

**CRUDE OIL DEGRADING ABILITY BY MARINE AND  
FRESHWATER BACTERIA**

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**CRUDE OIL DEGRADING ABILITY BY MARINE AND FRESHWATER  
BACTERIA**

**By**

**Nurul Ashikin binti Elias**

**Research Report submitted in partial fulfillment of  
the requirements for the degree of  
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**DECLARATION AND VERIFICATION REPORT  
FINAL YEAR RESEARCH PROJECT**

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

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## LIST OF ABBREVIATIONS

°C	-	Degree celcius
CFU	-	Colony Forming Unit
g	-	Gram
m	-	Meter
ml	-	Mililiter
NA	-	Nutrient agar
MNA	-	Marine nutrient agar
μL	-	Microliter
NB	-	Nutrient broth
MNB	-	Marine nutrient broth
ppm	-	Part per million
Psi	-	Pound per square inch (pressure)

## ABSTRACT

The extensive use of hydrocarbon can lead to the pollution of the environment which can give devastating impact to the abiotic and biotic components in the environment. Marine environment is the most concern areas as this area is the most susceptible area of pollutant. Thus, the study on bioremediation is carried out which use marine and freshwater bacteria to evaluate the efficiency of the bacteria to degrade the crude oil. The findings also found that four bacteria strains; *Enterobacter* sp., *Psychrobacter* sp., *Brevibacterium* sp. and *Chromobacterium* sp. USM2 shown good growth on crude oil agar. The number of colonies detected on crude oil agar shown no significant difference among each bacteria, whereby *Chromobacterium* sp. USM2 has shown the highest number of colony growth on crude oil agar (52 colonies). All four strains also have grown well in a basal salt medium enriched with the crude oil and glucose as carbon sources for them. The maximum growth of the bacteria in a crude oil treatment medium (1 ml) was  $12.7 \pm 0.01$  g/L by *Brevibacterium* sp. while in glucose treatment medium the maximum growth performed by *Enterobacter* sp. ( $15.8 \pm 0.09$ ) g/L. The study shows that the different carbon sources will yield different growth rate for each bacteria and the enrichment of nutrient in cultivation of bacteria will support the bacteria to grow well. Apart from the nutrient supply, other factors such as temperature for cultivation also considered as a limiting factor for the bacteria to grow. So, these four strains have proved that the effectiveness in degrading the crude oil where they use the crude oil as their sole carbon sources for growth.

## Kebolehan Degradasi Minyak Mentah Oleh Bakteria Laut Dan Bakteria Air Tawar

### ABSTRAK

Penggunaan hidrokarbon yang meluas boleh membawa kepada pencemaran alam sekitar yang boleh memberi kesan yang amat buruk kepada komponen biotik dan biotik dalam alam sekitar. Oleh itu, kajian mengenai biopemuliharaan dijalankan menggunakan bakteria laut dan bakteria air tawar untuk menilai kecekapan bakteria untuk mengurangkan pencemaran minyak mentah. Hasil kajian ini juga mendapati bahawa empat jenis bakteria; *Enterobacter* sp, *Psychrobacter* sp, *Brevibacterium* sp. dan *Chromobacterium* sp. USM2 menunjukkan pertumbuhan yang baik pada agar minyak mentah. Bilangan koloni yang tumbuh pada minyak mentah menunjukkan tiada perbezaan yang ketara antara satu sama lain bakteria, tetapi *Chromobacterium* sp. USM2 telah menunjukkan pertumbuhan koloni yang tertinggi di agar minyak mentah (52 koloni) berbanding bakteria yang lain. Kesemua empat jenis bakteria ini juga telah berkembang dengan baik dalam medium garam basal yang diperkaya dengan minyak mentah dan glukosa sebagai sumber karbon untuk mereka. Pertumbuhan maksimum untuk bakteria dalam medium yang ditambah 1ml minyak adalah  $12.7 \pm 0.01$ g/L oleh *Brevibacterium* sp. manakala di medium glukosa pertumbuhan maksimum telah ditunjukkan oleh *Enterobacter* sp. ( $15.8 \pm 0.09$ ) g/L. Kajian ini menunjukkan bahawa sumber-sumber karbon yang berbeza akan menghasilkan kadar pertumbuhan yang berbeza untuk setiap bakteria dan penambahan nutrient dalam kultur bakteria akan menyokong bakteria untuk tumbuh dengan lebih baik. Jadi, empat jenis bakteria ini telah membuktikan bahawa keberkesanan dalam mengurangkan kadar kepekatan minyak mentah di mana mereka menggunakan minyak mentah itu sebagai sumber karbon untuk pertumbuhan.