

2018 Herbicide and Cultivation Weed Management Study in Soybean at Rochester, MN.

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The objective of this trial was to evaluate various mechanical and chemical weed management systems in soybean. The research site was a loamy sand series with pH of 6.1, O.M. 2.4% and soil test P and K levels of 41 ppm and 137 ppm, respectively. The field was fall chisel plowed, spring disked and field cultivated once prior to planting. Fall fertilizer was broadcast on November 3, 2018 at a rate of 0-46-180-0 lbs/A. The previous crop was corn. STINE 17LH62 glufosinate resistant soybeans were planted on May 24, 2018 at a depth of 1.5 inches in 30-inch rows at a rate of 165,000 seeds per acre. Soybean emergence date was May, 30, 2018. A split-plot randomized complete block design with four replications was utilized for this trial. Main plots consisted of: inter-row cultivation, no inter-row cultivation, layered residual herbicide (Dual Magnum at 1.33 pt/a), and layered residual herbicide (Dual Magnum at 1.33 pt/a) followed by inter-row cultivation. Subplot treatments consisted of: PRE Verdict herbicide (5 fl oz/a), PRE Verdict herbicide (5 fl oz/a) followed by POST Liberty herbicide (32 fl oz/a) + N-PAK AMS (3pt/a), PRE Authority herbicide (6.4 oz/a), PRE Authority herbicide (6.4 oz/a) followed by POST Liberty herbicide (32 fl oz/a) + N-PAK AMS (3pt/a). In plots receiving a layered residual treatment and a POST Liberty treatment, the herbicides were applied at the same time as a tank mix. A Lilliston rolling cultivator was used for cultivating plots receiving a cultivation treatment. The Lilliston rolling cultivator was run at 7-8 MPH and was set to cultivate soil away from the base of the soybean plants. All herbicide applications were made at 4 MPH with a tractor-mounted sprayer delivering 15 GPA at 40 PSI. PRE treatments were applied using 110015 TTI nozzles, and POST treatments were applied using 110015 TT nozzles. Evaluations of the plots were taken June 11, 25, and September 24. The center two rows of each plot were machine harvested on October 22, 2018. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance rating for common waterhemp and grass control can be found in Table 2. There were no significant differences in yield data, so the data will not be presented.

Discussion:

The goal of this project was to compare different mechanical and chemical weed management strategies in soybean. Experimental design allowed the comparison of two levels of PRE herbicide programs with an assortment of POST emerge components. The primary treatments included the two levels of PRE herbicides with and without post emergence herbicide applications, then the main plot treatments (no cultivation, cultivation, layered residual herbicide, and layered residual herbicide with cultivation) were applied to these primary treatments. The benefit of this design was to allow for comparison of all potential combinations of the weed control components.

The two levels of PRE herbicide were Verdict at 5 fl oz/a and Authority First at 6.4 oz/a. Based on previous experience with these herbicides it was believed the Verdict should have functioned as a “weaker” PRE, providing less weed control and losing residual efficacy faster than Authority First, which was to function as a “stronger” or more robust PRE providing greater overall weed control and longer residual control. 2018 was an excellent year for PRE herbicides. Verdict, the “weaker” PRE provided about 90% weed control until the time of POST applications. Authority First, the “stronger” PRE, provided 99% weed control until the time of POST applications. For the purposes of discussion, we will focus on the end of season weed control ratings.

Waterhemp control with Verdict as PRE

When Verdict was used as the PRE treatment, a layered residual or layered residual followed by an inter-row cultivation gave the best season-long weed control. Addition of a POST Liberty treatment to either the layered residual or layered residual followed by cultivation generated slightly better weed control than a layered residual when cultivation was not used. Cultivation did not have any negative impact on herbicide performance. In fact, Verdict PRE/Liberty POST followed by cultivation had slightly better weed control than Verdict PRE/Liberty POST without cultivation.

Grass control with Verdict as PRE

Cultivation generally provided increased grass weed control, the exception being treatments with a layered residual and POST Liberty application. These treatments provided excellent weed control and the addition of cultivation was not necessary.

Waterhemp control with Authority First as PRE

Overall, Authority First provided better weed control than the Verdict and tended to mute the effects of other treatments. Cultivation did not negatively affect any of the herbicide treatments and increased control when added to the Authority First PRE followed by Liberty and Dual Magnum (layered residual).

Grass control with Authority First as PRE

Authority PRE had great grass weed control. Slightly lower season-long weed control was obtained when there was no POST herbicide or cultivation treatment. Cultivation did not have a negative effect on herbicide performance, and had a positive impact on weed control when added to Authority First alone or Authority First plus Dual Magnum layered residual. (University of Minnesota Extension Regional Office, Rochester.)

Table 1. Application timing, plant stages, environmental conditions.

Date	5/24	6/25	6/29
Treatment	PRE A	POST I B	POST II C
Temperature (F)			
Air	87.0	75.0	Sunny/Hot
Soil	70.7		
Relative Humidity (%)	46	62	
Wind (mph)	24	14	
Soil Moisture	Normal	Normal	Normal
Soybean			
Stage		V4-V5	V5/R1
Height (in)	0.0		9.0
Giant Ragweed			
Weed Density (ft ²)	0.0		
Height (in)			
Common Lambsquarter			
Height (in)		0.0	2.8
Common Waterhemp			
Height (in)		4.6	3.6
Grass			
Height (in)		6.4	7.4
Rainfall after each application (in)			
Week 1	1.39	3.09	2.47
Week 2	0.00	1.51	1.26
Week 3	0.93	1.26	0.64

Table 2. End of season percent weed control, rated September 24th, 2018, at Rochester, MN.

Treatments	RATE		APPLICATION TIME	Common Waterhemp		Grasses	
VERDICT Cultivation	5	fl oz/a	A C	88.8	fg	92.3	bcd
VERDICT No Cultivation	5	fl oz/a	A	88.0	g	82.5	e
VERDICT Dual Magnum (layered residual)	5 1.33	fl oz/a pt/a	A B	93.8	de	90.0	cd
VERDICT Dual Magnum (layered residual) Cultivation	5 1.33	fl oz/a pt/a	A B C	95.0	b-e	94.8	ab
VERDICT LIBERTY 280 N-PAK AMS Cultivation	5 32 2.5	fl oz/a fl oz/a % v/v	A B B C	92.5	ef	99.0	a
VERDICT LIBERTY 280 N-PAK AMS No Cultivation	5 32 2.5	fl oz/a fl oz/a % v/v	A B B	88.0	g	93.5	bc
VERDICT LIBERTY 280 N-PAK AMS Dual Magnum (layered residual)	5 32 2.5 1.33	fl oz/a fl oz/a % v/v pt/a	A B B B	97.8	abc	99.0	a
VERDICT LIBERTY 280 N-PAK AMS Dual Magnum (layered residual) Cultivation	5 32 2.5 1.33	fl oz/a fl oz/a % v/v pt/a	A B B B C	96.8	a-d	99.0	a
AUTHORITY FIRST Cultivation	6.4	oz wt/a	A C	97.8	abc	95.8	ab
AUTHORITY FIRST / SONIC No Cultivation	6.4	oz wt/a	A	95.0	b-e	88.8	d
AUTHORITY FIRST / SONIC Dual Magnum (layered residual)	6.4 1.33	oz wt/a pt/a	A B	98.0	abc	90.0	cd
AUTHORITY FIRST / SONIC Dual Magnum (layered residual) Cultivation	6.4 1.33	oz wt/a pt/a	A B C	97.0	a-d	96.0	ab
AUTHORITY FIRST / SONIC LIBERTY 280 N-PAK AMS Cultivation	6.4 32 2.5	oz wt/a fl oz/a % v/v	A B B C	99.0	a	98.8	a
AUTHORITY FIRST / SONIC LIBERTY 280 N-PAK AMS No Cultivation	6.4 32 2.5	oz wt/a fl oz/a % v/v	A B B	98.8	ab	99.0	a
AUTHORITY FIRST / SONIC LIBERTY 280 N-PAK AMS Dual Magnum (layered residual)	6.4 32 2.5 1.33	oz wt/a fl oz/a % v/v pt/a	A B B B	94.5	cde	99.0	a
AUTHORITY FIRST / SONIC LIBERTY 280 N-PAK AMS Dual Magnum (layered residual) Cultivation	6.4 32 2.5 1.33	oz wt/a fl oz/a % v/v pt/a	A B B B C	99.0	a	99.0	a
LSD P=.10				3.8		4.3	