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New resources from timber waste: bioactive constituents obtained by "smart chain extraction"

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Coniferous barks are known for high content in bioactive compounds with potential high bioactivities in several area. Timber industry is producing large amount of bark waste as result of wood cutting and preparation. In this paper an innovative extraction approach based on the sequential application of Supercritical CO2 extraction, microwave or ultrasound assisted extraction with green solvents (water-based mixture with minimum amounts of ethanol) will be applied to Picea abies barks and wood, obtaining extracts enriched in bioactive secondary metabolites. Detailed analysis using LC-DAD-MSn GC-MS, NMR, FT-IR have been performed, and main constituents were identified and quantified on each extract. PiceasideG, piceaside H, taxifolin, taxifolin glucoside, trachelogenin, 7-Hydroxymatairesinol, 7-oxo matairesinol were the most abundant polar secondary metabolites. Volatile constituents extracted with microwave distillator were identified as eucalyptol, □ and β pinene. More lipophylic constituents mostly extracted during the first step in CO2 were dehydroabietic acid, cinnamic ester with fatty acids. Obtained fractions have been subjected to different bioassays related to antioxidant and metal chelating activity (DPPH, ABTS, CUPRAC, FRAP, MCA, PMB). Furthermore, inhibitory assays on enzymatic activities were performed namely acetylcholinesterase, butyrilcholinesterase, tyrosinase, amylase and glucosidase. Some extracts present very high antioxidant activity and significant tyrosinase effect thus being good candidate for topic application as cosmetic or pharmaceutical treatments for skin hyperpigmentation. Other fractions revealed significant inhibitory activity on cholinesterase. Thus, further studies are in progress to assay isolated compounds.

The overall results showed the application of an innovative extractive approach based on green chemistry principles and combining different techniques. Obtained extracts demonstrated the opportunity to exploit timber industry waste as source of bioactive constituents.