

ABSTRACT

The present research project was designed to study the microstructural features of the wood of ethnobotanically important local trees, *Dalbergia sissoo* Roxb. and *Tamarix aphylla* (L.) H. Karst. which included the anatomical, physical and mechanical properties, cell types, their organization and structural characteristics, and significant. Based on the results thus obtained, *Tamarix aphylla*'s wood can be classified as an upper-class density wood (650-725 kg/m³). The modulus of rupture (MOR), measuring the strength before wood ruptures, for *Frash*, it was 778±17 Kg/cm², while for *Shisham* it was 1120±19 Kg/cm²; the modulus of elasticity (MOE) measuring only deflection but not ultimate strength, for *Shisham*, MOE was 85790±1550 Kg/cm², while *Frash* it was 53735±1400 Kg/cm². *Frash* has lower compression strength (3614 Kg/cm²) than *Shisham* (5606 Kg/cm²), illustrating each wood best suitability for specific uses. *Frash* exhibited 490 Kg side grain and 530 Kg end grain hardness, while *Shisham*'s hardness was 800 Kg. Cleavage of *Shisham* was found to be 22±0.7 Kg/cm while that of *Frash* was 33±0.81 Kg/cm. Impact bending for *Frash* was recorded to be 1.47±0.06 m-Kg while that of *Shisham* 1.79±0.06 m-Kg. A maximum diameter and frequency of 3.6 mm and 62 for *Shisham* wood were measured respectively, while 9 mm and 87 for *Frash* wood, showing that *Frash* wood dries roughly three times faster than *Shisham*. *Shisham*'s maximum vessel area was calculated to be 7569 micrometres square, while that of *Frash* 7396 micrometres square. For *Shisham*, the maximum ray height and width were found to be 99 cells and 10 cells respectively while that of *Frash* were 67 cells (height) and 16 cells (width), demonstrating that *Shisham*'s lateral transport system is faster and more effective. In both targeted wood samples, the fiber length was calculated to be 1.43 mm (*Shisham*) and 0.87 mm (*Frash*) and almost same fiber diameter was recorded in both targeted wood samples, i.e. 19 microns (*Shisham*) and 19.9 microns (*Frash*). The average ring width for *Shisham* was found to be 0.58 cm while that of *Frash* 0.62 cm and the average growth rate in *Shisham* was found to be 1.71 rings/cm while that of *Frash* 1.6 rings/cm. Generally, the age of a tree is equivalent to the number of annual rings in the wood of its main trunk. Thus the age of the targeted *Shisham* tree sample was found to be 72 while that of *Frash* 61 years. In terms of usability and feasibility for furniture and construction, *Shisham*'s flexibility and rigidity ratios were 0.56 and 0.17, while *Frash*'s flexibility and rigidity ratios were recorded as 0.48 and 0.31 respectively. It was found that *Shisham*'s wood hardness was almost double that of *Frash*'s as *Shisham* contains 47% fibers whereas *Frash* contains only 25%. Generally, wood density and its moisture content are directly related; *Shisham* wood (13.5% moisture content) was denser than *Frash* wood (12% moisture content); the density of *Shisham* wood was 710 kg/m³, while that of *Frash* was 635 kg/m³. According to these indicators and parameters, *Frash* may replace *Shisham* where the medium strength is needed; demonstrating that it is the best alternative to *Shisham* in terms of quality, strength, and application.