Abstract*

Ant soil engineering increases grass root arbuscular mycorrhizal colonization (Hymenoptera: Formicidae; Spermatophyta; Glomeromycota)

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The question for the edaphic factors driving the relationship between plant community structure and ecosystem processes is a key issue of the current debate on the functional implications of biodiversity (WARDLE & al. 2004). Here we draw a direct link between above-/ belowground relationships, vegetation structure and aboveground herbivory. We used ground nesting ants and arbuscular mycorrhizal fungi (AMF) as an example for quantifying the role of biotic interactions in soil. Though both groups are known to have a major impact on grassland ecosystems (VAN DER HEIJDEN & al. 1998, KOVAR & al. 2001, JOUQUET & al. 2006), the interactive effect of these two taxa on vegetation structure as well as its sensitivity to grassland management is a widely neglected field of research. Ants affect plants directly by cutting roots or other plant organs, dispersing seeds and causing disturbances through soil heaping and indirectly by changing soil physical and chemical properties (HOLEC & FROUZ 2006). AMF form mutualistic symbiotic associations with the roots of most plant species. Acting as extensions of the plant root system they increase nutrient and water uptake, thereby affecting seedling establishment and plant succession (RILLIG 2004). We show that the ant *Lasius flavus* (FABRICIUS, 1782) increases the root arbuscular mycorrhizal colonization (AMC) of grasses by modifying biotic and abiotic soil properties. As a consequence, shoot length of grass growing on the mounds was shorter and shoot N- and P-concentrations were higher than off the mounds. Land use by sheep grazing affected ant nest architecture and long-term development of soil. In turn, grazing together with ant activity affected AMF, with AMC being higher in successional old fields than in sheep pastures. These results emphasize the need to consider the interactions between plants, soil microorganisms, soil fauna and aboveground herbivory in order to increase the understanding of the drivers of biodiversity and ecosystem functioning in grasslands both above- and belowground.

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