

Biotechnologies towards Sustainable Development in Malaysia

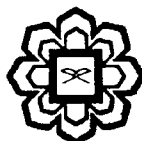
Zarina Zainuddin

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Zarina Zainuddin



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Table of Contents

Chapter 1 Bioethics and biotechnology: A holistic approach in Islamic perspectives	1
Ahmed Jalal Khan Chowdhury, Zaima Azira Zainal Abidin, Zarina Zainuddin and Suzannah Abdul Rahman	
Chapter 2 Malaysia's Sea Cucumber (Echinodermata: Holothuroidea) Database	16
Kamarul Rahim Kamarudin	
Chapter 3 Diversity and Exploitation of Sea Cucumbers in Malaysia and Its Neighbouring Countries	25
Kamarul Rahim Kamarudin	
Chapter 4 <i>Holothuria (Mertensiothuria) leucospilota</i> (Brandt, 1835) in the Marine Environment of Malaysia	36
Kamarul Rahim Kamarudin	
Chapter 5 Genetic manipulation for better bioremediation processes	50
Noor Faizul Hadry Nordin	
Chapter 6 Microbial bioremediation and sustainable development	64
Noor Faizul Hadry Nordin	
Chapter 7 Heavy metal uptakes by plants	74
Phang Ing Chia	
Chapter 8 Mechanisms of heavy metal tolerance in plants (I) – Avoidance mechanisms	84
Phang Ing Chia	
Chapter 9 Mechanisms of heavy metal tolerance in plants (I) – Tolerance mechanisms	89
Phang Ing Chia	
Chapter 10 Identifying catalytic residues for peptidases: <i>in silico</i> perspective	97
Noraslinda Muhamad Bunnori	
Chapter 11 Important considerations in qRT-PCR	103
Phang Ing Chia	

Chapter 12 Molecular approach of macroinvertebrates in tropical wetland, Lake Bera, Malaysia: Towards the assessment of ecosystem health	113
Nurhidayati Abdul Aziz, Ahmed Jalal Khan Chowdhury, Kamarul Rahim Kamarudin, Mohd Azmi Ambak and Najiah Musa	
Chapter 13 Probiotic for sustainability protein source in Malaysia	126
Tengku Haziya Amin Tengku Abdul Hamid	
Chapter 14 Bacteriocin as safe antimicrobial agent	133
Tengku Haziya Amin Tengku Abdul Hamid	
Chapter 15 Review on marine actinomycetes	141
Zaima Azira Zainal Abidin	
Chapter 16 Biotechnology potential tropical mangrove plant with special emphasis on <i>Avicennia alba</i> in Tanjung Lumpur, Pahang Malaysia	154
Ahmed Jalal Khan Chowdhury., Deny Susanti, and Nur Sazwi Binti Nordin	
Chapter 17 Studies on agronomy, breeding and genetics of <i>Stevia rebaudiana</i> (Bertoni) in Malaysia	168
Raji Akintunde Abdullateef and Mohamad bin Osman	
Chapter 18 Identification and characterization of <i>Burkholderia pseudomallei</i> serine and metallopeptidases	191
Noraslinda Muhamad Bunnori	
Chapter 19 Analysis of xylene degradation by bacteria isolated from petroleum contaminated sites	203
Noor Faizul Hadry Nordin and Marni Farhani Mansor	
Chapter 20 Bioadsorption of heavy metals from synthetic waste water by tropical rambutan seed	208
Ahmed Jalal Khan Chowdhury, Abul Bashir Mohammed Helal Uddin, Mohd Sufian Mohamad Shukri, Kamaruzzaman Yunus	
Chapter 21 Chitin and chitosan from fresh water fish tilapia (<i>Oreochromis niloticus</i>) scale	223
Ahmed Jalal Khan Chowdhury, Nor Hafizah Zakaria, Tengku Haziya Amin Tengku Abdul Hamid and Deny Susanti	
Chapter 22 Chitin and chitosan from potential shrimps and crabs of Malaysia	236
Ahmed Jalal Khan Chowdhury, Suffi Nurul Husna, Deny Susanti, Akbar John and Kamaruzzaman Yunus	

Chapter 23 Extraction of chitin and chitosan from Malaysian cephalopods “Sotong mengaban” (<i>Sepioteuthis lessoniana</i>) and “Sotong jarum” (<i>Loligo vulgaris</i>)	244
Ahmed Jalal Khan Chowdhury, Mohd Hazman Mohd Salleh, Deny Susanti, Akbar John and Jamaluddin Daud	
Chapter 24 <i>In Planta Agrobacterium tumefaciens</i> transformation of MR 219 rice	258
Zaima Azira Zainal Abidin and Rabiah Abdul Wahab	
Chapter 25 Optimisation of transformation system for chilli embryo (<i>Capsicum annuum</i> variety Kulai) using particle bombardment	268
Zarina Zainuddin and Rozilawati Mohamad Achil	
Chapter 26 Screening of mangrove plants for gram negative antibacterial activity	275
Zarina Zainuddin and ‘Izzati Akmal Hasan	
Chapter 27 Antibacterial activities of green and ripens banana peel (Musa, AA cv. Sucrier) in Malaysia	284
Ahmed Jalal Khan Chowdhury, Dina Fuad, Md. Tariqur Rahman and Akbar John	
Chapter 28 Agglutinin and antibacterial activities in oyster, <i>Chama pacifica</i> plasma	298
Najiah Musa, Arief Izzairy Zamani, Ahmed Jalal Khan Chowdhury and Muhamad Hazwan Mat Tar, Nadirah Musa	
Chapter 29 The effect of cooking methods on meat samples using PCR-RFLP analysis	305
Zaima Azira Zainal Abidin and Haryati Ithnin	

Chapter 7

Heavy metal uptakes by plants

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Introduction

Heavy metal uptake varies considerably, depending on plant species and the types of heavy metals. Herein, three key issues in relation to heavy metal uptake will be discussed: 1) bioavailability of heavy metals, 2) root uptake and xylem transport, 3) toxicity and detoxification.

Bioavailability of heavy metals and affecting factors

Heavy metal bioavailability is one of the key factors leading to the success of phytoremediation. Bioavailability is the metal concentrations that are available for uptake into plants. Different metals have different mobilities in the soils. Hence, total metal concentrations in contaminated sites do not necessarily correspond to bioavailability (John and Leventhal, 1995). For example, Zn and Cd occur primarily as soluble forms in the soil and thus are readily bioavailable for plant uptake. On the other hand, Pb tends to remain bound and immobile within the soil matrix. Thus Pb occurs in the form of insoluble precipitates, including phosphates, carbonates and hydroxides, which are mostly unavailable for plant uptake (Lasat, 2002). The release of metals from mineral deposits is strongly influenced by soil physical, chemical, and biological properties (John and Leventhal, 1995; Saxena *et al.*, 1999). These physico-chemical processes subsequently affect