CITRUS THRIPS (*SCIRTOTHRIPS CITRI*), AN EMERGING PEST OF MID TO LATE SEASON COTTON IN THE LOW DESERT

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Abstract

Citrus thrips (*Scirtothrips citri*) has been increasing during the past decade as a low desert cotton pest during the second half of the growing season, appearing from July-October. Thrips numbers and associated feeding damage necessitated insecticide applications to many local fields in 2018. Cotton on field borders is colonized and damaged first, with populations building before dispersing across the field. Youngest/tender leaves are first damaged by citrus thrips feeding, resulting in bronzed leaves before they dessicate and abscise when there is severe feeding injury. Severe damage by citrus thrips feeding also results in curled leaf tips and bracts. Boll losses have been noted, but yield losses not yet quantified. Insecticide trial efficacy data from 2018 did not note any insecticides providing adequate control.

Introduction

Over the past 10 years, pest control advisors in the ow desert pest had noted increasing numbers of thrips present during the latter half of growing season. These thrips were identified and verified as citrus thrips, *Scirtothrips citri* (Moulton). Cotton has been noted to serve as a host plant for citrus thrips for over 50 years (Bailey, 1964). There is no readily available information on the seasonality, damage symptoms or economics associated with citrus thrips on cotton when reviewing scientific reports/literature however.

This species is of concern, as hormoligosis (increased egg production due to non-lethal insecticide levels) is known to occur with this species (Morse and Zareh, 1991), thus potentially providing additional control difficulties.

Local damage and yield loss was noted in 2017 and 2018, with treatments applied specifically for this species in 2018. This project was initiated to collect information on the seasonality, damage and/or control of this insect on low desert cotton.

Methods and Materials

Cotton terminals were examined weekly from May into July for the presence of citrus thrips. A number of leaves were examined in multiple fields throughout the Palo Verde Valley located on the far eastern edge of California. Weekly examinations ceased once citrus thrips were discovered.

Notes on field damage patterns, damage to plants and photographs of damage were obtained to document cotton damage. This was done later in the season as patterns became more pronounced and citrus thrips damage intensified.

A field insecticide efficacy trial was also initiated, using a cotton field near Ripley, California, infested with citrus thrips. Five insecticide treatments were applied the morning of September 30, 2018 using a battery powered sprayer equipped with a boom and four (4) 8002-VS nozzles calibrated to deliver 18.6 gpa. Plots were 2 rows wide (7 ft.) x 25 feet long, with treatments having four replications utilizing a randomized complete block design.

Insecticides applied were Exirel®, Radiant® SC, Sivanto Prime, and Oberon 4SC. All treatments had the modified ethylated vegetable oil (ESO) concentrate Hasten-EA™ (Wilbur-Ellis Company) added as an adjuvant at 9 oz./acre. This product contains canola oil and is 100% ethylated seed oil/polyoxyalkylene fatty ester, and provides excellent wetting and penetration of insecticides. It was also used to reduce product evaporation after application under the high temperatures and low humidity conditions.

Exirel® (marketed by FMC Corporation) contains 0.83 lbs./gallon of the active ingredient cyantraniliprole. It was applied at top of label rate of 20.5 oz./acre. Labeling for thrips on cotton note that this product provides suppression of foliage feeding thrips.

Radiant® SC (marketed by Corteva Agrisciences) contains one (1.0) lb./gallon of the active ingredient spinetoram (a mixture of spinetoram-J and spinetoram-L). It was applied at two rates: 5.0 and 8.0 oz./acre. Labeling notes that

thrips control may be improved in some situations with the addition of emulsified crop oils or methylated crop oil plus organosilicone combination product.

Sivanto Prime (marketed by Bayer CropScience) contains 1.67 lbs./gallon of the active ingredient flupyradifurone. This active ingredient in the fairly new insecticide class known as butenolides (Group 4D), a nicotinic acetylcholine receptor antagonist. It is somewhat unique among insecticides in that it is considered to be acropetally systemic (moves upwards/outwards towards leaf tips, but not throughout the entire plant) as well as having translaminar movement. Sivanto Prime was applied at the top of label rate of 14 oz.

Oberon® 4SC (marketed by Bayer Crop Sciences) contains 4 lbs./gallon of the active ingredient spiromesifen. This tectonic acid based active ingredient, although registered for usage on cotton as Oberon® 4SC, does not include thrips as an insect that will be controlled. It was used at the rate of 8 oz./acre.

Plots were sampled at three, seven, ten and 14 days post treatment. Sampling consisted of five (5) strikes of the outer 8 inches of a cotton branch against a wire mesh screen that covered the top of a 12.6" x 8.8" x 1.9" deep baking pan that had been sprayed with the cooking spray "Pam", and counting and recording the citrus thrips adhering to the cooking spray in the baking pan. After thrips were counted, the pan was cleaned and re-sprayed prior to the next terminal being sampled. Five (5) terminals per plot were sampled. Remnants of Hurricane Rosa came through the area on September 30 with strong winds and rain, and may have washed off many of the thrips.

Statistical analyses of data and treatment mean separations were conducted using Tukey's Honestly Significant Difference (HSD) test (JMP Pro 13.0.0).

Results

Citrus thrips were first collected in area cotton in early-mid July, and were present in high numbers for several months, closely corresponding to the developmental period for 'top crop' cotton in the low desert.

Crops/plants being used as host plants by citrus thrips immediately prior to movement into cotton is unknown. No conclusive pattern was noted from adjacent crops indicating preferred hosts as substantial reproductive sites for citrus thrips prior to cotton infestation.

Cotton field borders, usually the outer rows, are initially infested and damaged, with infestations then moving across the entire field later in the season. The exact cause for this is unknown, however, some *Scirtothrips* spp., such as the chili thrips (*S. dorsalis*) prefer lower humidity levels (M. Hoddle, University of California-Riverside, pers. comm). Frequent furrow irrigation in low desert cotton would provide higher humidity levels in much of the field, but may also serve as a control mechanism, drowning the immature citrus thrips that pupate on the soil surface.

Feeding damage has multiple appearances: Bronzing of leaves, distortion of leaves, leaf tip curl and droop, curling of boll bract tips, and loss of boll set. Economic loss in cotton due to citrus thrips has not yet been well quantified, although area pest control advisors have indicated yield losses up to 1 bale/acre for entire fields in worst cases, with almost no yield on field edges.

Initial insecticide control trials did not found any of the tested chemistries to provide substantial initial control (Table 1). The remnants of Hurricane Rosa may have reduced thrips numbers in the October 1 sample. Thrips numbers continued to increase after this sample date, noted as being very prevalent in mid-October.

Table 1. Mean citrus thrips/terminal following application on September 30, 2018.

Treatment	Rate/acre	October 1	October 5	October 8	October 12
Exirel	20.5 oz.	9.4a	37.1a	30.1a	37.9a
Oberon 4SC	8.0 oz.	18.2a	35.3a	30.3a	43.3a
Radiant	5.0 oz.	8.4a	38.6a	31.1a	45.9a
Radiant	8.0 oz.	9.1a	31.9a	24.6a	28.8a
Sivanto Prime	14.0 oz.	17.7a	32.3a	34.6a	45.6a
Untreated	----	12.4a	38.1a	27.4a	45.9a
	P value	*0.54*	*0.94*	*0.67*	*0.51*

Means in columns followed by the same letter are not statistically different at the $p<0.05$ level (Tukey's HSD Test, JMP Pro 13.0.0)

Literature Cited

Bailey, S.F. 1964. A revision of the genus *Scirtothrips* Shull (Thysanoptera: Thripidae), Hilgardia 35(13): 329-362.

Morse, J.G., and N. Zareh. 1991, Pesticide-induced hormoligosis of citrus thrips (Thysanoptera: Thripidae) Fecundity. J. Economic Entomology. 84(4): 1169-1174.