EFFECT OF INTEGRATED HERBICIDE MANAGEMENT STRATEGIES ON SOYBEAN YIELD.

Micheal D.K. Owen, Palle Pedersen, Gregory L. Tylka, Damian D. Franzenburg*, Gregory D. Gebhart, James F. Lux, Christopher C. Marett, and Jodee M. Roland, Professors and Agricultural Specialists, Department of Agronomy, Iowa State University, Ames, IA 50011.

Experiments were conducted on grower fields at 10 Iowa locations in 2004, 2005 and 2006 to determine the effects of application method for two postemergence herbicides on crop injury and soybean yield. Locations varied in tillage regime (from no tillage to reduced tillage), soybean variety, and row spacing, none of which were treatment factors. Experiments were planted in row spacing ranging from 18 to 76 cm. Each experiment was a randomized complete block with six replications. Plots were 12.3 by 12.3 m in 2004 but reduced to 6.2 by 12.3 m in 2005 and 2006. Treatments included application timings of early postemergence (EPOST) at V2 soybean, mid-postemergence (MPOST) at V4 to V6, and late-postemergence (LPOST) at R1 to R2. Sequential timings of EPOST plus MPOST and EPOST plus LPOST were also included as treatments. Herbicides included glyphosate and acifluorfen. Half of the treatments included glyphosate applied alone at each application timing (EPOST and sequentially at 0.23 kg ae $ha^{-1}$), and the remaining treatments included glyphosate (0.23 kg ae $ha^{-1}$ at each application) plus acifluorfen (0.42 kg ai $ha^{-1}$ EPOST and 0.14 kg ai $ha^{-1}$ when applied sequentially) in each application. Weed counts were taken prior to the first application of each treatment. Visual crop injury was evaluated at 7 and 14 days after (DAA) the initial application if not followed by a sequential application. Otherwise, injury was evaluated for the last application of a treatment.

The presence of weeds in this research did not affect soybean yield. The most commonly observed weeds were giant foxtail, velvetleaf, common waterhemp, common lambsquarters and horseweed. All treatments provided excellent control of all weeds. Weed densities, as enumerated before herbicide applications, were only significantly different between treatments during 2005 and 2006. Treatment differences for 2005 were attributed to self-thinning of weeds during the time between EPOST and MPOST treatments, as smaller numbers were observed as the application timing was delayed. Patchy, heavy weed densities at the Ames location accounted for differences in 2006. Notably, there were no weed density differences between treatments in 2004 and when data was combined for all three years. Weed densities, overall, were not high enough to impact yield when their removal was delayed to the LPOST timing. The LPOST glyphosate treatment, which caused only 2% injury (averaged over all years), provided yields as high as any EPOST or MPOST treatment.

Since all soybean varieties included in the ten locations were glyphosate-resistant varieties, glyphosate injury did not exceed 5%. Injury from glyphosate/acifluorfen treatments ranged from 11 to 32%, depending on application timing. Single applications generally demonstrated lower levels of injury compared to split applications. EPOST/MPOST and EPOST/LPOST treatments with glyphosate/acifluorfen caused higher injury than MPOST and LPOST treatments, respectively.

Soybean yield did not vary by more than 471 kg $ha^{-1}$, which was the greatest difference among treatments for all three years. Application timing had a greater effect on soybean yield than the severity of herbicide injury. LPOST glyphosate/acifluorfen caused half as much observed soybean injury as EPOST glyphosate/acifluorfen, yet yielded significantly less in 2004 and when data was combined for all three years. Yield was reduced when acifluorfen was applied LPOST, though observed injury did not appear to be severe on R1 to R2 soybean.

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