



Effect of polyacrylamide as a post-fire erosion mitigation treatment during consecutive rainstorms

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Anionic polyacrylamide (PAM) has been proven to be an effective chemical soil amendment for reducing erosion in arable lands and infrastructure projects, but few attempts have been made to use it as a post-fire mitigation measure. Moreover, the mechanisms by which PAM reduces soil erosion are not fully understood. In this study, we tested the use of 50 kg/ha granular PAM as a post-fire amendment on infiltration rate (IR), runoff and soil loss both in laboratory and field experiments involving multiple rainstorms. In the laboratory experiments, three consecutive storms separated by drying periods were applied by means of a rainfall simulator to two contrasting soils affected by fire (Humic Cambisol and Calcic Regosol). During the 1st rainstorm, PAM decreased IR and increased runoff in both soils due to an increase in viscosity of the runoff and soil solution. At the same time, a reduction in soil loss was observed in both PAM-treated soils compared to the untreated controls. During the first drying period, PAM was irreversibly adsorbed to soil particles, and in the following storms PAM-induced soil loss reduction persisted while the effect of the polymer on IR and runoff was reversed. Differences in the effect of PAM on soil erosion between soils were attributed to changes in the electrolyte concentration of runoff and soil solution. The positive effect of PAM on post-fire soil loss was confirmed in field experiments with erosion plots constructed in the burnt Calcic Regosol. The application of 25 and 50 kg/ha of granular PAM reduced soil erosion by 23 and 57%, respectively, compared to the untreated control. Runoff was reduced only in the 50 kg/ha treatment. It is suggested that the application of PAM could be a good alternative to current post-fire erosion mitigation measures.