sc-CO_2 extraction of softwood bark: supercritical fluid chromatography and GC-MS/FID differences in extracts profiling characterization

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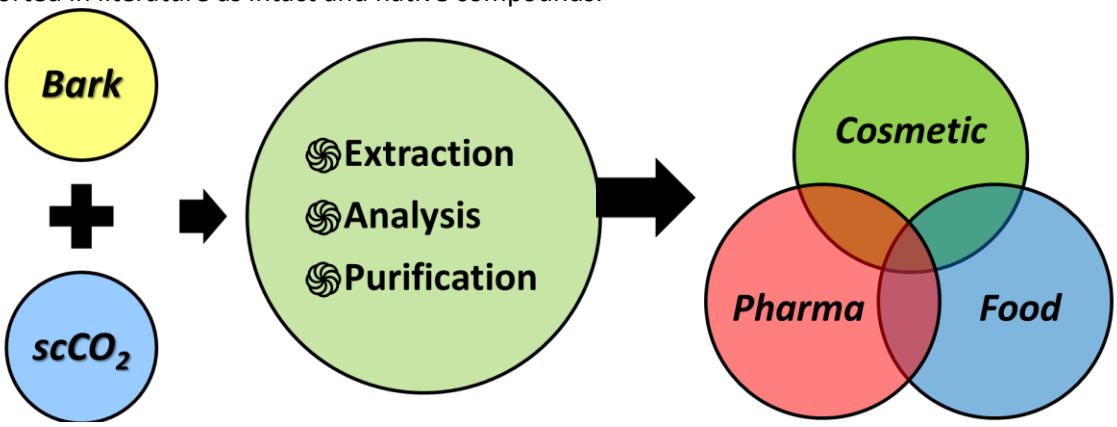
Trees are composed of approx. 45% cellulose, 30% hemicellulose, 23% lignin and 5% extractives.[1] Industrial paper products and man-made fibers like viscose are produced through conversion of wood pulp. Since the bark of trees contain less cellulose and more impurities compared to the bulk wood it is removed before the wood is chipped. This results in accumulation of bark residues in every pulp mill. Most of the time the bark is burned to provide additional energy for the recovery boiler and very small amounts are sold for horticulture or playground floor applications. Isolation and purification of bark extractives by supercritical fluids could offer a sustainable and green way to obtain very complex organic compounds, which would otherwise require a synthetic routes starting from oil-based chemicals. The nature of this complex mixture needs to be clarified for a possible utilization as nutraceutical, cosmetics or pharmaceutical ingredient. In our lab, we have investigated the composition of bark extractives applying two different analytical techniques: GC-MS/FID and UPC^2-QTof-MS. While the first one is a very exploited and known technique of analysis for lignocellulosic extractives,[2] the second variant was a new challenge. After the creation of a home-made library containing more than 4000 compounds, we found that supercritical fluid chromatography connected to a high resolution mass spectrometer could be a complementary analytical technique for elucidation of extractives composition[3]. Higher molar mass compounds like sterol esters and triglycerides, which are analysed by gas chromatography using a high temperature column and long analysis time (up to one hour), were eluted in less than three minutes using supercritical fluid chromatography without a hydrolysis or derivatization protocol. MS/MS technique was applied in order to identify each detected peak, resulting in the identification of six sterol esters and five triglycerides never reported in literature as intact and native compounds.



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https://bokuvienna.zoom.us/j/6926925949?pwd=ckZyQ1hUMjlPdG9xMEZ2TjhlTEFLQT09

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