

## CHANGES IN GROWTH AND PHYCOCOLLOID CONTENT OF *GELIDIELLA ACEROSA* AND *GRACILARIA EDULIS*

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### Abstract

Results obtained on seasonal growth, yield and physical properties of agar in *Gelidiella acerosa* and *Gracilaria edulis* for a period of one year are presented. Vegetation of these two species occurred throughout the year with two peak growth periods. In *G. acerosa* the agar content varied from 26.1 to 50.8 % and gel strength from 147 to 325 g/cm<sup>2</sup>. In *G. edulis* the yield of agar ranged from 26.5 to 45.0 % and gel strength from 69 to 139 g/cm<sup>2</sup>. Seasonal variations observed in growth and yield, gel strength, setting and melting temperature of agar were not conspicuous in both these red algae.

### Introduction

Studies on seasonal variations in growth and agar content of Indian agarophytes are necessary in order to harvest them during suitable periods for getting maximum yield of agar. Seasonal variations in growth, yield and physical properties of agar were reported for *Gracilaria verrucosa* (Thomas, 1977), *G. corticata* (Oza, 1978) *Gelidium pusillum* and *Pterocladia heteroplata* (Kaliaperumal and Umamaheswara Rao, 1981). Information on these aspects is not available for other agar yielding seaweeds especially for the species growing around Mandapam, which is the main seaweed harvesting centre in India. Hence, studies were made for a period of one year on *Gelidiella acerosa* and *Gracilaria*

*edulis* growing at Mandapam area and the results obtained are presented in this paper.

### Materials and Methods

Plants of *Gelidiella acerosa* (Forsskal) Feldmann et Hamel from Krusadai Island and Kilakarai and *Gracilaria edulis* (Gmelin) Silva from Krusadai Island were collected every month during spring tides for a period of one year during 1976-1978. Totally 50 plants were measured randomly for each species to determine the stature of plants. Agar was extracted by cooking 20 g of bleached and pulverized material in a water bath for 4 hrs. The material and distilled water were used in the ratio of 1 : 30. The extractive was filtered, cooled at room temperature and frozen for 24 hrs. in a deep freezer. The frozen gel was thawed and dried in the sun for 1 or 2 days and then in an oven at 60° C to a constant weight. The gel strength of 1.5 % agar was estimated using a gelometer (Funaki and Kojima, 1951). The setting and melting temperature of 1.5 % agar were determined with a thermometer following the movement of glass beads in the setting and melting gels. Three replicates were done to estimate agar content and to determine the physical properties of agar.

### Results

Data collected on growth, yield and physical properties of agar of *G. acerosa* are presented in

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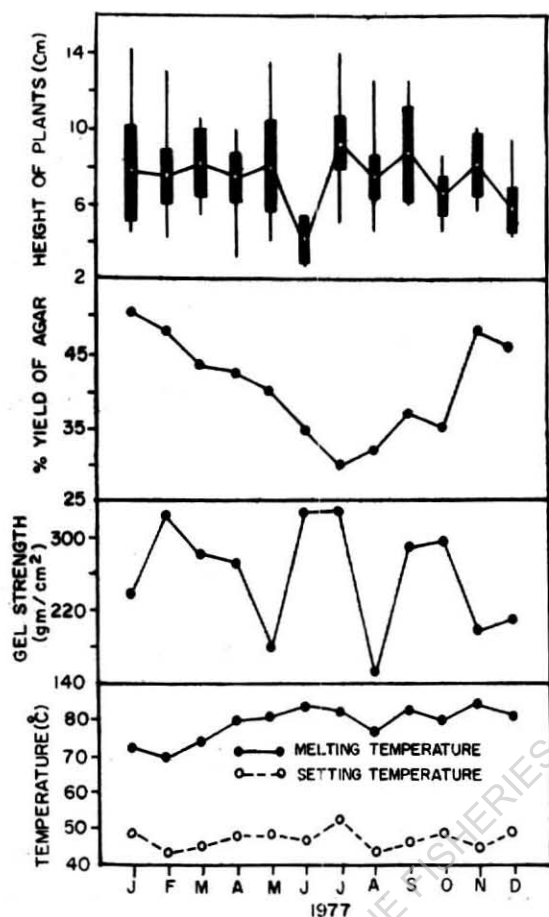


Fig. 1. Seasonal changes in growth and yield, gel strength, setting and melting temperature of agar of *G. acerosa* growing at Krusadai Island.

Figs. 1 and 2 and *G. edulis* in Fig. 3. In *G. acerosa* growing at Krusadai Island, though there were no regular changes in the growth behaviour, plants with maximum size occurred during the periods March-May and July-September (Fig. 1). The yield of agar varied from 30.0 % to 50.8 % with minimum value in July and maximum value in January. The gel strength ranged from 147 g/cm<sup>2</sup> in August to 325 g/cm<sup>2</sup> in June-July. The setting temperature varied from 43° C to 52° C and melting temperature from 69° C to 84° C (Fig. 1).

In *G. acerosa* occurring at Kilakarai also, the growth was irregular. But plants with maximum stature were found during April-May, November-January and March (Fig. 2). The agar content ranged from 26.1 % in May to 46.8 % in November. The gel strength varied from 162 g/cm<sup>2</sup> in September to 320 g/cm<sup>2</sup> in November. The setting temperature ranged from 42° C to 49° C and melting temperature from 61° C to 83° C.

In *G. edulis* growing at Krusadai Island, maximum growth of plants was observed during January-March and August-October. Minimum quantity of 26.5 % agar in June and maximum quantity of 45.0 % agar in

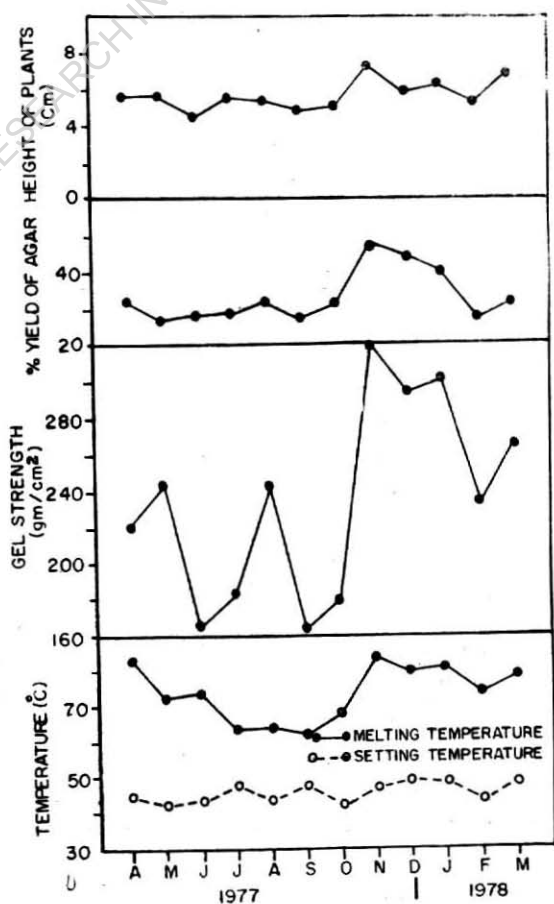


Fig. 2. Seasonal variations in growth and yield, gel strength, setting and melting temperature of agar of *G. acerosa* occurring at Kilakarai.

November were obtained. The gel strength ranged from 69 gm/cm<sup>2</sup> in May to 139 gm/cm<sup>2</sup> in August. The setting temperature varied from 44° C to 50° C and melting temperature from 61° C to 78° C. (Fig. 3).

### Discussion

From the foregoing account it is clear that vegetation of *G. acerosa* and *G. edulis* occur in all months of the year in the vicinity of Mandapam with two peak growth periods in a year. It coincides with the observations made earlier on the growth behaviour of *G. acerosa* (Umamaheswara Rao, 1973 a and Thomas *et al.*, 1975), *G. corticata* (Umamaheswara Rao, 1972), *G. edulis* and *G. foliifera* (Umamaheswara Rao, 1973 b) growing at Mandapam area.

In the present study the yield and gel strength of agar is more in *G. acerosa* than in *G. edulis*. The maximum yield of agar obtained from these 2 species agrees with the earlier investigations on the agar content in *G. acerosa* (Umamaheswara Rao, 1970; Chennubhotla *et al.*, 1977 and Thomas *et al.*, 1975) and *G. edulis* (Umamaheswara Rao, 1970 and Chennubhotla *et al.*, 1977). The yield of agar estimated in *G. acerosa* and *G. edulis* during the present study is found to be higher than that observed in *Gracilaria crassa* (Umamaheswara Rao, 1970), *G. corticata* (Oza, 1978) and *G. foliifera* (Umamaheswara, 1970 and Subba Rao *et al.*, 1977) and it can be compared with *G. corticata* (Umamaheswara Rao, 1970 and 1978 and Subba Rao *et al.*, 1977), *G. fergusonii* (Subba Rao *et al.*, 1977), *G. verrucosa* (Thomas, 1977), *Gelidiella indica* (Subba Rao *et al.*, 1977), *Gelidium pusillum* and *Pterocladia heteroplotos* (Kaliaperumal and Umamaheswara Rao, 1981).

Seasonal variations in yield and gel strength of agar were reported in *G. acerosa* (Thomas

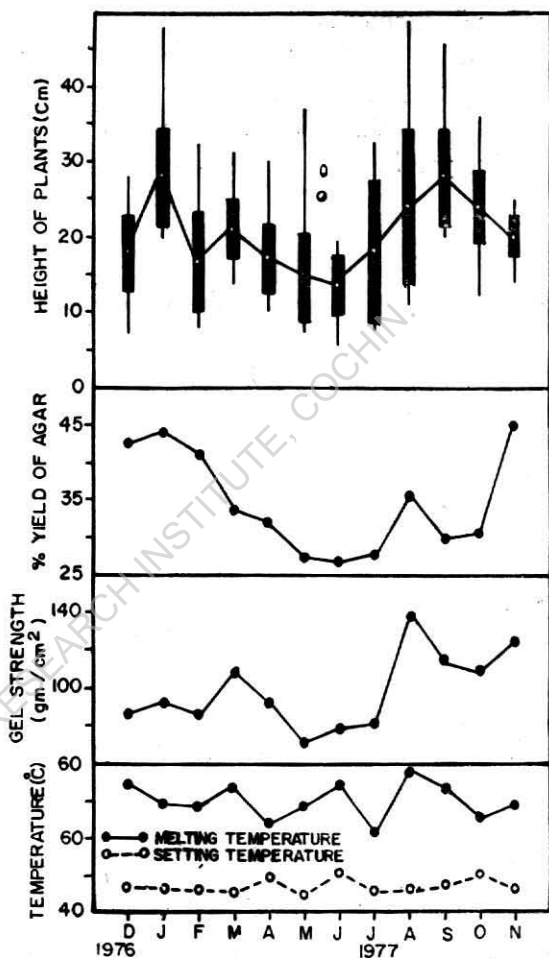


Fig. 3. Monthly variations in growth and yield, gel strength, setting and melting temperature of agar in *G. edulis*.

*et al.*, 1975), *G. corticata* (Oza, 1978) and *G. verrucosa* (Thomas, 1977). But there are no regular seasonal changes in the yield and gel strength of agar in the two red algae studied as observed in *P. heteroplotos* (Kaliaperumal and Umamaheswara Rao, 1981). There is no relationship between the growth cycle, yield and gel strength of agar in *G. acerosa* and *G. edulis* during the present investigation. But in general the suitable periods for harvesting these two agarophytes are January-March and July-September for getting more yield of agar with higher gel strength.

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