

EFFECT OF CULTURE MEDIUM ON THE SMALL-SCALE
VEGETATIVE PROPAGATION OF THE RED SEAWEEDS;
Gracilaria changii AND *Gracilaria edulis*

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UNIVERSITI MALAYSIA TERENGGANU

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VEGETATIVE PROPAGATION OF THE RED SEaweEDS,
Gracilaria changii AND *Gracilaria edulis***

By

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

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:

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LIST ABBREVIATION

km	-	Kilometer
sp.	-	Species
t	-	Ton
%	-	Percent
kg	-	Kilogram
Ha	-	Hactare
g	-	Gram
L	-	Liter
mg	-	Milligram
mL	-	Milliliter
M	-	Molarity
m	-	Meter
μ	-	Micron / Specific growth rate
s	-	Seconds
$^{\circ}\text{C}$	-	Celcius
mm	-	Millimeter
ln	-	Natural logarithm

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ABSTRACT

This study examines the ability of *Gracilaria changii* and *Gracilaria edulis* to propagate vegetatively from thallus segments (apical segments, mid segments and basal segments) in different culture media. *Gracilaria* samples were collected from Middle Bank, Penang Island and brought back to the laboratory in Universiti Malaysia Terengganu for further cultivation. Culture media chosen were Natural aged seawater, Enriched natural seawater (ES) medium and Plymouth Erd-schreiber (PE) media with soil extracts prepared from soil samples obtained from Sandakan, Setiu Wetland and Garden soil. Effects of culture media on *Gracilaria* segments were observed and expressed in the form of number of branches, length of newly formed branches and specific growth rate (compiled as daily growth rate and weekly growth rate). Cultivated apical segment in all media showed overall elongation rather than branch formation while mid and basal segments showed the opposite. Highest branch number for all cultivated segments of *Gracilaria changii* was observed in PE (Garden Soil) medium (16 on apical segments, 80 on mid segments and 85 on basal segments). As for *Gracilaria edulis*, all highest branch numbers were observed in Natural aged seawater: 229 branches were recorded for apical segments, 268 on the mid segments and 242 on the basal segments. In terms of branch length, longest branches were observed in ES medium and recorded as 9mm (apical segments), 9mm (mid segments) and 10mm (basal segments) for *Gracilaria changii*; 18mm (apical segments), 27mm (mid segments) and 23mm (basal segments) for *Gracilaria edulis*. Generally, it was observed that ES medium and PE (Setiu) medium provided the best results for most of the segments. Highest specific daily growth rate based on fresh weight recorded in ES medium were 0.0096 day⁻¹ for *Gracilaria changii* apical segments, 0.0155 day⁻¹ and 0.0149 day⁻¹ for *Gracilaria edulis* mid and basal segments respectively. As for the PE

(Setiu) medium, the highest daily specific growth rate observed were 0.0033 day^{-1} and 0.0034 day^{-1} for *Gracilaria changii* mid and basal segments respectively, and 0.0275 day^{-1} for *Gracilaria edulis* apical segments. The highest daily specific growth rate based on length was highest in ES medium for both *Gracilaria changii* and *Gracilaria edulis* (0.0084 day^{-1} and 0.0105 day^{-1} respectively). Thus, ES medium and PE (Setiu) medium are suitable for culture purposes in laboratory.

**Kesan Media Kultur ke atas Pertumbuhan vegetatif Rumpai Laut (Rhodophyta)
Gracilaria changii and *Gracilaria edulis* secara skala kecil**

ABSTRAK

Kajian in menguji keupayaan *Gracilaria changii* dan *Gracilaria edulis* untuk bertumbuh secara vegetatif dari bahagian talus (bahagian pucuk, bahagian tengah dan bahagian dasar) dalam media kultur yang berlainan. Sample *Gracilaria* dari Middle Bank, Pulau Pinang dipungut dan dibawa balik ke makmal Universiti Malaysia Terengganu untuk aktiviti kultur. Media kultur yang digunakan adalah air laut semulajadi yang berumur, media “Enriched natural seawater” (ES) dan media “Plymouth Erd-schreiber” (PE) dengan ekstrak tanah yang disediakan dengan menggunakan sampel tanah dari Sandakan, Setiu dan tanah tamanan. Kesan media ke atas *Gracilaria* diperhatikan dan diambilkira dalam bentuk jumlah ranting, panjang ranting yang tumbuh serta kadar pertumbuhan khusus (dalam bentuk harian and mingguan). Semua bahagian pucuk *Gracilaria* menunjukkan pemanjangan talus berbanding dengan pertumbuhan ranting baru manakala bahagian tengah and bahagian dasar talus menunjukkan yang keadaan yang sebaliknya. Jumlah bilangan ranting yang tertinggi didapati di dalam media PE (Garden) bagi semua bahagian talus *Gracilaria changii* iaitu 16 bagi bahagian pucuk, 80 bagi bahagian tengah dan 85 bagi bahagian dasar. Bagi *Gracilaria edulis*, bilangan ranting yang tertinggi didapati dalam air laut semula jadi yang berumur. 229 ranting baru telah direkod pada bahagian pucuk, 268 pada bahagian tengah and 242 pada bahagian dasar. Ranting yang terpanjang dijumpai dalam media ES bagi semua bahagian talus yang dikultur. Ranting yang paling panjang bagi *Gracilaria changii* adalah 9mm bagi bahagian pucuk, 9mm bagi bahagian tengah dan 10mm bagi bahagian dasar. Untuk *Gracilaria*

edulis, ranting terpanjang yang dicatat adalah 18mm bagi bahagian pucuk, 27mm bagi bahagian tengah dan 23mm bagi bahagian dasar. Secara umumnya, bahagian talus yang dikultur dalam media ES and media PE (Setiu) menunjukkan pertumbuhan yang paling tinggi. Kadar pertumbuhan harian tertinggi berdasarkan berat dicatat untuk talus *Gracilaria* yang dikultur dalam media ES adalah 0.0096 hari⁻¹ (bahagian pucuk *Gracilaria changii*), 0.0155 hari⁻¹ and 0.0149 hari⁻¹ bagi bahagian tengah dan bahagian dasar *Gracilaria edulis* masing- masing. Manakala kadar pertumbuhan harian yang tertinggi dalam media PE (Setiu) adalah 0.0033 hari⁻¹ and 0.0034 hari⁻¹ bagi bahagian tengah serta bahagian dasar *Gracilaria changii* dan 0.0275 hari⁻¹ untuk bahagian pucuk *Gracilaria edulis*. Untuk kadar pertumbuhan harian yang berdasarkan panjang bahagian talus, nilai tertinggi yang dicatat adalah 0.0084 hari⁻¹ bagi bahagian pucuk *Gracilaria changii* dan 0.0105 hari⁻¹ bagi bahagian pucuk *Gracilaria edulis* yang dikultur dalam media ES. Kesimpulannya, media ES and media PE (Setiu) sesuai digunakan untuk aktiviti kultur di makmal .