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Does polyacrylamide reduce post-fire runoff and inter-rill erosion as effectively as forest residue mulching?

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Forest fires are well-known to increase both overland flow and soil erosion during several years before returning to pre-fire levels. The mitigation of these effects has been less well quantified, especially by forest residue mulching and application of polyacrylamides (PAM). In this study, the effectiveness of both treatments was determined for an eucalypt stand in north-central Portugal during the first year after a wildfire. This was done using twelve micro-plots organized in four triplets located at roughly equal distances from the base to the top of a steep but short slope. After a total rainfall of 1419 mm, the overall overland flow and soil loss figures were markedly and significantly lower for the mulched than untreated plots. The PAM plots, however, did not produce significantly different runoff volumes and sediment losses than the control plots, although they revealed a tendency towards less runoff and, at the same time, greater sediment losses. Also, the key factors explaining runoff and soil erosion were basically the same for the untreated and PAM plots but distinct for the mulched plots. A possible explanation for the poor performance of the PAM was its preferential binding to the ash particles and, at the same time, the selective transport of these ash particles by the overland flow. Of interest was further that the plots on the lower section of the slope tended to produce more runoff and greater soil losses than the plots on the upper part of the slope. Possibly, this was due to differences in fire severity, which, in turn, reflected differences in biomass accumulation and, more specifically, less dry plant growth conditions.