Preliminary studies of *Eucheuma cottonii* (Rhodophyta) from the Toliara Area, Madagascar

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ABSTRACT

Euchcuma cottollii is a species of red algae found 011 the littoral of the Toliara area (Madagascar). It occupies a large area in the north of the Great Reef of Toliara facing the village of Amboaboaka. An ecological study and an evaluation of economic potential were made. The preliminary study of the phycocolloid of this species shows that it has carrageenan yield of 50% and that its gel strength reaches 226 g $cm^{-2.}$

INTRODUCTION

Seaweeds have long been used as soil fertilizers, as feed, in the human diet (Delepine, 19X9) and for production of phycocolloids. Mc Hugh (1993) estimated the world production of *Euchcul1la* (Rhodophyta) for the extraction of carrageenans to be about 66 000 tons per ycar. In Madagascar *Gelidium madagascariense* is extensively exploited (Andriamampandry (1976), and in 1986 the Society "Le Martin Pecheur", based in Fort Dauphin, exported 300 tons of G. *madagascariense.*

The present study deals with *Eucheuma cottonii,* a species exploited in many countries, such as the Philippines and Indonesia, on an industrial scale to extract carrageenans. The present work aim:

- to establish a brief description of the biology of *E.cottonii* and show the growth rate of the species in culture
- to determine its carrageenan content and to analyse the physio-chemical characteristics of that colloid.

MATERIALS AND METHODS

Study of the biology

The study site for *Ecottonii* is situated 25 km north of the town of Toliara in the vicinity of the village of Amboaboaka (23°10' S - 13° 40' E) (Fig. 1). Observations were made in April and August 1995. Physio-chemical parameters such as salinity, temperature and turbidity of the water were noted *in situ.*

Local fishermen provided information on the species distribution in the area.

Samples of this seaweed were taken to the laboratory and its morphology (Fig. 2), anatomy (Fig. 3) and carrageenan characteristics were studied.

Figure 1. Map of Toliara.

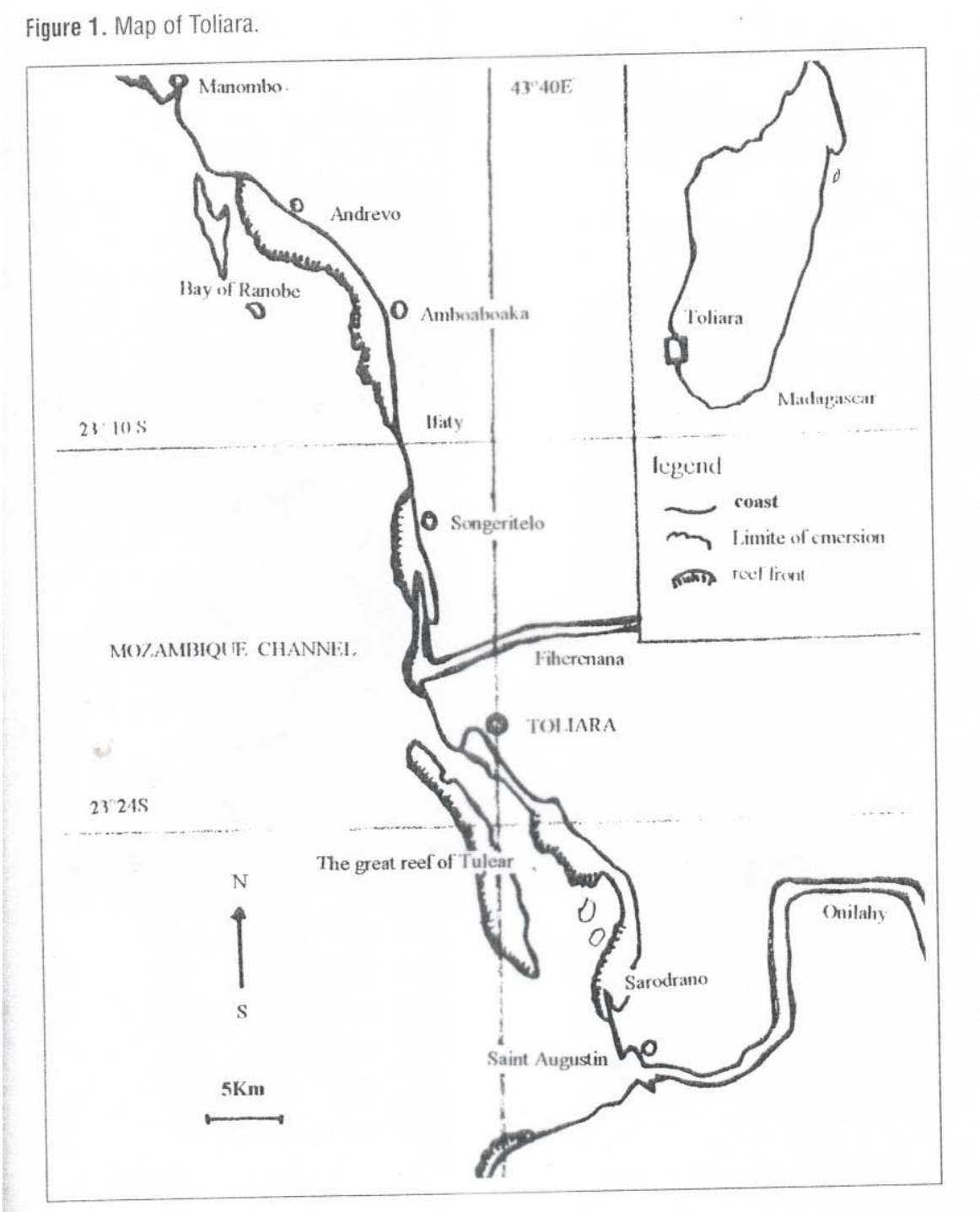
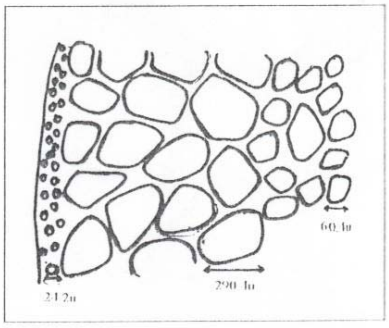


Figure 2. Morphology of *Euc/7euma cottonii.*

Figure 3. Anatomy of *Eucheuma cottonii.*



Growth rate studies

Pilot aquaculture station for E. *cottol1ii* was located on the Songeritelo reef (2.3^0 15' S - 43° *40'* E). The method of mono-line culture (Mollion, 1993) was used, and weight measurements for determining the rate of growth were undertaken twice a month. The growing rate was determined by the formula:

$$C = ((P2/P1)^{I/T} - 1) \times 100$$

C - relative daily growth rate
P2 - final weight, in grams
P1 - initial weight, in grams
T - the time in days

Extraction of carrageenans

After being washed in fresh water, the sample was first dried in the open air, and then dried for 24 hours in the oven at 60°C. About 50 grams of the dry sample was crushed to obtain a powder. The extraction method described by Scott (1969) was used with some modifications (Rasoamazava, 1991).

Physio-chemical characteristics of the carrageenan

The gel preparation is obtained from boiling and mixing a solution of 2 % of carrageenans with 0.5 KCI for 30 min. The measurement of the gel strength \Vas carried out at 20°C with a piston technique on a Roberval scale (Rasoamazava, 1991).

3,6-anhydrogalactose was determined with the modified resorcinol method (Yaphe & Arsenault, 1965). Fructose was used as a reference sample, which gives a colorimetric value that equals 90% of the 3,6-anhydrogalacrose. Optical density was read at 555 nm with a JENA type spectrophotometer.

The sulphuric orcinol method (Montreuil & Spik, 1963 was used for galactose determination, and the optical density was measured at 510 nm.

RESULTS

E. cottonii shows proliferation near communities of the seagrass, *Thalassodendron ciliatum.* The species is found in calm spots and in clear waters in Ranobe Bay (Fig. 1). Clumps of E. *cottoni* are attached to hard substrata essentially made up of dead corals and shells in association with E. *denticulatum* and *Galaxaura.* The salinity of the sea water was 3.5%, and the water temperature 26^0C

The daily growth rates averaged 2.7%. Carrageenan content and physio-chemical characteristics of this colloid are presented in Table 1.

Table 1. Yield, 3,6-anhydrogalactose (3,6-Ag), total galactose and gel strength of carrageenan from *E. cottonii*

Gel strength (gcm-2)	Carragenan content (%)	3,6-Ag (%)	Galactose (%)
226	56.7	28.2	69.7

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