Geophysical Research Abstracts
Vol. 19, EGU2017-15473, 2017
EGU General Assembly 2017

Effectiveness of distinct mulch application rates and schemes under laboratory conditions

Sergio Prats (1), Joao Abrantes (2), Isabela Crema (2), Jacob Keizer (1), and Joao de Lima (2)

(1) University of Aveiro, CESAM - Centre for Environmental and Marine Studies, Environment&Planning, Aveiro, Portugal (jjkeizer@ua.pt), (2) MARE - Marine and Environmental Sciences Centre, Department of Civil Engineering, Faculty of Science and Technology of theUniversity of Coimbra, Rua Luís Reis Santos, Pólo II – Universidade de Coimbra, Portugal

Post-fire forest residue mulching using eucalypt bark strands have been proven effective for reducing hillslope runoff and erosion in field plots of different sizes. Application rates of around 8-10 Mg ha-1 achieved about 80% of protective soil surface. Lower application rates, however, would reduce costs and, possibly, also allow faster application, which could be especially critical in late summer high-severity fires. Such lower rates could be achieved by applying less mulch per unit area, by applying mulch in specific zones (strips) and by removing the finest fractions, especially since these can be expected to contribute little to reduce erosion risk. The objective of this laboratory study was to identify the threshold, or the minimum application rate, at which a new mulch blend (without the fraction $\leq$4 cm) would effectively control runoff and erosion. Two levels of ground cover by forest residue mulch (50 and 70%) and three mulch strips (of 1/3, 2/3 and 3/3) at the bottom of the flume were tested against the untreated bare soil, by applying simulated rainfall and simulated inflow. The seven treatments were replicated three times using a 2.7 m x 0.3 m soil flume with a 40% slope, filled with a dry loamy sand soil. Each experiment included: (i) a “Dry” soil run comprising 20 min of simulated rainfall at a rate of 56 mm h-1; (ii) a “Wet” soil run with the same rainfall characteristics; (iii) a “Flow” run combining 20 min of rainfall with three inflows at increasing rates (52, 110, 232 mm h-1) on nearly saturated soil. The results showed that runoff, interrill and rill erosion were strongly reduced by covering 3/3 and 2/3 of the flume with mulch at 70% ground cover (overall mulch application rates of 2.6 and 1.3 Mg ha-1). The 1/3 mulch strip at 70% mulch cover (application rate of 1 Mg ha-1) also reduced significantly erosion but not runoff. The mulch strips at 50% were less effective, and only the application over the whole plot was able to reduce interrill and rill erosion. Apparently, runoff depended most on mulch cover, while soil losses depended most on strip width. Even so, the new mulch was poorly effective in reducing runoff but effective in reducing interrill erosion and even highly effective in reducing rill erosion.