

## **Transport mechanisms of Silver Nanoparticles by runoff – A Flume Experiment**

Karrar NM Mahdi Mahdi (1,3), Meindert Commelin (1), Ruud J.B. Peters (2), Jantiene E.M Baartman (1), Coen Ritsema (1), and Violette Geissen (1)

(1) Wageningen University and Research, Wageningen, Netherlands (karrar.mahdi@wur.nl), (2) RIKILT Wageningen university and research, Wageningen UR, the Netherlands, (3) College of Engineering, University of Baghdad, Baghdad, Iraq

Silver Nanoparticles (AgNPs) are being used in many products as it has unique antimicrobial-biocidal properties. Through leaching, these particles will reach the soil environment which may affect soil organisms and disrupt plants. This work aims to study the potential transport of AgNPs with water and sediment over the soil surface due to soil erosion by water. This was done in a laboratory setting, using a rainfall simulator and flume. Low AgNPs concentration ( $50 \mu\text{g}\cdot\text{kg}^{-1}$ ) was applied to two soil-flumes with slopes of 20% and 10%. The rainfall was applied in four events of 15 min each with the total amount of rainfall was 15mm in each event. After applying the rainfall, different samples were collected; soil clusters, background (BS) and surface sediments (Sf), from the flume surface, and, Runoff sediments (RS) and water (RW) was collected from the outlet. The results showed that AgNPs were detected in all samples collected, however, AgNPs concentration varied according samples type (soil or water), time of collection (for runoff water and sediment) and the slope of the soil flume. Further, the higher AgNPs concentrations were detected in the background soil (BS); as the BS samples have more finer parts (silt and clay). The AgNPs concentration in the runoff sediments increased with subsequent applied rain events. In addition to that, increasing the slope of the flume from 10% to 20% increased the total AgNPs transported with the runoff sediments by a factor 1.5. The study confirms that AgNPs can be transported over the soil surface by both runoff water and sediments due to erosion.