



Runoff and inter-rill erosion at the micro-plot scale following wildfire: comparing simulated and natural rainfall conditions

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Post-fire erosion has been an important issue in recent years due to the increasing number of fires. Monitoring post-fire erosion in this study is part of the EROSFIRE project (POCI/AGR/60354/2004), funded by the Portuguese Foundation for Science and Technology (FCT). Overall, the project will evaluate the suitability of rainfall simulation experiments (RSE's) to assess and model soil erosion hazard in recently burnt forest stands and, more specifically, commercial Bluegum plantations since it is the prevalent forest type in the north-central Portuguese hills and mountains. A total of six study sites were selected to carry out RSE's at various intervals following wildfires. In addition, 24 plots of the same dimensions (0.28 m²) were established to monitor runoff and erosion as well as of 24 of unbounded, slope-scale plots under natural rainfall for a period of 24 months.

The results will focus on the differences obtained for two neighbouring Bluegum stands during the first year following a wildfire in early July 2005. The main difference between the stands is their pre-fire land management, one site having been ploughed in downslope direction and the other lacking evidence of mechanical ground operations. Between September 2005 and July 2006, a total of 32 RSE's were carried out using a portable simulator following the Cerdà et al. (1997) design. This was done in four field campaigns, each campaign involving two pairs of RSE's at each site and each pair of RSE's involving two rainfall intensities, 40-45 and 80-85 mm/hr on two adjacent plots. During the second half of September 2005, both sites were equipped with two pairs of neighbouring micro-plots, which were then monitored at weekly intervals till early October 2006.

The RSE's at both sites produced high runoff coefficients in September 2005 (median values of 60-70 %), which then decreased with time after fire, with higher rates on the ploughed site. The sediment losses produced by the RSE's also tended to decrease with time after fire but the most interesting observation was the contrast between a few high (80-100 g/m²) versus mostly low values (< 20 g/m²). These high losses all occurred during the first two study periods, i.e. in September and November 2005.

Like the RSE's, the erosion plots revealed variable runoff and erosion though time, with some effect of soil water repellency. Overall differences between the two sites were relatively minor, with median runoff coefficients over the entire 12-month period of about 25% and corresponding sediment losses of 50-55 g/m².