

## Long-Term Trends in Herbicide Transport



Farmers in the Midwestern United States continue to be reliant on soil-applied herbicides for weed control in row crop production, and herbicide contamination of surface waters, especially in runoff-prone watersheds, remains an environmental problem. The primary objective of this study was to analyze trends in concentration and mass of atrazine, acetochlor, alachlor, metolachlor, and metribuzin in Goodwater Creek Experimental Watershed (GCEW) from 1992 to 2006. These herbicides are mainly used for weed control in corn and soybean. Secondary objectives included a retrospective assessment of the potential aquatic ecosystem impacts caused by atrazine contamination using screening criteria established by the U.S. EPA, and to document the effects of best management practices (BMPs) implemented within GCEW over the last 15 years on trends in herbicide transport. Located within the Central Claypan Region of northeastern Missouri, the GCEW watershed encompasses 28 sq miles of predominantly agricultural land uses. *Yearly, from*

*0.2% to 14% of the herbicides applied within GCEW were lost from the outlet, with atrazine having the highest losses in all but two of the years. Year-to-year differences in herbicide loss were mainly related to the timing of runoff events after herbicide application rather than the magnitude of the runoff events.* Atrazine reached concentrations that may be harmful to aquatic ecosystems in 10 out of 15 years. Because the atrazine ecological criteria established by the U.S. EPA were exceeded, atrazine manufacturers will be required to work with farmers in the watershed to implement practices that reduce atrazine transport. Despite extensive education and outreach efforts in the watershed, conservation best management practices (BMPs) within GCEW were mainly implemented to control erosion. Thus, these BMPs had no discernable impact on herbicide transport. Overall, changes in herbicide use and second quarter stream flow had the greatest effect on trends in concentration and annual mass transport.

Lerch, R.N., Sadler, E.J., Sudduth, K.A., Baffaut, C., and Kitchen, N.R. Herbicide Transport Trends in Goodwater Creek Experimental Watershed: I. Atrazine. *J. Environ. Qual.* 2009 (In Review).

Lerch, R.N., Sadler, E.J., Baffaut, C., Kitchen, N.R., and Sudduth, K.A. Herbicide Transport Trends in Goodwater Creek Experimental Watershed: II. Acetochlor, Alachlor, Metolachlor, and Metribuzin. *J. Environ. Qual.* 2009 (In Review).

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