

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 6.2 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 2004. Asgrow 3905 RR and 4603 RR soybean 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 in 20 GPA water. Monthly rainfall in inches was 2.9, 0.8, 1.6, 4.8 and 3.2 in April, May, June, July and August, respectively. Rainfall in May was sparse; 0.07 inches on the 9th, 0.4 inches on the 14th, and 0.32 inches on the 20th. Applications at each planting were preemergence (PRE), postemergence following a preemergence application at 2 to 4 inch weed height (2-4"W) and postemergence at weed heights 0 to 5, 5 to 10, 15 to 20, and 20 to 25 inches (0-5"W), (5-10"W), (15-20"W), and (20-25"W), respectively. For the postemergence only treatments, a second postemergence application was planned for 21 days later (21DL), but to be applied only if needed (-IN). The second postemergence application was needed in the first and third planting dates following the 0 to 5 inch weed height timing (21DL0-5"W-IN) and in the second planting date following the 5 to 10 inch weed height timing (21DL5-10"W-IN). Application information is listed below.

Planting date #1 (May 18, 2005)

Weed population per 0.25m² in the nontreated plots, mid-season, was 50 giant foxtail, 5 common cocklebur, 13 common ragweed, 18 common waterhemp, and 2 velvetleaf.

Date	May-18-05	Jun-09-05	Jun-10-05	Jun-17-05	Jun-22-05	Jul-08-05	Jul-18-05	Jul-06-05
Treatment	PRE	2-4"W	0-5"W	5-10"W	10-15"W	15-20"W	20-25"W	21DL0-5"W-IN
Air temperature (F)	78	77	87	76	76	82	79	78
Relative humidity (%)	30	70	51	50	80	46	84	41
Soil moisture	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ABONOR	ABONOR
soybean								
leaf no.		V1	V1	V2-V3	V3	R1	R2	V6
height (inch)		3-4	3-4	7-8	8	15	20-24	10-11
giant foxtail								
leaf no.		4-6	4-6	5-7	6-8	9-10	10+	4-6
height (inch)		3-6	3-6	5-8	9-13	12-15	20-24	3-5
common cocklebur								
leaf no.		4-7	4-7	5-7	6-8	7-9	10+	4-6
height (inch)		3-5	3-5	7-8	9-12	10-15	20-25	4-5
common ragweed								
leaf no.		4-8	4-8	6-8	8-12	10-12	10+	6-8
height (inch)		2-3	2-3	6-8	9-12	12-14	20-24	4-5
common waterhemp								
leaf no.			4-7	7-10	6-8	10-12	10+	9-10
height (inch)			1-3	5-8	6-8	9-11	20-24	4-5
velvetleaf								
leaf no.		3-5	3-5		3-5	6-8	10+	3-4
height (inch)		1-2	1-2		7-9	12-14	20-24	3-5

Planting date #2 (June 1, 2005)

Weed population per 0.25m² in the nontreated plots, mid-season, was 4 giant foxtail, 1 common cocklebur, 2 common ragweed, 3 common waterhemp, and 5 velvetleaf.

Date	Jun-01-05	Jun-23-05	Jun-24-05	Jul-01-05	Jul-08-05	Jul-18-05	Jul-22-05	Jul-23-05
Treatment	PRE	2-4"W	0-5"W	5-10"W	10-15"W	15-20"W	20-25"W	21DL5-10"W-IN
Air temperature (F)	80	79	96	83	82	79	91	88
Relative humidity (%)	34	80	32	39	43	84	56	70
Soil moisture	BELNOR	BELNOR	BELNOR	BELNOR	NORMAL	ABONOR	NORMAL	NORMAL
soybean								
leaf no.		V2	V2	V3	V4	R2	R2	R2
height (inch)		5	5	6	9-10	16-18	18-19	18-19

giant foxtail								
leaf no.	4-6	4-8	7-9	9-10	10+	8-10		
height (inch)	1-4	2-5	6-8	10-12	15-20	20-25		
common cocklebur								
leaf no.	3-5	3-4	7-9	6-8	10+	8-12	4-6	
height (inch)	1-3	2-4	5-6	6-8	15-18	20-25	5-10	
common ragweed								
leaf no.			5-6	4-6	10+	10+		
height (inch)			4-5	6-8	15-20	20-25		
common waterhemp								
leaf no.			9-10	10-11	10+	10+		
height (inch)			6-7	6-8	15-18	20-25		
velvetleaf								
leaf no.	2-3	2-4	4-6	6-8	8-10	10-12	4-5	
height (inch)	1-2	1-3	5-6	8-10	15-20	20-25	5-6	

Planting date #3 (June 15, 2005)

Weed population per 0.25m² in the nontreated plots, mid-season, was 11 giant foxtail, 14 common waterhemp, 6 velvetleaf, and 1 each of common cocklebur and common ragweed.

Date	Jun-16-05	Jul-08-05	Jul-08-05	Jul-11-05	Jul-18-05	Jul-22-05	Jul-27-05	Jul-29-05
Treatment	PRE	2-4"W	0-5"W	5-10"W	10-15"W	15-20"W	20-25"W	21DL0-5"W-IN
Air temperature (F)	79	82	82	76	79	91	72	80
Relative humidity (%)	37	43	43	96	84	56	70	40
Soil moisture	NORMAL	NORMAL	NORMAL	ABONOR	ABONOR	NORMAL	NORMAL	NORMAL
soybean								
leaf no.		V2	V2	V2	V3-V4	V5	R1	R1
height (inch)		4-5	4-5	4-5	8-10	10-11	12-14	12-14
giant foxtail								
leaf no.		3-4	5-6	6-8	5-10	8-10	8-10	
height (inch)		4-6	4-6	6-8	10-15	15-20	20-25	
common cocklebur								
leaf no.		4-6	5-6	8-10	8-12	10-12	10-12	4-6
height (inch)		2-4	4-6	7-9	10-15	15-20	20-25	0-5
common ragweed								
leaf no.						10-15	10+	4-6
height (inch)						15-20	20-25	0-5
common waterhemp								
leaf no.		6-8	8-10	9-10	10+	10+	10+	4-6
height (inch)		2-3	3-4	5-8	10-12	15-20	20-25	0-5
velvetleaf								
leaf no.		3-4	4-5	6-8	8-10	8-10	8-10	
height (inch)		2-3	3-4	5-6	10-12	15-20	20-25	

None of the herbicides caused soybean injury. Soil applied herbicides followed by glyphosate controlled giant foxtail, common cocklebur, common ragweed, common waterhemp, and velvetleaf 93 to 100%, regardless of planting date. No sequential applications of glyphosate were required to maintain 90% or greater weed control through harvest when glyphosate was applied at 10 to 25 inch weeds regardless of planting date. 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 in height consistently reduced soybean grain yield by 11 to 25 bu/A with the May and early-June planting date regardless of variety. Delaying the planting reduced grain yield by 11 to 12 bu/A when comparing the later-planted soybean with earlier-planted soybean regardless of variety. Within each planting date, there was no difference in grain yield in the handweeded plots among soybean varieties with yield ranging from 52 to 66 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 ^c									
	Rate (lb/A)	Time	Height inch	Maturity DAP	Moisture %	Yield bu/A	SETFA		XANST		AMBEL		AMATA		ABUTH	
							21 DAT	21 EOS	21 DAT	21 EOS	21 DAT	21 EOS	21 DAT	21 EOS	21 DAT	21 EOS
Planting date 1, Asgrow 3905 RR																
Nontreated			40	135	21.3	6	0	0	0	0	0	0	0	0	0	0
No herbicide + handweed			43	128	14.0	66	100	100	100	100	100	100	100	100	100	100
Sulfentrazone + cloransulam / glyphosate	0.25 +0.031 / 0.56	PRE / 2-4"W	42	128	14.2	60	0	97	90	93	97	100	100	100	93	100
Glyphosate / glyphosate	1.12 / 0.75	0-5"W / 21DL	39	128	13.9	64	100	100	87	100	100	100	83	100	96	100
Glyphosate	1.12	5-10"W	35	128	14.2	58	100	100	100	100	100	100	97	96	97	97
Glyphosate	1.12	10-15"W	35	128	14.6	58	100	100	100	100	99	99	100	100	98	98
Glyphosate	1.12	15-20"W	33	128	14.0	45	100	100	100	100	99	99	100	100	99	99
Glyphosate	1.12	20-25"W	34	128	14.7	41	100	100	100	100	98	98	100	100	99	99
Planting date 1, Asgrow 4603 RR																
Nontreated			39	146	21.1	6	0	0	0	0	0	0	0	0	0	0
No herbicide + handweed			42	139	14.6	63	100	100	100	100	100	100	100	100	100	100
Sulfentrazone + cloransulam / glyphosate	0.25 +0.031 / 0.56	PRE / 2-4"W	42	139	14.7	57	0	97	90	94	90	100	97	100	97	100
Glyphosate / glyphosate	1.12 / 0.75	0-5"W / 21DL	41	139	14.5	62	100	100	93	100	97	100	72	100	93	100
Glyphosate	1.12	5-10"W	40	139	14.5	58	100	100	99	99	100	100	98	98	96	98
Glyphosate	1.12	10-15"W	37	139	14.5	52	100	100	100	100	100	100	100	97	93	96
Glyphosate	1.12	15-20"W	33	139	14.2	48	100	100	100	100	100	100	100	100	99	99
Glyphosate	1.12	20-25"W	32	139	15.1	38	100	100	100	100	98	98	100	100	98	98

(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 ^c									
	Rate (lb/A)	Time	Height inch	Maturity DAP	Moisture %	Yield bu/A	SETFA		XANST		AMBEL		AMATA		ABUTH	
							21 DAT	21 EOS	21 DAT	21 EOS	21 DAT	21 EOS	21 DAT	21 EOS	21 DAT	21 EOS
Planting date 2, Asgrow 3905 RR																
Nontreated			39	121	13.8	23	0	0	0	0	0	0	0	0	0	0
No herbicide + handweed			39	118	14.1	57	100	100	100	100	100	100	100	100	100	100
Sulfentrazone + cloransulam / glyphosate	0.25 +0.031 / 0.56	PRE / 2-4"W	38	118	14.4	58	78	100	94	100	99	100	100	100	99	100
Glyphosate	1.12	0-5"W	36	118	14.4	55	100	100	100	100	100	100	100	100	96	96
Glyphosate / glyphosate	1.12 / 0.75	5-10"W / 21DL	35	118	14.5	56	93	100	97	100	100	100	98	100	92	100
Glyphosate	1.12	10-15"W	35	118	14.3	54	100	100	100	100	100	100	100	100	96	99
Glyphosate	1.12	15-20"W	33	121	14.5	54	100	100	100	100	100	100	100	100	99	99
Glyphosate	1.12	20-25"W	33	121	14.6	46	100	100	100	100	100	100	100	100	97	97
Planting date 2, Asgrow 4603 RR																
Nontreated			38	132	14.6	25	0	0	0	0	0	0	0	0	0	0
No herbicide + handweed			41	125	14.4	58	100	100	100	100	100	100	100	100	100	100
Sulfentrazone + cloransulam / glyphosate	0.25 +0.031 / 0.56	PRE / 2-4"W	41	125	14.2	58	70	100	99	100	100	100	99	100	93	100
Glyphosate	1.12	0-5"W	42	125	14.2	60	100	100	100	100	100	100	98	98	97	100
Glyphosate / glyphosate	1.12 / 0.75	5-10"W / 21DL	35	125	14.3	53	100	100	100	100	100	100	100	100	72	100
Glyphosate	1.12	10-15"W	37	125	14.1	55	100	100	100	100	100	100	100	100	90	98
Glyphosate	1.12	15-20"W	37	128	14.3	48	100	100	100	100	100	100	100	100	89	89
Glyphosate	1.12	20-25"W	37	128	14.0	49	100	100	100	100	100	100	100	100	94	94

(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 ^c									
	Rate (lb/A)	Time	Height inch	Maturity DAP	Moisture %	Yield bu/A	SETFA		XANST		AMBEL		AMATA		ABUTH	
							21 DAT	EOS	21 DAT	EOS	21 DAT	EOS	21 DAT	EOS	21 DAT	EOS
Planting date 3, Asgrow 3905 RR																
Nontreated			34	118	13.9	13	0	0	0	0	0	0	0	0	0	0
No herbicide + handweed			32	111	13.5	54	100	100	100	100	100	100	100	100	100	100
Sulfentrazone + cloransulam / glyphosate	0.25 +0.031 / 0.56	PRE / 2-4"W	31	111	13.2	52	52	100	99	100	100	100	95	99	88	99
Glyphosate / glyphosate	1.12 / 0.75	0-5"W / 21DL	32	111	13.3	54	92	100	97	100	97	100	88	100	93	100
Glyphosate	1.12	5-10"W	33	111	13.6	53	100	100	100	100	100	100	93	96	95	95
Glyphosate	1.12	10-15"W	33	111	13.3	53	100	100	100	100	100	100	100	100	99	99
Glyphosate	1.12	15-20"W	33	111	13.5	50	100	100	100	100	100	100	100	100	100	100
Glyphosate	1.12	20-25"W	33	111	13.5	46	100	100	100	100	100	100	100	100	93	93
Planting date 3, Asgrow 4603 RR																
Nontreated			37	118	14.4	16	0	0	0	0	0	0	0	0	0	0
No herbicide + handweed			36	114	13.6	52	100	100	100	100	100	100	100	100	100	100
Sulfentrazone + cloransulam / glyphosate	0.25 +0.031 / 0.56	PRE / 2-4"W	37	114	13.3	42	60	100	96	100	100	100	95	100	84	100
Glyphosate / glyphosate	1.12 / 0.75	0-5"W / 21DL	36	114	13.3	50	80	100	96	100	100	100	89	100	93	100
Glyphosate	1.12	5-10"W	37	114	13.2	46	97	97	99	99	99	99	95	95	92	93
Glyphosate	1.12	10-15"W	37	114	13.6	52	100	100	100	100	100	100	100	100	99	99
Glyphosate	1.12	15-20"W	35	118	13.3	48	100	100	100	100	100	100	100	100	100	100
Glyphosate	1.12	20-25"W	36	118	13.4	48	100	100	100	100	100	100	100	100	99	99
LSD			3.7	0	1.2	8	12.5	2	4.9	2	3.3	0.5	6.3	2.7	7.7	4.4
P			0.01	1.0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

^aFor all postemergence only treatments, a second postemergence application was planned for 21 days later (21DL), but only to be applied if needed, if listed, the second postemergence application was needed, if not listed, then not needed.

All glyphosate was Roundup WeatherMax.

^bDAP = Days after planting.

^cDAT = Days after preemergence for preemergence/postemergence or days after first postemergence for postemergence only. EOS = End of season.