Cotton Root Rot Control With TopGuard in Texas: 2012 Research

Thomas Isakeit, Texas AgriLIFE Extension Service,
Dept. of Plant Pathology, TAMU, College Station, TX
R.R. Minzenmayer, Texas AgriLIFE Extension Service, Ballinger, TX
G.D. Morgan, D.A. Mott, Texas AgriLIFE Extension Service, Dept. of Crop and Soil Sciences, Texas A&M University, College Station, TX
D R. Drake, Texas AgriLIFE Extension Service, San Angelo, TX
D.D. Fromme, Texas AgriLIFE Extension Service, Corpus Christi, TX
W.L. Multer, Texas AgriLIFE Extension Service, Garden City, TX
M. Jungman, R.M. Collett, Texas AgriLIFE Extension Service, Hillsboro, TX
Archie Abrameit, Texas AgriLIFE Extension Service, Thrall, TX
J. Stapper, Texas AgriLIFE Extension Service, Robstown, TX

Abstract:

Phymatotrichopsis root rot (PRR), caused by the fungus *Phymatotrichopsis omnivora*, is a major disease in many of the cotton production areas of Texas and other southwestern states. In recent years, we have documented the effectiveness of a soil application of Topguard (flutriafol) to control this disease. The objective of this study was to identify optimal rates (8-32 fl. oz./A) and compare three methods of application: T-band and in-furrow at planting, and a banded spray on the soil surface after planting. Experiments were established in different growing areas of the state to evaluate Topguard under different climates and production systems. Many of the experiments were unsuccessful mainly because of a lack of disease pressure, which was usually related to a lack of rain during the growing season. In two out of four experiments, the disease incidence was significantly lower (P=0.05) with some of the fungicide treatments, in comparison with the control. In two of those experiments, significant disease reduction was seen with 8 fl.oz./A Topguard applied by T-band. Higher rates more consistently reduced disease, though. However, in two out of four experiments, Topguard treatment resulted in a significantly greater (P=0.05) yield. In one of those experiments, a yield response was seen with 8 fl.oz./A Topguard applied by T-band. This fungicide shows promise for control of PRR, but additional experiments are needed to optimize its effectiveness.

Introduction:

Phymatotrichopsis root rot (PRR), caused by the fungus *Phymatotrichopsis omnivora*, occurs in many of the cotton production areas of Texas. This disease causes losses of $29 million annually (unpublished survey data of Gaylon Morgan *et al*., 2011) and limits where cotton can be grown.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 Topguard (flutriafol) for control of PRR. This fungicide, when applied at planting, has activity against PRR when the disease becomes active later in the season (Isakeit *et al*., 2011).

Materials and Methods:

Topguard (1.04 lb./gal. flutriafol, Cheminova, Inc.) was evaluated at several Texas locations as follows:

T-band at planting

A TeeJet DG 80015 VS tip, oriented perpendicular to the open furrow (Fig. 1a), applied the fungicide in a volume of 4 GPA. This treated the furrow around the seed, as well as the sides of the furrow, but the seed was not directly sprayed with fungicide.

Figure 1. Application at planting. **A.** Placement of nozzle for T-band application (arrow). **B.** Nutramark seed bed firmer used for in-furrow application (circled and detail).

In-furrow at planting

The fungicide was applied with a Nutramark seed bed firmer (Fig. 1b) in volumes of 3 or 7 GPA. The fungicide was more concentrated in the furrow than with a T-band application, but direct contact of the fungicide with the seed was minimized. In two experiments, the fungicide was applied with a fertilizer, 32 fl.oz./A Asset RTU (6-20-5, Helena Chemical) in a volume of 3 GPA.

Top band spray at planting

A 4-inch-wide band was sprayed on the soil surface, over the planted furrow, using a Teejet DG 8002 VS nozzle. The fungicide was applied in volumes of 4 or 6 GPA.

Results and Discussion:

We conducted 14 experiments with Topguard in 2012, in five production areas of Texas, with fields that were rain-watered, or irrigated by drip, overhead or furrow. There was no apparent phytotoxicity, seen as either reduced or delayed seedling emergence, in any of these fields, including a Nueces County field that received 0.3 in. rain one day after planting (Table 1).

Table 1. Effect of Topguard treatments applied by T-band or top band at planting on plant population 24 days after planting, in a field in Nueces County.

Method and formulation rate (fl.oz./A)	Plant population/A[1]
None (control)	33,700 ab
T-band, 8	36,200 ab
T-band, 18	30,200 b
T-band, 26	31,300 ab
Top band, 24	41,200 a

[1]Mean of 4 replicates, each 100 ft. × 4 rows. Evaluated at cut-out. Numbers within the column followed by different letters are significantly (P=0.05) different by LSD.

Based on observations from commercial, non-experimental fields, there can be a risk of phytotoxicity if there is a heavy rain within three days of planting. Unfortunately, there were only a few experiments in which there was sufficient disease pressure on all replicates of the controls to make meaningful comparisons on disease incidence and yield. For example, the first replicate of an experiment in Hill County had noticeable disease pressure and a noticeable response to the fungicide (Figure 2), but the disease was not as severe in the controls in some of the other replicates. Dry weather conditions during the growing season were a factor in reduced disease, but even in fields with ample watering, the disease did not appear where it was known to have appeared in previous years.

Figure 2. Hill County experiment on July 3, 2012. In the foreground, a non-treated plot to the left of the red line; a plot treated with 16 fl.oz./A Topguard to the right.

Effect of rate

There was a trend of reduced disease and increased yield at Topguard rates between 8 and 32 fl.oz./A (Tables 2 and 3). With 24 fl.oz./A, the disease reduction was significantly (P=0.05) different than the control in 3 out of 4 trials, in comparison with lower rates (Tables 2 and 3).

Table 2. Effect of Topguard rate applied by T-band at planting on PRR incidence and yield in a Hill County commercial field.

Formulation rate (fl.oz./A)	% PRR[1]	Lint Yield (bale/A)	Seed Yield (lb./A)
None (control)	47.2	0.9	578
8	27.5*	0.9	568
16	31.4	1.1	677
24	13.3*	1.2	769

[1]% diseased plants, mean of 4 replicates, each 100 ft. × 4 rows. Evaluated at cut-out. Numbers within a column followed by asterisks are significantly (P=0.05) different from the control.

Effect of method of application

In an experiment in the WW field, a T-band application of 16 and 24 fl.oz./A was just as effective for disease control and yield increase as the in-furrow application of the same quantities (Table 3). This data indicates there is some flexibility in how Topguard can be applied and there is a need for more research to optimize the application method for a particular farm.

Table 3. Effect of Topguard using different application methods and rates on PRR and yield in two commercial fields in Tom Green County and the Stiles Farm Foundation, Thrall (Williamson County).

Method & Rate	WW Field		JW Field		Stiles Farm	
(fl.oz./A)[1]	% PRR[2]	Yield (Bale/A)	% PRR[2]	Yield (Bale/A)	% PRR[2]	Yield (Bale/A)
Control	3.0	2.8	5.3	1.1	21.4	1.3
T-band, 8	0.5*	3.2*	2.4	1.4	12.7	1.3
T-band, 16	1.1	3.0	2.9	1.5	14.9	1.3
T-band, 24	0.4*	3.3*	3.9	1.4	7.1	1.5
T-band, 32	0.5*	3.2*	6.2	1.5	6.4*	1.4
In-furrow, 16	2.0	2.9	9.5	1.4	not done	not done
In-furrow, 24	0.4*	3.4*	2.7	1.5	not done	not done

[1]Commercial formulation.

[2]% diseased plants, mean of 4 replicates, each 100 ft × 4 rows. Evaluated at cut-out. Asterisks indicate treatments that are significantly (P=0.05) different from the control within a column.

At one location where there was ample disease pressure, the addition of Asset fertilizer with Topguard, applied in-furrow, reduced disease incidence and increased yield, in comparison with the control. The presence of this fertilizer with Topguard did not significantly (P=0.05) affect disease and yield, in comparison with Topguard by itself (data

not shown). To date, there is no indication that fertilizers applied in-furrow with Topguard interfere with its activity against PRR. However, there have been instances of mixing incompatibility of Topguard with some fertilizers. Growers should always test their fertilizer for compatibility with Topguard before field application.

Figure 3. Comparison of Topguard-treated rows with non-treated rows (A. caused by nozzle malfunction) in commercial fields. A. McLennan County. B. Tom Green County.

In 2012, we did not obtain data to evaluate the efficacy of a post-plant soil application of Topguard. However, in an experiment in San Patricio field in 2011, we found that the incidence of PRR following application of Topguard (32 fl.oz./A in 8 GPA) as a 4-in. band on the row 5 and 12 days after planting was 20-22%, which was significantly (P=0.05) less than PRR in the control (43% incidence) (Isakeit *et al*., 2012). Additionally, the application of 16 and 32 fl.oz./A (in 15 GPA) to the lower stem at pinhead square significantly (P=0.05) reduced PRR incidence to 18-21%. Yield was not measured in that experiment. These data suggest that post-plant applications of Topguard may also be effective against PRR and should be evaluated in future experiments.

Summary:

In some of our experiments, Topguard applied at planting demonstrated excellent potential as a fungicide for managing PRR (Figure 3b). In 2012, as a result of a section 18 exemption for Topguard, cotton farmers in Texas applied it to approximately 150,000 to 170,000 acres. The benefit to some commercial fields was quite dramatic (Figure 3a). However, there is still a lot of research that needs to be done to maximize the effectiveness of this fungicide, as well as minimize the risk of phytotoxicity. Topguard has the greatest impact when there is high disease pressure. Its effectiveness is associated with ample rain or overhead irrigation within a month of planting.

Acknowledgments:

We thank our cooperating growers; Pamela Minzenmayer, Zach Eder, Rudy Alaniz, Clint Livingston, and Martin Barroso for their technical assistance; and Doug Pustejovsky, Wayne Smith and Steve Hague for equipment assistance. We appreciate Dr. Robert L. Nichols for advice and enthusiastic encouragement. This work was partially funded by the Texas State Support Committee and Cheminova, Inc.

References:

Isakeit, T., R.R. Minzenmayer, D.R. Drake, W. Multer, A. Abrameit, M. Jungman, C. Crossland, D.T. Campion , N. Fryar, G. Morgan and D. Mott. 2011. Flutriafol for control of Phymatotrichopsis root rot of cotton Beltwide Cotton Prod. Res. Conf. 2011:207. (Abstract)

Isakeit, T., R.R. Minzenmayer, D.R. Drake, G.D. Morgan, D.A. Mott, D.D. Fromme, W.L. Multer, M. Jungman, and A. Abrameit. 2012. Fungicide management of cotton root rot (*Phymatotrichopsis omnivora*). 2012. Beltwide Cotton Prod. Res. Conf. 2012: 235-237.