

## Morphological changes of the red seaweeds *Hypnea spinella* and *Grateloupia dichotoma* during the adaptation to intensive culture conditions

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*Hypnea spinella* and *Grateloupia dichotoma* (Rhodophyta) are seaweed species with economically interesting possibilities whether intensive culture success is achieved. Optimal cultivation conditions for their growth in tanks and the use as biofiltering species in integrated poly-aquaculture systems has been recently studied. Under such "stressing" conditions (free-floating, high aeration, high irradiations or excess of nutrients) adaptations and changes of different physiological, biochemical and morphological characteristics of vegetative grown thalli are usually acute in most species including these.

In this study, micro- and macroscopical morphological changes shown by *Hypnea spinella* and *Grateloupia dichotoma* collected from natural populations and intensively cultured in 80 L cylindrical photobioreactors with an open flow of  $\text{NH}_4^+$ -enriched seawater during a 3 months period (spring-summer) are presented. Yields, growth rates and phycobiliproteins were also measured. Color changes were observed for both species during the first days of culture probably due to high protein synthesis because of high nitrogen assimilation. For *H. spinella*, dense ball forming morphologies were observed after 3 weeks. For *G. dichotoma*, high number of primary branches were observed after 3 weeks and some of the algae developed ball morphologies after 6 weeks. For *H. spinella*, growth rates over 5 %  $\text{d}^{-1}$  were maintained in a sustainable way during the experimental period. However, growth rates for *G. dichotoma* were not higher than 2 %  $\text{d}^{-1}$ .