C17. The carpospore culture of Gracilaria articulata, Gracilaria changii and Gracilaria edulis (Rhodophyta)

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Gracilaria Gerville is a commercially important agarophyte that produces around 80% of the world's total agar. Generally, it is cultivated vegetatively. However, the yield tends to decrease after many plantings. Therefore, there is a need to use spore culture methods. Malaysia has an extensive coastline of approximately 3,432 km, with the northwest of Peninsular Malaysia covered by mangroves which are suitable for *Gracilaria* cultivation. Plants of *G. articulata, G. changii* and *G. edulis* bearing cystocarps were collected from the field and maintained in the laboratory to obtain carpospores. The germination process of carpospores was observed using an inverted microscope. The diameter of carpospores released was measured to be approximately 20-25µm. The carpospores started to germinate upon attachment to the surface of the petri dish. The germination of carpospores followed the *Dumontia* pattern in which a large cell mass was formed before the erect frond was developed. After two months in culture, the young tetrasporophytes were used to carry out experiments to determine the effect of different irradiance levels on growth. All the species showed increased daily growth rate (%d^{-1}) with increasing irradiance levels, with *G. edulis* being the fastest growing among the three species. ANOVA tests showed that irradiance has a significant effect on the growth of the three species. *Gracilaria edulis* was selected for a more comprehensive experiment testing the effect of increasing irradiance levels and different salinities on growth. We found that the optimal irradiance and salinity for the growth of *G. edulis* are at 100µmol m^{-2} s^{-1} and 15‰. The findings from this study showed that *G. edulis* may be a potential candidate for mass cultivation in Malaysian brackish waters. Additionally, this study also demonstrated the feasibility of spore culture in supplying sustainable planting materials for mass cultivation.