

## Publication

## The role of wind-driven rain for soil erosion – an experimental approach

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Recent research has shown that wind can have a significant influence on velocity, impact angle and kinetic energy of raindrops, and subsequently increases soil erosion. The aims of this study were to 1) quantify the influence of wind on water erosion, 2) specifically observe the difference in processes between windless rain (WLR) and wind-driven rain (WDR) simulations and 3) test the device's and test sequence's practicability. The Portable Wind and Rainfall Simulator (PWRS), recently developed at Trier University for plot-scale in situ assessment of differences in soil erosion with and without the influence of wind on raindrops, was used. To facilitate extraction of the influences of WDR on soil erosion, to avoid systematic errors, and to reduce variability between test plots, a defined order of four consecutive test runs was established: 0) wind simulation, 1) WLR simulation on dry soil, 2) WLR simulation on moist soil, 3) WDR simulation. The tests were conducted on homogenous sandy substrate deposited on an area of 15.2 m x 60 m with uniform and smooth surface and low inclination (1 degrees) in the Willem Genet Tunnel of Wageningen University. The results show an increase of eroded sediment ranging from 113% up to 1108% for WDR simulations in comparison to WLR simulations. The increase in runoff was considerably lower (15% to 71%), resulting in an increase of sediment concentration between 56% and 894%. The results indicate an immense impact of WDR on soil erosion of sandy cohesionless substrate. The experimental setting and measurement proved reliable and reproducible and enables a clear process observation and quantification in the field.

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