

INTERNATIONAL JOURNAL OF
NURSING PRACTICE
OFFICIAL JOURNAL OF THE INTERNATIONAL
NURSING FEDERATION
VOLUME 13 NUMBER 1
MARCH 2007

ISSN 1471-2248

WILEY-BLACKWELL

LP
39
FMSM
1
2007

**RELATIONSHIP BETWEEN CHLOROPHYLL *a*, CHLOROPHYLL *b*
AND CAROTENOIDS AND THE SPECTRAL REFLECTANCE OF TWO
SELECTED MANGROVE SPECIES**

By

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

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UNIVERSITI MALAYSIA TERENGGANU
2007**

1100054071

This project should be cited as:

Nor-Suhaida, Z. 2007. Relationship Between Chlorophyll *a*, Chlorophyll *b* and Carotenoids and the Spectral Reflectance of Two Selected Mangrove Species. Final Year Project Report, Bachelor of Science (Marine Biology), Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu. 60 p.

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**JABATAN SAINS MARIN
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**PENGAKUAN DAN PENGESAHAN
LAPORAN PROJEK PENYELIDIKAN I DAN II**

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: **“Relationship between chlorophyll *a*, chlorophyll *b* and carotenoids and the spectral reflectance of two selected mangrove species”** oleh **Nor Suhaida Binti Zainal No. Matrik UK10369** telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Marin sebagai memenuhi sebahagian daripada keperluan memperoleh ijazah **Sarjana Muda Sains Biologi Marin** Fakulti Pengajian Maritim dan Sains Marin, Universiti Malaysia Terengganu.

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ACKNOWLEDGEMENTS

Firstly, I am grateful to my supervisor, Assoc. Prof. Sulong B Ibrahim for his continuous supervision and discussion from the beginning till the end the project. I am also very appreciate and thankful to Mr. Mohd Suffian B. Idris as my co-supervisor for all his guidance and effort in helping me throughout a year to finish up this project. My thank you also goes to Mr. Ruzalizam B Katimon for lend some time by helping me collecting sample around the campus and not forget his guidance about spectral reflectance.

I would like to show my gratitude to Mr. Abdul Habir Alias, Mr. Nasir Mohamad, Mr. Muhammad Razali Salam, Mr. Yunus Ibrahim, YM Raja Razali bin Raja Ghani, Mr. Suliman Kasim, Miss Wan Nurzalia Wan Saelan for their help, assistance, and sharing their knowledge with me during the fieldwork and lab work.

Last but not least, I want to express my appreciation and special thanks to my whole family and all of my friends for encourage and continuous moral support to me to finish this thesis.

And big thank you for those who their name is not mention above who help me either directly or indirectly during the preparation of this project until finished. *Merci beaucoup.*

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LIST OF ABBREVIATION/SYMBOLS

NIR	-	Near Infrared
Chl <i>a</i>	-	Chlorophyll <i>a</i>
Chl <i>b</i>	-	Chlorophyll <i>b</i>
Cars	-	Carotenoids
MERIS	-	The Medium Resolution Imaging Spectrometer
LAI	-	Leaf Area Index
DBH	-	Diameter at the breast height
ASD	-	Analytical Spectral Device
nm	-	Nanometer (10^{-9} m)
cm	-	Centimeter
m	-	Meter
g	-	Gram
°	-	Degree
mg/L	-	Milligram per litre
%	-	Percentage
μ	-	Sample mean
n	-	Sample size
R ²	-	Coefficients of determination

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ABSTRAK

Pigmen yang di kaji di dalam kajian ini adalah klorofil a, klorofil b and juga karotenoid setelah menyedari kepentingan mereka terhadap penentuan potensi fotosintesis dan juga pengeluar primer. Hubungan mereka dengan pembalikan cahaya tidak dipersoalkan. Spesis paya laut yang dikaji adalah *Rhizophora apiculata* dan *Sonneratia caseolaris*. Sampel dikutip berdasarkan kematangan iaitu muda (DBH < 10 cm) dan dewasa (DBH > 10 cm). Klorofil a adalah dominan di dalam sampel berbanding dengan klorofil b dan karotenoid dalam julat 18.0180 – 27.4493 mg/L dan kepekatan karotenoid adalah paling rendah terletak dalam julat 5.9213 – 10.8569 mg/L. Cahaya pembalikan dalam sampel menunjukkan bentuk yang sama tetapi pelbagai dalam data. Data menunjukkan semua sampel memantulkan cahaya lebih tinggi di kawasan NIR iaitu hampir 60.33%. Spesis muda menunjukkan data pembalikan lebih tinggi daripada spesis dewasa untuk semua spesis. Purata kepekatan klorofil *a* dan karotenoid menunjukkan tiada hubungan untuk pokok muda tetapi ada untuk pokok matang. Keseluruhannya, perhubungan di kawasan biru menunjukkan ada hubungan tetapi tidak untuk kawasan hijau. Terdapat hubungan antara kepekatan pigmen dan juga pembalikan cahaya yang mana nilai R^2 adalah tinggi kecuali pada kawasan NIR.

ABSTRACT

The pigment of interest in this study are Chl *a*, Chl *b* and carotenoids as it is realized as important factor in determining the photosynthetic potential and also primary production. Their relation with spectral reflectance is being studied. The mangrove species chosen for this study are *Rhizophora apiculata* and *Sonneratia caseolaris*. The sample are collected in two ranges which are young (DBH < 10 cm) and mature (DBH > 10 cm). Chl *a* is the prominent pigment compare to Chl *b* and Cars in all samples with range 18.0180 – 27.4493 mg/L while total Cars in leaves are the least with range 5.9213 – 10.8569 mg/L. The spectral reflectance of all samples show similar pattern but varied in reflectance data. Data show that all samples are reflecting more in NIR region which is up to 60.33%. The young species show higher reflectance value than mature in both species. The mean of Chl *a* and Cars concentration in young species studied show no relation but for mature stand there is relationship. However, the result is reversely in Chl *b*. Overall, the relationship between pigment concentration and the spectral reflectance in the blue region showed high correlated while no systematic differences in the green region. In general, the coefficients of determination in the red region have much lower value than other region. In the NIR region, matured *R. apiculata* clearly showed no relationship between leaf spectral reflectance and pigment concentrations.