

The use of chipped pruned branches to control the soil and water losses in citrus plantations in Eastern Spain

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Soil erosion is the main cause of soil degradation in agriculture land, which is a world-wide problem (Cerdà et al., 2009; Novara et al., 2011; Biwas et al., 2015, Colazo and Buschiazzo, 2015; Ligonja and Shrestha, 2015). High erosion rates result in the loss of soil and also changes the hydrological, erosional, biological, and geochemical cycles (Keesstra et al., 2012; Berendse et al., 2015; Decock et al., 2015; Brevik et al., 2015; Smith et al., 2015). Thus, there is a need to reduce the soil losses to achieve soil sustainability. However, although some findings show that straw, geotextiles, vegetation cover and tillage reduction are efficient strategies (Gimenez Morera et al., 2010; Cerdà et al., 2015; Lieskovský and Kenderessy, 2014; Taguas et al., 2015) there is still a need to find easy strategies for farmers to adopt in their fields that will protect, and also recover, their soils. Chipped branches are usually burned in many orchards to remove them from the fields. However, when they would be chipped and spread on the fields, they can be a source of organic matter, and in addition this might reduce soil losses and improve the water retention capacity of the soils (Mukherjee et al., 2014; Yazdanpanah et al., 2016).

The hypothesis is that the chipped branches reduce soil loss. To test this hypothesis we selected 3 study sites in which chipped branches were applied, and paired sites with bare soil to check the changes introduced by the chipped branches on the soils. We selected 3 sites of the Canyoles river watershed (Montesa municipality), SW Spain, with 10 plots in each site. At each site, 10 rainfall simulation experiments were carried out. Paired plots were selected in the nearby (less than 10 m in distance) orchard where the pruned branches were removed. Then, 60 rainfall simulation experiments at 55 mm h⁻¹ of rainfall intensity during 1 hour were carried out in small 0.25 m² plots to determine the soil particle detachment. The results show that in all three sites the soil erosion is reduced in one order of magnitude in average as a consequence of the cover of the chipped pruned branches (78.45 % in average cover) in comparison to the bare (control) soils.

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