Fire in the Earth System Abstracts
Vol. 1 FES-Fire effects on soil biota-36
Valencia, Spain, 3-7 November, 2021
© Author(s) 2021. CC Attribution 3.0 License

Resistance and resilience of bacterial communities against large wildfires in heathlands ecosystems

[1]Pinto, Rayo, [1]Ansola, Gemma, [1]Calvo, Leonor and [2]Sáenz de Miera, Luis E.

[1]*Dept. Biodiversity and Environmental Management, University of León, Campus de Vegazana s/n, 24071 León, Spain*
[2]*Dept. Molecular Biology, University of León, Campus de Vegazana s/n, 24071 León, Spain*

Abstract

Communities of bacteria present in soil play a critical role in regulating biogeochemical cycles of soil. They are fundamental in ecosystem recovery after any type of disturbance, included wildfires. These communities have traditionally been evaluated by indirect measures, such as carbon or microbial enzyme activities. However, at present the metagenomic techniques allow us to develop studies of the bacterial community directly. In this research, DNA was extracted from the soil of burned heathlands with different fire severities (Low and High) and two moments in time (one month after a large wildfire that occurred in 2017 and two years later, in 2019). It was also extracted DNA from soils of unburned heathland in the proximity of the wildfire (Control). The bacterial communities of 39 soil samples have been characterized by the amplification of the coding regions for zones V3 and V4 of the 16S rRNA. Then we have analyzed resistance and resilience of bacterial communities in low and high fire severities. Bacterial communities are resilient for most of the parameters used to characterize alpha-diversity (richness, diversity and dominance). Only the richness of the communities affected by a high fire severity has not recovered. Recovery can be considered complete for communities affected by low fire severity, but not in those affected by high fire severity. In the context of the beta-diversity analysis using the Bray-Curtis index, we can consider the communities affected by low fire severity as resilient but not those affected by high fire severity. At the phylogenetic level, analyzed using Weighted UniFrac, we found differences in the two axes for both severities, which have disappeared two years after the fire. An analysis of the resistance for each of the 7676 OTUs shows different behaviours in the two levels of severity evaluated. At both of them, we observed a decrease in abundance and its recovery two years after the fire. From the evaluation of the phyla present in the community, it can be deduced that there is a high resilience against the two levels of severity. Since despite presenting a lower resistance to high fire severity, greater recovery of abundance is observed in this case.

Keywords: Wildfire severity; Soil bacterial community composition; Diversity; Resistance;

Resilience

Acknowledgments: This study was financially supported by the Spanish Ministry of Economy and Competitiveness in the framework of the FIRESEVES (AGL2017-86075-C2-1-R) project; and by the Regional Government of Castilla and León in the framework of the SEFIRECYL (LE001P17) project.

DRAFT