

# **PESTICIDE TRANSPORT IN RUNOFF FROM AGRICULTURAL FIELDS**

**by**

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**The Clean Water Act of 1972 and Safe Drinking Water Act of 1974 are the major Federal statutes that establish the water-pollution and quality programs for the United States. Both acts are administered by the U. S. Environmental Protection Agency (EPA). The Clean Water Act (CWA) establishes water-quality and water-pollution goals for the nation. Two major provisions of the CWA that directly relate to row-crop pollution control are the requirements that States adopt water-quality standards and implement nonpoint-source pollution-control programs. Water-quality standards are rules and regulations that describe the quality of State water resources necessary to support desired uses of the water. Regulations represent a legal definition of clean water. The principle objective of the safe Drinking Water Act (SDWA) is to assure that water distributed by public-water supplies is safe for consumers. The EPA has established water-quality regulations of the quality of water delivered to public-water supply customers. These regulations define acceptable concentrations of a variety of substances, such as nitrates and pesticides, that may be delivered to the customer.**

**The Food Security Act of 1985, also called the 1985 Farmbill contained legislation mandating erosion control on farmland in the United States. The Conservation Provisions of the 1985 Farmbill were maintained in the 1990 Farmbill (the Food, Agriculture, Conservation and Trade Act of 1990). Cropland that was determined to be Highly Erodible Land (HEL) by the Soil Conservation Service, is subject to the Conservation Title of this Farmbill. Kansas has 12.9 million HEL acres, nationwide 141 million acres are HEL. Land managers and owners who wish to participate in the USDA crop support programs (about 80% of the framers) have to follow the Conservation Provisions.**

**Kansas surface water and groundwater indicate evidence of water quality impairments caused by nonpoint pollution sources.**

### **Surface Water**

**Analysis of Kansas water quality monitoring data collected by the Kansas Department of Health and Environment indicates:**

- 1. 92 percent of Kansas monitoring sites have nutrient impacts. Only the Verdigris River Basin is relatively free of nutrient impairments.**
- 2. 70 percent of the monitored sites have impairments caused by suspended solids. The Verdigris and Neosho River Basins are the least impacted. The greatest impairments occur in the Solomon, Cimarron, Lower Arkansas, and Kansas-Lower Republican River Basins.**
- 3. 42 percent of the monitoring sites have impairments caused by pesticides. The Kansas-Lower Republican River Basin has the highest rate of impairment while the Neosho and Cimarron River Basins have the lowest rate of impairment.**

**Studies have been completed that investigate water-quality requirements of these water acts and possible conflicts with tillage and residue requirements of the Food Security Act.**

**Samples of runoff were collected from test plots planted to corn during 1989-91. 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.**

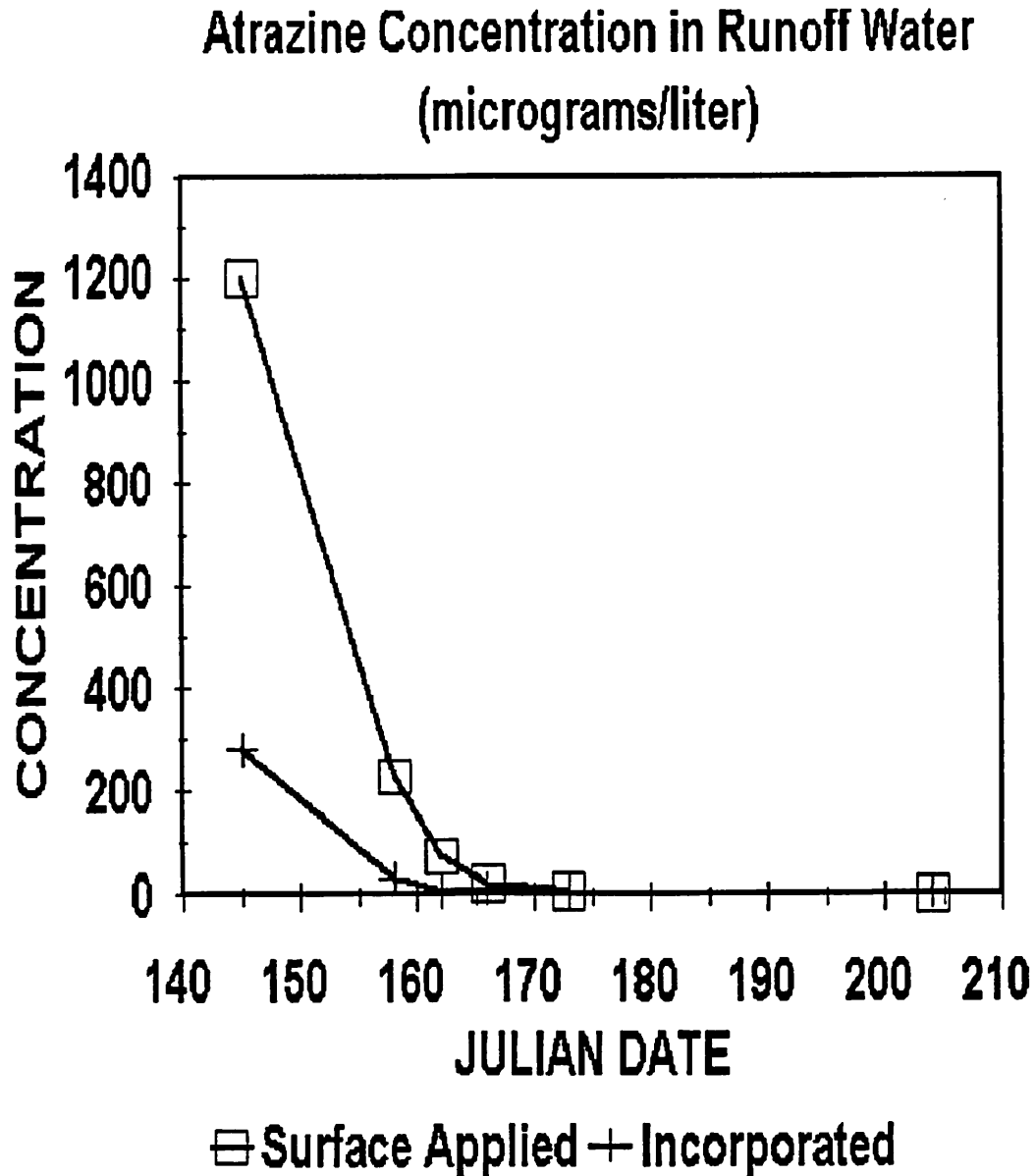
**Samples collected during storm runoff and sprinkler irrigations throughout the growing season were analyzed by gas chromatography/mass spectrometry for atrazine in the runoff water and sediments carried by that water.**

**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 (Figures**

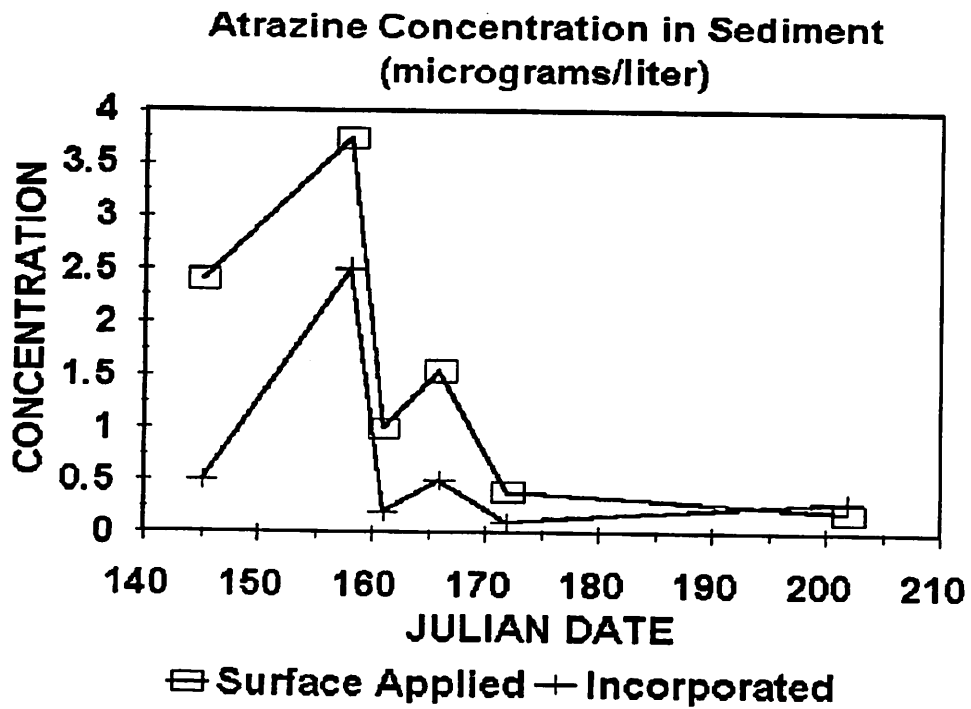
1 and 2). Runoff accounts for 1.1 percent of the herbicide mass that was lost from the surface applied plot while 0.3 percent of the herbicide mass that was lost from the incorporated plot (Figure 3).

Atrazine loss to surface runoff was reduced through chemical incorporation by 60%.

**Figure 1.**



**Figure 2.**



**Figure 3.**

