

Root decomposition and soil carbon pools in a laboratory experiment

Anna Zakharova, Robert Jandl, Helga Van Miegroet, Markus Puschenreiter
and Walter W. Wenzel

Changes in soil carbon pools are thought to be relevant in the context of climate change. Changes in land use and forest management may have direct and indirect impacts on carbon storage in soil and related carbon fluxes. Little is known about how tree roots and their decomposition, e.g. after forest clear-cut, affect soil organic carbon pools. We present data from a laboratory experiment studying spruce root decomposition in a Rendzic Leptosol from Achenkirch / Austria under controlled conditions. We incubated root material mixed into 50 g of sieved (< 2mm) and homogenised soil for 1, 2, 3, 4, and 5 months, respectively, at a temperature of 30°C and a soil moisture maintained at 80% of water holding capacity. The treatments are 'soil without roots' (control), 'soil mixed with fine roots', 'soil mixed with coarse roots', and 'soil mixed with fine + coarse roots', and 'litterbag', respectively. The litterbag treatment quantifies a potential methodological bias in decomposition experiments. Concentrations of total carbon in the soil and the root fractions were measured before and after incubation. During the incubation, soil respiration was measured weekly and the CO₂-emission was integrated to estimate carbon losses. At the end of the incubation we separated remaining roots and root fragments from the soil by passing the soil-root mixtures through a 2-mm screen and inspection of the remaining roots and root fragments for their stage of decomposition using light microscopy. - The information obtained from this experiment was used to estimate the contribution of decomposing roots to soil carbon formation.