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Sponge infestation on *Perna indica* kuriakose and nair 1976 in experimental culture systems

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Infestation of the brown mussel, *Perna Indica* from Vizhinjam and Dalavapuram by the boring sponge was studied. Brown mussel from Vizhinjam recorded 23% infestation with *Cliona lobata* forming the dominant species (61%) followed by *Cliona vastifica* (26%), *Cliona margaritifera* (9%) and *Cliona celata* (4%). Brown mussel cultured in Dalavapuram recorded 18% infestation and the study revealed that *Cliona vastifica* is the only major pest in the area studied.

[**Keywords:** Mussel, *Perna Indica,* Sponges, culture, calcareous, sedentary]

Introduction

The total number of boring sponge species recorded from the Indian seas till 1979 was 32 (Thomas, 1979 B) and this number, as compared to that in any oceans/seas of the world is far too high. This shows that the calcium carbonate – secreting animals in the Indian seas are under constant threat of sponge attack. The rate of infestation has always found to be less and well within the predictable limits from 3-10% in the natural beds for conventional species of boring sponges year after year along the south east and south west coast of India. But this situation drastically changed by 1980 when two new invaders; *Cliona margaritifera* and *Cliona lobata* made their appearance on the pearl oyster culture rafts moored at Vizhinjam Bay. It may be mentioned in this context that the incidence of boring sponges recorded from these rafts, just prior to the above invasion, was only 3-8% (Appukuttan, 1987). But the incidence was found high during the subsequent season ie. 47% in 1980 and 60% in 1981, (Thomas *et. al*., 1993) among raft-cultured pearl oysters.

From the culture rafts, these two new invaders started spreading to the commercially important molluscan beds in and around Vizhinjam. During a subsequent survey which ended in 1986, it could be seen that *Cliona margaritifera* migrated to the raft cultured pearl oysters at Tuticorin and *Cliona lobata* to the chank beds off Tiruchendur within a period of two years (Thomas *et. al*., 1993).

In order to collect the information on incidence pattern, migration of boring sponges from the wild to the tended stocks etc., samples were collected from pearl culture rafts at Tuticorin, and brown mussel culture rafts at Vizhinjam and Dalavapuram in Ashtamudi Lake.

Materials and Methods

Raft cultured mussel at Vizhinjam

In order to compare and contrast the rate of sponge infestation in natural beds with that in culture systems, a study was taken up at Vizhinjam utilizing the brown mussels reared through rope-culture methods. One hundred specimens taken from the raft at random was examined for sponge infestation.

Hydrographic conditions of the culture site

Water samples were collected from the culture site at monthly intervals from October, 1998 to March, 1999. Dissolved oxygen was estimated by Wrinkler method. For the estimation of salinity, samples were collected in polythene bottles and estimated titrimetrically by the Mohr Knudsen method. Inorganic phosphate, nitrate and silicate were estimated following the method given by Strickland and Parsons (1960).

Rope-cultured brown mussel at Dalavapuram

In order to study the boring sponge infestation pattern in estuaries Dalavapuram in the Ashtamudi Lake was selected the study area. Seeds of brown mussel were colleted from the intertidal areas of Neendakara harbour and seeded on to nylon ropes of 1m length and 10 mm diameter and wrapped with

cotton mosquito netting. Seeded ropes were suspended from fixed cassuarina poles. The cultured mussels were examined regularly from December, 1998 to May, 1999.

Hydrographic conditions

The water quality parameters temperature, salinity, dissolved oxygen, nitrate, phosphate and silicate were monitored throughout the culture period

Results

Raft cultured mussel at Vizhinjam

The surface temperature varied from a minimum of 31°C to a maximum of 33°C. Salinity values ranged from 30.38 ppt to 35.4 ppt. Dissolved oxygen values varied from a minimum of 3.26 ml/l in March to a maximum of 5.11 ml/l in January. Maximum nitrate content was recorded in March (1.58 µg at/l) and the lowest in February (0.77 µg at/l). Phosphate content fluctuated between 0.509 and 2.916 µg at/l during the study period whereas silicate content varied from 0.687 to 1.39 µg at/l (Fig. l).

In the above study the incidence of boring sponges was 23%, and it was quite high as against the same in natural beds (9.28%). The infestation started in 35 mm length groups and extended in different size groups upto 70 mm. Maximum infestation could be seen in 50-55 mm size group with the right valve infested mostly.

Four species of bring sponges were found to occur in the cultured brown mussel. *Cliona lobata* formed the dominant species (61%), followed by *Cliona vastifica* (26%), *Cliona margaritifera* (9%) and *Cliona celata* (4%). As mentioned earlier, in the competition between the two new invaders, *Cliona margaritifera* and *Cliona lobata*. It is *Cliona margaritifera* which wins finally but in the present observation both were found suppressed by *Cliona vastifica* which is a widely distributed conventional species in the Indian molluscan beds (Thomas, 1979 B).

Rope-cultured brown mussel at Dalavapuram

Dissolved oxygen values varied from 3.26 ml/l to 5.51 ml/l and temperature values were within the normal range, ie. 30°C to33°C. Salinity ranged from 26.49 ppt to 31.8 ppt. Nitrate concentration varied from 0.77 µg at/l in February to 1.58 µg at/l in March, phosphate from 0.50 µg at/l in December to 2.91 µg at/l in March and silicate from 0.68 µg at/l in December to µg at/l in February (Fig. 2).

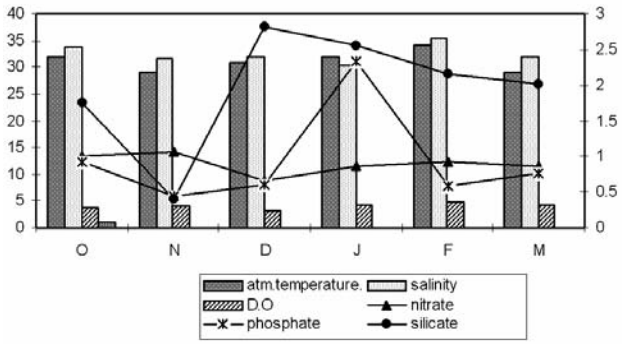

Fig. 1—Environmental parameters of water samples collected from mussel culture site at Vizhinjam

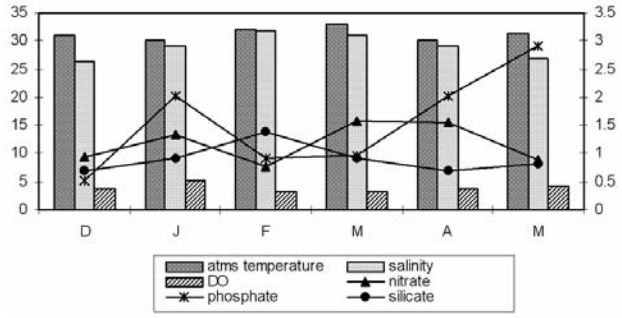

Fig. 2—Environmental parameters of water samples collected from mussel culture site in Ashtamudi Lake

Monitoring of the cultured mussels was done regularly for the growth and survival. Mussel seed with an average size of 31.5 mm in December reached an average size of 56.52 mm by May, 1999.

Out of 100 specimens of mussels examined, 18% were infested with boring sponge *C. vastifica* and the size group of 45-50 mm registered the maximum infestation. The openings made by the sponge were confined to the umbo region and the right valve was found infested mostly. No other species of boring sponge was observed at this station.

Discussion

Hartman (1958) opined that *Cliona vastifica* is a more adaptive and plastic species being capable of inhabiting a wide variety of habitats in regard to depth, reduced salinity and exposure to air than is true of *Cliona celata*, and in Indian Waters *C. vastifica* is more dominant than *Cliona celata* on oyster beds. Populations of *Cliona vastifica* have invaded brackish water in a number of regions of the world and have undergone parallel morphological changes in each area. Three populations along the American Atlantic coast apparently merit specific rank (Hartman, 1958).

In India, *C. vastifica* is commonly found in lakes and brackishwater areas and is reported from Chilka Lake, Adayar River and Ennore backwaters (Annandale, 1915), Zuari and Mandovi estuaries, Goa (Thomas, 1975) and Ashtamudi Lake (Thomas *et. al*., 1983). In the present study also it is reported as the only species of boring sponge from the estuarine realms of the southwest coast. The extreme salinity tolerance, capacity to form gemmules and faster growth are the three factors which made *Cliona vastifica* a successful species in the estuarine systems (Thomas, 1975).

The result of the present study shows that *Cliona lobata* was the dominant species in Vizhinjam culture rafts followed by *C. vastifica*, *C. margaritifera* and *C. celata*. But in the experimental culture raft at Dalavapuram in Ashtamudi Lake only the euryhaline species *C. vastifica* was observed.

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