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Shrub encroachment in Arctic tundra peatlands: *Betula nana* effects on above- and below-ground litter decomposition

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Changes in global climate have resulted in a 'greening' of Arctic peatlands, as the abundance of deciduous shrub species increases. Consequently, not only the living plant community, but also the litter composition changes, with potential consequences for Arctic carbon turnover patterns. In our study, we investigated how increasing litter of a deciduous shrub, *Betula nana*, affects decomposition rates of other common species. We conducted a two year litter bag experiment in a moist acidic tundra peatland in northern Alaska, where we decomposed three common tundra species (*Vaccinium vitis-idaea, Ledum palustre* and *Eriophorum vaginatum*) both alone and in combination with *Betula* litter. Additionally, we investigated how decomposition was affected by nutrient availability by placing the litterbags in an ambient and a fertilized environment.

Decomposition was examined seasonally, separating winter and summer decomposition patterns, for both leaf and root litter, and four different decomposition variables were measured (mass loss, litter microbial respiration, the temperature sensitivity of this respiration and microbial extracellular enzyme activity). We report faster decomposition of *Betula* leaf litter than other species, with support for species differences coming from all four measures of decomposition. Mixing effects were less consistent between decomposition measures, with negative mixing effects only shown for mass loss. Interestingly, nitrogen translocation from one litter type to another had no important role in the effects of shrub encroachment on decomposition patterns. Similarly, there was hardly an effect of fertilization on mass loss or the temperature sensitivity of litter respiration. We noted numerous differences between leaf and root decomposition patterns, indicating that conclusions from leaf litter experiments should not be extrapolated to differences between species in belowground decomposition. Overall, the high decomposition rates of *Betula* leaf litter, and relatively similar root decomposition rates of different species, suggests a potential for increases in carbon turnover as the dominance of deciduous shrubs in the arctic increases.