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Is timing of prescribed fire critical for limiting post-fire erosion? Lessons from Portugal

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The rapid increase in fire activity in parts of the Mediterranean from the 1960s onwards led to a rise in interest in the application of prescribed fire as a method of reducing fuel loads and thereby limiting the likelihood of the occurrence of severe wildfires and the size of the areas affected. The 'windows of opportunity' for carrying out controlled burning are restricted to comparatively brief periods during the autumn through to late spring when wind direction and strength, air temperature and humidity, and fuel load moisture contents are judged to be appropriate. Given that the most erosive rainfall events are often in the autumn to early winter, delaying prescribed fire until later in the winter might be seen as having advantages in reducing post-fire erosional losses of ash, sediment and nutrients, particularly in wetter regions, as on the Atlantic fringe of the Mediterranean. Burning in late winter or spring might be expected to limit the chances of early post-fire heavy and erosive rainfall events. This would allow good vegetation recovery throughout spring and summer before the intense rainfall events likely to occur from the autumn onwards. As part of the EU-funded DESIRE project investigating ways of mitigating the detrimental effects of wildfire on land degradation, a small (9 ha), steep catchment comprising mainly scrub vegetation with encroaching pines in central Portugal was subjected to experimental fire. Although scheduled for autumn-early winter, delay of burning until February 20th 2009 proved necessary because of persistent rainfall and ground conditions too wet for burning. Sediment losses were monitored before and after the burn at the hillslope scale using a series of sediment fences. These comprise geotextile material supported against a frame made of steel bars forming a trap for sediment eroded from upslope. Knowing the contributing areas for eroded material reaching the fences enables erosion rates to be determined. Early results before summer 2009 indicated soil losses generally lower than those collected from similar terrain affected by wildfire. However, rainfall events during the 2009-10 autumn – winter period have been large and have included some intense storms sufficiently erosive to increase erosion rates relative to those recorded in the early post-fire months of spring and early summer 2009. Despite a relatively moist post-fire spring and the rapid appearance of new shoots from resprouting vegetation in particular, the thin degraded nature of the soil has been in large part responsible for the slow establishment of a vegetation cover sufficiently dense to be very effective at protecting the soil. Pre-fire and post-fire erosion and indicative nutrient content of soil collected from the sediment fences are considered and compared with results from the wildfire site and from the literature to assess whether timing of prescribed fire within the window of opportunity matters to any great extent.