



The ash in forest fire affected soils control the soil losses. Part 2. Current and future research challenges

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Ash distribution on soil surface and impacts on soil properties received a great attention in recently (Pereira et al., 2010; Pereira et al., 2013). Ash is a highly mobile material that can be easily transported by wind, especially in severe wildland fires, where organic matter is reduced to dust, due to the high temperatures of combustion. In the immediate period after the fire, ash cover reduces soil erosion as previous researchers observed (Cerdà, 1998a; 1998b) and has strong influence on soil hydrological properties, such as water retention (Stoof et al. 2011) and wettability (Bodí et al., 2011). Ash is also a valuable source of nutrients important for plant recuperation (Pereira et al., 2011; Pereira et al., 2012), but can act also as a source of contamination, since it is also rich in heavy metals (Pereira and Ubeda, 2010). Ash has different physical and chemical properties according to the temperature of combustion, burned species and time of exposition (Pereira et al., 2010). Thus these different properties will have different implications on soil properties including erosion that can increase due to soil sealing (Onda et al. 2008) or decrease as a consequence of raindrop impact reduction (Cerdà and Doerr, 2008). The current knowledge shows that ash has different impacts on soil properties and this depends not only on the type of ash produced, but also on the soil properties (Woods and Balfour, 2010).

After fire wind and water strongly redistribute ash on soil surface, increasing the vulnerability of soil erosion in some areas, and reducing it in others. Understanding this mobility is fundamental to have a better comprehension about the spatial and temporal effects of ash in soil erosion. Having a better knowledge about this mobility is a priority for future research. Other important aspects to be assessed in the future are how ash particles percolate on soil and how ash chemical composition is important to induce soil aggregation and dispersion. How soil microtopography has implications on ash spatial distribution and if soil microtopography changes with time? What factors control it? What is the impact of ash on vegetation recuperation and the implications of this recovery on ash spatial distribution? We need studies with better spatial and temporal resolution, especially in the immediate period after the fire, when the major spatial and temporal changes on ash distribution and impacts occur. Based on high level research conducted by Artemi Cerdà and others, our future research will be focused on these and other aspects in order to have a better knowledge about the impacts of ash on post-fire spatio-temporal erosion.

Acknowledgements,

Lithuanian Research Council. Project LITFIRE, Fire effects on Lithuanian soils and ecosystems (MIP-48/2011) and the research projects GL2008-02879/BTE and LEDDRA 243857.

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