

MANGROVE WOOD BORED BY MOLLUSCS, SOUTHEASTERN COAST OF INDIA

By A. Sivakumar & K. Kathiresan

Centre for Advanced Study in Marine Biology, Annamalai University,
Parangipettai - 608 502, India

ABSTRACT

Seven wood-boring species were identified in the Pichavaram mangrove forest, southeastern coast of India, viz., 5 teredinids: *Bankia campanellata* Moll & Roch, *Bankia carinata* (Gray), *Dicyathifer manni* (Wright), *Lyrodus pedicellatus* (Quatrefages), *Teredo furcifera* von Martens, and 2 pholads: *Martesia striata* (L.) (predominant) and *Martesia nairi* Turner & Santhakumaran. Among the 12 species of mangrove trees, *Rhizophora lamarckii* Lamk., *Sonneratia apetala* B. Ham. and *Xylocarpus granatum* Koen., were highly affected by the borers. Dead mangrove stumps showed higher infestation of wood-borers than the live ones. The occurrence of wood-borers was high during July and low in December.

INTRODUCTION

Molluscan borers are a major group of wood-deteriorating organisms which cause extensive damage to underwater timber structures in the marine environment. The molluscs are represented by the Teredinidae (shipworms) and Pholadidae (Piddocks). These organisms are capable of extending their attack to live mangrove vegetation (Das & Dev Roy 1980, 1981; Santhakumaran 1985). Studies on this aspect is essential to assess the problem of wood-deterioration in the mangrove environment.

MATERIALS AND METHODS

Molluscan wood-borers were studied in the Pichavaram mangrove forest located on the southeastern coast of India (11°27'N; 79°47'E). Ten sampling sites, each 10 m², were selected at the periphery of an islet next to a water-way. The sites were marked with a coir rope. The molluscs were extracted from 10-100 cm long pieces of randomly collected live and dead mangrove stem and root. Sampling occurred one time during each season: summer (April-June, 1987), premonsoon (July-September, 1987), monsoon (October-December, 1987) and postmonsoon (Janu-

ary-March 1988). The percentage of mangrove species attacked by molluscs was calculated for the summer season April-June 1987. The wood borers were narcotized with 10 % ethanol and preserved in 10 % formalin. The pholads were identified following descriptions by Jones & Eltringham (1968), and Turner & Santhakumaran (1989). The teredinids were identified based on the descriptions given by Turner (1966).

RESULTS AND DISCUSSION

Seven species of molluscan wood-borers were identified (5 Teredinids viz., *Bankia campanellata*, *B. carinata*, *Dicyathifer manni*, *Lyrodus pedicellatus* and *Teredo furcifera*; 2 pholads viz., *Martesia striata* and *M. nairi*). Of the molluscan wood-borers, *Martesia striata* was the predominant species in the study area (Table 1).

A specific association was found between the molluscan wood-borers and mangrove species. *Martesia striata*, *Teredo furcifera*, *Bankia carinata* and *B. campanellata* were recorded in *Rhizophora* species. *Martesia nairi* was noted only in *R. apiculata* and *R.*

mucronata. *Lyrodus pedicellatus* was common in *Avicennia* species.

Most of the borers were present throughout the year. However, *Martesia nairi* was recorded only during premonsoon and *Bankia* spp., were not found in the monsoon (Table 2). The populations displayed seasonal variations with minimum numbers during the monsoon and maximum in the premonsoon in both live and dead mangrove stumps. It appears that the low salinity during the monsoon restricted the distribution of wood-borers.

Twelve species of mangroves were recorded in 10 sampling sites. From 4.4 to 100 % of these mangrove samples were infested with molluscs. *Sonneratia apetala*, *Xylocarpus granatum* and *Rhizophora lamarckii* showed 100 % attack and these plant species were fast disappearing from the study area (Kathiresan & Ravikumar 1993). The other commonly affected species were *Rhizophora apiculata* (78.1 %), *Aegiceras corniculatum* (57 %), *Avicennia officinalis* (22.5 %) and *Lumnitzera racemosa* (20 %) (Table 2).

The least affected mangrove species were *Avicennia marina* (7.5 %), *Ceriops decandra* (5.2 %) and *Bruguiera cylindrica* (4.4 %) (Table 2). These species are relatively less submerged during high tide and maintain dense stands in the present study area.

Serious attacks on mangrove species by molluscan wood-borers were observed on the

coast of Goa. *Rhizophora mucronata* and *Excoecaria agallocha* were attacked (Santhakumaran 1985); *E. agallocha*, *Aegiceras corniculatum*, *Avicennia* spp. and *R. apiculata* were attacked in the Krishna estuarine mangroves (Rambabu *et al.* 1987). Living mangrove trees were found riddled by the borers at their bases. In consequence, they were uprooted and easily broken during gales in the Sunderbans, Godavary estuary, and Goa coasts (Santhakumaran 1985). Similar observations were also made in the present study area.

Table 1 shows that the dead mangrove stumps were more heavily infested than the living parts. In a management scheme, we would recommend that infested stumps and other trash wood lying in the mangroves should be removed. They provide a source for the continuous supply of borer larvae for fresh attack. Constant monitoring on the incidence of wood-borers is essential to minimize the destruction of mangrove vegetation. Also, an eco-friendly method of controlling the molluscan wood-borers by using naturally occurring pesticides has to be undertaken. Environmental pollution caused by the use of chemicals to prevent wood-boring should be avoided.

ACKNOWLEDGEMENTS

The authors thank the UGC, New Delhi and the authorities of Annamalai University for providing financial support and facilities respectively.

Table 1. The number of individual wood-borers collected from live and dead mangroves of Pichavaram. Extracted from 60 mangrove samples collected at random. A: Summer (Apr-Jun); B: Premonsoon (Jul-Sep); C: Monsoon (Oct-Dec); D: Postmonsoon (Jan-Mar).

Wood-borers	A		B		C		D	
	Dead	Live	Dead	Live	Dead	Live	Dead	Live
<i>Bankia campanellata</i> Moll & Roch	5	1	5	3	-	-	7	3
<i>B. carinata</i> (Gray)	1	1	6	2	-	-	9	2
<i>Dicyathifer manni</i> (Wright)	2	1	5	3	1	1	4	3
<i>Lyrodus pedicellatus</i> (Quatrefages)	3	1	9	4	4	1	8	3
<i>Teredo furcifera</i> von Martens	4	3	21	15	4	1	13	6
<i>Martesia striata</i> (L.)	15	13	22	7	2	1	11	8
<i>M. nairi</i> Turner & Santhakumaran	-	-	3	1	-	-	-	-

Table 2. Live mangrove species affected by wood-borers. Values are the total of ten stations of 10 m² area each, recorded during summer (April - June 1987).

Plant species	No. of plants recorded	No. of plants infested	%
<i>Rhizophora lamareckii</i>	7	7	100.0
<i>Sonneratia apetala</i> Buch. Ham.	2	2	100.0
<i>Xylocarpus granatum</i> Koen	4	4	100.0
<i>Rhizophora apiculata</i> Blume	64	50	78.1
<i>Aegiceras corniculatum</i> (L.) Blanco	28	16	57.0
<i>Rhizophora mucronata</i> Lamk.	36	16	44.0
<i>Excoecaria agallocha</i> L.	34	12	35.3
<i>Avicennia officinalis</i> L.	354	80	22.5
<i>Lumnitzera racemosa</i> Willd.	10	2	20.0
<i>Avicennia marina</i> (Forssk.) Vierh.	80	6	7.5
<i>Bruguiera cylindrica</i> (L.) Bl.	454	20	4.4
<i>Ceriops decandra</i> (Griff.) Ding Hou.	76	4	5.2

REFERENCES

- Das, A. K. & M. K. Dev Roy. 1980. On the wood-boring molluscs of South Andaman, India. - Records of the Zoological Survey of India **77**: 179-187.
- Das, A. K. & M. K. Dev Roy. 1981. On the teredinids borers of mangroves of Camorta island, Nicobar, India. - Bulletin of the Zoological Survey of India **4**(3): 391-393.
- Jones, E. B. G. & S. K. Eltringham. 1968. Marine borers, fungi and fouling organisms of wood. - Organisation of European Community Development, Paris. 367 pp.
- Kathiresan, K. & S. Ravikumar. 1993. Two endangered species of mangroves in Pichavaram. - Indian Forester **119**(9): 773.
- Rambabu, A. V. S., B. V. Prasad & M. B. Rao. 1987. Incidence of wood-borers in the Krishna estuarine mangroves. - Mahasagar-Bulletin of National Institute of Oceanography **20**(4): 263-266.
- Santhakumaran, L. N. 1985. Destruction of mangrove vegetation by marine borers along Goa coast, with notes on their distribution in mangroves along the Indian coasts. Pages 492-498 in L. J. Bhosale (ed.). - Proceedings of National Symposium on Biology, Utilization & Conservation of Mangroves, November 1985. 558 pp.
- Turner, R. D. 1966. Survey and illustrated catalogue of the Teredinidae. - Museum for Comparative Zoology, Harvard University. 265 pp.
- Turner, R. D. & L. N. Santhakumaran. 1989. The genera *Martesia* & *Lignopholas* in the Indo-Pacific (Mollusca: Bivalvia: Pholadidae). - Ophelia **30**(3): 155-186.