

Observations on the Durability of Fifteen Species of CCA Treated Timber in the Cochin Harbour

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Observations on the durability of fifteen species of common Indian timber treated with CCA at two absorption levels, for eight years are presented. CCA treatment has improved the durability of these timber to a great extent. *T. grandis*, *D. indicus* and *X. xylocarpa* give maximum durability on treatment with CCA. Less durable *A. kurzi*, *T. nudiflora* and *P. longifolia* when treated with CCA showed results comparable to the best species.

Eventhough there are a few reports on the natural durability of common Indian timber and on the efficacy of some wood preservatives in marine environments, long term studies on the durability of different species of treated timber are meagre (Purushotham & Rao, 1971, 1971a; Cheriyan & Cherian, 1978). Studies on the efficacy of wood preservatives have proved that CCA (Ascu) has toxic effects on wood destroying organisms (Nagabhushanani, 1961; Ganapathi & Nagabhushanam, 1964). Two series of durability tests consisting of thirty species of timber treated with CCA and creosote; fuel oil have been reported by Purushotham & Rao (1971). But the duration of most of the tests reported by them is three years and hence further data are needed to determine the economic feasibility of the preservative method employed. The present paper reports the durability of fifteen species of timber treated with CCA and tested for over 8 years. The natural durability of these species of timber in the Cochin Harbour has been already reported (Cheriyan & Cherian, 1978).

Materials and Methods

The procedure of Cheriyan & Cherian (1978) was followed for the present tests. From each of the fifteen species three panels of 30.48 x 3.81 x 3.81 cm were selected. *Shorea robusta* is selected from Bihar, U.P., and West Bengal and *Tectona grandis* from Madras and Andhra. For purposes of easy discussion, the species selected from

each state are considered separately (Table 1). The test panels were treated with CCA in two series, namely, A1 (CCA 16 kg/m³) and A2 (CCA 32 kg/m³) at the Forest Research Institute, Dehra Dun. But *Shorea robusta*, *Tectona grandis*, *Pterocarpus dalbergioides*, *Albizia* sp. and *Xylia xylocarpa* did not give the required absorption levels as they are refractive to treatment. In *S. robusta* and *X. xylocarpa* the absorption varied from 4.8 to 9.6 in *T. grandis* from 12.8 to 20.48 in *P. dalbergioides* and *Albizia* sp. from 14.4 to 17.6 kg/m³ and those panels which gave higher absorption among themselves were included in the A2 series. The test panels in triplicate were inserted in box type iron frames described by Purushotham & Rao (1971) and suspended below low tide level in the Cochin Harbour. The test panels were examined after one month and three months for boring and fouling organisms. Foulers were removed for a thorough examination of the borer holes from the third observation onwards. Counting of holes and visual assessment of destruction were made. The species wise average percentage of destruction was calculated for 8 years. The percentage of destruction in the discarded panels was taken as 100.

Results and Discussion

Balanus sp., *Modiolus* sp., *Ostrea* sp., *Mytilus* sp., tubicolous polychaetes and hydroids were the common foulers. During the first three months settlement of foulers was negligible on A1 and A2 series. After

Table 1. Per cent destruction of test panels treated with CCA during different years (average of 3 test panels of each species)

Species of timber	Locality	1 year		2 years		3 years		4 years		5 years		6 years		7 years		8 years	
		A1	A2	A1	A2	A1	A2	A1	A2	A1	A2	A1	A2	A1	A2	A1	A2
<i>Alstonia kurzi</i> (Pala)	Andamans	nil	S	3	6	13	46	29	R	34	—	52	—	75	—	R	—
<i>Bombax insigne</i> (Ilavu, semul)	Andamans	4	2	11	6	38	16	41	24	42	28	48	35	51	38	78	54
<i>Albizzia</i> sp. (Vaka)	Andamans	S	S	2	3	21	47	53	75	59	77	R	R	—	—	—	—
<i>Tetrameles nudiflora</i> (Chini)	Andamans	S	S	2	2	11	12	22	18	28	21	37	28	64	30	77	35
<i>Pinus longifolia</i> (Caralm, Chir)	Kashmir	nil	nil	2	S	7	4	12	7	14	9	21	13	26	17	32	22
<i>Polyalthia fragrans</i> (Arana)	Coorg	S	1	7	8	22	16	47	23	50	28	76	38	R	68	—	R
<i>Shorea robusta</i> (Sal)	Bihar	S	S	2	1	8	9	14	15	22	25	77	73	79	74	83	R
<i>Shorea robusta</i> (Sal)	U.P.	S	nil	2	S	11	8	20	14	50	28	R	60	—	83	—	R
<i>Shorea robusta</i> (Sal)	W. Bengal	nil	S	S	1	5	7	14	14	16	25	52	54	76	R	R	—
<i>Terminalia paniculata</i> (Pillai marathu)	Bombay	S	nil	S	S	5	4	10	7	12	10	22	18	51	28	R	61
<i>Pterocarpus dalbergioides</i> (Thakara, Andaman padauk)	Andamans	nil	S	S	1	4	9	7	19	9	46	18	52	20	76	49	R
<i>Dipterocarpus indicus</i> (Karanjali)	Coorg	nil	nil	S	nil	S	nil	2	S	3	S	6	1	9	1	14	4
<i>Tectona grandis</i> (Teak)	Madras	nil	nil	S	S	S	S	1	1	2	2	5	6	6	8	11	13
<i>Tectona grandis</i> (Teak)	Andhra	nil	nil	S	S	2	1	6	2	8	4	13	8	17	12	23	18
<i>Xylia xylocarpa</i> (Irul)	Bombay	S	S	1	1	5	4	11	8	13	11	18	19	24	25	31	31

A1 = CCA 16 kg/m³; A2 = CCA 32 kg/m³; S = Slight attack; R = Rejection of all the 3 panels

sixth months all the panels irrespective of the treatment were covered by the fouling community. The common borers were *Sphaeroma terebrans*, *Martesia striata*, *Teredo furcifera*, *Lyrodus pedicellatus* and *Bankia companellata*. Table 1 shows the average percentage of destruction in A1 and A2 series.

A1 Series

In this series, *Albizzia* and *S. robusta* were discarded in the sixth, *P. fragrans* in the seventh and of *A. kurzi*, *S. robusta* and *T. paniculata* in the eighth year of immersion. Maximum resistance to borers was shown by *T. grandis* and *D. indicus*. However, *T. grandis*, *X. xylocarpa*, *P. longifolia* and *P. dalbergioides* also showed good results, the destruction being below 50% at the end of the eighth year. In *B. insigne*, *T. nudiflora* and *S. robusta* the natural durability is poor (destroyed in 2 to 3 years, Cheriyan & Cherian, 1978) also completed eight years even though the percentage of destruction of the panels was comparatively high.

A2 Series

A. kurzi was discarded in the fourth year, *Albizzia* in the sixth year, *S. robusta* in the seventh year and of *P. fragrans*, *S. robusta*, and *P. dalbergioides* in the eighth year. *D. indicus*, *T. grandis* and *P. longifolia* showed the maximum resistance to borer attack. *X. xylocarpa*, *T. nudiflora*, *B. insigne* and *T. paniculata* also gave good results. The number of species which lasted 8 years was similar to that in A1 series. But A2 series showed better resistance to borers.

Of the fifteen species *X. xylocarpa*, *D. indicus* and *T. grandis* have the maximum natural durability (Cheriyan & Cherian, 1978). The present study shows that in treated condition also they are giving the best results. Comparison of this study with those of Cheriyan & Cherian (1978) shows that the treatment with CCA improves the durability of all the species. It is interesting to note that *A. kurzi*, *T. nudiflora*, *P. longifolia* when treated with CCA, showed results similar to the best species and difference between A1 and A2 series was not very pronounced inspite of differences in CCA absorption.

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References

- Cheriyan, P. V. & Cherian, C. J. (1978) *J. Timb. Dev. Ass. India.* 24, 25
- Ganapati, P. N. & Nagabhushanam, R. (1964) *J. Timb. Dry. Preserv. Ass. India* 5, 13
- Nagabhushanam, R. (1961) *Amer. Zool.* 1, 242
- Purushotham, A. & Satyanarayana Rao, K. (1971) *J. Timb. Dev. Ass. India.* 17, 1
- Purushotham, A. & Satyanarayana Rao, K. (1971a) *J. Timb. Dev. Ass. India.* 17, 75