

PREEMERGENCE WEED CONTROL IN WEST TEXAS WITH STAPLE® HERBICIDE

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Abstract

Field studies have been conducted since 1990 throughout the cotton belt to evaluate preemergence efficacy and crop tolerance of Staple® herbicide (*pyrithiobac sodium*) in cotton. This paper summarizes test results from West Texas, New Mexico and the Mid-South.

Preemergence trials in West Texas have concentrated on Staple at 0.5 to 1.0 ozai/a alone and in combination with labeled rates of Karmex® (*diuron*) or Caparol® (*prometryn*) herbicides. Staple 0.5 to 1.0 ozai/a provided good to excellent (>80%) control of Palmer amaranth (*Amaranthus palmeri*), lanceleaf sage (*Salvia reflexa*) and venice mallow (*Hibiscus trionum*). However, control of red morningglory (*Ipomoea coccinea*) and entireleaf morningglory (*Ipomoea hederacea*) required Staple 1.0 ozai/a. The addition of Staple 0.5 ozai/a to Karmex herbicide increased control of all weeds evaluated, while the addition to Caparol herbicide increased control of all weeds except Palmer amaranth and devil's claw.

In preemergence field studies from the Mid-South, Staple 0.5 ozai/a has provided excellent (>90%) control of redroot pigweed (*Amaranthus retroflexus*), smooth pigweed (*Amaranthus hybridus*), and spurred anoda (*Anoda cristata*). Staple 0.5 ozai/a has provided good (>80%) control of Palmer amaranth, prickly sida (*Sida spinosa*) and velvetleaf (*Abutilon theophrasti*).

In West Texas trials, crop injury in sandy loam to clay soils following treatment from Staple 1.0 ozai/a averaged 1.3% at 14 days and 1.2% at 28 days after treatment. Crop injury in sand to loamy sand soils averaged 21.4% at 14 days after treatment and decreased to 12.5% at 28 days after treatment. However, in one trial on a sandy soil injury from Staple 0.5-1.0 ozai/a ranged from 47%-57% at 14 days after treatment.

Introduction

Since 1990, more than 70 replicated small plot studies have been conducted by DuPont and university researchers in West Texas and New Mexico to evaluate Staple's preemergence efficacy on key weeds and crop tolerance. These data represent a cross section of solid types and environmental conditions found throughout West Texas and

New Mexico. Additional trials conducted in the Mid-South demonstrate the efficacy of Staple on other key weeds not commonly found in West Texas.

Results and Discussion

Preemergence trials have concentrated on Staple at 0.5 to 1.0 ozai/a alone and in combination with Karmex and Caparol herbicides. As shown in Table 1, Staple at 0.5 to 1.0 ozai/a provided good to excellent control of Palmer amaranth, lanceleaf sage and venice mallow, while control of red morningglory and entireleaf morningglory required 1.0 ozai/a. These results are based on evaluations taken at 4-5 weeks after treatment. Control of devil's claw and prairie sunflower was poor to fair at all rates tested.

The addition of Staple 0.5 ozai/a to labeled rates of Karmex and Caparol greatly improved the overall weed control provided by these compounds alone. Table 2, shows the results from Staple plus Karmex mixtures. Control of Palmer amaranth and venice mallow are improved from the 80% level to greater than 90%. Control of red morningglory and lanceleaf sage increased from poor to good. In Table 3, a similar improvement in efficacy is seen when Staple 0.5 ozai/a is added to labeled rates of Caparol herbicide. Control of all weeds evaluated improved, except for Palmer amaranth and devil's claw.

Table 4 shows a summary of Staple preemergence trials conducted in the Mid-South and illustrates the efficacy of Staple on some key weeds not commonly found in West Texas. Staple 0.5 ozai/a gave good (>80%) control of Palmer amaranth, prickly sida and velvetleaf. Control of redroot pigweed, smooth pigweed, and spurred anoda averaged greater than 90%.

Cotton soils in West Texas generally range in texture from almost pure sand to clay. Therefore, data on preemergence crop tolerance is divided into the following two groups: 1) sandy loam to clay soils, and 2) loamy sand to sand. As noted in Table 5, early season cotton injury from preemergence applications in soils with sandy loam to clay texture following Staple 0.5 ozai/a averaged 1.0% at 14 days and 0.8% at 28 days after treatment. Results were very similar at the 1.0 ozai/a rate. Preemergence applications in these soils have demonstrated good crop tolerance. Visual injury symptoms, when observed, consist of slight stunting and chlorosis. These results are based on observation dates of 14 to 28 days after treatment.

Visual injury from the mixture of Staple 0.5 ozai/a plus Karmex averaged 3.7%-4.2% at 14 days and declined to 0.4%-3.0% at 28 days after treatment. Slightly less injury was seen with the Staple plus Caparol mixtures.

Injury symptoms from preemergence applications to sandy soils were considerably greater and appeared rate related. Visual injury from Staple 1.0 ozai/a in sand to loamy sand

soils averaged 21.4% at 14 days after treatment and decreased to 12.5% at 28 days after treatment.

Summary

In summary, the following key points can be made regarding Staple:

- Preemergence crop tolerance has been good in sandy loam to clay soils, but poor to sand to loamy sand soils.
- Staple provided good-excellent preemergence control of lanceleaf sage, venice mallow, red morningglory, and Palmer amaranth.
- Addition of Staple 0.5 ozia/a to Karmex improved control of all weeds evaluated.
- Addition of Staple 0.5 ozai/a to Caparol improved control of all weeds evaluated, except Palmer amaranth and devil's claw.
- Mid-South trials- Staple 0.5-0.75 ozai/a gave good-excellent control of pigweed species, spurred anoda, prickly sida and velvetleaf.

Staple will provide cotton growers in West Texas and other cotton growing areas with an important new tool for preemergence control of broad range of annual weeds. Registration of the preemergence use of Staple is expected for the 1998 use season.

Acknowledgments

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Table 1. Efficacy of preemergence applications of Staple in West Texas, 1990-1997

WEED PESTS	% WEED CONTROL			
	0.5 OZAI	0.75 OZAI	1.0 OZAI	CAP 19.2
P. AMARANTH	83 (12)	85 (13)	89 (20)	94 (14)
L. SAGE	80 (7)	88 (9)	93 (12)	64 (9)
P. SUNFLOWER	64 (3)	77 (3)	78 (3)	74 (2)
D. CLAW	43 (13)	53 (8)	66 (13)	47 (13)
RED MORNING	65 (7)	81 (7)	85 (10)	81 (10)
ENTIRELEAF MG	73 (2)	73 (2)	84 (2)	69 (1)
V. MALLOW	97 (4)	98 (3)	98 (3)	80 (5)

() DENOTES NO. OF TESTS
EVALUATION AT 4-5 WAT

Table 2. Efficacy of preemergence tank mixtures of Staple plus Karmex in West Texas, 1990-1997.

WEED PESTS	% WEED CONTROL			
	KAR 12.8	STA 0.5 + KAR 12.8	KAR 16.0	STA 0.5 + KAR 16.0
P. AMARANTH	83 (5)	97 (3)	93 (2)	98 (2)
L. SAGE	54 (5)	88 (1)	52 (2)	99 (1)
P. SUNFLOWER	76 (2)	94 (2)	85 (1)	88 (1)
D. CLAW	43 (7)	76 (5)	59 (3)	65 (3)
RED MORNING	70 (8)	81 (5)	77 (7)	90 (6)
V. MALLOW	87 (4)	98 (4)	80 (1)	100 (1)

() DENOTES NO. OF TESTS
EVALUATIONS AT 4-5 WAT

Table 3. Efficacy of preemergence mixtures of Staple plus Caparol in West Texas, 1990-1997.

WEED PESTS	% WEED CONTROL			
	CAP 12.8	STA 0.5 + CAP 12.8	CAP 19.2	STA 0.5± CAP 19.2
P. AMARANTH	87 (3)	80 (1)	94 (14)	96 (5)
L. SAGE	38 (2)	88 (2)	64 (9)	-----
P. SUNFLOWER	67 (1)	80 (1)	74 (2)	95 (1)
D. CLAW	21 (2)	44 (2)	47 (13)	49 (2)
RED MORNING	61 (4)	79 (5)	81 (10)	91 (4)
V MALLOW	42 (2)	98 (1)	80 (5)	100 (1)

() DENOTES NO. OF TESTS
EVALUATIONS AT 4-5 WAT

Table 4. Efficacy of preemergence applications of Staple in the Mid-South, 1990-1997.

WEED PESTS	% WEED CONTROL	
	0.5 OZAI	0.75 OZAI
P. AMARANTH	82 (21)	89 (2)
REDROOT PIGWEED	96 (8)	98 (7)
SMOOTH PIGWEED	100 (5)	99 (5)
SPURRED ANODA	96 (4)	96 (4)
PRICKLY SIDA	83 (29)	86 (23)
VELVETLEAF	82 (9)	85 (8)

() DENOTES NO. OF TESTS
EVALUATIONS AT 4-5 WAT

Table 5. Visual injury to cotton from preemergence applications of Staple in sandy loam-clay soils in West Texas, 1990-1997.

TREATMENTS	% VISUAL INJURY			
	14 DAT	RANGE	28 DAT	RANGE
STAPLE 0.5	1.0 (25)	0 - 18	0.8 (37)	0 - 18
STAPLE 0.75	1.7 (26)	0 - 32	0.7 (40)	0 - 14
STAPLE 1.0	1.3 (29)	0 - 22	1.2 (53)	0 - 12.5
CAPAROL 19.2	1.3 (25)	0 - 10	1.2 (32)	0 - 12.5

* () DENOTES NO. TESTS
OM - 0.7 - 2.3, Ph - 6.4 - 8.5