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Bacterial and fungal growth for monitoring the impact of wildfire combined or not with different soil stabilization treatments

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Soil stabilization techniques are rapidly gaining acceptance as efficient tool for reducing post-fire erosion. However, despite its interest, information concerning their impact on soil biota is scarce. We examined, under field conditions, the bacterial and fungal medium-term responses in a hillslope area located in Laza (NW Spain) affected by a high severity wildfire with the following treatments established by triplicate (4 x 20 m plots): unburnt control soil, burnt control soil, burnt soil with rye seeding and burnt soil with straw mulch. The bacterial and fungal growth, as well as respiration, were measured 4 years after fire and application of treatments using leucine incorporation for bacterial growth and acetate-in-ergosterol incorporation for fungal growth. The results showed that soil respiration and fungal biomass were negatively affected by fire, in the top layer (0-5 cm), while bacterial and fungal growth was stimulated. These microbial changes induced by fire were associated with modifications in organic matter (50% reduction in C content) and soil pH (increase of 0.5-0.9 units). Thus, the results suggested that under acid environment (pH in water 3.5) post-fire conditions might have favoured both microbial groups, which is supported by the fact that estimated bacterial and fungal growth were positive and significant correlated with soil pH (range of 3.5-4.5). This contrast with the well-known reported investigations showing that bacteria rather than fungi proliferation occurred after prescribed fire or wildfire; it should be noticed, however, that soils with a higher pH than that in the present study were used. Our data also indicated that bacterial and fungal communities were not significantly affected by seeding and mulching treatments. The results highlighted the importance of pre-fire soil pH as key factor in determining the microbial response after fire.
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