

<https://doi.org/10.7250/CONNECT.2024.062>

ENVIRONMENTALLY FRIENDLY PROCESSING OF FORESTRY BIOMASS SIDE STREAMS – CONIFEROUS NEEDLES AND GREENERY

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Abstract – Replacement of fossil materials with renewable biomass is essential to address climate change challenges and implement bioeconomy as essential element of sustainable development model. A significant source of biomass is forestry. However, besides timber, significant amounts of forestry biomass side streams are formed, and from circular bioeconomy perspective full utilisation of valuable resources is requested. One of the side products of coniferous tree processing are needles and greenery, and as these trees are dominant in Northern regions, a full use of their biomass can provide significant input to replace fossil resourcebased substances and materials. Coniferous tree needles and greenery are a rich source of biologically active substances with wide application potential as resource for biopharma industries, food and feed supplements, and materials for diverse application. Traditionally, for extraction of biologically active substances from coniferous needles and greenery, toxic and hazardous solvents, such as organochlorine and hydrocarbon solvents, have been used. The aim of the present study is to develop possibilities to use green chemistry approaches for coniferous needle and greenery extraction and following biorefinery to obtain biologically active components. For extraction of coniferous needle and greenery, green solvents have been tested, as well as so called intensive extraction methods have been used. The yield of extracts depends on extraction temperature, duration, solvent and other factors and optimal extraction conditions provide possibilities to obtain yield of extracts higher than use of traditionally used solvents. As a powerful tool to increase yields of extracts so called intensive extraction methods, such as treatment with ultrasound, microwaves, accelerated solvent extraction have been studied. The obtained extracts were characterised using gas chromatography with mass spectrometric detection, liquid chromatography and other methods. Possibilities of biorefinery of obtained extracts to isolate groups of substances or individual substances have been discussed.

Keywords – Analysis; coniferous needles and greenery; extraction; Green Chemistry

ACKNOWLEDGEMENT

This research was funded by the Rural Support Service of Latvia project “Full-cycle processing of green biomass from skewers to produce high-value feedstocks for the chemical and pharmaceutical industries” (Nr: 23-00-A01612-000007).