

Influence of Culture Conditions on Growth and Physicochemical Properties of Carrageenans in *Gigartina teedii* (Rhodophyceae – Gigartinales)

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Abstract

Female gametophytes of *Gigartina teedii* collected on the coasts of Brittany (France) contain in equal proportion kappa- and iota-carrageenans. In order to increase exploitable quantities of *G. teedii*, by keeping high the yield of carrageenan, without modifying qualities of gelification or viscosity, we have studied in controlled culture the action of some factors: light, temperature and nitrogen on the growth rate of *G. teedii* as well their effect on physicochemical characteristics of the polymer. Temperatures of 20 to 25 °C and light intensities of 500 $\mu\text{E m}^{-2} \text{s}^{-1}$ give active growth. On the other hand, high light intensities induce active synthesis of rhodamylon at the expense of the yield of colloid. A medium without nitrate decreases growth, but increases yields of carrageenans. We have established for each factor an optimal value for maximum growth, with the estimation of the quality and the quantity of phycocolloid produced in the following of this growth.

Introduction

In the past twenty years *Chondrus crispus* Stackhouse and *Mastocarpus stellatus* (Stackhouse) Guiry, from the Atlantic coasts, and various species of *Eucheuma* farmed in the Philippines, have been mainly used for the production of carrageenans. Species from the Atlantic are for the most part still collected from the wild, but the potential for further exploitation of this natural resource is limited. Many experiments have therefore been undertaken to develop aquaculture techniques for carrageenophytes and to produce a significant biomass under controlled conditions (Perez *et al.* 1992). The species tested so far are *Chondrus crispus* in France and in Canada and *Cystoclonium purpureum* (Hudson) Kütz. (Cosson *et al.* 1990). *Gigartina teedii* (Roth) Lamouroux has been selected here because of its remarkable growth possibilities

and high carrageenan yield (50 to 70% of dry weight). This red alga is already used in various countries. Its life-cycle has been completed in culture by Guiry (1984) and Braga (1985), and according to this latter author (Braga 1990), in nature there always seems to be a higher proportion of gametophytes than tetrasporophytes, which he was unable to correlate with any particular physical or chemical factor. This domination of the gametophyte phase appears to be characteristic for the species in the Sao Paulo area of Brazil (Braga 1990), and also on the French Channel coast (pers. observation) where no tetrasporophytes have been collected. Female gametophytes of *G. teedii* collected on the coasts of Brittany (France) contain kappa- and iota-carrageenans in equal proportions with quantities varying between 50 to 70% of dry matter.