

**A STUDY ON PHOTOSYNTHESIS AND RESPIRATION OF CORALS IN
TERENGGANU WATERS**

**By
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the requirements for the Degree of
Bachelor of Science (Marine Biology)**

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**PENGAKUAN DAN PENGESAHAN LAPORAN
PROJEK PENYELIDIKAN I DAN II**

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:

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LIST OF ABBREVIATIONS

°C	- Degrees Celsius
m	- meter
cm	- centimetres
cm ²	- centimetre square
mg	- milligram
g	- gram
L	- liter
mg L ⁻¹	- milligram per liter
mg L ⁻¹ cell ⁻¹	- milligram per liter per cell
mg L ⁻¹ cell ⁻¹ hr ⁻¹	- milligram per liter per cell per hour
mg L ⁻¹ cm ⁻²	- milligram per liter per one centimeter square
mg L ⁻¹ cm ⁻² hr ⁻¹	- milligram per liter per one centimeter square per hour
m ⁻² day ⁻¹	- per meter per day
m ⁻² h ⁻¹	- Per meter per hour
%	- percentages
N	- normality

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Abstract

In this study, the photosynthesis and respiration of hermatypic corals that symbiosis with zooxanthellae were examined through the determination of photosynthetic and respiration rates based on dissolved oxygen and total carbon dioxide determination. Comparisons were made between four species of corals namely *Acropora famosa*, *Pocillopora damicornis*, *Fungai repanda* and *Hydnopora grandis*. The experiment were conducted in-situ under light and dark condition. Dissolved oxygen and total carbon dioxide concentration were measured after 9 hour of exposure to calculate the gross photosynthetic and net respiration rates throughout the day (morning, afternoon and evening). Photosynthetic rates of *F. repanda* based on dissolved oxygen produced during the light reaction was highest in morning ($5.1274 \pm 0.4030 \times 10^{-9} \text{ O}_2 \text{ mg L}^{-1} \text{ cell}^{-1} \text{ h}^{-1}$ and $13.2649 \pm 1.0971 \times 10^{-3} \text{ O}_2 \text{ mg L}^{-1} \text{ cm}^{-2} \text{ h}^{-1}$) compared to the other species of corals. Conversely *A. famosa* (Redand Island) had the highest net respiration rate in the evening based on dissolved oxygen consumed which were $1.7688 \pm 0.9845 \text{ O}_2 \times 10^{-9} \text{ mg L}^{-1} \text{ cell}^{-1} \text{ h}^{-1}$ and $2.2877 \pm 1.273 \times 10^{-3} \text{ O}_2 \text{ mg L}^{-1} \text{ cm}^{-2} \text{ h}^{-1}$. However, the highest gross photosynthetic and net respiration rates based on total carbon dioxide alteration were *A. famosa* (Lang Tengah Island) in the afternoon and *H. grandis* in the evening respectively. The gross photosynthesis of *H. grandis* were $12.2630 \pm 10.7643 \times 10^{-9} \text{ CO}_2 \text{ mg L}^{-1} \text{ cell}^{-1} \text{ h}^{-1}$ and $15.0000 \pm 17.7096 \times 10^{-3} \text{ CO}_2 \text{ mg L}^{-1} \text{ cm}^{-2} \text{ h}^{-1}$. Whereas net respiration rate of *A. famosa* were $15.1610 \pm 7.7320 \times 10^{-9} \text{ CO}_2 \text{ mg L}^{-1} \text{ cell}^{-1} \text{ h}^{-1}$ and $12.5970 \pm 6.4246 \times 10^{-3} \text{ CO}_2 \text{ mg L}^{-1} \text{ cm}^{-2} \text{ h}^{-1}$. The variation in photosynthetic and respiration rates between the coral species could be due to variability in ecological and physiological aspects of endosymbiosis which includes the number of zooxanthellae, the chlorophyll content, photoadaptation, morphology and behavior of the corals.