

## RUBBER WOOD INDUSTRY

K G Karnika De Silva

There is no doubt that rubber wood can be labeled as the *Wood for the Future*. The recent ban the government on felling jak, breadfruit and even coconut trees will aggravate the current position of severe shortage of timber. Therefore rubber wood will become more and more prominent in the future.

Although, rubber wood can be considered as sustainable, renewable and eco-friendly wood resource to substitute presently available other good quality timber varieties there is a negative product image basically due to unawareness and confusion about the treated and untreated rubber wood. However we must accept the fact that the quality of all treated rubber wood is not excellent.

Common reasons for poor quality could be due to,

- \* absence of modern equipment quality and technical know how.
- \* lack of quality consciousness among entrepreneurs.
- \* lack of certification to conform to quality standards.

In improving the quality of treated rubber wood the following facts are important.

- \* improvements in treatment and drying techniques
- \* improvements in sawing methods and
- \* adaptation of some form of control.

Wastage is one of the major problem faced by the rubber wood industry. Steps have now been taken to use the waste materials in Sri Lanka in the future in value added products manufacture. *eg.* Small pieces of wood will be used in the manufacture of finger joined planks whereas saw dust will be utilized in MDF board manufacture using American technology.

### Statistics

Table 1 shows the country wise figures of the extent of rubber plantations, area replanted and percentage of replanting and the actual availability in 1994.

Table 1. (1994 figures ). ('000 hr.)

country	extent	area replanted	% replanted	actual availability
Indonesia	3448	39.2	1.14	103.4
Thailand	1940	37.0	1.91	58.2
Malaysia	1760	30.0	1.71	52.8
India	516	7.5	1.45	15.5
Sri Lanka	161	1.2	0.74	4.8

The extent of rubber plantations in Sri Lanka is 161,000 hr. (Census & Statistics Dept.) and the availability of rubber wood timber is 400,000 m<sup>3</sup> (150,624 tons) per annum from 4830 hr as the internationally accepted norm for replanting is 3% per annum. However currently, we utilize timber from only 0.74% of rubber plantations *i.e* 1200 hr.

Therefore there will be no shortage of rubber wood timber for processing in the near future and rubber wood can be considered as a by-product from rubber plantations since old trees are uprooted for replanting annually.

The rubber growing countries like Indonesia, Thailand, Malaysia are using treated rubber wood timber in the manufacture of a whole range of furniture, flooring, paneling and plywood, particle and wood-cement board manufacture.

In these countries, logging operations are done scientifically and economically using modern methods:

- \* bulldozers pull out the rubber trees
- \* branches are cut with power chain saws
- \* logs are sorted out and loaded using front loaders

and only 4-5 workers are needed for felling and handling an extent of one hr.

But in Sri Lanka, about 40-50 workers are required to do these jobs manually. As such the whole operation in the plantation itself is a costly affair in Sri Lanka.

Table 2 below gives an idea of Malaysia's export of sawn rubber wood timber in 1994.

Table 2. *Malaysia's exports of sawn rubber wood timber*

Country	Volume (m3)	(US\$ - Million)
Taiwan	32,059	9.95
Japan	3,667	1.45
Singapore	2,381	0.60
USA	1,305	0.52
Netherlands	442	0.16
Belgium	463	0.16
Others	4,980	1.61
Total	45,297	14.45

Table 3 gives a comparative economic analysis of sawn timber production from Light Red Meranti, which is a popular timber species in Malaysia, to rubber wood.

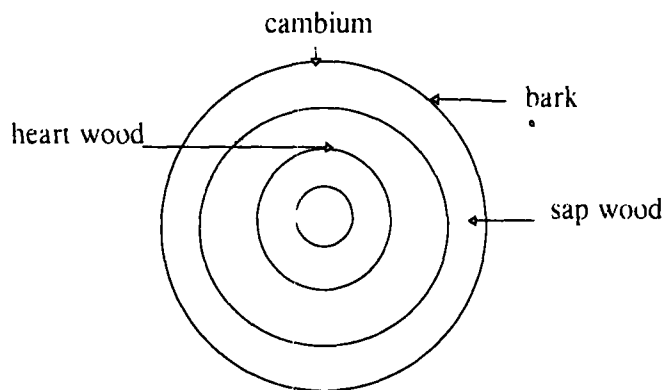
Table 3. *Comparative economic assessment of sawn timber production from light red meranti to rubber wood (1995)*

(per cu m in US \$)

Item	Light Red Meranti	Rubber Wood
Total manufacturing cost to produce timber including C.O.L.	321.6	110.7
Price ex-mill	347.7	292.0
Profit	26.1	181.3
Profit margin	8.0	164.0

Therefore very high profits can be obtained by processing rubber wood and it is a matter of adopting correct technology to treat rubber wood effectively.

Why it is necessary to treat rubber wood unlike other class 1 timber?



**Cross section of a normal log**

The sap which helps the growth of the tree is usually susceptible to borer attack easily but with time this sap could get converted to polyphenols / tannin which are not favorable substances to insects.

Rubber wood as a tropical softer variety of hard wood with a high % of starch has however no distinction between heart wood and sap wood and the whole log is easily attacked by insects, fungi and wood borers which could convert wood into dust in few months.

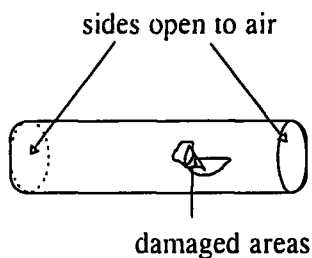
Therefore utilization of rubber wood should be concentrated to prevent the borer attack by means of a chemical treatment method.

### **Treatment of rubber wood**

Rubber wood should be treated against insect and fungal attack within a short period after felling and logging and the logs should be transported within 48 hrs. to the saw mills.

Long term (2-3 months) preservation in log form is also possible even though not recommended. This could be done by.

- \* dipping fresh logs in fresh water ponds
- \* applying chemicals on sides and damaged areas
- \* applying lime or carbide on the sides



## Methods of chemical treatment for long term preservation

- \* diffusion treatment ( DT.)
- \* pressure impregnation
- \* vacuum - pressure impregnation

### *Diffusion the treatment*

Green sawn wood with high moisture content is placed in the mixture of preservative chemicals (a mixture of Borax and Boric acid) which are cheap, and readily available chemicals. The chemicals penetrate into the wood by a process known as diffusion through moisture within wood. This is one reason why the wood has to be fresh at the time of chemical treatment.

### Boron treatment

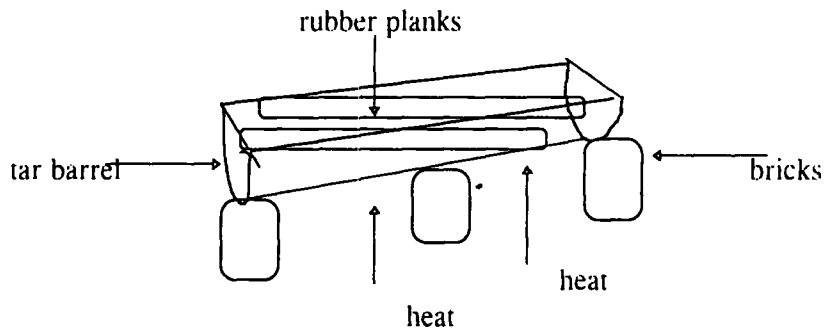
#### *1. Dipping in high concentrated Borax/ Boric acid mixture (Boron mixture) for a shorter time*

A 25% molar conc Boron solution prepared by mixing Boric Acid & Borax.

12.5% Boric acid  
 (125 kg B.A. in 100 l H<sub>2</sub>O)  
 +  
 19.4% Borax  
 (19.4 kg Borax in 100 l H<sub>2</sub>O).  
 (pH of the mixture. 7.2).

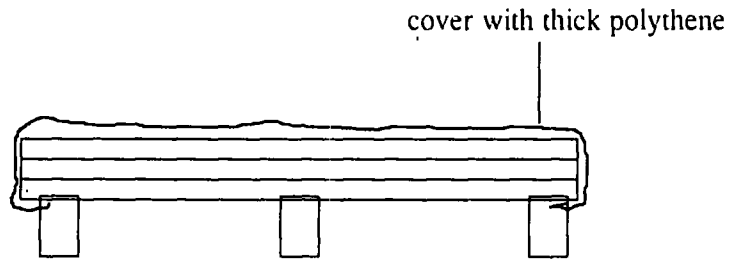
A 2% solution of sodium pentachloro phenate (SPP) as a fungicide with 0.5% sodium carbonate - (a toxic mixture) - can be used to prevent fungal attacks.

The preservative solution is heated to 46<sup>0</sup>C to increase the efficiency.



**Process**

Freshly sawn timber  
 ↓ for 30 sec.  
 dip in preservative solution.  
 ↓  
 stack in air (50 - 100 cu. ft.)  
 (no space/cover with thick polythene for 2-3 weeks.)



The wood planks are covered with thick polythene to facilitate the diffusion of chemicals (Impregnation of chemicals)

Diffusion time could vary depending on the thickness of the planks according to the table below.

Thickness mm	% Concentration	Diffusion time day
25	25	05
50	25	09
75	25	14

\* The specific gravity of the chemical solution has to be checked frequently using a hydrometer before dipping.

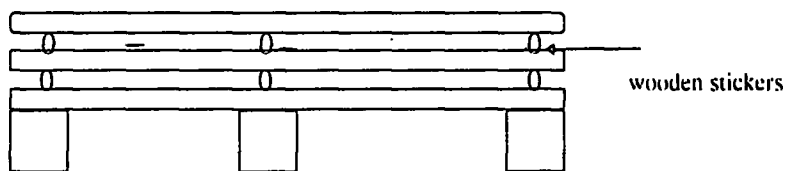
The polythene covering has to be removed after a specified period given in the table above.

restack timber on a foundation



seasoning

rubber planks



### Drying of planks in air

Drying in air until the moisture content is less than 15% would take about 2-3 months whereas drying in a kiln would take only about two weeks.

#### 2. Dipping in a low concentrated boron solution for a longer time

A 10% molar concentrated solution of boric acid./ borax is prepared as follows for low concentrated boron treatment.

B.A. 5.0% (5.0 kg B.A./100 l H<sub>2</sub>O)  
+  
Borax 7.7% (7.7 kg Borax/100 l H<sub>2</sub>O)

Dipping and storage times for planks with different thickness are given in Table 5.

Table 5

thickness mm	concentration %	dipping time sec	storage time days
25	10	15	05
50	10	30	09
50	10	45	14

## Most Effective Method of Boron Treatment (vacuum - pressure impregnation method)

Basic equipment consists of a pressure vessel, mixing tank for chemicals, vacuum pump and either a high pressure pump or other equipment suitable for pressurizing.

### *Treatment process*

The important steps in this method are as follows.

- \* loading the pressure vessel with timber to be treated
- \* vessel is then closed, sealed and a vacuum is created ( ~ 400 mm).
- \* treatment chemicals are drawn into the vessel and pressure is applied ( ~ 8kg/sq.cm)
- \* preservative chemicals are then drained out and a vacuum is again created
- \* pressure vessel is opened and treated timber is unloaded
- \* seasoning (drying in conventional air medium kiln)

### Features to look for good seasoning

- \* uniformity of air flow
- \* sufficient volume of air flow
- \* adequate and reliable controls for temperature, humidity *etc.*
- \* adequate steam/electrical heating coils of good quality
- \* suitable arrangement for venting

### Determination of moisture content

1. Moisture meter → direct reading
2. Oven drying method

In the oven drying method the following steps have to be followed.

weigh 2.5 cm x 2.5 cm. sample of treated wood  
(use an electronic balance)

dry at  $103 \pm 2^{\circ}\text{C}$  for 12-18 hrs.

↓

weigh

$$\text{Moisture Content} = \frac{M_0 - M_1}{M_1} \times 100 \%$$

$M_0$  = wt of the sample before drying

$M_1$  = wt of the sample after drying

### Properties

Rubber wood is a semi hard wood, light colour wood with reasonably good strength properties. It also has good gluing and sanding properties. Rubber wood can be drilled or bored with out any difficulty .

Therefore rubber wood has an immense potential as a valuable timber which could play a vital role in economic and industrial development in the country and the shortage of hard wood in furniture consumption and wood in buildings & wood works will further boost the demand.