

Destruction of Mangrove Vegetation by *Sphaeroma terebrans* along Kerala Coast

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Extent of damage caused by wood boring isopod crustaceans to mangrove vegetation off Kerala Coast has been evaluated in this study, based on a survey and monthly collections from two localities in Cochin backwater system. Even though the incidence of various borer and fouler species was recorded, *Sphaeroma terebrans* was found to be the chief destroyer of the prop roots and stems of the mangroves of Kerala. The major portions of the mangrove trees had their prop roots cut off at approximately the level of mean high water. Those prop roots that remained were perforated and exhibited all stages of destruction accompanied by secondary decomposition due to the attack of bacteria and fungi. Numerous individuals, both juveniles and adults of *S. terebrans* were found inside the prop roots and stems.

The role of marine wood borers in the destruction of underwater timber structures is as old as the history of navigation. These wood borers not only destroy dead underwater timber structures but also attack and destroy the living mangrove vegetation and hence they are pests of great economic importance all over the world. Considerable work has been done in India on various aspects of wood-borers in relation to its destruction of marine timber and is summarised by Pillai (1961), Nair & Saraswathy (1971) and Santhakumari (1975). Many authors (Das & Dev Roy, 1988; Dev Roy & Das, 1985; Dharmaraj & Nair, 1979; Rambabu *et al.*, 1984; Radhakrishnan & Natarajan, 1987; Rao, 1986; Sankaranarayana Iyer *et al.*, 1988, Santhakumaran, 1983; 1986) have discussed the damage caused by these pests to living mangroves. Even though much work has been done on wood-borers from Indian waters information about them from Kerala coast is meagre. Hence an attempt has been made to study the destruction of mangrove vegetation by wood-borers from different areas with detailed study from Vembanad lake.

Material and Methods

Monthly collections were taken from two fixed stations, at Tripunithura and Narakkal from Vembanad lake (Fig. 1) for a

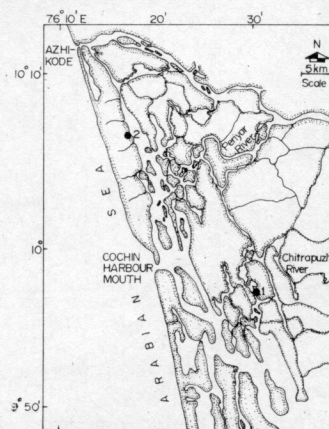


Fig. 1 The locations of sample collection, 1. Thripunithura and 2. Narakkal.

period of one year apart from the survey work carried out from different places of mangroves at Kayamkulam lake and Vembanad Lake. The wood borers were collected from the prop roots and stems, both dead and alive,

of mangrove trees. The intensity of incidence of various borer species was recorded.

Results and Discussion

The hydrographical parameters like temperature, salinity and dissolved oxygen are presented in Figs. 2 & 3. In the areas

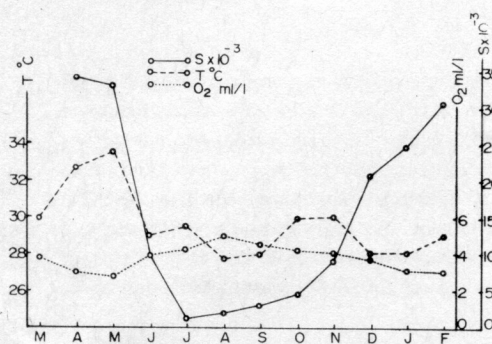


Fig. 2 Variations in hydrographical parameters at station 1 (Thripunithura)

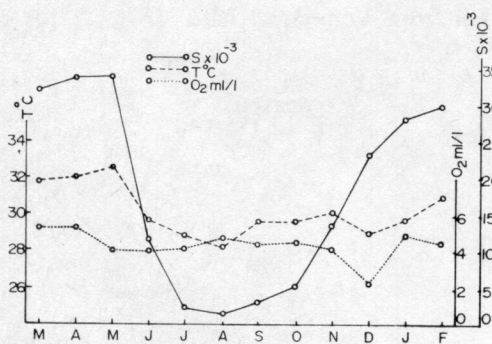


Fig. 3 Variations in hydrographical parameters at Station 2 (Narakkal)

studied, the salinity underwent marked seasonal variations. During the south west monsoon season almost fresh water condition prevailed during low tide in all places. The maximum salinity went up to 35.8‰. Because of the shallowness, the mangrove areas were exposed during low tide and submerged upto one metre depth during high

tide. In the backwater system the temperature was found to be always above 25°C in the region of mangrove vegetation. As low as 2.2 ml/l dissolved oxygen was observed.

Table 1 shows the intensity of incidence of the woodboring organisms. The most

Table 1. Percentage of infestation by wood borers from live and dead mangrove vegetation at two stations

Station	Live	Dead	Wood borer species
Station 1	66.6	100.0	<i>S. terebrans</i>
	50.0	80.0	<i>M. striata</i>
	33.3	50.0	<i>T. furcifera</i>
	0	66.6	<i>N. headleyi</i>
	0	33.3	<i>S. annandalei</i>
Section 2	70.0	100.0	<i>S. terebrans</i>
	33.3	50.0	<i>M. striata</i>
	0	33.3	<i>T. furcifera</i>
	0	0	<i>N. headleyi</i>

dominant borer, responsible for the maximum destruction of mangroves of these areas was the isopod crustacean, *Sphaeroma terebrans*. Second in abundance was the wood boring pholad *Martesia striata* which was found in both the localities in good numbers. *Teredo furcifera*, the shipworm was present in both the localities whereas *Nausitora hedleyi* and *S. annandalei* were noticed only from Tripunithura. The trees attacked by these borers were *Avicenia* sp. and *Rhizophora* sp. in these areas.

The extent of destruction caused by *S. terebrans* was more at Narakkal than at Tripunithura. The number of sphaeromids were maximum during the premonsoon period at Narakkal whereas the maximum was observed during postmonsoon at Tripunithura. About 70% of the mangrove vegetation was attacked by this pill bug in these localities. The dead mangrove trees were found to be completely destroyed by these pests (Table 2).

Table 2. Incidence of wood borers collected in different seasons

Name organisms	Post monsoon		Pre monsoon		Monsoon	
	Tripunithura	Narakkal	Tripunithura	Narakkal	Tripunithura	Narakkal
<i>S. terebrans</i>	A	VC	VC	A	C	C
<i>S. annandalei</i>	R	--	--	--	--	--
<i>N. hedleyi</i>	VC	C	--	--	--	VR
<i>T. furcifera</i>	--	--	C	VR	--	--
<i>M. striata</i>	C	R	VC	C	--	--

-- not recorded; VR very rare; upto 5 specimens; R - rare 6-20 specimens; C - Common, 21-50 specimens; VC - very common, 51-75 specimens A - abundant, above 75 specimens

The stems of these trees were riddled and during storms they fell down. The tip of the main trunk appeared brittle due to the intense tunnelling by these borers. Even when the base of the mangrove trees were riddled with the wood borers the tree seemed to be healthy with the green leaves. The population density of *S. terebrans* at Narakkal was higher with higher salinity. This suggests that this species is euryhaline. Over colonisation of the substratum by this species during the premonsoon was noticed and it was found to have occupied even the empty shells of the barnacles. The incidence of this borer was generally heavy throughout the year with maximum attack from September and minimum from June. The presence of young ones and ovigerous females in the population of *S. terebrans* suggested that they were continuous breeders. The study of Sankaranarayana Iyer *et al.*, (1988) also supported this observation. In their studies they reported the maximum intensity of *S. terebrans* from Vembanad lake during the postmonsoon season. This supports the present findings at Tripunithura whereas it contradicts the results at Narakkal. Rao (1986) made comparative studies from mangrove areas along the northern and western coasts of India and stated that the species composition and the agents causing maximum destruction differed with localities.

During the study period it was noticed that a major portion of the mangrove trees in the backwaters of Kerala had their prop roots cut off at approximately the level of mean high water. Those prop roots that remained were perforated and exhibited all stages of destruction accompanied by secondary decomposition by bacteria and fungi. Numerous individuals of *S. terebrans* including adults were found inside the prop roots and stems. When sphaeroma attack was heavy, the surface of the affected parts looked like honey comb.

Each burrow was cylindrical with 20-30 mm in depth and 5-8 mm across. The adjacent burrows were separated only by a thin film of wood. The burrows were usually at right angles to the surface of the root or stem. It was found that they preferred soft parts in the case of the prop roots of mangrove trees. As the burrow increased in number the wall separating the adjacent ones got thinned and by the wave action the outer layer dropped out exposing the animals. The direct sunlight may cause the animals to burrow deeper into the wood. The attack of fresh timber was always made by the adults and the attack was concentrated at a particular spot. As with many other marine animals, *Sphaeroma* sp. also selected a site previously colonised by their own species. Their dense settlement,

gregarious habits and the rapid rate of reproduction contributed to deeper and deeper penetration resulting in the rapid deterioration of timber. Observation along the backwaters of Kerala particularly in Cochin backwaters showed that sphaeroma constituted a very serious threat to the mangroves. Almost a similar type of observation was reported from South West Florida by Rehm and Humm (1973).

Among the fouling organisms *Balanus amphitrite* was the most conspicuous form and their maximum infestation was noticed in high saline months. Calcareous tubes of polychaetes, *Modiolus* sp., amphipods, hydroids and algae were found in good numbers. Free living polychaetes and planarians were seen in the empty burrows of the wood borers. Bryozoans, copepods, diatoms and protozoans were also noticed as foulers. Oysters and sea anemones were found as occasional visitors. Mud tubes of polychaetes were noticed in monsoon season.

The author is thankful to the Director, National Institute of Oceanography, Goa and the Scientist-in-Charge, Regional Centre of N.I.O. Kochi, for providing facilities and encouragement.

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