

POST GRASS HERBICIDES AND PYRITHIOBAC INTERACTIONS FOR COTTON WEED CONTROL

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Abstract

In the southwestern U.S., grasses are a severe problem in many cotton growing regions. The introduction of POST graminicides has made a substantial impact on grass weed control in cotton. It is often desirable to apply herbicides in a mixture to broaden the weed control spectrum and to reduce application trips across the field. Studies have been conducted to evaluate the activity of various POST broadleaf and grass herbicides when applied in a mixture. Reduced grass control through antagonism often is a result of applying these combinations.

Field studies were conducted at Yoakum, TX in south-central Texas during the 1996 through 1998 growing season to evaluate broadleaf signalgrass [*Brachiaria platyphylla* (Griseb.)] and slender amaranthus (*Amaranthus gracilis* Desf.) control with clethodim, fluazifop-P-butyl, and fluazifop-P-butyl + fenoxaprop-P-ethyl applied in combination with or in sequential applications of pyrithiobac.

The grass herbicides and rates used were clethodim at 0.14 kg/ha, fluazifop-P-butyl at 0.21 kg/ha, and a commercial premix of fluazifop-P-butyl and fenoxaprop-P-ethyl at 0.14 kg/ha and 0.04 kg/ha, respectively. Pyrithiobac at 0.88 kg/ha was the broadleaf herbicide. An untreated check was included for comparison. Herbicides were applied individually and in tank mix combinations of each grass herbicide and pyrithiobac. Sequential applications, where pyrithiobac was applied 24 h before or after the grass herbicide, were also evaluated. A crop oil concentrate (Agri-Dex) at 1.0% (v/v) was added to all treatments.

Plot size was 2 rows wide by 89 m long with 91 cm spacing. The experimental design was a randomized complete block with four replications. Herbicides were applied in water with a compressed-air bicycle sprayer calibrated to deliver 190 L/ha at 180 kPa. Broadleaf signalgrass was 10 to 15 cm tall, 15 to 20 cm tall, and 30-46 cm tall at time of herbicide application in 1996, 1997, and 1998, respectively. Slender amaranthus was 5 to 10 cm tall in 1996 and 1998 and 10 to 15 cm tall in 1997 at the time of herbicide application.

Early season signalgrass control was $\geq 95\%$ for all grass herbicides applied alone in 1996 and 1997 but was no greater than 76% in 1998. When these herbicides were applied to broadleaf signalgrass in 1996 or 1997 the grass was ≤ 20 cm tall. However, in 1998, due to heavy early season rains, which prevented entry into the field, grass height varied from 30 to 46 cm.

When pyrithiobac was tank mixed with the commercial premix of fluazifop-P-butyl + fenoxaprop-P-ethyl, early season broadleaf signalgrass antagonism was evident in 1996 and 1998. The tank mix of pyrithiobac plus fluazifop-P-butyl resulted in antagonism in 1997 and 1998 while clethodim did not result in any antagonism when mixed with pyrithiobac.

When sequential applications of pyrithiobac and the grass herbicides were applied, early season antagonism with the premix of fluazifop-P + fenoxaprop-P were apparent two of the three years. Pyrithiobac applied 24 h prior to fluazifop-P-butyl resulted in antagonism in 1997 while both sequential treatments with fluazifop-P caused antagonism in 1998. The sequential applications of pyrithiobac and clethodim resulted in no early season antagonism of broadleaf signalgrass.

Late season control of broadleaf signalgrass with any of the graminicides was $>90\%$ in 1996 and 1997 while in 1998 control was $< 40\%$ with all graminicides. Poor late season control in 1998 was primarily due to the large grass size at treatment time. Antagonism of the premix fluazifop-P + fenoxaprop-P tank mixed with pyrithiobac was evident in only 1996. Antagonism was evident only in 1997 with fluazifop-P and pyrithiobac in a tank mix. No late season antagonism was apparent with the tank mix of clethodim and pyrithiobac.

Sequential applications of pyrithiobac with the grass herbicides resulted in reduced late-season signalgrass control in 1997. Pyrithiobac applied before and after fluazifop-P-butyl + fenoxaprop-P caused antagonism in 1997. Pyrithiobac applied 24 h before fluazifop-P resulted in antagonism in 1997. No antagonism was observed with sequential applications of pyrithiobac and clethodim.

Early season slender amaranthus control with pyrithiobac alone was $\geq 85\%$ in all three years of the study. No antagonism was noted when pyrithiobac was applied in sequence with or tank mixed with the premix of fluazifop-P + fenoxaprop-P except for the pyrithiobac treatment applied 24 h after the premix application in 1997

In 1997 and 1998, fluazifop-P tank mixed with pyrithiobac resulted in antagonism. However, with clethodim, antagonism was apparent when pyrithiobac was applied 24 h prior to or after the clethodim application in two of the three years.

Late season control of slender amaranthus with pyriithiobac alone ranged from 73 to 100%. Antagonism of pyriithiobac with fluazifop-P + fenoxaprop-P was apparent only in 1997 when tank-mixed or when pyriithiobac was applied 24 h after the fluazifop-P application.

Fluazifop-P and pyriithiobac tank-mixed or pyriithiobac applied 24 h prior resulted in slender amaranthus antagonism in 1997 while only the tank mix of fluazifop-P and pyriithiobac resulted in antagonism in 1998. Pyriithiobac applied 24 h prior to clethodim resulted in antagonism in all three years. Pyriithiobac and clethodim tank mixed as well as pyriithiobac applied 24 h after clethodim resulted in antagonism in 1997.

Seed cotton yields reflected the level of broadleaf signalgrass and slender amaranthus control. In 1996, the sequential application of pyriithiobac following fluazifop-P + fenoxaprop-P produced the highest yield. In 1997, the tank mix of fluazifop-P + fenoxaprop-P with pyriithiobac produced the highest yield. Cotton seed yields in 1997 were higher where a grass herbicide alone was applied compared with pyriithiobac alone.

In summary, clethodim applied in combination or sequential with pyriithiobac caused no broadleaf signalgrass antagonism but did cause slender amaranth antagonism. The premix of fluazifop-P + fenoxaprop-P seemed to be the most antagonistic when applied in combination with pyriithiobac or sequential applications for broadleaf signalgrass control.