

PLANKTON AND FATTY ACIDS COMPOSITION OF  
DIFFERENT SIZE CLASSES ALONG MERANG WATERS

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SCHOOL OF MARINE SCIENCE AND ENVIRONMENT  
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**PLANKTON AND FATTY ACIDS COMPOSITION OF DIFFERENT SIZE  
CLASSES ALONG MERANG WATERS**

**By**

**Raveena a/p Kim Lai**

**Research Report submitted in partial fulfillment of  
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**SCHOOL OF MARINE SCIENCE AND ENVIRONMENT  
UNIVERSITI MALAYSIA TERENGGANU**

**DECLARATION AND VERIFICATION REPORT  
FINAL YEAR RESEARCH PROJECT**

It is hereby declared and verified that this research report entitled Plankton and Fatty Acid Composition of Different Size Classes along Merang waters by Raveena a/p Kim Lai, Matric Number UK27340 have been examined and all errors identified have been corrected. This report is submitted to the School of Marine Science and Environment as partial fulfilment towards obtaining Degree of Bachelor of Science (Marine Biology), Universiti Malaysia Terengganu.

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## LIST OF ABBREVIATIONS

SAFA	-	Saturated fatty acid
MUFA	-	Monounsaturated fatty acid
PUFA	-	Polyunsaturated fatty acid
HUFA	-	Highly unsaturated fatty acid
EPA	-	Eicosapentaenoic acid
DHA	-	Docosahexaenoic acid
EFA	-	Essential fatty acid
FA	-	Fatty acid
FAME	-	Fatty acid methyl ester
GC-FID	-	Gas chromatography – Flame Ionization Detector
mg	-	milligram
L	-	Liter
nm	-	nanometer
°C	-	degree Celcius
m	-	meter
ml	-	milliliter
µm	-	micrometer
BF <sub>3</sub>	-	Boron triflouride
GC	-	Gas chromatography
n-3	-	Omega-3

## LIST OF FORMULAE

Density of phytoplankton,

$$\text{Density (natural unit ml}^{-1}\text{)} = \frac{(C \times A_t)}{(A_s \times S \times V)} \quad (\text{e.q 1})$$

Where,

C = total number of cells counted

A<sub>t</sub> = area of coverslip, mm<sup>2</sup>

A<sub>s</sub> = area of one strip, mm<sup>2</sup>

S = number of strip counted, and

V = volume of sample under coverslip, ml

Density of zooplankton,

$$\text{Density (individual L}^{-1}\text{)} = \frac{\frac{(\text{No.of individual} \times \text{Vol.conc.Sample})}{\text{Subsample (5ml)}}}{\text{Vol.of seawater filter (L)}} \quad (\text{e.q 2})$$

Concentration of fatty acid;

$$C_{\text{FA}} = \left[ \frac{A_S}{A_{\text{IS}}} \times \frac{C_{\text{IS}}}{W_S} \right] \quad (\text{e.q 3})$$

Where,

A<sub>s</sub> = Peak area of fatty acid in the sample in chromatogram

A<sub>IS</sub> = Peak area of internal standard in chromatogram

C<sub>IS</sub> = Concentration of internal standard (mg)

W<sub>S</sub> = Weight of sample (g)

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## ABSTRACT

In natural environment, the primary food chain mainly dominated by phytoplankton which was the main photosynthetic producers as a food source for the higher trophic level followed by zooplankton as consumer. The studies of fatty acid content in plankton have been studied worldwide with different condition and climate especially in marine ecology. This method is very useful to trace the basic sources background in marine organisms. Fatty acid is important in as a source of energy in higher trophic level. The importance in this study was to determine the dominant plankton and to trace the fatty acid biomarkers in the natural plankton community with different mesh sizes. The composition of phytoplankton mainly dominated by Phylum Bacillariophyta or diatoms with more than 30% while zooplankton taxa were dominated by Copepods with more than 30% for both stations and depth. Phytoplankton densities range from 0.0002 to 0.8077 natural unit  $\text{ml}^{-1}$ . On the other hand, zooplankton densities range from 1.25 to 11.35 individual  $\text{L}^{-1}$ . As for fatty acid composition which mainly dominated by polyunsaturated fatty acid (PUFA) with C18:3n3 or Omega-3 dominated the fatty acid concentration with more than 60%. Fatty acid concentration range from 0.025 to 30.74  $\text{mg ml}^{-1}$ . The phytoplankton dominated by diatoms showed high in PUFA (C18:3n3) content. Most phytoplankton can synthesize the fatty acid compared to zooplankton. The results obtained were significant between phytoplankton density with PUFA and SAFA ( $p < 0.05$ ) but no significant difference among fatty acid content in zooplankton density ( $p > 0.05$ ).

# Komposisi Plankton dan Asid Lemak pada Berlainan Saiz Kelas di Sepanjang

## Perairan Merang

### ABSTRAK

Dalam persekitaran semula jadi, rangkaian makanan didominasi oleh fitoplankton iaitu pengeluar fotosintesis sebagai sumber makanan untuk peringkat trofik yang lebih tinggi iaitu zooplankton sebagai pengguna. Kajian daripada kandungan asid lemak dalam plankton telah dikaji di seluruh dunia dengan keadaan yang berbeza dan iklim terutamanya dalam ekologi marin. Kaedah ini berguna untuk mengesan latar belakang sumber asas dalam organisma marin. Asid lemak adalah penting dalam sebagai sumber tenaga dalam tahap trofik yang lebih tinggi. Kepentingan kajian ini adalah untuk menentukan plankton dominan dan untuk mengesan penanda biologi asid lemak dalam komuniti plankton semula jadi dengan saiz yang berbeza. Komposisi fitoplankton besarnya didominasi oleh Phylum Bacillariophytaa atau diatom dengan lebih daripada 30% manakala zooplankton taksa dikuasai oleh kopepod dengan lebih daripada 30% untuk kedua-dua stesen dan mendalam. Kepadatan fitoplankton antara 0.0002-0.8077 unit semula jadi  $\text{ml}^{-1}$ . Sebaliknya, kepadatan zooplankton antara 1.25-11.35 individu  $\text{L}^{-1}$ . Bagi komposisi asid lemak yang kebanyakannya dikuasai oleh asid lemak politaktepu (PUFA) dengan C18: 3n3 atau Omega-3 dikuasai kepekatan asid lemak dengan lebih daripada 60%. Asid lemak julat kepekatan 0.025-30.74  $\text{mg ml}^{-1}$ . Yang dikuasai oleh fitoplankton diatom menunjukkan tinggi dalam PUFA iaitu C18: 3n3. Kebanyakan fitoplankton dapat mensintesis asid lemak berbanding dengan zooplankton. Keputusan yang diperolehi adalah signifikan antara kepadatan fitoplankton dengan PUFA dan SAFA ( $p < 0.05$ ) tetapi tiada perbezaan yang signifikan antara kandungan asid lemak dalam kepadatan zooplankton ( $p > 0.05$ ).