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The impact of agriculture terraces on soil organic matter, aggregate stability, water repellency and bulk density. A study in abandoned and active farms in the Sierra de Enguera, Eastern Spain.

Artemi Cerdà (1,2), Maria Burguet (1), Saskia Keesstra (2), Massimo Prosdocimi (3,1), Simone Di Prima (4), Erik Brevik (5), Agata Novara (6), Antonio Jordan (7), and Paolo Tarolli (3)

(1) Soil Erosion and Degradation Research Group, Department of Geography, University of Valencia, Valencia, Spain. artemio.cerda@uv.es / maria.burguet@uv.es, (2) Soil Physics and Land Management Group, Wageningen University, Droevendaalsesteeg 4, 6708PB Wageningen, The Netherlands saskia.keesstra@wur.nl , (3) Department of Land, Environment, Agriculture and Forestry, University of Padova, Agripolis, Viale dell'Università 16, 35020 Legnaro (PD), Italy. massimo.prosdocimi@gmail.com / paolo.tarolli@unipd.it , (4) Department of Agricultural and Forest Sciences, University of Palermo, Viale delle Scienze, 90128 Palermo, Italy. simoedg@gmail.com, (5) Department of Natural Sciences, Dickinson State University, Dickinson, ND, USA. eric.brevik@dickinsonstate.edu , (6) Department of Scienze Agrarie e Forestali, University of Palermo, viale delle scienze, Italy. agata.novara@unipa.it, (7) MED_Soil Research Group. Dep. of Crystallography, Mineralogy and Agricultural Chemistry, University of Seville, Spain. ajordan@us.es

Soil erosion, land degradation, lack of organic matter, erodible soils, rock outcrops… are a consequence of the human abuse and misuse of the soil resources. And this is a worldwide environmental issue (Novara et al., 2011; Vanlauwe et al., 2015; Musinguzi et al., 2015; Pereira et al., 2015; Mwagno et al., 2016). Agriculture terraces are a strategy to reduce the soil erosion, improve the soil fertility and allow the ploughing (Cerdà et al., 2010; Li et al., 2014). Although this idea is well accepted there are few scientific evidences that demonstrate that soils in the terraced areas are more stable, fertile and sustainable that the soil in non terraced areas. In fact, the ploughing in comparison to the abandoned or not ploughed land results in the soil degradation (Lieskovský and Kenderessy, 2014; Gao et al., 2015; Parras-Alcántara et al., 2014). This is mainly due to the lack of vegetation that increase the surface runoff (Cerdà et al., 1998; Keesstra et al., 2007). And why is necessary to develop also in terraced landscapes soil erosion control strategies (Mekonnen et al., 2015a; Mekonnen et al., 2015b; Prosdocimi et al., 2016). Our objective was to assess the soil organic matter content (Walkley and Black, 1934), the soil bulk density (ring method), the aggregate stabilility (drop impact) and the water repellency (Water Drop Penetration Time test) in four study sites in the Sierra de Enguera. Two sites were terraced: one abandoned 40 years before the measurements and the other still active with olive crops. And two control sites non-terraced. We used the paired plot strategy to compare the impact of terracing and abandonment. At each site we collected randomly 50 soil samples at 0-2 cm, 4-6 and 8-10 cm depth. At each sampling point 100 WDPT measurements where carried out, and one sample for the bulk density, and one for the organic matter, and one for the soil aggregate stability were collected. The soil surface samples shown the largest differences. The results shows that the abandoned terrace is developing soils with more organic matter (7.34 % in average) than the control plot (5.37 %), with lower soil bulk density (1.01 g/cm3 against 1.05 g/cm3), higher WDPT (54 seconds against 42 seconds) and more stable aggregates (87 against 76 %). On the contrary, the active terrace shown soils with low more organic matter (2.05% in average) than the control plot non-terraced (5.39 %), with higher soil bulk density (1.12 g/cm3 against 1.06 g/cm3), lower WDPT (2.54 seconds against 43 seconds) and unstable aggregates (39 % surviving aggregates against 74 %). This results shown that terraces when abandoned are developing soils rich in organic matter, high aggregate stability, water repellent and low bulk density, but when active, the ploughing results in soils more degraded than the ones developed nearby.

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