

CAROTENOIDS FROM TROPICAL MICROALGAE, *Isochrysis ps*;
DETERMINATION OF THE EFFECTS OF CAROTENOIDS
ON KNOWN PATHOGEN

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DETERMINATION OF THE EFFECTS OF CAROTENOIDS ON KNOWN
PATHOGEN

By

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**KAROTENOID DARIPADA *Isochrysis* sp. MIKROALGAE TROPIKA;
PENENTUAN KESAN KAROTENOID TERHADAP PATOGEN YANG DIKENAL
PASTI**

Oleh

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**Laporan Penyelidikan ini diserahkan untuk memenuhi sebahagian
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DECLARATION AND VERIFICATION REPORT

RESEARCH PROJECT I AND II

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

Carotenoids from Tropical Microalgae, *Isochrysis* sp: Determination of the Effects of Carotenoids on Known Pathogen by Mohd Sharulnaim Bin Othman, Matric No. UK 18104, has 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 Bachelor of Science Marine Biology, Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

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LIST OF ABBREVIATIONS

NaNO ₃	-	Sodium Nitrate
NaH ₂ PO ₄ .H ₂ O	-	Monobasic Sodium Phosphate
HCL	-	Hydrochloric acid
H ₂ O	-	Water
CO ₂	-	Carbon dioxide
O ₂	-	Oxygen
CH ₃	-	Methyl group
CHO	-	Aldehyde group
C ₆ H ₁₂ O ₆	-	Glucose/Carbohydrate
CuSO ₄	-	Copper Sulfate
MnCl ₂	-	Manganese Chloride
FeCl ₃	-	Ferum Chloride
DMSO	-	Dimethyl sulfoxide
MTT	-	(3-(4,5-dimethylthiazol-2-yl)2,5-diphenyl tetrazolium bromide)
DPPH	-	2,2-Diphenyl-1-Picrylhydrazyl
DNA	-	Deoxyribonucleic acid
Abs	-	Absorbance
hr	-	Hour
EC ₅₀	-	Effective concentration

IC ₅₀	-	Inhibitory concentration
LC ₅₀	-	Lethal concentration
%	-	Percentage
v/v	-	Volume to volume
nm	-	Nanometer
μm	-	Micrometer
L	-	Liter
mL	-	Mililiter
μL	-	Microliter
mg/ml	-	milligram per mililiter
°C	-	Degree Celcius

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DETERMINATION OF THE EFFECTS OF CAROTENOIDS ON KNOWN
PATHOGEN

ABSTRACT

This study was carried out to identify whether the local microalgae, *Isochrysis* sp has commercial value to be apply for future used. Microalgae *Isochrysis* sp was first culture in large mass known as batch culture and apply nutrient starvation to the microalgae to increase their carotenoid production due to nutrient limitations. Carotenoid is a pigment that can be found in the microalgae and plant and mostly associate with photosynthetic membranes. The carotenoid then was extracted, dries out and weight to get 29.34 % total carotenoid in dry weight of microalgae 13 g. The crude was tested with antioxidant assay and it showed that the crude does not has EC₅₀ even at high concentration. Further test was MTT cytotoxicity test and showed that the crude has LC₅₀ towards normal cell at concentration 0.24 mg/ml and LC₅₀ towards cancer cell at concentration 0.32 mg/ml. The crude was test with pathogenic bacteria and showed no inhibition towards bacteria growth. From all the tests used on the crude, it's showed that the microalgae do stressed by nutrient starvation. The crude does has LC₅₀ towards normal cell and cancer cell at different concentration but the crude failed to inhibit growth of pathogenic bacteria at concentration 100 mg/ml. Further analysis should be done by using higher concentration to identify the inhibition of bacteria towards the crude concentration.

KAROTENOIDS DARI MIKROALGA TROPIKA *Isochrysis* sp; MENGENALPASTI
KESAN KAROTENOIDS TERHADAP PATHOGEN

ABSTRAK

Kajian ini dijalankan untuk mengenalpasti samada mikroalga tempatan, *Isochrysis* sp mempunyai nilai komersial untuk digunakan pada masa akan datang. Pada mulanya *Isochrysis* sp akan di kultur dalam jumlah yang besar dan di kenali sebagai “batch culture” dan kemudian di aplikasikan proses kekurangan nutrien dalam kultur bagi meningkatkan penghasilan karotenoid yang disebabkan oleh kekurangan nutrient. Karotenoid adalah pigmen yang boleh dijumpai di dalam mikroalga dan tumbuhan dan kebanyakan karotenoid berinteraksi dengan membran fotosintesis. Karotenoid diekstrak, dikeringkan dan kemudian ditimbang untuk mendapatkan 29.34 % jumlah karotenoid per berat kering *Isochrysis* sp iaitu 13 g. Karotenoid kemudian diuji dengan ujian antioksidan dan menunjukkan bahawa karotenoid tidak mempunyai EC_{50} walaupun pada kepekatan yang tinggi. Ujian seterusnya dijalankan iaitu MTT sitotoksisiti dan menunjukkan bahawa karotenoid mempunyai LC_{50} pada sel normal pada kepekatan 0.24 mg/ml dan LC_{50} pada kanser sel pada kepekatan 0.32 mg/ml. karotenoid kemudian diuji dengan pathogenic bacteria and tidak menunjukkan sebarang halangan pada pertumbuhan bacteria. Daripada semua ujian yang dijalankan, mikroalga yang digunakan memang telah mengalami tekanan pada kekurangan nutrien. Karotenoid mempunyai LC_{50} pada sel normal dan kanser sel pada kepekatan berbeza tetapi gagal untuk menghalang

pertumbuhan pathogenic bacteria pada kepekatan 100mg/ml. Analisis selanjutnya harus dijalankan dengan menggunakan kepekatan yang lebih tinggi untuk mengenalpasti kepekatan yang diperlukan untuk menghalang pertumbuhan bacteria.