LIPOPHILIC EXTRACTS FROM EUCALYPT AND ACACIAS BIOMASS – A VALORIZATION ROUTE UNDER THE BIOREFINING CONTEXT

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ABSTRACT

Eucalypts and Acacias are available in Portugal in large amounts. The first species because it is the raw material for the pulp&paper industry, and the second has been considered an invasive species due to its dominance over the natural flora and rapid proliferation, in particular after forest fires. One way to control acacia's spread is to use its biomass for different purposes in a cascade view, collecting all its possible products. We should do the same for the eucalypt biomass before processing it for pulping. This study is focused on the determination of the extractives contents present in the wood from *E. globulus* (stem wood, stumps and stumps bark) and *A. melanoxylon* (residues: wood chips, leaves and mixture). Raw materials were prepared: milled and sieved, and the 40-60 mesh fraction was collected for analysis. Around 1g was extracted in a Soxhlet apparatus with a sequence of solvents: dichloromethane (DCM), ethanol and water for 16h for each solvent. Total extractives content and DCM were determined. Around 1 mg of DCM extract was derivatized to trimethylsilyl ethers/esters (TMS)with 120 µL of pyridine and 80 µL of BSTFA and analysed by GC-MS. In eucalypt, total extractivesvaried according to the material: in the stem, wood ranged from 6.2% (sapwood) to 12.5% (heartwood) with a mean value of 9.4%; while in stumps wood, the range was 11.3 to 17.4% depending on the collection site, with the mean value of 15.1%; stumps bark from industry (ISB) had 4.1% of extracts,but a higher value was attained in bark collected in the laboratory (SB, 7.5%) because stumps are washed prior process. Acacia residues presented total extractives values of 7.3% (chips), 13.3% (crown residues) and 10.0% (mixture). DCM extracts in eucalypt represented: 0.4% (sapwood), 0.5% (heartwood), 0.5%(stumps wood), 0.7% (ISB) and 0.6% (SB). In acacia, the values attained reached 0.6%, 1.8% and 1.0%, respectively, in chips, crown residues and mixture. The GC-MS analysis showed a predominance offatty acids, phytosterols, aromatics and triterpenes, with different amounts in each material. In eucalypt stem wood, fatty acids were the main family (40.8%), followed by phytosterols (19.0%), aromatics (10.5%) and triterpenes (10.4%). It was interesting to see that in this last family, the following compounds were identified for the first time: hederagenin, maslinic acid, asiatic acid, caulophyllogenin and madecassic acid, which are interesting compounds due to their pharmacological properties (*e.g.* cytotoxicity against a wide range of tumour cells). In stumps bark, triterpenes prevailed (53.6% in SB and 33.7% in ISB), followed by fatty acids, phytosterols and fatty alcohols, accounting for 17.0%, 13.1%, 2.0% vs. 18.9%, 18.1%, 10.2% respectively in SB and ISB. Regarding the acacia residues, we are still analysing the DCM extracts to identify new compounds. This work concludes that these raw materials should be valorized integrally, mainly eucalypt stems wood and stumps, enhancing their valorization under bioeconomy, zero-waste philosophy and biorefinery perspectives.

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