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Residual Effects on Cotton

from Broadstrike + Treflan Applied to Soybean and Broadstrike SF + Dual Applied to Corn

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Introduction

Broadstrike (flumetsulam) is a broadleaf herbicide first suggested in Mississippi for weed control in corn and soybean in 1994. It is commercially available as a prepackaged mixture with Treflan (trifluralin) and Dual (metolachlor) for preplant soil incorporated or preemergence use in soybean. It also is available as a prepackaged mixture with Dual for preemergence use in corn. A new stand-alone flumetsulam product is available as Python. Currently, the restriction for planting cotton after use of flumetsulam is 18 months. Because of the planting restriction, cotton cannot be considered for crop rotation with corn or soybean for an extended period after the use of Broadstrike or Python. The objective of this research was to evaluate the response to the time lag between the use of Broadstrike and the planting of cotton.

Materials and methods

A Broadstrike + Treflan mixture was preplant soil incorporated to soybean, and a Broadstrike SF + Dual mixture was applied preemergence to corn in 1994 and 1995. Broadstrike + Treflan was applied at 1.6 pints per acre (0.05 + 0.68 pound active ingredient [ai]) and 2 pints per acre (0.063 + 0.85 pound ai). Broadstrike SF + Dual was applied at 1.6 pints per acre (0.05 + 1.5 pounds ai) and 2 pints per acre (0.1063 + 1.87 pounds ai). For comparison, a Treflan-only treatment was applied to soybean, and a Dual-only treatment was applied to corn.

Cotton was planted during 1995 in plots that had grown Broadstrike-treated corn and soybean for 1 year. In 1996 and 1997, cotton was planted in plots that had grown Broadstrike-treated corn and soybean for 1 year or 2 consecutive years.

All herbicides were applied with a tractor-mounted sprayer delivering 20 gallons total broadcast volume per acre. Row cultivation and postemergence-directed herbicides were applied with a four-row cultivator equipped with spray shields leaving a 12-inch undisturbed band centered on the crop row. [Table 1](#) presents a list of the mechanical tillage operations, and [Table 2](#) describes the herbicide applications for each crop during the 4 years. Cultivation for corn was performed on May 19, 1994, and May 10, 1995; for soybean, May 19 and June 20, 1994, and May 10 and 30, 1995; and for cotton, May 10 and 30, 1995, June 5, 1995, May 15, 1996, June 10, 1996, and June 5, 1997.

Corn (Deltapine brand '8695') was planted April 8, 1994, and March 21, 1995. Soybean (Pioneer brand '9592') was planted May 6, 1994, and April 10, 1995. Two cotton varieties were grown: Deltapine brand 'DES 119' was planted in 1995, and Suregrow brand 'SG 125' was planted in 1996 and 1997. Cotton was planted April 27, 1995, April 19, 1996, and April 21, 1997; it was replanted May 14, 1997. Cotton was grown without supplemental irrigation. A four-row John Deere 7100 planter was used for all crops. Crops were grown on a Bosket silt loam soil (30% sand, 53% silt, 17% clay, 1% organic matter, and pH 6.3). All areas were subsoiled at 45 degrees to the row direction in October or November each year.

In addition to the herbicide treatments described in [Table 2](#), a lay-by application of Bladex (cyanazine -- 1 pound ai per acre), Goal (oxyfluorfen -- 0.5 pound ai per acre), and COC 1% was made to cotton on July 21, 1997. Roundup D-Pak (glyphosate -- 0.75 pound ai per acre) and Induce at 1% v/v was applied to control winter vegetation on February 18, 1997.

Granular in-furrow fungicide (Terrachlor Super X) was applied to cotton. An insecticide (Force 3G) was applied to corn at planting, and other insect control was provided according to Mississippi State University Extension Service recommendations.

Nitrogen was applied as urea ammonium nitrate (UAN, 32% N) solution in early side-dress applications 10 inches to each side of the corn and cotton rows. No nitrogen was applied to soybean. A total of 150 pounds of N per acre was applied to corn in 1994, and a total of 180 pounds per acre was applied in 1995. Cotton received a total of 90 pounds of N per acre in 1995 and 100 pounds per acre in 1996 and 1997. In 1995, the growth regulator Pix (mepiquat) was applied to cotton on June 26 at 1 pint per acre and again on July 11 at 0.5 pint per acre.

Cotton was harvested once each year with a mechanical picker adapted to harvesting plots. Corn and soybean were harvested with a two-row Massey 8 plot combine, with a header attachment for corn.

The experiment was designed as a randomized complete block with six replicates. Individual plots consisted of four crop rows, 40 inches wide by 40 feet long. All data were obtained from the two center rows of each plot. Cotton response was measured by determining the stand, plant height, and yield each year. Cotton height was determined by measuring from the soil surface to the terminal of the plant. In May 1995, every 20th plant (8 to 12 plants total) in the two center rows of each plot was measured; in July 1995, every 10th plant (total of 14 plants) was measured. In 1996 and 1997, 15 consecutive plants in a selected row planted with the same planter unit were measured. An average was calculated for each plot and analyzed for treatment differences.

The field was infested with a scattered population of ivyleaf, pitted, and willowleaf morningglory; nodding surge; and annual grasses. Herbicide treatments, combined with hoeing, were effective in controlling weeds on the row, and cultivation controlled weeds between the rows. Purple nutsedge gradually increased each year but did not affect stand or yield. Zorial (norflurazon) was applied in 1997 to help in suppressing nutsedge.

Weed control was evaluated in 1994 and 1995. On May 27, 1994, morningglory control was evaluated by counting plants on a 12-inch-wide band centered on each of two center rows for their entire length of 40 feet. On May 17, 1995, a visual estimate of broadleaf weed control was recorded (0 = no control; 100 = complete control).

Results

Weed Control

[Table 3](#) presents data for broadleaf weed control in 1994 and 1995. Morningglory control was variable with Broadstrike + Treflan, Broadstrike SF + Dual, Treflan alone, and Dual alone. This finding probably resulted from the low and variable population (196 to 3,349 plants per acre) of morningglory present. Probably for the same reason, broadleaf control was also inconsistent in 1995, although Canopy (metribuzin + chlorimuron) was used on the Treflan-only soybean check treatment, and Cotoran (fluometuron) + Bladex was used on cotton. The mixture of Broadstrike + Treflan or Broadstrike SF + Dual performed as well as the no-Broadstrike controls under the conditions of this study for broadleaf weed control in 1994 and 1995.

In 1996 and 1997, weeds were controlled with uniform applications of herbicides to all treatments as needed ([Table 2](#)). Herbicides were augmented with hand hoeing and mechanical cultivation to prevent yield reductions due to weed competition.

Crop Response

Corn and soybean – Treatments with Broadstrike + Treflan or Broadstrike SF + Dual did not affect corn or soybean stand in 1994 or 1995, when compared with Treflan, Dual, or Canopy without Broadstrike ([Table 4](#)). The very low soybean plant population in 1995 resulted from the early planting date and very high rainfall (9+ inches) during the 13 days after planting.

Corn and soybean yields were not affected by the application of Broadstrike + Treflan or Broadstrike SF + Dual, when compared with Treflan, Dual, or Canopy applied alone ([Table 6](#)). The low soybean yields in 1995 reflect the low plant population.

Cotton – In 1995, cotton stand was not affected by any treatment. In 1996, a marginal stand in May was evident with some treatments ([Table 4](#)). When determined again in early August, cotton stand was reduced in plots that had been planted in soybean treated with 2 pints per acre of Broadstrike + Treflan, as compared with plots where Broadstrike was not used. In 1996, after 2 years of applying Broadstrike SF + Dual to corn at 2 pints per acre, cotton stand was reduced, when compared with Dual alone. In 1997, cotton stand was marginally adequate because of extended cool, wet conditions. These conditions were considered responsible for the few treatment differences that occurred.

Generally, cotton stand was not different in 1997 following corn or soybean. With one exception, this finding was true for cotton stands after 1 or 2 consecutive years of application of Broadstrike to corn or soybean. The exception was cotton planted in plots that had grown soybean treated with 2 pints per acre of Broadstrike + Treflan for 2 years.

Cotton plant height in late May 1995 was reduced with Broadstrike + Treflan applied at both 1.6 and 2 pints per acre to soybean in 1994 ([Table 5](#)). Broadstrike SF + Dual (2 pints per acre) applied to corn in 1994 also reduced cotton height in 1995. When measured in May 1995, cotton height was less in plots that had been planted in soybean treated with Treflan alone in 1994, as compared to plots that had been planted in corn

treated with Dual alone in 1994. July 1995 measurements revealed a similar cotton plant height reduction for Broadstrike + Treflan applied to soybean in 1994 at 2 pints per acre. However, cotton height was intermediate in plots that had received the 1.6-pint-per-acre Broadstrike + Treflan treatment in 1994; this finding indicates some plant compensation. Broadstrike SF + Dual applied to corn in 1994 at either rate did not reduce cotton height in July 1995. It is thought that the added plant residue from corn may have had a positive influence for reducing cotton injury.

In 1996, cotton height in June was not affected by Broadstrike + Treflan applied to soybean in 1994. When compared with the Treflan-only treatment, Broadstrike + Treflan applied to soybean at 1.6 pints per acre in both 1994 and 1995 resulted in reduced cotton height, and the reduction was even greater with the 2-pint-per-acre treatment. This relationship also was true for Broadstrike SF + Dual applied to corn in 1994 and 1995, when compared with Dual alone.

In 1997, cotton height in July was not affected by Broadstrike + Treflan applied to soybean or Broadstrike SF + Dual applied to corn in 1994, when compared with the standard herbicides. Likewise, cotton height was not affected by the applications of Broadstrike SF + Dual to corn in both 1994 and 1995. However, Broadstrike + Treflan applied to soybean at 2 pints per acre in both 1994 and 1995 reduced cotton height in July 1997, when compared with Treflan alone. On the other hand, the 1.6-pint-per-acre Broadstrike + Treflan treatment applied in 1994 and 1995 did not reduce cotton plant height in 1997, when compared with Treflan alone.

Cotton yield in 1995 was not affected by Broadstrike SF + Dual applied to corn in 1994 ([Table 6](#)). However, when Broadstrike + Treflan was applied at 1.6 or 2 pints per acre to soybean in 1994, cotton yield in 1995 was reduced, when compared with Treflan alone. Cotton yields in 1996 and 1997 were not affected by any of the treatments, regardless of the timing of the applications.

Conclusion

These studies confirmed the need to allow more than 12 months after 1 or 2 years of Broadstrike + Treflan application to soybean before planting cotton. These studies show no effect on cotton yield when cotton was planted 12 months after application of Broadstrike SF + Dual to corn for either 1 or 2 successive years. The cotton yield response after the use of Broadstrike in corn can probably be attributed to the influence of organic material produced by the corn crop on the residual activity of Broadstrike.

References

Etheridge, Robert E., Edward C. Murdock, Gregory S. Stapleton, and Joe E. Toler. 1996. Sicklepod (*Senna obtusifolia*) control in soybean (*Glycine max*) with imazaquin and metribuzin combinations. *Weed Technology* 10:78-84.

Hurst, Harold R. 1997. Non-irrigated cotton following the application of Broadstrike SF + Dual to corn or Broadstrike + Treflan to soybean for 1 or 2 years. *Proceedings of the Southern Weed Science Society*. 50:46-47.

Jennings, Katherine M., Alan C. York, Roger B. Batts, and A. Stanley Culpepper. 1997. Sicklepod (*Senna obtusifolia*) and entireleaf morningglory (*Ipomoea hederacea* var. *integriscula*) management in soybean (*Glycine max*) with flumetsulam. *Weed Technology* 11:227-234.

Johnson, III, W. Carroll, and Benjamin G. Mullinix, Jr. 1996. Phytotoxicity of flumetsulam on peanut. *Weed Technology* 10:481-487.

Jordan, David L., and Stephen H. Crawford. 1997. Rice (*Oryza sativa*) response to soil residues of selected herbicides. *Weed Technology* 11:379-383.

Sprague, Christy L., Edward W. Stoller, and Stephen E. Hart. 1997. Preemergence broadleaf weed control and crop tolerance in imidazolinone-resistant and -susceptible corn (*Zea mays*). *Weed Technology* 11:118-122.

Table 1. Tillage operations for Broadstrike applied to corn and soybean with evaluation of residual effect on cotton, 1994-1997.

Crop	1994	1995	1996	1997
Hip				
Corn	3/16/94	11/9/94	Not Planted	Not planted
Cotton	Not Planted	11/9/94, 3/13/95	2/26/96	3/17/97
Bed Conditioner (Do-All)				
Corn	3/16/94 (twice)	11/9/94 (Roller), 2/7/95	Not Planted	Not Planted
Soybean	3/16/94	Not Performed	Not Planted	Not Planted
Cotton	Not Planted	11/9/94 (Roller), 3/13/95 (twice)	2/26/96, 3/14/96	4/11/97
Disk Harrow				
Corn	Not Performed	8/25/94 (twice)	Not Planted	Not Planted
Soybean	4/15/94, 4/22/94	3/24/95	Not Planted	Not Planted
Cotton	Not Planted	3/13/95	2/26/96	3/12/97
Harvest				
Corn	8/23/94	8/8/95	Not Planted	Not Planted
Soybean	9/22/94	9/27/95	Not Planted	Not Planted
Cotton	Not Planted	9/15/95	10/3/96	10/2/97

Table 2. Herbicides and application for Broadstrike applied to corn and soybean with evaluation of residual effect on cotton, 1994-1997.

Crop	Herbicide, rate, and date applied			
	1994	1995	1996	1997
	lb ai/A	lb ai/A	lb ai/A	lb ai/A
Preplant Soil Incorporation				
Soybean	Trt. 1,3: Broadstrike + Treflan (0.063 + 0.85), April 8 Trt. 2,4: Broadstrike + Treflan (0.05 + 0.68), April 8 Trt. 5,6: Treflan (0.75), April 8	Trt. 3: Same, March 24 Trt. 4: Same, March 24 Trt. 5: Same, March 24	Not Planted	Not Planted
Cotton	Not Planted	None	Treflan (0.75), Feb. 26	Treflan + Zorial (0.75 + 0.64), March 12
Preemergence (20-inch band)				

Corn	Trt. 7,9: Broadstrike SF + Dual (0.063 + 1.87), April 8 Trt. 8,10: Broadstrike SF + Dual (0.05 + 1.5), April 8 Trt. 11,12: Dual (2), April 8	Trt. 9: Same, March 21 Trt. 10: Same, March 21 Trt. 11: Atrazine + Dual (1.5 + 2), March 21	Not Planted	Not Planted
Soybean	None	Canopy (0.375), April 10	Not Planted	Not Planted
Cotton	Not Planted	Cotoran + Bladex (1.25 + 0.4), April 27	Cotoran + Cy-Pro (1.25+0.4), April 19	Cotoran + Zorial + Bladex + Gramoxone (1.25 + 0.63 + 0.5 + 0.75), April 21
Postemergence (20-inch band)				
Corn	None	None	Not Planted	Not Planted
Soybean	None	Reflex (0.375) + surfactant (over-the-top) June 5 Assure II (0.094) + C.O.C. (over-the-top) July 14	Not Planted	Not Planted
Cotton	Not Planted	Bladex + Bueno 6 (0.6 + 1.5), directed June 5	None	Caparol + Ansar 6.6 (0.5 + 1.5), directed June 5

Table 3. Weed control with Broadstrike + Treflan, Treflan, and Canopy in soybean; Broadstrike SF + Dual in corn; and Cotoran + Bladex in cotton (1994 and 1995).

Trt. no	1994 Herbicide (rate) lb ai/A	Morningglory plants per 80 ft ² on row (5/27/94) ¹ no.	1995 Herbicide (rate) lb ai/A	Estimated visual broadleaf weed control (0-100%) ¹ %
Soybean		Cotton		
(1)	Broadstrike + Treflan (0.063 + 0.85)	3.7 b	Cotoran + Bladex (1.25 + 0.4)	96 a-d
(2)	Broadstrike + Treflan (0.05 + 0.68)	2.0 b	Cotoran + Bladex (0.125 + 0.4)	91 a-d
(6)	Treflan (0.75)	12.5 ab	Cotoran + Bladex (1.25 + 0.4)	81 d
Soybean		Soybean		
(3)	Broadstrike + Treflan	14.7 ab	Broadstrike + Treflan	84 cd

	(0.063 + 0.85)		(0.063 + 0.85)	
(4)	Broadstrike + Treflan (0.05 + 0.68)	12.0 ab	Broadstrike + Treflan (0.05 + 0.68)	84 cd
(5)	Treflan (0.75)	6.8 ab	Canopy (0.375)	97 abc
Corn				
(7)	Broadstrike SF + Dual (0.063 + 1.87)	9.3 ab	Cotoran + Bladex (1.25 + 0.4)	92 a-d
(8)	Broadstrike SF + Dual (0.05 + 1.5)	4.5 ab	Cotoran + Bladex (1.25 + 0.4)	90 bcd
(12)	Dual (2)	20.5 a	Cotoran + Bladex (1.25 + 0.4)	84 d
Corn				
(9)	Broadstrike SF + Dual (0.063 + 1.87)	1.2 b	Broadstrike SF + Dual (0.063 + 1.87)	100 a
(10)	Broadstrike SF + Dual (0.05 + 1.5)	2.0 b	Broadstrike SF + Dual (0.05 + 1.5)	97 abc
(11)	Dual (2)	11.2 ab	Dual (2)	98 ab
¹ Means within a crop with the same letter are not different using a significance level of 0.05 according to DMRT.				

Table 4. The residual effect of Broadstrike + Treflan and Broadstrike SF + Dual on crop stand, 1994-1997.

Trt. no.	Crop/Broadstrike use ^{1, 2}	
	1994	1995
	pt/A	pt/A
	Soybean	Cotton
(1)	2.0	None
(2)	1.6	None
(6)	None	None
	Soybean	Soybean
(3)	2.0	2.0
(4)	1.6	1.6
(5)	None	None
	Corn	Cotton

(7)	2.0	None
(8)	1.6	None
(12)	None	None
	Corn	Corn
(9)	2.0	2.0
(10)	1.6	1.6
(11)	None	None

¹Table 3 lists herbicides used with controls.

²Table 2 lists herbicides used with cotton.

³Means within a crop with the same letter are not different using a significance level of 0.05 according to DMRT.

⁴Rows counted early.

⁵Rows counted late.

Table 4. Continued.

Table 4. The residual effect of Broadstrike + Treflan and Broadstrike SF + Dual on crop stand, 1994-1997.

Trt. no.	Crop/Broadstrike use 1, 2 Crop plants/acre (thousands) ^{2, 3}				
	5/27/94	1995	5/27/96 ⁴	8/8/96 ⁵	7/7/97
	no./A	no./A	no./A	no./A	no./A
	Soybean	Cotton (5/23)	Cotton	Cotton	Cotton
(1)	175.7 a	43.0 a	41.4 a	31.4 abc	31.2 ab
(2)	181.3 a	46.6 a	32.0 a	41.2 abc	30.0 ab
(6)	201.8 a	46.7 a	26.8 a	37.2 ab	30.0 ab
	Soybean	Soybean (5/3)	Cotton	Cotton	Cotton
(3)	173.5 a	25.1 a	35.3 a	21.6 c	27.1 b
(4)	174.2 a	22.5 a	31.1 a	26.8 bc	29.6 ab
(5)	196.0 a	21.1 a	34.2 a	36.2 ab	33.8 a
	Corn	Cotton (5/23)	Cotton	Cotton	Cotton
(7)	16.4 ab	44.0 a	37.1 a	33.4 ab	28.4 ab
(8)	16.4 ab	42.4 a	32.2 a	31.8 abc	26.6 b
(12)	16.1 b	44.7 a	29.9 a	40.4 a	30.2 ab
	Corn	Corn (4/17)	Cotton	Cotton	Cotton
(9)	16.6 ab	32.3 a	39.3 a	27.0 bc	27.7 b
(10)	17.3 ab	32.6 a	30.2 a	31.8 abc	31.0 ab
(11)	18.1 a	31.9 a	42.7 a	39.0 a	31.0 ab

¹Table 3 lists herbicides used with controls.

²Table 2 lists herbicides used with cotton.

³Means within a crop with the same letter are not different using a significance level of 0.05 according to DMRT.

⁴Rows counted early.

⁵Rows counted late.

Table 5. The residual effect on cotton height of Broadstrike + Treflan applied to soybean and Broadstrike SF + Dual applied to corn, 1995-1997.

Trt. no.	Crop/Broadstrike use ¹		Cotton plant height ²			
	1994	1995	5/30/95	7/12/95	6/11/96	7/16/97
	pt/A	pt/A	cm	cm	cm	cm
	Soybean	Cotton				
(1)	2.0	None	7.3 d	64.3 c	29.1 ab	84.8 bc
(2)	1.6	None	8.3 d	71.3 bc	32.3 ab	86.9 b
(6)	None	None	13.1 b	84.9 ab	33.9 a	91.3 ab
	Soybean	Soybean				
(3)	2.0	2.0	--	--	8.8 d	77.3 c
(4)	1.6	1.6	--	--	17.6 c	85.5 b
(5)	None	None	--	--	28.4 ab	90.1 ab
	Corn	Cotton				
(7)	2.0	None	10.7 c	84.2 ab	32.1 ab	90.6 ab
(8)	1.6	None	11.4 bc	88.8 a	32.4 ab	89.1 ab
(12)	None	None	17.1 a	97.3 a	35.6 a	90.3 ab
	Corn	Corn				
(9)	2.0	2.0	--	--	18.2 c	93.2 ab
(10)	1.6	1.6	--	--	25.4 b	96.3 a
(11)	None	None	--	--	35.5 a	92.2 ab

¹Table 2 lists herbicides used with cotton, and Table 3 lists herbicides used with controls.

²Means within the same column with the same letter are not different using a significance level of 0.05 according to DMRT.

Table 6. The residual effect of Broadstrike + Treflan and Broadstrike SF + Dual on crop yield, 1995-1997.

Trt. no.	Crop/Broadstrike use ¹		Crop yield ^{2, 3}			
	1994	1995	1994	1995	1996	1997
	pt/A	pt/A				
	Soybean	Cotton	Soybean	Cotton	Cotton	Cotton

(1)	2.0	None	30.3 a	1,584 b	2,841 a	2,941 a
(2)	1.6	None	29.7 a	1,847 b	2,921 a	2,931 a
(6)	None	None	21.5 b	2,294 a	3,103 a	3,106 a
	Soybean	Soybean	Soybean	Soybean	Cotton	Cotton
(3)	2.0	2.0	27.7 a	19.3 a	2,625 a	2,644 a
(4)	1.6	1.6	28.9 a	18.8 a	2,700 a	2,665 a
(5)	None	None	26.8 a	13.6 b	2,950 a	3,001 a
	Corn	Cotton	Corn	Cotton	Cotton	Cotton
(7)	2.0	None	93.6 b	2,392 a	2,824 a	2,857 a
(8)	1.6	None	94.1 b	2,391 a	2,802 a	2,802 a
(12)	None	None	88.0 bc	2,465 a	3,077 a	3,083 a
	Corn	Corn	Corn	Corn	Cotton	Cotton
(9)	2.0	2.0	95.8 b	135.7 a	2,729 a	2,779 a
(10)	1.6	1.6	108.1 a	137.7 a	2,815 a	2,824 a
(11)	None	None	79.7 c	126.8 a	3,074 a	3,101 a

¹Table 2 lists herbicides used with cotton, and Table 3 lists herbicides used with controls.

²Means within a crop with the same letter are not different using a significance level of 0.05 according to DMRT.

³Crop yield is measured in bushels per acre at 13% moisture for corn and soybean. Cotton yield was measured in pounds of seed cotton per acre.

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