



Long-term water repellency in organic olive orchards in the Cànyoles River watershed. The impact of land management

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Soil water repellency is being researched in many environments of the world due to the fact that after two decades of intense investigations we found that soil water repellency is a soil property that can be found at any ecosystem (Atanassava and Doerr, 2011; Goebel et al., 2011; Mataix-Solera et al., 2013; Roper et al., 2013; Young et al., 2013; Badía-Villas et al., 2014; Jordán et al., 2014; Whelan et al., 2014). Soil water repellency inhibits or delays infiltration, encourage surface runoff but also the preferential flow in cracks and other macropores (Arye et al., 2011; Jordán et al., 2011; Madsen et al., 2011; Spohn and Rilling, 2012; García-Moreno et al., 2013; Hallin et al., 2013). Water repellency has been found in many soil types and it is present after forest fire, on forested land and also in agriculture soils (Granjed et al., 2013; Bodí et al., 2012; García Orenes et al., 2013; Jordán et al., 2012; Bodí et al., 2013; Dlapa et al., 2013; González-Peñaloza et al., 2012; López Garrido et al., 2012; León et al., 2013; Hewelke et al., 2014; Santos et al., 2014; Kröpfl et al., 2013).

This paper shows the measurements carried out by means of the water drop penetration time (WDPT) method in olive plantation in the Cànyoles watershed in Eastern Spain. Conservation practices applied such as no-tillage, manure addition, application of herbicides may contribute to increase soil organic matter and, hence, soil water repellency, and this is unknown under Mediterranean type ecosystems. The effect of long-term addition of plant residues and organic manure, no-tillage and no chemical fertilization (MNT), annual addition of plant residues and no-tillage (NT), application of conventional herbicides and no-tillage (H), and conventional tillage (CT) on soil water repellency in Mediterranean calcareous citrus-cropped soils (Eastern Spain) has been studied. Water repellency was observed in MNT soils, which may be attributed to the input of hydrophobic organic compounds as a consequence of the addition of plant residues and organic manure such has been demonstrated by the soil organic matter measurements. CT reduced the organic matter content and soils remained wettable. Water repellency was observed in soils under NT and H treatments, but it was below 5 seconds. Previous studies developed by González Peñaloza et al., (2013) show that under citrus production the response of the land management was similar. We found also an increase in the soil water repellency due to the time since organic matter is accumulating. This results should be shown in the framework of the land degradation that can trigger (or not) the increase in water repellency (Mekuria and Aynekulu, 2013; Nadal Romero et al., 2013; Neal et al., 2013; Taguas et al., 2013; Zhao et al., 2013).

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