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Factors controlling short-term soil microbial response after laboratory heating. Preliminary results

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Soil microbial response after fire is controlled by numerous variables which conclude with a mosaic of results depending on organic carbon alterations or pH fire-induced changes. This fact has complicated the studies focused on post-fire microbial response, compiling high variability of opposite result in the bibliography.
Soil laboratory heating cannot emulate a real wildfire effect on soil but lead us the possibility to control several variables and it is a valid tool to clarify the relative weight of different factors controlling microbial response after soil heating.
In this preliminary study different heated treatments were applied to unaltered forest soil samples, obtaining 4 different heating treatments to simulate a range of fire intensities: unaltered-control (UH), and soil heated at 300, 450 and 500 ºC. In order to isolate possible nutrient availability or pH heating-induced changes, different culture media were prepared using soil:water extract from each heating treatments and adding different supplements to obtain the total of 11 different culture media: unheated soil without supplements (UH-N-), unheated soil with nutrient supplement (UH-N+), soil heated at 300 ºC without supplements (300-N-), soil heated at 300 ºC with nutrient supplement (300-N+), soil heated at 300 ºC with nutrient supplement and pH-buffered (300-N+pH); soil heated at 450 ºC without supplements (450-N-), soil heated at 450 ºC with nutrient supplement (450-N+), soil heated at 450 ºC with nutrient supplement and pH-buffered (450-N+); soil heated at 500 ºC without supplements (500-N-), soil heated at 500 ºC with nutrient supplement (500-N+), soil heated at 500 ºC with nutrient supplement and pH-buffered (500-N+). Each media was inoculated with different dilutions of a microbial suspension from the original unaltered soil, and the abundance of viable and cultivable microorganisms were measured by plate count method. In addition, the analysis of heating-induced soil organic matter alteration by mean of pyrolysis-gas chromatography/mass spectrometry (Py-GC/MS) technique was applied to soil samples and soil:water extract in order to obtain a deeper understanding of soil organic matter-microorganisms interaction after fire.
Heating effect on soil:water extract media was evident since the number CFU in those media prepared by mean of heated soil was lower than those counted in media prepared with unaltered soil and inoculated with the same dilution. Nutrient addition appear to promote microbial proliferation in unaltered and 300 ºC treatments, while nutrient and pH compensation appear to attenuate heating effect in samples heated at 300 and 450 ºC. While, media prepared with soil:water extract form soil heated at 500ºC showed similar CFU abundance in all supplement treatments.
Soil organic matter analyses evidences difference in the pyrogram obtained from each heating treatment sample, with a marked diminution of peaks with increased temperature.
This preliminary study shows us the importance of soil organic matter fire-induced alterations in soil microbial response after soil heating process beyond the C content diminution or changes in C availability.