FIELD EVALUATION OF TOPGUARD (FLUTRIAFOL) FOR COTTON ROOT ROT MANAGEMENT IN OKLAHOMA

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Abstract

Phymatotrichopsis or cotton root rot (PRR) is caused by the fungus *Phymatotrichopsis omnivora*. Flutriafol (brand name Topguard) fungicide has recently been evaluated as a chemical management option. The objectives of this project were to evaluate the effects of two flutriafol rates (0.13 and 0.26 lb active ingredient/acre), two product formulations (Topguard and CHA-1328), and two application methods (T-band and modified in-furrow). An untreated check was included. In 2013 replicated trials were established in two known PRR infested producer-cooperator fields. Locations included a Tillman County no-till dryland site, and a Kiowa County furrow irrigated conventional tillage site. No substantial stand reduction issues arising from flutriafol treatments were noted at the Tillman County dryland site, but T-band treatment resulted in slightly higher stand counts at 14 and 28 days after planting (DAP) when compared to the modified in-furrow method. The dryland site expressed minimal disease incidence and later failed due to drought. The modified in-furrow application method reduced stand establishment at the Kiowa County site at 14 and 28 DAP, and resulted in a small but significant reduction in plants/row-ft when compared to the T-band. Although spatially variable, PRR infection at the Kiowa County site was very pronounced by Sep 26. By that date, about 66% of the plants in the untreated control were diseased. The 0.13 and 0.26 lb/acre flutriafol rates exhibited about 36% and 19% diseased plants, respectively. No differences were noted with respect to product or application method for diseased plants. Lint yield was significantly improved by flutriafol application. The 0.26 lb/acre rate resulted in significantly higher yield than the 0.13 lb/acre rate and the Topguard product resulted in greater yield than CHA-1328. Application method had no effect on lint yield. These data indicate that flutriafol is an effective product to reduce PRR induced stand and yield losses in Oklahoma.

Introduction

Phymatotrichopsis or cotton root rot (PRR) is caused by the fungus *Phymatotrichopsis omnivora*. Once infected, cotton is rapidly killed by this disease. As a result, yield is severely reduced, and harvesting efficiency declines due to dead stalks becoming entangled in harvester row units, particularly with stripper-type machines. Flutriafol (brand name Topguard) fungicide has been recently evaluated in Texas as a chemical control option. Isakeit et al. 2011, 2012 and 2013) show the progression from identification of flutriafol as a means of control through refinement of application techniques and rates. This work culminated in the 2012 and 2013 Texas Section 18 approvals by EPA (Drake et al., 2013). Oklahoma has several counties which border the Red River where many fields with the disease can be found (Damicone, 2010). Once recognized, growers generally choose to continuously plant infested fields to other unaffected monocot crops. Unfortunately there are very few economically viable rotational options. Planting cotton is an effective crop rotation, particularly for wheat, as it breaks weed and disease cycles that can be problematic for the grain crop. The availability of flutriafol as an efficacious PRR control product would enable Oklahoma producers to diversify crop rotations and allow cotton planting in PRR infested fields. The objectives of this project were to evaluate the effects of two flutriafol rates and product formulations, and two application methods for PRR control in Oklahoma cotton.

Materials and Methods

In 2013, two trials were established in known PRR infested producer-cooperator fields in southwestern Oklahoma to investigate the use of flutriafol for PRR control. Treatments included an untreated control, two flutriafol product formulations with different active ingredient (a.i.) formulations (Topguard with 1.04 lb a.i./gallon and CHA-1328 with 4.17 lb a.i./gallon), two rates - 0.13 and 0.26 lb a.i./acre, and two methods of application (T-band and modified in-furrow). These methods have been previously described in detail by Isakeit et al. (2013). A Schaffert rebounder was used with the modified in-furrow placement, and pressure was 17 psi. T-Band placement was accomplished using a Teejet 8002 flat fan even flow nozzle set to 24 psi. Total volume was 4 gallons/acre using a CO_2 system.

Four replicates of the 9 treatments were included at the Tillman County no-till dryland site, while the Kiowa County furrow irrigated conventional tillage site had 3 replicates. Plot size was four 40-inch rows by 50 ft long. A John Deere MaxEmerge XP vacuum planter was used. The Kiowa County site was planted with 4 seed/row-ft on May 24. Extreme environmental conditions resulted in difficult stand establishment. The Tillman County site was planted on June 13 at a higher than normal 5 seed/row-ft due to extreme environmental conditions. PhytoGen 499WRF cultivar was planted at both sites. Observations were made on the center two rows by the length of each plot, including lint yield. Plot harvest was accomplished using a modified John Deere 482 plot stripper. Analysis of variance was performed on the data using SAS Ver. 9.3 for Windows.

Results and Discussion

Results are presented in Table 1. Rainfall events of 0.4 and 0.8 inches were encountered 5 and 4 days after planting (DAP) at the Kiowa and Tillman County sites, respectively. No serious stand reduction issues arising from flutriafol treatments were noted at the Tillman County dryland site, but the T-band treatment resulted in slightly higher stand counts at 14 and 28 DAP when compared to the modified in-furrow method. The dryland site uniformly emerged and expressed minimal disease incidence and later failed due to exceptional drought.

Application method reduced stand establishment at the Kiowa County site at both 14 and 28 DAP. Modified in-furrow treatment resulted in a small but significant reduction in plants/row-ft. Although somewhat spatially variable, PRR infection at the Kiowa County furrow irrigated site was very pronounced by Sep 26 (Figure 1).

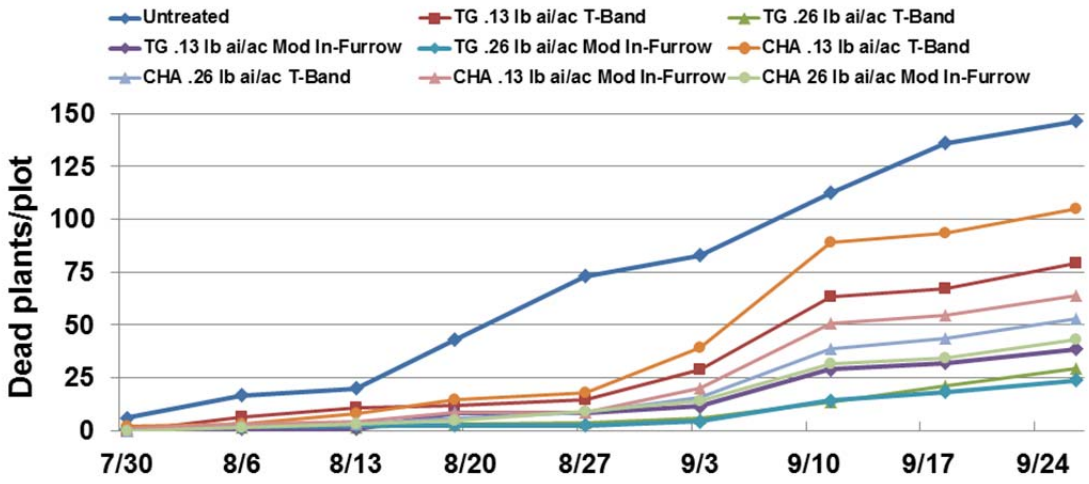

Figure 1. Disease progression at the Kiowa County irrigated site.

By that date, about 66% of the plants in the untreated control were diseased. The 0.13 and 0.26 lb/acre flutriafol rates exhibited about 36% and 19% diseased plants, respectively, with 0.26 lb rate having a lower percentage. No differences were noted with respect to product or application method for diseased plants.

Table 1. Results from dryland (Tillman County) and furrow irrigated (Kiowa County) flutriafol trials.

		Tillman County Dryland		Kiowa County Irrigated			
Trt No.	Description	plants/row-ft	plants/row-ft	plants/row-ft	plants/row-ft	% PRR diseased plants	Lint yield
		14 DAP	28 DAP	14 DAP	28 DAP	26-Sep	lb/acre
1	Untreated check	4.7	4.7	2.3	2.3	65.7	1226
2	Topguard 0.13 lb ai/ac T-Band	4.7	4.8	2.2	2.3	41.4	1662
3	Topguard 0.26 lb ai/ac T-Band	4.9	4.9	2.2	2.3	13.7	1794
4	Topguard 0.13 lb ai/ac Modified In-Furrow	4.4	4.4	1.7	1.7	22.6	1646
5	Topguard 0.26 lb ai/ac Modified In-Furrow	4.5	4.5	1.8	1.8	14.0	1787
6	CHA-1328 0.13 lb ai/ac T-Band	4.5	4.5	2.1	2.2	48.5	1261
7	CHA-1328 0.26 lb ai/ac T-Band	4.6	4.5	2.3	2.3	24.4	1688
8	CHA-1328 0.13 lb ai/ac Modified In-Furrow	4.5	4.5	2.0	2.1	31.2	1694
9	CHA-1328 0.26 lb ai/ac Modified In-Furrow	4.1	4.1	1.8	1.9	24.6	1592
	Pr > F	0.4786	0.3394	0.0001	0.0269	0.0613	0.0674
	LSD 0.10	NS	NS	0.3	0.3	27.1	335
	CV, %	9.8	8.9	11.5	10.8	59.9	14.7
3-Factor Factorial Analysis							
Rate	0.13 lb ai/ac	4.5	4.6	2.0	2.1	35.9	1566
	0.26 lb ai/ac	4.5	4.5	2.0	2.1	19.2	1715
Product	CHA-1328	4.4	4.4	2.1	2.1	32.2	1559
	Topguard	4.6	4.6	2.0	2.0	22.9	1722
Method	Modified In-Furrow	4.4	4.4	1.8	1.9	23.1	1680
	T-Band	4.7	4.7	2.2	2.3	32.0	1601
Source of variation		Pr > F					
	Rate	0.9406	0.5682	0.8120	0.8688	0.0249	0.0964
	Product	0.2709	0.1304	0.4790	0.5119	0.1875	0.0718
	Method	0.0734	0.0966	0.0027	0.0017	0.2029	0.3647
	Rate*Product	0.4163	0.3315	0.8120	0.7415	0.8369	0.8805
	Rate*Method	0.5049	0.6243	0.4790	0.6216	0.1943	0.1436
	Product*Method	0.6032	0.5147	0.3113	0.1997	0.9589	0.3010
	Rate*Product*Method	0.6032	0.5682	0.2455	0.3298	0.9531	0.1312
	LSD 0.10	0.3	0.3	0.2	0.2	11.8	148
	CV, %	10.4	9.4	12.4	11.7	59.3	12.5

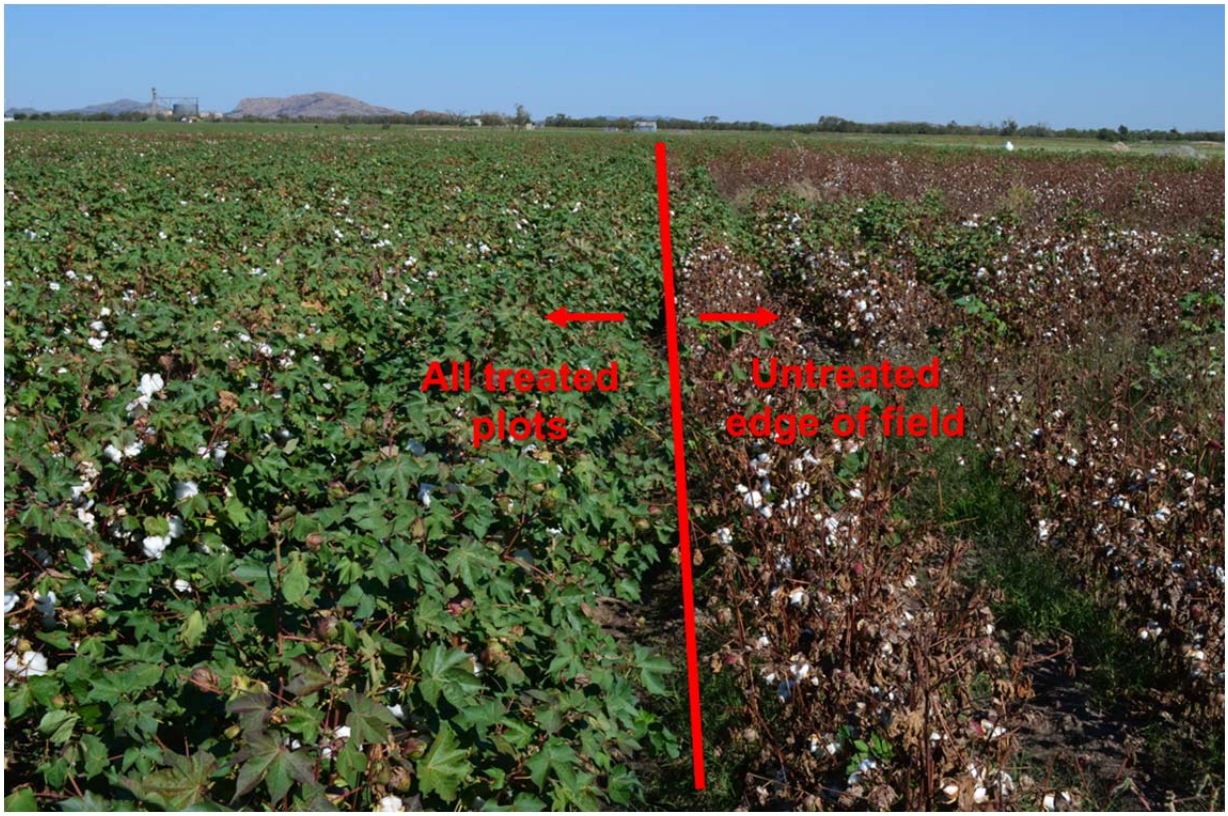

Figure 2. Kiowa County irrigated trial on Oct 1.

Figure 3. Kiowa County irrigated trial at harvest, Nov 1.

Ultimately, lint yield was significantly improved by flutriafol application. The 0.26 lb/acre rate resulted in significantly higher yield than the 0.13 lb/acre rate and the Topguard product resulted in greater yield than CHA-1328. Application method had no effect on lint yield.

Summary and Conclusions

Substantial but spatially variable PRR pressure was encountered at the Kiowa County site. Results indicate that 0.13 and 0.26 lb/acre flutriafol rates had lower percentage diseased plants than the untreated. The 0.26 lb/acre rate resulted in a lower percentage of diseased plants than the 0.13 lb rate. Although no differences were noted with respect to percentage of diseased plants, the Topguard formulation provided greater lint yield than the CHA-1328 product, the reasons for which are unclear. When compared to the modified in-furrow treatment, T-band application method resulted in a higher number of healthy plants at both 14 and 28 DAP, but this did not result in higher yield at harvest. Lint yields were 1226, 1566, and 1715 lb/acre for the untreated check, and flutriafol rate main effect means of 0.13 and 0.26 lb a.i./acre, respectively. When compared to the untreated check, yields were increased by 340 and 489 lb/acre for the 0.13 and the 0.26 lb a.i./acre rates, respectively. This represents 28 and 40 percent yield increases for flutriafol rates of 0.13 and 0.26 lb a.i./acre, respectively, when compared to the untreated check. Results from this project indicate that flutriafol was effective at reducing the negative impact of PRR at this site.

Acknowledgements

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