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DECAY RESISTANCE OF SCOTS PINE FROM NORTHERN FINLAND

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Introduction

The wood of Scots pine from northern Finland has been considered to be naturally durable against decay, because of, e.g., its slow growth rate (dense grain) and high heartwood content. Therefore the northern wood material should therefore have a longer life expectancy. As a part of a Finnish-Swedish consortium "Specific wood and timber properties, competitive ability and advanced conversion of Nordic Scots pine in mechanical wood processing" (SPWT), the natural variability of Scots pine twood in the resistance against brown-rot was tested using pine wood from northern and southern Finland.

Material and methods

The material consisted of heartwood and sapwood samples taken from standing trees growing in northern Finland (164 trees from 34 plots). Material collected from 10 plots in southern parts of the country, as well as commercially impregnated Scots pine wood was studied for comparison (Fig. 1). Five trees per plot were felled.

The brown-rot decay resistance of sapwood and heartwood was tested according to the standard EN 113 test procedure in the laboratory, using one fungus, *Coniophora puteana* (Schum. ex Fr.) Karst. (strain Bam EBW 15).

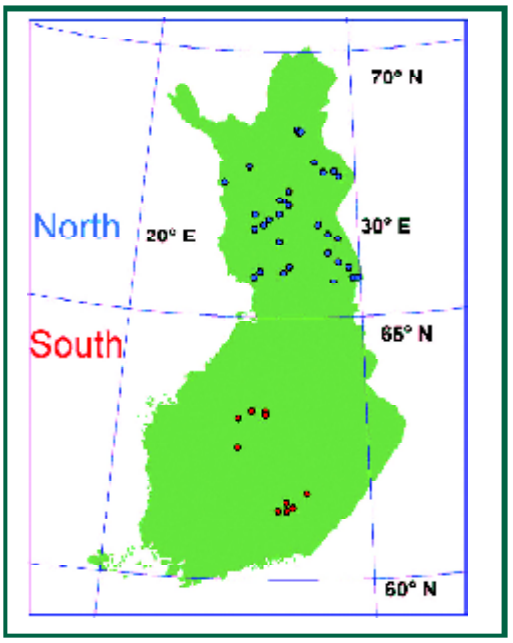

Figure 1. The location of the plots.

Results

The average weight loss in the wood samples from standing trees was 127 and 101 mg/ g in sapwood and heartwood samples, respectively. The weight losses were 30 % and 26 % of the initial dry mass, respectively. The weight losses in heartwood were about two times higher than in class A impregnated construction wood.

The weight loss varied more in the heartwood than in the sapwood samples, except in three plots from southern Finland (Fig. 2). The weight loss (mg/g) in heartwood samples was bigger in the samples from northern Finland than in the southern parts of the country, and the difference was significant (p=0,000). The densities of the heartwood samples did not differ (p=0.665). A strong positive correlation was found between the weight losses in the sapwood and heartwood samples from the same trees in the plots from southern Finland, but not in northern Finland.

In heartwood samples the variation in weight loss was much larger between trees within individual plots than between plots. The variation in weight loss between plots was noticeably larger in northern Finland (Table 1).

The differences according to sample height were not significant. The weight loss decreased slightly with the increasing age of the sample trees. The weight losses decreased with the increasing density of wood in southern Finland. However, forest site type, tree diameter, tree age, mean growth rate or wood density could not explain the differences in the weight loss of heartwood samples, according to regression and classification tree analyses.

Table 1. Mixed model analysis. Estimates of Covariance Parameters.
Dependent variable: Weight loss mg/ g of wood (heartwood samples).

Region	Parameter	Estimate	Std. Error
North	Residual (trees)	1361.690	113.830
	Variance (plots)	157.026	75.174
South	Residual (trees)	1791.671	267.086
	Variance (plots)	28.793	101.606

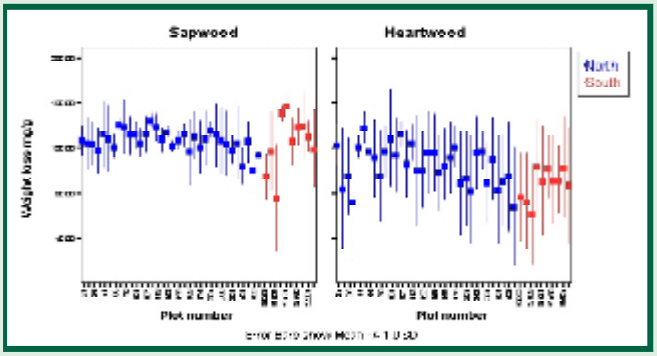

Figure 2. The variation in weight loss in northern and southern plots (expressed as mg/g of wood).

Discussion

The results showed a large variation in durability, even within Scots pine stands. The reasons for the bigger weight losses in northern Finland were somewhat surprising. The differences could not be explained by the measured site or tree variables. Factors affecting the natural durability, such as content of phenolics, sorption of water or lignification of the wood cells need to be analyzed in the future. Moreover, appropriate test procedures for realistic conditions need to be developed. The test used in this study represents only very severe conditions.

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