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EXTRACTION AND INVESTIGATION OF THE LIPOPHILIC FRACTION OF FORESTRY SIDE-STREAM BIOMASS

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Coniferous forests cover substantial areas in Northern Europe and the Baltic Sea region and they play an important role in circular economy by providing timber, bioenergy and various chemicals. During harvesting of the conifer trees a significant amount of needles and small branches, known as logging residue (LR), is left behind. This forestry side-stream is currently underutilised but shows potential for application in circular economy due to its chemical composition and biological activity. Biomass extractions often relies on hydrocarbon-based solvents like hexane and petroleum ether, but with the European Union shifting toward sustainable growth, there is a push to reduce fossil fuel use. This drives the demand for "greener"extraction methods that prioritise safety and environmental impact.

This study aims to investigate various extraction methods with a focus on reducing or eliminating the use of hydrocarbon-based solvents, thereby refining valuable compounds for various applications while also assessing the antimicrobial, antifungal and antioxidant properties of the obtained extracts.

The most effective method in extracting pine and spruce logging residues was found to be maceration at boiling point, using methanol for pine LR and butanol for spruce LR extractions. Various compounds groups were identified in the extracts such as fatty acids, resin acids, terpenes and more. All of the obtained extracts exhibited antibacterial activity against

S. aureus, and few extracts exhibited antifungal activity against C. albicans, B. cinerea,

A. flavus and A. niger as well as antioxidant activity.

The results of the study demonstrate the possibility to replace hydrocarbon-based solvents with environmentally friendly solvents to produce coniferous logging residue extracts containing bioactive compounds with high application potential.

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