



Direct and short-term effects of wildfire on organic matter content and microbial biomass in forest and shrubland soils of nw Spain

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Wildfires have been a common phenomenon in the rural areas of Galicia, NW Spain, during the past few decades and, consequently, their environmental impacts have received considerable attention from the region's scientific community, including soil scientists. Nonetheless, the wildfires' immediate effects on soil organic carbon stocks and the subsequent recovery are still poorly known. Also, the role of microbial activity in this eventual recovery is poorly studied.

We studied the immediate effects of wildfire on soil organic carbon content and microbial biomass at 31 sites that were burnt during the summer of 1999 and 2000. The sites included various forest and shrubland types (especially pine stands) and three geologic substrates (granite, schist and slate). At each study site, samples of burned soils were collected at a depth of 0-5 cm one month after the fire. The same was done at 31 unburned sites with comparable conditions as the neighboring burnt site. To investigate the short-term effects of wildfire we collected soils over a period of 2 years (1, 3, 6, 13 and 25 months after the fire). Organic matter content and microbial biomass were determined using standard laboratory methods.

The immediate wildfire effect on soil organic carbon content was highly variable. In about a quarter of the cases no detectable change was observed, whereas increases and decreases were found with similar incidences (42 and 35 % of the cases, respectively). Also the absolute changes in organic matter content were highly variable. The

decreases, for example, ranged from 17 to 44 %. The immediate effect on microbial biomass, however, was clear-cut. Almost all sites revealed a substantial lower biomass in the recently burnt soil than in the neighboring unburned soil. The corresponding decrease in the $C_{biomass}-C_{org}$ ratio indicates that recently burnt soils contain less, easily-biodegradable organic matter.

Restoration of pre-fire levels of organic matter content and microbial biomass was rapid where the immediate wildfire effects were small. At those sites, however, where the immediate effect had been pronounced, no significant change could be detected over the two-year study period.