STRUCTURAL CHARACTERISTICS OF NARROW-LEAVED ASH WOOD

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ABSTRACT

The properties of wood, its behavior during processing, as well as the application and use of wood elements and products, are all consequences of the anatomical structure and chemical composition of wood. The formation of basic anatomical elements of wood (wood cells) proceeds slowly through the metabolic processes. Besides the genetic factors, such processes are influenced by environmental conditions, which cause the dimensional variations of wood structural elements at different positions in the stem. Therefore, the aim of this study was to evaluate the anatomical characteristics and dimensional variations of the most common anatomical elements: wood fibers in the stem of narrow-leaved ash (Fraxinus angustifolia Vahl. ssp. Pannonica Soo & Simon), represented by the cells that provide the mechanical support and the cells that serve as the transport elements (vessels). Three characteristic cross-sections (transversal, radial, and tangential) of narrow-leaved ash wood were observed and analyzed with the application of scanning electron microscopy (SEM). The integrated system, which includes a Leica DMLS light microscope and a Leica DC 300 camera, coupled with the Leica IM 1000 software, was used to measure the length, cell-wall thickness, and lumen width of mechanical fibers and vessels.

The results of this study suggest that both the lumen width of vessels and the cell wall thickness of mechanical fibers increase in the radial direction, from the core towards the bark, while the lumen width of fibers decreases in the same direction. In addition, the length of mechanical fibers increases towards the bark, reaching its maximal value at the middle section of the radius. The height position in the tree trunk also shows the influence on the dimensions of the structural elements. Both the length and the cell wall thickness of mechanical fibers decrease towards the top of the trunk, while the lumen width of fibers increases.

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