MANAGEMENT OF COTTON ROOT ROT IN THE ROLLING PLAINS OF TEXAS

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Abstract

Cotton root rot, caused by the soilborne fungus *Phymatotrichum omnivorum* (Duggar) Hennebert, is an economically important disease for cotton (*Gossypium hirsutum* L.) in the Rolling Plains of Texas. The objectives of this project were to evaluate the effect of application methods and flutriafol rates on cotton stand density and lint yield. Two trials were conducted to determine the efficacy and phytotoxicity of flutriafol. Treatments for trial 1 included T-band flutriafol application at rates of 4, 6, and 8 fl oz/A, post-direct application at rates of 4 and 8 fl oz/A, Y-split application at 4 fl oz/A, and a non-treated control. Treatments for trial 2 included preplant flutriafol application at 0, 6, and 8 fl oz/A with T-band depth at 6, 8, and 10 inch, and a non-treated control. Phytotoxicity was observed in cotton treated with both T-band and Y-split applications of flutriafol during the early growing season; however, these methods reduced incidence of the disease to below 1.1 % compared to 7.3% in the non-treated control and maintained lint yield similar to non-treated control. Lint yield was highest with T-band applications of flutriafol at 4 fl oz/A. Cotton root rot infestation can be managed with flutriafol in the Rolling Plains of Texas.

Introduction

Cotton root rot, caused by the soilborne fungus [*Phymatotrichum omnivorum* (Duggar) Hennebert], is an economically important disease for cotton (*Gossypium hirsutum* L.) in the Rolling Plains of Texas. The fungus invades roots near the soil surface and can completely kill plants and greatly reduce lint yield. Recently, the fungicide flutriafol has gained attention as an effective management option for cotton root rot. While the fungicide is highly efficacious towards cotton root rot, problems with phytotoxicity have been observed. The objectives of this study were to evaluate the effect of application methods and flutriafol rates on cotton stand density and lint yield.

Methods

Two trials were planted to determine the efficacy and phytotoxicity of flutriafol for managing cotton root rot in the Rolling Plains of Texas. Trials were large plot studies conducted in Munday, TX. Trial 1 evaluated application method and rate, and trial 2 evaluated application rate and depth. Treatments for trial 1 included T-band flutriafol application at rates of 4, 6, and 8 fl oz/A, post-direct application at rates of 4 and 8 oz/A, Y-split application at 4 fl oz/A, and a non-treated control. Treatments for trial 2 included preplant flutriafol application at 0, 6, and 8 fl oz/A with T-band depth at 6, 8, and 10 inch, and a non-treated control. Treatments were replicated four times. Cotton was harvested October 17 and 18, 2015. Statistical analyses were conducted using Proc Mixed of SAS. Mean separation was conducted using LSMEANS at $P < 0.05$ for stand count and $P<0.1$ for disease incidence and lint yield. Lint yield averaged over application depth was 683 lb/A at 6 fl oz and 658 lb/A at 8 fl oz of flutriafol per acre application.

Results and Discussion

Trial 1 - Application method and rate study

Phytotoxicity was observed in cotton treated with both T-band and Y-split applications of flutriafol during the early growing season (Fig. 1A); however, these methods also reduced incidence of the disease to below 1.1 % compared to 7.3% in the non-treated control (Table 1) and maintained lint yield similar to the non-treated control (Fig. 1B). Lint yield was the highest with T-band application at 4 fl oz/A of flutriafol (Fig. 1B).

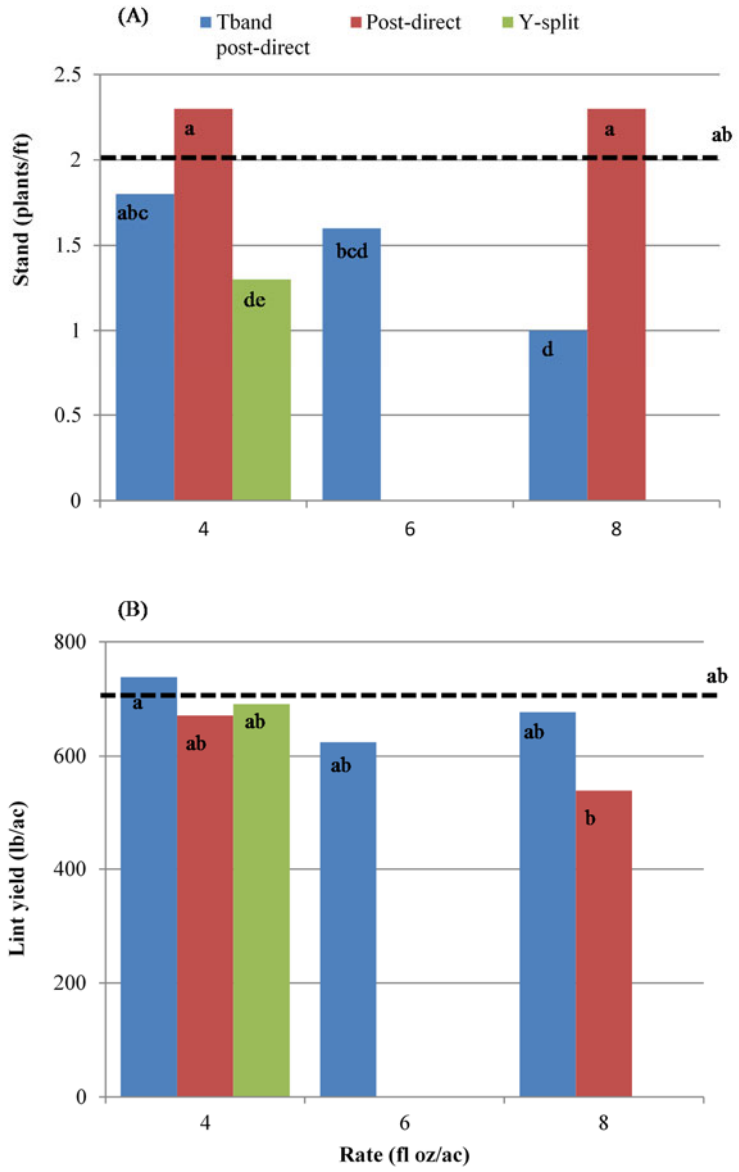

Figure 1. Effect of application method of flutriafol rates on (A) cotton stand density and (B) lint yield. Dashed line represents the non-treated control. Treatment means followed by the same letter are not significantly different at $P<0.05$ for stand count and $P<0.1$ for lint yield.

Table 1. Effect of application method on the incidence of cotton root rot

Treatment	Disease incidence (%)
Non-treated control	7.3 a
Post-direct	7.0 a
Y-split	1.1 ab
T-band	0.4 b

Trial 2 - Application rate and depth study

No statistical differences were observed on the effects of flutriafol application rate and depth except for disease incidence (Table 2). Stand count averaged over treatments was 1.7 plants/ft (Fig. 2A). Root rot incidence was higher under the flutriafol application rate at 6 oz (15 %) than 8 oz (11 %) (Fig. 2B). Lint yield averaged over application depth was 683 lb/ac at 6 oz and 658 lb/ac at 8 oz of flutriafol application (Fig. 2C).

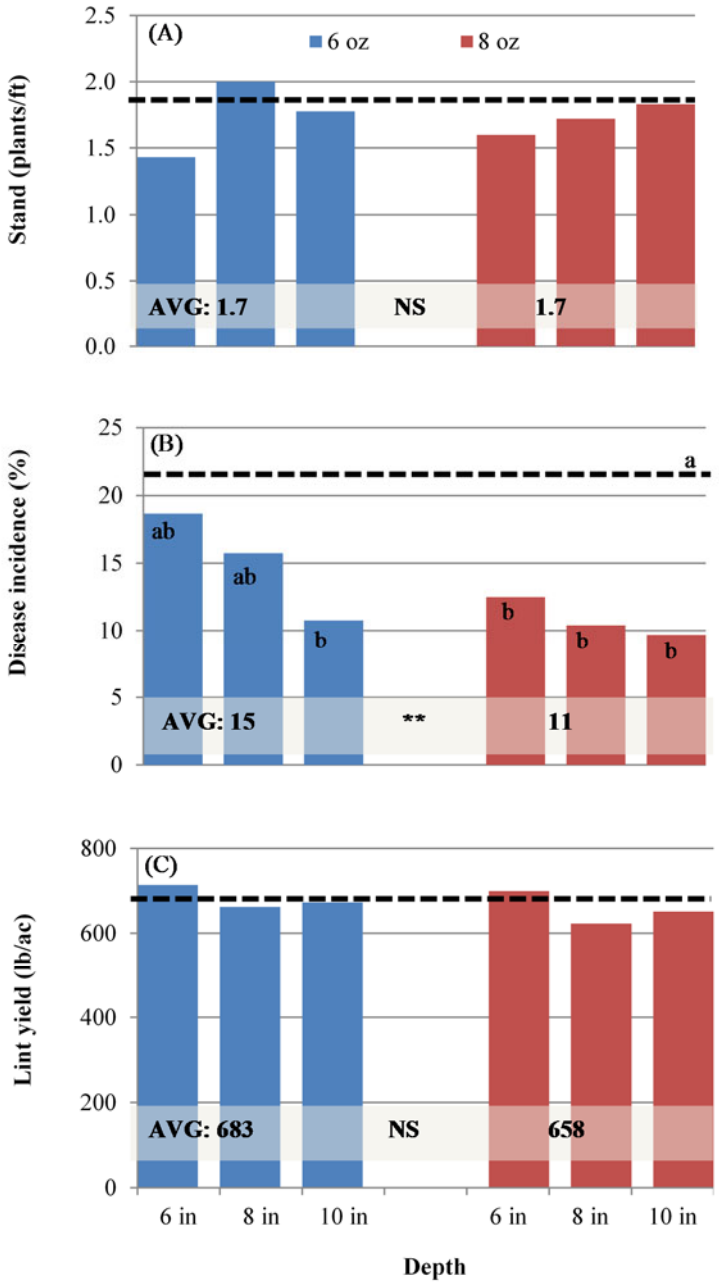

Figure 2. Effect of flutriafol application rate and depth on (A) cotton stand density, (B) disease incidence, and (C) lint yield. Dashed line represents the non-treated control. Treatment means followed by the same letter are not significantly different at $P<0.1$. Mean values over depth were compared between 6 oz and 8 oz by an orthogonal contrast at $P<0.05$.

Table 2. Significance for fixed source of variation from statistical analyses

	Stand count	**Disease incidence**	**Lint yield**
Trial 1: Application method and rate			
Rate	*	NS	+
Method	***	**	+
Rate × Method	*	NS	NS
Trial 2: Application rate and depth			
Rate	NS	**	NS
Depth	NS	NS	NS
Rate × Depth	NS	NS	NS

+, *, **, and *** are significant level at $P<0.1$, 0.05, 0.01, and 0.001, respectively.

Conclusion

Final stands were reduced following flutriafol application; however, applications also reduced incidence of the disease during the growing season while maintaining the lint yield. Flutriafol can be used to manage the cotton root rot infestation in the Rolling Plains of Texas. An investigation on the effect of continuous application of flutriafol on the cotton root rot populations in the field is needed.

Acknowledgements

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