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Can arbuscular mycorrhizal fungi be used as bioindicators of land use?

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Being abundant in nearly all soils and less diverse than other soil organisms, Arbuscular Mycorrhizal Fungi (AMF) are potential indicators of land management legacies and soil quality degradation. It has been pointed out that these are critical factors for understanding and supporting the sustainable use of soils, but can be difficult to measure directly (Jansa et al. 2014). To serve as broadly applicable bioindicators, AMF should exhibit consistent patterns in a range of soils.

In the framework of the EcoFINDERS project, soil AMF assemblages were described in four European long term observatories (mainly grasslands), located in different climatic and geological zones, subjected to either low or high management intensity. AMF communities were described, in both spring and autumn, by means of high-throughput metabarcoding targeting the ITS2 region. AMF community structures were related to soil properties, land management intensity and geographic distances to address the relative importance of these factors in shaping the composition of AMF communities.

As expected, our results indicate significant effects of management type ($p=0.000999$), soil chemical and physical properties (such as pH, soil texture, organic carbon content and available phosphorus), and among-site geographic distances on community composition (Mantel tests). Indicator species analysis (presence/absence data) retrieved some taxa (or their combinations) characteristic of specific land uses (or their combinations) in both seasons.

Jansa J. et al. 2014 - Soil and geography are more important determinants of indigenous arbuscular mycorrhizal communities than management practices in Swiss agricultural soils. Molecular Ecology 23: 2118–2135

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