

Soil microbial biomass and community structure in grasslands along an European gradient

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Introduction: The agro-ecological conditions and the land use management are among others, the key drivers of soil microbial communities of grasslands. In the BIOINVENT project, the soil microbes of these systems are investigated along a pan-European transect.

Materials and methods: Soils from ten agro-ecological regions defined by favourable (F) and less favourable (LF) growth conditions in each of five countries (Sweden, SE; Germany, DE; Switzerland, CH; Portugal mainland, PT and Azores, AZ) were sampled. In each of these regions, a gradient of management intensity was selected, from intensive grasslands with high nutrient inputs, to grasslands with an intermediate and extensive management intensity. The PLFA and NLFA (phospholipid- and neutral lipid fatty acid) analysis (Frostegård and Bååth 1996) was used to estimate the total and the specific biomass of the soil microbial groups.

Results: A marked impact of the ten agro-ecological regions was detected on the microbial community structure. The samples from PT were clearly separated from the rest of the samples, among which the biggest difference came out between AZ and SE. The detailed study in each country showed that management regimes affected the soil microbial community structure, but that the growth conditions (F vs. LF) had a larger effect than management in SE, DE and CH. These effects on the microbial community structure were dominated by distinct responses of fungal biomass and saprophytic fungal biomass (fig 1) to the agro-ecological region and management intensity. Fungal and saprophytic fungal biomass were generally higher in extensive grasslands than under the other management intensities.

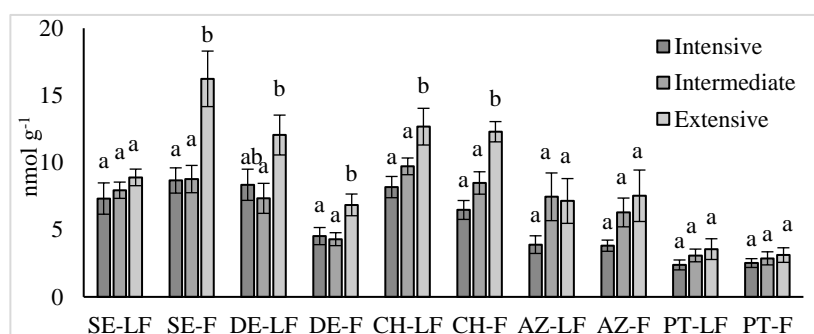


Figure 1: Saprophytic fungal biomass. F: favourable; LF: less favourable; SE: Sweden; DE: Germany; CH: Switzerland; AZ: Azores; PT: Portugal mainland. Different letters mean significant differences (ANOVA, $p < 0.05$).

Conclusion: Agro-ecologic region had the greatest effect on soil microbial communities. Within agro ecological region, the extensive grassland management provided the most prosperous habitat for fungal colonization.

Frostegård Å., Bååth E. (1996) The use of phospholipid fatty acid analysis to estimate bacterial and fungal biomass in soil. *Biology and Fertility of Soils* 22:59-65.