THE EFFECTS OF NATURAL DEGRADATION ON THE CHEMICAL COMPOSITION OF PEDUNCULATE OAK STUMP (*QUERCUS ROBUR* L.)

Jasmina Popović, Gordana Petković, Miloš Šuljagić, Mlađan Popović,
Milanka Điporović-Momčilović, Radoslav Lozjanin, Ivana Stojiljković

ABSTRACT

After trees are cut down, the stumps usually remain in the forest. Recently, there has been a growing interest in utilising stump biomass as an energy resource or alternative raw material to produce various chemicals. However, stumps left in the forest are exposed to various biotic (microorganisms, insects) and abiotic factors (UV radiation, precipitation, low/high temperatures, oxygen from the air, and atmospheric pollutants), causing their degradation over time.

This paper investigates the changes in the chemical composition of the xylem of pedunculate oak stumps (Quercus robur L.) after two years of natural degradation. In that aspect, the samples of the freshly cut stump were compared to the samples obtained from the stump that was exposed in the forest environment for two years. During this period, the cellulose and ash content decreased by 3.7% and 30%, respectively, while the lignin content increased by 5%. It was also found that after two years, the content of wood extractives in the oak stump increased by 15%. To detect natural products of stump wood extracts, the High-Performance Thin-Layer Chromatography (HPTLC) technique and post-chromatographic derivatisation with ASA (p-anisaldehyde/sulphuric acid) reagent were used. ASA is a widely used reagent for the detection of terpenoids, steroids, and carbohydrates through colour differentiation. The developed colours are indicative of the chemical nature of the compounds. Compounds visualised under white light after derivatisation and heating show that extracts from the stump wood, following two years of natural degradation, have more terpenoids, producing blue, purple, or brown zones. A decrease in the intensity of the grey and green spots under white light can also be observed, indicating that the chemical profile of the wood extract is less rich in steroids and allylic alcohols. Terpenoids are not only important for the tree's defence mechanisms but also for their role in the production of aromatic compounds that contribute to the wood's uses in industries like winemaking.

Keywords: *Quercus robur* L., natural degradation, stump, chemical composition, HPTLC.