YIELD COMPARISON OF BEECH (*Fagus sylvatica* L.) AND FIR/SPRUCE (*Abies alba* Mill./*Picea abies* L.) LOGS IN THE SAWMILL PROCESSING INDUSTRY

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ABSTRACT

Sawmilling technology in Macedonia is primarily characterised by small- to medium-capacity sawmills, many of which operate with mixed species and variable equipment configurations. These sawmills typically process between 1500 and 5000 m³ of roundwood annually and play a crucial role in the domestic wood industry. The technology employed often includes vertical bandsaws for primary sawing and simple layouts for material flow. Beech (Fagus sylvatica L.) and fir/spruce (Abies alba Mill./Picea abies L.) are among the most commonly processed species, representing a significant share of the raw material input due to their abundance, accessibility, and economic relevance. Beech is predominantly used in furniture production, while fir/spruce is more common in construction and structural applications.

This paper presents a focused comparative analysis of raw material yield efficiency between beech and fir/spruce logs in a primary processing setting. The study was conducted at the MARKISTO sawmill in Leskoec, Ohrid, a representative facility within the North Macedonian context, operating with a capacity of 2,500–3,000 m³ per year. A total of 160 logs from two standardised lengths (4.0 m and 5.0 m) and I, II, and III quality classes—80 from each species—were analysed. The objective was to quantify and compare the percentage yield of sawn timber relative to log volume, under real production conditions, without altering existing workflows. Key influencing factors such as log diameter, taper, and wood defects were recorded and assessed.

Results indicated that fir/spruce logs generally achieved higher yield rates than beech, particularly in the higher quality classes. For instance, Class I fir/spruce logs yielded up to 10–15% more usable lumber compared to Class I beech logs, mainly due to more uniform structure and lower waste values. In contrast, beech logs, especially from lower quality classes, were more affected by natural defects like heart checks and curvature, reducing the quantitative yield despite similar or larger diameters. The study confirms that both species and log quality significantly affect sawmill efficiency and that careful log selection and classification are essential for optimising material recovery.

Keywords: beech, fir/spruce, quality class, sawmills, yield, efficiency.