

Carbon stocks and carbon fractions in the organic layer (F + H) of forest soil

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Introduction

Recent studies have demonstrated that there is a clear link between climatic variation and the carbon balance in boreal and temperal forest ecosystems and soils (Barr et al. 2002, Morrison 2003, Qualls et al. 2003, Guo et al. 2005). The interaction between climate warming and carbon pools in forests at high latitudes may be important because climate change is expected to be greatest in northern boreal and especially sub-Arctic and Arctic regions (Vucetich et al. 2000).

Aims of the study

1. To determine the carbon stocks in the organic layer in Scots pine (VT site type) and Norway spruce (MT site type) stands on mineral soil sites.
2. To determine the proportions of water-soluble, slowly decomposing and relatively inert chemical fractions in the fermentation (F) and humus (H) layers in pine and spruce stands.
3. To calculate how much carbon is sequestered in roots and rhizomes in the F and H layers.

Material

A total of 336 samples were taken from the forest floor in 12 stands in different parts of the country (Fig. 2). Each sample consisted of a square (30 * 30 cm), and included all the living vegetation, and the complete organic layer. The F and H layers were separated individually (Fig. 3).



Figure 3. Taking the ground vegetation and organic layer samples. Photo: Maija Salemaa.



Figure 1. Pallasjärvi, near to sample plot 3. Photo: Sari Hilli.

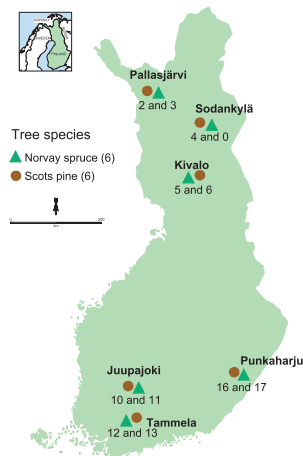


Figure 2. Location of experimental sites.

Analyses

- The samples were dried at 60° C, and then milled.
- Total C and N were determined on a CHN analyzer.
- The F and H samples were chemically fractionated into nonpolar extractives, polar extractives, cellulose and humic substances.

Results

- According to the preliminary results, the total C content as well as individual carbon fractions were higher in the H than in the F layer when all visible roots and rhizomes are removed (Fig. 4.)
- The amounts of cellulose and humic substances are higher in the Norway spruce compared to Scots pine stands (Fig. 4.)
- More C has accumulated in the F and H layers in the Norway spruce than in the Scots pine stands.

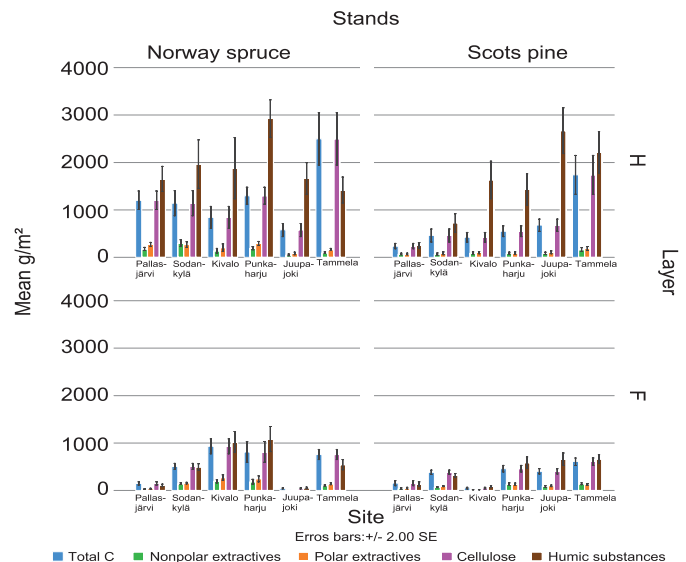


Figure 4. The amount of total C, nonpolar extractives, polar extractives, cellulose and humic substances in the F and H layers of the stands.