05-04: Identification and quantification of heartwood extractives of Norway spruce (*Picea abies*) and hybrid larch (*Larix gmelinii* x *japonica)* clones using GC-MS and MCR-ALS

Sophie Füchtner[1], Theis Brock-Nannestad[2], Sara Piqueras Solsona[1], Stefan Willför[3], Lisbeth Garbrecht Thygesen[1]

[1]*Institute of Geoscience and Natural Resource Management, University of Copenhagen, Copenhagen, Denmark, E-mail: sophf@ign.ku.dk*
[2]*Department of Chemistry, University of Copenhagen, Copenhagen, Denmark*
[3]*Laboratory of Wood and Paper Chemistry, Åbo Akademi University, Turku, Finland*

Wood is regaining importance as a construction material, a development that also has led to a renewed interest in how to prevent the material from being decomposed by microorganisms. Among these, the susceptibility of wood to fungal decay is one of the most severe drawbacks for its use as a construction material. In the living tree, the molecules responsible for wood durability are broadly termed extractives and are especially important in the heartwood - the central part of the tree consisting of dead cells. In order to obtain more resistant timber, it is consequently important to understand the nature, function and distribution of extractives, as well as the amounts present in the wood. This knowledge will allow for breeding for higher extractive contents, but will also inspire the development of "greener" wood impregnation systems via bio-mimicking the strategies that evolved in trees. The traditional wood impregnation methods are no longer an option due to the environmental problems they pose.

In this study, the heartwood extractive composition of two industrially relevant conifers grown in Denmark was investigated. Wood from Norway spruce and a hybrid species of Japanese and Dahurian larch – two clones each - were studied at three different stem heights. The samples were extracted using a slightly modified version of an extraction method developed by Fang et al. (2013) [1]. By means of a Dionex® Accelerated Solvent Extractor (ASE) the lipophilic components were extracted with heptane and the hydrophilic ones with acetone:water (95:5) in sequence. Gas Chromatography (GC) coupled to mass-spectrometry (MS) and flame ionization detection (FID) were used for identification and quantification of the extractive components. Quantification was done using a chemometric approach with the algorithm Multivariate Curve Resolution – Alternating Least Squares (MCR-ALS) [2]. The extractive composition along the stem of the two different conifers was compared, as well as the differences between the clones.

References

[1] FANG, W., et al., 2013: Evaluation of selective extraction methods for recovery of polyphenols from pine. Holzforschung, **67**, 843–851.

[2] PARASTAR, H., et al., 2011: Resolution and Quantification of Complex Mixtures of Polycyclic Aromatic Hydrocarbons in Heavy Fuel Oil Sample by Means of GC × GC-TOFMS Combined to Multivariate Curve Resolution. Anal. Chem., **83**, 9289–9297.