



Influence of soil management on water erosion and hydrological responses in semiarid agrosystems

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In Europe, in the Mediterranean area, water erosion is very severe, moderately to seriously affecting 50% to 70% of the agricultural land. However, it is remarkable the lack of field data of water erosion rates for agricultural areas of semiarid Mediterranean climate. Moreover, this lack of field data is even more severe regarding the hydrological and erosive responses of soils managed with organic farming compared to those with conventional managements or others under conservation agriculture. This paper describes an experimental field station (La Higuera Station) for the continuous monitoring of water erosion that was set up in 1992 in Central Spain (Toledo, Castilla-La Mancha). In the study area, the annual precipitation is around 450 mm with a very irregular inter-annual and seasonal distribution, which includes a strong drought in summer. The geology is characterised by non-consolidated Miocene materials, mostly arcose. The area presents a low relief and gentle slopes, generally less than 15%. At the experimental field, the soil is a Typic Haploxeralf (USDA, 1990). The land-uses are rainfed crops mainly herbaceous crops, vineyard and olive trees. The hydrological response and soil losses by water erosion under natural rainfall conditions are monitored in a total of 28 experimental plots of the USLE type. The plots have a total area of 33.7 m², (22.5 m long downslope and 3 m wide) and presented a slope gradient of 9%. Detailed descriptions of the experimental field facilities and the automatic station for monitoring runoff and sediment productions, as well as of the meteorological station, are presented. The land uses and treatments applied on the experimental plots are for different soil management systems for cereals crops (barley): 1) Organic farming, 2) Minimum tillage of moderate tillage intensity, 3) No-tillage, and 4) Conventional tillage; five alternatives of fallow: 1) Traditional fallow (white fallow) with conventional tillage, 2) Traditional fallow (white fallow) with minimum tillage, 3) Organic fallow (Green fallow), 4) Delayed fallow, and 5) Chemical fallow with a no-tillage management. Additionally, there is an experimental plot presenting a simulation of abandonment and natural re-vegetation. This paper presents the main results, for a data series of 20 years (1993-2013) with special attention to the organic farming management results, regarding to the following research objectives: 1) Monitoring the hydrological and erosive responses of the different management systems; 2) Study of the role of key factors in soil erodibility affected by the management as soil physics and chemistry, surface cover and roughness, and soil and surface initial conditions (soil water content, surface roughness...); and, 3) Characterizing the seasonal variability of the rainfall erosivity.