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USE OF RUBBER WOOD FOR THE MANUFACTURE OF SAFETY MATCHES

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Introduction

The most important raw material for the manufacture of safety matches is wood, although substitutes like paper and bamboo have been introduced occasionally. As many as seventy Indian species of wood have been indentified as raw material for the match industry. However, the Bureau of Indian Standards have included only 29 species in IS:1140 (Specification for logs and matches). But commercially only about ten species are favoured and are widely used. These species together are able to meet only a part of the total demand for wood by the match industry. The gap between demand and availability of wood for matches is likely to get widened as the production of matches is to increase from the present figure of over 20 billion boxes to about 40 billion boxes by the turn of the century. The perenial shortage of wood, has prompted Maheswaran [1] to suggest use of rubber wood for the manufacture of matches. Although it is not widely accepted, it is a fact that considerable quantities of this wood are presently being used by match manufacturers in the small scale sector.

Quality requirement of wood for match industry

Aspen wood (Populus tremala) was the most popular wood used in the early match industry. The creamy white colour of this wood has since then been accepted as an important requirement. In addition to colour, the wood must be easily peelable giving smooth veneers for the boxes. The wood must be easily choppable and contain straight grains for the splints. The wood must readily absorb wax to enable the splint take up flame properly. The head composition must be held strongly at the tip of the match stick. The splints should be strong enough for handling in the machines and other mechanical handling devices used in the small scale sector for waxing and head fixing.

Problems with rubber wood

Various problems have been reported regarding the use of rubber wood for the match industry. The most important among them are :

1. warping of splints during storage,
2. lower wax pick-up
3. discolouration during storage and
4. lower adhesion of head composition

The presence of considerable quantities of tension wood is responsible for the longitudinal shrinkage and consequent warping. Only through possible mechanical innovations and controlled drying techniques, it may be possible to minimise the problem of warping. It is also widely believed that some of the problems like lower wax pick-up and resistance to burn etc. are due to the presence of latex in rubber wood. However it is to be pointed out here that these are arising from prejudice and wrong notions about rubber wood. In fact only that portion of the rubber wood, which is close the bark, contains some rubber. The bulk of the wood remains largely free from rubber. Moreover, if at all the wood contains some rubber, it is not all likely to resist burning, rubber itself being more inflammable than cellulose and lignin.

Attempts for improvement

In the present work an attempt was made to improve

the wax pick-up and colour of splints made from rubber wood. Wax is generally used as a flame transfer agent in matches. In the absence of a flame transfer agent, on ignition, a match will burn only until the head composition has been fully consumed, and then the flame goes out. The reason for this is that the head does not supply sufficient heat to kindle the wood fibres. However, when a readily inflammable material like wax is applied to the splint, the heat from the burning head composition will be sufficient to vapourise and ignite it and as burning continues, additional heat is developed to ignite the splint. Therefore, the pick-up of wax by the splints is of great significance in deciding the quality of matches.

Different chemical treatments were tried to improve colour and wax pick-up. The colour of the splints was assessed visually and its wax pick-up gravimetrically. The results as given in Table-1 indicate that wax pick-up of the splints is improved by treatment with bleaching powder.

Table–1

Wax Pick-up of Treated Rubber Wood Splints

Sl. No.	Material	Treatment	Wax pick-up 95° C 15 seconds (%)
1.	Rubber wood	Nil	21.05
2.	,,	1% Na_2CO_3 (Unwashed)	27.01
3.	,,	1% Na_2CO_3 (Washed)	23.96
4.	,,	1% Na_2CO_3 (Bleached)	26.72
5.	,,	1% NaOH (Unwashed)	23.23
6.	,,	1% NaOH (Washed)	21.61
7.	,,	1% NaOH (Bleached)	24.25
8.	,,	Bleaching with 2% bleaching powder	28.40
9.	Vatta	Nil	28.07

Splints made of Vatta wood (Macaranga Indica) was used as control. The colour of rubber wood splints was found to improve as a result of treatment with bleaching powder. The other treatments were found to be less effective in improving wax pick-up and colour.

The effect duration of treatment was also studied in a separate experiment. It was found that an immersion period of 1 hr in 2% bleaching powder was sufficient to improve colour and wax pick-up.

Further trials, especially on commercial scale, are required to confirm these results and to work out economics.

Reference.

1. Maheswaran. S. Expected match wood famine-the solution. Souvenir of All India Chamber of Match Industries, Sivakasi. 1985.

(*Contd. from page 18*)

4. Chang, S. T. and W. A. Hayes. 1978. *The biology and cultivation of edible mushrooms.*, Academic Press Inc P, 819.

5 Haridasan, V. 1989. (Personal communication)

6 Lavie. D, 1988. Producing Oyster mushroom on cotton straw. *The Mushroom Journal* 182: 453-463

7. Pettipher, G. L, 1988 Cultivation of Oyster mushoom on ligno cellulosic wastes. *The Mushroom Journal;* 183: 491-493.

8. Zadrazil, F. 1973. Influence of Co2 concentration on the mycelial growth of three *pleurotus* species. *Eur. J. Appl Microbiol I* 327-335.