GRACILARIA CHANGII (Xia et Abott) Abott, Zhang et xia (RHODOPHYTA) TANK CULTURE AS BIOFILTER FOR DISSOLVED INORGANIC NITROGEN FROM FISH TANK EFFLUENTS

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Specially Dedicated to
Papa, Mama and sisters
with
love and gratitude

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ABSTRAK

Akhir-akhir ini, akuakultur intensif monospesies telah menyebabkan sebahagian daripada pencemaran nutrien apabila sebilagan besar nitrogen dibebaskan ke persekitaran. Oleh itu, *Gracilaria changii* yang dimana banyak terdapat di Malaysia disamping berupaya menghasilkan kualiti agar bermutu tinggi telah di cadang sebagai kultur integrasi untuk menghindarkan kompaun seperti ammonium, nitrite dan nitrate.

Gracilaria changii dikultur di dalam tangki dan bertindak sebagai penapis rumpai laut. Air laut dari tangki ikan akan mengalir melalui tangki penapis ini sebelum dibuang ke persekitaran. Kepekatan jumlah ammonium, nitrite dan nitrate akan ditentu sebelum dan selepas air laut melalui tangki penapis ini untuk mengetahui kecekapan *Gracilaria changii* sebagai penapis.

Dari segi pertumbuhan *Gracilaria changii* di dalam air perlepasan dari tangki ikan, keputusan eksperimen menunjukkan ia dapat bertumbuh dengan sihat, air perlepasan tangki ikan berkemampuan membekalkan nutrien kepadanya khasnya dalam bentuk bernitrogen.

Keputusan juga menunjukkan pengkulturan tangki *Gracilaria changii* berupaya mengambil 72.00% daripada jumlah nitrogen bukan organik terlarut daripada air perlepasan tangki ikan. Di antara kesemua nitrogen bukan organik terlarut, *Gracilaria changii* bercenderungan untuk mengambil ammonium berbanding dengan nitrite dan nitrate. Secara purata, 89.10% daripada jumlah ammonium terhindar daripada sampel air

dalam tangki pengkulturan rumpai laut. Pengurangan total ammonium ini telah membolehkan air disalurkan ke persekitaran dibawah kualiti air piawai Malaysia yang dicadangkan. Pada masa yang sama, jumlah kandungan nitrogen yang terdapat di dalam thallus rumpai laut telah menambah sebanyak 48.73% dari 17.5 mg/g hingga 26.03 mg/g. Ini menunjukkan nitrogen yang terhindar telah diasimilasikan oleh rumpai laut.

ABSTRACT

Recently, intensive monospecies aquaculture has caused a certain degree of nutrient pollution when large amounts of nitrogen are released to the environment. Therefore, *Gracilaria changii* which has a high yield of good quality agar and abundant in Malaysia are suggested for use in integrated farming to remove the main polluting compounds ammonium, nitrite and nitrate.

Gracilaria changii were grown in the trough tank that served as seaweed filtration tank. Seawater from fish tank was flowed through this seaweed cultivation tank before discharged into the environment. The concentration of total ammonium, nitrate and nitrate were determined before and after water flowed through the seaweed cultivation tank in order to study the uptake efficiency of *Gracilaria changii*.

In terms of growth of *Gracilaria changii* in fish tank effluents, results from this experiment showed that *Gracilaria changii* can grow well and that fish effluents are able to provide the essential nutrients to *Gracilaria changii* especially in terms of nitrogen.

The results also showed that *Gracilaria changii* cultivation tank is able to uptake 72.00% of total dissolved inorganic nitrogen from fish tank effluents. Among the dissolved inorganic nitrogen, *Gracilaria changii* prefers ammonium rather than nitrite and nitrate. In average, 89.10% of total ammonium disappeared from the water sample in seaweed cultivation tanks. The reduced ammonium concentration in the fish effluents resulted in the effluents meeting the Malaysian proposed water quality standard (0.1 mg/l

for class 1). At the same time, total nitrogen content in the seaweed thallus increased 48.73% from 17.50 mg/g before growth in fish effluents to 26.03 mg/g after growth in fish effluents. This proves that disappeared nitrogen has been assimilated by the seaweed.