Geophysical Research Abstracts
Vol. 17, EGU2015-10579-3, 2015
EGU General Assembly 2015


# Comparison of different types of medium scale field rainfall simulators

Tomáš Dostál (1), Peter Strauss (2), Marcus Schindewolf (3), Petr Kavka (1), Jürgen Schmidt (3), Miroslav Bauer (1), Martin Neumann (1), Andreas Kaiser (3), and Thomas Iserloh (4)

(1) Czech Technical University in Prague, Faculty of Civil Engineering, Irrigation, Drainage and Landscape Engineering, Prague 6, Czech Republic (miroslav.bauer@fsv.cvut.cz), (2) BAW Petzenkirchen, Austria, (3) TU Bergakademie Freiberg, Germany, (4) Trier University, Physical Geography, Trier, Germany

Rainfall simulators are used in numerous experiments to study runoff and soil erosion characteristics. However, they usually differ in their construction details, rainfall generation, plot size and other technical parameters. As field experiments using medium to large scale rainfall simulators (plot length 3 - 8 m) are very much time and labor consuming, close cooperation of individual teams and comparability of results is highly desirable to enlarge the database of results.

Two experimental campaigns were organized to compare three field rainfall simulators of similar scale (plot size), but with different technical parameters. The results were then compared, to identify parameters that are crucial for soil loss and surface runoff formation and test if results from individual devices can be reliably compared. The rainfall simulators compared were: field rainfall simulator of CTU Prague (the Czech Republic) (Kavka et al., 2012; EGU2015-11025), field simulator of BAW (Austria) (Strauss et al., 2002) and field simulator of TU Bergakademie Freiberg (Germany) (Schindewolf & Schmidt 2012).

The device of CTU Prague is usually applied to a plot size of 9,5 x 2 m employing 4 nozzles SS Full Jet 40WSQ mounted on folding arm, working pressure is 0.8 bar, height of nozzles is 2.65 m. The intensity of rainfall is regulated electronically, which leaves the nozzle opened only for certain time. The rainfall simulator of BAW is constructed as a modular system, which is usually applied for a length of 5 m (area 2 x 5 m), using 6 nozzles SS Full Jet 40WSQ. Usual working pressure is 0.25 bar. Elevation of nozzles is 2.6 m. The intensity of rainfall is regulated electronically, which leaves the nozzle opened only for certain time. The device of TU Bergakademie Freiberg is also standard modular system, working usually with a plot size of 3 x 1 m, using 3 oscillating VeeJet 80/100 nozzles with an usual operating pressure of 0.5 bar. Intensity is regulated by the frequency of sweeps above the experimental plot. Comparison was done during two independent campaigns, where always two devices were present. Rainfall intensity for the experiments varied between 40 to 60 mm/h. Mutual comparison was carried out between the CTU Prague and TU Freiberg RSs at plot size of 3 x 1 m and Between CTU Prague and BAW RSs at plot size of 5 x 2 m.

In general, the experiments revealed a significant effect of potential heterogeneities at the experimental plots and an effect of raindrop energy on both surface runoff formation and mainly soil loss. Therefore, coordination of methodology of the experiments and careful control of initial conditions seem to be a crucial point for comparability of results from individual devices. Detailed results will be presented on the poster.

The research has been supported by the research grants SGS14/180/OHK1/3T/11, QJ1230056 and 7AMB14AT020.

References

Kavka, P., Davidová, T., Janotová, B., Bauer, M. a Dostál, T. 2012. Mobilní dešťový simulátor.(in Czech), Stavební obzor. 8, 2012.

Schindewolf, M. & J. Schmidt (2012): Parameterization of the EROSION 2D/3D soil erosion model using a small-scale rainfall simulator and upstream runoff simulation, Catena 91, pp. 47-55, DOI: 10.1016/j.catena.2011.01.007

Strauss P., J.Pitty, M.Pfeffer, A. Mentler (2000): Rainfall Simulation for Outdoor Experiments. In: P. Jamet, J. Cornejo(eds.): Current research methods to assess the environmental fate of pesticides. pp. 329-333, INRA Editions.