FUNGICIDE MANAGEMENT OF COTTON ROOT ROT (*PHYMATOTRICHOPSIS OMNIVORA*): 2011 RESULTS

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Abstract

Phymatotrichopsis root rot (PRR), caused by the fungus *Phymatotrichopsis omnivora*, is a serious disease in many of the cotton production areas of Texas and other southwestern states. The objective of this study was to evaluate control of PRR with flutriafol, which was shown previously to have activity against PRR. Two rates of the fungicide were applied at planting as an in-furrow or top band spray, shortly after planting as a surface spray, as a side dress to young plants, prior to flowering, or, as a spray directed towards the lower stem. The disease incidence was not significantly lower (P=0.05) with any of the fungicide treatments at any of the four locations evaluated, in comparison with the control. Drought conditions in Texas in 2011 suppressed disease development, increasing variability in replicates and diminishing differences between fungicide treatments and controls. However, significant yield responses with the fungicide treatment occurred in two out of the four experiments. Flutriafol shows promise for control of PRR, but additional experiments are needed to optimize effectiveness.

Introduction

Phymatotrichopsis root rot (PRR), caused by the fungus *Phymatotrichopsis omnivora*, occurs in many of the cotton production areas of Texas. PRR causes losses of $29 million annually (unpublished survey data of Gaylon Morgan *et al*., 2011) and limits where cotton can be grown. The objective of this study was to evaluate flutriafol for control of PRR. Flutriafol was previously reported to have activity against PRR when applied at planting (Isakeit *et al*., 2011).

Materials and Methods

A liquid, commercial formulation of flutriafol was evaluated in several Texas locations as follows:

T-band at Planting:
A DG TeeJet 80015 VS tip, oriented perpendicular to the open furrow (see Fig. 1a for placement), applied the fungicide in a volume of 4 GPA. The furrow around the seed is treated, as well as the sides of the furrow, but the seed is not directly sprayed with fungicide.

In-furrow at Planting:
The fungicide was applied with a seed bed firmer (Fig. 1b) in a volume of 10 GPA. The fungicide is more concentrated in the furrow than with a T-band application.

Side dress at Pin Head Square:
Flutriafol was knifed at 0.13 lb. a.i./A in 4 GPA 32-0-0, 6” out and 5” deep.

Top Band Spray at Planting:
Applications were made by hand with a CO_2 sprayer, as a 5-inch-wide band on the soil surface, over the planted furrow, in a volume of 8 GPA.

Stem Spray at Match Head Square:
Flutriafol was applied in a narrow band to the lower stem and adjacent soil using a CO_2 sprayer equipped with a XR TeeJet 8004 VS tip, in 15 GPA.

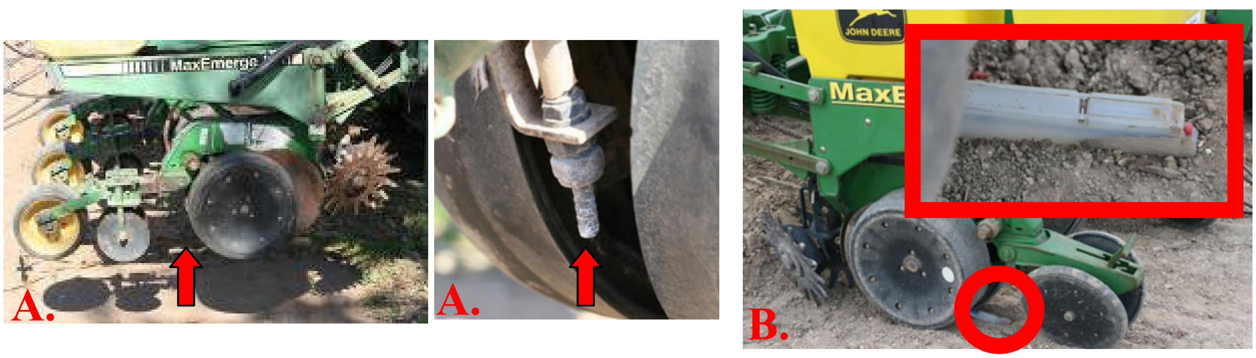

Figure 1. Application at planting. A. Placement of nozzle for T-band application (arrows, actual tip used not shown). B. Seed bed firmer used for in-furrow application.

Results and Discussion

The disease incidence was not significantly lower (P=0.05) with any of the fungicide treatments at any of the four locations shown in Tables 1 & 2, in comparison with the control. Drought conditions in Texas in 2011 suppressed disease development, increasing variability in replicates and diminishing differences between fungicide treatments and controls (Fig. 2). However, significant yield responses with the fungicide treatment occurred in two out of the four experiments (Tables 1 & 2).

T-Band Application at Planting:
At the Burleson County location, yield was significantly (P=0.05) increased with both 0.27 and 0.13 lb. a.i./A rates (Table 1), while at the WW field in Tom Green County, only the 0.27 lb. a.i./A rate increased yield (Table 2). In the Burleson County location, flutriafol treatment increased micronaire and lowered trash in comparison with the control, but did not affect other measurements of quality (data not presented).

In-furrow Application at Planting:
Both rates of flutriafol significantly (P=0.05) increased yield in the WW field in Tom Green County, in comparison with the control (Table 2).

Side Dress at Pin Head Square:

In a San Patricio County experiment, the average PRR following application of flutriafol at 0.13 lb. a.i./A knifed into soil when plants were at pin head square was 23%, which was not significantly (*P*=0.05) different than that of the control, 26%.

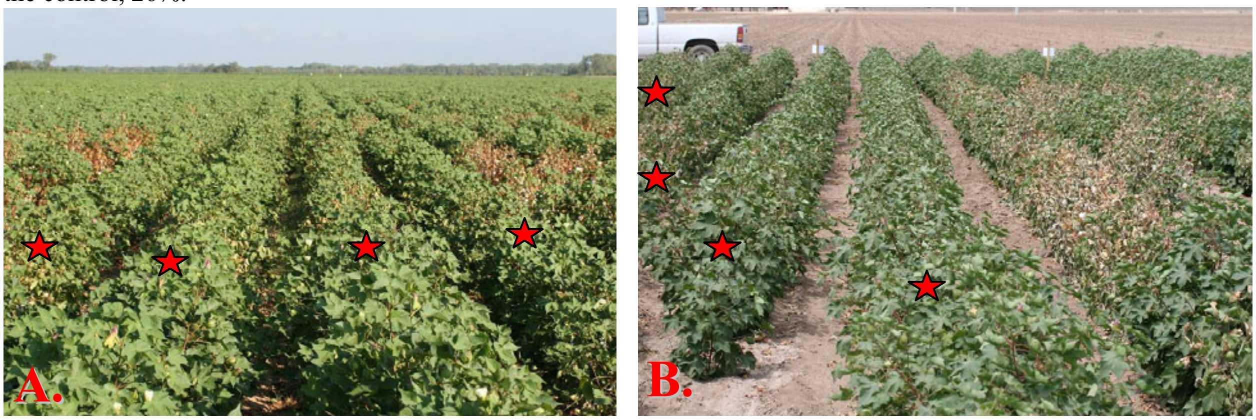

Figure 2. Reduction in PRR in rows treated with a soil application of flutriafol at planting (red stars) in experiments in A. Burleson County and B. Reagan County.

Top Band Spray at Planting:

At the WW field, yield was significantly (*P*=0.05) higher with the 0.27 lb a.i./A rate (Table 2). In a San Patricio county field, the average PRR following 0.27 lb a.i./A flutriafol was 12%, which was significantly (*P*=0.05) lower than the control, 46%.

Table 1**.** Effect of flutriafol application method and rate on PRR incidence and yield in a Burleson county experiment.

Method & Rate (lb. a.i./A)[1]	% PRR[2]	Yield (Bale/A)	Yield (% of Control)
Control	69 a	0.7 c	-
T-band, 0.13	46 a	0.9 ab	41
T-band, 0.27	41 a	1.1 ab	56
Stem Spray, 0.15	54 a	1.1 a	61
Stem Spray, 0.27	55 a	0.8 bc	28

[1]a.i. = active ingredient/A.

[2]% diseased plants, mean of 3 replicates, each 100 ft. × 4 rows. Evaluated at cut-out. Numbers within a column followed by different letters are significantly (*P*=0.05) different by LSD. Numbers in columns with no letters are not significantly (*P*=0.05) different.

Stem Spray:

In the Burleson county field, a stem spray of 0.15 lb. a.i./A flutriafol at match head square resulted in a significantly (*P*=0.05) higher yield than that of the control (Table 1). In a San Patricio county field, the average PRR following 0.13 & 0.27 lb a.i./A flutriafol applied at pin head square was 13%, which was significantly (*P*=0.05) lower than the control, 46%.

Table 2. Effect of flutriafol using different application methods on PRR at three locations in Tom Green and Concho counties.

Method & Rate (lb. a.i./A)[1]	JW Field		WW Field		KG Field	
	% PRR[2]	Yield (Bale/A)	% PRR[2]	Yield (Bale/A)	% PRR[2]	Yield (Bale/A)
Control	22	0.5	7	2.3 b	7	1.4
T-band, 0.13	15	0.7	3	2.3 b	1	1.4
T-band, 0.27	22	0.8	1	2.9 a	1	1.7
In-furrow, 0.13	11	0.6	3	2.7 a	1	1.4
In-furrow, 0.27	17	0.9	2	2.8 a	3	1.5
Top Band, 0.13	21	0.8	9	2.2 b	6	1.7
Top Band, 0.27	19	0.7	4	2.8 a	2	1.7

[1]a.i. = active ingredient.
[2]% diseased plants, mean of 4 replicates, each 100 ft × 4 rows. Evaluated at cut-out. Numbers within a column followed by different letters are significantly (*P*=0.05) different by LSD. Numbers in columns with no letters are not significantly (*P*=0.05) different.

We will be focusing our future experiments towards optimizing application of flutriafol at planting. There is still a lot of research that needs to be done to maximize the effectiveness of this fungicide. The fungicide apparently needs to be activated by water, either by rain or overhead irrigation, and the lack of such water can limit the effectiveness of the fungicide in dry years. We have found that the suppression of PRR and the increase in yield is repeatable, and based on this, we submitted a section 18 request for its use by Texas farmers in 2012. The proposed application is by T-band at planting only.

Summary

In these experiments, flutriafol applied at planting demonstrated excellent potential as a fungicide for managing PRR.

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