REGIONAL SURVEY 2009-2010: THRIPS SPECIES COMPOSITION ACROSS THE UPLAND COTTON BELT

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Abstract

The effect of preventive, insecticidal/nematicidal seed treatments on thrips species composition is reported as part of a regional cotton project that was conducted in 2009 and 2010. At-plant treatments included Aeris® or Avicta® seed treatments, Temik® applied in-furrow, and an untreated control (no at-plant insecticide). Thrips species varied greatly among the 17 locations which included trials within Arkansas, Georgia, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, and Virginia. Tobacco thrips was the dominant species at most locations. Overall composition of thrips species relative to preventive insecticide treatments did not appear to differ greatly among treatments. However, there was a slight trend towards a higher percentage of tobacco thrips in the untreated check plots and a higher percentage of western flower thrips in the aldicarb-treated plots, suggesting the possibility that western flower thrips may be less susceptible to the insecticides than tobacco thrips. No significant effects of insecticide treatment on thrips species composition based on identification of adults were noted.

Introduction

Various species of thrips occurring on seedling cotton in the mid-South have been identified in previous studies (Cook et al. 2003, Reed et al. 2006). Numerous pesticide evaluation publications have reported efficacy against thrips, but in general do not refer to species composition related to treatments unless a resistant species such as western flower thrips (*Frankliniella occidentalis* [Pergande]) is present. The objectives of this study were to (1) determine the composition of thrips species in cotton across the Mid-south and Southeast, and (2) to investigate differences in species across various at-plant insecticides.

Materials and Methods

Trials were established in 17 total locations in 2009 and 2010 within Arkansas, Georgia, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, and Virginia. Randomized complete block field studies evaluating Aeris® seed treatment (imidacloprid [insecticide] + thiodicarb [nematicide]), Avicta Complete Cotton® seed treatment (optional) (thiamethoxam [insecticide] + abamectin [nematicide]), Temik® (aldicarb [insecticide/nematicide]) applied in-furrow, and an untreated check, were completed in 17 locations in 2009 and 2010. Avicta was used in 10 locations in 2009 and 8 in 2010. All seed contained a fungicide package. For most locations, thrips were sampled on three sample dates by removing five plants from each plot beginning at the first-second true leaf stage and placing them in containers. They were subsequently returned to the lab, and thrips were washed from the plants onto a filter paper or fine mesh screen (Burris et al. 1989). Adult thrips were then counted and identified to species at Mississippi State University by Dr. Jack Reed.

Data were summarized by year across sample dates and replicates within locations, and data were analyzed using locations as replicates with all variables fixed. The percentage of individual species relative to treatment was analyzed by using only locations where the species of interest was present based on the arcsin(sqrt(x)) transformation (Marascuilo and McSweeney 1977). The median test (Chi^2; p=0.05) was the statistic used to evaluate differences of species percentages among treatments (Statsoft® Statistica, Tulsa, OK, 74104).

Results

Mean numbers of thrips per sample summarized across treatments and replicates is presented in Table 1. Thrips species composition varied considerably among locations within years and within some locations between years (Table 4), but were quite similar among treatments summarized across locations (Table 3). In 2009 and 2010 respectively, *Frankliniella fusca* (Hinds), tobacco thrips, was identified from fifteen and 16 locations; *Thrips tabaci* Lindeman, onion thrips, was found at 6 and 8 locations; *F. occidentalis* (Pergande), western flower thrips, and *Neohydatothrips variabilis* (Beach), soybean thrips, were found at 11 and 11 locations; and *F. tritici* (Fitch), flower thrips, was identified from 13 and 12 locations (Table 1). Primary species composition was approximately reversed in two locations between years: *F. fusca* and *F. occidentalis* at the Lang Farm, Tift Co., GA location, and *F. occidentalis* and *N. variabilis* at the Dimmitt, TX location. The Sunray, TX study resulted in virtually 100% *F. occidentalis* in 2009, but had a high number of *T. tabaci* in 2010. These differences may well reflect the affect of other crops planted adjacent to or in the near vicinity of the cotton seed treatment plots, or the presence or absence of nearby wild hosts early in the season.

Results of percentage distribution of each common species among treatments based on analyses, excluding locations where the species of interest was not found, were similar for both years (Figures 1-10). Results of Chi^2 median test analysis (p=0.05) were not statistically significant for any species for either year, indicating that the percentage of thrips of each of these species did not differ between treatments and that the systemic insecticides were not selective in this case.

Table 1. Mean number of adult thrips averaged across treatments by species and year.

Location	Tobacco Thrips		Flower Thrips		Western Flower Thrips		Soybean Thrips		Onion Thrips		Other*	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
Keiser, AR	5.60	8.67	0.08	0.08	0.04	0.05	0.04	0.07	0.23	0.00	0.00	0.02
Marianna, AR	7.02	14.02	0.04	0.08	0.00	0.00	0.10	0.07	0.06	0.00	0.04	0.00
Rohwer, AR	1.02	19.44	0.02	3.64	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00
ABAC Farm, Tift Co., GA	1.02		0.02		0.04		0.04		0.00		0.00	
Belflower Farm, Tift Co. GA		4.61		2.67		3.58		0.17		0.00		0.00
Lang Farm, Tift Co., GA	1.27	1.50	0.13	0.20	3.48	0.09	0.00	0.00	0.00	0.00	0.00	0.00
Winnsboro, LA	5.83	1.00	0.08	0.00	0.71	0.17	0.00	0.00	0.00	0.00	0.00	0.00
Shreveport, LA	3.61	18.92	0.14	0.17	0.17	0.00	0.06	0.14	0.00	0.00	0.06	0.00
St Joseph, LA		7.80		0.50		0.69		0.20		0.04		0.03
Portageville, MO	1.13		0.15		0.04		0.04		0.00		0.00	
Clarkton, MO		0.71		0.08		0.31		0.18		0.07		0.00
Raymond, MS	1.83		0.00		0.00		0.08		0.00		0.00	
Starkville, MS	1.15		0.13		0.00		0.00		0.00		0.00	
Stoneville, MS	0.94	5.90	0.04	0.03	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.02
Plymouth, NC		5.93		0.66		0.11		0.27		0.06		0.00
Raleigh, NC	7.08	4.54	0.53	0.23	1.25	1.74	0.11	2.55	1.58	0.27	0.03	0.00
Blackville, SC	1.33	3.83	0.00	0.06	0.00	0.00	0.10	0.22	0.00	0.00	0.00	0.00
Jackson, TN	2.06	5.79	0.13	0.00	0.00	0.00	2.44	2.36	0.63	0.13	0.00	0.00
Dimmitt, TX	0.00	0.00	0.00	0.00	10.25	1.36	0.00	0.00	2.83	3.45	0.00	0.00
Sunray, TX	0.00	0.02	0.00	0.00	0.50	2.20	0.00	0.00	0.00	6.98	0.00	0.03
Suffolk, VA	5.35	3.64	0.13	0.00	0.40	0.00	0.29	0.21	1.44	0.24	0.00	0.00
Number of locations where collected	15	16	13	12	11	11	11	11	6	8		

*Other thrips include: 2009- *Frankliniella williamsi* Hood, *Scolothrips paladus* (Beach), *Microcephalothrips abdominalis* (D. L. Crawford), or *Thrips nigripilosus* Uzel; 2010- *Frankliniella* sp., *Stomatothrips* sp., *Scirtothrips* sp., and *Thrips quinciensis*.

Table 2. Abbreviation guide

Ff	Fo	Ft	Nv	Tt
Frankliniella fusca	*Frankliniella occidentalis*	*Frankliniella tritici*	*Neohydatothrips variabilis*	*Thrips tabaci*
tobacco thrips	Western flower thrips	flower thrips	soybean thrips	onion thrips

Table 3. Percentage composition of adult thrips related to treatments, 2009 and 2010.

	Ff '09	Ff '10	Fo '09	Fo '10	Ft '09	Ft '10	Nv '09	Nv '10	Tt '09	Tt '10	Other '09	Other '10
Aeris	70.0	68	9.3	10	7.2	3	5.4	9	7.7	9	0.4	0
Avicta	76.4	63	8.9	13	3.1	2	3	5	5.4	17	0.3	0
Temik	71.2	72	12.1	12	5.8	4	6.2	5	4.6	6	0.2	0
Untreated	84.7	76	6.3	10	2.1	6	4.1	3	2.7	9	0.1	0

Table 4. Percentage composition of thrips species by location – years 2009 and 2010.

	Ff '09	Ff '10	Fo '09	Fo '10	Ft '09	Ft '10	Nv '09	Nv '10	Tt '09	Tt '10
Keiser, AR	93.4	97.7	0.7	0.5	1.4	0.5	0.7	1.3	3.8	1.3
Marianna, AR	97.1	95.9	0.0	0.0	0.6	0.3	1.4	3.7	0.9	0.0
Rohwer, AR	96.1	84.4	0.0	0.0	2.0	15.6	2.0	0.0	0.0	0.0
ABAC Farm , GA	90.7	53.5	3.7	31.4	1.9	13.7	3.7	1.4	0.0	0.0
Lang Farm, GA	26.1	85.7	71.4	9.7	2.6	4.7	0.0	0.0	0.0	0.0
Winnsboro, LA	88.1	84.6	10.7	15.4	1.3	0.0	0.0	0.0	0.0	0.0
Shreveport, LA	90.9	98.4	4.2	0.0	3.5	0.9	1.4	0.7	0.0	0.0
St. Joseph, LA	N/A	82.6	N/A	9.1	N/A	4.4	N/A	3.8	N/A	0.1
Portageville, MO	83.1	55.2	3.1	21.5	10.8	4.8	3.1	14.8	0.0	3.7
Raymond, MS	95.7	N/A	0.0	N/A	0.0	N/A	4.3	N/A	0.0	N/A
Starkville, MS	90.2	N/A	0.0	N/A	9.8	N/A	0.0	N/A	0.0	N/A
Stoneville, MS	93.8	97.4	2.1	0.5	4.2	2.1	0.0	0.0	0.0	0.0
Plymouth, NC	N/A	86.6	N/A	0.8	N/A	9.3	N/A	2.9	N/A	0.4
Raleigh, NC	67.1	55.8	11.8	22.4	5.0	1.4	1.1	2.2	15.0	2.2
Blackville, SC	92.8	91.5	0.0	0.0	0.0	2.3	7.2	6.2	0.0	0.0
Jackson, TN	39.3	69.8	0.0	0.0	2.4	0.0	46.4	28.2	11.9	2.0
Dimmitt, TX	0.0	0.0	78.3	34.6	0.0	0.0	0.0	0.0	21.7	34.6
Sunray, TX	0.0	0.9	100.0	39.1	0.0	0.0	0.0	0.0	0.0	59.9
Suffolk, VA	70.4	81.2	5.2	0.0	1.6	0.0	3.8	12.1	18.9	6.7

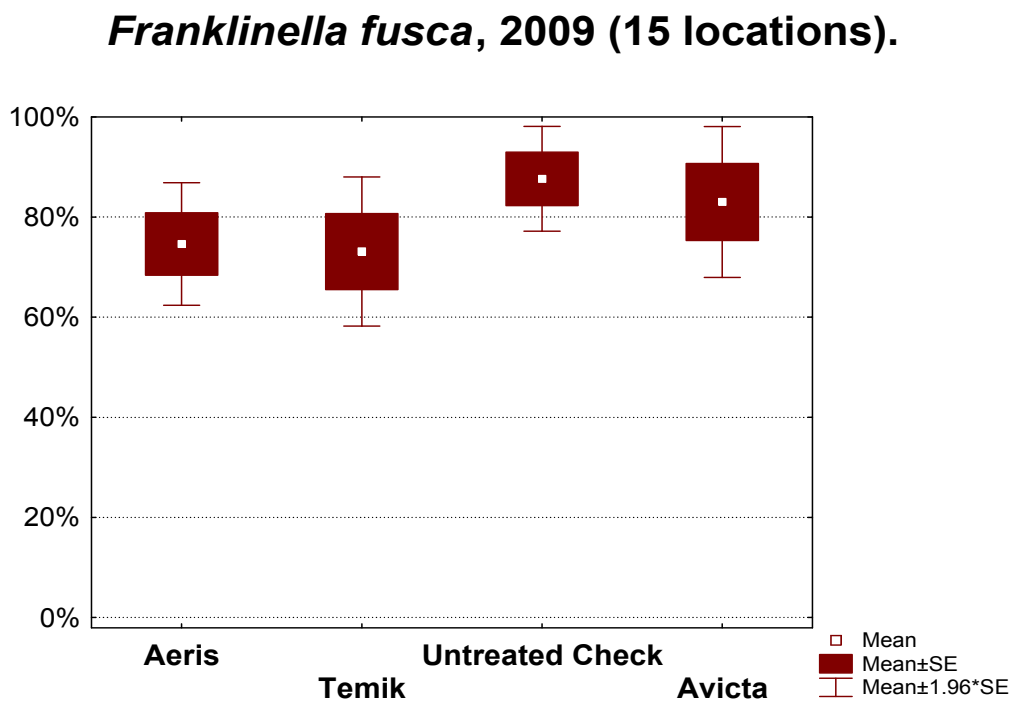

Figure 1. Percentage of adult tobacco thrips as related to treatments averaged across locations and samples dates for 2009.

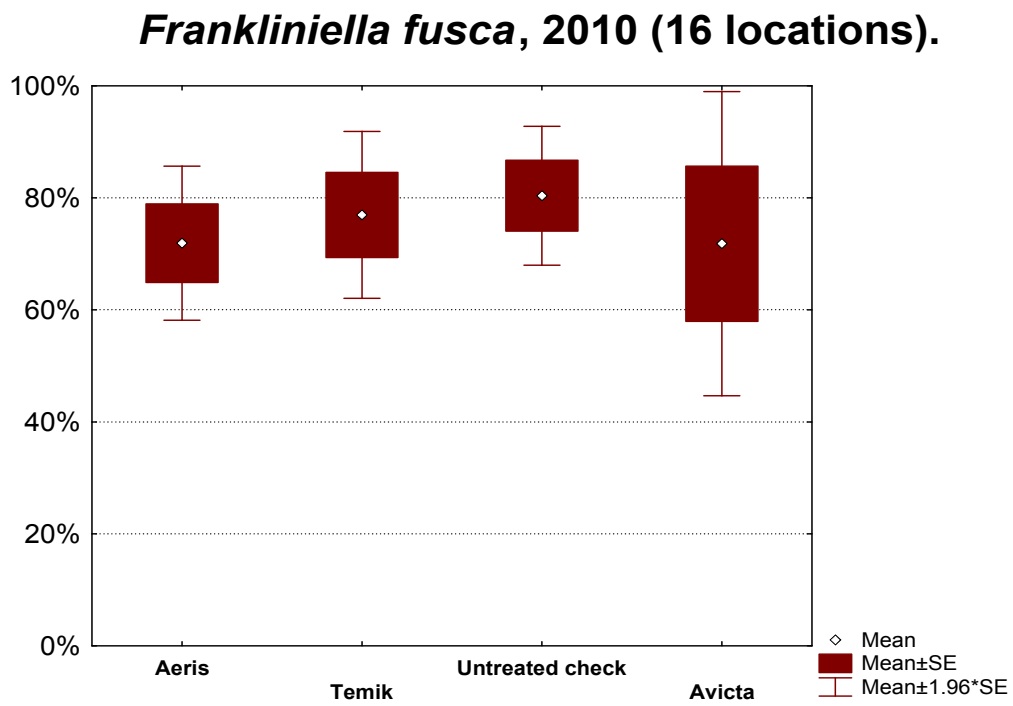

Figure 2. Percentage of adult tobacco thrips as related to treatments averaged across locations and samples dates for 2010.

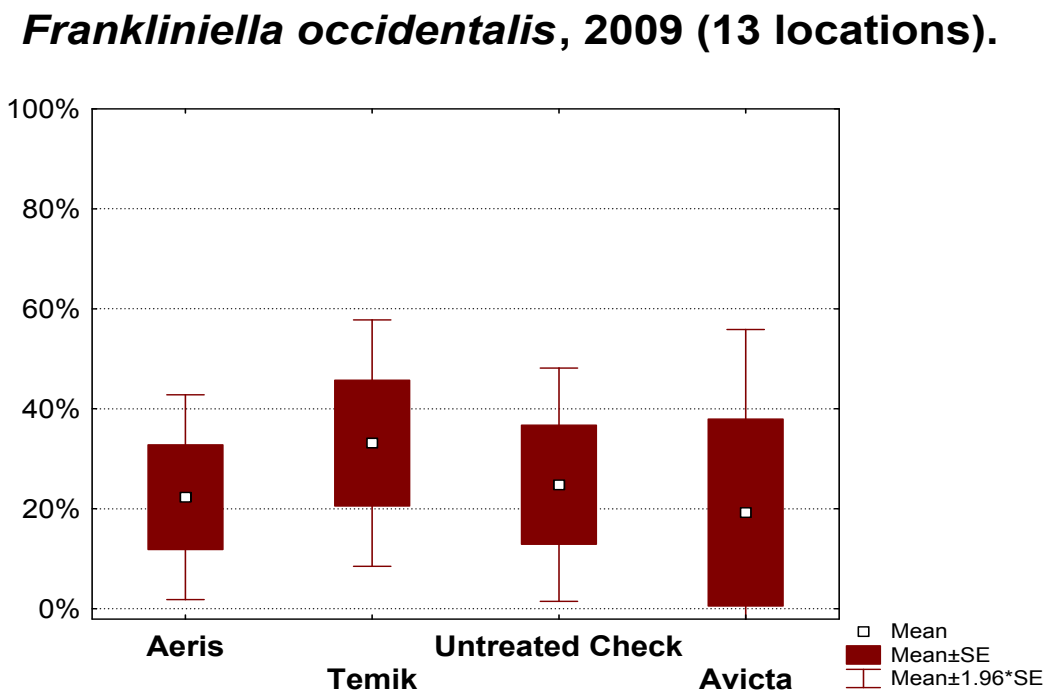

Figure 3. Percentage of adult western flower thrips as related to treatments averaged across locations and samples dates for 2009.

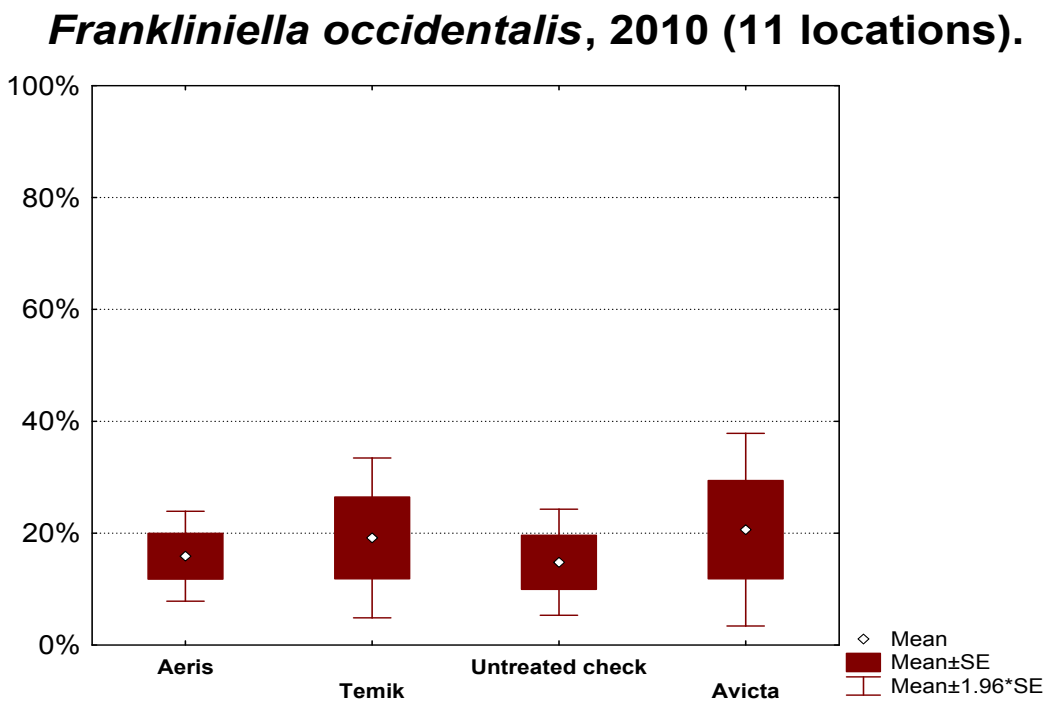

Figure 4. Percentage of adult western flower thrips as related to treatments averaged across locations and samples dates for 2010.

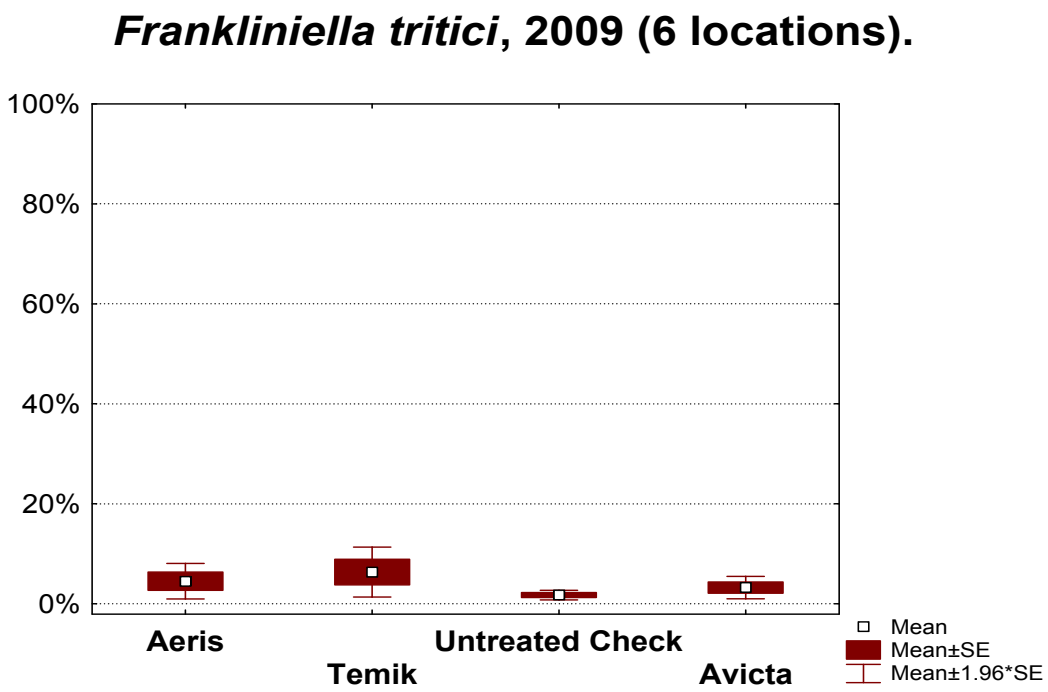

Figure 5. Percentage of adult flower thrips as related to treatments averaged across locations and samples dates for 2009.

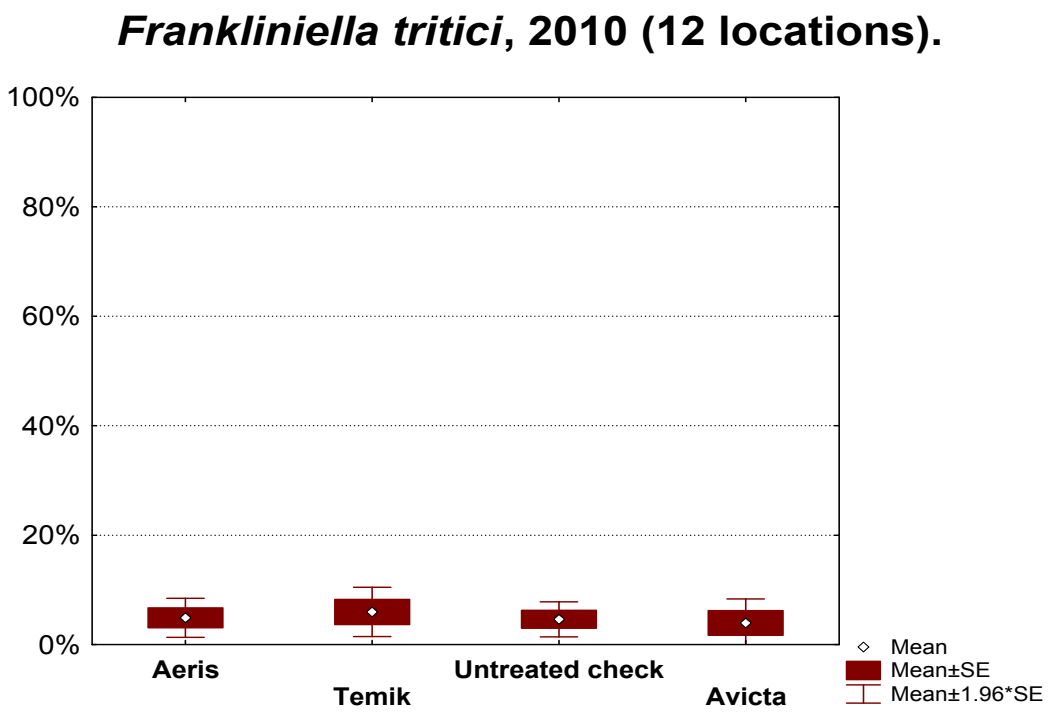

Figure 6. Percentage of adult flower thrips as related to treatments averaged across locations and samples dates for 2010.

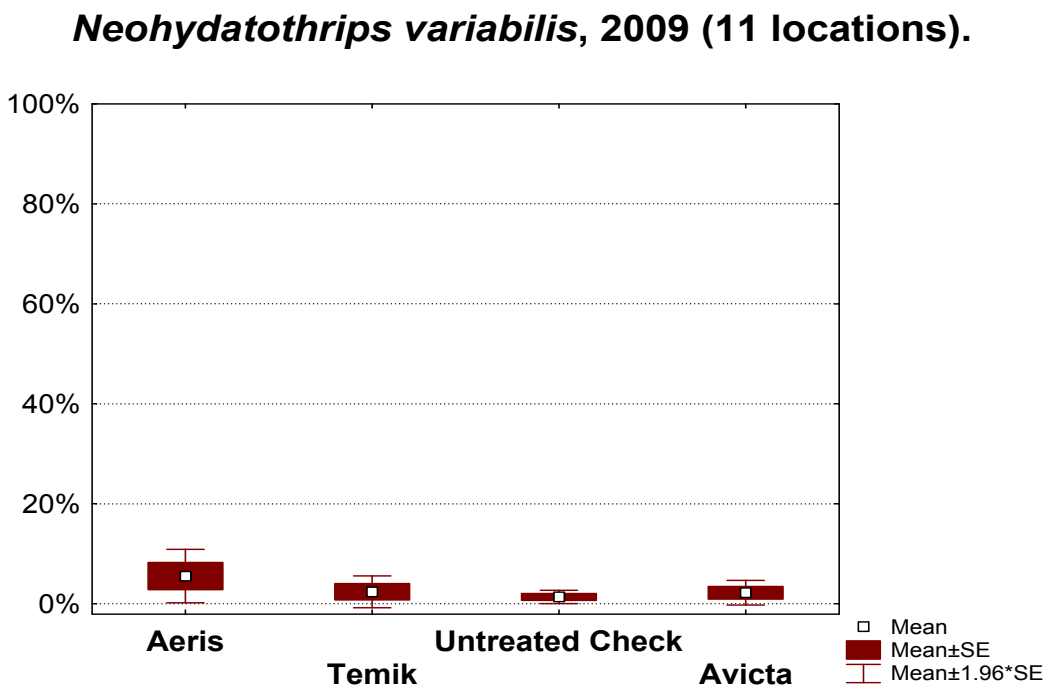

Figure 7. Percentage of adult soybean thrips as related to treatments averaged across locations and samples dates 2009.

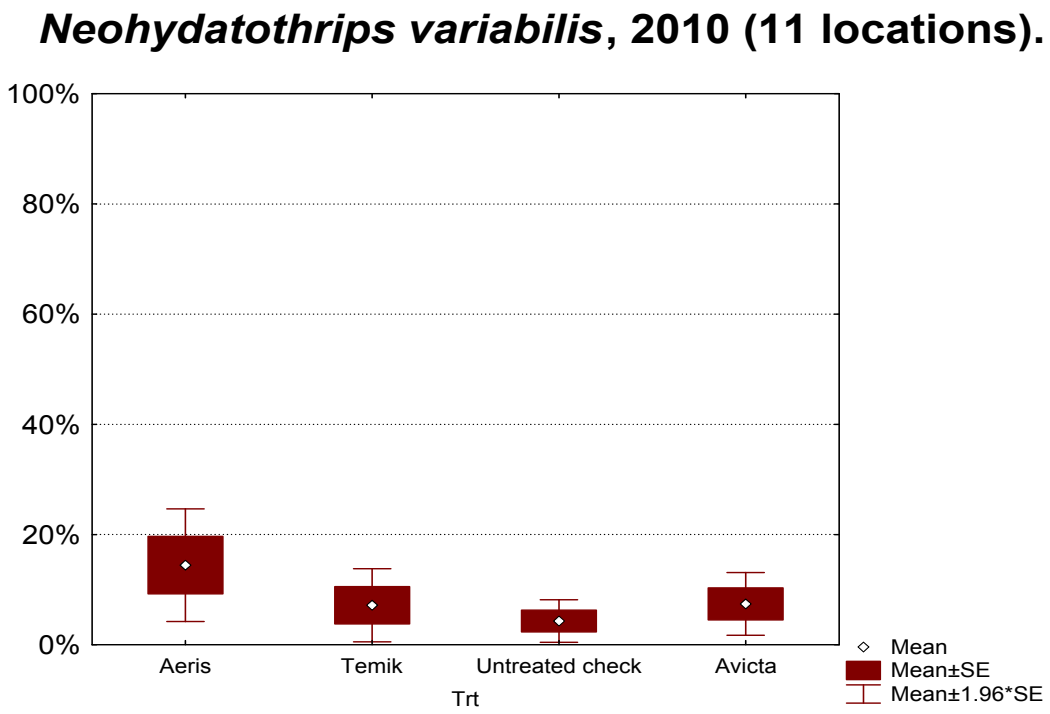

Figure 8. Percentage of adult soybean thrips as related to treatments averaged across locations and samples dates for 2010.

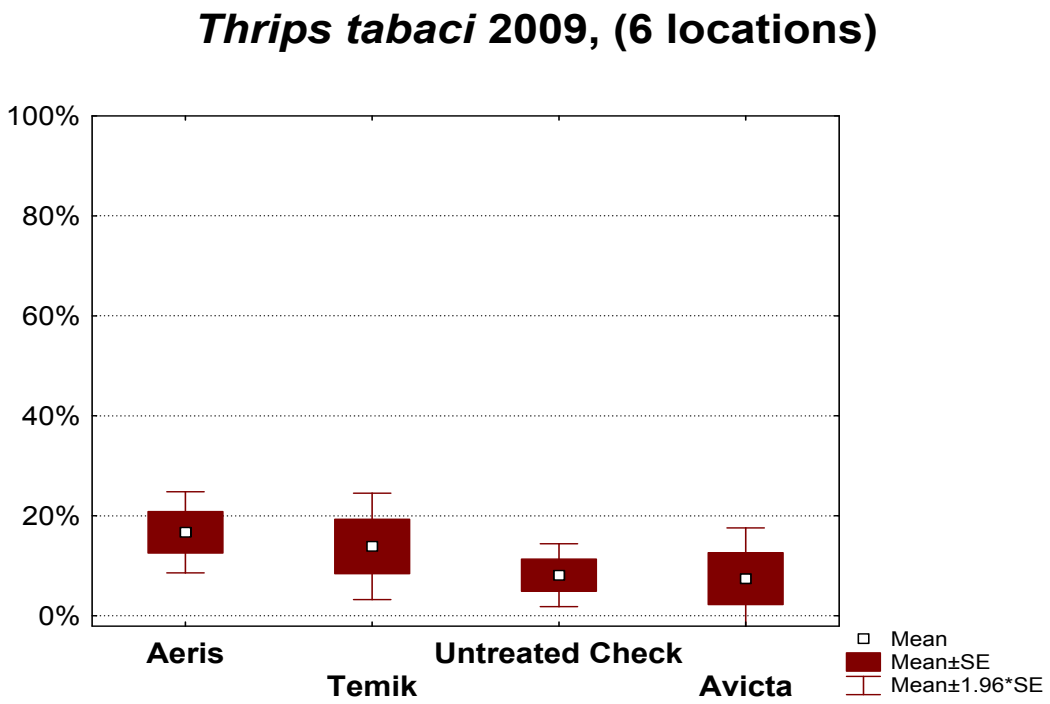

Figure 9. Percentage of adult onion thrips related to treatments averaged across locations and samples dates for 2009.

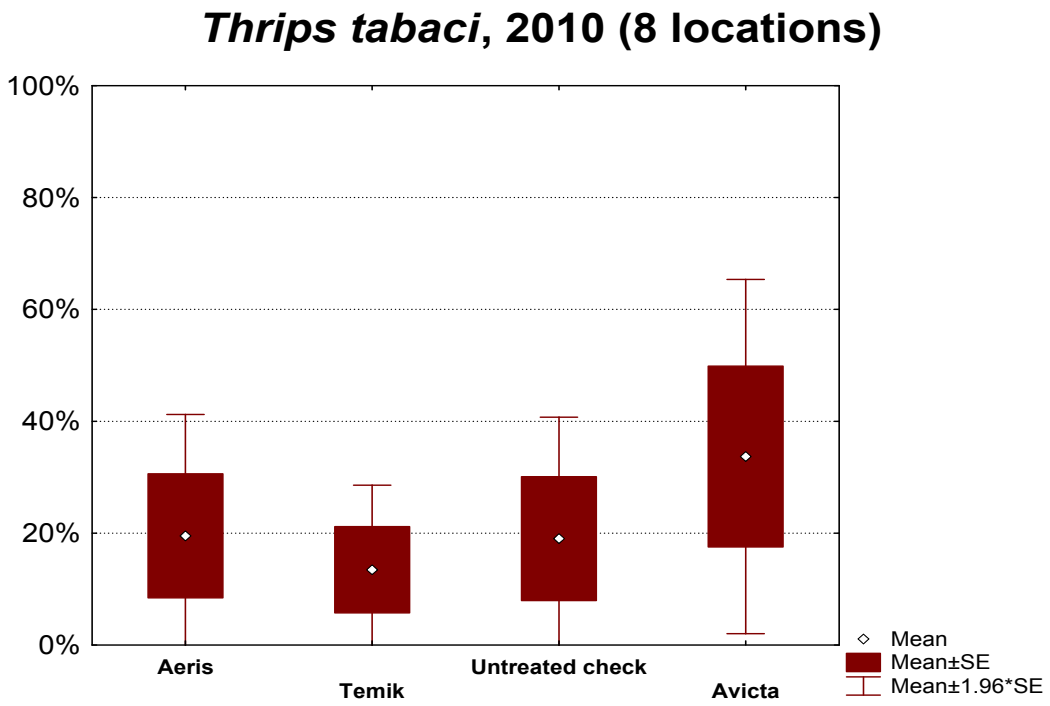

Figure 10. Percentage of adult onion thrips related to treatments averaged across locations and samples dates for 2010.

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