Rubb. Board bull. 25, No. 2 1989

RUBBER WOOD - PROMISE OF THE FUTURE

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With the fast depletion of forests, there is acute scarcity for wood. In this context rubber wood can claim as a reasonable alternative raw material for wood based industries.

The Rubber Board had made two studies in the past with a view to estimating the total availability of rubber wood in India. The studies covered around 20,000 hectares and the findings were that at the time of clear felling there would be an average of around 200 trees per hectare, although the initial stand at the time of planting may be 450 per hectare. The wood available is placed at about one cubic metre per tree.

Similar studies have been undertaken in Malaysia, Sri Lanka and Nigeria. From Malaysia it has been reported that around 180 cubic metres of rubber wood can be obtained per hectare, if branches of 5 centimetre diameter are also included. There can be a wastage of 15 to 20 per cent. Another report from Malaysia indicates that a maximum of 260 cubic metres of rubber wood is available from a hectare of rubber plantation. In Nigeria, upto 300 cubic metres of rubber wood was obtained from 1 hectare. Therefore, the estimate of 200 cubic metres as the average per hectare in India is reasonable.

Properties of rubber wood

Rubber wood has very attractive grains. Its normal colour is similar to white cedar. Some times it may be light brown but invariably it is light yellow. The hard wood has a density of around 560 to 650 kilograms per cubic metre. Its strength properties are favourably comparable to medium hard woods. It has good machining properties, reasonable bonding, planing, turning, shaping and sanding properties. It can be made to good finishes also. It is good for laminating with normal industrial adhesives.

At the time of clear felling, there can be a moisture content of around 60 percent, but the percentage can be reduced by air drying to around 15. If kiln drying is adopted, the percentage can be brought down to the same level within 10 days. Air drying may take a longer time to achieve that percentage.

Defects of rubber wood

The two enemies of rubber wood are various types of blue and sap stain fungus and also certain borer beetles. Further the logs can be had only with the size of around 2 feet in diameter. The lengths of the logs are usually between 6 to 8 feet. Termites can also attack rubber wood. However, these difficulties can be got over by chemical treatment at the appropriate time. In addition to the above defects, rubber wood is suceptible to warping. This occurs during sawing and drying. Some times raised grains occur in rubber wood during machining. This is due to the presence of tension wood. These problems can be got over to some extent by glue lamination and finger jointing. Due to these deficiencies. there is widespread prejudice against rubber wood.

Treatment of rubber wood

The choice of treatment of rubber wood will depend upon the use to which the wood is finally subjected to,. There are two common methods of treatment. One is the diffusion method and the other chemical impregnation under pressure and vacuum. The diffusion method is common to other wood as well. However, if the rubber wood is exposed and there is a possibility of leaching, the diffusion method may not be successful. However, the chemical impregnation method will give guarantee against the borer and and fungi, attack if the treatment is thorough.

The process of diffusion consists of either spraying freshly sawn rubber wood with a concentration of borax, boric acid and sodium penta

chlorophenate. The treated rubber wood should be stacked in an air-tight chamber or should be covered with polyethylene sheets to allow the diffusion to take place after dipping. Afterwards, the wood may be kiln dried.

Under the vacuum method a chemical solution is forced into the wood by means of pressure and vacuum. The chemical is a mixture of copper cromium and arsenic. Under this method the moisture content should be around 30 percent. This is some what costly compared to the diffuison method. It is also desirable to treat the wood immediately after felling by spraying the chemical or painting the open ends of the log.

Uses of rubber wood.

The traditional use of rubber wood has been as fire-wood. In a study conducted by the Rubber Board it has been found that around 40 per cent of the wood (the entire branch wood) is consumed in the State of Kerala, Karnataka and Tamil Nadu as fire wood. The annual production of rubber wood is currently placed at 45 million cft (1.2 million cmt). The firewood finds uses not only in the household but also in the brick kilns, tile factories, tobacco curing centres and rubber mokehouses. In the study mentioned above it has been found that out of the total production of 45 million cft, around 15.5 million cft is used in manufacturing packing cases. Out of the rest, 3 million cft is used for manufacturing veneers and splints for safety matches, another 3 million is used by small-scale plywood manufacturers, 0.5 million cft by furniture factories and 0.5 million by others. It has been estimated that around 500 units are engaged in various lines of rubber wood processing in Kerala. In addtiion to that, nearly thousand saw mills handle rubber wood logs. A study conducted by the Rubber Board found that 67 percent of the annual requirement of the wood-based industries in the State of Kerala was met by rubber wood.

Other areas where rubber wood is used in a small measure are for manufacturing chip board' accessories for textile mills and building materials. The building materials include doors and windows and scaffolding and shuttering materials for concreting. A large number of plywood manufacturers, some of them fairly big, use rubber wood for inside ply of flush doors. Some manufacturers make frames from small pieces of rubber wood which would have otherwise been used as fire wood.

Future areas of use.

In many countries rubber wood furniture has become a standard item. Malaysia is reported to have been exporting knock-down furniture to Japan and the United States. Similarly rubber wood chips are being exported from Malaysia to Japan for manufacturing paper pulp. In the sphere of furniture-manufacturing many countries have developed such items as folding chairs, rocking chairs, lunch sets, dining sets, bed room sets, garden sets, benches' stools etc. In addition, attractive mouldings can be produced from rubber wood for household uses. Rubber wood is also being used for panelling and laminated flooring.

Glue laminated rubber wood can be of use in various household articles and building materials. Glue laminated and finger jointed rubber wood can be used in the construction of beams'. columns and panels.

A new promising development is the rubber wood polymer-composite. This is an extension of polymerisation developed in western countries. In India a large plywood manufacturer has developed rubber wood polymer composites a few years ago and has started commercial production in a small way. Under this method a monomer is impregnated into rubber wood and polymerisation is achieved by irradiation. As a result, the quality of rubber wood will be very much enhanced. It will acquire greater resistance to decay, improved mechanical properties and dimensional stability. The above manufacturer has produced some pieces of furniture out of rubber wood polymer-composites. Unfortunately, at the present stage of development the polymer used in the rubber is costly. A minimum of 6 to 7 kilograms of polymer will have to be impregnated into a cubic foot of rubber wood, adding to the cost of processing and raw material. As a result, the finished product will not be able to withstand competition from good quality wood at their current level of prices. But there is a promising future for this line of activity.

In India, rubber wood has also been used for manufacturing particle boards. In addition to that rubber wood can be used for manufacturing cement board. In Malaysia one factory has already marketed cement board. In Kerala an important plywood manufacturer tried to

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Results and discussion

Penetration of preservative throughout the cross section was observed to be very good in all the members of the shutter, except the top rail, in which it was observed to be uniformly mottled. Through and through penetration in a 40 mm cross section of rubber wood is therefore, easy to achieve with proper pressure and time schedule as has been adopted in the treatment of door shutter reported in the the present study. This species has been included in 'b' category of treatability by Gupta *et al.* (1989) and hence complete penetration as observed in the present study is possible in commercial treatment practices.

Data obtained on the retention of preservative from all the eight members of the door shutter are presented in Table 1. The retention of the total salts varied from 5.85 kg/m³ in the top rail (which is reflected in the penetration test) to 21.80 kg/m³ in the stile. The average absorption of 14.2 kg/m³ is well above the recommended retention of 8 kg/m³ (IS-401) for door and window shutters. However, Sonti *et al.* (1982) favour an absorption of about fifty percent more CCA for this timber than normally specified for other species of wood based on their observations. Since the retention of 14.2 kg/m³ obtained in the present case is higher than that recommended for door and window shutters by IS I, as a cost effective measure, it is suggested that a solution of lesser strength is used but keeping the same treatment schedule, to achieve the desired absorption.

Also, the individual components of CCA in all the members of the door shutter was observed to be not in the desired ratio. As against the normal proportion of 1:3:4 of As, Cu and Cr in the treating solution, the proportion of salts in the treated members varied from 1:5.8:4.2 to 1:10.6:7.5, the average being 1:7.1:5.3, indicating a very low arsenic retention compared to copper and chromium.

Table 2 gives the extent of deviation of the observed from the expected values for the components of CCA in all the eight members of the treated specimens .The observed values were found to be significantly different from the expected values at 5% probability level' arsenic and chromium being significantly lower and copper higher than the expected.

Kuppusamy and Sharma (1987) have reported that when the same preservative solution is repeatedly used for treatment, the PH of the treating solution slowly increases from around 2 to more than 3 causing heavy sludging of the components of CCA and disproportionate retention of the components in the treated wood. The sludge was observed to contain more arsenic than copper and chromium. Formation of sludge also resulted in loss of these components from solution and concomitant reduction in the strength of the treating solution. As a consequence treated timber showed a disproportionate retention of the components. The proportions of the components of CCA in treated timber increased from 1:2.9:3.5 (As:Cu:Cr) in the first charge to 1:4.4:5 in the fifth charge, the retention of arsenic being much lower compared to copper and chromium during the fifth treatment charge.

One method of avoiding this kind of loss of preservative in the form of sludge is to monitor the PH of the treating solution at every stage of treatment and correcting it with chromic acid whenever it exceeds 2.5, which incidently may bring back into solution the portion of the preservative that has sedimented out. Another method of solving

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produce wood-cement board and succeeded in that experimentally. Commercial production is yet to be started. Rubber wood saw dust can be used for manufacturing briquette. Some research on producing paper pulp from rubber wood has also been carried out in India, but this has not been commercially successful so far.

Although large quantities of rubber wood are used in the safety match industry, the consumers have reported problems like warping and lower absorption of wax. Another recent development is the manufacturing of activated carbon from rubber wood. Attempts are going on to set up a factory in Kerala to produce activated carbon with American technology.

The production of rubber wood is expected to touch 61 million cft by 2000 AD. There is no need to worry about the supply of this promising raw material. With appropriate taeatment and preservation, rubber wood can stand on its own with other commercial wood. □