

Further Observations on the Comparative Efficacy of Some Indigenous Methods for the Protection of Underwater Timber Structures

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Results of long-term evaluation of several indigenous methods for protection of underwater timbers against wood boring organisms are reported in this paper. While unprotected control poles were totally destroyed due to severe infestation by the wood borers within a period of 9 months, the poles covered with copper-chrome-arsenic (CCA)/creosote fuel oil (CFA) treated coir rope lasted for 5 years, the ones studded with iron nails gave a life of 16 years and those plastered with cement over CCA treated coir rope winding/scattered nailing interconnected with winding wire were in sound condition even afterwards. Specific advantages offered by the methods in curtailing marine borer attack are also mentioned.

From time immemorial, artisans chose several indigenous methods to safeguard timber structures from the ravages of marine organisms (John & Chcriyan, 1964 and Santhakumaran & Jain, 1983). Balasubramanyan (1964) and Santhakumaran *et al.* (1982), however, found none of them reliable. Chcriyan & Chcrian (1975) evaluated several indigenous methods for protection of underwater timbers in Cochin harbour waters between 1971 and 1974. As the results were encouraging, field trials using the same materials were continued till 1987 and the efficacy of these methods in preventing marine borer attack is discussed here.

Materials and Methods

Details of the methods employed in the tests and installation of the poles (teak-sap wood) in the Cochin harbour are given by Chcriyan & Chcrian (1975). The trials were continued using (1) poles studded with 3 iron nails per sq. cm, (2) poles studded with 2 iron nails per sq. cm, (3) poles plastered with cement and sand in 1:4 proportion over scattered nailing inter-

connected with winding wire, (4) poles similarly plastered with cement and sand over copper - chrome - arsenic (CCA) treated coir rope winding, (5) poles covered with untreated coir rope, (6) poles covered with coir rope treated with 4% solution of CCA and (7) poles covered with coir rope treated with creosote fuel oil (CFO). The intensity of borer attack were recorded at intervals of six months.

Results and Discussion

Due to intense borer activity the untreated control poles were destroyed within 9 months of their installation (Chcriyan & Chcrian, 1975) (Fig.1).

The pole studded with 3 iron nails per sq cm gave an excellent service life of 16 years (Fig.1). A corrosion product was formed from the nails which later turned into a 'hard shell' encircling the entire pole and thereby keeping the timber inaccessible to borers. But, during the 16th year, the 'hard shell' in the middle portion of the pole was damaged due to unknown reasons. So, the exposed portion was im-

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mediately subjected to severe infestation by borers and in a short span of 6 months itself the pole broke off at that point. However, the 'hard shell' in other regions especially that in the intertidal region remained intact and resisted the borer activity. Sphaeromatids, pholadids and teredinids were all present in the infested zone, but sphaeromatids were most dominant and accounted for the maximum destruction. The

plastered with cement over CCA treated coir rope also curtailed borer infestation throughout the exposure period.

Cheriyen & Cherian (1975) reported that the poles with untreated coir rope covering were attacked by *Sphaeroma* sp. within 9 months and also by *Martesia* sp. later on and due to their combined activity the poles had to be rejected by the end of 15 months (Fig.1). The poles covered with CCA

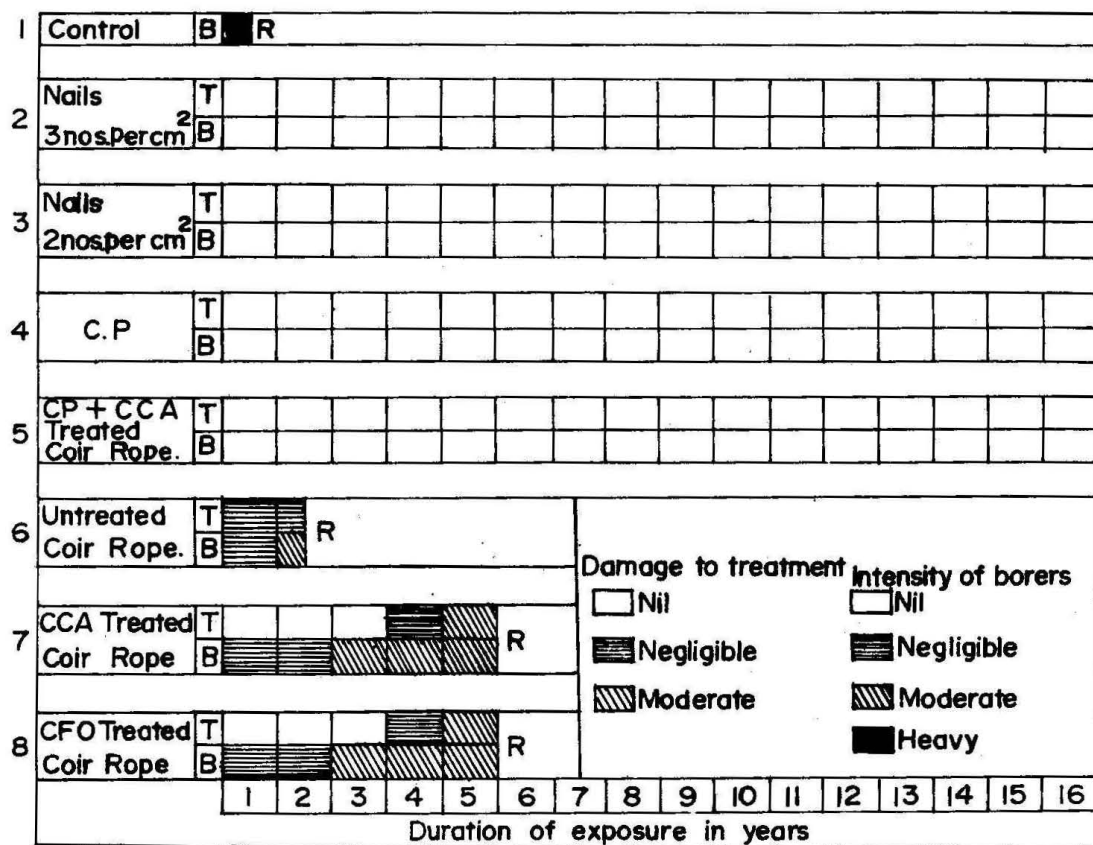


Fig. 1. Performance of some indigenous methods of treatment against marine borer attack in Cochin harbour waters; CP : Cement plastering; T : Treatment; B : Borer attack; R : Rejected.

performance of the pole studded with 2 nails per sq. cm was also extremely good throughout the test period, though the shell derived from corrosion products did not cover the surface fully.

The pole plastered with cement over scattered mailing interconnected with winding wire has successfully prevented borer attack for 16 years without even a trace of damage (Fig.1). Similarly, the pole

treated coir rope could prevent borer activity to a great extent for 5 years. While these poles were seen infested by sphaeromatids and pholadids alike, teredinids were not noticed. The attack of *Sphaeroma* sp. and *Martesia* sp. led to the damage of coir rope at several points exposing the poles to direct attack by more and more borers. Therefore, the poles were removed from the field after 5 years. The performance of the pole with CFO treated

coir rope was almost similar and this pole also lasted equally well for 5 years.

Ganapati & Nagabhushanam (1955), Cheriyan (1964) and Purushotham & Rao (1971) stated that the activity of *Sphaeroma* sp. is mainly confined to the intertidal region and is very much restricted below that level whereas the activity of *Martesia* sp. and teredinids is extremely less in the intertidal region but increases upto a particular depth. But, in the present instance, the midwater portion of the pole where the 'hard shell' was damaged sphaeromatid attack was severe while pholadid and teredinid attack was scarce. Prevailing environmental conditions (such as low salinity) unfavourable to pholadids, but ideal to sphaeromatids might have contributed to proliferation of sphaeromatids leaving very little space for the entry of pholadids and teredinids later.

Erlanson (1936) has stated that one of the best ways of protecting wooden piles is concreting. It is reported that very often the concreted surfaces crack due to rusting of iron rods used as reinforcement and through such cracks borers get access to the wood and subsequently destroy the piles. In the present instance, the use of iron is very much minimised in one case and is completely avoided in the other and this has helped in preventing formation of cracks in cement plastering.

The poles covered with CCA/CFO treated coir rope were completely free from teredinid attack. Even the poles with untreated coir rope were devoid of teredinid infestation. Unlike this, sphaeromatids bored into the treated coir within one year and pholadids a couple of months later. The success of these animals in boring into the treated coir rope seems to have resulted from their capacity to tolerate toxic preservatives although to different degrees and also from their non-subsistence on the substratum for food.

Among the 15 indigenous methods tried, the best performance was shown by the poles plastered with cement followed by those studded with iron nails. The poles covered with CCA/CFO treated coir ropes also gave reasonably good life. Therefore, adoption of these methods would be beneficial in case of fixed timber structures used in marine conditions as they are easy to apply, cheap to adopt and need no sophisticated equipment or expertise.

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