



## **The issue of precision in the measurement of soil splash by a single drop using a high speed camera**

Magdalena Ryzak, Andrzej Bieganski, Cezary Polakowski, and Agata Sochan  
Institute of Agrophysics PAS, Lublin, Poland (m.ryzak@ipan.lublin.pl)

Soil, being the top layer of the Earth's crust and a component of many ecosystems, undergoes continuous degradation. One of the forms of this degradation is water erosion.

Erosion is a physical degradation process affecting the soil surface. This process affects not only the environment, but also the productivity and profitability of agriculture. Therefore, understanding the mechanisms of erosion and preventing it is important for agriculture and economy. Erosion has been the subject of many studies among various research teams around the world.

The splash is the first stage of water erosion. The splash erosion can be characterised as two subprocesses: detachment of a particle from the soil surface and the transport of the particle in different directions.

The aim of this study was to evaluate the reproducibility of the soil splash phenomenon that occurs as a result of the fall of a single drop. Using high-speed cameras, we measured the reproducibility of recorded splash parameters; these included the number and surface of detached particles and the width of the crown formed as a result of the splash.

Measurements were carried out on soil samples with different textures taken from the topsoil of two soil profiles in south eastern Poland. After collection, these samples were dried at room temperature, sieved through a 2 mm sieve, and then humidified to three different humidity conditions.

Drops of water with a diameter of 4.2 mm freely fell from a height of 1.5 m. Measurements were recorded using a high-speed camera (Vision Research MIRO M310) and the data were recording at 2000 frames per second. The number and surface of detached particles and the resulting width of the crown during the splash were analysed.

The measurements demonstrated that:

- Soil splash caused by the first drop striking the surface was significantly different from the splash caused by the impact of subsequent drops. This difference was due to the fact that less moisture was present at the time of the incidence of the first drop. With each subsequent drop, the humidity of the rising incidence dropped, up to saturation. After reaching saturation of the soil surface, a micro-pool formed, while a crown formed during the splash.
- In the case of loamy silt soil, the reproducibility of the width of the crown resulting from the splash was much lower than that of the crown formed in the case of a sandy loam soil.
- The higher the water film on the surface the lower the width of the crown was.