

Forest fire effects in soil nutrients mobilization

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During the past three decades wildfires have affected vast areas in Portugal, and it can be expected to have a variety of negative on- and off-site impacts, including enhanced runoff generation and the associated sediment transport. The loss of sediments by fire-enhanced runoff has received much more research attention than the export of nutrients, including in the case of Portugal. Thus, the present study aims to estimate post-fire losses of nutrients by overland flow for the two predominant forest types in north-central Portugal, focusing on potassium, calcium, sodium, magnesium. In order to attain this goal three burnt slopes were selected in a recently burnt area in the municipality of Sever do Vouga, north-central Portugal, which were instrumented with micro-plot and slope-scale plots. The three slopes allow comparing the influence of the forest types (*Eucalyptus globulus* and *Pinus pinaster* plantations) and the geology (granite and schist) on the nutrients losses. For reference, nutrient stocks in the ash and topsoil (0–2 cm) layers were determined and a slope-scale plot installed at a neighbouring, long-unburnt eucalypt plantation on schist. The runoff plots were monitored over a period of six months, i.e. till the construction of

terraces for reforestation obliging to the removal of the plots. During these 6-months period, the runoff volume was measured on a 1- to 2- weekly basis, depending on rainfall. The runoff samples were collected for subsequent analysis using standard laboratory methods (acid digestion and atomic spectroscopy). However, for logistic reasons, laboratory analysis had to be limited to 282 of the 379 samples.

The three burnt slopes revealed small differences in the ash layer and topsoil stocks for four nutrients. The differences in topsoil stocks between the burnt and unburnt eucalypt sites (schist soil) were minor, suggesting a limited fire impact on the upper soil layer. Nutrient concentrations in the overland flow from micro-plots revealed a sharp decrease with time-since-fire. On the other hand, the nutrients concentrations at the slope scale had two behaviours: decreased more gradually or exhibit more complex patterns, with secondary peaks mostly associated with important rainfall and/or runoff events. Temporal patterns tended to be even more complex for nutrient losses and for both spatial scales. Nutrients losses were markedly higher, being more relevant for micro-plot than slope-scale.

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