

RESISTANCE OF SOME TIMBERS OF ANDAMAN ISLANDS AGAINST MARINE BORER ATTACK AT FIVE PORTS OF INDIA

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Six species of structural timbers grown in Andaman area have been examined for their natural resistance to marine wood-boring organisms at Bombay, Cochin, Goa, Visakhapatnam and Port Blair. *Pterocarpus dalbergioides* (Andaman padauk), has been found to be one of the most suitable timbers comparable with teak in performance. *Lagerstroemia hypoleuca* (Pynma), has shown a prolonged life and high degree of durability particularly at Bombay. Some important mechanical properties of these timbers have been compared with that of teak so that they may be considered as substitutes.

In recent years a growing need has been felt for developing harbour facilities for both naval and mercantile shipping. In construction of jetties, dockgates and other marine installations for development and expansion of harbours, timber is employed as a primary raw material even now. Though economical for use, timber has the disadvantage of being attacked by marine woodborers. As a result, in underwater installations only selected timbers such as *Tectona grandis* (Teak), *Shorea robusta* (Sal), have been widely employed as they are known to offer a fair degree of resistance in addition to providing strength. The constant use of few selected timbers obviously results in increase of their cost and depletion of limited resources.

Several workers are now engaged in studying the natural durability of many indigenous timbers in order to utilise more varieties of timbers for different purposes¹⁻⁵. The full utilisation of such research can be effectively made only if the varieties of timbers available in the states rich in forest resources are examined area-wise at various ports of maritime interest. Such a systematic survey of the durability of timbers from different states is very much lacking. Hence, the present investigation was undertaken with a view to examine the variety of timbers from Andaman and Nicobar Islands, which are yet to be fully exploited, since even few known timbers have not been examined for their natural resistance to wood-borers in Indian waters.

MATERIALS AND METHODS

Six timbers of constructional value grown in Andaman and Nicobar Islands were obtained through the Government Saw Mill, Chatham, Port Blair. Wooden panels of size 8" × 4" × 1" and 12" × 4" × 2" were made out of these timbers and exposed at five ports viz. Bombay, Cochin, Goa, Visakhapatnam, and Port Blair. Frames fitted with the above panels were exposed one foot below the lowest low water mark in the sea at all the five stations.

Experimental panels were examined at first visually for borer damage. Wherever there was destruction of 50% or more of the surface area, the panels were withdrawn, and cut open, after drying, for confirmation of the observations as described by Balasubramanyam and Menon¹. Assessment was carried out twice a year. *Tectona grandis* (Teak) was used as control for comparing the performance of these timbers and *Abies pindrow* (Himalayan fir) as control to determine the intensity of borer attack.

RESULTS AND DISCUSSION

Table 1 shows the performance of all the six Andaman timbers at the five ports of investigation. In the order of their durability against borer attack, they can be listed as *Lagerstroemia hypoleuca* (Pynma), *Pterocarpus dalbergioides* (Andaman padauk), *Mimusops littoralis* (Bullet Wood), *Bassia latifolia* (Hil mohwa), *Artocarpus chaplasha* (Taungpeinne) and *Dipterocarpus* sp. (Gurjan). Their life varied at different ports indicating the influence of local fauna.

Borers prevalent in various harbours have been studied by many workers in the past and reviewed recently⁶. It was found that at Port Blair, teredid, pholadid and limnoriid borers play an equal role in the destruction of timbers, while at Goa, Cochin and Visakhapatnam, the causative organisms belonged to teredid and pholadid groups of borers equally affecting the life of timbers. Of late, the intensity of borer attack at Visakhapatnam has been markedly reduced. At Bombay, teredid borers were predominant although recently occurrence of *Limnoria* has also been recorded at isolated places⁷. The intensity of the individual group of borers thus, varied from port to port.

TABLE 1
UNDERWATER DURABILITY OF SELECTED ANDAMAN TIMBERS AT FIVE PORTS

Name of Timber	PORT OF STUDY														
	BOMBAY			COCHIN			GOA			VISAKHAPATNAM			PORT BLAIR		
	Per-iod of exposure (months)	In-ten-sity of at-tack	Caus-ative spe-cies	Per-iod of exposure (months)	In-ten-sity of at-tack	Caus-ative spe-cies	Per-iod of exposure (months)	In-ten-sity of at-tack	Caus-ative spe-cies	Per-iod of exposure (months)	In-ten-sity of at-tack	Caus-ative spe-cies	Per-iod of exposure (months)	In-ten-sity of at-tack	Caus-ative spe-cies
<i>Tectona grandis</i> (Teak)	40	++	T	40	++	T&P	19	++	T&P	24	+	P	19	++	L&P
<i>Lagerstroemia hypoleuca</i> (Pynma)	52	—	—	40	++	T&P	19	++	T&P	24	—	—	19	++	L,T&P
<i>Pterocarpus dalbergoides</i> (Andaman Padauk)	36	++	T	40	+	P	24	++	T&P	24	—	—	19	++	T&P
<i>Mimusops littoralis</i> (Bullet Wood)	40	++	T	40	++	T&P	19	++	T&P	24	++	P	5	++	T&P
<i>Bassia latifolia</i> (Hil Mohwa)	11	++	T	28	++	T&P	5	++	T&P	24	++	T&P	5	++	T&P
<i>Dipterocarpus Sp</i> (Gurjan)	11	++	T	26	++	T&P	5	++	T&P	12	++	T&P	5	++	L,T&P
<i>Artocarpus chaplasha</i> (Taungpeinne)	11	++	T	28	++	T&P	12	++	T&P	24	+	P	5	++	T&P

— = No attack
T = Teredid borers
+ = Less than 50% attack
P = Pholadid borers
++ = More than 50% attack
L = Limnoriid borers

TABLE 2
MECHANICAL PROPERTIES OF ANDAMAN TIMBERS COMPARED WITH TEAK (AFTER TROTTER⁸)

Name of timber	Availability*	Wt. lbs/ Cft at 12% moisture	Strength as a beam ⁺	Stiff-ness as a beam ⁺	Suitabi-lity as a beam ⁺	Shock resis-ting ability ⁺	Reten-tion of shape ⁺	Shear ⁺	Hard-ness ⁺
<i>Tectona grandis</i> (Teak)	Most common	43	100	100	100	100	100	100	100
<i>Lagerstroemia hypoleuca</i> (Pynma)	Do	39	80	80	75	85	70	100	80
<i>Pterocarpus dalbergoides</i> (Andaman Padauk)	Do	45	100	105	105	100	105	115	130
<i>Mimusops Littoralis</i> (Bullet Wood)	Not known	69	140	155	140	155	50	175	250
<i>Bassia latifolia</i> (Hil Mohwa)	Most common	49	95	95	90	105	60	115	130
<i>Dipterocarpus Sp</i> (Gurjan)	Do	47	85	100	90	80	45	100	85
<i>Artocarpus chaplasha</i> (Taungpeinne)	Do	37	90	90	95	90	95	90	95

* I.S. Specification No. 399 : 1963.

+ Data expressed as percentage of teak.

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It is observed from the results that *L. hypoleuca* (Pyinma) was not affected upto 52 months at Bombay, while it lasted for barely 18 months at Port Blair. The pattern of durability compared between Bombay and Port Blair reveals that many timbers show a greater durability at Bombay while the same is attacked within a much shorter period at Port Blair. Our investigations have revealed that any timber showing a life of at least 12 months or more at Port Blair can be expected to resist the borer attack for a much longer period in the mainland ports, and hence should be considered a durable timber. Out of these six species, *L. hypoleuca* (Pyinma), *P. dalbergioides* (Andaman padauk), and *M. littoralis* (Bullet Wood) showed maximum resistance to marine borer attack. The remaining three timbers exhibited lesser durability at Bombay and Goa though a good degree of resistance was shown at Cochin and Visakhapatnam, despite the borer population at Goa, Cochin and Visakhapatnam being similar.

The mechanical properties of all these timbers are comparable with that of teak^s and a few of the timbers like *P. dalbergioides* (Andaman padauk), *M. littoralis* (Bullet Wood) are even superior to teak (Table 2). In view of this, it is felt that these timbers should be utilised more extensively for underwater constructions, slowly reducing the present heavy demand placed on the selected few timbers of the mainland. *P. dalbergioides* (Andaman padauk), *M. littoralis* (Bullet Wood) and *L. hypoleuca* (Pyinma) can replace *T. grandis* (Teak) wherever strength and durability are essential, in any of the ports of investigation. The other three timbers can be employed with discretion, depending upon place and use, for the effective utilisation of timbers grown in Andaman regions.

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REFERENCES

1. BALASUBRAMANYAM, R. & MENON, T. R., *J. Mar. Biol. Assn. (India)* 5 (1963), 294.
2. NAGABHUSHANAM, R., *J. Timb. Dry & Pres. Assoc (India)* 6 (1960), 1.
3. NAIR, N. B., *Fishery Technology* 1 (1964), 87.
4. PALKAR, V. C., & BAL, D. V., *J. Bombay, Nat. His. Soc.*, 53 (1955) 201.
5. SANTHAKUMARAN, L. N., *Ibid*, 67 (1970), 403.
6. NAIR, N. B. & SARASWATI, M., "Advances in Marine Biology", Vol. 9 (Academic Press, London), 1971, pp. 335-509.
7. SANTHAKUMARAN, L. N., *J. Bombay, Nat. His. Soc.*, 66 (1969), 203.
8. TROTTER, H., "The Commercial Timbers of India and Their Uses", (Vasant Press, Dehra Dun, India), 1944.