KURTOMATHRIPS MORRILLI: AN OCCASIONAL PEST OF COTTON ON TEXAS SOUTH PLAINS

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Abstract

Kurtomathrips morrilli Moulton is a rare pest of cotton on the Southern High Plains of Texas. Little is known about *K. morrilli* biology and its management in cotton. A field trial was initiated to evaluate insecticide efficacy against *K. morrilli*, and the effect of late season *K. morrilli* infestation on lint yield and quality. Treatments included untreated check, spinetoram at 44 g a.i. ha^{-1}, imidacloprid at 69 g a.i. ha^{-1}, acephate at 205 g a.i. ha^{-1}, thiamethoxam at 70 g a.i. ha^{-1} and acetamprid at 51 g a.i. ha^{-1}. The experiment was designed as an RCB with four replications. Thrips were counted by collecting 5 leaves per plot at 0, 7, and 14 days after treatment (DAT). Mean pre-treatment thrips counts ranged from 77 to 441 thrips per 5 leaves across all treatments. Thrips densities varied significantly across treatments at 7 and 14 DAT. At 7DAT, all insecticidal treatments but imidacloprid resulted in significantly fewer number of thrips than the untreated check. At 14DAT, only the plots treated with acetamiprid had significantly fewer total number of thrips (adults + immatures) compared to untreated check. Based on the percentage reduction in the average thrips population at 7DAT relative to the pre-treatment counts, all the insecticide treatments resulted in significantly larger decline than the untreated check.

Introduction

Kurtomathirps morrilli Moulton, family Thripidae is an occasional pest of cotton, *Gossypium hirsutum* in the Southwestern United States. *K. morrilli* was first reported in Arizona cotton in 1926 (Moulton, 1927). Feeding symptoms of *K. morrilli* include silvering and distortion of leaves, formation of dark speckling on the leaves, and premature defoliation under heavy infestation. In Texas, damaging levels of *K. morrilli* populations were reported in Southern High Plains cotton in 2011 (Anderson and Kerns, 2012). The *K. morrilli* outbreak in 2011 was coincided with severe drought in West Texas. The outbreak resulted in an estimated loss of 24 million pounds of cotton lint, resulting in more than $20 million in damage and control costs (Kerns and Anderson, 2012; Williams, 2012). In 2018, *K. morrilli* infestation in cotton was first spotted in early-mid September when the crop had reached 3-4 nodes above white flower stage (NAWF). Unlike the outbreak of 2011, *K. morrilli* infestation during 2018 season was largely localized and resulted into little or no significant yield losses across the region. A field trial was conducted to evaluate insecticide efficacy against *K. morrilli*, and to assess the impact of late season infestation by *K. morrilli* on lint yield and fiber quality.

Materials and Methods

The field trial was conducted on a commercial cotton field near Wellman, Texas. The field was planted on 28 May 2018 (Variety: DP1549B2XF) on 40-inch centers under dryland conditions. Treatments consisted of Radiant SC (spinetoram) at 5 fl oz. per acre (44 g a.i. ha^{-1}), Admire Pro (imidacloprid) at 1.7 fl. oz. per acre (69 g a.i. ha^{-1}), Orthene 97 (acephate) at 3.0 oz. per acre (205 g a.i. ha^{-1}), Centric 40WG (thiamethoxam) at 2.5 oz. per acre (70 g a.i. ha^{-1}) and Intruder 70WG (acetamprid) at 1.0 oz. per acre (51 g a.i. ha^{-1}). The experiment was designed as an RCB with four replications. Each plot was 2 rows X 40 ft in length. Pre-treatment counts were taken on 19 September at 3NAWF stage of cotton and treatments were applied on the same day. Insecticide applications were made with a CO2-pressurized hand-boom sprayer calibrated to deliver 10 gpa through hollow cone TeeJet TXVS6 spray tip nozzles (2 per row) at 30 psi. Wind speed was ~9 mph during spray application. Five randomly selected leaves from each plot on each sampling date were taken to the laboratory in glass mason jars containing 75% ethyl alcohol. Samples were processed using a washing technique and the number of *K. morrilli* adults and immatures in each sample were counted using a dissecting microscope (Slosser et al. 2005). At maturity, 10 ft long section from each plot was hand harvested and the samples were ginned at the Texas A&M AgriLife Research and Extension Center in Lubbock, Texas. Fiber samples were submitted to the Texas Tech Fiber and Biopolymer Research Institute in Lubbock for HVI analysis. Data were analyzed by ANOVA and means were separated by Tukey's mean separation test.

Results and Discussion

There were no significant differences among treatments on 19 Sept. Average pre-treatment *K. morrilli* counts ranged from 77 to 441 thrips per five leaves across all treatments (Table 1). At 7DAT, all insecticidal treatments except imidacloprid resulted in significantly fewer number of thrips than the untreated check. Based on the percentage reduction in the average thrips population at 7DAT relative to the pre-treatment counts, all the insecticide treatments resulted in significantly larger decline than the untreated (Table 2). The percent reduction in thrips numbers ranged from 72% in imidacloprid treated plots to 93% in the plots treated with spinetoram. At 14DAT, only the plots treated with acetamiprid had significantly fewer number of thrips (adults + immatures) compared to untreated check (Table 3). The number of *K. morrilli* immatures increased from 7DAT to 14DAT across all treatments except acetamiprid which indicates its longer residual activity. Treatments had a significant impact on both lint yield and micronaire (Table 4).

Table 1. Mean number of *K. morrilli* per five leaves prior to treatment and 7 days after treatment

Treatment		19 September (pre-treatment)			26 September (7 DAT)		
	g a.i. ha^{-1}	Adult	Immature	Total	Adult	Immature	Total
Untreated check	-	61.0	380.3	441.3	40.5 a	210.5 a	251.0 a
Spinetoram	44	20.8	56.3	77.0	0.8 b	3.50 c	4.3 c
Imidacloprid	69	38.8	185.5	224.3	5.0 b	54.8 ab	59.8 ab
Acephate	205	32.5	88.3	120.8	1.0 b	7.8 bc	8.8 bc
Thiamethoxam	70	61.5	182.0	243.5	4.5 b	47.3 bc	51.8 bc
Acetamprid	51	33.5	183.0	216.5	1.8 b	23.5 bc	25.3 bc
P value		*0.9094*	*0.5682*	*0.6429*	*0.0017*	*0.0019*	*0.0010*

Values in a column followed by the same letter are not significantly different (alpha = 0.05). Statistics were generated on transformed data (log transformation of X+1). Means presented in the table are actual data.

Table 2. Percent reduction in *K. morrilli* populations at 7 days after treatment.

Treatment	g a.i. ha^{-1}	26 September (7 DAT)		
		Adults	Immatures	Total
Untreated check	-	49.85 b	-1.44 b	14.27 b
Spinetoram	44	95.94 a	93.05 a	93.98 a
Imidacloprid	69	80.99 a	72.17 a	74.58 a
Acephate	205	95.66 a	90.35 a	91.79 a
Thiamethoxam	70	89.19 a	79.43 a	82.65 a
Acetamprid	51	94.22 a	88.66 a	89.75 a
P value		*0.0001*	*0.0164*	*0.0027*

Values in a column followed by the same letter are not significantly different (alpha = 0.05).

Table 3. Mean number of *K. morrilli* per five leaves at 14 days after treatment

Treatment	g a.i. ha^{-1}	3 October (14 DAT)		
		Adults	Immatures	Total
Untreated check	-	47.8 a	403.5 a	451.3 a
Spinetoram	44	1.5 b	42.3 ab	43.8 ab
Imidacloprid	69	17.0 ab	208.2 ab	225.2 ab
Acephate	205	12.6 b	127.9 ab	140.5 ab
Thiamethoxam	70	3.8 b	61.0 ab	64.8 ab
Acetamprid	51	1.5 b	22.5 b	24.0 b
P value		0.0063	0.0285	0.0232

Values in a column followed by the same letter are not significantly different (alpha = 0.05). Statistics were generated on transformed data (log transformation of X+1). Means presented in the table are actual data.

Table 4. Yield and micronaire

Treatment	g a.i. ha^{-1}	Lint Yield (lbs. acre^{-1})	Micronaire
Untreated check	-	241.58 ab	3.18 b
Spinetoram	44	285.18 ab	3.38 ab
Imidacloprid	69	219.50 b	3.42 ab
Acephate	205	342.25 a	3.45 ab
Thiamethoxam	70	315.20 ab	3.83 a
Acetamprid	51	294.50 ab	3.47 ab
P value	-	0.0328	0.0452

Values in a column followed by the same letter are not significantly different (alpha = 0.05). Statistics were generated on transformed data (log transformation of X+1). Means presented in the table are actual data.

Summary

The purpose of this study was to evaluate insecticide efficacy and assess the impact of *K. morrilli* infestation on lint yield and quality. *K. morrilli* appears to be sensitive to various insecticides including thiamethoxam, acetamiprid, acephate and spinetoram. Because the treatments were applied too late in the season (at NAWF = 3), yield differences among treatments are most likely to be from factors other than the *K. morrilli* control. Our results indicate that severe infestation of *K. morrilli* and premature defoliation can lead to low micronaire. Field observations indicate that *K. morrilli* is most likely to become an economic pest of cotton during periods of excessive heat and drought. While making management decisions for this pest, crop yield potential needs to be taken into consideration. Lower yield potential of dryland cotton may not justify insecticide application while the fields with higher yield potential may benefit from foliar treatment to control *K. morrilli*.

Acknowledgements

The authors appreciate Terry and Jackie Burris for allowing the use of part of their field. We also would like to thank Brad Franke, Sam Addison, and Adam Kesheimer for collecting leaf samples and counting thrips. Thanks to Plains Cotton Growers for partial financial support. This work was partially supported by Crops Protection and Pest Management Competitive Grants Program [grant no. 2017-70006-27188 /project accession no. 1013905] from the USDA National Institute of Food and Agriculture. This research was also supported in part by industry gifts of pesticides.

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