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VARIATION IN BIOFOULING ON DIFFERENT SPECIES OF INDIAN TIMBERS

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ABSTRACT

Biofouling on twenty species of wood exposed in waters of Mormugao harbour, Goa have been presented. Macrofouling biomass varied from species to species. Maximum biomass was recorded on *Artocarpus chaplasha* (4 kg/m^2) and minimum on *Hopea odorata* (1.1 kg/m^2). Fouling fauna comprised of barnacles, tunicates and bryozoans. The study brings out the antifouling properties exhibited by some of these Indian timbers.

Key-words : Biofouling, antifouling, wood, Mormugao harbour.

The inherent resistance of different species of wood against the attack of marine boring organisms has been well documented (Nair, 1956; Nagabhushanam, 1960; Karande, 1967; Southwell and Bultman, 1971; Santhakumaran, 1973; Kalyanasundaram and Ganti, 1975; Santhakumaran and Alikunhi, 1983; Raveendran and Wagh, 1991). However, their likely impact on the settlement of marine fouling organisms has not yet received much attention. In this regard, the authors made a preliminary attempt to elucidate the possible effect of different species of wood on the settlement of marine fouling organisms, the results of which are presented in this communication.

Wood species used in this study are 1) *Albizzia lebbeck* 2) *Amoora wallichii* 3) *Artocarpus chaplasha* 4) *Artocarpus gomeziana* 5) *Canarium euphyllum* 6) *Dipterocarpus* sp. 7) *Hopea odorata* 8) *Lagerstroemia hypoleuca* 9) *Mangifera indica* 10) *Mimusops* sp. 11) *Lannea coromandelica* 12) *Pajaneelia rheedii* 13) *Planchonia andamanica* 14) *Pterocarpus dalbergioides* 15) *Sageraea elliptica* 16) *Sideroxylon longepetiolatum* 17) *Tectona grandis* 18) *Terminalia bialata* 19) *Terminalia manii* and 20) *Tetrameles nudiflora*. Panels (15x10x2 cm) of these timber species were exposed in duplicate in the waters of Mormugao harbour (-1 m) from 7th November, 1988 to 23rd May, 1989, the period during which maximum fouling occurs at this station. On retrieval, the panels were analysed for the number/percentage coverage and species composition of fouling organisms. The biomass was determined on a wet weight basis and expressed as kg/m^2.

Fouling biomass as well as the faunal composition exhibited remarkable variations among different species of wood. Maximum biomass (4 kg/m^2) was recorded on *A. chaplasha* and minimum (1.1 kg/m^2) on *H. odorata* (Fig. 1). Comparatively low biomass values were recorded on *A. gomeziana* and *L. hypoleuca*. There are no earlier reports on fouling biomass on timber panels from this station. However, a maximum biomass of 10.7 kg/m^2 was recorded on an aluminium panel exposed at subsurface depth during the period Oct-May, 84 (Anil, 1986). Barnacles formed the single major contributor to the fouling biomass.

The major fouling fauna comprised of barnacles, tunicates and bryozoans. Barnacle species was *Balanus amphitrite* with a maximum basal diameter of 21mm. Barnacles settled on all types of wood (Fig. 1). The maximum number of barnacles settled on any single panel was 157/dm^2 on *S. longepetiolatum*. Minimum number of 46/dm^2 was recorded on *T. nudiflora*. Relatively, lesser number of barnacles settled on *A. lebbeck, C. euphyllum, H. odorata, P. rheedii, S. elliptica*, and *T. manii*.

Ascidians comprised of *Diplosoma* sp. Maximum ascidian coverage was noticed on *T. grandis* (Fig. 1). *A. gomeziana, H. odorata, L. hypoleuca* and *T. bialata* were completely devoid of ascidian coverage. Comparatively lower coverage was noticed on *A. lebbeck, A. wallichii, P. dalbergioides* and *T. manii*.

Major bryozoan species recorded on the panels were *Hippoporina indica, Alderina arabianensis* and *Electra bengalensis*. Bryozoan coverage, in general, was less on all the test coupons (Fig. 1). Probably, the high tunicate coverage on the panels might have prevented the bryozoan settlement. The larvae of the bryozoan, *Bugula pacifica*, is reported to delay their settlement in the presence of the ascidian *Diplosoma macdonaldii* (Young & Chia, 1981). Maximum bryozoan coverage was noticed on *T. manii*. *Mimusops* sp. and *L. coromandelica* were completely devoid of bryozoan coverage.

It may be mentioned here that seven out of twenty species of wood used in this study, viz. *P. dalbergioides, A. gomeziana, S. elliptica, L. hypoleuca, T. grandis, H. odorata* and *T. nudiflora* exhibited either complete or partial borer resistance (Raveendran and Wagh, 1991). Quite interestingly, some of these borer resistant varieties also exhibited some degree of fouling resistance too. For example, among the twenty species of wood, minimum biomass was recorded on *H. odorata*. Fouling biomass on *A. gomeziana* and *L. hypoleuca* was low. Minimum number of barnacles settled on *T. nudiflora*. Number of barnacles settled on *H. odorata* and *S. elliptica* was also low. *A. gomeziana, H. odorata* and *L. hypoleuca* were completely devoid of ascidian coverage. Low coverage was also noticed on *P. dalbergioides*. Presence of obtusaquinone in *Dalbergia retusa* is responsible for its borer resistance (Turner, 1976 a&b; Jurd and Manners, 1976). Probably, the varying chemical composition and content of the wood is responsible for its varying antifouling properties. At the same time, the very presence of one of the three major foulers as well as the presence of barnacles on all the timber species probably points to lack of adequate concentration of effective chemicals for complete prevention of fouling. Attention should also be given to the various factors, like availability of larvae, exposure depth of panels, interspecific

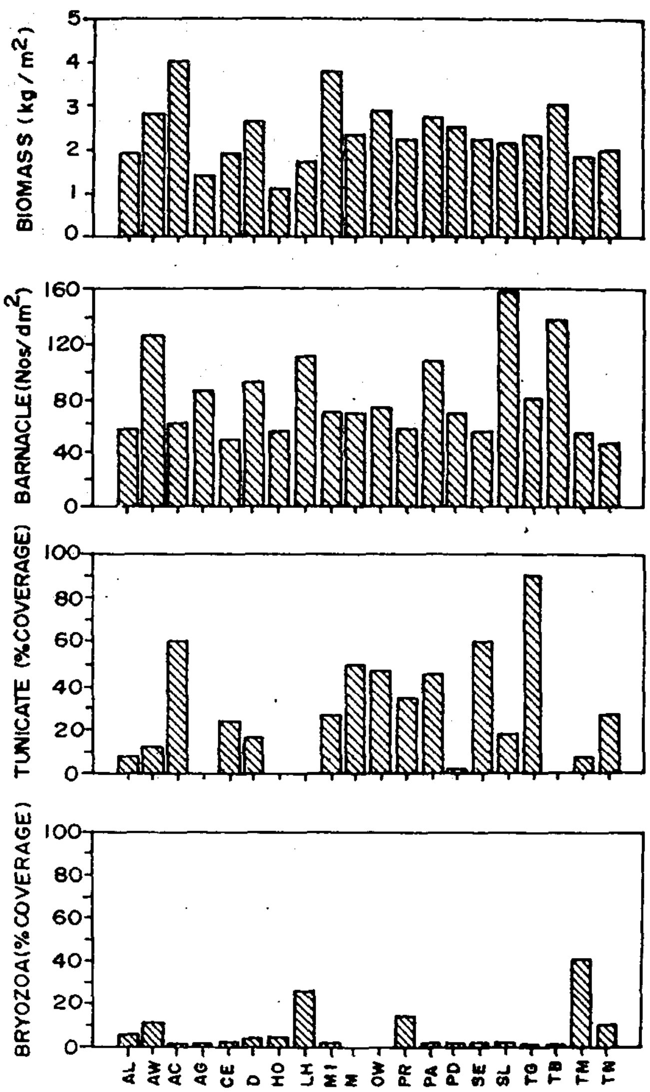

Fig 1. (a) Fouling biomass, (b) number of barnacles, (c) percentage coverage by tunicates and (d) percentage coverage by bryozoans on different species of wood

AL - *Albizzia lebbeck*	AW - *Amoora wallichii*
AC - *Artocarpus chaplasha*	AG - *Artocarpus gomeziana*
CE - *Canarium euphyllum*	D - *Dipterocarpus* sp.
HO - *Hopea odorata*	LH - *Lagerstroemia hypoleuca*
MI - *Mangifera indica*	M - *Mimusops* sp.
OW - *Lannea coromandelica*	PR - *Pajaneelia rheedii*
PA - *Planchonia andamanica*	PD - *Pterocarpus dalbergioides*
SE - *Sageraea elliptica*	SL - *Sideroxylon longepetiolatum*
TG - *Tectona grandis*	TB - *Terminalia bialata*
TM - *Terminalia manii*	TN - *Tetrameles nudiflora*

competition, gregareousness, surface chemistry of the substratum etc., which influence the intensity of fouling. However, these require detailed investigation.

Conventional antifouling technology involves continuous release of toxicants into the marine environment. With the day-to-day increasing environmental awareness, there is an increasing tendency to evolve a natural non-toxic means of fouling control. In this regard, search for antifouling compounds from marine organisms have already been initiated all over the world. Antifouling properties exhibited by selected Indian timbers may prove beneficial in this context.

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