CONTROL OF OLEO-RESIN DEPOSITION IN DEODAR WOOD CONTAINERS

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Introduction: Deodar *(Cedrus deodara)* is one of the most important softwood species of Pakistan. It is extensively used on account of its properties e.g., lighter weight, straight grain, good seasoning and working characteristics and high durability. One of its important uses is the manufacture of containers for various items. However, tarnishing of the metal surface of the material kept in deodar containers is generally observed. This difficulty arises due to the presence of oleo-resins in the wood which are volatile at room temperatures and to which it also owes its characteristics odour and durability. The wood is reported to contain 2.5% of oil (1). Once deposited on the metal surface, the oleo-resins of deodar being sticky, are difficult to remove. Therefore, a study was undertaken in the Forest Products Research Divsion of the Pakistan Forest Institute, Peshawar, to determine the effectiveness of aluminium paint in protecting the contents of deodar containers from deposition of oleo-resins.

Material and Methods: Deodar wood was converted into about 2 cm thick planks. The timber was tested for its moisture content by distillation method (3) as well as for the precentage of benzene extractives. Seven containers were manufactured from these planks with internal measurements of 30 x 15 x 15 cm and were marked with alphabets A to G. Six of these containers were painted with aluminium paint by brush in a single coat applying about 75 gm of paint per sq.m in the manner indicated in Table 1.

Table 1

Painting techniques and treatment given to deodar containers

Container	Paint applied	Treatments
A	Outside	Open sun
B	Inside	Open sun
C	Outside	Open sun
D	Outside	Open sun
E	Outside	In the room
F	Inside	In the room
G	Unpainted	Open sun

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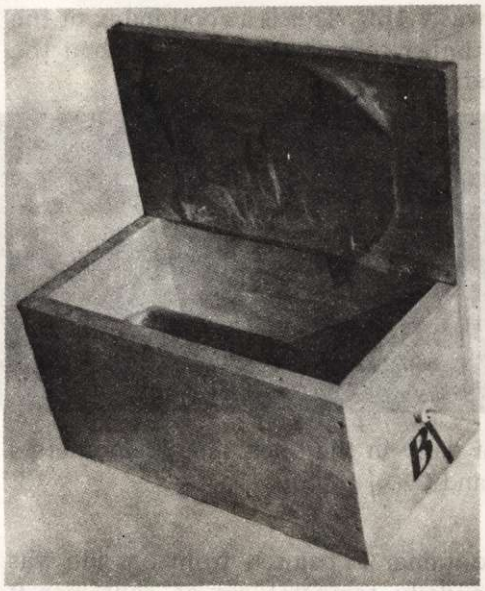
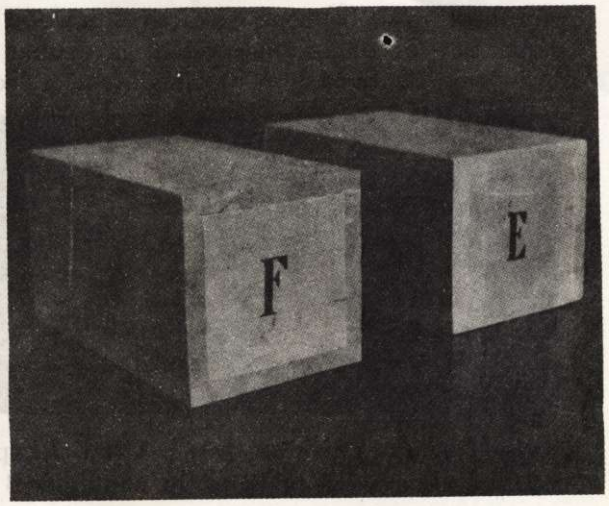
Seven cylinders were manufactured from 18 gauge brass sheet, each measuring approximately 23 cm in length and 5 cm in diameter and were marked A to G. The surface of the cylinders was polished with emery paper. The weight of each cylinder was recorded on a tripple beam balance. Cylinder A was wrapped in a polythene bag and rested on supports inside the container A with about 5 cm clearance on all sides and the container was closed by screwing the lid. Rest of the cylinders were kept in their respective containers without polythene wrapes and closed likewise. Container B and C were fitted with thermometers (Fig. 1.1



Fig—1.1 Container B with brass cylinder inside painted with alumimium paint from inside and fitted with a thermometer.



Fig—1.2 Container E and F kept inside the room

and 1.3) to record their internal temperature during day times. Container E and F were kept inside the room during the whole period while container A, B, C, D and G were kept outside in the open from 7 a.m. to 1.30 p.m. every day except holidays. Maximum temperature inside the container was recorded at 1.00 p.m. throughout the period of experiment.

The containers were opened after 1st, 2nd and 3rd month and brass cylinders taken out and weighed to determine the quantity of oleo-resins deposited on them at one month interval for three months. After three months period, the containers with brass cylinders inside were stored at room temperature for a period of nine months. The brass cylinders were weighed to find out any change

in their weights during this period. In the container C which was painted from outside, the brass cylinder was replaced with an aluminium cylinder and placed in the oven at a temperature of 60°C, to examine the possibility of deposition of resin at higher temperature. The oven was made to run from 7.30 a.m. to 1.30 p.m. for 15 days. After high temperature treatment, the container was opened and the aluminium cylinder was weighed to determine oleo-resin deposition.

Results and Discussion: Deodar timber was found to have a moisture content of 11.9% indicating that the wood used needed no further seasoning. The proportion of benzene extractives in wood was 7.16%. This is a good index of the quantity of oleo-resins present in deodar timber, but is much higher than the reported figure of 2.5% of oil content in deodar wood (1).

Fig—1.3 Container A, B, C, D and G kept daily in the open sun, themometers are seen fitted to the container B and C.

The inside daily temperature of container C painted from outside was found to be 2-5°C higher than the inside daily temperatures of container B painted from inside, the difference is probably due to external coating of the former which served as vapour proof barrier and prevented cooling effect through vapourization of oleo-resins from the outer surface of the box (2,4). A resinous deposition was observed on all brass cylinders when containers were opened after one and two months except those kept in the container B and F painted from inside. However, when the containers were opened after three months, the resinous substance had assumed the appearance of a hard, smooth and glossy coating on the brass cylinders. Cylinder A wrapped in polythene bag was also badly affected by the vapours of deodar wood oleo-resins. Further, a greenish colouration developed on the surface of brass cylinders at the places of heaviest oleo-resins deposition, which was probably due to chemical reaction between deodar wood oleo-resins and brass or the former served as solvent for any amount of rust formed on the latter during the experiment.

The increase in weight of brass cylinders at different times of their storage in deodar containers is given in Table 2. The containers C and D, painted from

outside, and container C, unpainted, and all kept in the open sun showed the maximum and almost equal amount of oleo-resin deposition on cylinders. This shows that external coating of aluminium had no effect on the amount of oleo-resins deposited. On the other hand, container B and F which were painted from inside were observed to have no deposition of oleo-resins, because aluminium paint on account of its flaky nature served as a vapour proof barrier stopping any amount of resin from coming out (2,4). Container E which was painted from outside and kept in the room throughout the whole period of experiment gave low deposition of oleo-resins. In contrast, container A, painted from outside and kept in the open and the brass cylinder wrapped in the polythene bag, gave a lower deposition of oleo-resins than container C, D and G and higher than the container E. This shows that the polythene is only partly effective in protecting the contents of deodar boxes from the oleo-resin deposition.

Table 2

Increase in the weight of brass cylinders due to the deposition of oleo-resins.

Brass cylinders	Original weight of the cylinders gm	Weight of oleo-resins deposited after 1st month gm	Weight of oleo-resins deposited after 2nd month gm	Weight of oleo-resins deposited after 3rd month gm	Weight of oleo-resins deposited after one year (First 3 months + 9 months storage gm)
A	366.25	0.36	0.31	0.41	0.44
B	378.45	0.00	0.00	0.00	0.00
C	361.53	0.53	0.56	0.64	0.62
D	352.62	0.54	0.55	0.62	0.65
E	361.20	0.29	0.32	0.43	0.42
F	374.02	0.00	0.00	0.00	0.00
G	351.99	0.54	0.53	0.64	0.62

When the containers were opened after second month, the cylinders gave no marked change in their weights. Either it increased slightly or remained more or less constant. But when the containers were opened after third month, all cylinders showed slight increase in their weights. The deposition of oleo-resins was maximum in the first month because of the high intitial oleo-resin contents of deodar wood and higher daily temperatures in the month of September. During the course of experiment the oleo-resins contents of wood as well as temperature decreased. Higher temperatures tends to decrease the viscosity of

the oleo-resins (4) and also increase the vapour pressure with the increased vapourisation. The amount of vapourisation is also directly dependent on the amount of oleo-resins present in the wood. This fact is further confirmed by the higher deposition of oleo-resins on the brass cylinders in the container C kept outside in the open sun than the container E kept in the room. A slight increase in the weight of cylinders in the third month is probably due to low daily temperatures in the month of October.

When the containers were opened after 9 months storage and the cylinders in them weighed, all the cylinders showed no marked changes in their weights. This indicates that oleo-resins once stabilized in the wood do not come out again at ordinary temperatures. Further, the aluminium cylinder placed in the container C pained from outside and kept in the oven for 15 days at 60°C also showed a slight increase of 0.004 gm in its weight (Table 3). This shows that oleo-resins are stabilized at about 45°C and become only slightly activated at temperature of 60°C.

Table 3

Increase in the weight of aluminium cylinder due to the deposition of oleo-resins after fifteen days storage at 60°C.

Container	Paint applied	Temperature of the oven °C	Initial weight of aluminium cylinder (gm)	Weight of aluminium cylinder after 15 says (gm)	Increases in weight of aluminium cylinder (gm)
C	Outside	60	46.6643	46.6683	0.004

Summary and Conclusion: Deodar wood is used for packing cases and containers in Pakistan. It is reported since long that the spoilage of articles kept in deodar containers takes place due to the deposition of deodar wood oleo-resins. In this experiment effectiveness of a coating of aluminium paint applied internally to the containers in protecting the contents from deodar wood oleo-resin is judged under different conditions. Seven containers of deodar wood were made and painted in different ways with aluminium paint by brush and brass cylinders were rested in these containers. Some of the containers were daily kept in the open sun while the others in the room. After three months of the experiment, it was seen that the containers which were painted from inside gave zero deoposi-

tion of oleo-resins on the brass cylinders irrespective of the treatement given. This means that the contents of deodar wood containers can be protected from deodar wood oleo-resins by applying internally a coat of aluminium paint to the containers at the rate of 75 gm/square metre. In the list of above findings the following conclusions are derived.

1. Seasoning reduces the oleo-resin contents of deodar timber but loss of moisture is more quick than that of oleo-resins. During seasoning only the surface layers of the timber loose oleo-resins rapidly and the oleo-resin contents are still high in the deeper layers. If the timber is seasoned in the large sizes and then converted, the new surfaces so exposed will again start giving out oleo-resin vapours. It is, therefore, advisable to convert the deodar timber to required sizes before seasoning.

2. The containers fabricated from deodar should be painted internally by brush with aluminium paint in a single uniform coat applying about 75 gm of paint per sq. m.

3. The articles kept in deodar containers should be sealed in thick polythene bags. These will protect the contents from deletarious effects of moisture and the oleo-resins of deodar.

4. Deodar wooden containers should never be kept in open sun, because it will cause an increase in the internal temperature of the containers and will activate the vapourisation of oleo-resins. The boxes should be stored under cover in a cool place with sufficient air movements.

References

1. ANNONYMUS. (1950). The wealth of India. Raw materials Vol. II. Deptt. of Scientific Research Govt. of India. 110 p.

2. COLLIER, J.W. (1967). Wood Finishing. Pergamon Press, Oxford: 193-94.

3. KOLLMANN, F.P., and COTE, W.A. (1968). Principles of Wood Science and Technology-I (Solid wood). Springer-Verlag, New York.

4. TACK, H.C. (1971). Joinery. Forest Products Research Laboratory, Department of Environment, H.M.S.O. London. 18 p.