

The effect of variety, planting date, and weed height on weed control and grain yield of glyphosate resistant soybean. Krausz, Ronald F. and Bryan G. Young. This study was designed to evaluate the effect of soybean variety, planting date, and weed height at postemergence application on weed control and grain yield in glyphosate-resistant soybean. The study was conducted on a Weir silt loam with 1.6 % organic matter and pH 6.4 at the Belleville Research Center. Fertilizer applied was 50 and 100 lb/A of P₂O₅ and K₂O, respectively, to an area that had been cropped to corn in 2003. Asgrow 'AG 3903 RR' and 'AG 4603 RR' soybeans were planted 1.0 inch deep at 75 lb/A into a reduced-till seedbed on each planting date. Plots consisted of four rows with 30 inch row spacing, 28 ft long arranged in a split-split-plot design with 3 replications. The herbicides were broadcast applied with a CO₂ pressurized sprayer using 8003 flat fan tips at 40 PSI and 20 GPA water. Monthly rainfall in inches was 1.3, 8.7, 2.8, 6.6, and 5.2 in April, May, June, July and August, respectively. Application timings, repeated for each planting date, were preemergence (PRE), as well as postemergence applications for weed heights 2 to 4, 0 to 5, 5 to 10, 10 to 15, 15 to 20, and 20 to 25 inches (2-4"W), (0-5"W), (5-10"W), (10-15"W), (15-20"W), and (20-25"W), respectively. Application information for each planting date is listed below:

Planting Date #1 (May 21, 2004)

Weed populations per 0.25 M² in the nontreated plots, mid-season, were: 4 fall panicum; 2 common ragweed; 6 common waterhemp 7 giant foxtail; 1 morningglory species; and less than 1 each of velvetleaf and yellow nutsedge. Total rainfall for the 7 days following the PRE application was 5.1 inches.

Date	5-24-04	7-16-04	6-24-04	7-1-04	7-6-04	7-12-04	7-19-04
Treatment	PRE	2-4"W	0-5"W	5-10"W	10-15"W	15-20"W	20-25"W
Air temperature (F)	80	82	84	76	82	82	70
Relative humidity (%)	50	70	48	93	98	62	76
soybean							
stage		R1	V4	R1	R1	R1-R2	R2
height (inch)		16-20	7-8	13-14	15-16	16-20	14-17
fall panicum							
leaf no.		5-6		15-20	20-26	5-19	7-28
height (inch)		3-5		6-8	12-14	6-14	8-18
yellow nutsedge							
leaf no.				24-26		6-8	8-10
height (inch)				7-8		10-14	11-13
common ragweed							
leaf no.		6-10	6-14	10-18	20-24	9-22	12-28
height (inch)		1.5-3	1.5-6	7-12	14-18	10-20	12-24
common waterhemp							
leaf no.		6-9	5-9	6-12	9-21	18-29	9-12
height (inch)		1-3.5	1-3	3-8	6-18	16-21	5-12
velvetleaf							
leaf no.		4-6	4-6	7-8			6-9
height (inch)		1-2	1-2	6-7			8-14
giant foxtail							
leaf no.		4-7	4-7		15-18	9-12	7-12
height (inch)		2-4	2-4		12-13	14-16	10-14
morningglory species							
leaf no.				4-26	10-25	20-25	8-10
height (inch)				4-10	4-10	10-12	14-16

Planting Date #2 (June 11, 2004)

Weed populations per 0.25 M² in the nontreated plots, mid-season, were: 18 fall panicum; 2 common ragweed; 13 common waterhemp; 16 giant foxtail; and less than 1 each of morningglory species, yellow nutsedge, and velvetleaf. Total rainfall for the 7 days following the PRE application was 1.8 inches.

Date	6-12-04	7-16-04	7-8-04	7-14-04	7-19-04	7-26-04	8-2-04
Treatment	PRE	2-4"W	0-5"W	5-10"W	10-15"W	15-20"W	20-25"W
Air temperature (F)	76	82	80	79	72	70	75
Relative humidity (%)	98	70	70	59	78	86	98
soybean							
stage		V4-V5	V2	V4-V5	R2	R2	R2-R3
height (inch)		12-14	4-6	12-14	14-16	14-16	20-24
fall panicum							
leaf no.						5-8	5-8
height (inch)						15-18	15-22
common ragweed							
leaf no.			5-6	8-12	6-12	5-8	7-10
height (inch)			0-5	14-18	8-20	15-20	20-25
common waterhemp							
leaf no.			6-10	7-15	10-22	7-10	7-10
height (inch)			0-6	6-12	14-18	15-20	20-25
velvetleaf							
leaf no.			4-5	5-7	4-7	5-8	8-10
height (inch)			0-5	8-12	8-14	15-20	15-20
giant foxtail							
leaf no.			5-6	5-9	7-14	5-8	5-8
height (inch)			0-5	10-12	12-20	15-18	15-22
morningglory species							
leaf no.			5-8	4-15	3-15	7-10	7-10
height (inch)			2-4	6-18	2-14	2-16	15-20

Planting Date #3 (June 23, 2004)

Weed populations per 0.25 M² in the nontreated plots, mid-season, were: 19 fall panicum; 3 yellow nutsedge; 2 common ragweed; 45 common waterhemp; 1 velvetleaf; 15 Pennsylvania smartweed; and less than 1 each of common cocklebur, giant foxtail, and morningglory species. There was no rainfall for the 7 days following the PRE application. Total rainfall for the 14 days following the PRE application was 3.1 inches.

Date	6-23-04	8-2-04	7-19-04	7-29-04	8-6-04	8-10-04	8-14-04
Treatment	PRE	2-4"W	0-5"W	5-10"W	10-15"W	15-20"W	20-25"W
Air temperature (F)	80	75	70	68	51	66	55
Relative humidity (%)	38	98	90	72	60	80	85
soybean							
stage		R1	V3	V4-V5	R1-R2	R2	R3
height (inch)		14-16	8-10	10-12	14-16	14-16	16-20
fall panicum							
leaf no.		5-6	5-8	5-8	7-10	7-10	7-10
height (inch)		1-4	6-12	6-12	12-20	10-20	15-20
yellow nutsedge							
leaf no.		5-6	5-8	5-8	8-10	8-10	8-10
height (inch)		1-4	4-9	6-12	10-15	15-20	20-25
common ragweed							
leaf no.			6-8	5-8	8-10	8-10	8-12
height (inch)			4-6	6-10	10-15	15-20	18-25
common waterhemp							
leaf no.			4-7	7-10	7-10	7-10	7-10
height (inch)			2-3	4-8	10-12	10-16	14-18

velvetleaf						
leaf no.		3-4	5-6	5-8	5-8	8-10
height (inch)		3-4	5-6	12-15	15-20	18-25
morningglory species						
leaf no.		7-9	7-10	7-10		
height (inch)		5-7	2-5	8-12		
common cocklebur						
leaf no.	5-6	4-6	5-8	8-10	8-10	8-10
height (inch)	2-4	4-8	6-12	10-15	15-20	18-25
Pennsylvania smartweed						
leaf no.		5-25	10+	10+	10+	10+
height (inch)		4-10	4-10	12-15	15-20	20-25

None of the herbicides caused soybean injury. Soil herbicides followed by glyphosate or glyphosate alone at 1.12 lb ae/A controlled fall panicum, giant foxtail, yellow nutsedge, common ragweed, common waterhemp, velvetleaf, ivyleaf morningglory, common cocklebur, and Pennsylvania smartweed, 93 to 100%, regardless of planting date or weed height. No sequential applications of glyphosate were required to maintain 90% or greater weed control through harvest. Weed competition did not reduce soybean height or maturity regardless of variety or planting date. Postponing the application of glyphosate until weeds were 20 to 25 inches tall consistently reduced soybean grain yield by an average of 7.5 bu/A or 13% across varieties and planting dates. Grain yield was 1 to 3 bu/A less with the later planted-soybean compared with earlier-planted soybean. Within each planting date, there was no difference in grain yield in the handweeded plots among soybean varieties with yield ranging from 55 to 62 bu/A. (Dept. of Plant, Soil and Agricultural Systems, Southern Illinois University, Carbondale)

Table. The effect of variety, planting date, and weed height on weed control and grain yield of glyphosate-resistant soybean. (Krausz and Young)

Treatment ^a	Application		Soybean ^b				Control, days after postemergence treatment ^c														XANST 21	POLPY 21
							PANDI		CYPES		AMBEL		AMATA		ABUTH		SETFA		IPOHE			
	Rate	Time	Height	Maturity	Moisture	Yield	0	21	0	21	0	21	0	21	0	21	0	21	%	%		
	(lb/A)		inch	DAP	%	bu/A	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Planting date 1, Asgrow 3903 RR																						
Nontreated			37	130	10.6	25		0		0		0		0		0		0		0		
No herbicide + handweed			37	130	9.6	59		100		100		100		100		100		100		100		
Sulfentrazone + cloransulam / glyt	0.25 +0.031 / 0.56	PRE / 2-4"W	37	130	9.6	57	90	100	100	100	100	100	100	100	100	100	100	100	100	100		
Glyphosate	1.12	0-5"W	36	130	9.7	59		100		100		100		100		100		100		98		
Glyphosate	1.12	5-10"W	37	130	9.7	59		100		100		100		100		100		100		98		
Glyphosate	1.12	10-15"W	37	130	9.7	58		100		100		100		100		100		100		100		
Glyphosate	1.12	15-20"W	36	130	9.5	53		100		100		100		100		100		100		97		
Glyphosate	1.12	20-25"W	36	130	9.7	51		100		100		100		100		100		100		100		
Planting date 1, Asgrow 4603 RR																						
Nontreated			34	136	12.4	20		0		0		0		0		0		0		0		
No herbicide + handweed			34	136	12.2	62		100		100		100		100		100		100		100		
Sulfentrazone + cloransulam / glyt	0.25 +0.031 / 0.56	PRE / 2-4"W	32	136	12.3	60	87	100	100	100	100	100	100	100	100	100	100	100	100	100		
Glyphosate	1.12	0-5"W	32	136	12.2	65		100		99		100		100		99		100		99		
Glyphosate	1.12	5-10"W	34	136	12.1	58		100		100		100		100		100		100		98		
Glyphosate	1.12	10-15"W	35	136	12.6	62		100		100		100		100		100		100		100		
Glyphosate	1.12	15-20"W	33	136	12.2	54		100		100		100		100		97		100		93		
Glyphosate	1.12	20-25"W	30	136	12.1	52		100		100		100		100		97		100		100		

(continued)

Table. The effect of variety, planting date, and weed height on weed control and grain yield of glyphosate-resistant soybean. (Krausz and Young)
(continued)

Treatment ^a	Application		Soybean ^b				Control, days after postemergence treatment ^c															
							PANDI		CYPES		AMBEL		AMATA		ABUTH		SETFA		IPOHE		XANST	POLPY
	Rate	Time	Height	Maturity	Moisture	Yield	0	21	0	21	0	21	0	21	0	21	0	21	0	21	21	21
	(lb/A)		inch	DAP	%	bu/A	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Planting date 2, Asgrow 3903 RR																						
Nontreated			34	115	12.9	30			0		0		0		0		0		0			
No herbicide + handweed			35	115	12.1	60			100		100		100		100		100		100			
Sulfentrazone + cloransulam / glyt	0.25 +0.031 / 0.56	PRE / 2-4"W	35	115	12.2	59	88	100	100	100	100	100	100	100	100	100	100	100	100	100		
Glyphosate	1.12	0-5"W	34	115	12.0	57			100		100		100		100		100		100			
Glyphosate	1.12	5-10"W	32	115	12.2	56			100		100		100		100		96		100		98	
Glyphosate	1.12	10-15"W	34	115	12.2	58			100		100		100		100		99		100		97	
Glyphosate	1.12	15-20"W	34	115	12.1	57			100		100		100		100		100		100		100	
Glyphosate	1.12	20-25"W	34	115	12.1	53			100		100		100		100		100		100		100	
Planting date 2, Asgrow 4603 RR																						
Nontreated			36	122	15.7	29			0		0		0		0		0		0			
No herbicide + handweed			36	122	13.4	58			100		100		100		100		100		100		100	
Sulfentrazone + cloransulam / glyt	0.25 +0.031 / 0.56	PRE / 2-4"W	36	122	13.2	57	88	100	100	100	100	100	100	100	100	100	100	100	100	100		
Glyphosate	1.12	0-5"W	35	122	13.3	58			100		100		100		100		100		100		100	
Glyphosate	1.12	5-10"W	36	122	13.4	56			100		100		100		100		100		100		98	
Glyphosate	1.12	10-15"W	35	122	13.2	59			100		100		100		100		99		100		99	
Glyphosate	1.12	15-20"W	37	122	13.2	56			100		100		100		100		100		100		99	
Glyphosate	1.12	20-25"W	35	122	13.6	52			100		100		100		100		100		100		100	

(continued)

Table. The effect of variety, planting date, and weed height on weed control and grain yield of glyphosate-resistant soybean. (Krausz and Young)
(continued)

Treatment ^a	Application		Soybean ^b				Control, days after postemergence treatment ^c															
	Rate (lb/A)	Time	Height inch	Maturity DAP	Moisture %	Yield bu/A	PANDI		CYPES		AMBEL		AMATA		ABUTH		SETFA		IPOHE		XANST	POLPY
							0	21	0	21	0	21	0	21	0	21	0	21	0	21	21	21
							%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Planting date 3, Asgrow 3903 RR																						
Nontreated			31	107	12.9	30		0		0		0		0		0				0	0	0
No herbicide + handweed			31	107	12.3	55		100		100		100		100		100				100	100	100
Sulfentrazone + cloransulam / glyt	0.25 +0.031 / 0.56	PRE / 2-4"W	32	107	12.5	57	97	100	95	100	100	100	100	100	100	100			100	100	100	100
Glyphosate	1.12	0-5"W	31	107	12.4	53		100		100		100		100		100				99	100	100
Glyphosate	1.12	5-10"W	30	107	12.2	50		100		98		100		98		99				98	100	100
Glyphosate	1.12	10-15"W	30	107	12.2	52		100		96		100		100		100				99	100	100
Glyphosate	1.12	15-20"W	31	107	12.5	51		100		95		100		100		97				100	100	100
Glyphosate	1.12	20-25"W	30	107	12.4	48		100		97		100		100		99				100	100	100
Planting date 3, Asgrow 4603 RR																						
Nontreated			36	119	14.7	31		0		0		0		0		0				0	0	0
No herbicide + handweed			35	119	13.8	54		100		100		100		100		100				100	100	100
Sulfentrazone + cloransulam / glyt	0.25 +0.031 / 0.56	PRE / 2-4"W	34	119	13.7	52	97	100	97	100	100	100	100	100	100	100			100	100	100	100
Glyphosate	1.12	0-5"W	35	119	13.8	55		100		100		100		100		100				99	100	100
Glyphosate	1.12	5-10"W	33	119	14.0	52		100		94		100		96		99				96	100	100
Glyphosate	1.12	10-15"W	33	119	13.6	52		99		99		100		100		100				99	100	100
Glyphosate	1.12	15-20"W	34	119	13.7	49		99		98		100		100		100				99	100	100
Glyphosate	1.12	20-25"W	33	119	14.0	47		99		98		100		100		99				99	100	100
LSD			2	0	0.5	6	7	1	7	1	0	0	0	1	0	2	0	0	0	3	0	0
P			0.01	1	0.01	0.01	0.02	0.01	0.5	0.01	1	1	1	0.01	1	0.01	1	1	1	0.01	1	1

^aFor all postemergence only treatments, a second postemergence application was planned, but only to be applied if needed, none were needed.

All glyphosate was Roundup WeatherMax.

^bDAP = Days after planting.

^cZero days after postemergence application is at postemergence application.