



Effect of grazing and mowing on soil microbial parameters and enzyme activity in permanent grassland soil

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The effect of land use practices on quality and quantity of SOM is still uncertain. On the one hand, negative effect of grazing includes GHG emissions and, consequently, reduction of system sustainability. On the other hand, grazing may imitate natural processes and promote sustainability. Certainly, both of the theories are partly true and up to contrasting results were mostly explained by different pedological and climatic conditions and different grazing intensity of the studied sites.

Our experiment included the investigation of two grassland treatments (grazing and mowing) at the experimental site SOERE ACBB (Lusignan, France) established in 2005. This experimental site was characterised by temperate climatic conditions and Luvic Cambisol. Geostatistical evaluation of stocks showed that the changes were heterogeneous under both of the treatments resulting in the zones with loss and C gain. Therefore, the aim of this study was to understand the reasons of such differences in stocks between two treatments. We hypothesised that these changes are linked to contrasting microbial activity at the studied sites as microorganisms are the main drivers of soil processes. Accordingly, we sampled soil in two depths (0-10 cm, 20-30 cm), in two zones (C gain and loss) and in two treatments (grazing and mowing) and measured DOC, microbial biomass, basal respiration and 9 extracellular enzymes activity.

Microbial biomass was 2-fold and 1.5-fold higher in topsoil and subsoil of grazing system compared to topsoil and subsoil of mowing system. Basal respiration was 2-fold higher in topsoil of grazing system compared to topsoil of mowing system, however, basal respiration in loss zones for the both of treatments was 1.3 times higher compared to gain zones. The lowest value of metabolic quotient was observed for topsoil from gain zone in grazing system suggesting that the system in this situation was the most efficient in terms of use. Topsoil sampled from gain zone in grazing system resulted in the highest values of all enzyme activities except phosphatase, which showed the highest value for loss zone.

The results demonstrate clear difference in microbial parameters and enzyme activity between grazing and mowing systems and less evident difference between the zones of loss and gain.