

EFFECT OF METHYL FARNE SOATE HORMONE ON MOULTING PERIOD  
OF ORANGE MUD CRAB, *Scylla olivacea* (HERBST, 1796)

YEE WOEI SHYAN

FACULTY OF MARITIME STUDIES AND MARINE SCIENCE  
UNIVERSITI MALAYSIA TERENGGANU

2011

LP  
49  
FMSM  
3  
2011



**EFFECT OF METHYL FARNESOATE HORMONE ON MOULTING PERIOD  
OF ORANGE MUD CRAB, *Scylla olivacea* (HERBST, 1796)**

**By**

**Yee Woei Shyan**

**Research Report submitted in partial fulfillment of  
the requirements for the degree of  
Bachelor of Science (Marine Biology)**

**Department of Marine Science  
Faculty of Maritime Studies and Marine Science  
UNIVERSITI MALAYSIA TERENGGANU  
20011**

This project report should be cited as:

Yee, W. S. 2011. Effect of methyl farnesoate hormone on moulting period of orange mud crab, *Scylla olivacea* (Herbst, 1796). Undergraduate thesis, Bachelor of Science In Marine Biology, Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu, Terengganu. 52p.

***No part of this project report may be reproduced by any mechanical, phonographic recording, nor may it be stored in a retrieval system, transmitted, or otherwise copied for public or private use, without written permission form the author and the supervisor(s) of the project.***

1100088870

LP  
49  
11/01/11  
2011



DEPARTMENT OF MARINE SCIENCE  
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE  
UNIVERSITI MALAYSIA TERENGGANU

## DECLARATION AND VERIFICATION REPORT

### FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled:

**Effect of Methyl Farnesoate Hormone on Moulting Period of Orange Mud Crab, *Scylla olivacea* (Herbst, 1796) by Yee Woei Shyan, Matric No. UK 16531** have been examined and all errors identified have been corrected. This report is submitted to the Department of Marine Science as partial fulfillment towards obtaining the Degree of Bachelor of Science (Marine Biology), Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

Verified by

Principal Supervisor

Name: **Dr. Mhd Ikhwanuddin b. Abdullah**

Official stamp: **DR. MUHAMMAD IKHWANUDDIN @ POLITY BIN ABDULLAH**  
Lecturer  
Institute of Tropika Aquaculture  
Universiti Malaysia Terengganu  
21030 Kuala Terengganu.

Date: **27/4/2011**

Second Supervisor

Name: **Dr. Safiah Jasmani**

Official stamp: **DR. SAFIAH BT JASMANI**  
Pensyarah  
Institut Akuakultur Tropika  
Universiti Malaysia Terengganu  
21030 Kuala Terengganu

Date: **26.4.2011**

Head of Department of Marine Science

Name: **Dr. Razak bin Zakariya**

Official stamp:

**DR. RAZAK ZAKARIYA**  
Ketua Jabatan Sains Marin  
Fakulti Pengajian Maritim dan Sains Marin  
Universiti Malaysia Terengganu  
(UMT)

Date: **26/4/11**

## ACKNOWLEDGEMENT

I would like to take this opportunity to sincerely thank to my first supervisor Dr. Mhd Ikhwanuddin b. Abdullah and my co-supervisor Dr. Safiah Jasmani for their guidance and advices. Without their encouragements and efforts in guiding me throughout the Final Year Project, I would not be unable to complete this project myself successfully. The contribution from them to me is precious and invaluable.

Beside that, I would like also to thank Dr. Siti Aishah for her advice and concern. My thanks also go to Miss Wan Nurul Nadiah bt Wan Rasdi and Miss Nurul Huda Mohamad that shared and taught me how to handle the MF hormone. I would like to acknowledge the contribution of Mr Azmi, Mr. Redzuary b. Alias and other staff in Institute of Aquaculture Tropical (AKUATROP) for the technical assistance in the hatchery and laboratory. My thanks are also extended to the staff of Biology Diversity Laboratory and Anatomy and Physiology Laboratory for allowing me to borrow and use the apparatus and instruments available.

I am grateful to my fellow Marine Biology course mates and friends for assisting me in the laboratory works and also during culturing period. Their willingness to support, care and advice towards my project had given me the strength to run the project more energetically. A special thanks to Miss Juariah Hafsyah and Miss Lim Chuan Siew for assisting and giving me useful comments in thesis writing.

I would like to express my gratefulness towards my family members for giving me support, care and love all the time. I had gain a lot of experiences and wonderful moments throughout the project and will never fade from my memories. Lastly, I would like to apologize to people that I miss out here and I appreciate all your support to me.

## TABLE OF CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENTS</b>	ii
<b>LIST OF TABLES</b>	vi
<b>LIST OF FIGURES</b>	vii
<b>LIST OF APPENDICES</b>	viii
<b>LIST OF ABBREVIATIONS</b>	ix
<b>ABSTRACT</b>	x
<b>ABSTRAK</b>	xii
<b>CHAPTER 1: INTRODUCTION</b>	1
1.1 Research Background	1
1.2 Problem Statement	3
1.3 Significant of Study	4
1.4 Objective	5
<b>CHAPTER 2: LITERATURE REVIEW</b>	6
2.1 Mud crab, <i>Scylla olivacea</i>	6
2.1.1 Crab fishery	7
2.1.2 Types of crab in crab fishery	8
2.1.3 Market size	8
2.1.4 Limited crab seed and management	9
2.1.5 Soft-shelled fisheries	9
2.2 Moulting	10

2.2.1	Moulting cycle	11
2.3	Methyl Farnesoate (MF)	13
2.3.1	Functions and characteristic of MF	14
2.3.2	MF in Mandibular Organ (MO)	15
2.4	Importance of inducing moulting	16
<b>CHAPTER 3: METHODOLOGY</b>		<b>17</b>
3.1	Animal	17
3.2	Limb Autotomy	19
3.3	MF Experimental Design	20
3.4	Crab Sexes	21
3.5	Data Collection	22
3.5.1	Water Quality	22
3.5.2	Carapace Width	22
3.5.3	Moulting Period	23
3.5.4	Survival Rate	23
3.6	Statistical Analysis	23
<b>CHAPTER 4: RESULTS</b>		<b>24</b>
4.1	Moulting process interval period	24
4.2	Effect of crab gender on moulting period	26
4.3	Crab carapace width (CW) increment (cm)	27
4.4	Crab survival rate (%)	30



<b>CHAPTER 5: DISCUSSION</b>	32
5.1 Moulting process interval period	32
5.2 Effect of crab gender on moulting period	33
5.3 Crab carapace width (CW) increment (cm)	34
5.4 Crab survival rate (%)	36
<b>CHAPTER 6: CONCLUSION</b>	38
<b>REFERENCES</b>	40
<b>APPENDICES</b>	45
<b>CURICULUM VITAE</b>	52

## LIST OF TABLES

<b>Table</b>		<b>Page</b>
2.1	The stages of the moult cycle and duration	12
4.1	Effect of different doses of MF hormones on number of <i>S. olivacea</i> moulted within 100 days study period	24
4.2	Crab carapace width (CW) and survival rate in four treatments.	28

## LIST OF FIGURES

Figure		Page
1.1	Photograph of adult male <i>S. olivacea</i> showing diagnostic features: low rounded frontal lobe spines (A); pair reduced spines obvious on propodus (B), on carpus inner Photo credits from: Queen land Museum in Keenan (1999).	7
2.1	Structure of methyl farnesaote	14
3.1	Map of Setiu Wetlands, Terenggnau	18
3.2	Crabs with coloured band in one of the holding tank	19
3.3	Crab with without chelae and six legs after limbs autotomy	20
3.4	Shape of abdominal flap for (a) males and (b) females.	21
3.5	The carapace width is measure at the widest part o f the carapace from left to right ninth lateral spines.	22
4.1	Mean moulting period for moulted crabs in three treatments of Control, Treatment 1 (4.5µg/animal/week) and Treatment 2 (9.0µg/animal/week).	25
4.2	Figure 4.2: Mean moulting period for moulted crabs (male and female) in three treatments of Control, Treatment 1 (4.5µg/animal/week) and Treatment 2 (9.0µg/animal/week).	26
4.3	Mean carapace width (CW) increment for moulted crabs in three treatments of Control, Treatment 1 (4.5µg/animal/week) and Treatment 2 (9.0µg/animal/week).	29
4.4	Mean carapace width (CW) increment for the male and female crabs in different treatments of Control, Treatment 1 (4.5µg/animal/week) and Treatment 2 (9.0µg/animal/week).	30
4.5	Crab trapped and died in the carapace during moulting process	31

## LIST OF APPENDICES

<b>Appendix</b>		<b>Page</b>
1	Data of moulitng period for all male crabs	<b>46</b>
2	Data of moulitng period for all female crabs	47
3	Data of carapace width increment for male crabs	48
4	Data of carapace width increment for female	49
5	Comparison between initial size and final size of the carapace width for the moulted male crab in C	50
6	Comparison between initial size and final size of the carapace width for the moulted female crab in C	50
7	Comparison between initial size and final size of the carapace width for the moulted male crab in T1	51
8	Comparison between initial size and final size of the carapace width for the moulted female crab in T1	51
9	Comparison between initial size and final size of the carapace width for the moulted male crab in T2	52
10	Comparison between initial size and final size of the carapace width for the moulted female crab in T2.	52

## LIST OF ABBREVIATIONS

ng	-	nanogram
µg	-	microgram
cm	-	centimeter
g	-	gram
ml	-	milliliter
%	-	percentages
CW	-	carapace width
ppt	-	part per thousand
°C	-	degree Celsius
SD	-	standard deviation

## ABSTRACT

Methyl farnesoate (MF), a hormone synthesized by the mandibular organ (MO) of crustacean plays an important role in regulating moulting. By identifying a practical and economic dosage, moulting estimated time without hyperecdysionism or perturbation can be obtained. In addition, a wide range of commercial applications such as propagation and soft-shelled production can also be developed. The objectives of this study are to examine the effect of the MF hormone on orange mud crab, *S. olivacea* in the aspects of moulting period, carapace width (CW) increment and the survival rate. Samples were divided into three groups where control group (C) treated with MF vehicle solvent (ethanol), Treatment 1(T1) treated with 3 µg of MF and Treatment 2 with 9 µg of MF in each crab per week. The experiment was lasted 100 days while the effect of MF on each aspect was observed and analyzed. In the aspect of moulting period, administration MF had no effect in accelerating the moulting period. In term of gender, MF did have the tendency to accelerate moulting duration in females ( $p = 0.018$ ) but not in males ( $p = 0.18$ ) however only females in T1 significantly moulted faster than males ( $p = 0.00$ ) while other groups did not show any differences ( $p > 0.05$ ). Female crabs have a positive response towards MF in accelerating moulting period with lower doses (3µg) but it tends to inhibit the moulting process in female crabs as the doses increased to 9 µg. Three different doses of hormone did not cause a tendency to affect CW increment as there was no significant observed in the increment ( $p = 0.274$ ). In term of genders, female crabs had significant difference ( $p < 0.05$ ) in CW increment for C group and T1 but not in T2 ( $p = 0.759$ ). The effect of MF seemed not related to CW increment and may easily be affected by external factors. In the aspect of survival rate, all crab survived through the operative period and suggested that MF has no lethal effect on mud crab, *S.*

*olivacea*. This study had shown that MF is able to accelerate the moulting period in female crabs with suitable dose of MF. However, an increased in range of hormone doses is recommended for more result reliable the in future.

# KESAN HORMON METIL FARNESOATE KE ATAS TEMPOH PENYALINAN

KULIT KETAM BAKAU, *Scylla olivacea* (HERBST, 1796)

## ABSTRAK

Metil Farnesoate (MF) merupakan hormon yang disintesisikan oleh organ mandibular (MO) krustasia dan memainkan peranan yang penting dalam proses penyalinan kulit krustasia. Dengan mengenalpasti dos hormon yang lebih praktikal dan ekonomi, tempoh bersalin kulit ketam dapat dipendekkan tanpa berlakunya gangguan hiperekdaisonisme atau perencatan. Selain itu, aplikasi di dalam sektor komersial seperti di dalam proses pembiakan dan penghasilan ketam berkulit lembut juga dapat dihasilkan. Objektif kajian ini adalah untuk mengenalpasti kesan hormon MF ke atas ketam bakau, *S. olivacea* dengan menekankan aspek tempoh bersalin kulit, penambahan lebar karapas ketam (CW) dan kadar kelangsungan hidup ketam selepas proses bersalin kulit. Sampel-sampel ketam dibahagikan kepada tiga kumpulan utama, iaitu kumpulan kawalan (C) dimana ketam dirawat dengan pelarut MF (etanol), kumpulan rawatan 1 (T1) yang dirawat dengan 3 µg MF dan kumpulan rawatan 2 (T2) yang dirawat dengan 9 µg MF ke atas setiap ketam selang seminggu. Eksperimen ini telah dijalankan dalam masa 100 hari dimana kesan MF ke atas setiap aspek diperhatikan dan analisa dilakukan. Di dalam aspek penyalinan kulit, penggunaan MF tidak mempunyai sebarang kesan untuk mempercepatkan proses penyalinan kulit ketam. Di dalam aspek jantina, aplikasi MF mempunyai kecenderungan untuk mempercepatkan proses penyalinan kulit ke atas ketam betina ( $p = 0.018$ ) tetapi tidak ke atas ketam jantan ( $p = 0.18$ ), dimana hanya ketam betina dari T1 bersalin kulit lebih awal berbanding ketam jantan ( $p = 0.00$ ) dan tiada perbezaan ditunjukkan oleh kumpulan rawatan yang lain ( $p > 0.05$ ). Ketam betina telah menunjukkan respon yang