



Grazing and mowing impact on soil organic carbon and microbial activity in grassland soil

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Grassland management practices, such as grazing with varying animal density and mowing may impact the processes leading to soil organic carbon (SOC) accumulation. Although, they serve similar agricultural purposes, they differ in their effect on plant physiology and their influence on SOC remains uncertain. We hypothesised that both practices affect SOC storage differently due to an altered plant C input and changed growth and physiological response leading consequently to contrasting soil microbial activity.

Based on this, our experiment included the investigation of three grassland treatments: grazing at two intensities and mowing which are located at the experimental station of SOERE ACBB (Clermont-Ferrand, France). Additionally, we included bare soil and unmanaged abandoned site considering as negative and positive controls, accordingly. The aim of the study was to estimate how grazing and mowing affect SOC chemical characteristics and its link with microbial activity.

Our results show highest SOC contents under low grazing intensity, whereas SOC content under high grazing intensity was lower and did not differ from abandoned grassland. SOC content under mowing was lowest among all treatments but still higher compared to bare soil. Microbial biomass C (MBC) followed a similar pattern under high grazing intensity and positive control whereas it was similar under mowing and low grazing intensity and lowest under bare soil. Absolute enzyme activities showed a similar tendency as SOC content. However, enzyme activities per MBC resulted in highest values under low grazing intensity and similarly lower values under all other treatments.

These results demonstrate that microbial parameters responded to management in various ways most probably related to the differences in dung and litter inputs. We suggest that dung input under high grazing intensity increased MBC and consequently compensated for plant removal thus keeping SOC contents increasing. Consequently, grazing at both intensities allows to maintain SOC at similar levels as in absence of management. While on unmanaged land high SOC may be related to absence of harvest, on grazed land it may be related to stimulation of microbial activity

due to animal activity. Mowing treatment on the other hand did not allow to increase SOC.

We conclude that the presence of animals in the system is essential to improve soil health, biogeochemical cycling, and SOC storage.