**Hydrological effects of prescribed fire and mulching with fern residues in Mediterranean forest areas**

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**Abstract.**Prescribed fire is a feasible practice to reduce the wildfire risk in the Mediterranean forest areas. However, the changes in soil properties and vegetation removal can lead to negative impacts on the hydrological response. Mulching has been proposed as an effective post-fire management technique to avoid these impacts. Several studies have analyzed the effects of prescribed fires and mulching on soil hydrology, showing that these impacts are of different magnitude and often contrasting. To integrate this knowledge, this study has evaluated the short-term effects of the prescribed fire and post-fire mulching using fern on the hydrology of soil in three forests (pine, chestnut and oak) of Southern Italy. Rainfall simulations have been carried out to estimate the water infiltration, and experimental plots have been installed to measure the surface runoff volume and soil loss under natural precipitations throughout one year. The soil water repellency (SWR) and the main chemical properties of the forest soils have been also determined immediately after the fire and one year after. The study has demonstrated that, under simulated rainfalls, the prescribed fire reduces the infiltration rates compared to the unburned soils. Mulching is not able to contrast this reduction, which, however, disappears some months after the fire. Immediately after the fire, the runoff (+150-375%) and erosion (+100-800%) significantly increase in all forest stands after natural precipitations. The pre-fire runoff and erosion rates restored after five months. Soil mulching with fern was effective to limit these increases (reductions in the runoff coefficients and soil losses by 30 to 80%). The prescribed fire significantly changed the main chemical properties of soils. In particular, SWR was detected in the pine and oak forests. Mulching with fern was unable to limit these changes, which however were generally transient. Overall, the experimental investigation has shown that, in the studied Mediterranean forests, post-fire management actions, such as the soil cover with a cheap mulch material as fern residues, are needed effective to control the short-term increases in surface runoff and soil erosion after prescribed fires.