Geophysical Research Abstracts
Vol. 13, EGU2011-4382, 2011
EGU General Assembly 2011

Bacterial transport and filtration rates as influenced by soil texture and flow conditions

Azadeh Safadoust (1), Ali Akbar Mahboubi (1), Bahram Gharabaghi (2), Mohammad Reza Mosaddeghi (1), Paul Voroney (2), Adrian Unc (3), and Gholamabbas Sayyad (1)

(1) Islamic Republic Of Iran (safadoust@gmail.com), (2) Canada, (3) USA

We evaluated the effects of soil texture and soil moisture levels on the transport and retention of bacteria in repacked (R) or physically and biologically weathered (PBW) columns of sandy loam (SL) and clay loam (CL) soils. PBW soil columns were weathered outdoors by exposure to wetting, drying, freezing and thawing cycles during the winter of 2008 and spring and summer of 2009. These physically weathered soil columns were subjected to additional 6 months of biological weathering by 20 earthworms placed onto each soil columns. Nalidixic acid-resistant Escherichia coli (E. coli NAR) was employed as pulse tracer and its temporal and spatial variability monitored in the leachate samples. Cumulative, maximum concentrations (Cmax) and filtration coefficients (lf) of E. coli NAR were assessed. In the repacked soil columns, average bacteria concentration and Cmax in leachate decreased, likely due to enhanced pollutant/soil particle interactions at low water flux velocities. The largest lf occurred in the repacked clay loam. Accelerated water flux velocities through preferential flow pathways were likely responsible for the smaller filtration coefficients in the PBW columns. Larger Cmax value of E. coli NAR in the PBW columns versus the repacked columns suggest a role for the preferential flow pathways in PBW soils. Unsaturated flow condition resulted in larger lf and smaller Cmax values.
Keywords: Repacked soil; Weathered soil; Filtration coefficient; Preferential flow