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Effects of snow condition on microbial respiration of Scots pine needle litter in a boreal forest

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Climate warming scenarios predict decreasing snow depths and increasing winter precipitation in boreal forests (“rain on snow”). I These conditions may affect the decomposition and the microbial respiration of leaf litter, contributing a major part of tree litters, To understand how different snow conditions during winter would affect the microbial respiration of Scots pine needle litter in a boreal forest, we conducted a laboratory experiment using needle litter of two age classes (newly dropped and older litter). The experiment simulated four different winter treatments, followed by spring and early summer : (1) ambient snow cover (SNOW), (2) Compressed snow and ice encasement (ICE), (3) frozen flood (FLOOD) and (4) no snow cover at all (NO SNOW). The experiment was carried out in four walk-in dasotrons (n=3) with soil temperatures of -2˚C and air temperatures of 2˚C during winter and increased to 15˚C and 20˚C during spring, respectively . Needle litter samples were collected three times (prior to the winter, just after winter and at the end of the experiment). We evaluated the microbial respiration from the litter at several temperatures (-5˚C, 0˚C, 5˚C and 12˚C), the SIR index (an index estimating the microbial biomass), and the C/N ratio .And we calculated Q10 value (index of microbial respiration activity) using microbial respiration data. We found significant differences in microbial respiration between the newly dropped and older litter at the beginning and at the end of the experiment. However, there were no significant differences in Q10 value and the SIR (index of microbial biomass) between the different winter treatments. All samples showed decrease of microbial activity with time. Finally, we conclude that the winter snow conditions with mild air temperatures as used in our experiment, are not detrimentally affecting the Scots pine needle litter decomposition and its respiration.