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Mass losses and nutrient mineralisation from organic matter in boreal wood ant mounds

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Wood ants (*Formica rufa* group) are dominating ecosystem elements in the boreal region due to their wide and abundant occurrence. They concentrate organic material (mainly needles and small twigs) and resin by building large long-lasting aboveground mounds. These mounds have higher temperature and considerably lower water content than the surrounding forest floor. In a small-scale environment, these mounds accumulate considerable amounts of carbon (C) and nutrients collected from the surrounding forest floor by the ants.

We studied how the peculiar environmental conditions inside wood ant mounds affected mass loss and nutrient mineralisation of organic matter in boreal Norway spruce dominated mixed forest stands in eastern Finland. We expected mass losses to be extremely low due to the low water content on the mounds. Norway spruce (*Picea abies* L. Karst.) needle litter was incubated inside inhabited and abandoned wood ant mounds as well as on the surrounding forest floor in forest stands of four age classes (5-, 30-, 60-, and 100-year-old). The decomposition was monitored for up to two years.

After two years, mass losses inside inhabited mounds were lower compared to the surrounding forest floor (30% vs. 50%), but higher than we expected. Decomposition in the abandoned mounds proceeded somewhat similarly as on the forest floor. The

only elements, which were visibly released from the litter in the ant mounds, were C, Ca, K and Mg. The amount of N remained stable during the two years and P was released after one year. Heavy metals (Cd and Zn) increased in total amount. The lower mass losses in inhabited wood ant mounds seem to be mainly due to their low water content. When these wood ants mounds are abandoned and their porous and dry structure is no longer maintained by the ants, their decomposition is accelerated, and nutrients may be available for uptake by plants. Wood ant mounds could be regarded as "compost heaps", although the nutrient release after mound abandonment seems still to remain lower compared to the surrounding forest floor.