

EMPIRICAL STUDIES OF AGRO-BASED INDUSTRY:

VOLUME 3

(AGRICULTURE AND AQUACULTURE)



EDITORS
KHAIRIYAH MAT
LEONY THAM YEW SENG

EMPIRICAL STUDIES OF AGRO-BASED INDUSTRY:

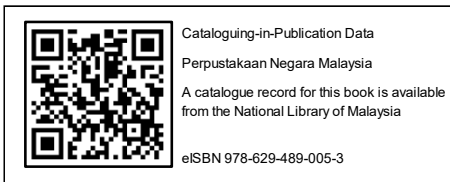
VOLUME 3

(AGRICULTURE AND AQUACULTURE)



Copyright UMK PRESS, 2023

All rights reserved. No part of this publication may be reproduced, stored in production, transmitted in any form, whether electronic, mechanical, photocopying, recording or otherwise, without having permission from the UMK Press.



Executive Producer: Azman Hashim. Copy Editors: Amirul Firdaus Zilah,
Raihana Sulaiman. Acquisition Editor: Nur Fatihah Pahazri.
Concept & Typesetting: Mohamad Kamarul Hisyam A Rahman.
Proof Reader: Zaliha Noor. Technical Assistant: Mohd Suhairi Mohamad.

Published by:
UMK Press
Universiti Malaysia Kelantan
The Office of Library and Knowledge Management
16300 Bachok, Kelantan
(Member of Malaysian Scholarly Publishing Council (MAPIM))
(Member of Malaysian Book Publisher Association (MABOPA))
Membership No. : 201903)

CONTENTS

List of Contributors
List of Figures
List of Tables
Preface
Acknowledgements

CHAPTER 1 EMPIRICAL STUDIES OF AGRICULTURE AND AQUACULTURE

Khairiyah Mat

CHAPTER 2 ROLE OF CHITOSAN AS A FOLIAR APPLICATOR TOWARDS GROWTH PARAMETER AND YIELD OF HYDROPONIC LETTUCE (*Lactuca sativa L.*)

Zul Ariff Abdul Latiff

CHAPTER 3 EFFECT OF CHITOSAN ON THE GROWTH AND YIELD OF HALF-RED AMARANTH (*Amaranthus gangeticus*)

Zul Ariff Abdul Latiff

CHAPTER 4 PATHOGENICITY OF *Vibrio alginoliticus* ON THE POST LARVAE OF *Macrobrachium rosenbergii*

*Adibah Bedol@Abd Halim, Siti Nuraliza Misri, Muhammad
Amiruddin Wahab, Khairiyah Mat, Nor Dini Rusli and
Hasnita Che Harun*

CHAPTER 5 OPTIMISATION OF AMMONIUM SULFATE FOR PROTEIN PURIFICATION FROM KEDAH-KELANTAN CATTLE (*BOS INDICUS*) PLACENTA

*Nurul Athirah Mohd Zuki @ Rosli, Khairiyah Mat, Nor Dini Rusli,
Hasnita Che Harun and Mohammad Mijanur Rahman*

CHAPTER 6
**EFFECT OF DIFFERENT LEVELS OF COCONUT PULP
RESIDUE ON FERMENTATION CHARACTERISTICS AND
NUTRITIVE VALUE OF NAPIER GRASS SILAGE**

*Mohammad Mijanur Rahman, Nor Iza Shafina Ramli and
Khairiyah Mat*

CHAPTER 7
**YIELD, NUTRITIVE AND ANTINUTRITIVE VALUES
OF SEVEN VARIETIES OF NAPIER GRASS (*Pennisetum
purpuerum*) GROWN IN KELANTAN**

*Mohammad Mijanur Rahman, Munira Mohd Zamri and
Norshazwani Muhamad Shariman*

CHAPTER 8
**ANALYSIS OF BACTERIAL CONTAMINATION AND
DEVELOPMENT OF A BIVALVE DEPURATION SYSTEM
FOR ASIAN CLAMS**

*Mohamad Shareef Mohd Hafiz Mani, Zulhisyam Abdul Kari,
An'amt Mohamed Noor, Wendy Wee and Lee Seong Wei*

CHAPTER 9
**ASIAN CLAM, *CORBICULA FLUMINEA*, STATUS IN
MALAYSIA**

*Mohamad Shareef Mohd Hafiz Mani, Zulhisyam Abdul Kari,
An'amt Mohamed Noor, Wendy Wee and Lee Seong Wei*

CHAPTER 10
**GROWTH PERFORMANCE AND CARCASS
CHARACTERISTICS OF RABBITS FED MULBERRY LEAF
PELLET**

*Nor Dini Rusli, Nur Ezatul Nabilah Johar, Julaikha Qistina Ibrahim,
Hasnita Che Harun and Khairiyah Mat*

CHAPTER 11
**HOW TO DATA FITTING YOUR EXPERIMENTAL DATA
ON CROP GROWTH: STEP-BY-STEP GUIDE USING
MYCURVEFIT**

Nurul Syaza Abdul Latif and Noor Asma' Mohd Anuar Mushoddad

CHAPTER 12
THE IMPORTANCE OF AGRICULTURE AND
AQUACULTURE

Khairiyah Mat

INDEX
EDITORS' BIOGRAPHIES

LIST OF CONTRIBUTORS

Zul Ariff Abdul Latiff

Associate Professor Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Hasnita Che Harun

Senior Lecturer Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Khairiyah Mat

Associate Professor Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Mohammad Mijanur Rahman

Senior Lecturer Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Lee Seong Wei

Associate Professor Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Nor Dini Binti Rusli

Senior Lecturer Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Nurul Syaza Binti Abdul Latif

Senior Lecturer Faculty of Computer and Mathematical Sciences
Universiti Teknologi MARA

Adibah Bedol@Abd Halim

Student Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Siti Nuraliza Misri

Student Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Muhammad Amiruddin Wahab

Student Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Nurul Athirah Mohd Zuki @ Rosli

Student Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Nor Iza Shafina Ramli

Student Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Munira Mohd Zamri

Student Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Norshazwani Muhamad Shariman

Student Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Mohamad Shareef Mohd Hafiz Mani

Student Faculty of Agro-Based Industry
Universiti Malaysia Kelantan

Zulhisyam Abdul Kari @ Abdullah

Senior Lecturer Faculty of Agro-Based Industry

Universiti Malaysia Kelantan

An'amt Mohamed Noor

Associate Professor Faculty of Bioengineering and Technology

Universiti Malaysia Kelantan

Wendy Wee

Lecturer Center of Fundamental and Continuing Education

Universiti Malaysia Terengganu

Nur Ezatul Nabilah Johar

Student Faculty of Agro-Based Industry

Universiti Malaysia Kelantan

Julaikha Qistina Ibrahim

Student Faculty of Agro-Based Industry

Universiti Malaysia Kelantan

Noor Asma' Mohd Anuar Mushoddad

Student Faculty of Agro-Based Industry

Universiti Malaysia Kelantan

LIST OF FIGURES

- Figure 2.1: Nutrient Film Technique, (Cutts, 2017)
- Figure 3.1: *Amaranthus gangeticus* (bayam separuh merah)
- Figure 4.1: Infected *M. rosenbergii* Post Larvae
- Figure 4.3: Determination of Lc 50 Using Probit Analysis with Different Concentrations of Bacteria without Control
- Figure 9.1: Asian Clam, *Corbicula fluminea*, Obtained from Kelantan
- Figure 9.2: A Study of Asian Clam, *Corbicula fluminea*, Grown in a Hatchery
- Figure 11.1: Example of the Best-Fitting Curve to a Given Set of Data Points (Weisstein, 2020)
- Figure 11.2: Least-Squares Fitting is by Minimising the Error between the Experimental Data Points and the Curve Points
- Figure 11.3: The Online-Curve Fitting www.mycurvefit.com. Curve Fitting Demonstration Using MyCurveFit
- Figure 11.4: The Graph of Experimental Data Points as in Table 11.2
- Figure 11.5: Data Entry
- Figure 11.7: The Michaelis-Menten Equation Graph (Walsh, 2012)
- Figure 11.8: The Curve Fitting Using Michaelis-Menten Equation
- Figure 11.9: The Curve Fitting Using Exponential (Proportional Rate Growth or Decrease) Equation
- Figure 11.10: How to Enter the User-Defined

$$y = \frac{K}{1+Ae^{-rx}} \text{ (Equation 1 for the Curve Fitting)}$$

Figure 11.11: The Curve Fitted Using the User-Defined Equation as

$$\text{in } y = \frac{K}{1+Ae^{-rx}} \text{ (Equation 1)}$$

Figure 11.12: Goodness Measures Using the User-Defined Equation as in Equation 1

LIST OF TABLES

Table 2.1: Mean and Standard Deviation for Height of Plant, Length of Root, and Yield per Plants (Weight in g)

Table 2.2: Mean and Standard Deviation for Number of Leaves, Length, and Width of Leaves for Each Treatment

Table 3.1: Mean and Standard Deviation of the Parameters for Each Treatment

Table 4.1: Correlation Analysis to Reveal the Relationship between Different Concentrations of *V. alginoliticus*

Table 5.1: Concentration of Protein in the First Precipitation of Ammonium Sulfate (mg/ml)

Table 5.2: Concentration of Protein in the Second Precipitation of Ammonium Sulfate (mg/ml)

Table 6.1: Composition of Napier Grass Ensiled with Coconut Pulp Residue and Other Ingredients

Table 6.2: Fermentation Characteristics of Napier Grass Silage Affected by Different Levels of Coconut Pulp Residue

Table 6.3: Proximate Components of Napier Grass Silage Affected by Different Levels of Coconut Pulp Residue

Table 7.1: Morphological Characteristics and Dry Matter Yield of 7 Varieties of Napier Grass over 6 Cuttings

Table 7.2: Correlations between Growth Parameters and DM Yields of Napier Grass

Table 7.4: Oxalate and Silica Contents of 7 Varieties of Napier Grass
at 1st Cutting

Table 8.1: Class of Shellfish EU Standard

Table 10.1: Body Weight Changes (g) between Groups (Mean±SE)

Table 10.2: Average Daily Body Weight Changes (g/d) between
Groups (Mean±SE)

Table 11.1: Common Functional Forms Used for Plant Growth
Modelling

Table 11.2: Pseudostem Height (in cm) Response of Banana to Foliar
Fertiliser

PREFACE

Undergraduate research enhances learning experience and empowers students to seek out resources and research opportunities to achieve their full academic potential. Hence, undergraduate curriculum at the Faculty of Agro-Based Industry imposes the students from each academic session to take up a final year project (FYP) to conduct research in their relevant academic programs. It is an obligatory for the completion of their B. Sc Honours degree. This book presents the comprehensive findings of undergraduate research that adhered to systematic research methods and analysis, supervised by experienced faculty members. The supervisors did not only expose students to diverse research approaches across various disciplines but also guided them in executing research systematically to achieve their study objectives, interpret their findings, and effectively communicate the outcomes in writing and presentations. This book will stand as a valuable resource for the future students to design and carry out their FYP undergraduate research related to the area of agro-based industry. The book provides models, approaches, recent trends and successful undergraduate research articles.

Khairiyah Mat

Leony Tham Yew Seng

ACKNOWLEDGEMENTS

We wish to acknowledge the Faculty of Agro-Based Industry, University Malaysia Kelantan, Jeli Campus, Kelantan, Malaysia for providing the facilities to carry out the research. A sincere thanks to the lecturers and laboratory assistants, who always spare some time in explaining all doubts regarding to laboratory works and check the instruments and chemicals to be used in laboratory.

A special thanks to Ministry of Higher Education, Malaysia, KTP-PSH grant scheme (R/KTPG/A07.00/00127A/002/2019/00621) financially supporting the work of Chapter 4: Pathogenicity of *Vibrio Alginoliticus* on the Post-Larvae of *Macrobrachium Rosenbergii*.

A special thanks to Ministry of Higher Education, Malaysia, Fundamental Research Grant Scheme (FRGS) (R/FRGS/A07.00/00130A/002/2017/000437) financially supporting the work of Chapter 5: Optimisation of Ammonium Sulfate for Protein Purification from Kedah-Kelantan Cattle (*Bos indicus*) Placenta.

A special thanks to Universiti Malaysia Kelantan internal grant financially supporting the work of Chapter 6: Effect of Different Levels of Coconut Pulp Residue on Fermentation Characteristics and Nutritive Value of Napier Grass Silage (R/SGJP/A07.00/01597A/001/2018/000448) and Chapter 7: Yield, Nutritive and Antinutritive Values of Seven Varieties of Napier Grass (*Pennisetum Purpuerum*) Grown in Kelantan (R/SGJP/A07.00/01597A/001/2018/000448).

Lastly, a special thanks to Ministry of Higher Education, Malaysia, Transdisciplinary Research Grant Scheme (TRGS) financially supporting the work of Chapter 8: Bivalve Depuration System and Bacteria Analysis (R/TRGS/A0.700/00387A/007/2016/000391) and Chapter 9: Asian Clam, *Corbicula Fluminea*, Status in Malaysia (R/TRGS/A0.700/00387A/007/2016/000391).

CHAPTER 1

EMPIRICAL STUDIES OF AGRICULTURE AND AQUACULTURE

Khairiyah Mat

Growing awareness of national food security and sovereignty issues has generated a range of unprecedented challenges for the agricultural sector in Malaysia. Agriculture has always been connected to productivity. Agriculture and aquaculture are two of the most essential and productive sectors of any economy. The main objective of these two fields is to meet human demand for food through the cultivation of crops and the rearing of aquatic animals. This article delves into a compilation of various research studies conducted in the field of agriculture and aquaculture with a focus on enhancing production methods.

The cultivation of crops and the raising of animals in order to produce food dates back many thousands of years, and although much has changed in the way food is produced, there are still many aspects of sustainable agriculture that have survived as essential features of production. Sustainable food production plays an important role in safeguarding the health of people and the environment, contributing significantly to employment and economic growth, and supporting social development. Sustainable agriculture is essential to overall food security and food safety. Sustainable agriculture contributes to food security when it increases productivity and promotes efficient use of resources; and to food safety when it reduces health hazards, such as the risk of bacterial contamination of crops and foods, caused by agrochemicals and other factors. Aquaculture is the farmed production of seafood like fish and crustaceans. It is the fastest-growing food production sector in the world, with production expected to double