

Stem girdling effect on soil respiration in 35 and 65 years old Norway spruce (*Picea abies*) stands

Isabella Børja, Petter Nilsen¹, Toril D. Eldhuset and Ingvald Røsberg

Norwegian Forest and Landscape Institute, P.O. Box 115, N-1432 Ås, Norway

1: The Research Council of Norway, P.O. Box 2700 St. Hanshaugen, N-0131 Oslo, Norway

The soil is considered to be the major C sink in boreal forests, thus determination of soil carbon fluxes is essential for reliable C budgets. Especially partitioning of soil and root respiration is a major challenge. Soil respiration (R_s) consists of autotrophic respiration (R_a , respiration of plant roots and of microorganisms living on root-derived organic C in the rhizosphere) and heterotrophic respiration (R_h , respiration of free-living microorganisms during their decomposition of soil organic matter).

In our study we attempted to estimate the contribution of roots to soil respiration by a girdling experiment. The study was established in two Norway spruce (*Picea abies*) stands, 35 and 65 year old, at Nordmoen, southeast Norway. Four quadratic plots (21m x 21m) were chosen within each of the two stands in spring 2006 and within two plots all trees were girdled. To estimate the contribution of root respiration, we measured CO_2 efflux within each plot with a PP EGM-4 gas monitor for CO_2 , at permanently marked spots during two years (2006 and 2007).

In the youngest stand in 2006, R_s in the control plots was higher than in the girdled plots at all measurement occasions. During this period, the mean R_s in the girdled plots was 64.9 % of the mean R_s in the control plots. In 2007, the R_s was highest in the girdled plots on most occasions, but the difference was never significant. In the oldest stand, R_s was also highest in the control plots in 2006 and highest in the girdled stand in most cases in 2007, but the difference was never significant. The implications will be discussed.