

# Soil microbial biomass and community structure in differently managed grasslands along a European gradient

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**Introduction:** Agro-ecological conditions and land use management are, among others, the key drivers of grassland soil microbial communities. In the BIOINVENT project, the soil microbiome of these systems was investigated along a pan-European transect.

**Materials and methods:** Soils were sampled in ten agro-ecological regions defined by favourable (F) and less favourable (LF) conditions, i.e. edapho-climatic conditions restricting plant growth, in each of five countries (Sweden, SE; Germany, DE; Switzerland, CH; Portugal mainland, PT and Azores, AZ). In each of these regions a gradient of management intensity was selected, from intensively managed grasslands with high nutrient inputs to grasslands with 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 microbial community structure as well as the biomass of the microbial groups.

**Results:** Canonical discriminant analysis (CDA) showed a clear separation of the PT samples from the others ( $P < 0.001$ ), among which the biggest difference came out between AZ and SE ( $P < 0.001$ ). The detailed study in each country showed that management affected soil microbial community structure, but that the growth conditions (F vs LF) had a larger effect in SE, DE and CH ( $P < 0.001$ ). The total microbial biomass was not affected by these factors; however, saprophytic fungal biomass was generally higher in extensive grasslands than under the other management intensities (Figure 1).

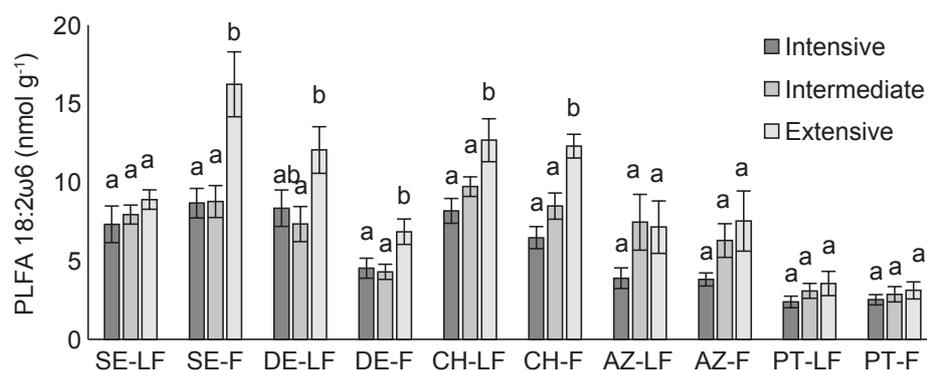


Figure 1. Saprophytic fungal biomass. F: favourable; LF: less favourable; SE: Sweden; DE: Germany; CH: Switzerland; AZ: Azores; PT: Portugal mainland. Different letters mean significant differences (ANOVA,  $P < 0.05$ ).

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

Frostegård Å. and 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.