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FIRE INTENSITY EFFECTS ON SOIL MICROBIOTA IN SHRUB ENCROACHED SUBALPINE GRASSLANDS

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Abstract

Livestock density reduction and the loss of the traditional use of fire is facilitating the encroachment of secondary grasslands, which is provoking a woody fuel accumulation that leads to a higher fire risk (Castellnou et al., 2010). Prescribed fires are performed under optimal conditions to minimize the damage to the soil. Although, they could have effects on soil microorganisms, even when the soil thermal range is low, because they respond to perturbations faster than soil physical and chemical properties (Santín & Doerr, 2016). For that reason, they can be used as bioindicators of soil health and quality. The objective of this study is to evaluate the immediate effects of different fire intensities on the soil microbial community under shrub encroached grasslands in the subalpine stage. For this study, soil monoliths were taken from an area located in the municipality of Asín de Broto (Central Pyrenees, Spain), under a *Echinospartum horridum* (Vahl) Rothm. encroached grassland. Then, the monoliths were transported to the lab and burned at 4 different intensities, combining the temperature (50 or 80 ºC) and the residence time (12 or 24 min) at 1 cm depth. Some monoliths were not burned and preserved as controls. Subsequently, soil samples were taken from the topsoil (0 – 3 cm) and several soil biochemical properties will be measured: community level physiological profiles (CLPPs), basal soil respiration, enzymatic β-D-glucosidase activity, microbial biomass carbon, total organic carbon and nitrogen, labile carbon and recalcitrant carbon. A previous work performed in the same location, showed that the potential functional diversity of the original microbial community (unburned samples) was low and the community was focused on the degradation of complex carbon compounds (Alfaro-Leranoz et al., 2022). After a prescribed burning, the potential functional diversity increased considerably, coinciding with a significant increase of labile carbon. We hypothesize that the increase happened because of the labile carbon inputs produced by the burning of the vegetation, that is supported by a significant increase on the electrical conductivity, which is a sign of ash incorporation. In this case, we do not expect such a great increase, because no vegetation was present in the experimental burning. Even

though, the fire could lead to a transformation of the recalcitrant carbon into more labile forms and produce changes in the microbial biomass and its activity (Arregui et al., 2022), and, therefore, changes in its potential functional diversity.

Keywords: soil biodiversity, soil microorganisms, CLPPs, fire severity

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