

A STUDY ON THE GROWTH RATE OF *Gracilaria fisheri* IN
CAGE AND TANK CULTURE AND ITS AGAR YIELD AND QUALITY

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A STUDY ON THE GROWTH RATE OF *Gracilaria fisheri* IN CAGE AND TANK CULTURE AND ITS AGAR YIELD AND QUALITY

BY

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ABSTRACT

This study is on the growth rate of *Gracilaria fisheri* in cage and tank culture and its agar yield and quality.

Experiments on the relative growth rate (RGR, % day⁻¹), of *Gracilaria fisheri* were conducted from August to October 1997, in tank (suspended and bottom culture), and in net cages in Setiu and Mengabang. After the 54-day culture period, the seaweeds were harvested and its agar extracted.

Mengabang net culture showed higher growth rates compared to samples from Setiu and both suspended and bottom tank culture. RGR varied during the culture period but were within -0.071 to 0.213 % day⁻¹. These RGR values are greatly lower than the generally reported values of 5-10% for *Gracilaria* species.

The highest RGR (0.213 % day⁻¹) was shown in the sample from Mengabang net culture followed by suspended tank culture (0.156 % day⁻¹). Tank bottom and Setiu net culture showed negative growth rates. The growth rates obtained are actually lower than the actual growth rates because of grazing in Setiu and ice-ice diseases in tank culture.

The agar yield, gel strength, gelling and melting temperature obtained after alkali treatment (5% NaOH, 90°C, 1½ h) of *G. fisheri* were compared with those of commercial agars from Southern Korea (strip agar) and agar powder from Japan and Thailand.

ABSTRAK

Agar with the highest yield (26.6%) and gel strength (789 g cm⁻²) was obtained from Mengabang net cage culture. The gel strength values ranged within 491-789 gcm⁻² and were comparable to that of agar strip and agar powder from Thailand. These results indicate that *Gracilaria fisheri* qualifies as a source of industrial food grade agar. Gelling and melting temperatures ranged within 38-40⁰C and 73-82⁰C respectively.

Gracilaria fisheri had lead (3.13 to 6.25 ppm) and zinc (103.5-262.3 ppm) contents higher than the permitted values of 2.0 and 100 ppm, respectively. However, international standards set the maximum limit for lead at 10 ppm for agar.

Based on the yield and physical characteristics of its agar, *Gracilaria fisheri* has great potential as a source of food grade agar and could be cultivated in a large scale but with good management.

ABSTRAK

Kajian ke atas kadar tumbesaran *Gracilaria fisheri* yang dikultur di dalam sangkar dan tangki dan penghasilan agar serta kualitinya.

Kajian ke atas relatif kadar tumbesaran (Kadar relatif tumbesaran, % per hari) *Gracilaria fisheri* dijalankan bermula dari Ogos hingga Oktober 1997 di dalam tangki (tergantung dan tenggelam), di dalam sangkar jaring di Setiu dan Mengabang. Selepas 54 hari pengkulturan, rumput laut dituai dan pengekstrakan agar dilakukan.

Sampel sangkar Mengabang menunjukkan kadar relatif tumbesaran yang lebih tinggi berbanding dengan sampel Setiu dan kedua-dua sampel terapung dan tenggelam di dalam tangki. Kadar relatif tumbesarannya berbeza sepanjang masa pengkulturan dan julatnya terletak di antara -0.071 kepada 0.213 % per hari. Nilai ini merupakan nilai yang sangat rendah daripada nilai 5-10 % yang pernah dilaporkan untuk spesies *Gracilaria*.

Nilai kadar relatif tumbesaran tertinggi (0.213 % per hari) ditunjukkan oleh sampel sangkar Mengabang diikuti oleh sampel tangki tergantung (0.156% day⁻¹). Sampel Tangki dasar dan Sangkar jaring Setiu menunjukkan kadar relatif tumbesaran yang negatif. Kadar relatif tumbesaran yang diperolehi adalah lebih rendah dari nilai kadar relatif tumbesaran yang sebenarnya disebabkan oleh masalah peragut di Setiu dan masalah penyakit 'Ice-ice' di kultur tangki.

Penghasilan agar, ketegangan agar, suhu gel dan pencairan dilakukan selepas rawatan alkali (5% NaOH, 90°C, 1½ jam). *Gracilaria fisheri* dibandingkan dengan

agar-agar komersial dari Korea Selatan (agar kepingan) dan Jepun serta Thailand (serbuk agar).

Penghasilan agar tertinggi (26.6%) dengan ketegangan gel (789 g cm⁻²) didapati dari sampel jaring sangkar Mengabang. Bagaimanapun, julat nilai ketegangan gel terletak di antara 491-789 g cm⁻² dan setanding dengan agar kepingan dan serbuk agar dari Thailand. Oleh itu hasil daripada keputusan tersebut menunjukkan *Gracilaria fisheri* adalah layak sebagai sumber agar gred bertaraf industri makanan. Suhu gel dan pencairan terletak dalam julat di antara 38-40⁰ dan 73-82⁰ masing-masing.

Gracilaria fisheri mempunyai kandungan plumbum (3.13 - 6.25 ppm) dan zink (103.5-263.3 ppm) yang lebih tinggi dari nilai yang dibenarkan iaitu 2.0 ppm dan 100 ppm masing-masing. Walaubagaimanapun, standard antarabangsa telah menetapkan had maksimum untuk plumbum dalam agar adalah 10 ppm.

Berdasarkan kepada penghasilan agar dan ciri-ciri fizikal agar tersebut, *Gacilaria fisheri* mempunyai potensi yang cerah sebagai sumber makanan gred agar dan boleh dikultur secara besar-besaran hanya melalui pengurusan yang cekap.