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Splash erosion under simulated rainfall affected by different initial soil water content and surface conditions

Nives Balenovic (1), Lisbeth Lolk Johannsen (1), Peter Strauss (2), Tomas Dostal (3), David Zumr (3), Thomas Cochrane (4), and Andreas Klik (1)

(1) Universität für Bodenkultur Wien, Department of Water, Atmosphere & Environment, Vienna, Austria (nives.balenovic@boku.ac.at), (2) Institute of Land and Water Management Research, Petzenkirchen, Austria, (3) Czech Technical University, Faculty of Civil Engineering, Prague, Czech Republic, (4) University of Canterbury, Department of Civil and Natural Resources Engineering, Christchurch, New Zealand

Splash erosion plays an important role in soil erosion processes; therefore a detailed knowledge about the factors influencing splash erosion is required. Apart from rainfall properties (intensity, kinetic energy and drop size distribution), physical characteristics of soil (moisture, organic matter content, infiltration capacity, texture, etc.) are crucial in understanding the soil splash erosion process. Main focus of this study was to investigate the impact of initial soil water content on soil detachment, as well as surface conditions formed after consecutive rainfall. Three different soil textures ranging from silt to sandy loam soils were used in this experiment.
The soils were collected at seedbed condition, air dried and sieved through 1 cm sieve. Soil detachment was measured with two replications with modified Morgan splash cups of 10 cm diameter. Splash cups were filled with soil and exposed to simulated rainfall for 30 min with rainfall intensities ranging from 30 to 65 mm/h. The soil samples were rained on twice. First simulation was with air-dry soil samples and the second simulation was performed on a wet (after 24 h of air-drying) or a dry and crusted surface (72 or > 72 hours of air-drying).
Preliminary results show that splash detachment was higher for the first simulation with initial air-dried soil samples. The second simulation on the same soil samples after a period of drying had lower splash rates. The main reason for this is due to soil surface crust formation. The crust formation decreased water infiltration, consequently water started to accumulate on soil surface preventing it from rain drop impact. This was especially recognized after the first 10 minutes of rainfall simulation with soil samples dried for more than 72 h. After this experiment the soil surface was more crusted compared to soil samples with shorter drying periods and higher water contents. Temporal changes in soil water content and changes in soil surface conditions are important parameters for describing splash erosion. Further experiments will be made, in order to achieve a better understanding of how soil initial properties influence splash erosion and how the soil surface structure changes by rain drop impact. This will finally enable researchers to describe possible uncertainties in field and laboratory experiments.