



Rock fragment cover controls the sediment detachment in citrus plantations

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Citrus orchards are seen as a source of sediments and water due to the lack of vegetation cover, the widespread use of herbicides, the compaction due to the use of heavy machinery, the lack of organic amendments and the removal of the pruned branches (Cerdà and Jurgensen, 2008; Cerdà et al., 2009; Cerdà and Jurgensen, 2011; Li et al., 2011). This is not unusual in agriculture, where high soil erosion losses are found in the orchards (Dai et al., 2015; Erkossa et al., 2015; Ochoa-Cueva et al., 2015). Therefore, there is a need to reduce the sediment delivery, and to achieve a sustainable situation with lower and renewable soil erosion rates (Cerdà et al., 2015; Nanko et al., 2015; Mwangi et al., 2016).

Vegetation cover is the most efficient strategy to control soil and water losses at different scales (Cerdà, 1999; Keesstra, 2007; Zhao et al., 2014), but farmers in the Mediterranean Regions prefer bare soils as this reduces the amount of water used by the plants, and also because of aesthetic concerns, as bare soils are perceived as tidy and therefore seen by farmers as the way their orchards should look. So therefore, there is a need to find an efficient strategy that reduces soil losses and will be accepted by the farmers also. One potential option for this may be to use rock fragments (stones) as a mulch to reduce the soil losses. Other researchers already found rock fragments to be an effective tool to reduce erosion (Poesen et al., 1994; Poesen and Lavee, 1994; Cerdà, 2001; Jomaa et al., 2012; Martínez Zavala and Jordán, 2008; Jordán and Martínez Zavala, 2008; Jordán et al., 2009; Zavala et al., 2010). Furthermore, rock fragments can improve soil quality and contribute to the restoration of ecosystems (Jiménez et al., 2015). However, most previous research on soil erosion and rock fragment cover was done under laboratory conditions or in forest soils. Meanwhile, little is known about the role of rock fragments in agriculture land under field conditions.

The objective of this research is to determine the impact of the rock fragment cover on soil and water losses in citrus plantations. Within the Corral Roig Soil Erosion Research Station, located in the Municipality of Montesa, 82 plots were selected with different rock fragment cover. In each circular plot of 0.25 m², a rainfall simulation experiment was carried out at 55 mm h⁻¹ of rainfall intensity during 1 hour under dry conditions in the Summer of 2013 under very dry conditions. It was found that the soil erosion rates are related to percentage of bare soil, and negatively correlated to the rock fragment covers. A cover of 30 % of rock fragments reduces the loss of soil with 81%.

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