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The impact of plant types on water repellency as a consequence of forest fires.

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Abstract

Forest fire induces changes in plant cover and soil properties. Fire also changes the soil's hydrological properties. Soil infiltration, soil water retention, and runoff discharge are modified by the heat and the organic matter losses. The hydrological response of the soils affected by forest fires is highly determined by the impact of soil water repellency (DeBano, 2000; Doerr et al., 2000). In the Mediterranean climatic conditions water resources are key for ecosystems and soil water repellence determines the wettability of the soils. After the forest fire in Beneixama (15/7/2019). A set of plots were selected to measure the evolution of the soil water repellency. A paired plot approach was designed with burnt and unburnt areas under Pinus halepensis, Quercus coccifera and Quercus ilex. A hundred drops were measured in 10 plots per plant species on control (unburnt) and burnt soils at 0, 1, 2, 5 and 10 cm depth. The Water Drop Penetration Time method was applied (Wessel et al., 1988) in the summer 2019, 2020, 2021, and 2022. The results show that Pinus halepensis induced an increase in water repellency in comparison to other plant species. The impact of fire reduced dramatically the water repellency and this reduction affected all the species involved in this research. We found an increase in soil water repellence on the 2 cm depth layer after the forest fire. During the three postfire years the water repellency was partially recovered in all three plant covers. We discuss the impact of plants species on soil properties and runoff generation and confirm the role of plants on the water and soil characteristics in the Mediterranean (Doerr and Thomas, 2000; Cerdà and Doerr, 2007; Schnabel et al., 2013; Cerdà et al., 2021).

Keywords: Fire, Wildfire, Plants, Soil, Infiltration, Beneixama, Mediterranean.

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