

Simulation of Water and Atrazine Movement in Soil from Drip Irrigation

Meng Mao Li Ren

Department of Soil and Water Sciences, College of Resources and Environmental Sciences,

China Agricultural University, and Key Laboratory of Plant-Soil Interactions, MOE,

Beijing, P. R. China, 100094

ABSTRACT

In recent years, the use of chemigation has become a popular method to apply pesticides directly to the plant root zone through drip irrigation system. We, therefore, studied the spatial distribution of atrazine [6-chloro-*N*-ethyl-*N'*-(1-methylethyl)-1,3,5-triazine-2,4-diamine] in soil being under chemigation condition. The distribution of atrazine in a sandy loamy soil was monitored in a drip chemigation experiment and, thereafter, numerical simulations were conducted. In addition, adsorption and degradation parameters of atrazine on the test soil were obtained by batch equilibrium and batch incubation experiments. HYDRUS-2D software was used to simulate the moisture movement and atrazine transport in the soil. The mathematical model considered unsaturated, non-steady flow in a sandy loam and taking into account the adsorptive and degradable herbicide. Freundlich equation and first order kinetic equation were used to describe the adsorption and degradation of atrazine respectively. Based on the observed data obtained from a drip chemigation device to the V-shaped soil box and result of the sensitivity analysis, the numerical model was validated and it was shown that the numerical simulation of atrazine

dynamics in the soil was most sensitive to Freundlich adsorption parameters. Then the numerical model was used to analyze the effects of different initial water contents and different water application rates on the spatial distribution of moisture and atrazine in the soil.