

Fertilization effects on the fungal biomass in grasslands

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Fertilisation is a common practise in grass production systems performed to increase primary production, a supporting ecosystem service essential for other services. However, different fungal groups, like saprotrophic fungi (SF) and the obligate symbionts arbuscular mycorrhizal fungi (AMF), have potential differential response to the fertilizer concentration and composition. Three controlled field experiments were utilised in our study, two medium-term (6 years) in the south of Sweden (SE) and one long-term experiment (46 year) in Switzerland (CH), all sampled in 2018. The Swedish sites included the same two factor treatment, i.e. four different plant mixtures and two (SE-Lanna) or three (SE-Alnarp) nitrogen fertilization levels (0, 60, 120 kg ha⁻¹ yr⁻¹); while the Swiss experiment included different proportions of N, P and K fertilization under different cutting regimes (CH-Bremgarten). The PLFA and NLFA (phospholipid- and neutral lipid fatty acid) analysis was used to estimate the fungal biomass (SF+AMF). The application of N was associated with a decrease in the AMF biomass, with significant effects with the application of 60 and 120 kg N ha⁻¹ in SE-Alnarp, and 75 and 150 kg N ha⁻¹ in CH-Bremgarten. On the other hand, the SF biomass was only negatively affected by the N fertilization in SE-Lanna (60 kg N ha⁻¹) under the plant mixture that showed the biggest SF biomass in the unfertilized plot; and by the highest application of N in CH-Bremgarten. Our findings indicate that nitrogen fertilization influences microbial community structure and reduces the abundance of AMF, with these being more sensitive than SF to fertilizer application.