



Effect of plant diversity on a set of soil characteristics relevant to soil erosion processes: an example from a biancana badland site (Siena Province, Central Italy)

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A study on the influence of vegetation (grassland) on the evolution of a set of soil characteristics was carried out in a protected area (Site of Community Importance, Natura 2000 Network) where there are some residual areas of biancana badlands. This site, named “Crete di Camposodo e Leonina” is located in the Province of Siena, Tuscany, central Italy. Following geomorphological zonation in the badlands, the areas were firstly classified in a series of different classes where erosion is or was active and where sedimentation is or was active. Secondly, for each “erosion class” as determined before, another classification criterion based on the type of vegetation cover was given. Random plots were then sampled on the basis of these classifications until 22 plots were chosen for analyses. In each plot, vegetation was described in a squared sampling unit (40*40cm), and, after description, it was cut, dried and weighted. A functional matrix, based on plant functional traits, was created and Functional Diversity indices, as well as other classic biodiversity metrics (such as Shannon, Simpson, etc) were obtained. On the same sampling area, 4 randomly selected soil cores (each with a depth of 20cm) were extracted and used for laboratory analysis while undrained soil shear strength at saturation (U_{4S}) was measured using a pocket torvane. Electrical conductivity, pH, and U_{4S} were then compared with several of the vegetation features, including epigeal and ipogean biomass, vegetation cover and biodiversity indices. Our results clearly identify the relationships which attribute to vegetation (as representative of the ecosystem they shelter) the main role in modifying the soil from bare rock to a well developed surface horizon: while vegetation changes soil attributes, the changed soil attributes make the niche suitable to other plants, with a modification of the composition of the grassland. Finally, we also demonstrated that plant functional dissimilarity represents one of the most correlated parameter with observed dissimilarity in soil characteristics between areas, indicating that Functional Diversity represents a finer indicator of ecosystem functioning than species richness.