Public Abstract

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Title: Agronomic and Pest Interactions in No-Till Corn and Soybean with Fall Versus Spring Herbicide Applications

Recent increases in the utilization of no-till production systems and glyphosate-resistant crops have provided environments conducive to winter annual weed establishment. This coupled with the ability to better distribute spring workloads has sparked interest in fall herbicide applications. However, little is known of how fall herbicide applications impact soil conditions, insect populations, and winter and summer annual weed populations. Similarly, few studies have directly compared fall herbicide applications to early spring applications. Therefore, the objectives of these experiments were to 1) evaluate the efficacy of fall versus spring herbicide applications on winter annual weed populations and the emergence of summer annual weed seedlings, 2) determine the impact of fall and early spring herbicide applications on soil temperature, soil moisture, and insect populations, and 3) evaluate differences in weed control obtained with residual and non-residual herbicide applications. Studies were conducted in both no-till corn and soybean fields from 2004 through 2006 in central, northwest, and northeast Missouri. Herbicide applications were made in the fall and at three spring timings. Two residual and one non-residual herbicide treatment were applied at each one of the four application timings. Measurements of soil moisture and insect populations revealed no significant impact of application timing. However, removal of winter annual weeds with the three herbicide treatments led to an increase in soil moisture just after planting, and a decrease in insect populations and feeding up to seven weeks after planting. Measurements of soil temperature indicated that removing winter annual weeds could increase temperatures in the spring, however, this result was only consistently obtained when soil temperatures were above 20°C. Evaluations of weed control exposed significant differences in treatments and application timings. Fall residual herbicide treatments provided the highest level of winter annual weed control. However, these treatments provided poor control of summer annual weed species after planting. Residual herbicide applications made at the last spring timing provided the highest level of summer annual weed control, but poor winter annual weed control. Residual herbicide applications made one to two months prior to planting offered the best balance between winter and summer annual weed control. Based on the results of these experiments, no-till corn and soybean producers can obtain maximum weed control and planting conditions by applying a residual herbicide in the early spring rather than the fall.