

Root system carbon pools in northern peatland forests: effects of stand density manipulation

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Root systems may be a significant C pool in forested eco-systems. Their morphology and C pool vary among different sites. It has been suggested that in sites with deep organic soils (peatlands), root system C pool might be about one third higher than in otherwise similar stands in mineral soil sites.

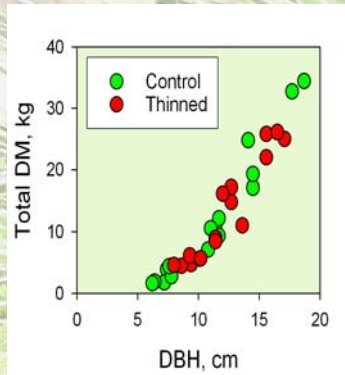


Fig. 1. Total stump and coarse root (diameter > 1 cm) dry mass per tree relative to tree diameter at 1.3 m.

The relationship between tree DBH and the dry mass of both the whole root systems and each of the different fractions was similar in the thinned and control stands (Fig. 1). However, the wood density of roots was on average lower in the thinned stands (t-test p-values 0.032 for total, 0.094 for stumps, 0.020 for roots ≥ 5 cm, and 0.246 for roots 1-5 cm). This was caused by the increased growth of the root systems: they were horizontally more extensive in the thinned plots. We postulate that this was because the trees needed more support after the

In the control plots, the density of the stumps had decreased by 15 % over 6 years ($p=0.003$) (Fig. 3); the density of the roots remained unchanged. In the thinned plots, the densities were on average higher in the root systems of the trees felled earlier, and thus decomposition could not be detected with this method.

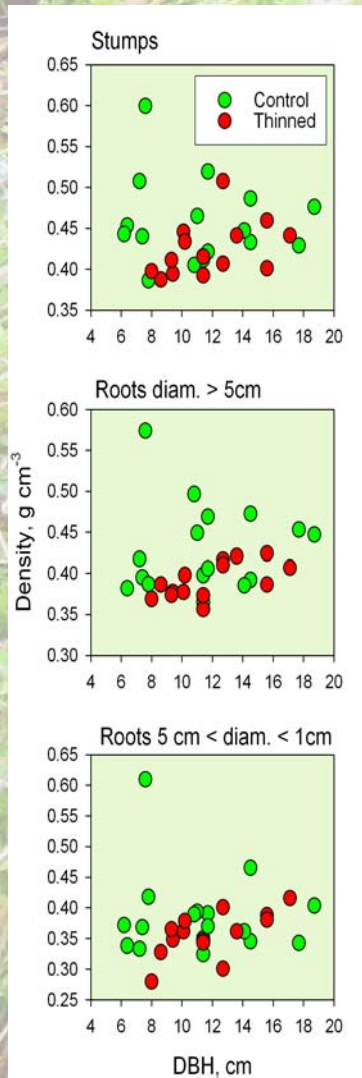


Fig. 2. Wood density in the different fractions of the root systems, control and thinned plots.

We excavated the root systems (diameter ≥ 1 cm) of 47 Scots pines (*Pinus sylvestris* L.) growing on drained peatland in northern Finland. Thirty-one of the trees had been felled recently, 14 of these in plots that had been thinned to a stem number of 900 ha⁻¹ 13 years previously, and 17 in control plots with a stem number of 1500 ha⁻¹. Sixteen trees had been felled 6 years previously, 9 in thinned and 7 in control plots.

The root systems were divided into stumps, roots with diameter ≥ 5 cm, and roots with diameter 1-5 cm. Total fresh mass was determined for each fraction, after which a representative subsample was taken for volume and dry mass measurements. Wood density was calculated as dry mass per fresh volume.

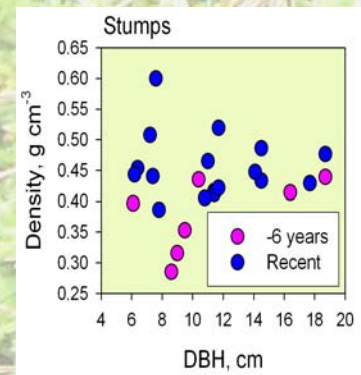


Fig. 3. Wood density in the stumps of trees felled at different times, control plots.

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