Geophysical Research Abstracts, Vol. 9, 04960, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04960

Evaluation of soil erodibility using rainfall simulation in comparison to the USLE estimation

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The susceptibility of a soil to erosion is defined as its erodibility. Due to different methodologies in application of rainfall, soil condition and preparation, and plot scale, researchers achieve to a variant range values of this factor. In this study erodibility of some arid region soils was investigated using rainfall simulation compared to Wischmeier nomograph estimation. A portable rainfall simulator was applied on 27 small scale plots (1 m2) in nine experimental sites. A rain intensity of 35 mm hr–1 for 40 minutes was run and runoff samples were collected at the end of each experiment. Also, soil erodibility factor (K) was calculated using Wischmeier nomograph. The rainfall simulator results showed that total sheet erosion and runoff coefficient varied from 23.5 to 97.6 g m-2 and 14.2% to 48.1%, respectively. Clay content increased erosion and sediment concentration, while increasing sand fraction, runoff and erosion rate decreased. Surface gravel increased sediment yield and runoff, but increasing embedded gravel, runoff rate declined. Estimations of Wischmeier nomograph indicated that K factor was between 0.20 and 0.44 which silt fraction was the most susceptible part of particle size distribution to water erosion and also surface gravel decreased K predictions, significantly. It was concluded due to different processes dominated in rill and interrill erosion, predicted K values contradicted with the results of rainfall simulator. However, particle size distribution is the main factor which controls sediment yield and runoff generation under interrill erosion processes in this arid region soils.