# Spatial distribution of mites in two contrasting habitats: birch and heather moorland

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## Introduction

Trees are known as ecosystem engineers and immigration of trees into a new area brings about some dramatic changes in biotic and abiotic factors, both aboveground and belowground. It has been found that trees increase the spatial aggregation of abiotic factors (Bruckner et al., 1999), and this could influence the soil fauna by creating 'hotspots' (Ettema and Wardle, 2002). However, not much is known of the effect of these changes on soil fauna and which changes affect soil fauna most. Hence, a scale study was setup to elucidate the effect of trees on vegetation and belowground abiotic factors and the distribution, species richness and abundance of soil mites.

The hypotheses were that we would find the highest species richness and abundance of mites under birch, and that there would be differences in the distribution of mites between the two habitats.

## Methods

To describe and compare the two contrasting habitats 105 samples were collected in a naturally developed birch stand on former heather moorland, and 105 samples were collected in adjacent heather moorland. A spatially nested design was used to take the samples to optimize the possibility of determining spatial patterns. At each sample point a soil core was collected, the soil fauna was extracted and mites of 2 different groups representing different functional groups (Mesostigmatid and Oribatid mites) were identified to species level where possible.

## Results

The study reveals that the abundance of mites and the number of Oribatid mite species is significantly higher in the birch stand than in the heather moorland and that the dissimilarity of Mesostigmatid mite samples changes significantly more over distance in the birch stand than the heather moorland. Furthermore the data reveal a much higher variation in soil moisture, bulk density and total carbon and nitrogen content in the birch stand.

## Discussion

The difference in species richness of Oribatid mites seem to be correlated with a much higher variation of abiotic factors such as soil moisture, bulk density and total C and N content in the study area for birch than heather moorland. That we don't find a significantly higher species richness of Mesostigmatid mites could be due to feeding

habits. Mesostigmatid mites are predators but seem to be relatively generalistic in their food choice and more species and/or different composition of species lower in the foodchain might not affect them significantly.

That we only find a significant difference in the effect of distance on dissimilarity of Mesostigmatid mites and not for Oribatid mites was surprising. However, further data analysis indicates that the Oribatid mites in heather change gradually over the sampling area, probably due to an underlying change in environmental factors whereas there is more randomness in the Oribatid mite communities in birch caused by several small aggregations. This leads to the same overall change in dissimilarity between samples of Oribatid mites.

## References

Bruckner, A., Kandeler, E., Kampicler, C. 1999. Plot-scale spatial patterns of soil water content, pH, substrate-induced respiration and N mineralization in a temperate coniferous forest. Geoderma **93**, 207-223.

Ettema, C.H., Wardle, D.A. 2002. Spatial soil ecology. Trends in Ecology & Evolution **17**, 177-183.