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Management-induced soil water erosion and nutrient losses in different land use in Mediterranean environment

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Soil erosion by water is one of the most important degradation processes. Land use has important effects on soil properties, therefore it is key to identify the type of management that have more impacts and find solutions to mitigate it. In order to understand the effects of land use management on soil and soil erosion in the Istria region (Croatia), we studied the impacts of different agriculture practices (vineyard, cropland, and olive orchard) on soil properties and runoff. The simulated rainfall was carried out at 58 mm h^{-1} in the summer of 2018 (30% soil water content) for 30 min on 0.785 m^2 circular plots. The results showed that bulk density was significantly higher in cropland plots than in the vineyard and olive orchard. Soil organic matter, mean weight diameter, and aggregate stability were significantly higher in olive orchard plots than in the vineyard and cropland. Runoff and sediment losses were higher in olive orchard compared to vineyard plots. Carbon, nitrogen, and phosphorus losses were highest in olive orchard plots with 3.9 kg ha^{-1} , 405.2 g ha^{-1} and 73.6 g ha^{-1} , respectively, while lower values were measured in the vineyard plots, where nutrients losses were lower with 0.9 kg ha^{-1} , 73.8 g ha^{-1} and 6.5 g ha^{-1} , respectively. No runoff was observed in cropland plots. Even with the highest measured values of runoff and erosion in the herbicide treated olive orchard, results indicate that both herbicide application and tillage represent a threat to the sustainability of Istrian soils. Vegetation cover on cropland reduces the runoff generation indicating the need for adoption of conservation strategies. In current management, vegetation removal should be avoided since it contributes to practice to reduce nutrient losses and increase the sustainability of the soils.

Keywords: Soil water erosion, Soil tillage, Rainfall simulation, Agriculture land management, Mediterranean

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