

**THE EFFICACY OF GRASS HERBICIDES ON  
BARNYARDGRASS  
(ECHINOCHLOA CRUS-GALLI) WHEN APPLIED  
ALONE AND IN COMBINATION  
WITH STAPLE (PYRITHIOBAC SODIUM)  
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**Abstract**

Both broadleaf and grassy weed species can negatively impact cotton growth, development, defoliation and quality. Studies are being conducted in the San Joaquin Valley of California to determine the effects of Staple (pyrithiobac sodium) with Fusilade (fluazifop), Poast (sethoxydim), and Prism (clethodim) when the grass herbicides are either tank mixed with or applied after the Staple application. At 21 days after application (DAT) in 1996, there was no indication of antagonism. At 28 DAT in 1997 there was no indication of antagonism with the Poast or Prism tank mixes or sequential treatments, however there was evidence of antagonism with Fusilade on barnyardgrass (*Echinochloa crus-galli*).

**Introduction**

Broadleaf and grassy weeds compete with cotton for light, nutrients and space during cotton establishment and development. Grassy weed species such as barnyardgrass can reduce the effects of defoliants on cotton and interfere with harvest. Grasses can also have a negative effect on quality due to green staining and contamination of the lint. Consequently, it can be very important to effectively control grasses in cotton.

Cotton profitability is becoming a very important issue. If a tank mix application can control both broadleaf and grassy weeds, there could be a significant financial advantage to the grower. But only if this tank mix is effective and there is no antagonism between the broadleaf and grass herbicides. Research is being conducted in the San Joaquin Valley of California to investigate the effects on selective grass herbicides when tank mixed with Staple or applied 1, 4 or 7 days after Staple. These studies have been performed exclusively with barnyardgrass and will continue in 1998.

**Materials and Methods**

An Acala Maxxa cotton field was divided into four replications in a randomized complete block design. All treatments were applied with a CO<sub>2</sub> backpack sprayer using 8002VS nozzles in 20 GPA of spray solution at 30 psi. In 1996, herbicides were applied over a period of a week

beginning June 3. At the first application date, the cotton was 5.5 inches tall with 5 to 6 true leaves and the barnyardgrass was 12 to 18 inches tall. In 1997, applications were made on May 13 and May 20. At the first application, the cotton was at 3 true leaves and the barnyardgrass was at 4 to 8 inch shoots. At the second application, the cotton was at 4 to 5 true leaves and the barnyardgrass was at 8 to 12 inch shoots.

In 1996, barnyardgrass control evaluations were taken at 12, 15, and 21 DAT. In 1997, barnyardgrass control evaluations were taken at 7, 14, 21, and 28 DAT. Statistical analysis was based on analysis of variance and mean separation on Fisher's Protected LSD. Means followed by the same letter are not significantly different from each other at the 5 percent level.

**Results**

The initial work in 1996 was done with Prism. The primary objective was to determine if application intervals had antagonistic effects that had been reported in other research. Sequential applications of Prism were made the same day, 1, 4 and 7 days (Day 1, 2, 4, 7) after the Staple applications. At 12 DAT, the Day 7 application indicated significantly greater barnyardgrass control than any other timing. At 15 DAT, there were no significant differences between the Staple and Prism tank mix and the Day 7 application of Prism with ratings of 85 and 92 percent respectively. At 21 DAT (Table 1), there were no significant differences with any of the Prism applications with control of barnyardgrass ranging from 84 to 92 percent. Staple had no effect on barnyardgrass at any time. There was no evidence of phytotoxicity at any of the evaluation dates.

In 1997, the sequential applications were limited to Day 1 and Day 7. The primary objective of this study was to determine antagonistic effects of Staple on the three major selective grass herbicides. At 14 DAT, there was no significant difference in control between Fusilade, Poast and Prism applied alone exhibiting 85 to 95 percent barnyardgrass control. At 21 DAT, the 7 DAT applications of Poast or Prism exhibited 99 percent control and were not significantly different from Prism alone at 94 percent control. At 28 DAT (Table 2), Fusilade, Poast and Prism alone exhibited 100 percent control and were not significantly different from the Prism tank mix, Poast or Prism at Day 7. At all evaluation dates there was definite grass antagonism with the Staple, Fusilade tank mix.

**Discussion**

Results indicate that Staple and Prism may be used as a tank mix for effective barnyardgrass control. Poast may also provide effective control when tank mixed or applied sequentially with Staple. Control was slower in the tank mix and sequential applications in 1997 probably due to cool spring weather conditions. Previous work with

bermudagrass (*Cynodon dactylon*) did not indicate the antagonism between Staple and Fusilade that was exhibited in the 1997 barnyardgrass work. Research conducted with johnsongrass (*sorghum halepense*) in 1997 also did not exhibit the antagonism between Staple and Fusilade.

### Summary

Using this method of broadleaf and grass weed control with tank mixes of Staple and grass herbicides will require patience on the part of the grower as visible control may take longer to appear than for applications of the grass herbicides alone. However, with proper timing, tank mixes of broadleaf and grass herbicides may provide a financial advantage to the grower.

Table 1. 1996 Barnyardgrass Control

Treatment	Rate ai/A	Timing	21 DAT
1 Staple	1.0 oz	Day 1	0 b
2 Prism	.125 lb	Day 1	87 a
3 Staple + Prism	1.0 oz .125 lb	Day 1	90 a
4 Staple + Prism	1.0 oz .125 lb	Day 1	84 a
5 Staple + Prism	1.0 oz .125 lb	Day 1 Day 2	89 a
6 Staple + Prism	1.0 oz .125 lb	Day 1 Day 4	86 a
7 Staple + Prism	1.0 oz .125 lb	Day 1 Day 7	92 a
8 UTC			0 b
Percent CV			12.87

Table 2. 1997 Barnyardgrass Control

Treatment	Rate ai/A	Timing	28 DAT
1 Staple	1.0 oz	Day 1	0 d
2 Prism	.125 lb	Day 1	100 a
3 Poast	.188 lb	Day 1	100 a
4 Fusilade	.188 lb	Day 1	100 a
5 Staple + Prism	1.0 oz .125 lb	Day 1	97 a
6 Staple + Poast	1.0 oz .188 lb	Day 1	82 b
7 Staple + Fusilade	1.0 oz .188 lb	Day 1	14 c
8 Staple + Prism	1.0 oz 125 lb	Day 1 .Day 7	98 a
9 Staple + Poast	1.0 oz 188 lb	Day 1 .Day 7	99 a
10 Staple + Fusilade	1.0 oz 188 lb	Day 1 .Day 7	86 b
11 UTC			0 d
Percent CV			10.09