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Wind and water erosion on abandoned land in High Andalusia - First results of a portable combined wind and rainfall simulator

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On abandoned land in semi-arid environments wind and water erosion are the main driving factors causing soil degradation. Recent research has proven the existence of very complex interactions between both processes. For in situ assessment of these interactions on soil erosion rates a portable combined wind and rainfall simulator was constructed and used in a field study in Andalusia. The main objective is to get first results for comparison of erosion rates with and without the influence of wind on plot scale on abandoned land in a semi-arid environment.

The simulator is 4 m long, 0.7 m high, 0.7 m wide and rectangular in shape. A bounded plot of 2.2 m^2 can be irrigated by four downward spraying pressure nozzles (Lechler 460.608) in the roof of the tunnel producing a rainfall intensity of about 90 mm h-1. Approximate wind speed is 8 m s-1 free stream. For sediment collection a gutter system has been combined with two wedge-shaped sediment traps and a beam with four Modified Wilson & Cook Samplers. Runoff was collected with 0.5 l plastic bottles. Test duration is 30 min with measurement intervals of 2.5 min for surface runoff. The test runs were carried out with three variations in the following order on each plot: (1) single wind test run, (2) single rainfall test run and (3) simultaneous wind and rainfall test run.

Runoff results show no distinctive differences between test runs without (2) and in combination with wind (3). The sediment loss seems to be higher with wind (3). This might indicate the influence of wind on the kinetic energy and impact angle of raindrops and consequently on the detachment and provision of soil particles. It could be argued that in addition to conventional rainfall simulations the inclusion of wind could assist a better understanding of soil erosion processes in the future.