Geophysical Research Abstracts
Vol. 14, EGU2012-6610, 2012
EGU General Assembly 2012

Transport of sulfonamide antibiotics in small fields during monsoon season

J. Y. Park (1), B. Huwe (1), A. Kolb (1), and J. Tenhunen (2)

(1) University of Bayreuth, Department of Soil Physics, Bayreuth, Germany, (2) University of Bayreuth, Department of Plant Ecology, Bayreuth, Germany

Transport and fate of 3 sulfonamide antibiotics (sulfamethoxazole, sulfadimethoxine and sulfamethazine) were studied in small agricultural land during monsoon period. The experiment has been conducted in 2 typical sandy loam potato fields of South Korea after application of the veterinary antibiotics and bromide. Precipitation was measured by AWS (Automatic Weather Station) near the fields during the whole monsoon season. Runoff generation was estimated by multislot divisors in combination with pressure sensor. Concentration of the target antibiotics and the conservative tracer in runoff, soil-water and soil was determined using HPLC-MS-MS and Br selected electrode. Transport simulation has been performed with Hydrus-2D program which can consider soil characteristics, climate condition, adsorption/desorption and degradation. Results from the measurements and modeling focus on the role of heavy rainfall, of related the ratio of runoff and infiltration in terms of the selected antibiotics distribution and fate. Bromide on topsoil was moved into soil as increasing rainfall loading. On the contrary, the sulfonamides were relatively retarded in upper soil layer owing to adsorption onto soil particles. Different patterns of runoff were observed, and slope and rain intensity was representative factor in this study. Distribution of target pharmaceuticals was strongly dependent on constitution of furrow and ridge in the agricultural fields. Modeling results positively matched with background studies that describe physico-chemical properties of the sulfonamides, interaction between soil and the antibiotic group, solute transport through vadose zone and runoff induction by storm events.