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Study on soil erodibility using portable rainfall simulator: Comparison of the USLE estimates with the field measurements

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Soil erodibility (K) is defined as the susceptibility of particles against detachment and transport processes by rainfall and runoff erosive agents. In the Universal Soil Loss Equation (USLE), the K factor can be estimated based on the nomograph of Wischmeier. In the arid and semiarid regions, some parameters such as surface gravel, lime, gypsum, salinity and sodicity, affect on soil erodibility, which have not considered in the nomograph, directly. This study investigates the erodibility of some rangeland soils by direct measuring and predicting procedure, as well. Constant rain intensities of 35 mm/h with 40 min duration were simulated on 27 plots in the field conditions and runoff samples were collected. In addition, based on the nomograph and using soil properties, erodibility factor was estimated. The results showed that measured sediment yield varied between 23.5 to 97.6 g m-2. In comparison, K values were estimated in range of 0.20 to 0.44, which had no consistency with the measured values. Rain erosivity, soil properties, predominant erosion processes and scale effect are some reasons of this inconsistency. The results reveal the necessity of more studies on soil erodibility, especially in arid and semiarid conditions.

Keywords: Rainfall simulation, Erodibility, USLE, Soil properties.