



Effects of ephemeral gully erosion on soil degradation in a cultivated area in Sicily

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Water erosion is the main cause of soil degradation on cultivated lands under Mediterranean climate. In this conditions, gully erosion is a major contributor to loss of soil productivity due to the big amounts of soil removed from the most productive top-layer. However, only few studies on the effects of gully erosion and artificial controlling measures on soil degradation are available. The study analyzes the effects of the ephemeral gully erosion and infilling by tillage operations on several physical-chemical soil properties influencing the soil productivity. The study area is located in the center of Sicily, in an agricultural context characterized by ephemeral gully erosion. Five fields with different crops and soil characteristics affected by this type of erosion were selected. Currently, local farmers adopt the artificial measure to gully filling activities to control gully erosion and continue the same agricultural management practice. Therefore, the studied ephemeral gullies show a cyclic behavior. They appear during the rainy season, are erased from July to October by soil infill from areas adjacent to the channel using ordinary tillage equipment, and, in most years, they reappear in the same position during the following rainy season. For each situation, 20 samples were taken, located on 5 transects in the direction perpendicular to the ephemeral gully, in specific positions: 2 outside the erosive channel (one in the valley-deposit area and one upstream of the basin in the undisturbed area), and 3 along the same. For each transect, the samples were collected in 4 different positions: one inside the ephemeral gully, the other 3 in external points spaced to represent the areas affected by the annual process of erosion and infilling of the gully. For each sample, a set of the main chemical and physical soil characteristics which influence the soil fertility were determined: particle size, pH, electrical conductivity, total content of carbonates, nitrates, etc. The parameters tested were geo-referenced and spatially interpolated to show the variability along the slopes of the landscape, especially in the undisturbed and deposit areas generated by the ephemeral gully erosion. The results showed that the channelized erosion influences the fertility of the soil even at level of a single cultivated field; therefore, the soil production could be compromised in the long term.