CONTROL OF VOLUNTEER WHEAT: IMPACT OF GLYPHOSATE APPLICATION TIME ON STORED SOIL MOISTURE. Randall S. Currie, Norman Klocke, and Curtis R. Thompson, Associate Professor, Full Professor and Associate Professor, Kansas State University, Garden City KS 67846

Wheat is a major weed in wheat-fallow-wheat rotations. Although much research has been done on rates and timings to kill wheat with glyphosate, little is known about the impact of these treatments on soil water storage, the main objective of the fallow period. In the winter of 2000-2001, 0.83-kg/ha applications of glyphosate were made on uniform stands of wheat in November, March, April, or May. A bare-soil control received 1.1-kg/ha applications of glyphosate as needed for a weed-free control during the winter and spring. Soil water was measured monthly in 0.3-m increments to a depth of 2.4 m for a year after initial treatment. After wheat senescence, the entire plot was maintained weed free with 1.1-kg/ha applications of glyphosate as needed. The experiment was repeated at different locations in 2001, 2002, 2003, and 2004. Between November and April, the total soil water in the 0- to 1.8-m profile was not consistently affected by when glyphosate was applied, so there was no clear trend for timing of application that would indicate reduction of evaporation or leaching losses compared with that of bare soil. The water storage of bare soil was only superior if glyphosate treatments were delayed until May or April. If glyphosate application was delayed until May, the bare-soil treatment preserved from 48.3 to 58.4 mm more soil water over the 1-year period than did plots treated in May. Water below 2.4 m was considered effectively lost to leaching. Leaching losses were not significant, were inconsistent, or were small for most treatments in most years. But in 4 of 5 years, the bare-soil treatment leached more soil water below 2.4 m than did the April applications of glyphosate. These losses were small and averaged less than 7.6 mm. When glyphosate treatment was delayed until May, leaching losses were also reduced in 4 of 5 years, and the magnitude of these reductions was doubled compared with those of April glyphosate applications. Although leaching losses were often small, November and May glyphosate applications produced greater than 17.8 mm water losses in 1 of 5 years, compared with those of bare-soil treatments. Compared with November applications, March or May glyphosate applications resulted in leaching losses greater than 17.8 mm in 1 of 5 years. This research suggests that soil-water losses to leaching or evaporation are seldom affected by delaying glyphosate applications for volunteer-wheat control until March or April. We speculate that before March, under no-till conditions, the benefits of the residue outweigh the cost of the water used to grow the volunteer wheat.

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