THE POTENTIAL INTERACTION OF PREVENTATIVE TREATMENTS FOR INSECT AND WEED CONTROL

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Abstract

The potential interaction of at-planting insecticide treatments with pre-emergence herbicides used in cotton was investigated in 2013 and 2014. In both years, pre-emergence herbicide use did not affect final yield, but in 2013, the use of pre-emergence herbicides reduced vigor ratings. Also in 2013, higher immature thrips numbers were recorded where pre-emergence herbicides were applied. Lower thrips numbers were recorded where seed was treated with Gaucho (imidacloprid) and where Temik (aldicarb) was applied in-furrow during both years. Also, the use of Gaucho and Temik positively affected yield both years. In 2013, the use of at-planting insecticide treatments increased vigor ratings except where seed was treated with Cruiser (thiamethoxam). In 2014, the use of every insecticide increased vigor ratings. Cruiser failed to provide adequate control of thrips in both years. There were some indications of interactions between at-planting insecticide treatments and pre-emergence herbicides in 2013, but interactions were not apparent in 2014.

Introduction

The increasing occurrence of glyphosate-tolerant weeds has dramatically increased the use of pre-emergence herbicide, especially for control of Palmer pigweed, *Amaranthus, palmeri*, in West Tennessee. These herbicides may have negative effects on seedling growth and development, and thus could potentially retard seedling growth and increase the time of susceptibility to thrips (Order: Thysanoptera; Family: Thripidae). This increase in the use of pre-emergence herbicides has coincided with a reduction in efficacy of insecticide seed treatments in regards to thrips control. Thus, field studies were conducted in 2013 and 2014 using different pre-emergence herbicides and at-planting insecticide treatments to investigate possible interactions of these factors on thrips control.

Materials and Methods

The pre-emergence herbicides and at-planting insecticide treatments used in our studies are listed in Tables 1 and 2. Treatments were arranged in a factorial design within a randomized complete block. Main effects were the pre-mergence herbicide used and the at-planting insecticide treatment. Each treatment was replicated four times, and individual plots were four rows planted on 40-inch centers. Plot length was 30-35 feet, and the seeding rate was four plants per foot of row. Pre-emergence herbicides were applied the day of planting in 2013 and the day after planting in 2014. Applications were made at a volume of 10 GPA, using a self-propelled sprayer in 2013, and due to machinery malfunction, a backpack sprayer in 2014. Thrips numbers were taken from 8 plants per plot at the 1st and 2nd true leaf stages based on the development observed in Temik plots. Vigor ratings were also recorded at the 1st and 2nd true leaf stages. Ratings were on a scale of 0 - 5 where 0 = plant death and 5 = 100% vigor throughout the plot. Seed-cotton yield was also collected in all plots. Statistical analyses were done using ARM 9.0 Software (Gylling Data Management, Brooking, SD). Mean separations were done using Fischer's LSD at an alpha level of 0.05.

Table 1. Planting date, pre-emergence herbicide treatments, and at-planting insecticide treatments evaluated in these studies.

Planting date	Insecticide main effects	Herbicide main effects (oz/acre)
14-May-13	Untreated	Untreated
13-May-14	Cruiser 5F (thiamethoxam, 0.375 mg ai/seed)	Cotoran 4L (40)
	Gaucho 600 (imidacloprid, 0.375 mg ai/seed)	Cotoran 4L (40) + Reflex (16)
	Temik 15G (aldicarb, 0.75 lb ai/acre)	Cotoran 4L (40) + Dual Magnum (20)

Table 2. List of active ingredients used in these studies.

Chemical	Company	Active ingredients (% concentration)
Cotoran 4L	Makhteshim-Agan N. A.	Fluometuron (41.7)
Reflex	Syngenta	Fomesafen (22.8)
Dual Magnum	Syngenta	S-metolachlor (83.7)
Caparol 4L	Syngenta	Prometryn (44)
Cruiser 5F	Syngenta	Thiamethoxam (47.6)
Gaucho 600	Bayer CropScience	Imidacloprid (48.7)
Temik 15G	Bayer CropScience	Aldicarb (15)

Results and Discussion

Temik (aldicarb) provided the best control of thrips during both years. Gaucho (imidacloprid) provided the second best control of thrips. Cruiser (thiamethoxam) was statistically similar to untreated plots, failing to provide adequate control of thrips in either year. Herbicide applications resulted in higher thrips numbers in 2013. There was no change in thrips numbers due to herbicide application in 2014 (Table 3).

Table 3. Effect of insecticide treatment on numbers of immature thrips per 8 plants in cotton at the 2nd leaf stage.

Insecticide	Untreated	Cruiser	Gaucho	Temik
2013	129.3 a	109.1 a	55.4 b	13.5 c
2014	103.4 a	103.6 a	48.8 b	23.4 c
Herbicide	Untreated	Reflex/Cotoran	Cotoran	Cotoran/Dual Magnum
2013	51.2 c	100.6 ab	84.6 a	70.9 bc
2014	64.1 a	69.0 a	73.9 a	72.3 a

The use of Gaucho and Temik resulted in higher vigor ratings that the untreated plots in 2013, while the vigor ratings of Cruiser plots did not differ from the untreated plots. In 2014, the use of all three insecticide treatments increased vigor ratings over the untreated plots. Herbicide use in 2013 reduced vigor ratings, while in 2014; there was no effect of herbicide on vigor (Table 4).

Table 4. Effect of insecticide treatment on seedling vigor ratings, 0 - 5 scale, for cotton at the 2nd leaf stage.

Insecticide	Untreated	Cruiser	Gaucho	Temik
2013	2.27 c	2.44 c	3.06 b	3.44 a
2014	2.08 c	2.46 b	3.16 a	3.38 a
Herbicide	Untreated	Reflex/Cotoran	Cotoran	Cotoran/Dual Magnum
2013	3.06 a	2.73 bc	2.84 ab	2.58 c
2014	2.81 a	2.69 a	2.84 a	2.74 a

The use of Gaucho and Temik increased yield in both years compared with plots not treated with insecticide. The yield of plots treated with Cruiser did not differ from that of untreated plots. Herbicide applications did not have any effect on yield (Table 5). There were some indications of interactions between at-planting insecticide treatments and pre-emergence herbicides in 2013 (data not shown), but there were no indications of interactions apparent in 2014.

Table 5. Effect of insecticide treatment on yield (pounds of seed cotton per acre).

Insecticide	Untreated	Cruiser	Gaucho	Temik
2013	3263 b	3296 b	3409 ab	3556 a
2014	2651 b	2641 b	3290 a	3382 a
Herbicide	Untreated	Reflex/Cotoran	Cotoran	Cotoran/Dual Magnum
2013	3445 a	3377 a	3425 a	3276 a
2014	3089 a	2901 a	3097 a	2878 a

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