

Growth, Reproduction & Liberation of Oospores in *Turbinaria ornata* (Turner)

J. Agardh

N. KALIAPERUMAL, V. S. K. CHENNUBHOTLA & S. KALIMUTHU

Central Marine Fisheries Research Institute
Mandapam Regional Centre, Mandapam Camp

Received 27 May 1977; revised received 28 July 1977

Young plants of *T. ornata* appeared in April and grew to maximum size during October to December. Plants were mostly unbranched between February and June and thereafter branching started reaching maximum during September to November. Reproductive plants were found throughout the year with a peak spore output in November (33810 oospores/plant). There was no periodicity in the liberation of oospores. *T. ornata* may be harvested during the peak growth period from October to December for the manufacture of alginic acid.

STUDIES on the oospore shedding seasons of algin yielding seaweeds are very limited. Among the 3 species of *Turbinaria* commonly growing in the vicinity of Mandapam, oospore liberation has been studied in *T. decurrens*¹ and *T. conoides*². This paper deals with the data collected on growth, reproductive cycle and oospore output in *T. ornata* during 1 yr (Oct. 1974 to Sept. 1975).

T. ornata plants were collected from coral stones at 1-2 m depth in the Palk Bay, near Mandapam. Mean height of the plants together with SD was calculated for each month as given earlier³. For computing oospore liberation, total number of receptacles per plant was found by counting receptacles of 5-10 reproductive plants. Daily liberation of oospores was estimated by conducting 5 experiments per month and 4 mature receptacles were used in each experiment. Receptacles were placed in petri dishes immersed in fingerbowls containing boiled and filtered seawater. Oospores liberated and settled were counted for 20 days. During the experiments seawater in the bowls was changed daily and the experimental sets were illuminated with 14 w daylight lamp from 0900 to 1700 hrs.

Data on mean height of plants, percentage frequency of young plants (below 5 cm in height), branched and reproductive plants are given in Fig. 1. Mean values of 60 experiments are plotted in Fig. 2 to show the daily oospore output for 7 days. Data on SD of means and maximum and minimum height of plants in the monthly samples are also shown in Fig. 1A.

Growth cycle — Young plants of *T. ornata* were found in April when 82% of plants were below 5 cm in length (Fig. 1B). In July also 36% of the plants were less than 5 cm in length. After July the mean height was more and the plants attained maximum size during September and December. Plants were almost unbranched between February and June and maximum number of branched plants were seen during September to November (Fig. 1C).

Reproductive cycle — Receptacles were found when the plants attained a minimum height of 4.5 cm. Reproductive plants were seen throughout the year and the number of plants bearing receptacles varied from month to month (Fig. 1C). Minimum percentage of reproductive plants were in April to June. The number of reproductive plants increased from July onwards and 97-100% of the plants occurred in fruiting condition during the maximum growth period, November and December.

Oospore liberation — Data collected on oospore liberation for 12 months are given in Table 1. In *T. ornata* periodic liberation of spores was not found and the oospores in different stages of development were seen on the receptacles. Maximum spore output was seen on 6th day (Fig. 2) and

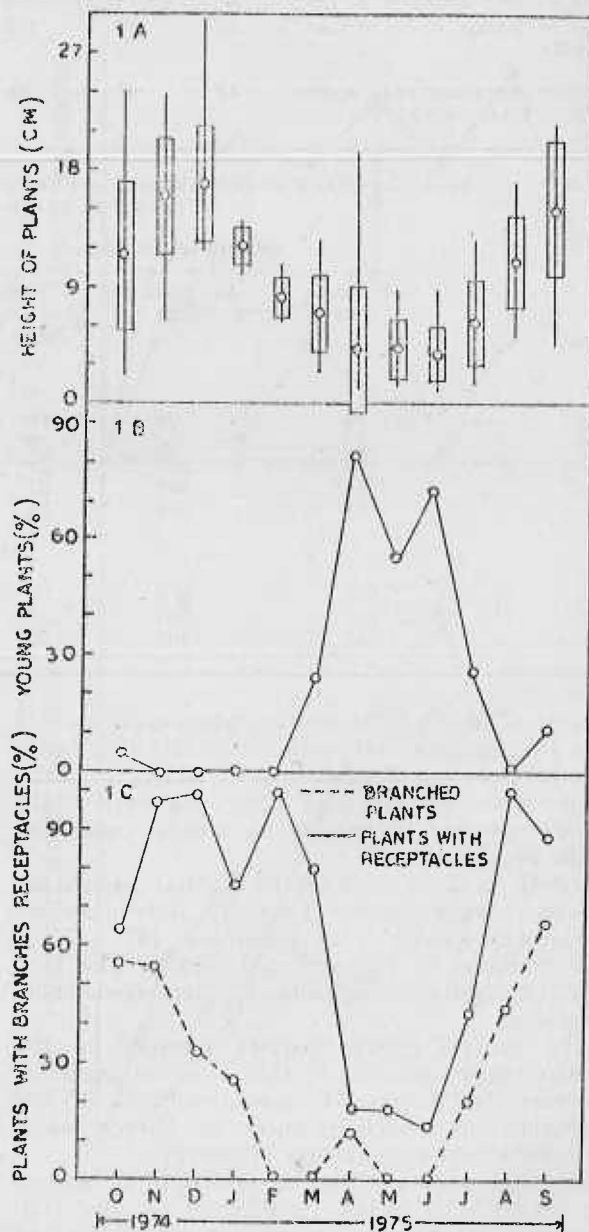


Fig. 1 — Monthly change in mean height of the plants (A), frequency of young plants (B) and frequency of plants with branches/receptacles (C)

thereafter it decreased. Receptacles were found to be healthy even after 7 days, but the spores liberated after 1 week were mostly in degenerating condition.

Spore liberation was highest in Nov. 74 and lowest in June 75 (Table 1). The number of receptacles per plant varied from month to month and these changes may be due to shedding of receptacles along with leaves and size of the plants selected for estimation. From the above observation it may be stated that plants of *T. ornata* liberate maximum number of oospores during the early phase of the reproductive cycle (from August to November).

Results obtained on growth and reproductive cycle of *T. ornata* (Fig. 1) agree with the earlier observations³ made for 4 yr period. Oospore liberation in *T. ornata* was observed throughout the year with peak output in November, whereas in *T. decurrens*¹ and *T. conoides*², oospore liberation was observed only for 5 months from October to February with peak output in November and January respectively. Oospore output is high (33810 oospores/plant) in *T. ornata* when compared

with *T. decurrens* (28196 oospores/plant) and *T. conoides* (11312 oospores/plant). Oospores in different stages of development were seen on the receptacles and periodicity in the liberation of oospores was not observed as in *T. decurrens* and *T. conoides*. From the above studies on growth and reproduction, it is evident that *T. ornata* can be harvested during the peak growth period between October and December as good yield of alginic acid was obtained from *Turbinaria* species during the peak growth periods^{3,4}.

Thanks are due to Dr E. G. Silas, Director, and Shri G. Venkataraman, Officer-in-charge, for their encouragement.

References

1. KALIAPERUMAL, N. & UMAMAHESWARA RAO, M., *Indian J. Fish.*, **22** (1975), 225.
2. CHENNUBHOTLA, V. S. K., KALIAPERUMAL, N. & KALIMUTHU, S., *Bot. Mar.*, (in press).
3. UMAMAHESWARA RAO, M. & KALIMUTHU, S., *Bot. Mar.*, **15** (1972), 57.
4. UMAMAHESWARA RAO, M., *6th Int. Seaweed Symp.* (Morgalit Subsecretaria, Dela Marina Madrid, Spain), 1969, 579.

TABLE 1 — OOSPORE LIBERATION IN *T. ornata* DURING OCT. 1974 TO SEPT. 1975

Month	Number of receptacles/plant	Mean oospore output/receptacle/day	Oospores/plant/day	Oospores/plant*
1974				
Oct.	42	57	2394	16758
Nov.	42	115	4830	33810
Dec.	49	17	833	5831
1975				
Jan	20	75	1500	10500
Feb.	17	15	255	1785
March	19	30	570	3990
April	36	4	144	1008
May	20	17	340	2380
June	10	14	140	980
July	38	14	532	3724
Aug.	44	73	3212	22484
Sept.	63	54	3402	23814

*Estimated on the basis of liberation for 7 days as healthy spores were observed for 1 week.

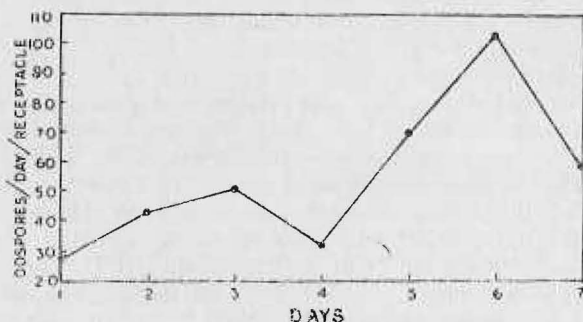


Fig. 2 — Variations in daily liberations of oospores from receptacles