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# Microbial biomass and activity in soils with different moisture content heated at high temperatures

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It is well known that soil properties determining the thermal transmissivity (moisture, texture, organic matter, etc.) and the duration and temperatures reached during soil heating are key factors driving the fire-induced changes in soil microbial communities. However, despite its interest, the information about this topic is scarce. The aim of the present study is to analyze, under laboratory conditions, the impact of the thermal shock (infrared lamps reaching temperatures of 100 ºC, 200 ºC and 400 ºC) on microbial communities of three acid soils under different moisture level (0 %, 25 % and 50 % per soil volume). Soil temperature was measured with thermocouples and the impact of soil heating was evaluated by means of the analysis of the temperature-time curves calculating the maximum temperature reached (Tmax) and the degree-hours (GH) as an estimation of the amount of heat supplied to the samples (fire severity). The bacterial growth (leucine incorporation) and the total microbial biomass (PLFA) were measured immediately after the heating and one month after the incubation of reinoculated soils. The results showed clearly the importance of moisture level in the transmission of heat through the soil and hence in the further direct impact of high temperatures on microorganisms living in soil. In general, the values of microbial parameters analyzed were low, particularly immediately after soil heating at higher temperatures; the bacterial activity measurements (leucine incorporation technique) being more sensitive to detect the thermal shock showed than total biomass measurements (PLFA). After 1 month incubation, soil microbial communities tend to recover due to the proliferation of surviving population using as substrate the dead microorganisms (soil sterilization). Thus, time elapsed after the heating was found to be decisive when examining the relationships between the microbial properties and the soil heating parameters (GH, Tmax). Analysis of results also showed that the measurement of the heat supplied to the soil (GH) rather than Tmax is a useful parameter to interpret microbial changes induced by soil heating.

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