KANSAS SOYBEAN COMMISSION-FINAL REPORT

Title: Best Management Practices in Soybeans for Managing Herbicide-Resistant Weeds in Western Kansas.

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Objectives:

1. Quantify the impact of row-spacing, time of planting, and seeding rates on glyphosate-resistant kochia and Palmer amaranth interference in soybean.

2. Determine the ultimate impact of those agronomic practices on soybean grain yields and quality in western Kansas.

Materials and Methods: Field study was conducted at Kansas State University Agricultural Research Center (KSU-ARC) near Hays, KS. Soybean plots were established under no-till wheat stubbles. Experiment was setup in split-split plot design with 4 replications with following factors: **Whole plot:** a) Standard herbicide program; b) No herbicide; **Split plot:** a) 100,000 seeds/ac; b) 150,000 seeds/ac; c) 200,000 seeds/ac; **Split-split plot:** a) 30-inch row spacing; b) 15-inch row spacing. Study site had natural infestation of Palmer amaranth population. A Roundup Ready 2 Xtend soybeans Asgrow "AG39X7" was planted on May 20, 2020. A standard PRE herbicide treatment of Authority MTZ @10 oz/a was applied to selected plots on May 20 followed by a POST treatment of Xtendimax @ 22 fl oz/a plus Roundup PowerMax @ 32 fl oz/a was applied on June 26, 2020. Data on soybean injury, Palmer amaranth density, and percent visible control were collected throughout the growing. Data on soybean grain yields were recorded at the time of crop maturity by harvesting middle two rows of each plot by plot combine.

Results and Discussion: Across all seeding rates and row spacing combination, herbicide program consisting PRE application of Authority MTZ @ 10 oz/A followed by POST application of Xtendimax @ 22 fl oz/A plus Roundup PowerMax @ 32 fl oz/A provided effective control (90 to 98%) of Palmer amaranth compared to nontreated plots throughout the growing season **(Figure 1; Table 1).** The data on percent visible control was consistent with Palmer amaranth density observed. All treated plots had almost no Palmer amaranth seedlings at 9 WAP compared to non-treated plots **(Table 1)**. Consistent with other percent Palmer amaranth control and density data, only herbicide program had significant effect on soybean grain yield among all tested treatment combinations. For instance, the reduced Palmer amaranth interference with PRE applied Authority MTZ followed by (*fb*) POST applied Xtendimax treatment resulted in improved soybean grain yield compared to nontreated plots, irrespective of row spacing or soybean seeding rates (Table 2). Soybean grain yield

in treated plots ranged from 37 to 43 bu/ac, whereas it ranged between 26 to 29 bu/ac in nontreated plots (Table 2).
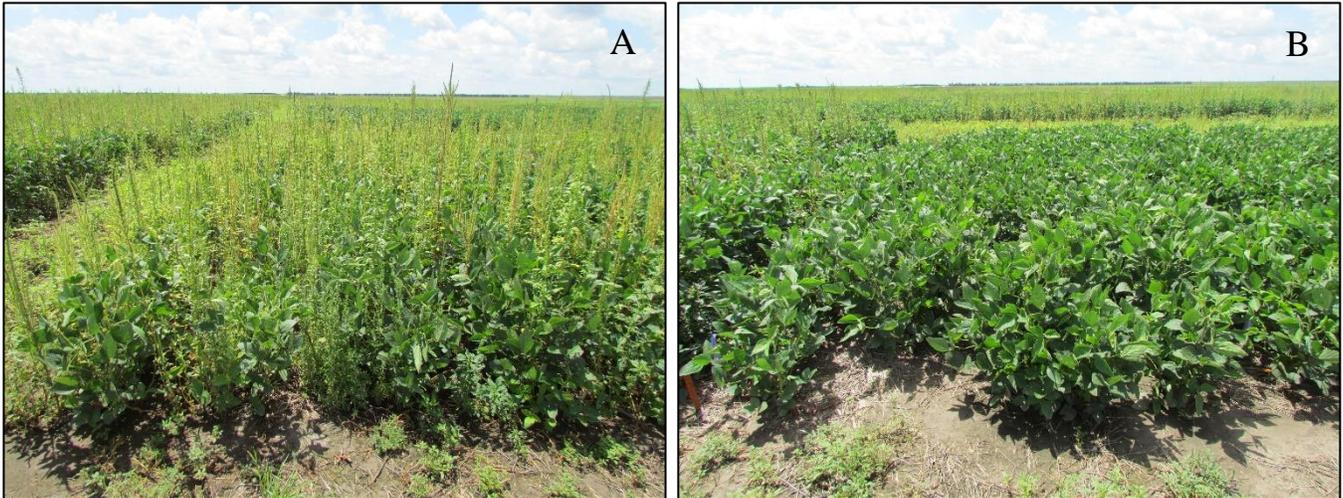
Figure 1. Palmer amaranth control in soybeans planted at 100,000 seeds/ac in 15-inch row (A & B). Plot A was not treated with any herbicide; whereas, plot B was treated with Authority MTZ followed by Xtendimax plus Roundup PowerMax. Pictures were taken on July 29 (about 9 weeks after planting).

Table 1. Influence of herbicide program, seeding rate, and row spacing on Palmer amaranth control and density in Roundup Ready 2 Xtend soybeans at Kansas State University Agricultural Research Center near Hays, KS.

Herbicide(s) [a]	Seeding rates (seeds ac^{-1})	row spacing (in.)	Palmer amaranth control (%)			Palmer amaranth density (no. ft^{-2})
			5 WAP	9 WAP	13 WAP	
Authority MTZ *fb*	100,000	15	93 a	96 a	96 a	0.1 b
Xtendimax + Roundup PowerMax	100,000	30	94 a	97 a	97 a	0 b
	150,000	15	90 a	92 a	93 a	0 b
	150,000	30	90 a	94 a	94 a	0.1 b
	200,000	15	94 a	97 a	97 a	0 b
	200,000	30	94 a	98 a	98 a	0 b
Nontreated	100,000	15	0 b	0 b	0 b	5.1 a
	100,000	30	0 b	0 b	0 b	4.8 a
	150,000	15	0 b	0 b	0 b	4.2 a
	150,000	30	0 b	0 b	0 b	3.5 a
	200,000	15	0 b	0 b	0 b	5.2 a
	200,000	30	0 b	0 b	0 b	4.5 a

[a] Authority MTZ at 10 oz/a was applied immediately after soybean planting; whereas, a tank mixture of Xtendimax at 22 fl oz/a and Roundup PowerMax at 32 fl oz/a was applied at 4 weeks after soybeans planting (at V4 to V5 stage).

[b] Means followed by the same alphabet letters within a column are not statistically different according to Fisher's Protected LSD ($\alpha = 0.05$).

Table 2. Influence of herbicide program on Roundup Ready 2 Xtend soybean grain yield at Kansas State University Agricultural Research Center near Hays, KS.

Herbicide(s) [a]	Seeding rates (seeds ac^{-1})	row spacing (in.)	Soybean grain yield (bu/acre)
Authority MTZ *fb*	100,000	15	40 a
Xtendimax + Roundup PowerMax	100,000	30	37 a
	150,000	15	43 a
	150,000	30	38 a
	200,000	15	38 a
	200,000	30	39 a
Nontreated	100,000	15	26 b
	100,000	30	26 b
	150,000	15	24 b
	150,000	30	27 b
	200,000	15	27 b
	200,000	30	29 b

[a] Authority MTZ at 10 oz/a was applied immediately after soybean planting; whereas, a tank mixture of Xtendimax at 22 fl oz/a and Roundup PowerMax at 32 fl oz/a was applied at 4 weeks after soybeans planting (at V4 to V5 stage).

[b] Means followed by the same alphabet letters within a column are not statistically different according to Fisher's Protected LSD ($\alpha = 0.05$).