

Seasonal variations in growth, alginic acid and mannitol contents of *Sargassum wightii* and *Turbinaria conoides* from the Gulf of Mannar, India*

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ABSTRACT

Seasonal variations in growth, alginic acid and mannitol contents of *Sargassum wightii* and *Turbinaria conoides* growing in the Gulf of Mannar near Mandapam have been followed for a period of two and a half years from August 1965 to January 1968. Marked seasonal changes occur in the growth of these two brown algae with a slow growth in the population up to July or August and a rapid growth from October to December when reproductive receptacles were noticed in both the species.

Results obtained on the alginic acid and mannitol contents indicate that these two carbohydrates vary with the seasonal growth behaviour of the two brown algae investigated. Yield of alginic acid is high during the peak growth and fruiting periods. Mannitol content is at its maximum in the early stages of the growth cycle from May to August and minimum after the initiation of the reproductive receptacles.

INTRODUCTION

Although the alginic acid content of many Indian brown algae has been estimated (VALSON, 1955; KAPPANNA, *et al.*, 1962), detailed studies have not been done on the seasonal growth behaviour of the brown algae and on the changes in alginic acid and mannitol contents during their growth and development. While working on the alginophytes of the Gulf of Mannar area, some observations were made on the annual variations in growth, alginic acid and mannitol contents of *Sargassum wightii* and *Turbinaria conoides* growing near Mandapam. Results obtained from August 1965 to January 1968 are presented in this paper.

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imum height during the period from November to January. However, from January onwards epiphytes like *Ectocarpus*, *Sphacelaria* and *Jania* were seen growing on this alga and the degenerating shoots disappeared from the selected rock in February.

Fruiting periods

Plants bearing reproductive receptacles were found during the maximum growth periods of *S. wightii* and *T. conoides*. In both these algae branched receptacles appeared in the month of October and the fruiting period extended until the end of December in *S. wightii* and up to January in *T. conoides*.

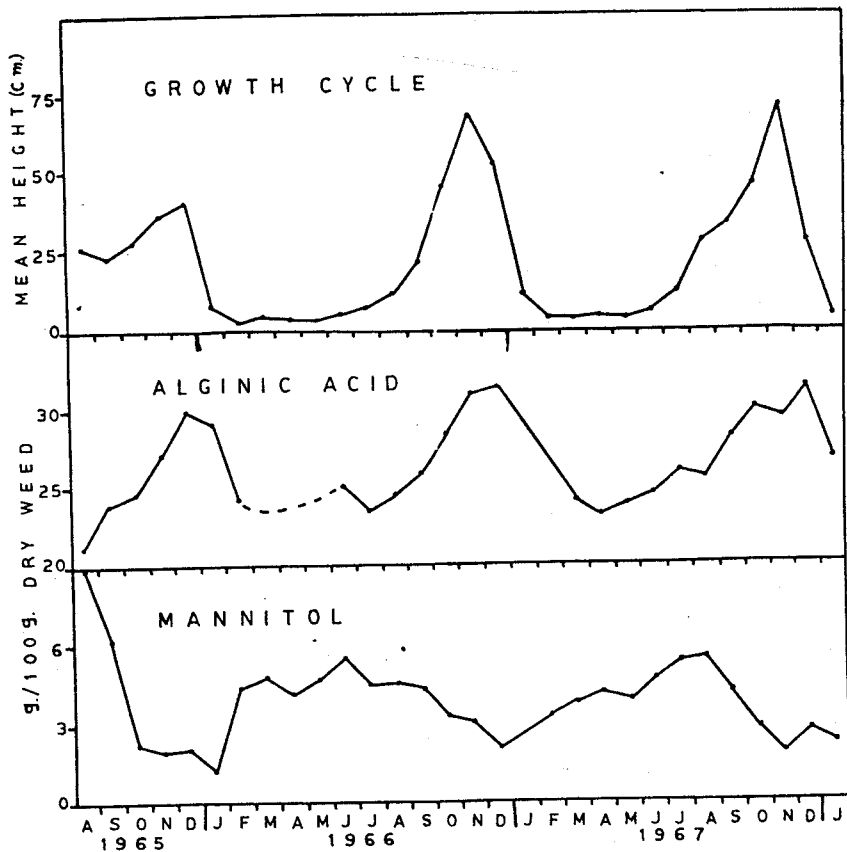


FIG. 1. — Seasonal changes in growth, alginic acid on mannitol contents of *Sargassum wightii*.

May suggesting that minimum quantities occur in the slow growth period of this alga. Decline in the yield was observed from January though there was no change in the growth of the alga (fig. 2). This all in the alginic acid content may be due to the degenerating condition of the plants with epiphytes in January and February.

Mannitol varied to a considerable extent, exhibiting an inverse relationship with the growth behaviour of the two algae studied. In *S. wightii* mannitol content was high from March to July or August and low from October to January (fig. 1). The amount of mannitol varied from 1.2 % to 5.5 %, except in August and September 1965 when the highest values were obtained. Fluctuations in the mannitol are more marked in *T. conoides* and maximum amount of 5 to 7 % was found between June and August. From September onwards it decreased gradually and minimum values ranging from 1.78 to 3.02 % were obtained during the period from November to February. Comparison of the data further shows that the quantities of mannitol and alginic acid are more in *T. conoides* than in *S. wightii*.

DISCUSSION

The present study on *Sargassum wightii* and *Turbinaria conoides* shows that regular and marked changes occur in the growth of these algae throughout the year, and that the alginic acid and mannitol contents vary with the changes in growth and development of the plants. In general, alginic acid is high during the period, October to December or January, which coincides with the peak growth and fruiting periods of the algae studied (figs. 1 and 2), whereas mannitol accumulated in the plants during the vegetative phase of the growth cycle and decreased to a minimum after the formation of reproductive receptacles.

Various investigations carried out on the seasonal changes in the chemical composition of brown algae have been reviewed by BONEY (1965). Working on the members of Laminariales, BLACK (1950 a), SUZUKI (1955), HAUG and JENSEN (1956), STEWART *et al.* (1951) and others have shown that marked seasonal changes occur in the mannitol and alginic acid contents with peak values at different times of the year. Seasonal trends observed in the alginic acid and mannitol contents of *S. wightii* and *T. conoides* are more or less similar, though the changes are less conspicuous than those reported in the species of Laminariales. But results obtained by BLACK (1950 a) and the other authors cited above have not been correlated with the changes in growth and reproductive cycles of the plants investigated by them.

Recent studies on *Fucus* and other brown algae (BONEY, 1965) have clearly shown that the chemical composition of the plants varies at the