

Do agricultural terraces and forest fires recurrence in Mediterranean afforested micro-catchments alter soil quality and soil nutrient content?

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Bioclimatic characteristics and intense human pressure promote Mediterranean ecosystems to be fire-prone. Afforestation processes resulting from the progressive land abandonment during the last decades led to greater biomass availability increasing the risk of large forest fires. Likewise, the abandonment and lack of maintenance in the terraced lands constitute a risk of land degradation in terms of soil quantity and quality. Despite the effects of fire and the abandonment of terraced lands on soil loss and physico-chemical properties are identified, it is not clearly understood how wildfires and abandonment of terraces affect soil quality and nutrients content. Microbiological soil parameters and soil enzymes activities are biomarkers of the soil microbial community's functional ability, which potentially enables them as indicators of change, disturbance or stress within the soil community. The objective of this study was to investigate the effects of terracing (abandoned and non-abandoned) on the soil enzyme activities, microbiological soil parameters and soil nutrients dynamics in three Mediterranean afforested micro-catchments (i.e. < 2 ha) under different forest fire recurrence in the last 20 years; i.e. unburned areas, burned once and burned twice. The combination of the presence of terraces and the recurrence of forest fire, thirty-six plots of 25 m² were sampled along the these three micro-catchments collecting four replicas at the corners of each plot. The results elucidated how non-terraced and unburned plots presented the highest values of soil respiration rate and extracellular soil enzymes. Differences between experimental plots with different forest fire recurrence or comparing terraced and unburned plots with burned plots were weaker in relation to biochemical and microbiological parameters. Soil nutrient content showed an opposite trend with higher values in terraced plots, although differences were weaker. We conclude that terraced landscapes present poorer soil quality parameters due to land abandonment and the lack of terraced management. In addition, forest fire recurrence exacerbates soil degradation processes due to the direct effects on vegetation and soil properties.