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The use of straw mulch as a strategy to prevent extreme soil erosion rates in citrus orchard. A Rainfall simulation approach

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Not only the Sahel (Haregeweyn et al., 2013), the deforested land (Borelli et al., 2013) the chinese Plateau are affected by intense soil erosion rates (Zhao et al., 2013). Soil erosion affect agriculture land (Cerdà et al., 2009), and citrus orchards are being seeing as one of the crops with the highest erosion rates due to the managements that avoid the catch crops, weeds or litter. Example of the research carried out on citrus orchards is found in the Mediterranean (Cerdà and Jurgensen, 2008; 2009; Cerdà et al., 2009a; 2009b; Cerdà et al., 2011; 2012) and in China (Wu et al., 1997; Xu et al., 2010; Wang et al., 2011; Wu et al., 2011; Liu et al., 2011; Lü et al., 2011; Xu et al., 2012), and they confirm the non sustainable soil losses measured. The land management in citrus plantations results in soil degradation too (Lu et al., 1997; Lü et al., 2012; Xu et al., 2012). The use of cover crops to reduce the soil losses (Lavigne et al., 2012; Le Bellec et al., 2012) and the use of residues such as dried citrus peel has been found successful. There is a need to find new plants or residues to protect the soils on citrus orchards.
Agriculture produces a high amount of residues. The pruning can contribute with a valuable source of nutrients and a good soil protection. The leaves of the trees, and some parts of the plants, once harvest can contribute to reduce the soil losses. Due to the mechanization of the agriculture, and the reduction of the draft animals (mainly horses, mules, donkeys and oxen) the straw is being a residue instead of a resource. The Valencia region is the largest producer of citrus in Europe, and the largest exporter in the world. This citrus production region is located in the eastern cost of Spain where we can find the rice production area of the l'Albufera Lagoon paddy fields, the third largest production region in Spain. This means, a rice production region surrounded by the huge citrus production region. There, the rice straw is not used in the paddy fields after harvesting and the straw is being as a residue that damages the air quality when burnt, the water quality due to the decomposition and the methane production, and is not accepted in the field by the farmers. This is a new problem as few years ago the rice straw was use for animal feeding. Many attempts were developed in the last decade to remove and use the straw to avoid fires and water pollution (Iranzo et al., 2004; Silvestre et al., 2013).
Our goal is to test if a residue such as the rice straw can be transformed as a resource: soil erosion control. Straw has been seen as a very efficient to reduce the water losses in agriculture land (García Moreno et al., 2013), the soil losses in fire affected land (Robichaud et al., 2013a; 2013b; Fernandez and Vega, 2014), and soil properties (García Orenes et al., 2009; 2010; Jordán et al., 2010; García Orenes 2012).
Rainfall simulations under 55 mm h-1 rainfall intensity during one hour on 0,25 m2 plots were carried out on plots paired plots: bare and covered with straw. The plots covered with straw had different straw mulch cover: from 10 to 100 % cover and from 0,005 g m2 to 300 g m2. The results show a positive effect of the straw cover that show an exponential relation between the straw cover and weight with the sediment yield.

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