five clones of ramie plants. The method used is descriptive analysis, using purposive sampling technique on five clones of ramie plants. Diversity was observed for the morphological characters (leaves, stems and flowers) which were qualitative. Based on the observations, it was found that broad variability was found in 4 qualitative characters, namely petiole color, leaf color, flower sex and female flower color. The wider the phenotypic variants, the greater the role of genetics in influencing the diversity of plant characters, conversely the lowert of phenotypic variants, the greater the environmental factors in influencing the appearance of a plants character. Characteristics that have broad variability allow a breeder to select individual plants that are in line with the objectives of the plant breeding program.

Keywords: Ramie plants, clones, phenotypic, variability, morphological characters

D3

The Diversity of Local Rice Varieties with Specific West Sumatra Flavor Based on Agronomic Characteristics and Yield Components

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ABSTRACT

Unlike in other provinces in Indonesia, West Sumatra's people like a specific 'pera' flavor of rice. The availability of pera flavor rice varieties, however, is very limited. Because of that, local rice germplasms of West Sumatra can be alternative to overcome the variety's limitation. Two researches aimed to determine the diversity of West Sumatra's local lowland rice varieties with specific preferences of West Sumatra's people based on their agronomic characteristics and yield components have been conducted at the farmers' field in Air Tajun village in Lubuk Alung district and Toboh Gadang Barat village in Sintuk Toboh Gadang district, Padang Pariaman regency, West Sumatra province, Indonesia from April to June 2018. The researches used a randomized complete block design with six treatments and four replications. The treatments consisted of six local rice varieties of West Sumatra, i.e. Putiah Papanai, Lubuak Nyarai, Cantik Manih, Kuriak Putiah, Randah Kuning and Padi Merah. Observations were made on their agronomic characteristics and yield components. Data were analyzed using analysis of variance followed by LSD test at 5% significance level. Results showed that Putiah Papanai variety had relatively more productive tillers with an average of 20.8 stems and higher productivity (7.28 ton/ha) compared to other varieties.

Keywords: Rice, pera flavor, local varieties, West Sumatra

D4

Structure and Composition of Trees in The Upstream of Batang Mahat Watershed Kabupaten 50 Kota West Sumatera

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ABSTRACT

Land use change at the upstream Batang Mahat Watershed was assumed to cause flood during rainy season. This change is related to vegetation in the area which has been cleared. Meanwhile, the data regarding the vegetation in that are has never been researched. Therefore, there is a need for a research to be done concerning tree's structure and composition in the upstream area of Batang Mahat. The research was conducted in Jorong Kubu Baru Nagari Baruh Gunung Bukit Barisan District. The objectives of this study are to know species and to determine structure and composition of trees within the area. Research sampling was conducted by using three belt-transects with measurement of 20x50 m. The transects was placed with the distance of 10 m from one another. The results of this study are: 1) 113 species of trees and saplings belonging to 40 families as well as 3 unidentified species are founded; 2) The highest Important value index (IVI) of trees in transect 1 are: *Rhodoleia championii* (63%), *Calophylum soulatteri* (24 %), and *Eurya acuminata* (20 %). In transect 2 are *Voacanga foetida* (49%) and *Schima wallichii* (33%). In transect 3 are *Schima wallichii* (43%), *Voacanga foetida* (41%), *Guioa sp*. (29%) and *Lithocarpus cyclophorus* (26%). 3) The highest IVI among saplings in transect 1 are *Rhodoleia championii* (33%) and *Alstonia* sp. (21%), in transect 2 are: *Hancea pengangensis* (25%) and *Sterculia* sp. (21%). In transect 3 are *Voacanga foetida* (43%), *Macaranga lowii* (31%), and *Elaeocarpus* sp. (22%); 4) The diversity index (H') is ranging form 3,13 – 3,2 for tree. Whereas for the saplings is ranging from 3,04 – 3,36. The diversity index in this area is categorized as high.

Keyword: vegetation, structure, composition, natural resources

D5

Variability and Agronomic Performance of Some Okra Genotypes Derived from the F2 Generation

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ABSTRACT

Inbred lines are needed as parents in crosses to produce hybrid varieties. Inbred lines are obtained from the self-pollinated process for several generations until all genotype composition accomplishes homozygous. The research objective was to assess several okra genotypes' variability and agronomic performance derived from the first-generation population's selfed pollination. The research was conducted at the Research Station of the Faculty of Agriculture, Universitas Andalas, from January to May 2021. The materials used are seeds obtained from self-pollinated 16 genotypes derived from hybrid and composite varieties. Data collected based on an individual observation, and then the data were analyzed using descriptive statistics. Results showed high variability of agronomic traits among genotypes, indicating a high probability to obtain plants with the particular traits. Generally, the performance of plants varied within genotypes.

Keywords: Homozygous, variety, hybrid, composite, self-pollination

D6

Variability and Heritability of Agronomic Traits of West Sumatran Upland Rice Cultivars

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ABSTRACT

The abundance of genetic diversity, especially local upland rice cultivars, makes a great opportunity in obtaining local cultivars with the desired character. The study's objective was to evaluate the genetic variability and heritability of agronomic traits among local upland rice cultivars from West Sumatra. In this study, 28 local upland cultivars from West Sumatra were subjected to the analysis of variance. The evaluation was conducted using a Randomized Complete Block Design with three replicates. Results showed variation in variability among traits, ranging from medium to high in height, medium to long in panicle length, small to medium in the number of tillers, days to flowering, days to harvest and grain yield. A high heritability estimate was found in plant height, the number of productive tillers, days to flowering and days to harvest, while a moderate heritability estimate was found in panicle length and grain yield.

Keywords: characterization, local cultivars, genetic variability

D7

Morphology characteristics of Leaf, Flower and Pod Among Vietnamese Cocoa Varieties

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ABSTRACT

This study examined the morphological traits of sixty-three (63) cocoa varieties that have been imported and cultivated in Vietnam. These cocoa varieties were collected from five regions in Southern Vietnam. The morphological features were individually evaluated and analyzed, including the leaf characteristics (leaf and stem anatomy) and flower features (ligule shape, anther number, pollen, stamen and ovule, fruit, seed). The results of this study showed a large variation across all morphological characteristics of the evaluated cocoa varieties. The Vietnamese cocoa flower showed a diversity of morphological characteristics including five shapes of ligule (oval, broad, deltoid, elliptic, and sub-lanceolate) and each stamen also had dithecous anthers with the exception of tri-thecous anthers for TD11. Furthermore, the shape of pollen grains was found homogeneous in all 63 varieties. The colour of the stamens and ovules was purple and white respectively for all examined samples. Three kinds of fruit shapes were identified, namely Angoleta, Amelonado and Cundeamor, and these were of varied colours. The Vietnamese cocoa cultivars were classified into three groups based on their fruit morphology characteristics (Trinitario-Criollo, Trinitario-Forastero, and Trinitario). Additionally, an anatomical analysis on the midrib structure of the leaves from 63 varieties showed high similarities, likewise the stem structure. The colour of young leaves was observed as being green and red. This primary research scrutinizes the morphological biodiversity of Vietnamese cocoa varieties during the three-decade development of the Vietnam cocoa project. The results provide practical applications for cocoa cross breeding and botanical taxonomy.

Keywords: cocoa, floral description, fruit shape, reproductive organ, *Theobroma cacao* L.

D8

Community Structure of Ants in Palm Oil Plantation Border with Secondary Forest

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ABSTRACT

Deforestation or functional change from forest to non-forest plays a role in changing ecosystems and species within it. Insects as one of the fauna in it is an interesting aspect to be studied, especially ants. The experiment was conducted at Nagari Gunung Selasih and Sungai Kambut, Pulau Punjung District, Dharmasraya Regency, West Sumatera in November 2017 until January 2018. This research aimed to find out ant diversity in oil palm plantation ecosystem bordering forest ecosystem. This research took the form of survey, with sample point taken using purposive random sampling method. Sampling method on each plant using Hand Collecting method, Bait Trap, and Pitfall Trap. Identification of samples obtained at the Laboratory of Animal Taxonomy, Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Andalas, Padang. Total ants (Hymenoptera: Formicidae) were collected during the study of 3,046 individuals consisting of 5 subfamilies, 15 genus, and 29 species. The most dominant species are Anoplolepis graciliphes species followed by Odontoponera denticulate species, and Odontomachus simillimus. Based on the results of the research, it can be concluded that the abundance and diversity of ant species is not directly affected by the distance from the forest ecosystem but is strongly influenced by the composition of environmental factors such as temperature, humidity and light intensity, as well as existing habitat and vegetation management factors.

Keywords: Bioindicator; Deforestation; Pest; Hymenoptera; Natural enemies

D9

The Diversity of Stingless Bees (Apidae: Meliponini) in Batusangkar, West Sumatra

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ABSTRACT

The study on diversity of stingless bees (Apidae: Meliponini) in Batusangkar had been conducted from September until December 2020. This study aimed to do the inventory of stingless bee species at meliponicultures in three subdistricts of Batusangkar City in Tanah Datar Regency, West Sumatra. The study surveyed the meliponiculture sites by purposively sampling and directly collecting, by hand, the workers of stingless bee at their colony entrances. A total of 5 species of stingless bee from 44 colonies were collected. Species with the most abundance population observed at the study area was *Heterotrigona itama* (23 colonies). It was followed shortly by other four species, i.e. *Geniotrigona thoracica* (10 colonies), *Tetragonula laeviceps* (7 colonies), *Tetragonula fuscobalteata* (3 colonies) and *Homotrigona fimbriata* (1 colony). The diversity of stingless bees in this study was thought to be influenced by species' productivity and behavior within the meliponiculture environment. The study represents stingless bees species that adaptive to meliponiculture environtment in Batusangkar.

Keywords: Colony, direct observation, meliponiculture, species

D10

Macrochelid Mites from Sumatra, Indonesia

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ABSTRACT

Macrochelidae is known as one of acarine biocontrol agent which targets agricultural pest. In this article, we conducted literature review of the species of Macrochelidae (Acari: Mesostigmata) in Sumatra, Indonesia and its potential use is also discussed. Most of the Macrochelid mites were collected from the surface body of dung beetles Scarabaeidae, captured by baited pitfall trap (*human dung traps*). Twenty-two species of Macrochelidae belonging to 5 genera are found in Sumatra. None of them is endemic, and there have been no reports of the use of Macrochelid for the agricultural system on this island so far. Therefore, intensive research on Macrochelidae in Sumatra Island is needed.

Keywords: Biocontrol, Macrochelidae, mites, Sumatra

D11

Getting Another Piece of Mosaics on West Sumatran Spiders (Araneidae): Inventory from Mount Marapi in West Sumatra

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ABSTRACT

This research aimed to study the diversity of spiders (Araneidae) at Mount Marapi in West Sumatera Province. The field survey had been conducted from September until December 2019 by deploying an array of hand collection, sieving, sweeping and beating techniques applied simultaneously at along three pairs of 120 m transect positioned at both sides of mountain hiking tracks. There were 25 spider individuals collected in this study; they were then identified and classified into 15 species which belong to 8 genera. *Gasteracatha* was a genus with the most species found (3 species, 9 individual), followed by *Argiope* (3 species, 7 individual) and *Cyclosa* (3 species, 5 individuals). Without minimizing the role of other collecting techniques, the hand collection technique was seemed to be more effective in doing the inventory on either spider individuals or species than the beating, sweeping or sieving techniques. The latter technique yielded the least result in this study.

Keywords: Araneidae, ***Mount*** Marapi, spiders, sweeping technique

D12

The Prevalence of Ectoparasites Associated with Muridae Rats in the Sago Malintang Nature Park, West Sumatra

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ABSTRACT

Sago Malintang Nature Park as one among mountainous forest areas in Sumatra, situated in Tanah Datar Regency, has been facing pressure due to the high rate of forest destruction that affects many wildlife, including rodents from family Muridae. Muridae is known as a vector for many infectious diseases, either by itself or through the ectoparasites it harbors. Ectoparasites in rodents play a role in transmitting various diseases to humans, pets and livestock. Therefore, studying rodents, their parasites and the prevalence of parasitism on rodents become an essential aspect. This research aimed to identify and to do the inventory on ectoparasites associated with rodents from family Muridae. It applied purpovise sampling method with traps at three elevations (low, mid and high elevation) in Mount Sago using 400 m transect. Trapped rodents were put into cloth bags before their parasites sampled. The data analysis included the abundance of rodent, the prevalence of rodents' ectoparasites and the diversity of ectoparasite using Shannon-Wiener Index. There were 27 rodent individuals collected in this study, classified into 5 species. The infesting ectoparasites on rodents were from fleas, mites and lices with a total of 1,977 individuals collected and identified into 13 ectoparasite species. *Echinolaelaps echidinus* was the most common ectoparasite, counted as many as 413 individuals and with the highest prevalence (40.74%.) The high elevation of Mount Sago was found to have the highest diversity of ectoparasite (H=2.014).

Keywords: Ectoparasites, Muridae, prevalence, West Sumatra

D13

A New Mealybug Species Attacks on Indonesian Tropical Fruits

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ABSTRACT

Mealybug (Hemiptera: Coccoidea: Pseudococcidae) is the second-largest family of scale insects but little is known about this insect pest species in Indonesia. A series of surveys were conducted randomly in mid-2020 in Bengkulu Province and recorded the presence of mealybug species, *Dysmicoccus* sp. n. Zarkani & Kaydan. This mealybug species was found to attack some tropical fruits such as *Durio zibethinus* Murr. (Malvaceae), *Lansium parasiticum* Corr. (Meliaceae), *Manilkara zapota* L (Sapotaceae) and *Coffea robusta* Lindl.Ex De Will. (Rubiaceae) in Sukaraja district, Seluma regency. The incidence of the new species was around 10% to 40%. Morphological data, key identification and species images are also provided.

Keywords: Biodiversity, host plant, insect pests, mealybugs, taxonomy

D14

The Abundance of Arthropods in Two Growth Phases on Hybrid Corn Landscape, Solok District, West Sumatra, Indonesia

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ABSTRACT

Solok District, West Sumatra Province is one of the regions for producing hybrid corn in Indonesia. The hybrid corn can be a source of habitat and the main niches for the main corn arthropods. So far there have been no studies on the abundance of arthropods from hybrid corn landscapes in West Sumatra. This study aimed to compare the abundance of arthropods in two growth phases of hybrid corn in Solok District, West Sumatra, Indonesia. This research was conducted from May to November 2020 in Tanah Garam Subdistrict, Solok District, West Sumatra. Arthropod sampling was carried out in 2 growth phases of maize. Sampling was carried out 4 times during the planting period of hybrid maize, namely at the age of 20, 40, 60, and 80 Days After Planting (DAP). The 20 and 40 DAP of age represent the vegetative phase, while the 60 and 80 DAP of age represent the generative phase of maize in the field. The arthropod collection technique was carried out using 2 methods, namely yellow trap and vacuum modified. The identification process was carried out at the Insect Bioecology Laboratory, Faculty of Agriculture, Universitas Andalas. The results obtained have been two classes of arthropods biodiversity in two growth phases of hybrid corn, namely the arachnid class and the insect class. The Shannon-Wienner diversity index value (H ') is 1.383, the evenness index of species (J') is 0.997, and the total of individuals (N) is 2927 individuals. Diversity of arthropods was dominated by the insect class by 98% (2,866 individuals), and the remaining 2% from the arachnid class (61 individuals). Most of family arthropods which founded belong to natural enemies (predators and parasitoids).

Keywords*:* Diversity, Maize, Vegetative, Generative, The Shannon-Wienner

D15

The Influence of Some Chili Cultivation Methods on Diversity of Coccinellidae Predator

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ABSTRACT

Coccinellidae has met all the criteria as biological control agents, especially aphids on chili. Conservation is an application method to optimize the potential of these biological agents. For this reason, it is necessary to design a chili cropping system that can conserve these predators. One form of conservation that can do is to provide alternative habitat and feed. It is no less important is to provide added nutrients to improve the fitness of Coccinellidae. This study aims to study the effect of several chili cultivation methods on the effectiveness and diversity of coccinellids. This research was in the form of an experiment arranged in a randomized block design (RBD); there were four treatments with four replications. The investigation was carried out on an area of 35 m x 10 m. The data were processed using analysis of the variety of SAS 90 programs. If there are differences between treatments, the processing was continued with Duncan's multiple range test at the 5 percent accurate level. The results showed that the border crop and refugia chili cropping model affected the number of species and individuals. On the other hand, the effect of chili cropping type has not been seen on the diversity and evenness of Coccinellidae.

Keywords: Aphididae, conservation, natural enemies, parasitoids, biological control

D16

Abundance and Diversity of Arthropods in The Corn (*Zea mays*) Plant Ecosystem in West Pasaman District, West Sumatra Province

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ABSTRACT

Corn is one of the leading commodities in the development of agricultural sector in West Sumatra. Arthropods can be found on the surface of the soil and plant canopy that interact with corn plant, which act as pest, herbivores, scavengers, decomposer, natural enemies like predator and parasitoid. Diversity is a function of stability in ecosystem. The research aims to determine the level of abundance and the diversity of Arthropods on the surface in corn (Zea mays) plantations in West Pasaman. This research was conducted from October 2019 to March 2020 in West Pasaman District, West Sumatra. The methods used in this research is survey. The observations were made using the yellow trap and vacuum modified since the plant age 20 days after planting and interval tweenty days. The identification process was carried out at the Insect Bioecology Laboratory, Faculty of Agriculture, Universitas Andalas. The finding showed that there were 8 arthropods ordo in corn ecosystem, with total 84 families. Arthropods diversity (H') index of 1.38 including middle diversity, and evenness index of species (J') is 0.9957 with a total of 5477 individuals. The abundance of arthropods in maize was found using vacuum modified more higher from yellow trap, with the number of 3576 individuals, while the yellow tray was 1901 individuals.

Keywords: Arthropods diversity, Maize, Ecosystem, Yellow trap, Vacuum modified

D17

Exploration and Morphological Characterization of Koro Beans Plant in Solok Regency, West Sumatera

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ABSTRACT

Koro beans are an alternative source of vegetable protein that has not been explored for its genetic potential and utilization. The exploration and characterization of the koro bean in Solok Regency was carried out with the aim of knowing the extent to which information on the phenotype character can be used as a differentiator for the accession of the koro bean germplasm in Solok Regency. This research was carried out from September to December 2019 in Solok Regency, West Sumatra province. This research was conducted using a survey method by observing the phenotypic characters in the field with purposive sampling. Exploration was carried out in all sub-districts in Solok Regency and succeeded in obtaining 116 plant accessions which can then be grouped into three types of koro beans, namely kratok koro beans (*Phaseolus lunatus L.*), red sword koro beans (*Canavalia gladiata*) and white sword koro beans (*Canavalia ensiformis*). The differences between types of koro beans are seen based on the main characterizing characters, namely the shape of the leaf tip, leaf base shape, flower crown color, petal opening, pod color, pod length, seed background color, seed pattern color and seed coat pattern. Phenotypic variations are found within the same species. leaf base shape, flower crown color, petal opening, pod color, pod length, seed background color, seed pattern color and seed coat pattern. Phenotypic variations are found within the same species. leaf base shape, flower crown color, petal opening, pod color, pod length, seed background color, seed pattern color and seed coat pattern. Phenotypic variations are found within the same species.

Keywords: Accession, exploration, characterization, germplasm, variability

D18

Morphological Characterization of Avocado Fruit (*Persea americana* Mill.) In Luhak Nan Duo District, West Pasaman Regency

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ABSTRACT

The avocado plant (*Persea americana* Mill.) is cross-pollinated; thus, an individual plant has a different genetic fashion. This research was carried from November 2019 to February 2020 in Luhak Nan Duo District, West Pasaman Regency. The research aimed to obtain information about the morphology and describe the level of diversity of avocado plants in Nagari Persiapan Giri Maju, the center of avocado production in Luhak Nan Duo District, West Pasaman Regency. The research used a survey method with purposive sampling as a sample collecting design. Morphological characterization was carried out on avocado fruit. Exploration and characterization conducted successfully identified 238 accessions of avocado plant that showed narrow to wide phenotypic variability in each fruit character. Ten potential avocado accessions were obtained from the characterization that had been carried out with the following characteristics, i.e: oval fruit shape, grade A fruit weight, green color of ripe fruit peel, buttery, and non-fibrous fruit flesh texture. Hence, the accessions can be recommended as a candidate for new potential avocado varieties. Based on qualitative traits, cluster analysis resulted in seven groups of accessions with a 38% degree of similarity.

Keywords: avocado, accession, characterization, exploration, morphology

D19

Exploration and Morphology Identification of Spores of Asbuscular Mychorhiza Fungi From Horticultural Plantation Land in Payakumbuh State Agriculture Polytechnic

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ABSTRACT

This study aims to determine the presence and number of spores as well as to determine the morphological characteristics of Arbuscular Mycorrhizal Fungi (AMF) originating from the rhizosphere of several horticultural crops in the agricultural land of Payakumbuh State Agricultural Polytechnic. This research was conducted in Payakumbuh State Agricultural Polytechnic Laboratory for 6 months. The method used in this research is descriptive exploratory method by means of purposive sampling for soil sampling. While the stages of this research include: taking and collecting data in the field, determining the point of location for soil sampling, taking soil samples, analyzing soil properties in the laboratory, isolating AMF spores and identifying AMF spores morphologically. The conclusions of this study are 1) The population of AMF spores in horticultural land is high. The highest spore population was found in soil samples of the root area of shallot plants (556 spores per 10 g of soil), while the lowest number of spores was in soil samples of eggplant root areas (271 spores per 10 g of soil), 2) AMF exploration in several horticultural crops in the agricultural land of the Payakumbuh State Agricultural Polytechnic, based on morphological identification (shape, color and size), the AMF found consisted of three genera, namely *Glomus* sp, *Gigaspora* sp, and *Scutelospora* sp.

Keywords: arbuscular mycorrhizal fungi, horticultural crops, exploration, identification and morphology

Plant Protection

P1

Behavior of Shallot Farmer in the Use of Pesticides with the Approach of Prediposition, Enabling and Reinforching Factors

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ABSTRACT

The focusess of this research are on the factors that influence the behavior of shallot farmers in the use of pesticides using the approach of Prediposition, Enabling and Reiforching factors. This research was conducted using a quantitative descriptive approach method in Lembah Gumanti, Alahan Panjang Subdistrict, Solok Regency, West Sumatra. The selection of Solok Regency was carried out purposively because Solok is the largest shallot production area in West Sumatra. Data were Analyzed used Partial Least Square structural equation modeling. The results showed that (1) the predisposition factor has no significant effect on behavior (2) the enabling factor has a significant effect on behavior (3) the reinforcing factor has a significant effect on the behavior (4) the predisposition factor has a significant effect on intention (5) intention has a significant effect on behavior

Keywords: Behavior, Agriculture, Pesticides, SEM

P2

Spodoptera litura Fabricius Attacks Barieties *Chrysanthemum* spp.

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ABSTRACT

Chrysanthemum spp. is ornamental plant that have high economic value, so it have the potential to be developed commercially. Chrysanthemum cultivation business is inseparable from pest attack *Spodoptera litura* which is a problem related to the decrease in the quality and quantity of the crop. The use of synthetic pesticides has been carried out by farmers in effort to control. However, the use of pesticides has been often not well targeted and has a negative impact on the environment. The use of resistant varieties is an effective control method. Thus, it is necessary to observe *Spodoptera litura* in the field on various chrysanthemum varieties that are generally grown by farmers. This study was aimed to determine the level of *S. litura* attack on various chrysanthemum varieties. The research method used was direct observation of pest attacks. Pest observations were carried out at the age of 13 weeks after planting, of eleven chrysanthemum varieties, namely: Dewi ratih, Remix pink, Yoko, Limeron, Puspita nusantara, Krisan kulo, Ririh, Marimar, Tadasita, Azzura, and Semifil. The results showed that the resistance of chrysanthemum varieties to *S. litura* tended to be different. Marimar and Azzura were classified as resistant varieties, Limeron, Ririh, Marimar, Tadisita were classified as very vulnerable, Yoko and Krisan kulo were classified as vulnerable. Dewi Ratih, Remix Pink, and Puspita Nusantara were relatively resistant.
Keywords: *Chrysanthemum,* resistance level, *Spodoptera litura*, varieties

P3

Application Of Biostimulant Consortium To Increase The Growth Of Sugarcane (Var. Cenning) In Dry Land

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ABSTRACT

Sugarcane considered as one of the most promising crops. In general the growth of the crop is affected by the photosynthesis reaction, in addition of water and nutrient absorption by plants. Biostimulant is a non-nutrient biomaterial that is proven to improved crop growth. Based on this idea, Biostimulant technology can be used as an alternative in improving the growth of sugarcane. This research aimed to asses the Biostimulant consortium (Sucrosin, humic acid, and AM fungal) to improve the growth of the sugarcane var. Cenning in a dry land. The research tested 2 treatments i.e. control (standard procedures) and Biostimulant Consortium application. Sucrosin was apply on 1, 3, 4, and 5 months after planted (MAP) by using a foliar spray. Application mycorrhizal fungi is spread around the roots area of sugarcane crops, while the application of humic acid was spray on the ground and as coating agent of inorganic fertilizers. Coating fertilizer is carried out by mixing a humic acid solution as much as 1% of the amount of fertilizer. The results of this research showed the treatment of the Biostimulant Consortium yield significant results to the growth of sugarcane compared to the control on 8 MAP. Biostimulant Consortium is able to improve crop height and stem diameter significantly up to 30-40% compared to control. This indicates that the treatment of the Biostimulant consortium is able to improve the vegetative growth of sugarcane in dry land.

Keywords: Sugarcane, consortium biostimulant, dry land, Cenning variety

P4

The Existence of Squash Mosaic Virus on Cucumber in Gianyar, Bali

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ABSTRACT

Survey was conducted during 2020, we found mosaic symptoms in Gianyar, Bali. A Comovirus was inferred to be the possible cause of the virus-disease-like symptoms. The study aimed to identify the causal of the mosaic symptoms on cucumber. Severe disease incidence caused by this virus was observed on cucumber cultivation in Gianyar that was in the range of 5.81-66.87%. PCR using specific primer for coat protein (CP) gene of SqMV was successfully amplified the DNA fragments of ± 582 bp on samples from Payangan, Tegallalang, Ubud, Sukawati, Blahbatuh, and Gianyar districts, except for samples from Tampaksiring. It is indicating that those mosaic symptoms on cucumber is associated with SqMV infection. This indicates that the presence of SqMV is widespread in Java and Gianyar. SqMV included a category A2 of quarantine organism, causes the important role of plant quarantine to avoid the distribution of cucumber seeds were infected SqMV to area was not yet available.

Keywords: Coat protein, Comovirus, mosaic symptoms, polymerase chain reaction

P5

Managing Climatic Risks in Coffee Plantation of India: An Exploration of Plausible Alternatives

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ABSTRACT

Plantation crops in India are vulnerable to perils of climatic variability which necessitates adoption of appropriate risk management systems to stabilise income for growers. In this regard, Revenue Insurance Scheme for Plantation Crops was introduced by the Government of India on a pilot basis with an intent to protect plantation growers against risks associated with declining international and domestic prices and yield loss due to adverse weather parameters. However, pilot Revenue Insurance Scheme for Plantation Crops did not elicit desired response from the target groups and Insurance Companies. This study discusses the approaches to risk management in the coffee plantation of India with specific reference to this Scheme. Relevant information regarding awareness about the scheme, risk coverage, premium payment, insurance modalities, implementation process were collected through in-depth interviews and focus group discussions with stakeholders including growers, insurance companies, and policymakers. Based on field insights the study highlights the challenges faced during efforts taken to implement the scheme as an insurance mechanism for coffee plantation. Further, plausible alternatives to protect coffee growers from risks of weather vulnerability and price instability are discussed. The study recommends an alternative weather-based insurance schemes viz., Rainfall Insurance Scheme for Coffee, which is already functional to protect growers against anticipated shortfall in yield due to deviations in rainfall within a specified area and period. Such an insurance is based on a weather index which provides insurance for losses arising due to vagaries of weather. These weather indices could be erratic rainfall, extreme fluctuations of temperature, relative humidity and / or a combination of above. These products are easy to administer, are designed taking into consideration the local agro-climatological properties, do not entail long-term liabilities on the governments, are rated based on actuarial principles and offer high level of flexibility in terms of coverage and indemnity level.

Keywords: Climatic Risks, Coffee, Crop Insurance, Risk Management

P6

Molecular Identification of *Pepper yellow leaf curl Indonesia virus* on Chili Pepper in Nusa Penida Island

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ABSTRACT

Pepper yellow leaf curl Indonesia virus (PYLCV) has been reported as caused yellow leaf curl disease in Bali Island since early 2012. Dominant symptoms of PYLCV infection in chili pepper were yellowing, leaf curl, yellow mosaic, and mottle. Yield loss due to yellow leaf curl disease in Bali Island ranges between 40 to 100%. *Bemisia tabaci*, has been known to vector on the case yellow leaf curl disease. Observations on the Nusa Penida Island in 2020 showed symptoms such as yellow leaf curl disease, but identification of PYLCV in Nusa Penida Island has not been studied. Molecular identification was conducted using polymerase chain reaction and sequence analysis. Data collected in this study was disease symptoms and disease incidence. The results showed that dominant disease symptoms caused by virus from Nusa Penida were yellow mosaic, yellowing, and mottle. Universal DNA fragments of 920 bp were successfully amplified from 50 leaf samples using *begomovirus* degenerate primers SPG 1 (5'-CCCCKGTGCGWRAATCCAT-3') and SPG 2 (5'ATCCVAA YWTYCAGGGAGCT-3'). Sequence analysis showed that the isolate from Nusa Penida was a *Pepper yellow leaf curl Indonesia virus* with a 98–100% homology with several reference isolates.

Keywords: Begomovirus, homology, molecular identification, polymerase chain reaction

P7

Study of Cocoa Leather Liquid Smoke Toxicity with Differences of Purification Methods

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ABSTRACT

Cocoa shell is an underutilized waste from plantations. Cocoa shells can be used as raw material in the manufacture of liquid smoke and cocoa charcoal. Charcoal from the burning of cocoa pod husks can be used as dye adsorbent. The research objective was to determine the different purification and filtering methods for the toxicity of liquid smoke from cocoa husks and to find out which purification method is more appropriate for liquid smoke from cocoa husk so that it is not toxic. The results showed that the purification and filtering of liquid smoke from cocoa peels using various methods were non-toxic. The best method with the greatest LD50 value is purification using zeolite with an LD50 value of 3019.95 ppm. Then followed by the method of activated charcoal, activated charcoal + zeolite and distillation with LD50 values of 2,951.21 ppm, 2,398.83 ppm and 1,412.54 respectively.

Keywords: Cocoa shell, liquid smoke, purification, toxicity

P8

Effect of Silicon, Boron and Ethephon on Growth, Yield and Quality of Sesame Seed (*Sesamum indicum* L.)

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ABSTRACT

The sesame is one of the plants which was cultivated interveningly with rice in spring-summer crop in An Giang province. This crop is often affected by high temperature and lack of irrigation water, so the yield of sesame declines. Therefore, the study was carried out with the aim of evaluating the effectiveness of silicon and boron fertilization and foliar spray of ethephon to improve sesame yield. The experiment was arranged in a completely randomized block design with 3 replicates of 10 treatments (T1: control; T2: control+E; T3: 1B+E; T4: 2B+E; T5: 30Si+E; T6: 40Si+E; T7: 1B+30Si+E; T8: 1B+40Si+E; T9: 2B+30Si+E; T10: 2B+40Si+E). In the experiment, boron was supplemented in the form of boric acid with two levels of 1 kg (1B) and 2 kg (2B); silicon was supplied in the form of Na2SiO3 with two levels of 30 kg (30Si) and 40 kg (40Si); ethephon (E) was sprayed at a concentration of 50 ppm. They were applied as there was any capsule on the plant that turned yellow. The study was carried out in My Hoa Hung commune, An Giang province, Vietnam. The result indicated that the growth and yield of sesame were influenced by fertilizing levels of boron and silicon, in which the treatment T4 had reduced plant height, number of capsule per plant, seed yield (0.6 ton/ha) and the lowest harvest index (12.1%). Fertilizing Si at the amount of 30 and 40 kg/ha or mixture of Si with B helped increasing stem hardness. Among them, the treatment T10 had the highest stem hardness (13.9 Newton), the number of capsules per plant (33 capsules/plant), the seed yield (1.34 tons/ha) and the highest profit was 26.8 million VND/ha. When ethephone was combined with different levels of boron and silicon, it helped to harvest 5 days earlier than control sample and did not affect seed quality.

Keywords: *Sesamum indicum* L., silicon, boron, ethephon, growth, yield and stem hardness

P9

Percentage of Damage and Lost Production by *Spodoptera frugiperda* in Padang Pariaman and Solok Districts, West Sumatra, Indonesia

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ABSTRACT

Maize is the second food crop after rice in Indonesia. One of the main problems in maize production is pest. This study aims to identification, learn percentage of damage and lost production by the new invasive pest attack on maize in Padang Pariaman and Solok Districts, West Sumatra. The research method used in this study was a random or sampling. The results showed that there was a severe attack a new invasive pest, *S. frugiperda* on maize in Padang Pariaman and Solok Districts. The percentage of damage by *S. frugiperda* in Padang Pariaman is higher than Solok District. It was reach 0.71 larvae population per stems in Padang Pariaman District, and 0.52 larvae population per stems in Solok District. Then, the population fluactuation of *S. frugiperda* in Padang Pariaman district was higher than Solok district, with was from 0.00 - 1.31 larvae per stems in Padang Pariaman, and 0.00 - 0.52 larvae per stems in Solok District. Analysis of the correlation between population of *S. frugiperda* and production of maize was carried out by regression analysis. Regression model is logarithmic, with formula is $y = 380.87 \ln(x) + 28$ and a value $R^2 = 1$ for Batang Anai Subdistrict, and $y = 213.52 \ln(x) + 35$ and a value $R^2 = 1$ for Kampung Dalam Subdistrict, Padang Pariaman District. Then formula is $y = 474.65\ln(x) + 11$ with a value $R^2 = 1$ for Tanah Garam Subdistrict, Solok District, and $y = 367.89\ln(x) + 12$ with a value $R^2 = 1$ for Tikalak Subdistrict, Solok District.

Keywords: Fall armyworm, Damage, Population fluctuation, Corn, Regression analysis

P10

The Effectivity of Soap Nuts Extract (Sapindus Rarak.Dc) with the Extractions of Aquades and Methanol as Bioherbicide Towards the Germination of Fimbristylis miliacea and Leptochloa chinensis

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ABSTRACT

F. miliaceae dan *L.chinensis* weeds were grown predominantly in paddy fields which cause a decrease in production yields of up to 36% - 43%. The aim of this experiment was to evaluate the method of extractions and find the best concentration of soap nuts extract *(Sapindus rerak* DC*)* which extracted by aquades (MEPA) and methanol (MEPM) solvents to against the growth of *Fimbristylis miliacea* and *Leptochloa chinensis,* which do not reduce the growth of paddy plant (*Oryza sativa*). This research was arrange by two experiments, the first is bioassay test of the growth of *F.miliaceae* and *L. chinensis* weeds which applied by soap nuts *(Sapindus rerak* DC*)* extract with MEPA and MEPM in a greenhouse. The second experiment was the rice growth toxicity test (Oryza sativa) which was applied lerak extract with MEPA and MEPM. The first experiment was carried out using a randomized block design arranged in a factorial (2x5), while in the second experiment using a single factor randomized design in the form of concentration. The first factor was the weeds of *F. miliaceae* and *L. chinensis.* The second factor is the level of concentration, consisting of 0 (control), 25% soap nuts extract, 50% soap nuts extract, 75% soap nuts extract and 5% saponins. The data obtained were analyzed using the LSD test at the 5% level. The results showed that the application of soap nuts extract with MEPA was able to inhibit the growth of *L.chinensis* and *F.mileacea* weeds at a concentration of 50% and 75%, while the application of soap nuts extract with MEPM was more effective in inhibiting the growth of *L.chinensis* weeds (concentration 25%, 50% and 75%) compared to *F.mileacea* weeds (50% and 75% concentration). The application of soap nuts extract with MEPA did not affect rice growth, whereas MEPM inhibited rice plant height and stover weight at a concentration of 75%, but did not inhibit the growth of root length and leaf number.

Keywords:

P11

Pathogenicity of Endofit Bacteria as Entomopatogen Towards *Spodoptera litura* Fabricius. (Lepidoptera: Noctuidae)

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ABSTRACT

One of the biological control efforts in controlling pest populations is the use of bacteria isolated from plant tissue or known as endophytic bacteria. The aim of this study was to obtain endophytic bacterial isolates from the root tissue of potential onion plants as entomopathogens against larvae of *Spodoptera litura*. This study used an experimental method in a Completely Randomized Design (CRD) with 9 treatments consisting of 8 endophytic bacterial isolates and 1 control with 3 replications. Data were analyzed by analysis of variance and if significantly different continued with the Least Significant Difference test (LSD) at the 5% level. The results showed that, the bacteria *Serratia marcescens* JB1E3 and *Bacillus cereus* P.14 caused the highest mortality in the larval phase, whereas *Serratia marcescens* ULG1E4 and *Bacillus* sp. SJI has a long-term effect (latent) and causes pupae and imago of *Spodoptera litura* are not formed

Keywords: endophytic bacteria, entomopathogen, *Spodoptera litura*, mortality

P12

Endophytic Bacteria: Its Potential to Suppress the Severity of Bacterial Leaf Blight in Rice Plants

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ABSTRACT

Biological control of bacterial leaf blight (*Xanthomonas oryzae* pv. *oryzae*) using endophytic bacteria is one of the control techniques that support sustainable agriculture. This study was conducted to select and characterize of endophytic bacterial isolates from healthy rice and to test the ability of these bacteria to promote plant growth and suppress bacterial leaf blight disease. A complete randomized design (CRD) method, which consists of 24 treatments (22 endophytic bacterial isolates + positive control + negative control) and 3 repetitions was used. The isolates that were able to induce resistance of Xoo in the plants *are* LmB1 (35.82%), LmA6 (23.78%), and LmB2 (23.78%). While LmA6 (69.56%), LmB1 (56.51%), and LmB35 (47.82%) increases the growth. Furthermore, LmB 1 and LmA 6 isolates have the ability to induce and increase plant growth. Identification of endophytic bacteria showed that these selected isolates LmA6 were similar to *Bacillus cereus* MD152, LmB2 similar to *Bacillus thuringiensis* ATCC 10792, LmB1 similar with *Ochrobactrum intermedium* strain OI1, and LmB35 similar with *Stenotrophomonas maltophilia* strain A1w2, respectivelly.

Keywords: biocontrol, endophytic bacteria, resistance induction, *Xanthomonas oryzae* pv. *oryzae*ne

P13

Application of *Beauveria bassiana* (Bals.) Vuill on Rice Seeds and Its Effect on The Biology of Brown Planthopper (*Nilaparvata lugens* Stal)

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ABSTRACT

The brown planthopper or BPH (*Nilaparvata lugens* Stal) is an important pest that causes low productivity in rice plants. This pest can be controlled by using biological agents, one of which is the fungus *Beauveria bassiana* (Bals.) Vuill. The study was to know the fungus *B bassiana* on rice seeds on the biology of the brown planthopper (WBC). The study was arranged in a completely randomized design (CRD) with five treatments and five replications: BbJg, BbWS, Pb211, Td312, and control. The concentration of *B. bassiana* used was 108 conidia/ml. *B. bassiana* was applied to rice seeds through the seed soaking method for 24 hours. The data obtained were processed using variance analysis (ANOVA) and LSD test at 5% level. The results showed that the BbWS isolate was the best in colonizing the nets of a rice plant. The highest colonization was found in the leaves at 16.08%. BbWS was also the best isolate in influencing BPH preference in laying eggs and reducing the proportion of eggs hatched by 28%, and the length of BPH stadia became longer.

Keywords: Biological control, Entomopathogen, Fungi, Pest

P14

Lethal Competition on Joint Predators during Suppressing Brown Planthopper Population

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ABSTRACT

One technique to control brown planthopper or BPH (*Nilaparvata lugens*) in the rice field is to use joint predators. This study aims to determine the effect of joint predator density (*Pardosa pseudoannulata* and *Phidippus* sp) on competition and its predatory rate in suppressing the BPH population. The study used a completely randomized design by combining *P. pseudoannulata* or Pp (1,3,5 individuals) and *Phidippus* sp or Ps (1,3,5 individuals) to become Pp1Ps1, Pp1Ps3, Pp1Ps5, Pp3Ps1, Pp3Ps3, Pp3Ps5, Pp5Ps1, Pp5Ps3, Pp5Ps5. The parameters observed were joint predation rate, body weight, mortality of both predators and the competiton model. BPH for treatment was reared in the laboratory on the IR 42 rice variety, while *P.pseudoannulata* and *Phidippus* sp were collected directly from the rice field around Pauh, Padang City. The results showed that the highest predation rate was found in Pp5Ps5 (47 individuals), but it was not significantly different from Pp3Ps3. However, the highest body weight was found in Pp3Ps3 (0.02 g). The most increased *P. pseudoannulata* mortality was found in Pp5Ps5 (60%), as well as the mortality of *Phidippus sp* (40%). *Phidippus* sp tended to be superior in competing during the three days of observation. The draw competition was found on Pp3Ps5.

Keywords: *Nilaparvata lugens, Pardosa pseudoannulata, Phidippus* sp, competition, predation

P15

Refuge Plants and Jajar Legowo Systems Increasing the Useful Insect Populations and Production of the Rice Crops

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This study aims to evaluate the effectiveness of refuge plants and cropping systems on the population of useful insects and rice production. The study was conducted on the farmland in Central Sulawesi, Indonesia without implementing the agrochemicals using a Split Plot Design. The main plots were refuge plants with four treatments, namely rice without refuge crops, rice crops with wild Cosmos (*C.caudatus*), marigold (*Tagetes erecta*), and both flower plants as the refuges. Meanwhile, two cropping systems i.e. the jajar legowo system (JLS) with a 2:1 pattern and the symmetrical system (SS) was set up as a sub-plot. Direct observation and collection of the pests and useful arthropods (pollinators, predators) were carried out using yellow-pan traps and a sweep net. The parasitoid eggs were reared at the laboratory. In addition, rice growth and yields were measured. Refuge plants and cropping system had a significant effect on the observed variables, independently. The refuge plants, had no effect on the arthropods population but changes their community structure, and increased the proportion of useful insects. Meanwhile, rice production in the JLS (5.16 tons GKG/ha) was significantly higher than the SS (4.10 tons GKG/ha) and this was in line with the differences of the tillers number in both cropping systems. The study highlighted the importance of implementation of ecological engineering at the paddy fields by using the flower plants as the refuge for the beneficial organisms combined by JLS for enhancing the rice yield.

Keywords: Ecological engineering, flower plants, jajar legowo, useful insects, rice yield

Land Use and Soil Science

S1

Hidrology Balance in Sustainable Land Development

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ABSTRACT

One of the important requirements for land use is that it is free from the danger of flooding. flood naturally has a cycle of three months, years and five years, or maybe 20 years. The areas that are prone to flooding are generally located in the fishiography of the alluvial system Several cities in West Sumatra are in an alluvial system formation even though they are at an altitude above 350m dml, for example Kota Solok 350m, Bukittinggi 900m, and Padang 25 m dml. The growth of this city was initially safe from floods, but lately it has often experienced flood disasters or disturbed the hydrological balance. This is presumably due to changes in land use, especially changes in rice fields into settlements or offices. This change causes the area factor from 0, 8 to change to 1, due to the occurrence of perfect land cover in the conditions of the residential area. The city of Solok has lost 385 ha of rice fields so far, the city of Padang has lost 35 ha of rice fields / year, Bukittinggi has lost nearly 200ha of its total rice field area. Rice fields have water needs through evapotranspiration and percolation. When there is a land use change to a settlement, the amount of water required during rice cultivation becomes water that has to be disposed of, and this should affect the expansion of the drainage channel. If the water requirement for one growing season is at a value of 1300mm, with a length of time from soil processing to harvesting is 4 months, meaning that every month the rice fields need water as much as 1251250m3, which is equivalent to 0.48m3 / sec. The amount of water that must be discharged is accumulated with the maximum amount of rainfall for 3 days, respectively 125mm, 100mm, and 150mm. This amount of rainfall has a correlation with the amount of water needed for soil saturation, this pore filling is related to the height of the groundwater depth. In alluvial physiography, the depth of groundwater is at 60cm, using pF 4.2 data with 45% KA, and 1.2cm3 / gr soil BV value, 65% TRP, so the amount of water needed for saturation is 144mm. the number of three days of rainfall is 375mm. The amount of abundant water is 231mm / ha. The total water in the area of rice that has changed function is 389350m3 / ha, the accumulated depth of 385ha as much as 1946750 m3 for 1 day is equivalent to 22.53 m3 / sec, the accumulation between water needs and the amount of rainfall is 23.01 m3. / sec. This is equivalent to a channel size of 4m wide and 6m deep. This change in canal construction is in line with the principles of sustainable land development to prevent flood damage

Keywords: Aluvial fishiographic system, flooding, Land used change

S2

Assessing Soil Organic Carbon Stock Under Different Land Uses in Koto XI Tarusan District, West Sumatra

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ABSTRACT

Soil organic carbon can be used as an indicator of soil quality and can contribute to climate change mitigation. There is still a lack of soil carbon stock assessment in soils from West Sumatra. This study assessed the distribution of soil organic carbon stock in several land uses in Duku, Koto XI Tarusan District, Pesisir Selatan Regency. The study area consisted of four land uses: paddy field, dryland agriculture, scrubland, and secondary forest. Soil samples were collected using the stratified sampling method design. Soil samples at a depth of 0-20 dan 20-40 cm were obtained from each land use type with the same slope and soil type. The sampling location was randomly selected within a soil unit polygon. A total of 21 samples were collected, and they were analyzed for texture, bulk density, soil respiration, total organic carbon, and nitrogen content. Results indicated that bulk density is larger in scrubland>dry land> paddy soils>secondary forest. Soil pH is higher in paddy soil>scrubland>dryland>forest, but total N was higher in secondary forest>paddy soil>bush>dry land. The highest soil organic carbon stock was found in secondary forest (128.82 - 294.09 ton/ha), followed by paddy field (16.99 - 227.14 ton/ha), dryland agriculture (10.40 - 65.43 ton/ha), and scrubland (13.39 - 53.19 ton/ha). The data were interpolated over the whole study area using the Inverse Distance Weighted (IDW) interpolation method. Soil organic carbon stock distribution from the highest to lowest: 17% was <50 ton/ha, 39% was 50-100 ton/ha, 32% was 100-150 ton/ha, 10.5% was 150-200 ton/ha, 1% was 200-250 ton/ha, and 0.5% was 250-300 ton/ha. Overall, this study demonstrates that soil organic carbon can be used as an indicator for assessing soil quality. The nitrogen content, the status of soil acidity (soil pH H_2O), bulk density status, and soil respiration condition are among soil quality parameters that were directly influenced by organic carbon stock. This information on SOC stocks from forest to agricultural areas is important for future studies on assessing SOC dynamics.

Keywords: Organic Carbon Stock, Paddy Field, Scrubland, Dryland Agriculture, Secondary Forest

S3

Identification and Characterization of Tephra for Geopolymer Precursor

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ABSTRACT

Volcanic ash and pumice are products of volcanic eruptions, characterized by a high amount of amorphous silica and alumina. They can potentially serve as a source of raw materials for the production of geopolymers. Geopolymers are more environmentally friendly compared to conventional cement. However, there is a requirement for the aluminosilicate for creating geopolymers. This study aims to identify the mineralogical composition and chemical properties of the volcanic ashes and pumice for potential use as geoploymers' precursor materials. Tephra and pumice samples were collected from several volcanoes in Indonesia. The samples include two tephras from recently erupted volcanoes in Java and one pumice material from West Sumatra. Tephras collected one week after the eruptions of Mt. Tangkuban Perahu (26th July 2019). Another source of tephra was from Mt. Kelud, which erupted on 13th February 2014. Pumice samples of Mt. Maninjau were collected at Sungai Limau district, 30 km from the Maninjau caldera, a product of the Holocene (52K) volcanic eruption of Mt. Maninjau. Mineralogy of the tephra and pumice samples was identified with XRF and XRD. Chemical properties characterized include pH, exchangeable cations, cation exchange capacity (CEC), potential-P, and available-P. Results showed that volcanic ash and pumice were dominated by crystalline feldspar minerals and amorphous volcanic glass. The SiO_2 content is higher in pumice follow by tephras from Mt. Tangkuban Perahu and Mt. Kelud (74.97%-60.28%). But the Al_2O_3 content is higher in Mt. Kelud compared to pumice and Mt. Tangkuban Perahu (23.57%-4.03%). The pH is very acidic to slightly acidic (2.35–6.1). Mg is higher than Ca, Na, and K. The potential-P and available-P were considered very low. Among the samples, Mt. Kelud volcanic ash has the highest available-P compared to Tangkuban Perahu volcanic ash and pumice. The SiO_2/Al_2O_3 ratio are 4.35, 8.00, and 26.38 for samples of Mt. Kelud, Mt. Maninjau pumice, Mt. Tangkuban Perahu, respectively. The optimum ratio of geopolymer is between 2.5–5, and thus volcanic ash Mt. Kelud is the most suitable option. Nevertheless, the exchangeable basic cations of volcanic ash and pumice indicated that they are more suitable for plant nutrition.

Keywords: Kelud, Maninjau, pumice, pyroclastic materials, Tangkuban Perahu

S4

Application of Satellite Images and GIS to Assessing The Situation And Proposed Solutions for Developing Pineapple Cultivation In U Minh Thuong, Kien Giang

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ABSTRACT

The study was conducted to assess the situation and propose solutions to develop pineapples crop in the area of U Minh Thuong, Kien Giang province. The study used the Object-Based Image Analysis (OBIA) classification method to create a map of pineapple cropping in the U Minh Thuong area in 2016. Rainfall, soil type, temperature, and water reserves are inherited from the studies of the Department, Institute of Technology and analyzed by the GIS method. Water irrigation on pineapple was estimated based on the formula of Mladen Todorovic, 2016. Based on comparing freshwater reserves in the research region and irrigation water on pineapple, researched spatial distribution map of water response capacity for pineapple. The research results showed that the U Minh Thuong has natural conditions suitable for the cultivation of pineapple, the area of pineapple cultivation in this area was 4,387.29 ha, the largest in Vinh Thuan district. The total freshwater reserve of the region varies according to rainfall, with the highest volume being 4,546.2 m3/ha (in September 2015) and the lowest 67.7 m3/ha (in March 2016). Accordingly, the U Minh Thuong region lacks water in the dry months from January 2016 to April 2016, the amount of water is starved with watering demand from 2.385 to 2.969 million m3 on the total cultivated area of pineapple. In the rainy season, in contrast, the surplus water was quite high, about 2.252 – 27.257 million m3 in Vinh Thuan district in September 2015. The assessing results are the basis for making recommendations on water use effectively and propose solutions to develop pineapples crop in U Minh Thuong region, Kien Giang province.

Keywords: pineapples, GIS, water reserves, U Minh Thuong

S5

Digital Mapping of Stock Carbon in Volcanic Paddy Soils in The Vicinity of Mt. Kerinci

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ABSTRACT

The storage of soil organic carbon (SOC) in volcanic soils is crucial for mitigating climate problems. Even though volcanic soils have a large pool of SOC but they are in high risk as rapidly conversion of tropical volcanic soils from natural state to agriculture and urban uses. Conversion of natural volcanic soils to paddy cultivation occurred about 300 years ago in the vicinity of Mt. Kerinci West Sumatera. Changes in soil carbon stocks in volcanic paddy soils were investigated and mapped their spatial distribution as well as determined their relationship with vegetation index. The research site covered an area about 1,293 ha (01 °35'2.56"-01°31'44.64"S and 101°18'17.93"-101°14'18.76"E) in Sangir, Solok Selatan district, West Sumatera. 71 soil samples were collected from 0-20 and 20-40 cm based on 500 x 500 m grid interval. Soil were characterized for their bulk density, pH, organic carbon, labile carbon, very unstable carbon,carbon bound to non-crystalline minerals, humus carbon metal complex, recalcitrant carbon, total nitrogen and total carbon. Soil bulk density meet the requirement for andic soil properties (0.30–0.90 Mg m^{-3}) and lower value obtained for forest soil, pH ranged from 5.0-6.7 at a depth of 0-20 cm, 4.1-7.6 at a depth of 20-40 cm and lower values found in forest soil. Total-C ranged from 9.27-26.78 % in upper part and from 6.85% to 21.67 % in subsurface. The carbon stock at a depth of 0-20 cm is about 326,264,467 Mg and 576,118,981 Mg at a depth of 20-40 cm. The NDVI *(Normalized Difference Vegetation Index)* range of 0.37 - 0.77 and correlate with soil organic carbon. Paddy cultivation after 300 years in volcanic soils changes the SOC pool and can be used as a reference for land management to maintain carbon stocks in the soil.

Keywords: Carbon pool, Climate change, Normalized difference vegetation index (NDVI), Spatial distribution

S6

Soil Quality and Its Correlation on Soil Hydrolase Enzyme Activities in Maize Corp Patterns in 50 Kota District of West Sumatra Province

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ABSTRACT

Continuous planting of corn can cause a decrease in soil quality. Improving soil quality can support the work of soil function as a medium for plant growth and to support the environment for the better. This study aims to assess soil quality and hydrolase enzyme activities in land units planted with maize in Kenagarian Mungka, Lima Puluh Kota District. The survey method used in this study was purposive sampling with random sampling techniques based on land units in Kenagarian Mungka planted with maize. The cropping patterns studied were monoculture of maize, intercropping maize-eggplant and maize-cassava. The results of the soil quality assessment on this cropping pattern showed that the highest soil quality index was found on land with monoculture maize cropping patterns (0.89), followed by maize-cassava intercropping (0.86) and maize-eggplant patterns (0.85). The three maize cropping patterns studied were still categorized as very good and had a positive correlation with β-glucosidase and acid, alkaline soil phosphatase activities and could be used as indicatosr of soil quality. It is recommended to add organic matter through fertilization to the soil in order to maintain the soil quality index.

Keywords: β-glucosidase, Croppping pattern, Maize, Phosphatase

S7

Mapping of Geochemical Properties of Volcanic Soil Using Digital Soil Mapping: A Case Study of Tea Plantation

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ABSTRACT

About 34% or 6.5 million ha of land area in Indonesia is considered as volcanic soils and most of them serve to produce horticultural and estate crops such as tea. In the early 1918, the Dutch colony cleared up the primary forest located at the southern slope of Mt. Kerinci in Central Sumatera to establish tea plantation. In this study, we investigated soil chemical variables and accurately estimating and mapping the geochemical properties of volcanic soil in tea plantations. Soil samples were collected from 138 sites both in north and south slope with a grid of 500 x 500 m. Soil samples were collected from two layers (0-20, 20-40 cm), air-dried and analyzed for their chemical properties (pH, C- organic, CEC, exchange basic cations, N-total, available-P, P-retention) and total oxide composition with XRF. Regression kriging (RK) was utilized to spatially predict the soil chemical parameters. The SiO_2 content was around an average of 37.7%, lower than the southern slopes around an average of 42.8%. The northern slope have an acidic to neutral soil pH (4.7- 6.9) with an average value of 5.88 compare to 5.81 found in southern soils. The average bulk density was 0.56 Mg m^{-3} and the available P was very high (22.1-249.6 ppm) in both soils. P Retention is about 97.6%, higher than soils of the southern slope with the value of 90.9%. CEC values were very low to very high (2.67-118 $^{me}/_{100g}$). The total nitrogen content in northern site is higher (0.69%) compared to soils at the southern slope (0.62% N). The organic carbon ranged from low to very high (1.5-18.7%). The exchangeable Mg> Ca> Na> K (31.2> 14.5> 14.03> 8.08 in $cmol_c$ kg^{-1}). To conclude soils used for tea cultivation in the northern slopes of Mount Kerinci have higher geochemical properties than those of the tea plantations on the southern slopes of Mount Kerinci.

Keywords: Climate change mitigation, Geochemical properties, Regression kriging, Soil spatial predictions models

S8

Digital Mapping of Stock Carbon in Volcanic Paddy Soils in The Vicinity of Mt. Kerinci

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ABSTRACT

The storage of soil organic carbon (SOC) in volcanic soils is crucial for mitigating climate problems. Even though volcanic soils have a large pool of SOC but they are in high risk as rapidly conversion of tropical volcanic soils from natural state to agriculture and urban uses. Conversion of natural volcanic soils to paddy cultivation occurred about 300 years ago in the vicinity of Mt. Kerinci West Sumatera. Changes in soil carbon stocks in volcanic paddy soils were investigated and mapped their spatial distribution as well as determined their relationship with vegetation index. The research site covered an area about 1,293 ha (01 °35'2.56"-01°31'44.64"S and 101°18'17.93"-101°14'18.76"E) in Sangir, Solok Selatan district, West Sumatera. 71 soil samples were collected from 0-20 and 20-40 cm based on 500 x 500 m grid interval. Soil were characterized for their bulk density, pH, organic carbon, labile carbon, very unstable carbon,carbon bound to non-crystalline minerals, humus carbon metal complex, recalcitrant carbon, total nitrogen and total carbon. Soil bulk density meet the requirement for andic soil properties (0.30–0.90 Mg m^{-3}) and lower value obtained for forest soil, pH ranged from 5.0-6.7 at a depth of 0-20 cm, 4.1-7.6 at a depth of 20-40 cm and lower values found in forest soil. Total-C ranged from 9.27-26.78 % in upper part and from 6.85% to 21.67 % in subsurface. The carbon stock at a depth of 0-20 cm is about 326,264,467 Mg and 576,118,981 Mg at a depth of 20-40 cm. The NDVI *(Normalized Difference Vegetation Index)* range of 0.37 - 0.77 and correlate with soil organic carbon. Paddy cultivation after 300 years in volcanic soils changes the SOC pool and can be used as a reference for land management to maintain carbon stocks in the soil.

Keywords: Carbon pool, Climate change, Normalized difference vegetation index (NDVI), Spatial distribution

S9

Digital Soil Mapping of Geochemical Properties of Volcanic Paddy Soils of Mt. Kerinci

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ABSTRACT

Natural volcanic soils are considered as one of the productive soils in the world because of intermittent addition of volcanic materials when volcano erupted. Soils formed from volcanic materials has different characteristics from other soils with different kind of parent materials. Conversion of natural volcanic soils to paddy cultivation occurred about 300 years ago in the vicinity of Mt. Kerinci West Sumatera. The aim of this study was to provide information about the geochemical properties of volcanic paddy soils located in the northern slope of Mt. Kerinci. Soil samples were taken in Sangir Solok Selatan West Sumatera, which is 15 km from the top of Mt. Kerinci. A total of 71 samples for paddy soils were collected at a depth of 0-20 and 20-40 cm according to 500 x 500 m grid interval and 3 samples from forest. Standard soil analyses were carried out in laboratory such as soil texture, bulk density, pH, available and potential P, exchangeable cation and cation exchange capacity (CEC), P retention, total elemental analysis with *X-Ray Fluorescent*. Results showed that paddy soils have pH in H_2O between 5.05-6.73 and from 3.75-5.91 for pH in KCl, higher soil pH are obtained for forest soils. The CEC of studied soils are considered very high with an average value of 53.21cmol.kg^{-1} and the exchangeable complex are dominated by magnesium followed by calcium, natrium and kalium. The phosphate retention in the soil is 69-99%. The total oxides composition found in paddy soils of Mt. Kerinci are SiO_2 (45.28%), Al_2O_3 (31.12%), Fe_2O_3 (13.2%), CaO (1.76%), K_2O (0.32%), SO_3 (1.4%), P_2O_5 (2.26) and lesser amount for Mn, Zn, Ti, Zr, Sr, Cu, Cr. Changes in soil chemical properties such as soil pH, bulk density, soil organic carbon content occur after 300 years of paddy cultivation in volcanic soils at northern slope of Mt. Kerinci.

Keywords: Andisols, total elemental oxides, X-Ray Fluorescent, Volcanic ash

S10

Detection of sulphurdioxide in volcanic deposits and aerosol after Mt. Sinabung eruption in 2019 using proximal and Sentinel5P

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ABSTRACT

Mount Sinabung erupted on August 28, 2010 and stopped in mid-September 2010. Then the new eruption started on September 15, 2013 and continues to this day. Both pyroclastic materials and gas or aerosol ejected during volcanic eruption contain sulfur which presence as sulphate salt deposits on particle surfaces or gases. Then, the SO_2 from the eruption will have a direct impact on the surrounding area. Spectral from satellite remote sensing optical sensors can be used to monitor and measure SO_2 gas near real time after an eruption. The distribution of SO_2 column density in the atmosphere was tracked using the Sentinel5P satellite. Regression kriging (RK) is applied to predict the spatial distribution of sulfur. The area under study is located in a radius of 3-7 km from the eruption hole, the area is about 4,517ha. A total of 56 soil samples and volcanic ash were collected from the ground surface (0-20 cm) based on a 1x1 km grid interval. All samples were air dried, sieved and analyzed for pH, sulfate, and total SO_3 using XRF. The Google Earth Engine (GEE) platform was also used to process sentinel5P satellite imagery to determine the number and distribution of SO_2 columns density in the atmosphere during 2019. The pH of the ash is very acidic to neutral (3.56 - 6.55), while soils are considered as acidic to neutral (4.67 - 6.52). The available sulfate content in soil ranges from 0-303.39 ppm and from 0-142.47 ppm in volcanic ash samples. The total SO_3 content in ash ranges from 0%-16,53% and 0-3.71% in soils. Sentinel5P satellite image spectral data shows that SO_2 is concentrated mainly in the southern region, with the highest level occurring in August 2019. This method can serve asone of the volcanic mitigation programin active volcanic region of Indonesia.

Keywords: SO_2 , Regresion Kriging, GEE, Sentinel5P

S11

Prediction of Volcanic Soil Carbon Stock by Using Digital Soil Mapping After 50 to 100 Years of Tea Cultivation in Mt. Kerinci

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ABSTRACT

Indonesian volcanic soils cover an area of about 5.4 million ha and about 602,500 ha located in West Sumatera. Intensive tillage without the return of carbon to the soil can cause the carbon content to decrease. Carbon content in the soil determines the level of soil fertility. The purpose of this study was to identify carbon stock and their fractions. Soil samples were collected from 138 sites with a grid interval of 500 x 500 m at a depth of 0-20 cm and 20-40 cm, air-dried, sieved and analyze to determine soil pH, bulk density, organic C and C fractionation and total carbon. Normalized Difference Vegetation Index (NDVI) was utilized to identify vegetation cover. Regression kriging (RK) was applied to spatially predict the carbon distribution. Lower soil pH ranged from 4.95 to 6.87 at a depth of 0-20 cm found in the southern slope soils compare to those from northern site (4.74 to 6.93). Soils in Northern slope have slightly higher pH than soils in southern slope. The average bulk density is 0.60 Mg m^{-3} for soils in the southern slope and 0.56 Mg m^{-3} for those from northern slope. Soil organic carbon (SOC) is around 7.53% at a depth of 0 -20 cm and 4.32% at a depth of 20-40 cm, SOC is lower in southern slope than soils situated in the northern slope, (with an average 8.18% (0-20 cm) and 4.32% (20-40 cm). The average total carbon ranges from 14.31% (0-20 cm) and 11.50% (20-40 cm) and their values are lower than those in the northern slope (19.32% for upper soil and 16.07% for lower soil). The C-organic content on the South slope is lower than the North slope in the study area. Soils in the southern slopes store more carbon stock (45,575.8 Mg/ha) compared to those in northern slope of Mt. Kerinci (36,263.30 Mg/ha). The NDVI value for soils in the southern slope ranges from 0.3885–0.9667. This high and low carbon value can be used as a reference for land management to maintain soil organic carbon storage.

Keywords: Climate change mitigation, Regression kriging, Soil carbon sequestration, Soil spatial predictions models

S12

Mapping of Volcanic Soil Chemical Properties With Digital Soil Mapping After Prolong Eruption of Mt. Sinabung (2013-2020)

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ABSTRACT

Volcanic soils in Indonesia cover an area about 5.4 million ha and around 2.7 million ha in Sumatera. The prolong eruptions of Mt. Sinabung in North Sumatra from 2013 to the present, eject pyroclastic materials which blanketed and altered the soil surface. As a result, volcanic soil formed from these pyroclastic deposits. The objective of this study is to map the chemical properties of volcanic soils after prolong eruption of Mt. Sinabung from 2013-2020. A total 34 soil samples were collected at a depth of 0-20 cm according to grid sampling system with an interval of 1x1 km covering an area about 4,500 ha. Regression kriging (RK) was applied to spatially predict the soil chemical properties and their distribution. The soil samples were air dried, sieved and analyzed to determine soil pH (H_2O and KCl), available, potential and retention P, organic carbon, total nitrogen, cation exchange capacity (CEC) and exchangeable basic cations. Soil pH (H_2O) range from very acidic to neutral (4.14-6.52) and very acidic to acidic pH (KCl) (3.89-5.26), low to very high available-P (3.46-382.01 ppm), potential-P very low to very high (3.76-230.26 mg $100g^{-1}$), P-retention is categorized as very high (90-99%), organic carbon low to very high (1.73-13.05%), low to high total nitrogen (0.13-0.60%), low to high cation exchange capacity (11.78-97.71 $cmol_c\ kg^{-1}$) and exchangeable base cations are categorized as high with K values (1.60-2.98 $cmol_c\ kg^{-1}$), Na (3.72-7.45 $cmol_c\ kg^{-1}$), Mg (5.79-12.15 $cmol_c\ kg^{-1}$) were categorized as high and Ca very low (0.039-0.157 $cmol_c\ kg^{-1}$). The estimation area with soil pH between 4 to 5 is about 424.85 ha and soils with pH 5 to 6 covered an area about 3,964.81 ha. Our findings suggest that persistent eruptions of Mt. Sinabung supply new plant nutrition which can enrich and increase soil fertility in the future.

Keywords: Pyroclastic material, Soil Fertility, Volcanic Soil

S13

Detection of Pyroclastic Material and Deformation of Lava Dome in Mt. Sinabung with Multi-Temporal Analysis (2010-2020)

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ABSTRACT

The persistent eruptions of Mount Sinabung resulted in deformation of lava dome as well as blanketed the surrounding area with pyroclastic material. This research focused on determining the changes occur in Mt. Sinabung during the prolong eruptions from 2010-2020. A total of 22 volcanic ash samples were collected following a 1x1 km grid interval spread over from the East to South slope of Mt. Sinabung. The studied area is the most affected by volcanic eruption. Digital elevation models from shuttle radar topographic mission and sentinel-1 were utilized to monitor deformations of lava dome and distribution of pyroclastic material on Mt. Sinabung. Sentinel Application Platform and Google Earth Engine were used as the main tools in multi-temporal digital elevation model (DEM) data processing. The eruption of Mt. Sinabung from 2010 to 2020 changed the height from 2,460 m to 2,404.3 m and created a new crater (5.35 ha). Lava dome volume from 2010 to 2020 is about 2,308,041 m^3 and some of the dome has collapsed to produce pyroclastic material which deposit to the surrounding area of Mt. Sinabung during eruption. The distribution of pyroclastic material increased from 2010 to 2019 covered up an area of 103,27 ha (2010), 846.48 ha (2013), 1.029,74 ha (2016), 1.235,97 ha (2017) and 1.463,62 ha (2019). The thickness of the pyroclastic material deposit Mt. Sinabung until 2020 was varied from 13,24 cm to 219 cm. The findings from this study can be used as a reference for observing topographic changes due to volcanic activities and to draw a mitigation and contingency plan for volcanic disaster program in active volcanic region of Indonesia.

Keywords: deformation, interferometry, pyroclastic materials, volcano

S14

The Normalized Difference Vegetative Index Value of Volcanic Paddy Soils of Mt. Talang Using Landsat 8 Image

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ABSTRACT

Volcanic soil in West Sumatra based on various soil maps areabout 602,500 ha. Soils of volcanic origin are considered asfertile and productive soils. They are widely used to grow for annual and perennial crops. Paddy cultivation in volcanic soils is commonly practiced in West Sumatra.The production of paddyis crucial to maintain local and national food security in West Sumatra and Indonesia. Observation of the condition of rice plants in volcanic areas can be done from remote sensing by calculating the vegetation index value through the NDVI (*Normalized Difference Vegetation Index*). This study aims to determine the vegetation index of paddy growsin Gunung Talang by using Landsat 8 satellite imagery and correlate the index value with the total-C content. Soil samples were collected using the 1x1 km interval grid method from 4.526 ha of volcanic paddy fields. Soil samples were dried and sieved with a 2-mm sieve and then analyzed for total-C and standard soil chemical properties. The results showed that the average vegetation index value was high with a maximum value of 0.67 and a minimum value of 0.34. The results of the regression analysis show that there is no relationship between NDVI and total-C. Determination of vegetation index during the growing period of paddy is very useful to improve the accuracy of paddy identification sites at regional scale and to predict the potential paddy production in due time.

Keywords: Digital soil mapping, Vegetation Index, Rice cultivation, Spectral and temporal resolution

S15

Detecting the Surface Temperature of Pyroclastic Materials After 1 Year Eruption (2019-2020) of Sinabung Volcano With Remote Sensing

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ABSTRACT

Volcanic eruptions release gas, liquid (lava) and solid (pyroclastic) material. Pyroclastic material is a combination of various size of solid particles rocks. The temperature of volcanic eruption materials is estimated to reach 1,200°C. The utilization of remote sensing spectral and temporal resultion can serve as a solution to measure the temperature of pyroclastic materials before, during and after eruption. Landsat 8 and MODIS are satellites with capacity to measure temperature as the satellite have a Thermal Infrared Sensor (TIRS) band.Landsat 8 and MODIS data processing in temperature measurement can also be done online using Google Earth Engine (GEE). This study aims to investigate the temperature of volcanic ash and soil after 1 year of eruption. Ash and soil samples were taken at a depth of 0-20 cm consisting of 22 ash samples and 28 soil samples by using the grid with interval of 1 km x 1 km. The studied area waslocated within 3-7 km disaster prone areas. Measurement of ash and soil temperature in the field was done with a soil thermometer.The results showed that the temperature of ash and soil after 1 year of eruption ranged from 19-32°C where the highest and lowest temperatures were found in the ash sample. The soil temperature ranged from 20-23°C. The average temperature at a radius of 5 km from the summit is higher than the radius of 7 km. The decrease in temperatureof ash and soil is due to partly by land cover and rainfall.

Keywords: temperature, GEE, MODIS

S16

Digital Mapping of Soil Organic Carbon in Volcanic Soils After ProlongEruption Mt. Sinabung, Karo Regency, North Sumatra

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ABSTRACT

Mount Sinabung (Karo Regency, North Sumatra) is considered as an active volcano since 2010, and after 3 years of quiescence, the activity of the volcano resumed in 2013 to date. The deposition of volcanic ash buried everything on soil surface with various thickness. Volcanic ash is valuable inorganic materials and consists mostly primary minerals. But with time, thesematerials can initiate carbon storage through revegetation process. This study aims to investigate carbon storage and sequestration in volcanic soils which affected by the intermittenteruptions of Mt. Sinabung. A total of 34 soil samples were collected in aa area 3 to 7 km away from the eruptive vent. The samples were analyzed chemically to obtain the values of labile-C, very labile-C, total-C, Organic-C, non-crystalline-C, and metal complex-C. Regression kriging (RK) was applied to spatially predict the carbon distribution. The results show that the highest labile-C is 1.65% is located in the Southeast sector and the lowest 1.20% in the Southern sector. The highest value of very labile-C is in the Southeast (1.20%), the lowest value is in the Northern (0, 46%). The highest (11.66%) and lowest values (8.84%) of total-C are in the Northeast and South, respectively. The highest Organic-C value is 7.42% in the Northeast volcanic soils and the lowest is 5.74% is in the South. The lowest non-crystalline-C is in the Northeast sector (0.60%), the highest is in the southeast (0.82%). While the highest metal complex-C value is 0.88% in the Southeast, and the lowest is 0.36% in the South. These data show that the highest carbon storage is parallel with the direction of the ash distribution which tends to the Southeast site of Mt. Sinabung. The results of this study demonstrated that volcanic region have strong resilience capacity to bounced back after devastating natural hazards. Volcanic deposits interact with atmospheric water to initiate regrowth of vegetation and create carbon pool within their particles.

Keywords: Pyroclastic materials, Ash distribution, Carbon deposits

S17

Land Use Changes the last 10 years In the Upper Batanghari Dam Watershed

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ABSTRACT

The Batanghari Dam, located in Dharmasraya Regency, West Sumatra Province, Indonesia, was completed and began to be used in 2003. This dam was built for irrigation and flood control purposes. After 23 years, this dam began to decline in function, due to a large amount of sediment deposited at the base of the dam. This sediment deposit occurs as a result of erosion in the upper watershed of the Batanghari Dam. Erosion occurs mainly due to land exploitation in the form of land clearing for plantations and mining. Plantation land clearing often does not pay attention to land conservation principles. While mining is done illegally and a lot of damage to the environment. It is suspected that this land conversion has occurred a lot in the last 10 years, due to the development of Dharmasraya Regency and South Solok Regency. Based on this, it is necessary to research to look at changes in land use during the last 10 years in the upstream watershed of the Batanghari Dam. This research was conducted by spatially and temporally analyzing satellite image data from 2011 to 2020. The satellite image used was Landsat 8 TM with a resolution of 30 meters. The analysis uses the ArcMap 10.3 application by digitizing the main land uses, namely forests, plantations, shrubs, moor/fields, rice fields, open land, and settlements. For land control using the DJI Pro + drone. Furthermore, a temporal analysis was carried out by comparing land use from 2011 to 2020. Then also compared with a map of forest areas to see land uses those use areas that are prohibited for cultivation.

Keywords:

S18

Community Perceptions on Land Uses in the Sub-District Hiliran Gumanti, Batang Hari Hulu Sub-Watershed, Solok District, West Sumatra, Indonesia

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ABSTRACT

The Batang Hari watershed is one of the critical watersheds in Sumatra, the increasing population and the pressing economic needs are two factors that are the reasons for changing land use. This condition needs to be a concern because land use does not pay attention to environmental aspects, including changing forest areas into open land so that the ability of land as a place to absorb and store water no longer functions. This study aims to analyze changes and land use in Hiliran Gumanti Subdistrict (Batang Hari Hulu Sub-watershed) for 10 (ten) years of time series, namely in 2009, 2014, and 2019 and to determine community perceptions as aspects that affect land use and change. The research was carried out by analyzing land use and their change and analyzing the community's perception of land use in the Batang Hari Hulu sub-watershed. The results showed that land changes and uses during the last 10 (ten) years consisted of forest, horticulture, fields, rice fields, settlements, open land, and shrubs. Land use for rice fields, horticulture, and fields has increased in the area over the last 10 (ten) years. Meanwhile, community perceptions of these land uses change reveals that the land use and change activities are to support economic needs and land conditions that are suitable for farming activities and the changes have no impact on watershed conditions. These finding have far reaching implication on environmental education as well as on ecosystem service payment mechanism.

Keywords: Batang Hari, Basin, upland, small farmers, ecosystem service payment

S19

Soil Classification in North Side of Maninjau Caldera as A Result of Pleistocene Volcanic Eruption (52ky)

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ABSTRACT

About 52 thousand years ago, an ancient volcano erupted, and emitted two types pyroclastic materials (Quarter Andesite Maninjau (Qamj,) Quarter Pumice Tuff (Qpt)) and affected large areas in North-central part of West Sumatra. Volcanic materials can affect the nature and characteristics of the soil around the Maninjau Caldera area. The aim of this study was to classify soils in the North side of Maninjau Caldera based on Soil Taxonomy to family level and correlated them to soil of The World Reference Base for Soil Resources and National Soil Classification of Indonesian to the second level. There were 5 locations for soil profile sampling with an overall distance of ± 25 km. Soils were analyzed for texture, bulk density, pH H_2O and KCl, C-organic, N-total, Cation Exchange Capacity, Base Saturation, available-P, P-retention, Al-, Fe-, Si-oxalate and Melanic Index. Soil surface in three profiles met the requirement of umbric epipedon and the other 2 are ochric epipedons, all the sub-surface soils are cambic horizon. The upper part 60 cm of soil do not fulfill the requirement for andic soil properties. Based on the Soil Taxonomy System, the soils in North of the Maninjau Caldera were classified at family level as Typic Dystrudepts, Fine, Mixed, Isohipthermic in Nagari Cicawan, IV Koto, Koto Tinggi and Harasam, meanwhile soils in Nagari Nan Tujuah is classified as Typic Eutrudepts,Fine, Mixed, Isohipthermic. The results of this study provide many information regarding soil moisture and temperature condition, particle size distribution, dominant mineral contents and soil fertility. These parameters are important aspects in soil and agriculture managements.

Keywords: Andic Soil Properties, Maninjau Caldera, Qamj, Qpt, Soil Taxonomy

S20

Application of Clay and Rice Husk Biochar and its effect on Soil Pore Distribution of Psamment and Corn Yield

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ABSTRACT

The effect of clay and rice husk biochar application under minimum soil tillage on soil pore distribution of psamment and corn yield was conducted in Batang Anai District, Padang Pariaman Regency. Plot experiment consisting four treatment (without clay or biochar ; 20 t clay/ha; 20 t biochar/ha ; and 20 t biochar/ha + 20 t clay/ha with 3 replications. Soil samples were analyzed at soil laboratory, Faculty of Agriculture, Universitas Andalas Padang and Soil Laboratory, Bogor Soil Research Institute. Soil physical properties were categorized by soil criterias, while crop growth and yield data were statistically analyzed using F test and DNMRT at 5% level. Results showed that application of 20 t/ha of clay and rice husk biochar improved soil physical properties of psamment namely : decreasing soil bulk density, increasing total soil porosity, aeration pores, and available water pores. Application of biochar and clay were also increased the growth and yield of corn.

Keywords: Psamment, clay, biochar, pore distribution

Socio-Economics and Environmental Management (SEM)

SEM1

Willingness to pay of Local Communities for the Conservation of Coral Reefs in Guiuan Marine Reserve Protected Landscape and Seascape

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ABSTRACT

Coral reefs are a valuable environmental resource that provides a wide range of benefits, especially to marginalized coastal communities. The long-term viability of this ecosystem in Marine Protected Areas (MPAs) is largely defined by how the local community perceives its significance in relation to the services it offers. In this study, we investigated the residents' MPA-related activities, environmental perception, and willingness to pay (WTP) for the conservation of coral reefs in Guiuan Marine Reserve Protected Landscape and Seascape (GMRPLS). It utilizes the contingent valuation method to elicit and estimate the WTP of randomly selected households within coastal zones of GMRPLS. Swimming, beach camping, and fishing are among the most common activities within the MPA. Overall, residents believed that the condition of the marine environment had changed dramatically over the years. Overfishing, destructive fishing operations, marine pollution, the impact of typhoons, and mining activities were the most common and serious threats to reef survival in the area. A majority of 84 percent is willing to pay for reef conservation, with an estimated mean WTP of Php 200.62 (4.19 USD) per household per year delineated as a community tax and collected at the village level. These findings provide valuable input to the future assessment of ecosystem services provided by coral reefs and policy decisions concerning environmental conservation in GMRPLS.

Keywords: Ecosystem Services Valuation, Willingness to Pay, Coral Reef Ecosystem

SEM2

TVET for Sustainable Development: Analysis of Japan's Aid Effectiveness for Industrial Human Resource Development in Lower Mekong Region

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ABSTRACT

This article primarily aims to examine Japan's aid assistance to Lower Mekong Region by using five indicators of the 2005 Paris Declaration on Aid Effectiveness (ownership, alignment, harmonization, managing a result, and mutual accountability). Lower Mekong Region is a transnational region in Southeast Asia created by the Asian Development Bank (ADB) in 1992 to transform the region from a Cold War front-line battlefield into a commerce marketplace corridor. In the attempt to accelerate industrialization in Lower Mekong Region, Technical and Vocational Education and Training (TVET) emerges as a critical component of a country's toolkit for economic, social development, and poverty reduction toward the 2030 Agenda of Sustainable Development Goals (SDGs). KOSEN is an abbreviation of the Japanese word "Koto-sermon gakko," meaning College of Technology, where "Koto" stands for high-level and "Senmon" stands for major (engineering), which is well-known as boosting Japan for its predicate of a top country for science and engineering in the world. Japan's aid assistance has addressed TVET problems in the region by developing KOSEN, especially in Thailand and Vietnam. This research was composed using qualitative analysis for literature review and in-depth interviews from Thailand and Vietnam. The aid program under TVET toward sustainability will be elaborated by HRD theory from Challagan (2016) on two particular aspects: learning and performance. This research found two pivotal findings, as follows: 1) Japan's ownership of aid effectiveness is differently implemented in terms of dominant leadership, and 2) KOSEN has the potential to contribute to SDGs as a hard tool mechanism and its KOSEN values as a soft mechanism. In summary, KOSEN can potentially achieve the SDGs priority, and it is prospective for the sustainability of the economy, environment, and society.

Keywords: Vocational Education, Aid Effectiveness, Sustainable Development Goals, KOSEN, Japan, *Sustainable Development Issues*

SEM3

How Pollution-Intensive Are India's Exports?

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ABSTRACT

Though, pollution-intensive industries and their possible impact on delocalization and environmental impacts have received due attention across the globe (Albrecht, 1998; Azar and Elliott, 2007; Broner and Bustos, 2012; Busse, 2004; Cole et al., 2005; Gallagher and Ackerman, 2000; Grether and de Melo, 2004; Hettige et al., 1995; Mani, 1996; Mani and Jha, 2006; Mani and Wheeler, 1998; Van Beers and Van den Bergh, 1997; Walter, 1979), a little is researched in the Indian context. In fact, there is lack of adequate literature on the pattern of India's trade with respect to the composition and growth of pollution-intensive products with an analysis of recent trends and policy regime, considering the trade-environment interface. Further, the available studies are mainly based on quantitative models incorporating the pollution abatement costs or environmental stringency as a policy variable (Gamper-Rabindran and Jha, 2004; Sawhney and Rastogi, 2015). In this context, this paper, taking the reference of pollution-intensive industries attempts to explain how pollution-intensive are India's exports and does India really have comparative advantage in pollution-intensive products along with discussing the emerging issues. The analysis is based on UNCOMTRADE database for the period 1991-2018, and inference based on critical evaluation of the major policy documents. The analysis helps us to argue that much of India's exports happen under this category, which do have high environmental concern. Meanwhile, majority of products noticed having better RCA values, indicating comparative advantage in their future expansion. While aiming for the same, there is a need to attend the sector specific problems encountered by them along with having a well knitted environmental policy in place.

Keywords: Pollution-intensive industries, Dirty Industries, Trade, Comparative Advantage, India

SEM4

Testing Weak Form of Market Efficiency During Pandemic: A Study on BSE

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ABSTRACT

Is it possible to make profits in stock market? Whether the modern economic system is entrenched for egalitarian society? One of the propositions of current economic system: 'Efficient Market Hypothesis' (EMH) imports that financial markets are "Informationally efficient", means the current market price of the stocks reflect all the available information. Hence, this study investigates the weak-form efficiency during pandemic for the stocks listed in Bombay Stock Exchange (BSE) during January 2020 to April 2021, includes total observation of 331. The examination of the weak-form efficiency is exercised using Kolmogorov–Smirnov (KS) test, Runs Test and Autocorrelation Test. The KS test reveals that 25 companies out of 30 companies stock price changes are not normally distributed. The outcome of Runs Test reveals that stock value of 29 companies out of 30 companies follow random-walk. The Autocorrelation test renders that the changes in the price of stocks are independent. Hence, the study favour that it is difficult for a trader to use past prices to predict the future price and to make additional profit during pandemic.

Keywords: Weak Form Efficiency, Auto correlation, Runs test, Random walk, SENSEX

SEM5

Role of Micro Finance in Green Development with Reference to India

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ABSTRACT

Micro finance plays a major role in income generation. Households in rural areas especially in developing countries collect different materials directly from the forest for livelihood. Millions of people harvests collects and sells such materials as their income generating source. Few sell materials from their own traditional land areas to logging companies, or make and sell furniture, handicrafts, which will help them in generating enough income to support themselves and their families. If there is micro finance institution that helps in financial assistance that will be given for them to generate income, they will stop destroying forest which automatically leads to green development.

Keywords:

SEM6

Do Indian Stock Market Rely on China Stock Markets during COVID-19 Pandemic?

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ABSTRACT

No previous infectious disease outbreak, including the Spanish flu, has affected the stock market as strongly as the Covid-19 pandemic. At a time when economic activity in India has been derailed by the ongoing Covid-19 crisis, the current study examines the relationship between Indian stock market BSE Sensex and Chinese stock market index SSE composite. A careful examination of recent global stock market movements reveals that there is a high degree of interdependence across national stock markets (Joshi, 2011). Thus, the objective of the study is to examine whether the Indian stock market is influenced by Chinese stock market during the pandemic crisis period of COVID-19. For which the daily prices of BSE Sensex and SSE composite indices during the global COVID-19 pandemic crisis were used for the study. The multiple linear regression method has been deployed to identify, if there exists any relationship between the dependent variable BSE Sensex of India and explanatory variable SSE Composite Index of China stock market. The results suggest that SSE Composite price has a significant impact on BSE price. Thus if SSE prices increases by 1 %, the BSE prices increases by 1.5% during the Covid-19 pandemic. The findings will help investors and policy makers on understanding the Asian stock market dynamics during the most stressful event of COVID-19 pandemic.

Keywords: Stock Market, India, China, multiple regression, Asian stock market

SEM7

Green Marketing and Greenwashing – A Right Way to Go Green

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ABSTRACT

Many companies are striving to improve their environmental position by presenting their environmental efforts to the public. To do so, green marketing strategies are in place to help them gain competitive advantage and appeal to environmentally conscious consumers. However, not all green marketing claims accurately reflect the environmental behaviour of firms and can be seen as 'Greenwashing.'. It is a method practised by organisations in which the environmental and social values of a product, service or organisation as a brand are made up of unsubstantiated or deceptive statements. In order to make the business look more environmentally friendly than it really is, greenwashing practise is introduced by investing more money, time and efforts to advertise the goods as 'green' rather than actually mitigating its detrimental effect on the environment. Sustainability is a growing worldwide concern as the majority of the population are putting additional stress on the environment. Therefore, Greenwashing is becoming a largely influential marketing strategy which consumers got to be more conscious of . This paper focuses on understanding the concept of Greenwashing and highlight the right way of going Green by avoiding Greenwashing. This Study will attempt to bring out various challenges in green marketing.

Keywords: Green Marketing, Greenwashing, Sustainability, Competitive Advantage

SEM8

Eco Friendly Living in Urban Area – A Micro Level Study of Kerala Economy

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ABSTRACT

Eco friendly living in urban areas provide quantitative and qualitative benefits to the mankind throughout the world. Quantitative benefits are in the form of financial returns that emanate from a healthy living. Qualitative benefits are in the form of less polluted green environment ,social and aesthetic returns. Eco friendly living in urban areas constitute eco friendly houses, afforestation in town, town fringe farming . Finding the inspiration resources and know how to design an eco-friendly house in the middle of an urban is not a task one takes on lightly. This task requires a strong sense of commitments, perseverance and faith in the inherent worth of embracing practise of sustainability.The present study attempted to analyse the prospect of eco friendly living in urban areas taking Kerala economy as a model. The main objectives of the study are the following (1) To analyse the trends in eco friendly houses in Kerala. (2) To examine the future prospects of urban afforestation and town fringe farming in Kerala. (3) To assess the trends in eco friendly activities in Kerala. Green buildings is not a simple development trend; it is an approach to building suited to the demands of its time, whose relevance and importance will only continue to increase. By the year 2050, 75% of the population of the world is expected to be living in urban areas. This means that cities will be massive contributors to co_2 level and overall pollution, but it also gives them an opportunity to make changes that can have a deep impact. One way to do this is by creating Green buildings, parks etc. Urban green area and plants around the buildings can be viewed as an acceptable alternative habitats for urban plants and native wildlife. The presence of wildlife may enrich the ecological quality and health of the environment as well as provide additional emotions, intellectual, social and physical benefits to humans. Apart from that, plants also release oxygen to the atmosphere through its unique photosynthesis, which breaks down carbon dioxide and water to create sugar and oxygen. This achieves not only oxygen generation, but also carbon dioxide reduction. The purposed study is based on primary and secondary data. The primary data will be collected by using a structured questionnaire on a simple random basis. The purpose sample size is 100 and the data will be analysed by using statistical techniques such as Arithmetic mean, median, mode and trend method. The secondary data will be collected from different articles, Technical and trade journals, business documents etc. It is good to see these welcome modifications happening in our lifestyle and habits. Eco friendly living and sustainable development are surely two of much needed novice way to save our mother earth. And this again is good for us and for our comfortable survival on earth. It is our turn now to contribute our bit to mother earth by adopting measures of eco-friendly living and sustainable development.

Keywords : Green- Building system; sustainable buildings; eco friendly architecture; renewable resources.

SEM9

The Effect of Sustainability and Health Values on Purchasing Organic Vegetables Using aTheory of Planned Behavior

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ABSTRACT

Organic food consumption has increased, and health and environmental concerns are becoming particularly crucial for policymakers and individual consumers. Meanwhile, consumers are increasingly demanding sustainable practices for organic food production. This research aims to investigate the impact of sustainability and health values on consumer purchase intention and behavior in selecting organic vegetables. To answer the research objectives, consumers of organic vegetables in East Java, Indonesia were chosen as respondents in this research by using the development of a theory of planned behavior. A structured questionnaire presented in Google form was used to survey 116 research respondents online, and the data was analyzed using Partial Least Squares - Structural Equation Modeling. The respondents' determination has been adjusted to the minimum requirement for the amount of data used in the analysis by taking into account the minimum R-squares and power statistics. The results indicate that the value of sustainability and health effects on purchase intention through mediating consumer attitudes. Attitudes, subjective norms, and perceived behavioral control, on the other hand, influence purchasing behavior by mediating purchase intention. The findings of this research are expected to strengthen the development of marketing strategies for organically processed products, especially vegetables, to gain potential consumers.

Keywords: theory of planned behavior; organic food; PLS-SEM; sustainability; health

SEM10

Impact on Innovative Leadership in Achieving Bussiness Success and Sustainable Development Goals

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ABSTRACT

Innovation leadership is considered to be the capability of a leader to fill inspiration towards the prolific action in himself and the people around him during times of creation as well as innovation of new ideas. It is a requisite skill for companies wishing to create genuinely creative goods and services. Innovative leaders are creative visionaries who have big dreams, creative ideas and, most importantly, can inspire people around them to turn those visions and ideas into reality. Sustainable development delivers on the idea of fulfilling business goals without compromising on the resources needed for future generations. It merely focuses on the extension of resources for the long term future needs. The balancing between these two concepts is vital as there will be no development in social, human and cultural dimensions without having proper leadership guidance. This study mainly focuses on the small scale industries in Kerala as they are considered to be the major contributor to the GDP of the nation. The main aim of this study is to draw a clear picture on the impact of innovative leadership on the success of the firm as well as the attainment of sustainable development goals. Selected registered and renowned SSI units from the State of Kerala in India are taken as the sample units of this research. This study reveals that innovative leadership has a close relationship with sustainability and success of the firm. This study will serve as a guideline for future researchers in the area of Innovative leadership research study.

Keywords: Innovative Leadership, Environment Social Governance, Sustainable Development Goals, Business Success, SSI units

SEM11

Adapting Global Sustainability Certification Systems in Local Coffee Plantations: The Case of Institutions and Collectives in Coorg, India

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ABSTRACT

Coffee is widely grown in South India in areas derived from forest, and both its expansion and management raised biodiversity concerns. The shifts in the regulatory apparatus in agriculture and trade globally are also changing the way local institutions and farmers address sustainability concerns. This resulted in several sustainability standards that emerged in response to consumer concerns on the conditions of land and labour based on which coffee production took place. It is estimated that 40 percent of global production and 12 percent of global exports of coffee in 2012 were of the certified variety (Potts et al. 2014). The paper looks into the emergence of global private regulatory certification system and changing dynamics of the growers' collective in the Indian coffee growing regions, with a specific focus on Coorg, Karnataka, South India. The certification systems which proved successful elsewhere is finding it difficult to adapt to the local requirements in terms of biodiversity preservation in Coorg, which is a biodiversity hotspot. While the certification programmes on aspects of environmental preservation is getting promoted, the twin objectives of meeting biodiversity at the same time providing a sustainable return from the exported product to coffee growers is perceived to be a larger governance challenge. The paper follows a descriptive approach based on the theoretical value chain framework and identifies the pattern and behaviour of coffee growers' collectives and the related institutions in the pre and post certification scenario. The paper argues that as long as the objectives of growers' collectives and those of the global private sustainability standards are not aligned with the objectives of local sustainability, the adoption would not only stay away from preserving biodiversity, but also would result in a configuration of growers' collective that would gain neither ecologically nor financially.

Keywords: India, Coffee Plantations; sustainability Certification; institutions

SEM12

Effect of Sustainable Leadership Development and Employee Empowerment in Msme Industry in India

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ABSTRACT

In the 21st Century, The Micro Small, and Medium Enterprises (MSME) in India have established their credibility of mass employment and contributing to around 30% of India's GDP in 2020. As of 2020, India is a house of 2.5 million units and proved the backbone of large sectors such as Manufacturing, Agriculture, Aviation, IT & ITeS, Pharma, Cement, and Automobile to name a few. India Government initiatives helped MSME to grow at the rate of 18.5% CAGR in 2019-2020. Indian Government is committed to bringing sustainable growth to the MSME sector. This brings the point to look into scalability issues often faced by these industries due to typical Owner and employee organization structure with lack of knowledge in recent HR practices. All the management and operational decisions are factored into top leadership (the business owner and his son's). With the young entrepreneurs stepping into the family business, the face of this industry is bound to change further. Indian Government has doubled the budget for the MSME sector in FY22 that is $ 1.03 billion in FY 21 to $ 2.14 billion in FY22. With the Industrial revolution 5.0, India has witnessed multiple Unicorns in the last decade; therefore, it is bound to see maturity in leadership sustainability and focus on employees' empowerment. The study goal is to look into labor law barriers faced by the MSME industry which is not covered in the FY22 vision document for the early adoption of a modern HRM approach to meet 5 trillion dollars business demands by 2025.

Keywords: Sustainable leadership, employee performance, empowerment, business resilience, and economy

SEM13

Socio-economic performances of indigenous irrigation system in Tanah Datar District West Sumatera Indonesia

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ABSTRACT

Water and culture are strongly interlinked in indigenous water management, especially traditional irrigation systems. In West Sumatera, the indigenous irrigation system, called *Paraku*, applies local ecological knowledge through customs, rituals, and social norms to distribute and regulate water resources. Nevertheless, the government has been introduced Water User Association ("P3A" in Bahasa Indonesia). Yet, the farmers still manage the irrigation system under *Paraku*. Thus, this study's main objectives are to evaluate the socio-economic performance of *the Paraku* system in Tanah Datar District, West Sumatera, Indonesia. The results showed that the farmers still manage the *Paraku* system because of the fairness in water distribution and the responsibilities to maintain *Adat* (custom) *Minangkabau*. The other results showed that irrigation management (water distribution, irrigation facilities maintenance, and conflict resolutions) is determined under *Mufakat* (consensus). Based on the multiple regression analysis, the farmers' age, farmers' experience in rice farming, and fertilizer used for rice farming has a statistically significant impact on the yield. In contrast, irrigation water resources (springs and river) and rice field length to the weir has no statistically significant impact on the yield. Furthermore, the result from the t-test showed that there is no difference between farmers' income in the upstream area and farmers' income in the downstream area. It can be concluded that the long persistence of the *Paraku* system might result from conserving *Adat* Minangkabau and the fairness in water distribution. Nevertheless, some critical points should be addressed to assess the sustainability of the *Paraku*: First, many young generation does not have the willingness to conserve the *Adat*; Second, many young people choose to work in the capital city rather than working as farmers. As *Paraku* institution relies on the *Adat* Minangkabau, the collective action to conserve the value and tradition of the *Paraku* is needed to sustain the system.

Keywords:

SEM14

Increasing livelihood Strategy of Rice Farmer by Developing New Rice Variety "Inpago Unsoed 1" in Central Java, Indonesia

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ABSTRACT

The livelihood approach is a popular concept for identifying the nexus between environmental and social entities. Strategies for sustainable livelihoods usually used to achieve successful rural development related to food security and shelter, and also to realize social equity and sensitivity to environmental integrity. We use the livelihood strategy approach to assess the farmer's acceptance in cultivating new rice variety "Inpago Unsoed 1" regards to increase the national rice productivity and community empowerment. Research was conducted in three sub districts in Banyumas District, Central Java, Indonesia on March 2nd until 28th 2021. The results show that political/legal, economic, and social components need to be increased since these components play important role in success the developing new rice variety "Inpago Unsoed 1" while the other components, i.e., biophysical, cultural, and psychological have less concern. Nevertheless, the effort of farmer to strive from poverty and hunger is not only doing by provide of their need but also the surround environment that support the livelihood.

Keywords: community empowerment, Inpago Unsoed 1, livelihood strategy, rice productivity.

SEM15

The Formulation of an Environmental Resilience Index for Selangor

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ABSTRACT

Over the years, rapid urbanisation aided with advanced technologies and population increment has altered the natural environment into concrete jungles resulting in significant environmental degradation. In order to mould a sustainable, resilient and green future, global efforts and directive have been introduced, such as the 17 Sustainable Development Goals, low carbon cities, and others at international and local levels. Nevertheless, grassroots initiatives and actions are crucial in producing results. Presently, there is no mechanism to measure the relevant environmental components into a comprehensive system indicating the level of resilience level in Selangor. Though the local governments have to report their development performance via MURNINET, a system developed by PLANMalaysia, this system does not include environmental resilience. As such, this study on the Environmental Resilience Index (ERI) was embarked, proposing five environmental components that can be used by local authorities to assess the environment, which are environmental resources, built environment, climate condition, natural disasters and environmental issues. On the other hand, this paper shares an ERI pilot analysis on the component of environmental resources of the study area, Selangor, Malaysia, consisting of 9 districts. This data used to analyse are majorly secondary data from official reports of responsible technical departments and agencies in Malaysia to ensure validity and reliability of data. The output of this analysis was generated using ArcGIS software as it relates to the weightage of different components and sub-components. The results show that most districts in Selangor have an ERI level of moderate level, while two districts, namely Sabak Bernam and Petaling, are categorised as low ERI levels.

Keywords: Environmental Resilience Index, environmental resources, Selangor

SEM16

Government Intervention Policy, Ecosystem Services and Their Implications for Smallholder Farmers Livelihoods and Adaptation Strategies in Forest Ecosystems

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ABSTRACT

Efficient enhancement and sustainable use of forest ecosystem services plays a crucial role to income generation and improvement of local livelihoods, and hence sustainable management of forest ecosystems. This poses a challenge to achieving the dual goal of forest management, both development and conservation. However, government intervention, drought and climate change increase pressure on livelihoods and reduce the benefits of ecosystem services. This study aims to identify the linkages between ecosystem service provioning and livelihoods and assess the adaptation measures of local people in forest ecosystems of An Giang province of the Vietnamese Mekong Delta, which is severely affected by the impacts of climate change and extended drought over the past few years. The study employed a mixed-methods research by conducting in-depth interviews and focus group discussions with key informants who are government officials, environmental experts, and farmers in the study areas. The findings show that ecosystem services provide substantial benefits to agricultural systems such as rice, upland crops, fruit trees and livestock. The ecological sub-regions with rice and upland crops have a higher poverty rate than the sub-areas with fruit cultivation. To deal with the situations, local government agencies have implemented several measures such as investing in irrigation systems and intensive farming with an increase in 03 rice crops per year, and using extensive amount of fertilizers and chemical. These measures not only hamper livelihood opportunities of the local people, but also reduce the benefits of ecosystem services. While this is the case, there are emerging solutions towards adopting indigenous knowledge at the local level, such as integrated agroforestry farming systems (e.g. planting medicinal herbs under forest tree shadow, fruit trees combined with forest trees and developing community-based eco-tourism). These solutions not only help increase the benefits of ecosystem services but also bring about desirable economic, social and environmental benefits. This study suggests that solutions based on indigenous knowledge of the local people need to be considered to advance local capacities to deal with climate change effects and improve future livelihoods of local communities.

Keywords: policy, forest, ecosystem services, livelihoods

SEM17

Community Perceptions on Land Uses In the Sub-District Hiliran Gumanti, Batang Hari Hulu Sub-Watershed, Solok District, West Sumatra, Indonesia

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ABSTRACT

The Batang Hari watershed is one of the critical watersheds in Sumatra, the increasing population and the pressing economic needs are two factors that are the reasons for changing land use. This condition needs to be a concern because land use does not pay attention to environmental aspects, including changing forest areas into open land so that the ability of land as a place to absorb and store water no longer functions. This study aims to analyze changes and land use in Hiliran Gumanti Subdistrict (Batang Hari Hulu Sub-watershed) for 10 (ten) years of time series, namely in 2009, 2014, and 2019 and to determine community perceptions as aspects that affect land use and change. The research was carried out by analyzing land use and their change and analyzing the community's perception of land use in the Batang Hari Hulu sub-watershed. The results showed that land changes and uses during the last 10 (ten) years consisted of forest, horticulture, fields, rice fields, settlements, open land, and shrubs. Land use for rice fields, horticulture, and fields has increased in the area over the last 10 (ten) years. Meanwhile, community perceptions of these land uses change reveals that the land use and change activities are to support economic needs and land conditions that are suitable for farming activities and the changes have no impact on watershed conditions. These finding have far reaching implication on environmental education as well as on ecosystem service payment mechanism.

Keywords: Batang Hari, Basin, upland, small farmers, ecosystem service payment

SEM18

What a difference a road makes: The impact of infrastructure on livelihoods and natural resource management in coastal communities in West Sumatra

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ABSTRACT

Households in coastal communities in Indonesia often have many sources of income. Many factors contribute to the decision to diversify livelihoods. These include access to new technologies, learning from peers, access to capital, attitude to risk, declines in traditional sources and the development of supporting infrastructure. This present research continues in the trajectory of finding solutions to the natural resources challenges that coastal communities face. In short, this present research aims to: (1) analyze the impact of road construction and tourism development to the livelihood of coastal communities and natural resource threats in Sungai Pinang, Sungai Nyalo and Mandeh, (2) explore factors for maximizing opportunities for coastal communities (with a particular focus on the poor), while at the same time safeguard the ecological functioning of the area. Both, primary and secondary data were collected. Secondary data will be compiled to evaluate the scale of development in these 3 villages. Primary data will be collected from direct observation and key informant interviews and household survey. Interviewees will include members of coastal communities, NGOs operating in the area, extension officers and civil servants from the departments of tourism and department of the environment. Initial interviewees will be selected purposively because they a) had opened a new business since the road was developed or b) because they were classified as low-income families. Further families will be selected using a snowball method. Secondary data will be analyzed descriptively. The results show that road infrastructure development has a positive and significant impact on the economic benefits. On the other hands, road infrastructure development also poses a threat to the sustainability of natural resources, especially groundwater resources, fisheries and mangrove resources. Tourism has a positive but not significant effect on the economics of local coastal communities. Coastal communities benefited from road construction because it gives better access for economic and social activities.

Keywords: coastal communities, development, tourism, infrastructure, livelihoods

SEM19

Factors Affecting Cocoa Price Fixing in West Pasaman Regency

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ABSTRACT

Supply chain is a decision-making process regarding the flow of materials, flow of information and flow of money conducted jointly by supply chain actors to fulfill a product into the hands of the end consumer continuously. The number of actors involved in the supply chain has different interests. Government policy on supply chain management is expected to address the complexity of supply chain structure and supply chain system uncertainty, especially price uncertainty. This study aims to determine the factors that influence cocoa pricing in West Pasaman. The research method conducted is descriptive and quantitative research using questionnaires through Smart PLS method. The results showed factors that influence cocoa pricing is product availability, product quality and cocoa marketing system.

Keywords: Cocoa Supply Chain, Cocoa Pricing

SEM20

Literature Review: *Supply Chain Management* Agroindustri Rumput Laut

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ABSTRACT

Agro-industrial supply chains have different characteristics compared to other supply chains. Seaweed farming is growing rapidly, especially in the food industry, which is the market leader for high-value seaweed products. The seaweed supply chain faces complex problems, such as instability in the availability of seaweed which results in an inability to meet customer needs. Poor quality can harm reducing long-term customer satisfaction. Seaweed price fluctuations also greatly affect profitability resulting in lost profits. The sustainability of seaweed for future needs emphasizes the importance of proper supply chain management. This study aims to review knowledge about supply chain management including concepts, methodologies, and research objects. This research method is descriptive qualitative. The result of this research is that supply chain management has not reached the development of derivative product production centers to meet the availability of raw materials sustainably. In conclusion, supply chain management in the seaweed agro-industry will affect the development of production centers, increase the resource capacity of seaweed agro-industry supply chain players, and the availability of raw materials in the form of sustainable derivative products.

Keywords: supply chain management, agro-industry, seaweed

SEM21

Economic Analysis of Supply and Demand for Oranges in West Sumatra

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ABSTRACT

This research aims to analyze the factors affecting the demand and supply of oranges in West Sumatra. Principal component analysis was employed to analyze secondary data. The results show that significant factors influencing demand is the purchasing power factor consisting of the price of oranges and the price of papaya where the price of papaya has the most influence, while the significant factor influencing the supply is the incentive factor consisting of the price of oranges, the area of harvest and government programs where the price of oranges has the most influence. Own-price elasticity for oranges is elastic. The cross-price elasticity of mango and papaya are inelastic. The change in income does not have a big influence on the change in demand for orange, while the change in the price of oranges greatly affects the change in the supply of oranges. The balance of demand and supply indicates a divergent condition

Keywords: demand, orange, supply, PCA

SEM22

Strengthening Web-Based Marketing Strategies for SMES with Disabilities

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ABSTRACT

Recently, a study stated that the Covid-19 virus pandemic has caused Indonesia to experience a decrease in the percentage of economic growth by 0.1% in 2020. This is very much felt by business actors in Indonesia. Several Small and Medium Enterprises (SMEs) in West Sumatra are persons with disabilities who already have products that have a fairly high commercial value. However, the lack of access for persons with disabilities to market their business products makes them increasingly marginalized economically. The decline in people's purchasing power, lack of access to raw materials and the difficulty of marketing products due to the limitations of SMEs with disabilities have made their businesses even worse. For this reason, innovation efforts are needed to support independence and encourage added value and competitiveness of products for people with disabilities so that they can still reach and expand market share for the products they produce both on a local, national and even international scale. The innovation needed at this time is the application of website technology to rearrange business strategies for SMEs that are occupied by persons with disabilities through the use of special websites for them to introduce and market their products. This website was built using the Waterfall method where in each design phase it must be done linearly and sequentially. Each phase is defined by different tasks and objectives, where the whole phase describes the software life cycle to its delivery. Through this website specifically for them, it is hoped that persons with disabilities will have special marketing channels in order to get a lot of convenience in introducing wider information about the type, shape and quality of their products including the location of their business to potential local, national and international consumers.

Keywords: website, product, SMEs, disabilities, marketing

SEM23

Factors Influencing Farmers of Small Holders Tea Plantation Join the Cooperative

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ABSTRACT

Building a community agribusiness, the existence of an institution is important as a supporting subsystem that ensures the agribusiness system can run sustainably to coordinate and manage limited resources. Cooperatives are the most suitable institutions. However, to be sustainable, the process of forming a cooperative must be based on social transformation through collective action or the awareness of individuals. Therefore, research on the factors that influence farmers to join the cooperative is carried out, to determine whether internal factors or external factors encourage farmers to join. The research object is the farmers who are members of the *Sebelas Jurai Saiyo* Organic Tea Producers Cooperative, which is abbreviated as KPTO-SJS, totaling 99 people. This cooperative was chosen because the members are smallholder tea farmers who in 10 years have succeeded in producing 156 tonnes of premium quality tea, besides that this cooperative has also won a fairtrade certificate. By using a qualitative descriptive method, a census survey was conducted to all members. Then the data were analyzed qualitatively. The results showed that the factor that influenced farmers to join the KPTO *Sebelas Jurai Saiyo* was due to external encouragement, namely the marketing contract with the company PT. SHGW Bio-Tea Indonesia. The research findings also show that these external factors are not able to make farmers stay as cooperative members, this is evidenced by the number of members of the KPTO *Sebelas Jurai Saiyo* cooperative who are still active, only 33 people. As many as 66 people resigned from the cooperative and returned to work with middlemen, because the marketing cooperation contract with PT.SHGW-Bio Tea Indonesia had ended. This proves that cooperatives that are formed not based on individual awareness or collective action cannot develop sustainably.

Keywords: Cooperative, Collective Action, Small Holders Tea Plantation

SEM24

Policy Contestation of Traditional Forest Governance Between the Government and Traditional Society in the Post Rules of Mk No. 3S of 2012 Concerning Traditional Forests in Indonesia

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ABSTRACT

Forest management involves various goals and interests of various parties, including the goal of developing human welfare and the goal of sustainable forest development. These goals and interests are formulated from various approaches and models of forest management that contain various ideologies, actors and interests of the government, indigenous peoples and other social organizations and actors involved in forest management. Their expertise and knowledge related to sustainable forest management places indigenous peoples having an important role in managing forests in a sustainable manner, their role is determined by the protection guarantees provided by the state regarding their traditional rights in owning and managing the forest and its resources. This guarantee is given in the form of an agreement that the UNDRIP (United Nations Declaration on the Rights on Indegenous Peoples) must establish a minimum standard of protection for indigenous peoples, even though the agreement has been formulated by various countries in the form of various policies related to forest management but the form of implementation of this policy has various obstacles overlap the interests of various parties involved in forest management as a development resource. This paper describes the various conflicts of interest involved in forest management since the implementation of decentralization and regional autonomy in Indonesia until the issuance of the Constitutional Court decision no. 35/2012 concerning customary forests and the implementation of these decisions in various forms of government regulations and regulations, this research uses a qualitative method with a case study approach. From the results of the research carried out, it was found that there was identification of the same law as law, this identification reduced the distance between legal norms that have been enacted as a barrier factor in the implementation of the guarantee for the protection of indigenous peoples in the ownership and management of forests and forest resources.

Keywords: Forest Governance, Government, Indigenous Peoples Sustainable Development

SEM25

Searching for Recognition: Complexity of Land Rights and Legal Pluralism in Mentawai Islands

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ABSTRACT

Mentawai Islands is an archipelago that located in western part of Sumatra, Indonesia. With enormous biodiversity, natural resources and unique tradition, Mentawai is supposed to be an area with a good resources management as well as law enforcement. But in fact, until today, Mentawai people are still facing many challenges in securing their rights over land and natural resources. When decentralization system was introduced after Reformation era in 1999, it gave tremendous impact on land rights in Indonesia, which also contributed to land acquisition conflicts in Mentawai. This situation is very contra with Article 33 of Indonesian Constitution which clearly stated that any kind of natural resources are controlled by State and will be utilized for the prosperity of people. Besides, the 1960 Agrarian Law also supported this constitution by recognizing the existence of local people and their communal land. Contrarily, this Act is very weak because it acknowledged the principle that State may acquire land for public purposes against the wishes of the prior owners. This Act allowed private sectors to have land use permit (HGU – Hak Guna Usaha) for about 35 years, which can be extended for another 25 years. Its really devastating the rights of local community to their land. At the other side, many scholars and non-profit organization tried to support Mentawai people in searching the recognition over their rights and applying their customary law. This study used observation, key informant interviews and secondary data. The study also revealed that in order to solve the complexity about land rights, a critical concern is urgently needed from many legal perspective, not only State Law, but more important is considering the rights of local people and their customary law.

Keywords: Land rights, Legal Pluralism, Customary Law, Mentawai

SEM26

Gender Roles in Wetland Management: a Case Study in Tinh Bien District, An Giang Province, Vietnam

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ABSTRACT

People living in rural areas across the Mekong Delta in Vietnam rely highly on natural resources for their livelihood and well-being. Women are a crucial part of the agricultural labor force in Vietnam and make an essential contribution to national economic development, but this is often not fully recognized by society. Women tend to work in agriculture as unpaid laborers on family farms or paid laborers at other farms. Due to entrenched gender roles, women's decision making power over agriculture at both the household and institutional levels is still limited. This paper aims to explore the participation of women in decision-making platforms in wetlands resources management and their participation in multi-scaler wetland management institutions. This research draws upon field studies in two border and multi-ethnic communes in Tinh Bien district, An Giang province, Vietnam. The study employs focus group discussion, in-depth interviews and participation observations to gather data at household and local and higher levels of governance. The research adopts the typology "participation" proposed by Bina Agarwal to measure the actual degree of participation by women in wetland management. The findings highlight that women in the study areas tend to face bigger barriers to participation in relevant management institutions, so their interests are overlooked at higher levels and are thus more vulnerable to external threats. Khmer minority women have more privilege at household level than Kinh women but both Khmer and Kinh women's decision-making power over wetlands and water management institutional levels is still limited. In conclusion, even being a crucial part in agricultural production, women are not fully included in decision-making platform in wetland management.

Keywords: gender roles, participation, wetland management, Tinh Bien district, Vietnam

SEM27

Role of Communication in the Resource Management of Sacred Groves of Kerala

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ABSTRACT

Sacred Groves in Kerala and in other parts of the world are bio hot spots which were protected and nurtured due to socio-cultural belief systems. A sacred grove which was traditionally a religious commons has unique management systems in place. Sacred groves were in the ownership of a family or a community and had multiple stakeholders playing an active role in their maintenance and upkeep. However rapid urbanization, increasing demographic demands have negatively impacted the sacred groves. It is noted that while the general public is aware about the significance of sacred groves it does not translate into its proper resource management. One of the major challenges faced by the sacred groves is the lack of involvement of youth in its sustenance. The interactions between generations have dwindled and much of the knowledge about the values of ecological heritage like sacred groves remains with the older generation and is not passed on to the younger generation. This paper studies the role of communication in the resource management of sacred groves by exploring the role of intergenerational dialogue to engage youth. Better exchange of ideas with respect to sacred groves will result improvement of resource management of sacred groves. The study uses, narratives, personal interviews and focus group discussions centered on intergenerational dialogue to explore a pathway for sustenance of sacred groves. Findings will inform the patterns in communication about sacred groves between generations and help in the developing policies for resource management.

Keywords: Environmental Communication, Focus Group ,Intergenerational Dialogue, Resource Management , Sacred Groves

SEM28

The Pattern of Labor Division in the Siberut Community Livelihood System

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ABSTRACT

This study results from ethnographic research on the livelihood system of the indigenous community in Siberut through a case study of Matotonan village. The study focuses on the pattern of labor division between men and women in the livelihood activities of Siberut community. This community is still very dependent on natural resources, especially forest products. Their high dependence on nature makes the people of Siberut become part of the natural surroundings. This study uses a feminist ethnographic approach, which is descriptive and holistic. Data collection techniques are through literature study, in-depth interviews, participatory observation, life stories, and FGDs. The data were analyzed by qualitative descriptive method. The findings show that there is a tradition of harmonization between the fulfillment of the necessities of life and the natural surroundings passed down from generation to generation through the daily activities of this community, namely farming or *Mone*. The division of labor in the family shows that men do sago processing, take care of livestock, and work to increase family income such as patchouli farming, looking for *manau* and rattan. Women's duties are related to daily needs such as finding and processing food in the fields, as well as taking care of children. In conclusion, this paper presents a "role equality" in family life and activities. Traditionally, people adhere to this patrilineal system, where family groups from the father's lineage play an important role in Siberut society. On the other hands, these subsistence community must be able to survive in the face of market influences

Keywords: Patterns, Livelihoods, Indigenous Community, Subsistence, Markets

SEM29

Family Resilience of Smallholders Farmer in Indonesia oil Palm Plantation

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ABSTRACT

Problems about family are still carried out in general, and do not specifically looked at the livelihood aspect. However this factor significantly contributes to the resilient of family. One of the family issues which became the major issue in Indonesia is about family resilient in oil palm plantation context. Families in the plantation sector always have tremendous challenges either from internal, external and structural layers. At the internal level, families have to bear with psychological and physical issues which may trigger them to become more vulnerable. From external level, the work ambience in palm plantation as well as price fluctuation and access to financial capital may threat the families who work on oil palm plantation. Thus, from structural level, families have to deal with biased and unfair regulation which undeniably make them become poorer and suffered. This study aimed to analyze the vivid condition about smallholder's families in oil palm plantation context and how they deal with those challenges, so that they can be a resilient family. This study used qualitative method, by conducted FGDs and in-depth interviews with smallholder's farmers of oil palm plantation as key informants from two different plantation areas in Indonesia; Lampung and Kalimantan.

Keywords: family, resilient, oil palm plantation, smallholders, Indonesia

Tourist Development (T)

T1

Green Economy and Kerala Ecotourism

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ABSTRACT

According to the International Ecotourism Society (TIES), ecotourism can be defined as "responsible travel to natural areas that conserve the environment, sustains the well-being of the local people, and involves interpretation and education". Such traveling can be created thanks to an international network of individuals, institutions, and the tourism industry where tourists and tourism professionals are educated on ecological issues. Ecotourism has many characteristics; involves travel to natural destinations, minimizes impact, build environmental awareness, provides direct financial benefits for conservation, provides financial benefits and empowerment for local people and respect local culture green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities -United Nations Environment Programme (UNEP) (2010). A green economy is an economy or economic development model based on sustainable development and a knowledge of ecological economics. Green Growth means fostering economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies.Low carbon energy (especially renewable energy and resource of energy) and sustainable production of food (organic, biodynamic faming and sustainable practices for livestock). Ecotourism and green economy are much more related concepts. Without green economic development ecotourism does not exist. Both of them are given more importance to the conservation of environment. In Kerala, ecotourism is well developed due to the natural beauty. Kerala ecotourism is well designed and has well protected environment. Many foreigners comes to Kerala, the "Gods Own Country" for experiencing her natural beauty. Green economy and ecotourism is considered as the two sides of a coin. Without green economy, the concept of ecotourism becomes meaningless.

Keywords:

T2

The Development Strategy of Coffee Agro-Technopark in Tabanan Regency to Realize the Synergism of Agriculture and Tourism

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ABSTRACT

Tabanan Regency has various kinds of superior agricultural commodities including coffee plantations and also has several potential tourist attractions. The agriculture and tourism sectors in Tabanan have not been fully exploited so that the two have not yet run synergistically. Planning for an Agro-Technopark (ATP) area is expected to create a production area based on agricultural technology, livestock, and natural beauty, which will be able to leverage the potential of upstream agribusiness, downstream agribusiness, infrastructure, and supporting services in supporting the production, processing and marketing process of coffee. The research objective was to identify the sub-system of input, process, output, and development strategy of coffee ATP in Munduk Temu, Tabanan Regency. Data collection was carried out in two stages, namely secondary data collection with document study methods and primary data collection in the field using observation and interview methods. Data were analyzed using SWOT and strategic priority determination using Quantitative Strategic Planning Matrix (QSPM) analysis. The results showed that coffee cultivation with an integrated system in support of coffee ATP in Muduk Temu Tabanan fulfills the requirements both in terms of input, process, and output, but the quantity and quality of each sub-system need to be improved. The coffee ATP development strategy is carried out by optimizing internal strength to take advantage of external market opportunities with two main strategic priorities: 1). intensifying the implementation of applied studies of pre-harvest and post-harvest processing technology (TAS value of 6.94), 2) Financial support from the government and product protection in both domestic and international markets (6.87) and 3). It is necessary to strengthen the institutional synergy between Village Owned Enterprises (*Bumdes)* managers, *subak abian*, and tourism stakeholders in strengthening the agricultural sector in synergy with the tourism sector.

Keywords: Agriculture, agro-tourism, coffee, technology.

T3

O.V.O.P-Based Community Empowerment Program Strategy and Digital Marketing to Support Tawangmangu Regional Economic Resilience in The New Normal Era

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ABSTRACT

Pagebluk (in Javanese) or known as the Covid-19 virus outbreak in a region. This virus first spread in Wuhan, China. The spread of Covid-19 affected various aspects, such as the crisis that hit several countries, increasing unemployment and poverty, as well as policies that caused a decrease in economic manifestations. One of the areas affected is the Tawangmangu District, Karanganyar Regency, Central Java Province, Indonesia. in this area there has been a decline in the economic, agricultural and tourism sectors. On the other hand, Tawangmangu Regency, which is located on the slopes of Mount Lawu, has abundant agricultural resources spread across 10 villages. Based on data from the Central Statistics Agency (BPS) of Karanganyar Regency, the amount of seasonal vegetable and fruit production in 2019 reached 8,145.5 thousand tons. The objectives of this paper are: 1) To provide community empowerment strategies based on O.V.O.P (One Village One Product) and website-based Digital Marketing, 2). Supporting potential areas such as Tawangmangu Regency to restore the community's economy through empowerment programs. The basic method of writing used is descriptive method, or emphasizes collecting facts and identifying data. The results showed that the O.V.O.P-based empowerment program can restore the community's economy through equal production in each village area. In addition, it can develop regional products so that they can develop and enter a wider market and build sustainable activities through expanding market access produced by each village. O.V.O.P-based empowerment has several structured stages such as preparation or socialization of GO, organizing or G0-Organization, implementation or GO-Implementation and evaluation of program mentoring or G0-Advocation. Then a website-based digital marketing called GO-Tewe which contains Hero, Hub and Hygien content. Therefore, this empowerment strategy will help restore the economy of the Tawangmangu community in the new normal era.

Keywords: Covid-19, Digital, Emprowment, O.V.O.P, Tawangmangu

T4

Trend and Distribution of Lubuk Larangan in Scientific Publications with Notes on How to Promote It in International Level

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ABSTRACT

Lubuk Larangan is a local wisdom in Sumatran people to manage river and its fish resources in sustainable way. Existence of the Lubuk Larangan did not get enough attention from local government and international institution. Although many researchers studied Lubuk Larangan, their publication has been scattered. Recently, there is no proper data base containing list and distribution of Lubuk Larangan. We used Publish-or-Perish software to perform systematic review on Lubuk Larangan. We searched for keyword “lubuk larangan” or “ikan larangan”in data base of Scopus and Google Scholar. We found six articles in Scopus with only two articles specifically talking about Lubuk Larangan. In Google Scholar, there are 639 entries mentioning the keywords in the text body and 111 entries in the title. However, the articles were written mostly in Indonesian language. We analyzed distribution of the scientific papers on spatial and temporal aspect, and type of publication. Lubuk Larangan is distributed in four provinces; West Sumatra, North Sumatra, Riau and Jambi. Term of Lubuk Larangan have been mentioned in theses, journal articles, reports, books, etc since 1989. There is an increasing trend for studies on the Lubuk Larangan. Based on the data, we discuss ways to engage international attention to Lubuk Larangan and possible methods to promote and empower this local wisdom.

Keywords: conservation biology, habitat, local wisdom, systematic reviews

T5

Sustainability of Adaptive Tourism Covid-19 in Padang City

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ABSTRACT

The background of this research is that the COVID-19 outbreak touches all aspects of life, including the economy and people's incomes in various sectors, one of which is the tourism sector. Tourism is a sector that is able to move the local community's economy and is able to be sustainable both in terms of economy, social culture and the environment. Tourists and local communities are community members who are subject to social restrictions, so that their space for carrying out social and economic activities is limited, which of course will lead to financial difficulties and other difficulties in the community itself. This study was proposed to determine the extent of the impact of the COVID-19 outbreak on the sustainability of Covid-19 adaptive tourism in the city of Padang. The research location is the Covid 19 adaptive tourist destination in Padang City, namely Air Manis Beach and Pasir Jambak Beach. According to the Head of the Padang City Tourism Office, there are two COVID-19 adaptive tourist destinations in Padang City. This is in line with Regional Regulation (Perda) Number 6 of 2020 concerning Adaptation of New Habits (IMR) in the prevention and control of Covid 19 which is already in effect in West Sumatra. This adaptive tourism destination was formed with the aim of breaking the chain of the spread of Covid 19 and maintaining public health.

Keywords: sustainability, tourism, covid 19

T6

Legal Pluralism Situation in Managing Ecotourism in West Sumatera (*Cases of Twa Harau Valley and Twa Merapi Mountain, West Sumatera*)

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ABSTRACT

The demand for ecotourism increases recently especially under COVID-19 pandemic that allow only domestic travel, since national and international travel is limited. West Sumatra has a variety of very popular ecotourism spots, among other are Harau Valley and Mount Merapi. Ecotourism in West Sumatra is generally a community-based tourism management. West Sumatra is an area that still has strong customary rules. Managing the ecotourism has to consider legal pluralism situation in West Sumatra, the very resources being managed are regulated many sources of law. The purpose of this study is to describe the situation of legal pluralism in ecotourism management in West Sumatra. This study uses a multi-case study approach, namely the management of the Harau Valley natural tourism park and Mount Merapi natural tourism park. These two natural tourism parks are spots that received significant number of visitors. The data were obtained from regional regulations, the Tourism Office, Natural Resources Conservation Agency, local newspapers and from journals ecotourism. The results of the study show that the management of ecotourism in the Harau Valley has undergone several changes and involving several actors, i.e; private sector, local government body, and the local community. This condition raises the issue of how the provisions of the procedures and requirements for the management of cooperation between the government, the private sector, and local communities which cause conflict of authorities among actors, especially Natural Resources Conservation Agency, the Lima Puluh Kota Regency Tourism Office, and local community. In the management of Mount Merapi ecotourism, there is a dispute between the nagari which claim the right to manage visitors and Natural Resources Conservation Agency. The study suggests to hold a forum among parties to resolve the conflict otherwise the spot may no longer interest visitors.

Keywords: Forum shopping, conservation, tourism, conflict

Health and Disaster Resilience (H)

H1

Disaster Resilience in Flood Hit Kerala

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ABSTRACT

Kerala, the southern state in Indian peninsula is affected by floods for last three consecutive years. Changing weather pattern leading to heavy monsoon and development without considering the ecological vulnerabilities of the region has been pointed out as the reasons for flooding. Displaced communities, destruction of agricultural and industrial enterprises and health concerns have made disaster management a challenge for community and government alike. Even though there were lots of difficulties, the way keralites came out of all these miseries and their adaptation was really inexplicable and always provided a scope for research in that area. This paper focuses on examining the flooding pattern and impact of flood in Kerala, India and access the resilience capacity of the affected community. The study found that communities show resilience to flood with partnership and decentralised management of disasters. The study could help recognising the strategies for building resilient communities through policy intervention and civil society participation.

Keywords*:* Flood, Displaced communities, Disaster Management, Resilience capacity, Decentralised disaster Management

H2

Digitally Enhanced Disaster Risk Co-Management in Kerala, India

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ABSTRACT

India has witnessed devastating natural disasters in recent past like droughts, floods, cyclones, earthquakes, landslides etc. The most recent flooding caused by prolonged rainfall in Kerala has been widely described as the worst in the last century. As floods and landslides have engulfed households and farmland, more than 471 life lost, an estimated 1.2 million people in temporary shelters and around 20,000 houses seriously damaged. However, Kerala is unique in India with his high literacy rate and high digital penetration, High HDI and large population working outside the state and country. The flood though has shaken the base of Gods on Country, however the usage of digital platforms such as Facebook,Google maps and Whatapp for disaster risk management by government and community was commendable. Latitude, Longitude, Airdrop where the buss words for the digitally driven disaster risk co-management of flood risk in Kerala, India.The main objective of the study is to analyse the extend of usage of digital platforms such as facebook, google map and whatapp for disaster risk management by community and government and secondly to analyse how digital platforms supported in quicker , faster and stronger reponse to flood risk management. The study use case study methodology. 30 individual rescue cases are studied in detailed using unstructured questionnaires and focus groups. The study use decision tree analysis to understand how these digital platforms supported in disaster risk management. The results point out that the usage of these platforms has helped in effective communication and coordination between survivors and rescue teams.

Keywords: ICT, Disaster Risk Management, Flood, Kerala, India

H3

Policy and Practices in Sanitation in India: A Critique

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ABSTRACT

Urbanization results in enormous changes at the economic, social and physical facade, making it challenging in providing basic services in cities. One of the important services that have lagged is Sanitation which needs to be addressed adequately. In India, 13% of urban households practice open defecation (OD) and 6% dependent on public toilet (Census 2011) resulting in morbidity and mortality. Hence, a quick review of urban sanitation in India lately indicates a pragmatic shift in the way sanitation has been defined both conceptually and in policy directives. In the last decade, policy makers are pushed to think beyond conventional parameter of defining sanitation and is a key development parameter to evaluate the marginalised sections of society. Thus, it is pertinent to investigate the process of making (Urban) sanitation policy and investigatethe reasons for such a poor rating over the years. The analysis is based on reviewing the key policy documents, secondary data, focussing mainly on Swachch Bharat Abhiyan of Government India, which are substantiated with field insights. The study outlines the historical account of Urban sanitation policy in India highlighting the gap in its making. While doing so we flag the wide gap in policy and practice which we feel is underlying factor for not achieving the target. The study shows that India still has to go a long way in achieving an OD free in the true sense given the fact that mere construction of toilets do not ensure usage, but making them functional toilets in all respects, specifically focusing on behaviour and appropriate operation and maintenance will bring about the needed change and suggests policies from a practitioner perspective.

Keywords: India, Urban Sanitation, Swachch Bharat Mission, Open Defecation, Sanitation Policy

H4

The Scope of a Right to Health *Vis-Vis* Quest for State Accountability in Health Governance

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ABSTRACT

Countries all over the world have adopted various measures to tackle the COVID 19 pandemic. The stringency of the measures differs from country to country, based on the magnitude of the problem, population density, the availability of resources, the spending capacity and the State will. Data on the percentages of population, that have received at least one dose of vaccination all over the world, shows that Israel leads with 62% and Asia is at a dismally low percentage of 5.25. Interestingly, as on May 23, 2021 the number of people vaccinated in Asia is the highest with 245.55 million people having received at least one dose of vaccination. While this may be attributed to the high population figures, it remains a decisive factor in formulating policy. Meanwhile judicial intervention has been sought. The High Courts in India have directed the State to make available adequate vaccines and oxygen cylinders; but to construe a right to health as a part and parcel of a right to life as the Courts proclaim, seems to be far-fetched. The UN Committee on Economic, Social and Cultural Rights, General Comment No. 14, mentions 'The Right to the Highest Attainable Standard of Health'. Around 22 countries in the world make mention of a right to health in some form like access to medicine, healthcare, vaccination etc. While States grapple with the issue, judicial interventions and dismal situations have triggered academic interest. This research explores the right to health claims in a qualitative thematic analysis to examine the legitimacy of the claims and determine its scope. It concludes that while efficient health governance is crucial, State accountability towards provisioning for medicines and vaccines can only be limited. However, demand for equitable distribution of available healthcare resources is justified which states must ensure and be accountable for.

Keywords: right to health, access to medical aid and healthcare facilities, vaccination, health policy, state accountability

H5

Developing an Innovative Disaster Resilience Framework with Universities as Key Agents – The Value of Consolidating International Expertise

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ABSTRACT

Since the start of the Covid-19 pandemic, the higher education sector has seen an expansion of universities' expertise from being providers of education, research and knowledge transfer to providers of crisis response capacity for partners and stakeholders. Prior to that, nascent approaches towards delivering disaster mitigation and response capability through community training and volunteering were seen across universities located in areas prone to natural disasters. This leads to the purpose of the paper which is to address initiatives required to enhance the role of the higher education sector in disaster resilience. Specifically in relation to driving national policy making and disaster management activities at the local level, high levels of decentralisation prevent effective interventions by central government bodies. Advocating a bottom-up approach, the paper commences with a review of four theoretical perspectives on resilience planning including systems thinking, multi-stakeholder integration, adaptive governance and scalability. Based on an inductive approach, the methods used were informed by an initial fact-finding exercise and a series of roundtable discussions involving senior higher education and disaster resilience experts from across Indonesia and Europe. The insights derived from those helped to establish the need for integrating universities into wider disaster resilience strategies and policy-making by reflecting on the educational, innovation, business, community and policy-related activities that higher education institutions are typically involved in and by identifying some of the weaknesses in current disaster management approaches. Building on the four theoretical perspectives, expert opinions then informed the conceptual development of an innovative and scalable disaster resilience framework. Within the higher education sector this integrates conventional streams of university activity, such as curriculum development, research, innovation, knowledge transfer and networking with a contextually adapted and appropriate disaster mitigation and response capability.

Keywords: Disaster Resilience, Higher Education Management, National Policy, Qualitative Research

H6

A Study on Natural Disaster Causes and Effect on Human Life with Reference to India

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ABSTRACT

A natural disaster is a major adverse event resulting from natural processes of the Earth; examples include floods, hurricanes, tornadoes, volcanic eruptions, earthquakes, tsunamis, storms, and other geologic processes. A disaster is an unexpected, calamitous event that truly disturbs the working of a community or society and causes human, material, and monetary or natural misfortunes that surpass the local area's or society's capacity to adapt utilizing its own assets. Despite the fact that frequently brought about by nature, disasters can have human beginnings. Disaster is characterized as an emergency circumstance causing wide spread harm which far surpasses our capacity to recuperate. Disaster is an abrupt; these occasions are bringing incredible harm, misfortune, annihilation and decimation to life and property. The harm brought about by these disasters are unlimited and changes with the geographical location, environment and the sort of the earth surface. Natural disasters are moderately abrupt and cause enormous scope, inescapable demise, loss of property and aggravation to social frameworks and life over which individuals have an almost no control. Societies will consistently confront common dangers; however the present disasters are regularly produced by human exercises. At the most sensational level, human exercises are changing the common equilibrium of the earth, meddling as at no other time with the environment, the seas, the polar ice covers, the timberland cover and the normal columns that make our reality a decent home. In any case, we are likewise placing ourselves in hurt way. This paper looks into the natural disaster causes and its effects and prevention. Thus equilibrium is maintained in nature. This is called ecological balance which is disturbed by human activities.

Keywords: Natural Disaster, floods, Hurricanes, Earth quakes

H7

The Aspects of Construction Industry Stakeholders' Ignorance to Earthquake Risk Reduction in West Sumatra: Forms, Actors and Causes

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ABSTRACT

Construction industry stakeholders i.e. planners, contractors, supervisors and owners must pay attention to seismic aspects since the loss of lives and properties during the earthquake is mostly caused by a sudden collapse of the infrastructure rather than by the shocks. This study aims to learn about the ignorance behavior of construction industry stakeholders in West Sumatra on earthquake risk reduction. This research was conducted by collecting and analyzing documents, interviews, and distributing questionnaires to stakeholders as research subjects. The analysis was done by recalculation of the designs, content analysis and Fuzzy Delphi methods. The results show that there is widespread ignorance to earthquake risk reduction among the construction industry stakeholders in West Sumatra. It appears in form of intentional or unintentional actions, referring to several indicators i.e. the power of the doer to take any action, the doer's knowledge about the action and the compatibility of the results of the action with the plan. Private building owners and developers are considered as the main actors of ignorance, followed by the contractor's field workers, licensing and supervision officers and policymakers. This study also identifies that the causes of ignorance behaviour are complex and are a dynamic combination of three aspects: the actors, social relationship and structural barriers. However, structural barriers (i.e rules and resources) are considered as the dominant cause of ignorance. The ignorance will reduce the public security and safety against earthquake hazard.

Keywords: ignorance, construction industry, disaster risk reduction, earthquake, behaviour

H8

Effect of pasteurization time and temperature on bioactive compounds, antioxidant ability and color value of beverage produced from herbal extract (*Passiflora foetida and Embryo Nelumbinis*)

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ABSTRACT

Herbal beverage is one of the natural products which are greatly preferred by customers. *Passiflora foetida* and *Embryo Nelumbinis* are two kinds of medicinal plant that possess many precious bioactive compounds that have the effect of supporting calmness, reducing worry, treating insomnia; and have been used in many folk remedies in Vietnam. The maim objective of study is to investigate the effect of temperature (75, 85 and 95°C) and pasteurization time (15, 30, 45 and 60 minutes) on the content of bioactive compounds (polyphenol, flavonoid, tannin, alkaloid and saponin), antioxidant ability (FRAP, DPPH) and color parameters (L^*, a^*, b^* và ΔE) of product. The experiment was arranged in a complete randomized design with two factors and three replicates. The content of bioactive compounds and antioxidant capacity of product were analyzed by standardization methods using spectrophotometer; and the color parameters were measured by the colorimeter. The result showed that the opitmal pasteurization temperature and time were 85°C and 30 minutes, the product maintained high level of bioactive compounds and antioxidant ability. The content of polyphenol, flavonoid, tannin, saponin and alkaloid were 9.46 mgGAE/g, 4.44 mgQE/g, 4.85 mgTAE/g, 7.40 mgSE/g, 14.25 mgCE/g; the antioxidant capacity of product by DPPH and FRAP method were 64.50% and 28.25 μMFeSO4/g; the color parameters such as L^*, a^*, b^* and ΔE were 31.58, -0.24, -0.47 and 61.25, respectively. The production process was successful in pilot equipment and the product can be used as one of the beverages for health strengthening.

Keywords: antioxidant activity, herbal beverage, bioactive compounds, color parameters, pasteurization.

H9

How Ayurveda an ancient Medicine of India to Cure and Deal with such diseases for Better Public health Management

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ABSTRACT

The Year 2019-20 given an outburst of a New Biological disaster called CORONA VIRUS. The COVID-19 pandemic has exposed a suboptimal response to this threatening global disaster. The Pharma sector and medical sectors are very hard to Sort out new challenges arose by the New Strains of COVID.The COVID-19 pandemic has created a global health crisis posing an unprecedented public health emergency. The number of deaths and people being infected are increasing daily throughout the globe. This situation is much more severe due to possible devastating situations because of several social and economic factors like most populated countries like China, India, USA, Brazil, Italy and many. Effective management to address this infection is still evolving and attempts are being made to integrate traditional interventions along with standard of care. No specific drug or 100% suitable vaccination against the virus is available at present. Although some drugs have been used thoroughly, the present priority given more on prevention of the spread of the infection. Home isolation for the suspected cases, quarantine of the positive cases, social isolation, and self-imposed curfew are some adopted strategies, showing promising results. Through this paper I want to Convey how Ayurveda an ancient Medicine of India to Cure and Deal with such diseases for Better Public health Management.

Keywords:

H10

The Organoleptic Test Formulations Snakehead Fish Flour Based Functional Cookies as An Alternative Snack for Stunting Toddlers

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ABSTRACT

Background: The substitution of cork fish flour to make the cookies have the function in increasing nutrient. Objectives: To analyze the effects of cork fish flour on sensory characteristics of cookies Methods: This was experimental study using random complete design. First step of the study was to characterize and develop snakehead fish flour, the second step was to determine functional cookies formulation with four treatments: 0%, 10%, 15% and 20% snakehead fish flour. Cookies were then evaluated for their hedonic evaluation.
Results: Organoleptic study in the form of hedonic test to 30 semi trained panellist showed all categories except odor were not significantly different at $p>0.05$.The highest acceptance percentage on was in adding snakehead fish flour 15% significantly. Conclusion**:** The acceptability of respondent showed that snakehead fish flour treatment had a significant effect ($p<0.05$)

Keywords: snakehead fish flour; oyster mushroom powder; sensory evaluation; calcium content

H11

Patent Waiver Versus Compulsory Licensing of Pharmaceutical Drugs During Covid 19 Pandemic: The Way Forward

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ABSTRACT

As the world attempts to get a grip on how to deal with the Covid 19 pandemic situation, the role of patent rights in the context of innovation and access to Covid 19 vaccines and drugs have raised some existential questions. We are witnessing massive shortages of vaccines and drugs for treatment of Covid 19. As the pandemic ravages through the world, the issue of how to make vaccines available to the entire world at the quickest possible time is at the centre of the how we can overcome the pandemic. India and South Africa, joined by almost two third of the WTO members have been demanding suspension of intellectual property rights, contained in the TRIPS Agreement in respect of Covid 19 technologies. It is also argued that flexibilities in the TRIPS Agreement read with The Doha Declaration on the TRIPS Agreement and Public Health, 2001 provides ample regulatory autonomy to deal with the pandemic. As disagreement on the waiver proposal persists, deliberations are going on how to get the countries together and it remains to be seen how suspending protection of intellectual property rights will help countries to quickly access Covid 19 vaccines and drugs. In this context, the paper aims to compare and critically analyse waiver of patent rights vis-a vis compulsory licensing of pharmaceutical drugs in order to identify the best possible way forward to ensure quick access to Covid 19 vaccines and drugs. The paper argues patent waiver will be more effective to achieve better access to vaccines and drugs during Covid 19 pandemic.

Keywords: COVID-19, Compulsory Licensing, Access and Affordability of Medicine, Patent Waiver, TRIPS Agreement

H12

Effect of Ownership Structure on Efficiency and Productivity Analysis of Indian Pharmaceutical Industry

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ABSTRACT

The Indian Pharmaceutical industry is considered to be the international manufacturing hub for generic medicines. The industry has undergone dramatic changes from MNCs during 1970s, rise in R & D intensity, consolidations, mergers and acquisitions and introduction of new Product Patent Act 2005. The country is home to more than 3,000 pharma companies with a strong network of over 10,500 manufacturing facilities. According to the Economic survey 2020-2021, the industry which is currently valued at $41 billion, is expected to grow 3 times in the next decade and reach $120 – 130 billion by 2030. Covid – 19 has presented an opportunity for Indian Pharmaceutical companies to make India as “the pharmacy of the world”. Indian Pharmaceutical firms have also made efforts to become more productive and efficient. Efficiency of a firm play an important role in the survival and growth of a firm. The purpose of this article is to measure the efficiency of Indian Pharmaceutical industries using Data Envelopment Analysis. Besides Research and Development, the ownership structure, size and firm specific factors determine the efficiency of the firms. The ownership structure of Indian pharmaceutical industries is majorly classified as foreign owned firms and domestic firms. Further the study has been conducted to test the effect of ownership structure on efficiency of the firms.

Keywords: Data Envelopment Analysis; ownership structure; Efficiency; Pharmaceutical industry; Patent Regime.

H13

Geographic Information System (GIS) of Natural Disasters and Evacuation Routes

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ABSTRACT

Natural disasters are extraordinary events caused by nature that resulting in fatalities, environmental damage, loss of property, and Impact. Such disasters are earthquakes, tsunamis, landslides, floods and flash floods. Padang city is one of the areas that are prone to disasters and has a lot of vulnerable areas. With this fact, the Padang City government made a number of disaster-prone areas and evacuation route points for residents of Padang City. Therefore the Geographic Information System was created to display disaster-prone area points and evacuation routes using the Android-based Dijkstra algorithm method. So that the residents of Padang City know the point of disasterprone areas and the existence of evacuation routes. This application can be displayed online and offline. The results of research on the geographic information system for disaster-prone points and the closest evacuation route in West Sumatra based on the web include, in this geographic information system the public can easily see and access maps of areas that are often prone to disasters and evacuation routes, if a tsunami wave occurs in the cities of Padang and West Pasaman. This system will provide the public with various information on natural disasters that have occurred as well as education on natural disasters that have occurred in the cities of Padang and West Pasaman. This geographic information system will assist the wider community and local governments in anticipating natural disasters that can occur at any time by accessing the information provided by the system. and with this system make it easier for the public to know the locations or points that are prone to disasters so that people are more prepared and alert. so that can minimize casualties, increase community awareness and reduce material damage caused when a disaster occurs.

Keywords: Disaster prone area points and evacuation routes, Geographic Information Systems, Dijkstra algorithms, Applications can be used in Online or Offline

Education and Sustainable Development (Ed)

Ed1

Mapping of Sustainable Development Issue in Indonesia Through Education for Sustainable Development

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ABSTRACT

The challenges in implementing education for sustainable development as an interdisciplinary approach in higher education institution hamper by the structural format of the University. Education for sustainable development as an educational tools stated in SDG 4.7 function to educate people in this case young generation as a future leader and agent of change. This is to understand the broad concepts on sustainable development which covers the economic prosperity, equitable distribution of resources, energy use, and health and environmental awareness as well as diverse global environmental challenge such as climate change, loss of biodiversity, poverty and etc. The study evaluates the student's performance from the corporate social responsibility, CSR and Community Development courses in the Permata Sari program. Further, mapping the issues related to Sustainable Development Goals, SDGs 2030 is used to map diverse issues related to development for further strategic action towards SDGs implementation at the local level. The Permata Sari is an online student exchange program involving 33 student from higher education institution from all regions in Indonesia organized by the State Higher Education Cooperation Agency. Concept mapping has been used as a tool to monitor and promote meaningful learning, thinking, and action in. During the course, the students are required to complete their field practice through observations and other data collection. We use qualitative approach of adult learning theory by David A. Kolb's for in depth analysis of the data. As an experiential learning, this overall learning cycle requires the student's involvement as a process than the outcome. Hence, student involves in a grounded experience during observation of development issues in their local context, which involves students' new experiences, developing reflecting, creating concepts for the proposed solution by using solving problems theory. This process involve transaction between the student as a person and their environment. That is, how sustainable development is promoted on campus through student field practice according to their area from student observations, interviews, and other data they collect. The main points of the result are summarized into a concept map, which consists of the diverse development issues at the local level represents the provinces in Indonesia. Student's reflection indicates time and energy spent in promoting sustainable development through this course . This is to shows that issue mapping provide empirical evidence to develop the concept map for sustainable development is important once it taught on a campus as part of the education for sustainable development in Indonesia.

Keywords: Mapping, SDGs, Education for Sustainability Development

Ed2

A Comparative Study on Sustainable Development Goals Accomplishment In Tropical Region

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ABSTRACT

Sustainable Development Goals are the collection of 17 global goals linked with each other designed is such a way which can give enduring sustainable future to everyone living on this planet collectively. When we look into the sustainable development of Tropical Asia, most of the regions are facing issues such as poverty; lack of better lifestyle, gender inequality, lack of development in the field of education, resource degradation etc. Tropical Asia is very rich with the natural resources and diversity in their culture and people. To achieve Sustainable Development Goals it is important that priority is given to the development of each individual region in terms of its contribution. Hence the aim of this paper is to compare the achievement of SDG Goals using various SDG Index calculations to assess where tropical Asia is struggling. The comparison will through light upon the performance of goals in tropical region and may give indication for learning from each other. Overall performance index also help us to understand the commitment of nations and the governance challenges in this region.

Keywords: SDG, Linkages, Governance, SDG Index, Tropical Asia

Ed3

Corporate Sustainability through ESG Practice – An Indian Perspective

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ABSTRACT

The role of business organizations in contributing towards achieving sustainability of our planet is crucial. The practice of sustainability in their business models help them to achieve sustainability of their business as well as contribute towards the sustainable development of society. However, in some emerging economies, the voluntary actions of firms in leading the Environmental, Social and Governance (ESG) aspects are often daunted by the lack of co-evolution in the regulatory and institutional framework. India currently ranks among the bottom 10 out of 180 countries on the Environmental Performance Index 2018 as per the World Economic Forum 2018. In India, there is a large corporate sector, which could tap the low-cost green market for funding. Similarly, mutual funds, private equity, and venture funds industry also have a platform to raise resources both domestic as well as global for funding ESG-compliant companies. As the FDIs (Foreign Direct Investment) and FIIs (Foreign Institutional Investors) are on an upward trend towards the Indian financial markets, an emerging economy, the regulatory framework should resonate with the expectation of the investors in sustainable investments. The foreign investors know the importance of impact investing and how it leads to long term financial performance and sustainability. This paper attempts to review the sustainability efforts of select firms in Indian context across heterogeneous sectors which includes both ESI (Environmentally Sensitive Industries) and non ESI industries. Through a content analysis, the paper builds on company and regulatory data from secondary sources. The paper argues that for ESG oriented firms to move forward and realize multiple benefits on the sustainability front and the economic front, a standardized disclosure apparatus and a co-evolution of institutions in corporate governance are the prerequisites.

Keywords: ESG (Environmental, Social and Governance), Impact investing, corporate sustainability performance, corporate financial performance, ESI (Environmentally Sensitive Industries)

Ed4

A Study on Assessing the Role of Quality Education in Attaining the Sustainable Development Goals-With Reference to India

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ABSTRACT

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The Agenda 2030 for sustainable development focuses attention on lifelong learning opportunities for all. The new targets expand on their predecessors, the Millennial Development Goals, by both widening and deepening the scope of system-wide quality education systems. At this critical time, the best thing that the government can do to stimulate progress is to provide the nation with the best minds to help the nation tackle future challenges. In this paper, the role of quality education for sustainable development goals (SDGs) is reconnoitred. The challenges for higher education and the steps involved in translating global commitments will be studied. Quality education is called SDG-4 because it is a fourth goal of the SDGs.. For the purpose of study the secondary data will be used for the analysis.

Keywords: Quality Education, Sustainable Development Goals, Millennial Development Goals

Ed5

Higher Education Sector and Information Security

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ABSTRACT

Globally, in this technological era, the quality of learning in higher education is characterised by the construction and sharing of knowledge by means of technology as a primary source of communication. The current situation of COVID 19 pandemic forced the education system around the word to make a shift from classroom to ICT enabled e-learning environment. The education institutions hold vast quantity of important information, preserved for knowledge acquisition and delivery. To maintain the quality of higher education, an uninterrupted flow of knowledge acquisition and delivery is essential, hence the technology needs a robust infrastructure. Any damage to the infrastructure will cripple the activities of the institutions and affects the quality of education. From an information security perspective, finding a research gap, an open source intelligence was made among the IT infrastructures of top ten outstanding Higher Education sector in the world. The intelligence work was mainly focused in exploring, collecting and analysing the flaws among the IT infrastructures of the targeted top ten Universities using various open source tools. The study identified the root causes of the vulnerabilities among the systems as outdated software, unpatched security vulnerabilities, misconfiguration, unprotected or less protected infrastructure and lack of awareness. The findings backed the top ten Universities to reckon the destructions that could have been generated by the security flaws that were existed within their IT infrastructures and served as a foundation for proactive measures. It also steered the security managers of the institutions towards the deterrence of targeted security flaws. The outcome of the study had improved the state of knowledge about the vulnerabilities in the higher education sector and helped in securing their Information technology infrastructure.

Keywords: Education system, e-learning, Higher education sectors, Security flaw, Vulnerabilities

Ed6

Sustainable Primary Education in Andhra Pradesh During COVID-19

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ABSTRACT

Sustainable development describes the simultaneous maintenance of balance between socio-economic development and environmental sustainability without jeopardizing the future generation's potential to serve their own needs. The main aim of this article is to analyze the sustainability attained by government schools in Andhra Pradesh through providing education to elementary pupils during COVID -19. The unexpected outbreak of the deadly virus COVID-19 wreaked havoc on educational systems, harming children's education. In response to the lockdown, all educational institutions had been closed for an extended length of time and remained shuttered even today. According to the information gathered the government of Andhra Pradesh took all necessary safety measures to ensure the accessibility of government elementary schools and to minimize primary school dropouts. They televised the online lessons to every class at periodic intervals on governmen t regional channels for students. Pupils were given worksheets to exercise according to the curriculum aired on television. These worksheets were submitted for review to the concerned faculty by students' parents. The children were given dry rations monthly as part of the "Mid-Day-Meal" program, which offered healthy meals to address the students' food difficulties, food security, and access to schooling during the Covid-19 epidemic. This document serves as a resource for teachers, administrators, and government officials on how to deal with and avoid the trajectories that primary school pupils face in the future when confronted with difficult situations. Furthermore, the whole perspective provides a list of resources, recommendations, and strategies for ens uring the sustainability of the educational system during the pandemic.

Keywords: Primary school, Online lessons, Government, Worksheets, Food security, Sustainable development issues.

Ed7

Strategies for Increasing Disaster Resilience at the Higher Education Level: Awareness, Integration and Management

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ABSTRACT

Higher education has a very important and strategic role in efforts to increase disaster resilience. Muhammadiyah University (Unismuh) Palu as one of the universities in Central Sulawesi, Indonesia has the resources to ensure the use of a foundation of science and technology in disaster management. In addition, increasing disaster resilience is a shared responsibility and requires the involvement of all parties, including the academic community through systematic, massive and structured activities. This study aims to analyze disaster resilience strategies at the tertiary level based on aspects of awareness, integration, and management. This study uses a qualitative descriptive method to describe conditions and problems, while the Analytical Hierarchy Process (AHP) is used to examine the implications of disaster resilience in the academic community and its relationship with aspects of awareness, integration, and management. The strategy for increasing disaster at the tertiary education level is determined using a SWOT analysis. The results showed that the disaster resilience of the academic community can be improved through awareness, integration and management of disaster mitigation. In addition, it is necessary to implement management that guarantees the implementation of disaster mitigation regulations. The conclusion of this study is that increasing disaster resilience requires a synergy strategy of academicians that is integrated with the Catur Dharma of Higher education activities at Unismuh Palu.

Keywords: Awareness, integration, management, disaster resilience

Ed8

Role of Learning and Development in Sustainable HRM for Employee Mental Wellness

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ABSTRACT

In recent years Mental Wellness has been getting more attention as compared to the Physical Wellness which had been the pivotal focus of Employee Wellness programs. There are few crucial aspects to Wellness that needs to be identified beyond the mental and physical wellness. Looking at sustainability as the future of HRM, a new paradigm towards employee wellness, motivation and positivity as an important aspect for the efficient people management has been introduced to evaluate how the various tools of sustainable HRM creates an impact on organizational productivity. The main objectives of this research paper are to analyse the role of Learning and Development in bridging the gap by recognising the need of wellness solution for employee taking into consideration their emotional wellbeing. This conceptual paper analyses the effectiveness of Learning and Development in sustainable HR to encourage employee wellness initiatives. The research is based on reference from secondary sources like article, books, blogs to understand the issue regarding Sustainable Human Resource Management and Learning and Development. With strategic sustainable techniques proper Learning and Development plan can be effectively implemented for stress free work life balance. Organizations may make a positive contribution in maintaining the metal wellness boosting the positivity of employees that would be beneficial in contributing towards employee and organisational productivity. This research recommends that Sustainable HRM must incorporate initiatives and learning practices promoting positivity, mental health of employees in their organizations for Employee Development. For future research to understand the impact of Learning and Development in Sustainable HRM on other aspects of employee wellbeing like Relationship, Kindness, Purpose, Spirituality, Philanthropy, Financial Wellness can reviewed that can add value to the employee wellness and productivity.

Keywords: Learning and Development, Sustainable HRM, Employee Productivity, Organisational Productivity, Mental Wellness

Ed9

Embedding Sustainability Education into Hospitality, Tourism and Events Management Curricula – a Preliminary Best Practice Model

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ABSTRACT

With over seventy percent of millennials preferring to spend disposable income on experiences rather than consumer goods, organisations operating in the tourism, hospitality and events sectors are predicted to see increasing demand. Despite being recognized as a major contributor to economic activity, these sectors have been criticized for being a root cause of environmental degradation, acculturation, economic leakage and migration. The recent collapse of international travel firms with far reaching consequences for employees, suppliers and destinations has highlighted the vulnerability of organisations to volatility in the business environment and calls for a reassessment of business and leadership models.Since the adoption of the United Nations Sustainable Development Goals in 2015, sustainability initiatives are becoming more embedded into corporate strategies with an increasing focus on the triple bottom line. Following the creation of the Global Reporting Initiative Standards and sector specific standards, there is a growing expectation that organisations demonstrate accountability for their sustainability initiatives. In Western societies, this reflects a shift away from the liberalist notion of the "Theory of the Firm" towards the sustainability paradigm.The purpose of this exploratory paper is to propose a preliminary framework for embedding innovative sustainability education undergraduate degree programmes. The paper first reviews UK based guidelines for sustainability education at university level. It then proposes a corresponding curriculum audit tool that assesses how comprehensively sustainability education is embedded into undergraduate curricula. The University of Gloucestershire's degree programmes in International Hospitality and Tourism Management and Event Management are used as case studies to demonstrate how this audit can be used in practice for assessing and enhancing sustainability education. The paper recommends the further development of the tool into a best practice model integrating graduate attributes, key learning outcomes and skills, and an appropriate learning and teaching infrastructure. Transferability across subjects and transnationally is identified as area for further research.

Keywords: Sustainable Development Goals, Higher Education, Curriculum Standards, Case Study, Best Practice Model

Covid-19 Management (C)

C1

Burnout among Healthcare Workers During COVID-19 Pandemic-A Case Study of Kerala

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ABSTRACT

Several viral outbreaks, including SARS, MERS, Ebola and COVID-19 have created widespread miseries to the mankind throughout the world. Such outbreaks caused psychological distress and post-traumatic stress in health care workers. These stresses are due to clinical factors, personal factors and societal factors. Clinical factors are contact with affected patients, forced redeployment to care for affected patients, perceived inadequacy of training. Personal factors include fear of quarantine, especially in staff with children at home and an infected family member. Societal factors consist of social stigma towards hospital workers. Aside from being personally harmful, burnout can result in suboptimal patient care. The present study is an attempt to explore the burnout among health care workers with special reference to Kerala. The health care workers plays very important role in any health care system. Burnout among healthcare workers needs attention as they make crucial life changing decisions every day and thus, their state of physical and mental well being is an absolute necessity during the period of pandemic. So the resent study aims to find out personal, work related and client related burn out among front line health care workers. (1) To examine the personal burnouts among health care workers in Kerala. (2) To assess the work-related burnouts among health care workers in Kerala. (3) To analyze the client related burnouts among health care workers in Kerala. The purposed study is based on primary and secondary data. The primary data will be collected by using a structured questionnaire on a simple random basis. The purpose sample size is 50 and the data will be analyzed by using *likert scaling technique*. The secondary data will be collected from different articles, government publication like economic survey and economic review etc. Although researchers worldwide are exploring numerous avenues to prevent and treat the COVID-19 threat, the psychological effect on HCWs has also been assessed. However, managers of healthcare institutions are not taking several measures to minimize the impact of psychological distress on HCWs. This study shows the importance for hospital managers to carry out management practices that provide employees with job resources, in order to reduce the burnout risk.

Keywords : Burnout; COVID-19 Pandemic; Health care workers; Post-traumatic stress

C2

Health Infrastructure Governance and Intensity of Covid-19 in India

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ABSTRACT

The COVID-19 pandemic has impacted every sector to an unprecedented extent around the world over the course of 2 despairing years. The tragic number of human lives lost, and the entire world being under lockdown has brought us to a standstill experienced never before in our lives. Through this ordeal, scientists and medical experts around the world have developed vaccines which is said to be effective against this deadly disease, lives still remain affected. The purpose of paper is to investigate the impact of COVID-19 on public health and economy in Tropical Asia. It also aims to study the effect of various Government measures to tackle COVID-19. Secondary data will be collected from various published sources and primary data will be administered to a sample (n= 250) for detailing Indian case in particular. This will help to determine the impact of COVID-19 on their livelihood and assess if the measures taken by the Indian Government to mitigate this disaster have been effective and satisfactory. In the paper, we aim to discuss aspects of health infrastructure investment and governance, measures taken and intensity of COVID-19 in India in terms of its impact on economy. The paper also highlights the counteractive measures, policies carried out by the Governments of Asia in response to COVID-19 and determine their efficacy and results.

Keywords: COVID-19, Health Infrastructure, Governance, Economy, Tropical Asia

C3

A Case Study on Impact of COVID-19 on Agriculture Sector in Indian Subcontinent

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ABSTRACT

Entire world is going through the COVID 19 health crisis and has affected everyone's life. Governments are taking all the measures to control the pandemic through rigorous lockdowns and vaccination drives. In these challenging times COVID 19 affected agriculture sector in Indian Subcontinent (Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka). Except Maldives all the Indian subcontinent countries have significant contribution to their GDPs from agriculture sector. (1)The main objective of this study is to do a comparative study on impact of COVID 19 on agriculture sector in Indian subcontinent. (2)The other objective of this study is to understand how Indian Subcontinent Governments dealt with the agriculture crisis during lockdown. A case study approach is used to do the comparative study on impact of COVID 19 on agriculture sector in seven subcontinent countries. This case study will help to understand what are the problems faced by farmers during lockdown and what are the distribution, logistics and inventory management challenges faced by the Indian subcontinent governments. This case study will conclude how the Indian Subcontinent handled the crisis and what are the measures governments can take to handle such future crisis like COVID 19.

Keywords: COVID 19, Agriculture, Indian Subcontinent, Governments

C4

Effectiveness of Video Media and Brochures on the Improvement of Students' Knowledge about Covid-19 (A Case Study in Universitas Muhammadiyah Palu, Sulawesi Tengah, Indonesia)

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ABSTRACT

Since the positive case report for Covid-19 in Indonesia was first announced in March 2020, the government has anticipated and even implemented a Large-Scale Social Restriction (PSBB) policy to limit the movement of citizens, but the spread of Covid-19 in Indonesia continues to expand. In an effort to prevent the spread of Covid-19, the Rector of the Muhammadiyah University (Unismuh) of Palu has issued a circular containing policies/instructions aimed at the academic community and society. The circular contains the awareness and prevention of Covid-19 transmission related to the implementation of academic activities, prevention efforts, and the existence of the Covid-19 Service Unit at Unismuh Palu. The Rector's policies and instructions have followed the protocols of the central government, the ministry of education, and the Central Sulawesi provincial government. The implementation of the policy is carried out by the academic community, especially lecturers and students. Increasing community awareness is carried out through massive socialization and education to the public regarding the implementation of Clean and Healthy Behavior using various media. The research aims to determine the effectiveness of video and brochures on knowledge about Covid-19. The research method used is a Quasi-Experimental Design applying a test as the research instrument. The test (pretest and posttest) is administered to 100 respondents which are divided into 2 groups. Based on the statistical test (t-test) at a determined degree of freedom and alpha (0.05), the t-value is higher than the t-table. It means that Ha is accepted. It is also found that there is a difference in the effectiveness of video media and brochures on student knowledge about Covid-19. The research conclusions show that video media is more effective than brochure media in increasing knowledge about Covid-19 for the students of Unismuh Palu.

Keywords: Media Effectiveness, Knowledge, Covid-19

C5

Covid-19 Pandemic, Virtual Activities, and Its Impact on Land Use

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ABSTRACT

The Covid-19 pandemic has encouraged people to adjust the way they live. In The Covid-19 pandemic, the public must be having physical distancing, avoiding crowds, and minimizing movement. It encourages people to carry out various productive activities online or virtual by utilizing information and communication technology. Online learning activities, working from home, online shopping, and even online health consultation services are unavoidable activities during the Covid-19 Pandemic. This shift in people's behavior towards virtual or online activities will certainly encourage a change in the spatial pattern of using physical space, further explored in this study. Specifically, this study explores the influence of virtual or online activities on the use of physical space, as observed from land-use patterns. The method used in this study is mapping the geo-position data of virtual or online activity that emerged during the Covid-19 Pandemic. This study uses ArcGIS software combined with analysis of frequency distribution and spatial distribution of virtual or online activity actors for each type of land use. This analysis use data from 400 virtual or online activity actors in Semarang City and Yogyakarta City. This data is collected through the random distribution of spatial-based online questionnaires to virtual or online activity actors. From this analysis, it can be found that the development of virtual or online activities has led to a pattern of multiple activities on one type of land use, thus giving rise to multiple uses characteristics in land use patterns. Residential areas have become areas that have experienced an increase in the intensity and variety of activities during the Covid-19 Pandemic. Residential areas that function as living quarters are currently developing to work, shop, school, and various other productive human activities.

Keywords: Covid-19 pandemic, virtual activities, online activities, and land use

C6

Impact of Climate on Covid-19 in Asian Countries

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ABSTRACT

The Current Global Pandemic had several bearings on the economy especially to the developing countries. Climate change has already made conditions more favourable to the spread of some infectious diseases, including Lyme disease, waterborne diseases like Vibrio parahaemolyticus which causes vomiting and diarrhoea, and mosquito-borne diseases like malaria and dengue. Along with this, a few cases of new fungus and its mutants like Black and white fungus have been reported (Sasikumar et al, 2020). The rise within the number of cases observed during summer time, and particularly in countries with high average ambient temperatures, demonstrates that weather and climate variables, within the absence of public health interventions, cannot mitigate the resurgence of COVID-19 outbreaks. The paper examines the impact of climate on Covid 19 in Asian countries. Since Asia constitutes 60 per cent of total world population, this gives insight to the Government and policy makers to take fruitful measure. For this, the countries are selected based on the population density and considered one of the factors for health material (Hanlon, M., Burstein, R., Masters, S.H. et al, 2012). Other factors of climate and COVID-19 are humidity, precipitation, wind speed, COVID-19 death cases are discussed by taking the pre-COVID and COVID period for each country. The findings shows that the global menace caused by the covid-19 has brought about the various effects on the environment and climate which accounts approximately 65-85 per cent of the variance, which signifies that COVID-19 transmission depends strongly on local temperature rise before community transmission phase. The covid19 cases are clustered at temperature and humidity ranging within 27-32°c and 25-45 perf cent respectively. The humidity, the sweat, the temperature give rise to the significant mutant corona virus.

Keywords: Climate; COVID-19; Asia; Temperature; Population density

C7

The Impact of Human Mobility of COVID-19 epidemic in Kuala Lumpur Using GIS

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ABSTRACT

During the third wave of the COVID-19 incident in Malaysia, the Ministry of Health had recommended to impose total lockdown (Movement Control Order-MCO) of the entire country. However, there was a need to trace people movement to make it more effective in controlling the spread of the virus. Movement data helps organizations discover patterns of behavior of human mobility, understand current and past movement patterns which can help predict outcomes for future events. Geographic Information Systems (GIS) is useful in cartography that can produce flow maps, thematic maps and flow charts. In fact, GIS is capable to show the movement of people from one location to another and explore the relationship between the people movement patterns associated with the land use. This study uses the GIS to determine and create lockdown boundaries and zones depending on the people movement. It is also employed to explore the most visited areas during the MCO period between November and December of 2020. A Survey and questionnaire involving 380 Malaysian residents was conducted. Meanwhile, the People Movement Data was obtained from the Mysejahtera apps. for the same period. This study was conducted in the city of Kuala Lumpur. Data collected from the respondents were organized into an excel spreadsheet. This data was analyzed by the GIS software where the movement of people was simulated and the areas identified as having a "likely increase in ratio/speed of infection" were mapped. Results showed that the daily movement of Kuala Lumpur residents between November and December 2020 (RMCO period) could be used to introduce "restrictive measures for the containment of COVID-19". These areas should be targeted for limited locality-based lockdowns instead of implementing complete lockdown throughout the country. Hence this helps the government to focus on smart lockdown policy to avoid total crippling of the nation's economy. Another important contribution of this study is to use the results of the GIS mapping to help the Health authorities and the government to reduce the movement of people through optimal distributions of the most visited places in proportion to the population density. This strategy could help in controlling the spread of the epidemic more scientifically and effectively.

Keywords : COVID-19. Geographic Information System (GIS), Human movement, Mysejahtera app.

C8

An Anti-androgen Phytoconstituent from *Terminalia chebula* as a Potential Lead for COVID-19 Therapeutic Interventions

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ABSTRACT

Terminalia chebula (Family Combretaceae) commonly known as Haritaki is a medicinal plant which is listed first in ayurvedic literatures due to its multifarious use in treating diseases. Among the 150 phytoconstituents being isolated and characterised from the plant, some are found to have antiandrogenic effect. *Terminalia chebula* fruit pericarp is commonly used in ayurvedic preparations and it is found to be rich in ellagitannins. A polyphenol ellagic acid which is formed in the gut due to acid hydrolysis of ellagitannins, was found to be able to exert hair regrowth in rats with androgenetic alopecia (AGA) due to its antiandrogenic mode of action. In the current context, there are reports suggesting an androgen influence on COVID-19 severity and a disproportionately higher incidence of COVID-19 infections in males when compared to females. It is found that androgen receptor regulates the transcription of TMPRSS2 and ACE2 which are required for COVID-19 infectivity. Also androgen receptor antagonism was found to downregulate the expression of TMPRSS2 and ACE2 and so can reduce the viral entry into the cells, making the prognosis of COVID-19 disease better. Currently there are six trials with antiandrogen therapies registered in clinicaltrials.gov. We conducted an in-silico study with ellagic acid. The bioavailability of this phenolic compound and the affinity and probability of this compound to bind with AR- LBD- ABS site was compared with the standard antiandrogen flutamide. Bioavailability was determined using Lipinski's rule of five, affinity using AutodockVina and probability using endocrine disruptome. Ellagic acid showed binding affinities at par with the standard antiandrogen flutamide and was found to block ABS, which support studies showing their antiandrogenic mode of action. This makes them promising potential leads for COVID-19 therapeutic interventions.

Keywords: antiandrogen, COVID-19, ellagic acid, ellagitannin, *Terminalia chebula*

C9

Correlation of Humidity, Rainfall, Sunshine and COVID-19 Pandemic in a Tropical City, Padang

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ABSTRACT

The COVID-19 pandemic in the city of Padang still becomes a threat to various aspects of life. The latest data on COVID-19 findings in Padang City has reached 21,087 cases with 371 deaths. As stated in the epidemiological triad concept, environmental factors influence the disease agent and host susceptibility. As a tropical area that is very close to the equator and the coast, the city of Padang has humidity, rainfall, and duration of sunshine that are different from other areas. This regional climatic factor is also a determining factor for the spread of the virus and the host's resistance. This study aims to see the correlation between humidity, rainfall, and sunshine duration on daily cases and deaths from COVID-19 at time lags 0, 7, 14, and 21 according to the incubation period of the virus. This research method is an ecological study using correlation analysis by the Spearman test. One-year COVID-19 data was obtained from the Padang City Health Service. Then, regional climate data were obtained from the Meteorology, Climatology, and Geophysics Agency (BMKG) Teluk Bayur Maritime Meteorology Station. The results showed that there was no correlation between humidity and daily cases and deaths. Rainfall was positively correlated with daily cases at time lag 14 and 21 and positively correlated with mortality at time lag 21. While sunlight was negatively correlated with daily cases and death in all-time lags. Understanding the correlation of regional climatic factors with the COVID-19 pandemic can be one of the determinants in monitoring and early warning systems for controlling future outbreaks.

Keywords: humidity, rainfall, sunshine, COVID-19, tropical city

Rural and Urban Management (R)

R1

Sustaining *Subak*, the Balinese Traditional Ecological Knowledge in the Contemporary Context of Bali

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ABSTRACT

The combination of cosmology, spiritual, science, ecology and engineering aspects of the Balinese traditional ecological knowledge and wisdom in managing and distributing water for agricultural purposes is legitimized under the local organisations called as *Subak*. As the sustainable resources management system reflects in a cultural landscape of rice terraces as part of the Bali Island UNESCO world heritage site, it's become one of the main tourism attraction with its multiplier effect. However, spatial development and urbanisation that cause decreasing land for agricultural activities affect the Subak are among issues face by the contemporary Subak. Hence, to what extend the existing practice of traditional ecological knowledge can sustain in the current context and contemporary of Bali complex adaptive system become our focus of study. This paper aims to documented the various perspective of TEK of the Subak that relates with sustainable agriculture practices, its ecological principles, water irrigation system and spiritual practices and values as part of the learning document. Consider the *Subak* as a live monument with strong humans' institutions, it still has strong community capital values which can be treat as the Subak restoration through incorporation of the socio-cultural-eco-agricultural approach in the existing of Bali cultural landscape. The study captures several initiative in sustaining the Subak through formal education and provide several solution to preserve the Subak as TEK in the contemporary setting of Bali as tourism attraction such as community based-Subak tourism is proposed.

Keywords: traditional ecological knowledge, Subak, water, sustainability, tourism

R2

Strengthening the Integration between Rural and Agricultural Development: Case in Bali Province, Indonesia

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ABSTRACT

In the developing countries, agricultural sector is still very important to support and accelerate the economic development. Most of the agricultural areas are located in rural areas. So that it is often identified that rural development is also agricultural development. Natural resources and human resources in rural areas have great potential to be developed in the agricultural sector. Land and water are the main natural resources in rural areas and are used for farm management by rural residents who mostly work in the agricultural sector. Therefore, the management of natural and human resources is the key to success in the realization of the goals of agricultural and rural development. The agricultural and rural development designed to increase the productivity of land and human resources in order to improve the lives of their people. The objective of this study is to describe the integration between rural and agricultural development in order to accelerate economic development. The Pandemic Covid 19 has given a lesson to redesign the development in Bali province, Indonesia. The tourism development should be based on the culture, especially agriculture. The agricultural sector clearly cannot stand alone because it has strong links with the manufacturing sector, service industry and other sectors. Therefore, the rural development plan should include aspects of agriculture, rural industries, tourism, household handicrafts and small industries, and infrastructure development that support socio-economic activities. The agricultural and rural development in Bali should be addressed to develop tourism, industry, environment, and economic activities. These could be in the forms of development of agritourism, agroindustry, integrated farming system (system of crops and livestock) and village-owned enterprises. The improved agricultural and rural development has accelerated the growth of rural economy, thus decrease the poverty.

Keywords: Agricultural, rural, development, economy, poverty

R3

Urban Region Formation of Small Cities and Spatial Inequality: A Tale of Two Cities of Central Java, Indonesia

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ABSTRACT

The expansion of urban areas has become a spatial feature in the urbanization process of cities in Indonesia. As the most populous island in Indonesia, Java has experienced such formation in both large and small cities. The expanded urban formations also create fragmented urban regions, as urbanized areas are managed by different authorities according to their territories. This fragmentation then exposes the differences in regional governance performance that can lead to regional disparities in the urban region. Using the case of *Kota* Tegal and Pekalongan, two smaller cities of Java whose urban areas have expanded into surrounding *kabupaten* or regencies, this paper aims to elaborate on the understanding of how the expansion of small cities can influence spatial inequality. The research, which uses *kecamatan* (sub-districts) analysis unit, seeks to uncover how the spatial process can affect inequality, starting with an analysis on the urbanization process and service provision in these subdistricts through spatial and comparative analysis. By analyzing the urbanization process, the typology of the sub-regions can be seen in terms of density and spatial development. Time series analysis is used to develop an understanding of how urbanization affects spatial inequality. Furthermore, a comparative analysis involving a comparison of *kecamatan* in an urban region and a comparison between the two urban regions is done to better understand the issue. The findings show that the urbanization process needs to be managed with equal attention to every part of the region to avoid creating spatial inequality in the region and in surrounding regions. As an implication, the paper suggests an improvement of cooperation. Cooperation between regional governments is needed in an institutional governance in the form of structures and mechanisms to optimize the management of the urbanization process and urban development processes.

Keywords: Java, small towns, spatial inequality, urbanization process, urban area expansion

R4

A STUDY ON APPROCHES OF SUSTAINABLE GREENARY PLANNING OF URBAN CITIES IN INDIA

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ABSTRACT

Urban greening contributes notably to quality of life and ecosystem services in cities. Compact cities in developing and developed countries are commonly beset by greenspace deficit. Based on literature review supplemented by field studies in different cities in india , a sustainable urban greening strategy is proposed. Greenery can contribute to reducing the amount of noise pollution experienced by residents. It also facilitates water management and promotes biodiversity in built-up areas, and can help reduce the effects of noise pollution. Urban renewal and new developments without a greening vision could miss the opportunities like Green contributes to social cohesion, attracts companies, contributes to better health and increased well-being, cooling the city in summer and reduces the risk of flooding plants bring relief. The public and private sectors can join hands to insert plantable spaces into the urban fabric. Urban greenspaces (UGS) with good connectivity forming a green network to permeate the city constitute the hallmarks of a naturalistic design. Preservation and creation of natural areas with rich biodiversity offer a new dimension to UGS design. Greening benefits could be expressed in economic terms to complement conventional ecological-environmental emphasis. Outstanding trees could receive high-order conservation efforts, and trees in construction sites warrant enhanced protection. Tree transplanting demands an overhaul in concepts and skills. Improving roadside tree planting and maintenance offers a cost-effective way to upgrade the townscape. Ameliorating widespread soil limitations could remove a major hindrance to tree growth. Innovative ideas of development right transfer, street pedestrianization, river and canal revitalization, green roofs and green walls could mobilize hitherto underused plantable resources. Lacking appropriate institutional setup and scientific capability pose intractable bottlenecks. Innovative public policies and greening technologies are needed for sustained improvements. Amalgamating natural and social sciences in a multidisciplinary approach and reinforcing the link between science and public policies could overhaul greening.

Keywords: Compact city. Ecosystem service. Nature deficit. Precision planning

R5

The Value of Local Wisdom of Settlements in Nagari Pariangan

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ABSTRACT

This research examines the concept and empirical of settlements and local wisdom. The settlement contains a residential environment along with facilities and infrastructure to support its function. Local wisdom is good value of local ideas or norms that are practiced and believed to be a reference in everyday life. The question is; how is the implementation of local wisdom in settlement management. This study aims to assess the local wisdom contained in settlements in Nagari Pariangan, Tanah Datar Regency. The method used in this paper is descriptive qualitative. The novelty of this research contextually reveals the local wisdom of settlements in Nagari Pariangan. Settlements in Nagari Pariangan are unique. There are Rumah Gadang and surau which are owned by each tribe. There are edge near the Rumah Gadang and Surau. This edge is useful for common purposes. Choosing the location of the rumah gadang near a water source also applies to building houses, cattle sheds, and other buildings. There is also a prohibition to build a house at an altitude called the *Tumbuak* and *Angin* (strong whirlwind) area. The results of this study show that the values of local wisdom in settlements in Nagari Pariangan are manifested in environmental conservation and social values, which are not fully preserved in the sense that some have not been continued or implemented until now.

Keywords: Settlements, Local Wisdom, Nagari Pariangan

R6

Impact of Various Initiatives Taken by Government on Poverty, Employment, Women Empowerment in Rural, Angola "Africa"

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ABSTRACT

"Extreme poverty anywhere is a threat to human security everywhere." Kofi Annan, Seventh Secretary-General of the United Nations Poverty is when an individual is unable to meet the basic needs of day-to-day life. Poverty is a serious problem in Angola, as Angolans die every day for various reasons, such as hunger, and delay the socio-economic-cultural development of the nation. In order to investigate the impact of poverty in Angola looking at the period 2002-2021 poverty in Angola affects the lives of Angolan citizens causing death, creating an impact on unemployment, low education, low health and poor quality of life and well-being of Angolans. After analysis of the impact of poverty in Angola we founded some important details like monthly food and non-food consumption expenditures per adult equivalent is 48.5% at the national level. The incidence of poverty rates is higher in rural areas 62.5% in urban areas 29.6%, in Angola per day 46 children starve to death. It has been analysed that 54% of Angolans are multidimensional poor and Poverty is more pronounced among children under the age of 10. Keeping such facts and figures in mind, this study throws light on the impact of Angolans residing in Rural as well as urban areas due to poverty.

Keywords: Poverty, Country, poor, Quality of life, socio-economic imbalance

R7

Uma-Based Mentawai Traditional Society Interrelation In Supporting Sustainable Development

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ABSTRACT

This article describes the interrelations that occur in the Indigenous community with outsiders from Uma that affect the values of local wisdom in Mentawai. As a cultural organization of the Mentawai people, Uma is at the center of the life and livelihood activities of the indigenous Mentawai people. In addition, Uma is also the basis for sustainable development for the Mentawai people because it is supported by the positive interrelation that has been built up within clans and clans with the external public. Although on the other hand, this interrelation also has a negative character, so that it can threaten the implementation of sustainable development in the Mentawai Regency. Through interrelationships carried out by the indigenous Mentawai people internally and externally outside Uma, it impacts Uma's existence as a social and cultural organization in supporting sustainable development in the Mentawai Regency. In theory, positive interrelation strengthens Uma's function, especially those related to symbolic roles in Mentawai society. However, the negative interrelation impacts the shifting of Uma's values so that it affects its existence to support the implementation of this sustainable development. Therefore, this paper describes the form of interrelation that occurs in this Uma-based customary community and the changes that occur in affecting Uma's function in supporting sustainable development. This article will link these aspects of interrelation with the goal of sustainable development in eradicating poverty and peace, justice, and strong institutions.

Keywords: Uma, Poverty, Institution, Development, Interrelation

Sustainable Infrastructure Development (SD)

SD1

Dynamics of Infrastructure Development Planning in Sustainable Development

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ABSTRACT

This paper contributes to providing an understanding of the dynamics of infrastructure development planning in sustainable development. First, this paper will explain the concept of development from the beginning the concept is used in a scientific context. Then it will also be explained about development planning and in more detail about infrastructure development planning. The research method used is a qualitative approach with systematic literature review (SLR) from various sources of the best journals in googlescholar.com, sciencedirect.com and other relevant sources. The result of this article review is to explain the development of development planning concepts from different periods; development planning context (Developed and Developing countries); categories of physical or social infrastructure development planning; then the sustainability impact of infrastructure development planning both positive and negative impacts of economic, environmental and social aspects, the last about the relationship of development planning with political decision making Based on this paper it is known that the dynamics of infrastructure development planning related to the sustainability of development. Then development planning cannot stand autonomous as an idea or concept that is normative because there is an aspect of political decision-making that determines the success of the planning. Furthermore, it is necessary to collaborate and synergize development actors in realizing infrastructure development planning. The novelty in this paper is to raise some research questions that can be researched for the future about the dynamics of infrastructure development planning in the context of sustainable development.

Keywords: Planning, development, infrastructure, sustainability impacts

SD2

Sustainable Housing and Sattlements in Bengaluru City

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ABSTRACT

India with 899 projects and gross sqt of 24.81 is in third position in the list U.S. Green Building Council LEED Green Building (2019) only behind Mainland China with 1,494 projects and Canada with 3,254 projects. Karnataka with 301 green projects, Karnataka tops second place in India's the Top 10 States wise list announced by US Green Building Council's LEED green building of year 2020 ,followed by Haryana, Tamil Nadu ,Uttar Pradesh. According to IILF Finance (2018) a green building can cut down effects on the environment, operational costs, and it promotes Built with eco-friendly materials, efficient water and Waste management, and most importantly it Improves health and comfort of occupants which is very necessary in today's world. India is racing towards no. 1 position in the World facing many challenges," Globally, the adaptation rate (to green building practices) is below 10%.This means 90% of all our buildings are still environment –unfriendly and adding to pollution levels". Said Tai Lee Siang, former chairman of the World Green Building Council. "The problem is more critical for Asian countries that are developing fast and building more Structures", he added. Real estate sector which mainly deal with the affordable housing segment plays a major role in increasing lane to sustainable growth. The benefits of green house (buildings) should breach deeper into improving the quality of life and should put an end to problem of exhausting natural resources. The objective of the research is find out the success barriers of Sustainable Housing, what are factors which are holding back the sales of Sustainable Houses and what measures can be taken by builders ,Other agencies to promote customers in purchasing of the sustainable houses. Here consumer attitude is studied in order to know how customer's purchasing and expectation towards Sustainable houses.

Keywords: Consumer attitude, Sustainable Houses, Real estate, Factors, Promote

SD3

Settlement Development: Through Sustainable Livelihood Settlements in Urban Areas

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ABSTRACT

This paper aims to capitalize on the development of earlier studies of residential concepts in planning for housing development. Preliminary research for now is a need, especially for large cities that have complex problems, like slum areas, squatter settlement. settlement densities and the others. Financial capital can only be judged by easy access to the financial capital. But more than that existing in urban life can be judged on the quality of the sustained settlement of, namely, obtaining access to clean water, air quality, connectivity to the production and trade centers in economic activity includes effort disaster reduction based on consep "The Sendai Framework " for risk reduction by avoiding high - risk areas. The livelihood approach based on that components that make up the bridge in a sustainable villian building. Thus it would be necessary to systemic review to map the basil research before it.

Keyword: livelihood, sustainabel settlement, the slum area, "Sendai framework". Sustainable Development Issues

SD4

Identification on the Use of Building Construction Materials and Its Cycles of The Houses in Kampong Naga, West Java

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ABSTRACT

Kampong Naga is a traditional village located in Tasikmalaya, West Java that still preserves the environment and tradition naturally. Kampong Naga, is an embodiment of environmental and vernacular architectural construction that have been built and maintained for generations by the people. This research analyse how vernacular architecture in Kampung Naga which is a traditional house that uses the concept of sustainable architecture by applying various principles of local wisdom. This research will focus on studying the traditional houses of Kampung Naga that use tropical architectural designs of West Java, starting from the material selection, the construction process and to finding the material cycles. The house is designed by optimizing local materials in its natural environment by minimizing the use of artificial materials, this allows the formation of a closed cycle which is a basic principle in the theory of cradle to cradle. This research will examine thoroughly the use of house materials cycles from foundation construction to roof and will be measured as the biological cycle and the technical cycle from the beginning until at the end of the building's life.This study uses qualitative methods by processing primary and secondary data to identify Kampong Naga's building construction with the used materials of the house based on the theory.

Keywords: Vernacular architecture, cradle to cradle, material cycles, Kampong Naga

SD5

Covid-19 Pandemic Impact on the Deteriorating Street Function

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ABSTRACT

Since the pandemic had hit the globe in 2020, it has changed the street's image. The street remains silent due to COVID-imposed lockdown. The street that usually been bustling with people and activities were near silent. The commencement practice of "social-distancing" has brought dramatic changes in street usage, where streets portray as a place for active travel, mobility and connecting peoples. Thus, this paper reviews the present effect of change street behavior based on existing literature. Qualitative analysis was performed using content analysis to elaborate the impact of streets function during this pandemic. Activities on the street such as walking, cycling, gathering and social events have impacted and limited participation in public. However, the street plays a vital role in supporting physical and mental well-being, as mentioned in SDG 11: Make the cities and human settlements inclusive, safe, resilient and sustainable. The findings of this study will help ensure that streets can become a public health approach and risk reduction for people to engage with outdoor activities. Therefore, streets serve as primary hope in overcoming the pandemic and how the city and people can have inclusive and safe access to the streets throughout the pandemic. We believe that social distancing should not preclude social interaction.

Keywords: Covid-19, streets, social distancing, SDG 11

SD6

IoT Enabled Smart Homes as a Means of Sustainable Development

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ABSTRACT

Internet of Things (IoT) in the context of Smart Homes has been an emerging area of study. IoT technologies take Smart Homes a step further by introducing integrated centralized control. IoT technology-enabled home is the one where electrical, electronic and household appliances are connected to a centralized monitoring and control system where the users can remotely adjust access in the house, temperature and lighting etc., but also functions of the smart TV, refrigerator, oven etc. A step forward to this, Smart 2.0 can be achieved by integrating greeneries maintenance atomization with the IoT technologies to maintain a healthy indoor environment. This research work focusses how IoT enabled Smart Homes can be considered in various building designs enabling a new era of development and growth aimed at achieving Sustainability. A critical review of various works will be done and factors will be identified that will align the development catering to the 2030 Agenda for Sustainable Development in the context of the Paris Agreement of UN-Habitat New Urban Agenda, European Union's Urban Agenda which are today's International Agendas safeguarding the sustainability of our Cities and Communities. Increasing Urbanization can be the source of solutions to, rather than the cause of, the challenges that our world is facing today. Well-planned and well-managed IoT enabled Smart Homes in the context of urbanization, can be a powerful tool for sustainable development for both developing and developed nations. Achievement of SDGs especially, Goal 3, 7, 11 and 12 is impossible without the role of technology. With the proper delivery and implementation of IoT enabled Smart Homes, safeguarding the sustainability of Cities and Communities is possible. IoT in Smart Home keep the power, water, temperature, ventilation systems, solar power, greeneries and waste in check contributing towards energy conservation in turn leads to optimal use of renewable energy.

Keywords: IoT, Smart Homes, Sustainable Development Issues, UN-Habitat New Urban Agenda, European Union's Urban Agenda

SD7

UPI- Redefining Digital Payment

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ABSTRACT

Over the years, India has made remarkable changes and developments in the field of digital payments. The innovations in the payment sector have accelerated technological up gradations so far. Unified Payment Interface is one among the innovation and has proved to be beneficial to the entire human race. Change is an inevitable factor. Unified Payment Interface 2.0 has the ability to expedite and navigate change at a much accelerated rate. This paper studies Unified Payment Interface 2.0 launched by National Payment Corporation of India on August 2018, an upgraded version of UPI. Unified Payment Interface in India has embraced mobile adoption and stimulated innovation, undoubtedly. This paper further studies the key role played by UPI in changing the scenario of the economy, identifies the major benefits of UPI 2.0 and also focuses on the comparative differences in the growth of UPI Pre Covid and during the pandemic. UPI is the most modern revolution initiated so far and has undergone remarkable transformation since its inception. Therefore it is important to study the overall impact of UPI in the economy and to sense the key role played by UPI and its major predominance in the society. Secondary data in the form of government websites, articles, Journals are explored and used in order to gather relevant information. In an attempt to construct this paper, it was established that, UPI is being embraced by the population and absolutely a revisionist in the digital payment field by examining the growth and changes it has brought about in the payment arena.

Keywords: UPI, Digital Payments, India, Digitalization, Technological Up gradation

SD8

Aligning Melaka Green City Action Plan (GCAP) by Assessing GHG Emission Inventories

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ABSTRACT

Melaka aspires to become a Green Technology City State by 2020. Melaka state took major initiative by publishing Green City Action Plan (GCAP) in 2014 aiming to reduce GHG emission intensity by 40% by the year 2020 compared to 2005 level. One of the action plans outlined in the GCAP is to compile a GHG inventory to identify the major sources of energy use emissions and to establish a carbon footprint baseline for the entire state of Melaka. This research aims to evaluates GCAP-based initiatives that have been implemented in Melaka. This research also evaluates the GHG emission inventories using Global Protocol for Community Scale (GPC) from 2013 to 2017. Related activity data were collected and analyzed which presented into 3 scopes (Scope1, 2, 3). Major sources of GHG emissions are Stationary Energy (52.95%), Transportation (27.04%), Waste (18.52%), Agriculture, Forestry & Other Land Use (AFOLU) (1.49%). The result indicated steady increase of GHG emissions from 8,859,802 tCO2e (2013) to 8,911,173 tCO2e (2017). However, the emission intensity of emissions decreased from 0.317 (2013) to 0.248 (2017), indicating that certain activities effectively reduced GHG emissions from ballooning. As a result, it is possible to assess the performance of the GHG reduction target and compare it to initiatives that have been implemented in accordance with GCAP.

Keywords: sustainable development, ghg inventory, green initiative

SD9

GIS-Multi Criteria Analysis to Enhance Planning Judgement for New Township Development

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ABSTRACT

Urban development is the continuous process towards hillsides which has been a challenging issue for developing Asian countries such as Malaysia due to limited flat land. Therefore, it is very crucial that their location should be carefully chosen. The objective of this study is to develop Geographic Information System (GIS)-based land suitability analysis model considering accessibility for locating optimal sites to the hillside development against environmental threats and economic pull factor. In order to determine suitable site towards hillside, the important factors are incorporated, namely accessibility and topography, land cover, and economic by using multi-criteria decision analysis (MCDA) method in decision making process. In this paper, pair-wise comparison matrixes, consistency ratio by using analytic hierarchy process (AHP) as a multi-criteria analysis method. Priority weights were obtained in Expert Choice software. As the result, consistency ratio (CR) was obtained, where Scenario 1 Accessibility is 0.04 and Scenario 2 Environment is 0.07. The outcomes of this study will be land suitability model for hillside developments in Malaysia as well as other developing countries.

Index Terms: Analytic Hierarchy Process, GIS, Land suitability analysis, MCD