Flow and transport in Subsurface-Drained Agricultural Fields. (A05-haws080003-Oral)

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Abstract:

Subsurface drainage in the Midwest states has lead to adverse water quality impacts extending to the watershed scale and beyond. Studies of these systems typically focus solely on the drainage effluent, and few probe into the transport domain to quantify contributions from different regions and the importance of boundary conditions and chemical properties in these regions. This study investigates the dominant transport pathways of surface applied water and chemicals and links the processes in these internal pathways to the integrated response at the outlet. Hypotheses are tested with the HYDRUS-2D code using single and dual porosity assumptions. Computer modeling also investigates how heterogeneity and boundary conditions affect the transport pathways. Computer simulations are coupled with data from a field experiment where multiple tracers were applied in bands running parallel to, and at increasing distances from, the subsurface drain. Tracer movement was monitored using multi-level and fully-screened wells, and the tracer breakthrough was captured at the outlet. Both the numerical and field studies are examined and their revelations of pathways and processes discussed.

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