Boron and Chloride Transport in the Vadose Zone: Model Results and Field Data. (S02vaughan145940-Oral)

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Abstract:

Boron in soil solution is beneficial to plants only over a limited concentration range thus development of transport models for soil boron is of practical importance. Model prediction of soil solution and adsorbed boron is a necessary component of transport models for soil boron. For prediction of boron transport in soil, the onedimensional Unsatchem model of variably-saturated water flow and multicomponent solute transport was modified to include adsorption of boron as a tetrahedral surface species (SH3BO4-) reacting with B(OH)4- and H3BO3 in solution. Simulation of chloride and boron transport for 20 locations in a San Joaquin Valley agricultural field predicted substantial leaching of Clwhereas measured resident Cl- concentrations indicated only minor leaching during a two-year period. Model predictions of B leaching were substantially better. The inability of the model to represent bypass flow could explain these results because the modeled uniform flow regime would remove Cl- from the profile more efficiently than would bypass flow. The retardation effect due to adsorption of B could explain the improved results for B transport because the leaching process was slower for B.

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