

ISOLATION OF POLYHYDROXYALKANOATE PRODUCING
BACTERIA FROM SEDIMENT COLLECTED AT SETIU

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Final Research Project Report Declaration and Verification Form



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DECLARATION AND VERIFICATION REPORT FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled: **Isolation of Polyhydroxyalkanoate Producing Bacteria from Sediment Collected at Setiu** by **Muhammad Amirrul Rasyid Bin Ahmad** Matric no. **UK22831** have 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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Isolation of Polyhydroxyalkanoate Producing Bacteria from Sediment Collected at
Setiu

By
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Research Report submitted in partial fulfilment of
the requirement for the degree of
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List of abbreviations and symbol

% mol	Mol percent
μ	Micro
C ₁₀	Carbon-10
C ₁₂	Carbon-12
C ₁₄	Carbon-14
CaCl ₂	Calcium chloride
CDW	Cell dry weight
CME	Caprylic methyl ester
CoA	Coenzyme-A
CoCl ₂ ·6H ₂ O	Cobalt (II) chloride hexahydrate
CrCl ₃ ·6H ₂ O	Chromium chloride hexahydrate
CuSO ₄ ·5H ₂ O	Copper sulfate pentahydrate
FeCl ₃	Iron (III) chloride
G	Gram
H ₂ O	Water
H ₂ SO ₄	Sulphuric acid
KH ₂ PO ₄	Potassium dihydrogen phosphate
kPa	Kilo pascal
L	Liter
MCL- PHA	Medium chain length PHA
Mg	Milligram

min	Minute
mL	Millilitre
MS Agar	Mineral salt agar
MSM	Mineral salt medium
Na ₂ HPO ₄	Disodium hydrogen phosphate
Na ₂ SO ₄	Sodium sulphate
NH ₄ Cl	Ammonium chloride
NiCl ₂ ·6H ₂ O	Nickel chloride hexahydrate
NMR	Nuclear magnetic resonance
NR Agar	Nutrient rich agar
NRM	Nutrient rich medium
°C	Degree Celcius
P(3HB)	poly(3-hydroxybutyrate)
P(3HB- <i>co</i> -3HHx)	poly(3-hydroxybutyrate- <i>co</i> -3 hydroxyhexanoate)
P(3-HB- <i>co</i> -3HHx).	poly(3-hydroxybutyrate- <i>co</i> -3-hydroxyhexanoate)
P(3HB- <i>co</i> -3HV)	poly(3-hydroxybutyrate- <i>co</i> -3 hydroxyvalerate)
P(3HD)	poly (3-hydroxydecanoate)
P(3HDD)	poly(3-hydroxydodecanoate)
P(3HHp)	poly (3-hydroxyheptanoate)
P(3HHx)	poly (3-hydroxyhexanoate)
P(3HHx- <i>co</i> -3HO)	poly(3-hydroxyhexanoate- <i>co</i> -3-hydroxyoctanoate)
P(3HO)	poly (3-hydroxyoctanoate)
P(3HTD)	poly(3-hydroxytetradecanoate)
PHA	Polyhydroxyalkanoate

PCR	Polymerase Chain Reaction
rpm	Revolution per minute
SCL-PHA	Short chain length PHA
TCA	Tricarboxylic acid
wt %	Percentage per weight
<i>B</i>	Beta

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- Appendix I Report of gas chromatography of strain A22 10^{-6} 1.
- Appendix II Report of gas chromatography of strain A22 10^{-6} 2.

ABSTRACT

Gram negative strains, A 22 10⁻⁶ 1 and A 22 10⁻⁶ 2 were isolated from mangrove sediment collected at Setiu. Both strains are potential polyhydroxyalkanoate (PHA) producer after shown positive results in screening for PHA production with Nile red stain when emitted pink fluorescence under UV light. Biosynthesis of PHA by both strains were carried out with glucose, fructose and oleic acid as carbon sources. GC analysis on dried sample of both strains from biosynthesis enriched with glucose and fructose detected production of medium chain length PHA. Strain A22 10⁻⁶ 1 detected in production of C₁₀, poly(3-hydroxydecanoate) P(3HD), C₁₂, poly(3-hydroxydodecanoate) P(3HDD) and C₁₄, poly(3-hydroxytetradecanoate) P(3HTD) while A 22 10⁻⁶ 2 detected for production of P(3HD) and P(3HTD).

ABSTRAK

Pengasingan bakteria yang menghasilkan polihidroksialkanoat daripada sedimen yang dikumpulkan di Setiu

Strain Gram negatif , A 22 10⁻⁶ 1 and A 22 10⁻⁶ 2 telah diasingkan dari sedimen di persekitaran bakau yang dikumpulkan dari Setiu. Kedua-dua strain adalah berpotensi menghasilkan polihidroksialkanoat (PHA) selepas menunjukkan keputusan positif dalam saringan terdapat penghasilan PHA dengan pewarnaan 'Nile red' memancarkan florescen merah jambu di bawah cahaya ultra ungu. Biosintesis PHA oleh kedua-dua strain dilakukan dengan menggunakan glukosa fruktosa dan asid olik sebagai sumber karbon. Analisis gas kromatografi ke atas sampel kering kedua dua strain daripada biosintesis yang diperkaya dengan glukosa dan fruktosa mengesan penghasilan PHA rangkaian sederhana panjang. Strain A 22 10⁻⁶ 1 dikesan dalam penghasilan C₁₀, poly(3-hydroxydecanoate) P(3HD), C₁₂, poly(3-hydroxydodecanoate) P(3HDD) and C₁₄, poly(3-hydroxytetradecanoate) P(3HTD) manakala A 22 10⁻⁶ 2 dikesan dalam penghasilan P(3HD) and P(3HTD).