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Priming effect of labile and recalcitrant litter carbon on the decomposition of temperate coniferous forest soils

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Soil organic carbon (C) is the largest C pool in terrestrial ecosystems. Especially temperate forest soils have been implicated in holding a great potential for storing C. However, soil C pool is susceptible to changes in fresh C input from the litter, which can influence soil organic matter (SOM) decomposition. Here we labelled spruce seedlings with depleted 13C-CO_2 and extracted labile (LC) and recalcitrant (RC) C from the litter. These substrates were then added to the mineral coniferous forest soil and incubated in laboratory microcosms for seven months. During this time, soil respiration was regularly sampled and analyzed for CO_2 and 13C-CO_2. Results show that respiration in LC and LC+RC treatments was increased largely at the beginning and then decreased quickly. The effect of RC and LC+RC lasted longer than LC meaning that LC had been quickly depleted. When the isotopic data were used to assess the priming effect on the original SOM decomposition, it was clear that all the substrates caused the priming effect. The highest priming was caused in the LC+RC treatment followed by the RC treatment. This suggests that more recalcitrant forms of C are responsible for a greater priming effect than more labile ones.