SOYBEAN INJURY FROM DICAMBA DRIFT

J.L. Griffin, M.J. Bauerle, D.O. Stephenson, III, D.K. Miller, and J.M. Boudreaux
School of Plant, Environmental, and Soil Sciences, Dean Lee Research Station, and
Northeast Research Station

In sugarcane the dicamba containing herbicides, Weedmaster/Brash/others (dicamba + 2,4-D) and Clarity/Vision/others (dicamba), are labeled for use both in-crop, during the fallow period, and on ditchbanks. In the sugarcane area it has become more common for soybeans to be planted in fallowed sugarcane fields. The close proximity of soybeans to sugarcane increases the potential for dicamba drift to soybeans. Field studies were conducted over three years and at three locations in Louisiana to evaluate soybean growth and yield response to postemergence application of dicamba. Clarity was applied to soybeans at V3-V4 (2 to 3 fully expanded trifoliate leaves) at 8, 4, 2, 1, 0.5, 0.25, and 0.125 oz/A (1/2 to 1/128 of the labeled use rate in sugarcane of 16 oz/A). In a separate study, soybeans at R1 (first flower) were treated with Clarity at 2, 1, 0.5, 0.25, 0.125, 0.063, and 0.031 oz/A (1/8 to 1/512 of the labeled use rate). In both studies a non-treated control was included for comparison and a randomized complete block experimental design with four replications was used. Treatments in both studies were applied in 15 gallons per acre spray volume. Parameters measured were visual crop injury 7 to 10 and 14 to 21 d after treatment (DAT); mid-season plant height and crop canopy width; mature plant height; and soybean yield. For each of the parameters measured, data were averaged across experiments.

For the V3-V4 application, soybean injury 7 to 10 DAT was 90% at 8 oz/A Clarity and injury decreased in a stepwise progression as rate decreased; injury was 18% at 0.125 oz/A (data not shown). For the R1 application, injury 7 to 10 DAT was 65% at 2 oz/A Clarity and injury decreased in a stepwise progression as rate decreased; injury was 16% at 0.031 oz/A. At 14 to 21 DAT, soybean injury for the V3-V4 application was 97% at 8 oz/A and 36% at 0.125 oz/A (Table 1). Soybean injury for the R1 application 14 to 21 DAT was 67% at 2 oz/A and 19% at 0.031 oz/A (Table 1). Injury ranged from cupping and crinkling of uppermost leaves to plants turned down with growing points near the soil surface. At higher rates stem swelling and cracking were observed. For the V3-V4 application, mid-season soybean height compared with the non-treated was reduced 85% at 8 oz/A Clarity and 14% at 0.125 oz/A (data not shown). Mid-season height following the R1 application was reduced 56% at 2 oz/A and 21% at 0.031 oz/A. For the V3-V4 application, mid-season soybean canopy width compared with the non-treated was reduced 83% at 8 oz/A Clarity and 9% at 0.125 oz/A (data not shown). Mid-season canopy width following the R1 application was reduced 42% at 2 oz/A and 13% at 0.031 oz/A.

For the V3-V4 application mature soybean height compared with the non-treated was reduced 71% at 8 oz/A Clarity and 6% at 0.125 oz/A (Table 1). Mature height following the R1 application was reduced 57% at 2 oz/A and 26% at 0.031 oz/A. Soybean yield compared with the non-treated for the V3-V4 application was reduced 92% at 8 oz/A Clarity and 8% at 0.25 oz/A (Table 1). When Clarity was applied at 0.125 oz/A, soybean yield was equivalent to the non-treated (46.6 Bu/A). For the R1 application, soybean yield was reduced 79% at 2 oz/A and 17% at 0.031 oz/A. When Clarity was applied at 0.25 oz/A (1/64 of the use rate and which can be expected with herbicide drift), soybean yield was reduced 8% with Clarity applied at V3-V4 and 43% when applied at R1.

Table 1. Soybean injury, mature plant height, and yield as influenced by application of Clarity (dicamba) at V3-V4 (2 to 3 fully expanded trifoliate leaves) and at R1 (first flower).

Clarity rate	Soybean injury (14-21 DAT)[2]		Mature height[2]		Soybean yield[2]	
oz/A[1]	V3-V4	R1	V3-V4	R1	V3-V4	R1
	---------%--------		cm (% reduction vs. non-treated)		Bu/A (% reduction vs. non-treated)	
8 oz	97 a[3]	--	27.5 h (71%)	--	3.5 g (92%)	--
4 oz	87 b	--	45.5 g (52%)	--	9.5 f (80%)	--
2 oz	71 c	67 a	51.6 f (45%)	42.7 f (57%)	18.8 e (60%)	10.7 h (79%)
1 oz	58 d	46 b	59.4 e (37%)	49.4 e (50%)	30.8 d (34%)	21.9 g (56%)
0.5 oz	47 e	35 c	63.3 d (33%)	58.2 d (41%)	35.1 c (25%)	25.1 f (50%)
0.25 oz	40 f	32 c	69.6 c (26%)	59.8 d (40%)	43.0 b (8%)	28.6 e (43%)
0.125 oz	36 g	25 d	87.9 b (6%)	66.6 c (33%)	45.2 a (3%)	34.8 d (31%)
0.063 oz	--	24 d	--	68.2 bc (31%)	--	38.7 c (23%)
0.031 oz	--	19 e	--	72.8 b (26%)	--	41.8 b (17%)
Non-treated	0 h	0 f	94.0 a	98.9 a	46.6 a	50.2 a

[1] Clarity rates represent 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128, 1/256, and 1/512 of the use rate of 16 oz/A.

[2] For soybean injury, V3-V4 data averaged for 6 experiments and R1 data averaged for 5 experiments; for mature height, V3-V4 data averaged for 2 experiments and R1 data averaged for 3 experiments; for yield, V3-V4 data averaged for 5 experiments and R1 data averaged for 6 experiments.

[3] Means within each column followed by the same letter are not significantly different ($P \leq 0.05$).

EVALUATION OF BERMUDAGRASS CONTROL PROGRAMS IN A FALLOWED SUGARCANE FIELD

J.L. Griffin, J.M. Boudreaux, M.J. Bauerle, and M.E. Salassi
School of Plant, Environmental, and Soil Sciences and
Department of Agricultural Economics and Agribusiness

In a typical fallow program, sugarcane stubble from the last harvest is destroyed in the spring or early summer, and fields are prepared for replanting in August and September. During this time period, producers are able to control perennial weeds, which have established over the crop cycle with postemergence application of glyphosate and timely tillage operations. The fallow period is critical for perennial weed management because once sugarcane is planted the row top will not be mechanically disturbed for the remainder of the multi-year crop cycle.

A study was conducted at the Sugar Research Station, St. Gabriel, LA, in a sugarcane field heavily infested with bermudagrass. Prior to implementation of treatments, stubble was destroyed by disking (2 passes each) on May 1 and May 26. Fallow programs for bermudagrass included various combinations of tillage to include bottom plowing (10 to 12 inches deep), disking, chisel plowing, and re-hipping of beds along with single or multiple applications of glyphosate (Roundup OriginalMax at 46 oz/A per application). The July 26 bermudagrass control ratings represented 14 days after the first Roundup application (treatments 1 and 2), 14 days after re-hipping of beds (treatment 3), and 10 days after chisel plowing, disking, and bed-up (treatment 4) (Table 1). Bermudagrass ground cover was around 5% for treatments 1 and 2, 39% for treatment 3, and 20% for treatment 4.

On August 11 ground cover ratings were made just prior to the second Roundup application (treatments 1 and 2) and just prior to the first Roundup application (treatments 3 and 4). Bermudagrass ground cover was 17 and 28% for treatments 1 and 2, respectively, 28% for treatment 3, and 56% for treatment 4. Sugarcane was planted September 10 and the entire experimental area was treated broadcast with Sencor at 2.0 lb product/A. Bermudagrass ground cover on November 23 (74 days after planting) was less numerically where two applications of Roundup were made compared with one application and ground cover was less where Roundup was applied twice and plots were bottom plowed (16 vs. 11% ground cover). This response was also observed on December 22 (103 days after planting) and bermudagrass ground cover was 9 and 11% for treatments 1 and 2, respectively, 21% for treatment 3, and 15% for treatment 4. Sugarcane shoot population was determined on October 26 and November 24 and differences among treatments were not noted (Table 1). Variable treatment cost for the fallow programs, which included charges for tillage (fuel and labor) and herbicide (material and application), was $81.22, $76.95, $55.83, and $59.12 for treatments 1, 2, 3, and 4, respectively (Table 1). Comparing treatments 1 and 2, the bottom plow operation for treatment 1 increased variable cost $4.27/A. The greater variable cost for treatments 1 and 2 compared with treatments 3 and 4 was related primarily to the number of Roundup OriginalMax applications. In late February of 2011, Sencor at 2.5 lb product/A was applied broadcast to the entire experimental area. Bermudagrass control will be evaluated in plant cane and sugarcane shoot population will be determined.

Table 1. Bermudagrass control, sugarcane shoot population, and variable cost for tillage and Roundup OriginalMax fallow programs at the Sugar Research Station, St. Gabriel, LA, 2010.

			Bermudagrass ground cover (%)				Sugarcane shoot population (no./row)		
Treatment	Field operations[1]	Date performed	July 26[2]	August 11[3]	November 23[4]	December 22[4]	October 26	November 24	Variable cost/A[5]
1	Bottom plow (10 -12 inches deep)	May 27	5 c[6]	17 b	11 a	9 a	85 a	104 a	$81.22
	Chisel plow	June 18							
	Disk	June 21							
	Bed up (2 operations)	June 21,22							
	Roundup OriginalMax @ 46 oz/A	July 12							
	Roundup OriginalMax @ 46 oz/A	August 11							
2	Chisel plow	June 18	4 c	28 b	16 a	11 a	85 a	99 a	$76.95
	Disk	June 21							
	Bed up (2 operations)	June 21,22							
	Roundup OriginalMax @ 46 oz/A	July 12							
	Roundup OriginalMax @ 46 oz/A	August 11							
3	Chisel plow	June 18	39 a	28 b	25 a	21 a	76 a	103 a	$55.83
	Disk	June 21							
	Bed up (2 operations)	June 21,22							
	Re-hip beds	July 12							
	Roundup OriginalMax @ 46 oz/A	August 11							
4	Chisel plow	June 18	20 b	56 a	21 a	15 a	91 a	108 a	$59.12
	Disk	June 21							
	Chisel plow, disk, bed up	July 16							
	Roundup OriginalMax @ 46 oz/A	August 11							

[1] Prior to implementation of treatments stubble was destroyed by disking (2 passes each) on May 1 and May 26.

[2] Rating made 14 days after the first Roundup application (treatments 1 and 2); 14 days after re-hipping (treatment 3); and 10 days after chisel plow, disk, and bed-up (treatment 4).

[3] Rating made just prior to second Roundup application (treatments 1 and 2) and just prior to first Roundup application (treatments 3 and 4).

[4] Ratings made 74 and 103 days after sugarcane planting.

[5] Variable treatment cost includes charges for tillage (fuel and labor) and herbicide (material and application). Fallow treatment input prices used: diesel @$2.30/gal.; labor @ $9.60/hr.; herbicide @ $57.60/gal.

[6] Means within each column followed by the same letter are not significantly different ($P \leq 0.05$).