



## **Rainfall simulation experiments – drop size, drop size distribution and distribution pattern of a small mobile nozzle-type simulator**

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Rainfall simulation is a wide spread method for soil erosion studies, especially on agricultural land and grazing land in semi arid and arid landscapes. Small mobile rainfall nozzle type simulator with a motor-driven pump, a single nozzle, are often used from various study groups in Germany, Spain, Morocco and other countries. Our simulator produces a rainfall intensity of ca.  $40 \text{ mmh}^{-1}$  on a plot of  $0.3 \text{ m}^2$ . The results are needed to quantify soil and water losses under different crops, tillage systems and treatments. In contrary to the high number of experiments just small investigations were published about the methodical problems of this measurement, especially the structure of the artificial rainfall. To elaborate the drop size and drop size distribution we used four methods: 1. indication paper (water sensitive paper), 2. plaster micro plot, 3. Joss-Waldvogel Disdrometer, 4. Thies Laser Disdrometer. The drop distribution pattern on the plot is measured with 100 rainfall collectors.

Although the procedures and techniques are very variably, all methods for drop size and drop size distribution generate similar results: the drop diameter varies between  $>0.5$  to  $4 \text{ mm}$ , which represents a quite natural drop spectrum of rain storms. The results of indication paper and plaster micro plots are on the same level and Joss-Waldvogel Disdrometer and Thies Laser Disdrometer show corresponding data. But the plaster micro plot method and Joss-Waldvogel Disdrometer method represent small drops inadequately. The indication paper method seems very suitably because of easy handling and low costs.

The drop distribution shows a maximum on the small categories. However large drops which are relevant for splash effect are too seldom. This leads to the conclusion that

the calculated erosion rate of such experiments could be underestimated.

The drop distribution pattern on the plot shows a inhomogeneity between 15 to 102 ml during a test period of 30 minutes simulated rainfall. This might create problems to the erosion processes on the plot.