Geophysical Research Abstracts
Vol. 18, EGU2016-347-5, 2016
EGU General Assembly 2016

Soil erosion-runoff relationships: insights from laboratory studies

Amrakh Mamedov (1), David Warrington (2), and Guy Levy (3)

(1) Institute of Soil Science and Agrochemistry, ANAS, Baku, Azerbaijan (amrakh03@yahoo.com), (2) State Key Laboratory of Soil Erosion and Dryland Farming on the Loess Plateau, Institute of Soil and Water Conservation, Northwest A and F University, Yangling, Shaanxi, P. R. China (david_warrington@hotmail.com), (3) Institute of Soil, Water and Environmental Sciences, ARO, The Volcani Center, Bet Dagan, Israel (vwguy@volcani.agri.gov.il)

Understanding the processes and mechanisms affecting runoff generation and subsequent soil erosion in semi-arid regions is essential for the development of improved soil and water conservation management practices. Using a drip type laboratory rain simulator, we studied runoff and soil erosion, and the relationships between them, in 60 semi-arid region soils varying in their intrinsic properties (e.g., texture, organic matter) under differing extrinsic conditions (e.g., rain properties, and conditions prevailing in the field soil). Both runoff and soil erosion were significantly affected by the intrinsic soil and rain properties, and soil conditions within agricultural fields or watersheds. The relationship between soil erosion and runoff was stronger when the rain kinetic energy was higher rather than lower, and could be expressed either as a linear or exponential function. Linear functions applied to certain limited cases associated with conditions that enhanced soil structure stability, (e.g., slow wetting, amending with soil stabilizers, minimum tillage in clay soils, and short duration exposure to rain). Exponential functions applied to most of the cases under conditions that tended to harm soil stability (e.g., fast wetting of soils, a wide range of antecedent soil water contents and rain kinetic energies, conventional tillage, following biosolid applications, irrigation with water of poor quality, consecutive rain simulations). The established relationships between runoff and soil erosion contributed to a better understanding of the mechanisms governing overland flow and soil loss, and could assist in (i) further development of soil erosion models and research techniques, and (ii) the design of more suitable management practices for soil and water conservation.