



The effectiveness of two contrasting mulch application rates to reduce post-fire erosion in a Portuguese eucalypt plantation

Jacob Keizer, Flávio C. Silva, Diana C.S. Vieira, Óscar Gonzalez-Pelayo, Isabel M.A.N. Campos, Alda Vieira, and Sergio A. Prats

Earth Surface Processes Team, Centre for Environmental and Marine Studies (CESAM), Department of Environmental and Planning, University of Aveiro, Portugal

Wildfires are well-known to increase runoff and erosion during the initial stages of the window-of-disturbance, and mulching has been widely documented to effectively minimize this impact. However, the relationship of mulch application rate with erosion reduction is poorly studied, in spite of its potential importance for optimising mulching costs and efforts per ha. Therefore, a field experiment was carried out in a recently burnt eucalypt plantation in Central Portugal that had been burnt by a moderate severity fire during the summer of 2015, comparing mineral soil losses and organic matter losses from 3 untreated 2 m x 8 m erosion plots with losses from 3 plots mulched with eucalypt logging residues at rates of 2.5 and 8.0 Mg ha⁻¹, respectively. The two mulching treatments resulted in the targeted litter covers of 50 and 70 %, and these covers had hardly changed one year later. Throughout this first post-fire year, the mulched plots produced significantly less mineral soil as well as organic matter losses than the untreated plots. At the same time, the plots with the high mulching rate produced consistently less sediment than the plots with the low mulching rate but the differences were not statistically significant over all measurement periods. Over the first post-fire year as a whole, erosion rates were, on average, 86 and 96 % lower following mulching at 2.5 and 8.0 Mg ha⁻¹, dropping from 8.0 Mg ha⁻¹ y⁻¹ to values around and well-below (1/3) of the widely-accepted threshold of tolerable soil loss of 1 Mg ha⁻¹ y⁻¹. If this threshold value is acceptable to land managers, they could treat a three times larger area with the same amount of mulch.