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Using synthetic polymers to reduce soil erosion after forest fires in Mediterranean soils

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Forest fires are a major environmental problem in the Mediterranean region because they result in a loss of vegetation cover, changes in biodiversity, increases in greenhouse gasses emission and a potential increase of runoff and soil erosion. The large increases in runoff and sediment yields after high severity fires have been attributed to several factors, among them: increase in soil water repellency; soil sealing by detached particles and by ash particles, and the loss of a surface cover. The presence of a surface cover increases infiltration, and decreases runoff and erosion by several mechanisms which include: rainfall interception, plant evapotranspiration, preservation of soil structure by increasing soil organic matter, and increasing surface roughness. The loss of vegetation cover as a result of fire leaves the surface of the soil exposed to the direct impact of the raindrops, and therefore the sensitivity of the soil to runoff generation and soil loss increases.
In this work, we propose a new method to protect soils against post-fire erosion based on the application of synthetic polymers to the soil. Laboratory rainfall simulations and field runoff plots were used to analyze the suitability of the application of synthetic polymers to reduce soil erosion and stabilize soil structure in Mediterranean soils. The combination of these two processes will potentially favor a faster recovery of the vegetation structure. This method has been successfully applied in arable land, however it has not been tested in burnt forests. The outcome of this study may provide important managerial tools for forest management following fires.