HERBICIDE MASS TRANSPORT FROM AGRICULTURAL FIELDS IN KANSAS

by

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TRANSPORT IN SURFACE RUNOFF

Samples of runoff were collected from test plots planted to corn during 1988-90. The plots were located in the Kansas River valley alluvium. Two plots were planted on a silty loam soil and atrazine herbicide was applied to these plots at a rate of 3.36 kg/ha. One plot was subject to minimum tillage, with a 30 percent crop residue maintained and herbicides sprayed on the surface. The second plot was subject to conventional tillage, which included spraying on the herbicides and lightly incorporating them with a disk in the top two inches of soil.

Samples collected during storm runoff and sprinkler irrigations throughout the growing season were analyzed by gas chromatography/mass spectrometry for atrazine in the runoff water and sediments carried by that water.

Analyses for atrazine indicate distinct differences in the quality of runoff between surface applied and incorporated herbicides. Herbicide concentration in runoff from these plots indicate concentrations as much as two orders of magnitude higher with the surface applied herbicide. Runoff accounts for 5.7 percent of the herbicide mass that was lost from the surface applied plot while 1.6 percent of the herbicide mass that was lost from the incorporated plot.

TRANSPORT IN THE SOIL AND VADOSE ZONE

Atrazine and two degradation products were monitored at seven depths in the soil and vadose zone for this irrigated corn study. The soils in this study were a Kimo silty clay loam and a Eudora silt loam soil in the surface horizon underlain by a course river sand to the water table. The purpose of this field study was to was to identify and quantify the mobile and persistent parent and degradation products of atrazine that comprise the input, or "source term," to groundwater resulting from the application of atrazine to the soils. Atrazine, deethylatrazine, and deisoproplatrazine was monitored at various depths using suction lysimeters to determine to determine the relative proportions at which these compounds enter the aquifer. Deethylatrazine was the major degradation product of atrazine identified in the soil water and appeared to enter the underlying aquifer at a concentration 5.0 μg/L, atrazine at 1.1 μg/L, and deisopropylatrazine detected as a trace.