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Soil Erosion in Agriculture Land in Spain: a Review

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Abstract

The pioneering work of Lasanta and Sobrón (1984) on traditional plowing practices in the vineyards of La Rioja showed soil erosion rates < 1 Mg ha-1 year-1. López Bermúdez (2002) reported ploughed fields averaged 1.84 Mg ha-1 year-1 of soil loss in Murcia, but values were lower when cereal crops were planted (barley - 1.04 Mg ha-1 year-1), and very low on scrubland (0.05 Mg ha-1 year-1). This demonstrates that vegetation cover is the key factor that controls soil loss and explains the soil loss reductions found by Francis (1990) and Ruiz Flaño et al., (1992) in the north and south-eastern Spain after land abandonment. In Andalucía, Cuadros et al., (1993) measured soil losses of 10.9 Mg ha-1 yr-1 in citrus orchards using traditional ploughing methods, while soil loss was reduced to 2.9 Mg ha-1 yr-1 under non-tillage conditions. De Alba (1998) found soil losses of 2.4 Mg ha-1 year-1 when cereal fields in the Castilla-La Mancha region are fallow, 0.48 Mg ha-1 year-1 when a crop is present, 0.67 Mg ha-1 yr-1 when no-tillage is applied, and only 0.17 Mg ha-1 year-1 on abandoned land. Bienes and Torcal (1997) found similar results in Central Spain. The available data confirm that agricultural lands contribute to soil exhaustion (Lasanta et al., 2001). In addition, soil erosion rates on agricultural land in Mediterranean environments depend on the type of crop that is grown. Giráldez et al., (1989) used the Universal Soil Loss Equation to show that no-tillage practices reduced the soil losses in all crops they studied (sunflower, wheat, sugar beet, beans) except in olive orchards. However, no-tillage practices aimed to reduce soil losses are not always the most sustainable land management system. Francia et al., (2000) found that no-tillage increased the soil erosion rates (5.2 Mg ha-1 year-1), as compared to traditional tillage (1.3 Mg ha-1 year-1), and areas with vegetation cover (0.41 Mg ha-1 year-1). Martínez-Raya et al., (2001) also found a no-tillage strategy for an Andalucía olive orchard

increased the soil losses to 28.03 Mg ha-1 year-1, as compared to traditional plowing of 9.08 Mg ha-1 year-1, and 1.56 Mg ha-1 year-1 in soil with vegetation cover. Soil losses are usually low or negligible where vegetation cover is present or surface mulches are used (Bienes et al., 2000). The latest research findings on soil erosion for agricultural land in Spain show that non-sustainable soil losses are widespread (Gómez et al., 2004; Arnáez et al., 2006; De Santisteban et al., 2006) and more research is necessary on control of soil erosion by water and tillage. The non-sustainable soil erosion rates in Spain found by the pioneers mentioned here were confirmed along the last decades by many other researchers such as Sastre et al. (2017); Rodrigo-Comino et al. (2018); Merchán et al. (2019); Rodríguez Sousa et al. (2019) and Zuazo et al. (2020).
The review of the literature show that soil erosion in agriculture land is high in comparison to forest land, included the fire affected areas. This show the need to research new strategies to control the non-sustainable soil erosion rates.

Keywords: Soil, Erosion, Spain, Sustainability, Agriculture

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