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# Disentangling the effects of tree diversity and identity on soil invertebrates in four different European forests

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## Abstract

Soil macroinvertebrates is a highly diversified group of organisms that play important roles in many ecosystem processes, from decomposition to primary productivity. Besides of the effects of climatic and edaphic factors, their diversity, abundance and activity also respond to aboveground vegetation properties such as species richness or functional diversity. However, relationships between plant diversity and soil animals are not yet well understood and have been mainly studied in grasslands, but much less in forests, which limits our ability to predict soil fauna community patterns and their effects on the functioning of these ecosystems.

We investigated the taxonomic and functional responses of three groups of soil macroarthropods (carabids, isopods and diplopods) in 64 forest stands either composed of single tree species or mixtures of three species in a total of four major European forest types. We used two different sampling methods, hand sorting of excavated soil blocks and pitfall traps. We used redundancy analyses and structural equation modelling to disentangle the effects of climate, edaphic factors, tree identity and diversity and resource availability (leaf litter or prey) on soil fauna communities.

Soil macroarthropod abundance, richness and functional diversity did not differ between singletree species stands and mixtures of three species regardless of forest type, but was affected by the proportion of evergreen tree species in the canopy. We also showed that tree identity was an important determinant of soil fauna community composition. These identity effects were driven by canopy cover and leaf litterfall or indirect effects on soil pH and understory cover.

Our study describes some of the complex interactions between biotic and abiotic factors shaping soil fauna communities, and highlight the predictive power of the functional traits approach.

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