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Effect of *Lantana camara* L extract on specific gravity of wood species

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ABSTRACT

Wood is used for a wide variety of structural and decorative purposes but the quality of its products is often reduced by physical, chemical or biological deterioration. The lesser known wood species are generally not used because of less durability and lower quality of wood. The specific gravity of wood or its relative density influences strength and durability and is an important parameter to determine wood quality.Therefore the present investigation was carried out to study the effect of *Lantana camara* L extract treatment at different concentrations (0.25, 0.5, 1.00, 1.50 and 2.00%) on the specific gravity of three wood species viz *Pinus roxburghii* Sargent, *Celtis australis* L and *Bombax ceiba* L. The results elucidated maximum specific gravity in *P roxburghii* (0.573) and minimum in *B ceiba* (0.415). The specific gravity values were higher at lower concentrations of the extract as compared to treatment with higher concentrations. The highest specific gravity of *C australis* (0.589) was recorded at 0.50 per cent *L camara* extract concentration. The lowest specific gravity of 0.391 was recorded in *B ceiba* wood in control. Hence the results revealed that the specific gravity of wood has been influenced by *L camara* extract concentrations.

Keywords: Specific gravity; wood; treatment; extract; concentration; durability

INTRODUCTION

Shortage in the supply of durable wood species has resulted in increase in the use of plantation grown timber species. Most of the plantation grown wood species being non-durable in nature fall an easy prey to wood destroying agencies. Therefore in order to enhance the service life of plantation grown non-durable species preservative treatment becomes necessary (Tripathi et al 2009). Specific gravity is an important parameter to determine wood quality, pulp yield and strength of paper. The three lesser known species selected for the present investigation viz *Celtis australis* L, *Pinus roxburghii* Sargent and *Bombax ceiba* L find no use as timber because of their non-durablility but can reduce the pressure on durable species if treated with preservatives. *C australis* (Ulmaceae) commonly known as Khirk is moderately hard and heavy and its specific gravity varies from 0.5 to 0.6. It is easy to season,

moderately durable and liable to borer attack. It is used for making tools, sports goods, sticks and for building purpose. *P roxburghii* (Pinaceae) is commonly known as Chir pine. Specific gravity of wood of Chir pine varies from 0.543 to 0.656 among high resin yielders. *B ceiba* (Bombacaceae) is commonly known as Semul. The wood of *B ceiba* is very light, straight grained, even and coarse-textured and with large open pores. It is widely used for making plywood, packing boxes and match boxes.The specific gravity of *B ceiba* falls in the range of 0.34-0.394.

MATERIAL and METHODS

The wood samples of size 5 x 2.5 x 2.5 cm ± 0.25 x 0.15 x 0.15 cm (longitudinal x radial x tangential) were got prepared from air-dried woods of *P roxburghii*, *C australis* and *B ceiba*. These samples were properly planed and sanded for smoothness on surface and straight lines were drawn with lead pencil on all the planes for taking dimensions on the same point every time.

The tender twigs of *Lantana camara* L along with leaves were collected, shade-dried and ground into fine powder. The powdered material was extracted with methanol in Soxhlet apparatus on a boiling water bath. After complete extraction, methanol was completely distilled off from the extract and the residue was vacuum-dried. Stock solution of 10 per cent concentration was prepared by dissolving the vacuum-dried extract in 5 per cent methanol. From stock solution, different concentrations of 0.25, 0.5, 1.00, 1.50 and 2.00 per cent for dip treatment were prepared. The control was taken as 5 per cent methanol solution (in distilled water). The wood specimens of *P roxburghii*, *C australis* and *B ceiba* were dried at 105 ± 2°C to constant weights and dipped in the different concentrations (w/v) of *L camara* extract solution for 72 hours. The samples meant for control were dipped in 5 per cent methanol solution. The treated samples were then dried at 105 ± 2°C to constant weights. These wood samples were analysed for the relative density/specific gravity by the maximum moisture content method (Smith 1954) using following formula:

$$\text{Specific gravity} = \frac{1}{\frac{Mm-Mo}{Mo} + \frac{1}{GS}}$$

where Mm= Fresh/green weight of the sample having maximum moisture, Mo= Oven-dried constant weight of the sample, GS= Average density of wood substance a constant having value 1.53

RESULTS and DISCUSSION

The specific gravity of wood is its relative density which influences its strength and durability. In the present findings it has been influenced by *L camara* extract concentrations. Data pertaining to specific gravity of wood for all the species and treatments are presented in Table 1. The

Table 1. Effect of *Lantana camara* extract on specific gravity of wood

Treatment	Species			
	Celtis australis (S_1)	*Pinus roxburghii* (S_2)	*Bombax ceiba* (S_3)	Mean
T_1 (0.25%)	0.576	0.564	0.434	0.525
T_2 (0.50%)	0.589	0.549	0.430	0.522
T_3 (1.00%)	0.575	0.538	0.417	0.510
T_4 (1.50%)	0.570	0.527	0.409	0.502
T_5 (2.00%)	0.579	0.516	0.408	0.501
T_6 (Control)	0.550	0.492	0.391	0.478
Mean	0.573	0.531	0.415	

$CD_{0.05}$

Species (S): 0.005
Treatments (T): 0.006
S x T: 0.011

perusal of data revealed significant differences in specific gravity of wood among different species and treatments at 5 per cent level of significance.

The maximum specific gravity of 0.573 was recorded in *C australis* and minimum value of 0.415 was noticed in *B ceiba*. There was a decrease in specific gravity with increase in concentration of extract. Among the treatments highest value of 0.525 was found in T_1 (0.25% concentration) and the lowest value of 0.478 was observed in control.

The significant differences have been found among the species, treatments and their interaction with the treatments in specific gravity after treatment with *L camara* extract. The highest specific gravity of 0.589 was found in wood of *C australis* at 0.50 per cent concentration (S_1 x T_2) and the lowest 0.391 was recorded in *B ceiba* wood in control (S_3 x T_6).

Devi (2013) and Kumar (2013) found the similar results. Stamm (1929) has shown that the density of wood substances is relatively constant and varies only slightly among species as a result of variation in cellular composition of species. Similar findings have been reported by Halverson and Lebow (2011) while studying the relationship between wood properties and solution uptake during pressure treatment. They found negative relationship between wood density and solution absorption (more dense specimens tended to have lower uptakes). This may be attributed to the absorption of *L camara* extract which enters the void spaces in the wood and results an increase in specific gravity.

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