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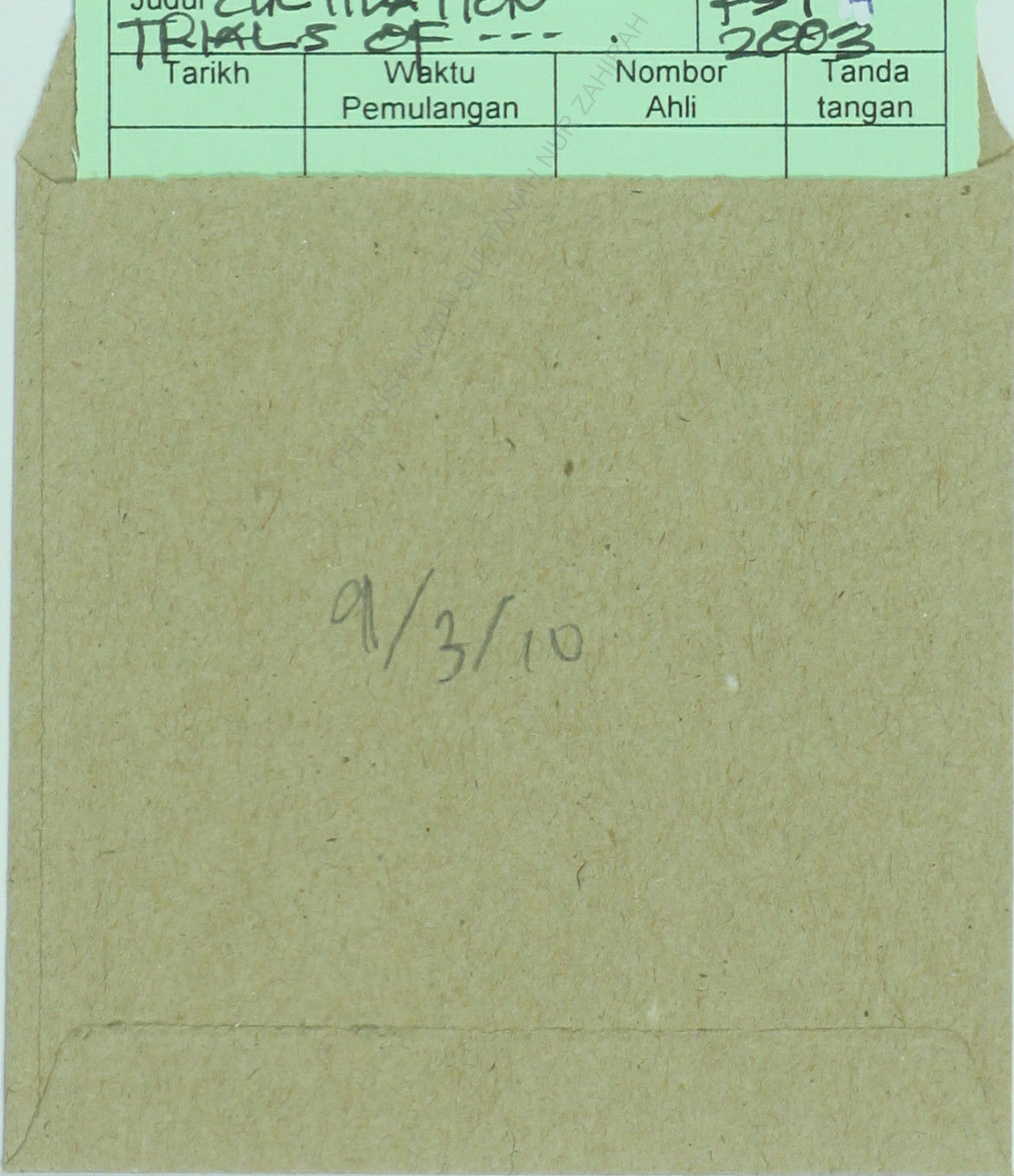
Cultivation trials of Gracilaria fisheri in tanks and pond / Teng Sheue Mei.



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CULTIVATION TRIALS OF *Gracilaria fisheri* IN TANKS AND POND

BY

TENG SHEUE MEI

This project is submitted in partial fulfillment of
the requirements for the Degree of
Bachelor of Science
(Marine Biology)

**Faculty of Science and Technology
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ABSTRACT

More than half of world's agarophyte product consists of *Gracilaria* while *Gracilaria* is the most common agarophyte that can be found in Malaysia. Cultivation became increasingly important to overcome the over harvested in *Gracilaria* natural populations.

Growth rate, agar yield and quality of *Gracilaria fisheri* from Setiu, Terengganu were grown in tanks and pond in KUSTEM. Seaweeds were cultured in tank (56 cm in diameter and 47 cm in depth) over 28-day period and pond (1 km² and 30-95 cm in depth) over 56-day period. The agar quality was determined as gel strength, gelling and melting temperatures.

Pond-cultured *Gracilaria fisheri* showed higher relative growth rate, with -4.01 %day⁻¹ than tank-cultured *Gracilaria fisheri* (-11.22 %day⁻¹). Most of the cultured *Gracilaria fisheri* bleached or broke into small pieces during the culture period. The light intensity in both culture systems were more than the 100 $\mu\text{molm}^{-2}\text{s}^{-1}$ which considered as optimal for growth. The t-test ($p>0.05$) showed that temperature and nitrite concentration had a significant difference between tank and pond culture. Pond showed higher temperature (>30°C) that may due to thermal stratification in pond caused by turbid conditions and sediments which may absorb heat easily while tank temperatures were 26-28°C during sunny days. Pond also showed similar nitrite concentration as Pak Uda pond according to t-test ($p>0.05$).

Tank-cultured *Gracilaria fisheri* showed lesser contaminants (26.6 %) than pond-cultured *Gracilaria fisheri* (40.8 %). Pond-cultured *Gracilaria fisheri* with agar yield 20.8 % showed commercial potential as source of agar as *Gracilaria* with agar yield higher than 8 % are considered as potential for commercial source of agar while tank-cultured *Gracilaria fisheri* showed 6.25 % of agar yield.

Both cultured *Gracilaria fisheri* showed lower gel strength and darker in colour compared to commercial agars from Thailand, China and Japan but had similar gelling temperature with commercial Chinese agar strip (32°C). However, both cultured *Gracilaria fisheri* showed lower gelling temperature than commercial Japanese agar powder (33.5°C) and Thai agar powder (34.7°C). Pond-cultured *Gracilaria fisheri* showed the highest melting temperature (85°C) compared to tank-cultured *Gracilaria fisheri* (80°C) and commercial agars from Japan (79°C), Thailand and China (80°C).

ABSTRAK

Didapati bahawa lebih daripada 50 peratus product agar mengandungi *Gracilaria* sebagai isi kandungannya. *Gracilaria* merupakan tumbuhan “agarophyte” tempatan yang paling kerap dijumpai di Malaysia. Kepentingan kultur rumput laut semakin meningkat dalam menangani masalah eksploitasi tanpa kawalan terhadap populasi semula jadi *Gracilaria*.

Kadar pertumbuhan, hasil agar serta kualitinya bagi *Gracilaria fisheri* telah dikaji melalui pengkulturan di dalam tank and kolam KUSTEM. *Gracilaria fisheri* telah dikultur di dalam tank (berdiameter 56 cm dan 47 dalam) selama 28 hari dan di dalam kolam (1km² luas dan 30-95 cm dalam) selama 56 hari. Kualiti agar telah ditentukan berdasarkan kekuatan struktur agar, takat beku dan takat lebur agar.

Gracilaria fisheri yang dikultur di kolam menunjukkan kadar pertumbuhan yang lebih tinggi, iaitu $-4.01 \text{ \%hari}^{-1}$ berbanding dengan kadar pertumbuhan *Gracilaria fisheri* $-11.22 \text{ \%hari}^{-1}$ yang dikultur di tank dalam tempoh 28 hari. Kebanyakan thalli *Gracilaria fisheri* yang dikultur telah putus atau menjangkiti penyakit “ice-ice”. Keamatan cahaya di kedua-dua tempat melebihi $100 \mu\text{molm}^{-2}\text{s}^{-1}$ dimana nilai ini merupakan keamatan cahaya optima untuk kadar pertumbuhan maksimum bagi *Gracilaria fisheri*. Ujian t ($p>0.05$) menunjukkan bahawa faktor suhu dan kepekatan nitrite dalam air antara tank dan kolam adalah berbeza. Suhu tinggi di kolam ($>30^{\circ}\text{C}$) mungkin disebabkan oleh keadaan turbiditi dan sedimen kolam yang mudah menyerap haba ketika hari panas manakala suhu yang tercatat di tank adalah

antara 26-28°C. Ujian t-test ($p > 0.05$) menunjukkan bahawa kolam mempunyai kepekatan nitrite yang serupa dengan kolam Pak Uda.

Peratusan kontaminasi bagi *Gracilaria fisheri* yang dikultur di dalam tank adalah lebih rendah, iaitu 26.6 % berbanding dengan *Gracilaria fisheri* yang dikultur di dalam kolam (40.8 %). Nilai hasil agar ekstrak (20.8 %) daripada *Gracilaria fisheri* yang dikultur di kolam berpotensi menjadi sumber komersial agar kerana lebih tinggi daripada 8 % (tahap minimum hasil komersial agar). *Gracilaria fisheri* yang dikultur di tank menghasilkan 6.25 % hasil agar sahaja.

Kekuatan struktur agar yang daripada kedua-dua *Gracilaria fisheri* yang telah dikultur adalah lebih rendah daripada agar komersial Thailand, China dan Japan. Takat beku bagi *Gracilaria fisheri* yang telah dikultur serupa dengan komersial agar China, iaitu 32°C tetapi kurang daripada komersial agar Japan (33.5°C) dan Thailand (34.7°C). Takat lebur bagi agar daripada *Gracilaria fisheri* yang dikultur di kolam adalah paling tinggi, iaitu 85°C, diikuti dengan agar daripada *Gracilaria fisheri* yang dikultur di tank, agar komersial Thailand dan China (80°C) serta agar komersial Japan (79°C).