

# WEED CONTROL IN COTTON WITH COMMAND 3 ME, FLUOMETURON, AND

STAPLE

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## Abstract

Several trials were initiated in 1997, to evaluate the length of residual weed control of Command 3 ME plus fluometuron with and without Staple postemergence and to evaluate Command 3 ME plus fluometuron preemergence followed by Staple postemergence in a systems approach to weed control in cotton compared to competitive programs. Soil applied treatments with Command 3 ME controlled problem weeds in cotton better and longer into the season than Prowl + fluometuron or Zorial + fluometuron applied PRE. Staple applied postemergence following the preemergence treatments generally lengthened weed control in the Command plus fluometuron treatments but not always in competitive treatments. In a systems approach, preemergence treatments that contained Command at 0.5 to 1.0 lb ai/ac and followed by Staple postemergence, controlled troublesome weeds in cotton equal to or better than competitive treatments.

## Introduction

Soil applied herbicides in a systems approach with postemergence herbicide technology has long provided most reliable weed control results (Wilcut, et. al., 1996). Command 3 ME plus fluometuron controls many troublesome weeds in cotton (Jordan, et. al., 1990; Smith, et. al. 1996). Weed control programs that eliminate residual herbicides from a cotton production system may require more management and present greater risks from a weather, weed size / early weed competition standpoint (Brown, 1997). Early season weed free cotton growth has always been the goal of cotton growers. It has been reported that when preemergence herbicides were included in a program approach with postemergence herbicides in cotton, less postemergence applications were necessary (Wilcut and Hinton, 1997). Another report has indicated that the most effective weed control can be obtained with soil applied

herbicides followed by POST treatments versus a total POST programs alone in cotton (Isgett, et. al., 1997; Keeling and Dotray, 1997; Keeton and Murdock, 1997; Murdock, et. al., 1997). Several trials were conducted to compare Command 3 ME based preemergence herbicide programs to competitive herbicide programs.

## Materials and Methods

Several trials were initiated in 1997, to evaluate Command 3 ME with fluometuron preemergence (PRE) followed by Staple postemergence (POST) in cotton. Two sets of trials were initiated to evaluate length of residual control of Command 3 ME plus fluometuron with and without Staple postemergence (POST) and to evaluate Command 3 ME plus fluometuron PRE followed by Staple POST in a systems approach to weed control in cotton compared to competitive programs.

### Length of Residual

Trials were initiated in Arkansas, North Carolina, Texas, and Mississippi to compare the length of residual weed control to other standard PRE herbicides with and without Staple as follow-up POST treatments. Command at 0.75 and 1.0 lb ai/ac plus fluometuron at 0.75 and 1.0 lb ai/ac were tank-mixed and applied PRE followed by Staple POST at 0.0625 lb ai/ac. These treatments were compared to Prowl at 0.75 lb/ac plus fluometuron PRE alone and followed by Staple POST at 0.0625 lb/ac and Zorial at 1.0 lb/ac plus fluometuron at 0.75 lb/ac with and without Staple POST.

Trials were evaluated weekly beginning at 7 days after emergence and weekly thereafter to evaluate length of residual control for each treatment. Once weeds began to grow through a treatment, Staple was applied POST.

### Program Approach

In the program approach set of trials there were 19 different problem weeds evaluated in nine southern cottonbelt states. All trials were conducted in a small plot format. Plots were generally two to four rows treated and two untreated rows per plot. Plots ranged in length from 30 to 50 feet. Herbicides were applied using small plot, compressed air applicators. Disyston at 0.75 lb/ac was applied in furrow with all Command 3 ME treatments. PRE herbicides were applied immediately following planting.

### Results and Discussion

Weed control data were collected, then the number of days after planting each treatment provided at least 85% control of each species was tabulated. Weed control data were summarized by location then combined over location for this manuscript. Treatment means were compared to other treatments occurring in the same trial.

### Length of Residual

Command + fluometuron controlled entireleaf morningglory greater than 84% for 40 or more days after planting (DAP),

in a Mississippi trial. This is compared to approximately 23 DAP by Prowl + fluometuron applied PRE or Zorial + fluometuron applied PRE. Each of the two latter treatments provided greater than 84% entireleaf morningglory control for 23 DAP or less. Staple was applied POST to all treatments at 43 DAP. After the POST Staple application, Command + fluometuron at 0.75 + 0.75 lb /ac controlled entireleaf morningglory over 67 DAP. POST Staple treatments did not improve entireleaf morningglory control in the Prowl + fluometuron PRE treatment. However, entireleaf morningglory control in the Zorial + fluometuron PRE followed Staple POST was improved to at least 84% control for more than 23 DAP but less than 40 DAP. Staple POST treatments were required at 27 DAP in the Prowl + fluometuron PRE and Zorial + fluometuron PRE treatments in a North Carolina trial with a mixture of morningglory species. In contrast, the treatments receiving Command + fluometuron PRE did not require a POST over-the-top treatment until 32 DAP. Prowl + fluometuron applied PRE controlled morningglories < 84% at 27 DAP. All Command + fluometuron treatments controlled morningglories greater than 84% at 27 DAP.

Treatments receiving Prowl plus fluometuron PRE or Zorial plus fluometuron PRE did not provide > 84% control beyond 27 DAP. All plots that received Command + fluometuron or Zorial + fluometuron and treated with Staple POST controlled morningglories better than 84% for more than 58 DAP. Staple POST also improved morningglory control in the Prowl + fluometuron treatment to more than 84% beyond 27 DAP.

Pitted morningglory was the prevalent morningglory at the Arkansas and Texas locations. All PRE treatments controlled pitted morningglory over 84% for 42 and 82 DAP at the Texas and Arkansas locations, respectively. Longer residual morningglory control at these locations without a POST Staple treatment was probably due to lower morningglory infestations compared to the other trial sites.

At the Arkansas site, all PRE treatments controlled smooth pigweed > 84% over 34 DAP. Staple was applied to the entire trial at 30 DAP, however, the only treatment that required Staple for pigweed control was Prowl + fluometuron applied PRE. After the Staple POST treatment, Command plus fluometuron PRE and Zorial plus fluometuron PRE each resulted in over 82 days of pigweed control greater than 84%. In contrast, Prowl + fluometuron followed by Staple POST controlled pigweed over 84% at 55 DAP but not at 82 DAP. At the Mississippi site, smooth pigweed was controlled over 40 DAP by all treatments without a Staple POST application (data not shown).

Command plus fluometuron applied PRE controlled prickly sida more than 40 DAP. Comparatively, Prowl plus fluometuron PRE and Zorial plus fluometuron PRE controlled prickly sida over 84% for less than 23 DAP. When Staple was applied POST following Command plus

fluometuron applied PRE, prickly sida was controlled for more than 67 DAP. Prickly sida control was extended past 23 DAP but less than 40 DAP by Prowl + fluometuron followed by Staple or to 57 DAP by Zorial + fluometuron followed by Staple POST. However, prickly sida control was less than that obtained with treatments with Command PRE followed by Staple applied POST.

Soil applied treatments with Command 3 ME controlled morningglories better and longer into the season than Prowl + fluometuron or Zorial + fluometuron applied PRE. In two other trials, morningglory control was equal between these treatments. Staple POST lengthened morningglory control in the Command plus fluometuron treatments but not in the competitive treatments.

Smooth pigweed control was similar among PRE treatments without Staple POST at two locations. Staple applied POST following the PRE treatments lengthened the residual control for smooth pigweed by Command + fluometuron more than for Prowl + fluometuron at the Arkansas location.

Command plus fluometuron controlled common cocklebur in North Carolina greater than 84% for more than 27 DAP. Prowl + fluometuron and Zorial + fluometuron failed to provide this level of cocklebur control for 27 DAP. Staple applied POST improved common cocklebur control in all treatments to an acceptable level beyond 58 DAP.

In Mississippi, Command + fluometuron treatments controlled prickly sida longer than competitive treatments. The addition of Staple POST lengthened prickly sida control for all treatments, although Command plus fluometuron followed by Staple controlled prickly sida 10 to 17 days longer than Prowl plus fluometuron followed by Staple or Zorial plus fluometuron followed by Staple POST.

Preemergence treatments that contained Command at 0.75 to 1.0 lb/ac controlled troublesome weeds in cotton better than competitive treatments. This agrees with past work by other researchers that reported Command plus fluometuron based herbicide treatments equaled or exceeded that from other PRE herbicides programs (Jordan, et. al., 1993) They also reported that Command + fluometuron programs controlled pitted morningglory and cotton yields with this treatment exceeded that with standard treatments of a dinitroaniline herbicide + fluometuron or norflurazon + fluometuron based treatments. Nimbal et. al. (1995) reported that Command + PRE was more effective than other standard PRE programs in controlling cocklebur. Other reports indicate control of troublesome weeds in cotton by Command + fluometuron (Jordan et. al., 1990) equal to or greater than standard treatments (Brecke, 1996; Harrison and Hayes, 1992; Smith, et. al., 1996).

### **Program Approach**

Command at 0.5 to 1.0 lb/ac plus fluometuron at 0.5 to 1.0 lb/ac followed by Staple POST controlled large crabgrass at 36 to 64 DAT similar to Prowl + fluometuron at 0.75 + 1.0 lb/ac PRE followed by Staple POST. Command at 0.75 to 1.0 lb/ac + fluometuron at 0.75 to 1.0 lb/ac followed by Staple POST controlled large crabgrass better than Prowl + fluometuron PRE followed by Staple POST. As Command rate increased, large crabgrass control increased. In the two trials conducted on johnsongrass, Command + fluometuron at 0.5 + 0.5 lb/ac, was not tested. Command (0.75 to 1.0 lb/ac) + fluometuron (0.75 to 1.0 lb/ac) followed by Staple controlled johnsongrass 8 to 10% higher than Prowl + fluometuron followed by Staple POST. When Command was applied at 1.0 lb/ac, Palmer amaranth control was higher than with the competitive treatment at 16 to 28 days after treatment (data not shown).

Ivyleaf morningglory and prickly sida control with Command based treatments was equal to the Prowl + fluometuron treatment, both followed by Staple POST. Pitted morningglory control was higher in all command based treatments versus Prowl + fluometuron.

### **Summary**

These data indicate that Command is an effective soil applied PRE herbicide that will prevent early season weed interference and will lessen the need for difficult to time POST applications later in the season. Several reports indicate that Command based PRE herbicide programs control troublesome cotton weeds and prevent early season weed competition (Harrison and Hayes, 1992; Jordan et. al., 1990; Jordan et. al., 1993; Nimbale et. al., 1995; Smith et. al., 1996). Effective PRE cotton weed control programs reduce management decisions and widen the window for timing of later POST applied herbicides. Past research indicates that a combination of PRE and POST herbicides integrated into a systems approach offers a more effective and reliable weed management program (Brown, 1997; Isgett et. al., 1997; Keeling and Dotray, 1997; Keeton and Murdock, 1997; Murdock et. al., 1997; Wilcut and Hinton, 1997).

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Table 1. Length of residual morningglory control in cotton with Command 3 ME + fluometuron - 1997.

Treatment	lb ai/ac	DAP <sup>a</sup> Weed Control was > 84 % (No Staple postemergence)			
		IPOHG <sup>b</sup>	IPOXX	IPOLA	IPOLA
		MS	NC	AR	TX
Command	0.75	<40	<27	>82	>42
fluometuron	0.75				
Command	1.0	>40	>27	>82	>42
fluometuron	1.0				
Prowl	0.75	<23	<27	>82	>42
fluometuron	0.75				
Zorial	1.0	>23	<27	>82	>42
fluometuron	0.75				

<sup>a</sup>DAP = Days After Planting.

<sup>b</sup>IPOHG - entireleaf morningglory; IPOXX - mixture of morningglory species; IPOLA - pitted morningglory.

Table 2. Length of residual morningglory control in cotton with Command 3 ME + fluometuron followed by Staple postemergence - 1997.

Treatment	lb ai/ac	DAP <sup>a</sup> Weed Control was > 84 % (Staple postemergence at 0.0625 lb ai/ac)			
		IPOHG <sup>b</sup>	IPOXX	IPOLA	IPOLA
		MS	NC	AR	TX
Command	0.75	>67	>58	>82	>42
fluometuron	0.75				
Command	1.0	>67	>58	>82	>42
fluometuron	1.0				
Prowl	0.75	<23	<58	>82	>42
fluometuron	0.75				
Zorial	1.0	<40	>58	>82	>42
fluometuron	0.75				

<sup>a</sup>DAP = Days After Planting.

<sup>b</sup>IPOHG - entireleaf morningglory; IPOXX - mixture of morningglory species; IPOLA - pitted morningglory.

Table 3. Length of residual pigweed and cocklebur control in cotton with Command 3 ME + fluometuron with and without Staple applied postemergence - 1997.

Treatment	lb ai/ac	DAP <sup>a</sup> Weed Control was > 84 %			
		AMACH <sup>b</sup>		XANST	
		Mississippi		North Carolina	
		- Staple	+ Staple <sup>c</sup>	- Staple	+ Staple
Command	0.75	>34	>82	>27	>58
fluometuron	0.75				
Command	1.0	>34	>82	>27	>58
fluometuron	1.0				
Prowl	0.75	>34	>55	<27	>58
fluometuron	0.75				
Zorial	1.0	>34	>82	<27	>58
fluometuron	0.75				

<sup>a</sup>DAP = Days After Planting.

<sup>b</sup>AMACH - smooth pigweed, XANST - common cocklebur.

<sup>c</sup>Staple applied POST at 0.0625 lb ai/ac.

Table 4. Length of residual prickly sida control in cotton with Command 3 ME + fluometuron with and without Staple applied postemergence - 1997.

Treatment	lb ai/ac	DAP <sup>a</sup> Weed Control was > 84 % Prickly Sida (Mississippi)	
		- Staple	+ Staple <sup>c</sup>
		Command	0.75
fluometuron	0.75		
Command	1.0	>40	>67
fluometuron	1.0		
Prowl	0.75	<23	<40
fluometuron	0.75		
Zorial	1.0	<23	>57
fluometuron	0.75		

<sup>a</sup>DAP = Days After Planting.

<sup>b</sup>Staple applied POST at 0.0625 lb ai/ac.

Table 5. Grass control with Command 3 ME + fluometuron PRE followed by Staple applied postemergence in a program approach - 1997.

Treatment <sup>a</sup>	lb ai/ac	% Control	
		DIGSA <sup>b</sup>	SORHA
Command	0.5	83	--
fluometuron	0.5		
Command	0.75	93	93
fluometuron	0.75		
Command	1.0	92	95
fluometuron	1.0		
Prowl	0.75	85	85
fluometuron	0.75		

<sup>a</sup>Staple applied postemergence at 0.0625 lb ai/ac following all preemergence treatments.

<sup>b</sup>DIGSA - large crabgrass; SORHA - johnsongrass.

Table 6. Broadleaf weed control with Command 3 ME + fluometuron PRE followed by Staple applied postemergence in a program approach - 1997.

Treatment <sup>a</sup>	lb ai/ac	% Control		
		IPOHE <sup>b</sup>	IPOLA	SIDSP
Command	0.5	91	93	97
fluometuron	0.5			
Command	0.75	94	92	96
fluometuron	0.75			
Command	1.0	96	94	98
fluometuron	1.0			
Prowl	0.75	93	87	95
fluometuron	0.75			

<sup>a</sup>Staple applied postemergence at 0.0625 lb ai/ac following all preemergence treatments.

<sup>b</sup>IPOHE - ivyleaf morningglory, IPOLA - pitted morningglory, SIDSP - prickly sida.