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Isoxaflutole leaching and persistence in three soils of the Midwestern USA

Sharon K. Papiernik^{a)}, William C. Koskinen^{b)}

a) United States Department of Agriculture, Agricultural Research Service, Morris, MN; b) United States Department of Agriculture, Agricultural Research Service, St. Paul, MN
E-mail: papiernik@morris.ars.usda.gov

Isoxaflutole is a relatively new pre-emergence herbicide used in corn production. Isoxaflutole's phytotoxic metabolite (DKN) has a low sorption coefficient and may be persistent in soil, indicating that this herbicide may have a tendency to contaminate water resources through leaching and runoff. Two-year field dissipation studies were conducted in three soil types (sandy loam, loam, and clay loam) in Minnesota (USA) to determine the rate at which isoxaflutole/DKN dissipate under relatively cool, wet soil conditions. Separate plots were treated with isoxaflutole and potassium bromide, a non-sorbed, non-degraded tracer. Soil cores were collected six times during the growing season to a 1 m depth and sectioned into 0-10, 10-20, 20-40, 40-60, and 60-100 cm increments. Bromide or herbicide concentration was measured in replicate samples at each depth at each sampling time. In the first year of the study, isoxaflutole/DKN dissipated by both degradation and transport in each soil. Some leaching of very low concentrations (ng/g) of isoxaflutole/DKN to depths >40 cm was observed. Persistence was estimated by using the bromide results to account for the influence of transport in reducing herbicide concentrations. The degradation half-life of isoxaflutole/DKN was estimated to be about 5 to 10 d in the top 1 m of each soil. Samples from the second year of the study are being analyzed. These results will provide information for the development of best management practices for this herbicide.

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Adsorption and desorption characteristics of several herbicides in sediment

T. Kawakami^{a,c)}, H. Eun^{b)}, M. Ishizaka^{b)}, S. Endo^{b)}, K. Tamura^{a)}, T. Higashi^{a)}

a) Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan; b) National Institute for Agro-Environmental Sciences, Tsukuba, Ibaraki 305-8604, Japan; c) *Present Address*; Faculty of Pharmaceutical Sciences, Tokyo University of Science, Noda, Chiba 278-8510, Japan
E-mail: river_244@hotmail.com

The investigation of adsorption and desorption characteristics of pesticides in sediment is very important for the fate of pesticides in aquatic environment, because the sediment is thought as one of the sink of the pesticides exposed for aquatic environment. Actually several herbicides applied to paddy fields were detected from sediment.^{1,2)} In this study, to investigate the adsorption and desorption characteristics of several herbicides in sediment, kinetics, isotherms, hysteresis and effect of organic matter were examined. We investigated these characteristics of esprocarb (Esp), thiobencarb (Thio), pretilachlor (Pre), simetryn (Sim), and dimethametryn (Dim), using a sediment sample collected from Sugao marsh, Japan. The extent of adsorption ratio on sediment increased in the following order: Pre < Dim < Sim < Thio < Esp. On the other hand, those on sediment removed organic matter increased in the following order: Thio < Esp < Pre < Dim < Sim. The adsorption amounts of Sim, Dim and Pre on sediment removed organic matter were increased, while those of Esp and Thio were decreased in comparison with original sediment. It is strongly suggested that the adsorption site of herbicides on sediment might be not only the organic matter, but also the mineral surface in sediment. The hysteresis of adsorption and desorption were observed for all herbicides and they were affected by the presence of organic matter in sediment.

1) K. Kawata et al., J. AOAC Int., **88**, 1440-1451 (2005)

2) T. Kawakami et al., J. Pestic. Sci., **31**, 6-13 (2006)