UNIVERSITI PUTRA MALAYSIA

SHOOT DENSITY AND BIOMASS FLUCTUATION OF SEAGRASS FROM MERAMBONG SHOAL

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FP 2013 96

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This project report is submitted in partial fulfilment of the requirements for the degree of Bachelor of Agriculture (Aquaculture)

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2013

CERTIFICATION OF APPROVAL

DEPARTMENT OF AQUACULTURE

FACULTY OF AGRICULTURE

UNIVERSITI PUTRA MALAYSIA

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This is to certify that I have examined the final project report and all corrections have been made as recommended by the panel of examiners. This report complies with the recommended format stipulated in the AKU4999 project guidelines, Department of Aquaculture, Faculty of Agriculture, Universiti Putra Malaysia.

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ACKNOWLEDGEMENT

"In the name of Allah, the most gracious, the most compassionate"

First and foremost, all praise to Allah for giving me good health, guidance and strength to finish all work in the final year thesis. I would like to express my special appreciation and thanks to my supervisor Assoc. Prof Dr .Muta Harah binti Zakaria @ Ya, who have been a tremendous mentor to me. Her encouragement and advice have been priceless. I would also like to thank the laboratory staffs, Pn. Nur Syafikah Mualad Abdul Jalil and En. Zawawi bin Idris. They have been there to support me when I recruited help and analyzed data for my thesis.

A special thanks to my family. Words cannot express how grateful I am to my mother Zaiton binti Aman and father Zahari bin Idris for all of the sacrifices that they have made on my behalf. Your prayer for me was what sustained me thus far. I would also like to thank all of my friends, especially Wan Hazma binti Wan Nawi, Nordiah binti Bidin, Emmclan Lau Sheng Hann and all aquaculture students who supported and encouraged me to strive towards my goal. Last but not least, I would like express appreciation to my beloved wife Nadiah binti Alwi@Harun who was always support in the moments when there was no one to answer my queries.

ABSTRACT

A study on vegetative morphology and diversity of seagrass with monitoring cover, shoot density and biomass was carried out at Merambong shoal (N 01° 19' 50.9", E 103° 36' 45"), Johore, Malaysia from March to August 2013 during low tide. Line-transect and quadrat methods were used for obtaining the mentioned seagrass diversity. A percentage of cover was recorded in the field while shoot density and biomass data was processed in the laboratory from 3 random sub-samples of quadrats. A total of 8 seagrass species; *Enhalus acoroides*, *Thalassia hemprichii*, big-leaved *Halophila ovalis*, small-leaved *H. ovalis*, *H. spinulosa*, *Cymodocea serrulata*, *Halodule pinifolia* and narrow-leaved *H. uninervis* were identified at Merambong shoal. The higher no of species per quadrat recorded are 1-7 species. A smaller species e.g., *H. ovalis* produce higher cover (small-leaved *H. ovalis* 6.00-39.49% and big-leaved *H. ovalis* 6.72-30.81%) when compared to larger species (e.g., *E. acoroides* 3.17-7.52%). Big-leaved *H. ovalis* was the dominant species with 64.63 percent of contribution. Small-leaved *H. ovalis* was the highest shoot density 5608.33 shoot/m^2 and big-leaved *H. ovalis* had highest biomass (AG 86.78 g DW m^{-2}, BG 36.29 g DW m^{-2}) compared to other species. In this study, strong correlation between above-ground and below-ground DW biomass ratio was recorded (r=0.845) for linear leaves and (r=0.835) for rounded leaves.

ABSTRAK

Kajian tentang vegetatif morfologi rumput laut dan diversiti dengan memantau litupan, kepadatan pucuk dan biomasa telah dilakukan di beting Merambong, (N 01° 19' 50.9", E 103° 36' 45") Johor, Malaysia dari bulan Mac hingga Ogos 2013 pada waktu air surut. Kaedah garis transek dan kuadrat telah digunakan untuk mendapatkan kepelbagain rumput laut yang telah dinyatakan. Peratusan liputan telah direkodkan di lapangan sementara kepadatan pucuk dan biomasa diproses didalam makmal daripada 3 sub-sampel kuadrat. Sejumlah 8 spesies rumput laut; *Enhalus acoroides*, *Thalassia hemprichii*, *Halophila ovalis* berdaun besar, *H. ovalis* berdaun kecik, *H. spinulosa*, *Cymodocea serrulata*, *Halodule pinifolia* dan *H. uninervis* berdaun tirus telah dikenalpasti di benting Merambong. Bilangan spesies didalam kuadart yang paling banyak direkodkan adalah 1-7 spesies. Spesies yang kecil seperti *Halophila ovalis* telah menhasilkan liputan yang tinggi (*H.ovalis* berdaun kecil adalah 6-39.49% dan *H. ovalis* berdaun besar adalah 6.72-30.81%) berbanding dengan spesies yang besar (misalnya *E. acoroides* 3.17-7.52%).*Halophila ovalis* berdaun besar adalah spesies yang paling dominan dengan peratus liputan 64.63%. *Halophila ovalis* berdaun kecil mempunyai kepadatan pucuk paling tinggi iaitu 5608.33 shoot/m^2 dan *H. ovalis* berdaun besar mempunyai biomasa paling tinggi (AG 86.78 g DW m^{-2} , BG 36.29 g DW m^{-2}) berbanding dengan spesies yang lain. Dalam kajian ini, korelasi positif yang ketara di antara nisbah berat atas tanah (AG) dan berat bawah tanah (BG) rumput laut DW biomasa telah direkodkan (r=0.845) untuk daun linear dan (r=0.835) untuk daun bulat.

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LIST OF ABBREVIATIONS/ SYMBOLS

%	percent
m	meter
cm	centimetre
DO	Dissolved Oxygen
TSS	Total Suspended Solid
No	Number
g	gram
NTU	Nephelometric Turbidity Units
psu	practical salinity units
ppm	parts per million
DW	Dry Weight
mm	millimetre
ha	hectare
NO_3-N	Ammonia Nitrogen
NO_3	Nitrate
YSI	Professional plus Instrument (Pro Plus)

CHAPTER 1

INTRODUCTION

Seagrasses are known as the only flowering plant which lives completely submerged in marine and brackish water and acts as an important part of the food web (den Hartog, 1970; Japar Sidik *et al.*, 2006). The high productivity of seagrass ecosystem has provide food and shelter to various species of fish and dugong (Beck *et al*., 2001). In Malaysia, 15 species of seagrass were recorded (Japar Sidik and Muta Harah, 2011). Seagrasses play a vital part in the marine ecosystem. They provide food, habitat, and nursery areas for numerous vertebrate and invertebrate species. They perform numerous functions in stabilizing the sea bottom, providing food and habitat for other marine organisms, maintaining water quality and supporting local economies (Japar Sidik and Muta Harah, 2003).

The vast biodiversity and sensitivity to changes in water quality inherent in seagrass communities makes seagrasses an important species to help determine the overall health of coastal ecosystems. Furthermore, the abundance of seagrass species can be determined through shoot density and biomass. According to Duarte and Kirkman (2001), shoot density is a basic way to describe seagrass abundance and can be a key parameter for monitoring growth of seagrass at that place. Shoot density also show the abundance of seagrass according the building block. Biomass fluctuation is mass of above and below part of seagrass that show the changes in 6 months monitoring.

The development of nearby area of Merambong caused changes to the environment and can endanger the area of seagrass such as the development of petrochemical facility on 40.5 ha of reclaimed island at the estuary. It is expected to handle annually 60 million tons of petroleum products - industrial and marine fuel oils, diesel, jet fuel and biodiesel (Chiew Hilary, 2008). Hence, the least of studied on seagrass in term of their sensitivity to the changes of water and environmental quality may cause to its extinction. This will affect the shoot density and biomass fluctuation of seagrass at Merambong shoal. Seagrasses which colonize near coastal ecosystem have potential as indicator of environmental health. Japar Sidik and Muta Harah (2011) reported only 5 researchers have done the study on the biomass and shoot density of seagrass species in Malaysia. Only 2 researchers did the study on Merambong shoal at south western Johor Coast, Peninsular Malaysia (Japar Sidik *et al*., 1996; Ethirmannasingam *et al*., 1996).

Based on the information above and lack of literature on seagrass shoot density and biomass especially in Malaysia, the aims of this study are:

1. To determine the vegetative and reproductive morphology of seagrasses at Merambong shoal
2. To determine the diversity of seagrasses at Merambong shaol
3. To determine the shoot density and biomass fluctuation of seagrasses at Merambong shoal

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