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CHLOROACETANILIDE HERBICIDE METABOLITES IN WISCONSIN GROUNDWATER

Jeffrey Postle*, Bruce Rheineck

ABSTRACT: Alachlor, metolachlor and acetochlor belong to the chloroacetanilide class of herbicides. Each of these three parent compounds break down into unique ethane sulfonic acid (ESA) and oxanillic acid (OA) metabolites. The metabolites appear to have higher leaching potential than the parent compounds due to higher solubility and mobility in the environment. Groundwater standards have not been established for these compounds and relatively little is known about their toxicology. Starting in 1999, the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) conducted two studies on the occurrence of chloroacetanilide herbicide metabolites in Wisconsin Groundwater. The first study sampled 27 monitoring wells, 22 private drinking water wells, and 23 municipal wells. Wells were selected based on previous detections of pesticides or proximity to agricultural fields. Results showed detections of the ESA and OA metabolites of alachlor and metolachlor in over 80% of the monitoring and private drinking water wells and over 50% of the municipal wells. The metabolites of acetochlor, which had only been used since 1994, showed a lower frequency of detection. Concentrations of the metabolites in groundwater ranged from near the level of detection to 42.1 ug/l. The monitoring wells and private drinking water wells showed higher detection frequencies and concentrations than the deeper municipal wells, but the municipal wells did show significant impacts. The second survey involving chloroacetanilide metabolites was a statewide survey of pesticides and nitrate-nitrogen in private drinking water wells. The survey was completed in 2001 and was a follow-up to similar surveys conducted by DATCP in 1994 and 1996. Three hundred thirty six wells were sampled in a stratified random design. The main goal of this survey was to establish the detection frequencies and concentrations of pesticides and nitrate-nitrogen in Wisconsin groundwater. Results of this study showed that alachlor ESA and metolachlor ESA had the highest estimates of proportions of detections at 28 and 25%, respectively. The OA metabolites of these two compounds had detection proportion estimates of 3.7 and 6.4%, respectively. Parent alachlor, metolachlor and acetochlor were rarely detected. The results of this survey emphasize the need for toxicological assessments of herbicide metabolites and establishment of water quality standards.

* Groundwater Specialist, Wisconsin Department of Agriculture, Trade and Consumer Protection, 2811 Agriculture Drive, Madison, WI 53718, USA, Phone: 608-224-4503, Fax: 608-224-4656, Email: jeff.postle@datcp.state.wi.us