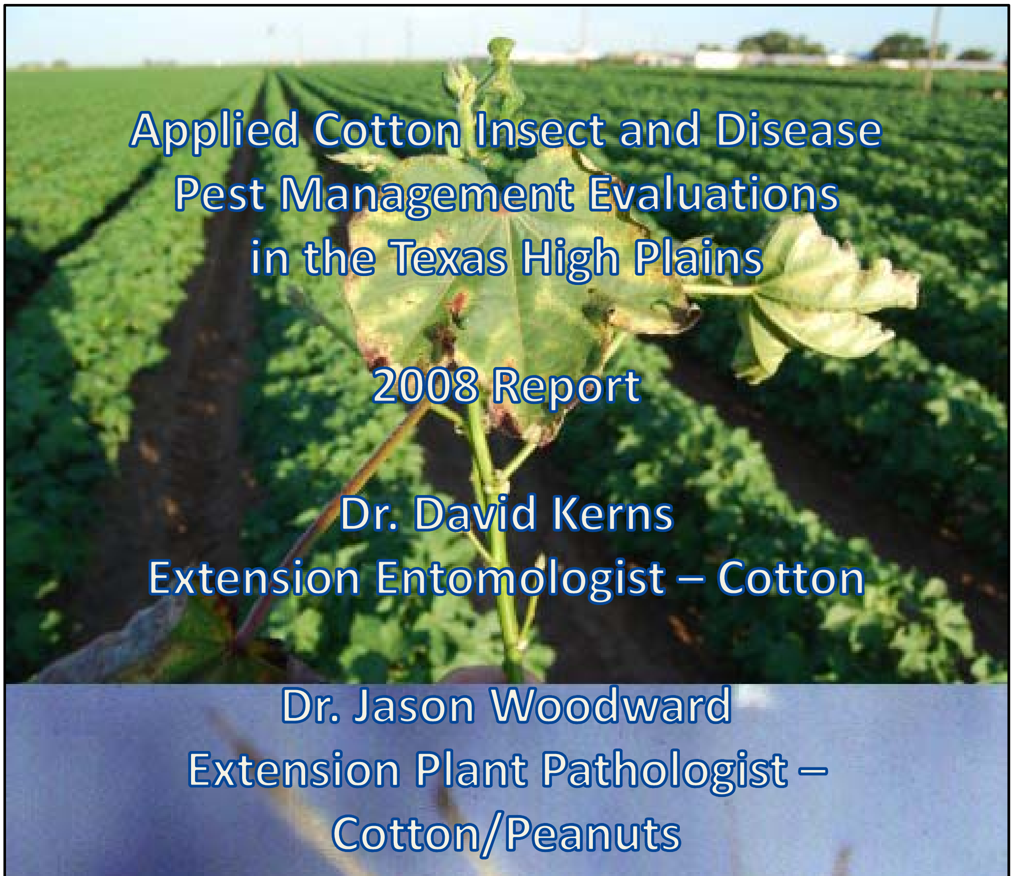
AgriLIFE EXTENSION
Texas A&M System



Applied Cotton Insect and Disease Pest Management Evaluations in the Texas High Plains

2008 Report

Dr. David Kerns
Extension Entomologist – Cotton

Dr. Jason Woodward
Extension Plant Pathologist – Cotton/Peanuts

Dr. Terry Wheeler
Research Plant Pathologist

Bo Kesey
Extension Program Specialist – Cotton Entomology

February, 2009

Applied Cotton Insect and Disease Pest Management Evaluations in the Texas High Plains

2008 Report

Dr. David Kerns
Extension Entomologist – Cotton

Dr. Jason Woodward
Extension Plant Pathologist – Cotton/Peanuts

Dr. Terry Wheeler
Research Plant Pathologist

Bo Kesey
Extension Program Specialist – Cotton Entomology

Texas AgriLife Extension Service
Texas AgriLife Research and Extension Center
Lubbock Texas

February, 2009

ACKNOWLEDGEMENTS

The authors thank the following for their support of this project:

Plains Cotton Growers and Cotton Incorporated
Texas State Support for funding

Producers/Consultants-Cooperators:

Tim Black – Muleshoe
Tyler Black – Muleshoe
Kendal Devault – Farwell
Chad Harris – Ralls
Glenn Farms – Levelland/Wolfforth
Brad Kleman – Dimmitt
Dana Palmer – Lubbock
Chuck Roland – Seminole
Kenneth Schilling – Dimmitt
Bruce Turnipseed - Levelland

Co-Researchers:

Dr. Megha Parajulee – Texas AgriLife Research, Lubbock
Abhilash Balachandran – Graduate Research Assistant,
Department of Plant and Soil Science, Texas Tech University
Brant Baugh – EA-IPM, Lubbock County
Manda Cattaneo – EA-IPM, Gaines County
Greg Cronholm – EA-IPM, Hale/Swisher Counties
Tommy Doederlein, EA-IPM, Dawson/Lynn Counties
Emilio Nino – EA-IPM, Castro/Lamb Counties
Scott Russell – EA-IPM, Terry/Yoakum Counties
Kerry Siders – EA-IPM, Cochran/Hockley Counties
Monti Vandiver – EA-IPM, Bailey/Parmer Counties
Steve Young – CEA-AG/NR, Castro County

Texas AgriLife Research:

Dr. Jane Dever
Dr. Terry Wheeler
Mr. Mark Arnold
Mr. Doug Nesmith
Mr. Danny Meason

Companies:

All-Tex
Americot / NexGen
Amvac Chemical Corporation
Bayer CropScience (FiberMax, AFD, Stoneville)
Croplan Genetics
Delta and Pine Land
DuPont Crop Protection
FMC Corporation Agricultural Products
Helena Chemical Company
ISK Biosciences Corporation
Loveland Products, Inc.
MANA - Makhteshim Agan of North America, Inc.
Monsanto Company
PhytoGen
Syngenta Crop Protection, Inc.

Fiber and Biopolymer Research Institute
Texas Tech University

Texas Department of Agriculture – Food and Fibers Research

Table of Contents

Evaluation of At-Planting Insecticides for Thrips Control in Cotton, Farwell - 2008

Cooperators: Kendal Devault Farm, Cotton Grower/
Texas AgriLife Extension Service

David Kerns, Monti Vandiver and Bo Kesey
Extension Entomologist-Cotton, EA-IPM Bailey/Parmer Counties
and Extension Program Specialist-Cotton

Parmer County

Summary:

The use of preventive, in-furrow insecticides and seed treatments are common for managing western flower thrips, *Frankliniella occidentalis* (Pergande), in areas of the High Plains where thrips are especially troublesome. In this test we evaluated the efficacy of in-furrow applications of Temik, and the seed treatments Aeris, Avicta Complete Cotton, and Cruiser, and a combination of Temik and Aeris. Unfortunately, the thrips pressure in this study was very low. Unlike our 2007 Parmer County test, when significant yield loss was prevented by utilizing similar preventive treatments, we were not able to detect any benefit from using any these treatments in 2008. These data demonstrate that using preventive treatments is not always justified, and that under some conditions, using a foliar treatment regime based on an action threshold may be more cost effective.

Objective:

To determine the efficacy of at-planting insecticides targeting thrips in cotton.

Materials and Methods:

This test was conducted in a commercial cotton field near Farwell, TX, managed by the Kendal Devault Farm. The field was planted on 21 May on 30-inch rows at and seeding rate of 60,000 seeds/acre. The variety was 'FiberMax 9063B2F'. The field was irrigated using a pivot irrigation system. The test was a randomized complete block design with four replications. Plots were 2-rows wide × 200 ft in length. Treatments, application type and timing are listed in Table 1. In-furrow insecticides were applied at planting with the seed using a granular-insecticide metering box at a depth of 1.5 inches.

Adult and immature western flower thrips, *Frankliniella occidentalis* (Pergande), were sampled by visually inspecting 10 whole plants per plot. Samples were taken on 2, 9, 16 and 23 Jun.

Plant height and leaf area was estimated on 23 Jun by collecting 10 plants per plot. Height was determined by measuring the distance from the cotyledons to the terminal. Leaf area was estimated using a leaf area indexer. All plots were hand harvested on 11 Nov using a HB stripper. An area of 1/1000th acre was harvest from the center two rows of each plot.

Grab samples were taken by plot and ginned at the Texas AgriLife Research and Extension Center at Lubbock to determine gin turnouts. Lint samples were submitted to the International Textile Center at Texas Tech University for HVI analysis, and USDA Commodity Credit Corporation (CCC) Loan values were determined for each treatment by plot.

Data were analyzed using linear regression models and PROC MIXED with means separated using an F protected LSD ($P \leq 0.05$).

Results and Discussion:

At 12 and 19 DAP, thrips numbers were low and there were no significant differences among treatments for adult, immature or total thrips per plant (Table 2).

By 26 DAP, the thrips population had increased and at this time the Avitca CC, Temik at 5 lbs/ac and Temik + Aeris treatments did not differ from the untreated (Table 3). Additionally, Avicta CC had more thrips than plots treated with Cruiser or Temik at 3.5 lbs/ac. There were no significant differences among treatments for immature or total thrips. No significant differences were detected among treatments at 33 DAP.

Although no differences were detected in square set, yield or damage based on leaf area, plants in the untreated plots were taller than those in the Aeris, Avicta CC, and Cruiser plots, and plants in the Temik + Aeris treated plots were taller than those in the Aeris and Avicta CC plots (Table 4).

There were no detectable differences in any of the HIV lint parameters (Table 5), or for loan value or net return (Table 6).

In conclusion, there appeared to be no benefit from using seed applied or in-furrow treatments for thrips management in this test. This finding is in sharp contrast to 2007 observations where thrips control prevented significant yield loss. The reason the 2008 study did not show a benefit from thrips management is probably due to early season temperatures, which were 10 to 15 ^{o}F warmer in 2008 relative to 2007. Under warmer conditions the cotton plants were simply able to out grown the damage potential posed by the thrips.

Acknowledgments:

Appreciation is expressed to the Texas Department of Agriculture - Food and Fiber Research for funding of HVI testing at the Texas Tech University - Fiber and Biopolymer Research Institute, and to Plains Cotton Growers for financial support of this project.

Disclaimer Clause:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Insecticide components, rates and application type, Kendal Devault Farm, Farwell, TX, 2008.

Treatment/formulation	Rate mg(AI)/seed	Application type
Untreated check	--	--
+ Dynasty CST 125FS	+ 0.03	seed
Aeris[b]	--[b]	seed
+ Trilex Advanced[c]	+ 1.6 fl-oz/100 lb seed	
Avicta Complete Cotton[a]	--[a]	seed
Cruiser 5FS	0.34	seed
+ Dynasty CST 125FS	+ 0.03	
Temik 15G	3.5 lbs/ac	in-furrow
+ Dynasty CST 125FS	+ 0.03	seed
Temik 15G	5.0 lbs/ac	in-furrow
+ Dynasty CST 125FS	+ 0.03	seed
Temik 15G	3.5 lbs/ac	in-furrow
+ Aeris[b]	--[b]	seed
+ Trilex Advanced[c]	+ 1.6 fl-oz/100 lb seed	

[a]Avicta Complete Pak is a mixture of Avicta 500FS at 0.15 mg(AI)/seed, Cruiser 5FS at 0.34 mg(AI)/seed, and Dynasty CST 125FS at 0.03 mg(AI)/seed.
[b]Aeris is a mixture of Gaucho Grande 5FS at 0.375 mg(AI)/seed and thiodicarb at 0.375 mg(AI)/seed.
[c]Trilex Advanced is a mixture of trifloxystrobin 8.55%, triadimenol 4.27% and metalaxy 12.82%.

Table 2. Mean number of thrips at 12 and 19 DAP, Kendal Devault Farm, Farwell, TX, 2008.

Treatment/ formulation[a]	Rate mg(AI)/seed[a]	2 Jun – cotyledon stage (12 DAP) Thrips per plant			9 Jun – 1 true leaf stage (19 DAP) Thrips per plant		
		adults	immatures	total	adults	immatures	total
Untreated check	--	0.06a	0.03a	0.09a	0.08a	0.04a	0.11a
Aeris	--	0.05a	0.00a	0.05a	0.00a	0.00a	0.00a
Avicta CC	--	0.05a	0.00a	0.05a	0.00a	0.03a	0.03a
Cruiser 5FS	0.34	0.05a	0.00a	0.05a	0.00a	0.05a	0.05a
Temik 15G	3.5 lb/ac	0.03a	0.00a	0.03a	0.05a	0.00a	0.05a
Temik 15G	5.0 lbs/ac	0.00a	0.00a	0.00a	0.00a	0.00a	0.00a
Temik 15G + Aeris	3.5 lbs/ac + --	0.00a	0.00a	0.00a	0.00a	0.00a	0.00a

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD (*P* ≥ 0.05).
[a]See Table 1 for full listing of treatment components and rates.

Table 3. Mean number of thrips at 26 and 33 DAP, Kendal Devault Farm, Farwell, TX, 2008.

Treatment/ formulation[a]	Rate mg(AI)/seed[a]	16 Jun – 2 true leaf stage (26 DAP) Thrips per plant			23 Jun – 4 true leaf stage (33 DAP) Thrips per plant		
		adults	immatures	total	adults	immatures	total
Untreated check	--	0.88a	0.37a	1.24a	0.13a	0.10a	0.23a
Aeris	--	0.70ab	0.15a	0.85a	0.10a	0.23a	0.33a
Avicta CC	--	1.05a	0.15a	1.20a	0.28a	0.08a	0.35a
Cruiser 5FS	0.34	0.40b	0.20a	0.60a	0.20a	0.25a	0.45a
Temik 15G	3.5 lb/ac	0.28b	0.10a	0.38a	0.30a	0.33a	0.63a
Temik 15G	5.0 lbs/ac	0.68ab	0.13a	0.08a	0.25a	0.00a	0.25a
Temik 15G + Aeris	3.5 lbs/ac + --	0.65ab	0.20a	0.85a	0.18a	0.00a	0.18a

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD (*P* ≥ 0.05).
[a]See Table 1 for full listing of treatment components and rates.

Table 4. Effects of seed applied and in-furrow treatments targeting thrips on seedling cotton growth, development and yield, Kendal Devault Farm, Farwell, TX, 2008.

		23 Jun			18 Nov
Treatment/ formulation[a]	Rate mg(AI)/seed[a]	Plant height (cm)	Leaf area (cm^2/plant)	Percent square set	Yield (lbs-lint/ac)
Untreated check	--	10.47a	88.54a	97.08a	756.25a
Aeris	--	9.04c	74.20a	100a	907.32a
Avicta CC	--	9.01c	79.95a	98.38a	715.61a
Cruiser 5FS	0.34	9.24bc	81.54a	97.67a	774.99a
Temik 15G	3.5 lb/ac	9.85abc	87.81a	94.70a	647.14a
Temik 15G	5.0 lbs/ac	9.92abc	79.33a	97.36a	701.72a
Temik 15G + Aeris	3.5 lbs/ac + --	10.34ab	90.69a	96.49a	647.78a

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).
[a]See Table 1 for full listing of treatment components and rates.

Table 5. Impact of at-planting insecticides targeting thrips on HVI fiber properties, Kendal Devault Farm, Farwell, TX, 2008.

Treatment/ formulation[a]	Rate mg(AI)/seed[a]	Mike	Staple length (32nds)	% length uniformity	Strength (g/tex)	% elongation	Rb (% reflec)	+b (yellowness)	Leaf grade
Untreated check	--	2.74a	1.16a	79.69a	28.81a	9.41a	75.35a	10.86a	2.38a
Aeris	--	2.63a	1.14a	79.15a	28.35a	9.48a	74.93a	11.55a	2.00a
Avicta CC	--	2.90a	1.16a	80.45a	29.68a	9.50a	75.30a	11.25a	1.50a
Cruiser 5FS	0.34	2.60a	1.18a	80.65a	29.60a	9.40a	75.40a	11.30a	1.75a
Temik 15G	3.5 lb/ac	2.83a	1.19a	80.53a	29.75a	9.35a	75.48a	11.05a	2.00a
Temik 15G	5.0 lbs/ac	2.78a	1.17a	80.30a	29.20a	9.40a	74.98a	11.48a	2.00a
Temik 15G + Aeris	3.5 lbs/ac + --	2.88a	1.19a	80.05a	28.85a	9.28a	75.55a	10.20a	2.50a

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).
[a]See Table 1 for full listing of treatment components and rates.

Table 6. Impact of at-planting insecticides targeting thrips on loan value and net return, Kendal Devault Farm, Farwell, TX, 2008.

Treatment/ formulation	Rate mg(AI)/seed	Cost[a] ($/acre)	Loan[b] value ($/lb)	Net return[c] ($/acre)
Untreated check	--	6.00	0.45a	0.00a
Aeris	--	20.56	0.44a	52.06a
Avicta CC	--	20.42	0.47a	-37.14a
Cruiser 5FS	0.34	16.24	0.44a	0.39a
Temik 15G	3.5 lb/ac	17.94	0.46a	-61.17a
Temik 15G	5.0 lbs/ac	23.05	0.44a	-37.60a
Temik 15G + Aeris	3.5 lbs/ac + --	32.50	0.47a	-72.68a

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD (*P* ≥ 0.05).
[a]In addition to insecticide costs, the cost/acre included the cost of the fungicide.
[b]Loan value based on HIV parameters in table 5.
[c]Net return based on yield, loan value and non-fungicide chemical costs.

AgriLIFE EXTENSION
Texas A&M System

Evaluation of At-Planting Insecticides for Thrips Control and Effect on Leafminers in Cotton, Seminole - 2008

Cooperators: Chuck Roland Farm, Cotton Grower/ Texas AgriLife Extension Service

David Kerns, Manda Cattaneo and Bo Kesey
Extension Entomologist-Cotton, EA-IPM Gaines County and Extension Program Specialist-Cotton

Gaines County

Summary:

The use of in-furrow applications of Temik in irrigated cotton is common in Gaines County; however, the target pest for these treatments is primarily nematodes, and secondarily western flower thrips, *Frankliniella occidentalis* (Pergande). In this test we wanted to evaluate the benefit of using preventive, in-furrow insecticides and seed treatments for managing thrips in a field with low nematode pressure in Gaines County. In this test we evaluated the efficacy of in-furrow applications of Temik, and the seed treatments Aeris, Avicta Complete Cotton, and Cruiser, and a combination of Temik and Aeris. Unfortunately, the thrips pressure in this study was low, and because of warm temperatures, the impact of thrips on the cotton was minimal and we could not detect any benefit from using any these treatments solely for thrips control in 2008. However, we did note the presence of leafminers, *Liriomyza* sp., in this test. All of the treatments that included Temik had a lower percentage of leafminer mined plants than the untreated, but did not differ from Cruiser or Avicta CC. Aeris, Cruiser and Avicta CC did not differ from the untreated in the percentage of leafminer mined plants. A significant reduction in leaf area was noted; and plants in all of the treatments except Aeris had a greater leaf area than the untreated. Plant leaf area was closely correlated with leafminer, indicating that the damage was caused by this pest. However, no differences in yield were observed. It is not known if leafminers mining seedling cotton pose an economic threat, but it is possible that they may act similarly to thrips where they may cause yield loss when the seedling cotton is subjected to early-season stress, such as cold weather. More research is need on this pest to address this question.

Objective:

To determine the efficacy of at-planting insecticides targeting thrips in cotton, and impact of leafminers.

Materials and Methods:

This test was conducted in a commercial cotton field near Seminole, TX, managed by the Chuck Roland Farm. The field was planted on 13 May on 40-inch rows at a seeding rate of approximately 46,000 seeds/acre. The variety was 'FiberMax 9063B2F'. The field was irrigated using a pivot irrigation system. The test was a randomized complete block design with four replications. Plots were 2-rows wide × 100 ft in length. Treatments, application type and timing are listed in Table 1. In-furrow insecticides were applied at planting with the seed using a granular-insecticide metering box at a depth of 1.5 inches.

Adult and immature western flower thrips, *Frankliniella occidentalis* (Pergande), were sampled by visually inspecting 10 whole plants per plot. Samples were taken on 23 and 28 May, and 2 and 9 Jun. Leafminers, *Liriomyza* sp., were estimated by recording the number of infested plant from 10 plants per plot.

Plant height and leaf area was estimated on 9 Jun by collecting 10 plants per plot. Height was determined by measuring the distance from the cotyledons to the terminal. Leaf area was estimated using a leaf area indexer. All plots were hand harvested on 31 Oct using a HB stripper. An area of 1/1000th acre was harvest from the center two rows of each plot.

Grab samples were taken by plot and ginned at the Texas AgriLife Research and Extension Center at Lubbock to determine gin turnouts. Lint samples were submitted to the International Textile Center at Texas Tech University for HVI analysis, and USDA Commodity Credit Corporation (CCC) Loan values were determined for each treatment by plot.

Data were analyzed using linear regression models and PROC MIXED with means separated using an F protected LSD ($P \leq 0.05$).

Results and Discussion:

At 10 and 15 DAP, thrips numbers were low and there were no significant differences among treatments for adult, immature, total thrips per plant, or percentage of leafminer mined plants (Table 2).

By 20 DAP, the thrips population had increased and at this time there were still no significant differences among treatments for adult thrips or leafminers, but all of the insecticide treatments had fewer immature thrips than the untreated, and Temik at 3.5 lbs had fewer total thrips than the untreated (Table 3). The lack of colonization as indicated by the reduced number of immature thrips in the chemical treatments relative to the check indicates that treatments were expressing activity 20 days past planting.

By 27 DAP the thrips population had decline sharply and there were no difference in the number of thrips among treatments. However, all of the treatments that included Temik had a lower percentage of leafminer mined plants than the untreated, but did not differ from Cruiser or Avicta CC. Aeris, Cruiser and Avicta CC did not differ from the untreated in the percentage of leafminer mined plants.

No differences were detected in plant height or yield, but Avicta CC, Cruiser, and the treatments containing Temik, all had a greater leaf area than the untreated (Table 4). A simple linear regression analysis indicated that leaf area was correlated with the percentage of plants with leaf mines (R^2=0.86, $P < 0.001$) (Figure 1), but no correlation was observed for yield. It is not known if leafminers mining seedling cotton pose an economic threat, but it is possible that they may act similarly to thrips where they may cause yield loss when the seedling cotton is subjected to early-season stress, such as cold weather. More research is need on this pest to address this question.

Based on the HIV analysis of the lint, micronaire was the only trait where significant differences were observed (Table 5). The untreated plots had the highest mike, and was significantly higher that Temik at 3.5 lbs/ac and Cruiser. The reason for the differences in mike is not certain, but it did not result in a significant difference in loan value or net return (Table 6).

Temperatures at this test site were warm during the test period. During the first week post emergence, the temperature ranged from 59-95 ^{o}F, and was 63-91 ^{o}F, 68-102 ^{o}F, and 65-95 ^{o}F for weeks 2, 3, and 4 respectively thereafter. Under such warm conditions, the cotton was developing very rapidly, and the impact of thrips, and possibly leafminers was minimized. In essence, the cotton was able to out grow any sustained damage.

Acknowledgments:

Appreciation is expressed to the Texas Department of Agriculture - Food and Fiber Research for funding of HVI testing at the Texas Tech University - Fiber and Biopolymer Research Institute, and to Plains Cotton Growers for financial support of this project.

Disclaimer Clause:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Insecticide components, rates and application type, Chuck Roland Farm, Seminole, TX, 2008.

Treatment/formulation	Rate mg(AI)/seed	Application type
Untreated check	--	--
+ Dynasty CST 125FS	+ 0.03	seed
Aeris[b]	--[b]	seed
+ Trilex Advanced[c]	+ 1.6 fl-oz/100 lb seed	
Avicta Complete Cotton[a]	--[a]	seed
Cruiser 5FS	0.34	seed
+ Dynasty CST 125FS	+ 0.03	
Temik 15G	3.5 lbs/ac	in-furrow
+ Dynasty CST 125FS	+ 0.03	seed
Temik 15G	5.0 lbs/ac	in-furrow
+ Dynasty CST 125FS	+ 0.03	seed
Temik 15G	3.5 lbs/ac	in-furrow
+ Aeris[b]	--[b]	seed
+ Trilex Advanced[c]	+ 1.6 fl-oz/100 lb seed	

[a]Avicta Complete Pak is a mixture of Avicta 500FS at 0.15 mg(AI)/seed, Cruiser 5FS at 0.34 mg(AI)/seed, and Dynasty CST 125FS at 0.03 mg(AI)/seed.
[b]Aeris is a mixture of Gaucho Grande 5FS at 0.375 mg(AI)/seed and thiodicarb at 0.375 mg(AI)/seed.
[c]Trilex Advanced is a mixture of trifloxystrobin 8.55%, triadimenol 4.27% and metalaxy 12.82%.

Table 2. Mean number of thrips at 10 and 15 DAP, Roland Farm, Seminloe, TX, 2008.

Treatment/ formulation[a]	Rate mg(AI)/seed[a]	23 May – cotyledon stage (10 DAP) Thrisp per plant adults	immatures	total	% mined plants	28 May – 1 true leaf stage (15 DAP) Thrisp per plant adults	immatures	total	% mined plants
Untreated check	--	0.10a	0.00a	0.10a	0.0a	0.15a	0.13a	0.28a	5.0a
Aeris	--	0.00a	0.00a	0.00a	0.0a	0.08a	0.00a	0.08a	2.5a
Avicta CC	--	0.00a	0.00a	0.00a	0.0a	0.08a	0.00a	0.08a	0.0a
Cruiser 5FS	0.34	0.00a	0.00a	0.00a	3.0a	0.05a	0.03a	0.08a	0.0a
Temik 15G	3.5 lb/ac	0.00a	0.00a	0.00a	0.0a	0.05a	0.00a	0.05a	0.0a
Temik 15G	5.0 lbs/ac	0.00a	0.00a	0.00a	0.0a	0.00a	0.00a	0.00a	0.0a
Temik 15G + Aeris	3.5 lbs/ac + --	0.03a	0.00a	0.03a	0.0a	0.15a	0.03a	0.18a	0.0a

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).

[a]See Table 1 for full listing of treatment components and rates.

Table 3. Mean number of thrips and percentage of leafminer mined plants at 20 and 27 DAP, Roland Farm, Seminole, TX, 2008.

Treatment/ formulation[a]	Rate mg(AI)/seed[a]	2 Jun – 2 true leaf stage (20 DAP) Thrips per plant adults	immatures	total	% mined plants	9 Jun – 5 true leaf stage (27 DAP) Thrips per plant adults	immatures	total	% mined plants
Untreated check	--	0.54a	0.40a	0.94a	12.5a	0.05a	0.01a	0.08a	11.3a
Aeris	--	0.38a	0.00b	0.38a	7.5a	0.10a	0.00a	0.10a	12.5a
Avicta CC	--	0.20a	0.08b	0.28a	0.0a	0.20a	0.00a	0.20a	5.0ab
Cruiser 5FS	0.34	0.30a	0.03b	0.33a	5.0a	0.08a	0.00a	0.08a	5.0ab
Temik 15G	3.5 lb/ac	0.28a	0.03b	0.30b	5.0a	0.20a	0.00a	0.20a	2.5b
Temik 15G	5.0 lbs/ac	0.53a	0.00b	0.53ab	0.0a	0.13a	0.00a	0.20a	0.0b
Temik 15G + Aeris	3.5 lbs/ac + --	0.20a	0.08b	0.28a	2.5a	0.13a	0.05a	0.18a	0.0b

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).

[a]See Table 1 for full listing of treatment components and rates.

Table 4. Effects of seed applied and in-furrow treatments targeting thrips on seedling cotton growth, development and yield, Roland Farm, Seminole, TX, 2008.

		9 Jun		31 Oct
Treatment/ formulation[a]	Rate mg(AI)/seed[a]	Plant height (cm)	Leaf area (cm^2/plant)	Yield (lbs-lint/ac)
Untreated check	--	6.00a	60.03c	1062.75a
Aeris	--	6.24a	67.23bc	975.32a
Avicta CC	--	6.86a	78.68a	931.98a
Cruiser 5FS	0.34	6.83a	83.34a	1012.06a
Temik 15G	3.5 lb/ac	6.60a	75.28ab	1106.34a
Temik 15G	5.0 lbs/ac	6.56a	79.35a	1236.88a
Temik 15G + Aeris	3.5 lbs/ac + --	6.46a	78.07a	1056.85a

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).
[a]See Table 1 for full listing of treatment components and rates.

Table 5. Impact of at-planting insecticides targeting thrips on HVI fiber properties, Roland Farm, Seminole, TX, 2008.

Treatment/ formulation[a]	Rate mg(AI)/seed[a]	Mike	Staple length (32nds)	% length uniformity	Strength (g/tex)	% elongation	Rb (% reflec)	+b (yellowness)	Leaf grade
Untreated check	--	5.14a	1.15a	81.73a	30.64a	9.69a	80.09a	7.26a	2.13a
Aeris	--	5.18a	1.12a	81.30a	29.75a	9.60a	79.35a	7.13a	1.00a
Avicta CC	--	5.08abc	1.13a	81.65a	30.65a	9.63a	79.73a	7.15a	1.50a
Cruiser 5FS	0.34	5.00bc	1.14a	80.93a	30.53a	9.88a	79.95a	7.45a	2.00a
Temik 15G	3.5 lb/ac	5.10ab	1.14a	81.55a	30.33a	10.15a	80.10a	7.30a	2.00a
Temik 15G	5.0 lbs/ac	4.95c	1.14a	81.63a	30.53a	10.18a	80.25a	7.33a	2.25a
Temik 15G + Aeris	3.5 lbs/ac + --	5.05abc	1.16a	81.03a	30.50a	9.68a	80.05a	7.18a	2.25a

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).
[a]See Table 1 for full listing of treatment components and rates.

Table 6. Impact of at-planting insecticides targeting thrips on loan value and net return, Roland Farm, Seminole, TX, 2008.

Treatment/ formulation	Rate mg(AI)/seed	Cost[a] ($/acre)	Loan[b] value ($/lb)	Net return[c] ($/acre)
Untreated check	--	4.00	0.56a	0.00a
Aeris	--	13.70	0.55a	-43.95a
Avicta CC	--	13.60	0.56a	-68.92a
Cruiser 5FS	0.34	10.82	0.56a	-20.69a
Temik 15G	3.5 lb/ac	15.94	0.56a	22.58a
Temik 15G	5.0 lbs/ac	21.05	0.56a	92.92a
Temik 15G + Aeris	3.5 lbs/ac + --	25.64	0.55a	-10.83a

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).
[a]In addition to insecticide costs, the cost/acre included the cost of the fungicide.
[b]Loan value based on HIV parameters in table 5.
[c]Net return based on yield, loan value and non-fungicide chemical costs.

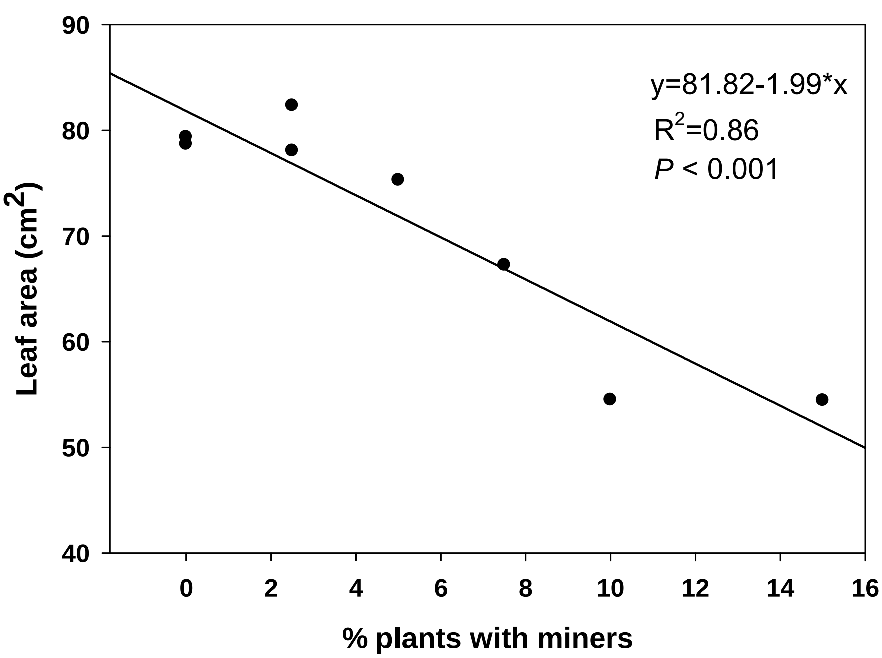


Figure 1. Simple linear correlation of plant damage expressed as leaf area to the percentage of plants with leaf mines.

AgriLIFE EXTENSION
Texas A&M System

Developing an Action Threshold for Thrips in the Texas High Plains - 2008

Cooperators: Tyler Black Farm, Tim Black Farm, Chuck Roland Farm, Bruce Turnipseed Farm, Chad Harris Farm, Cotton Growers/ Texas AgriLife Extension Service/Texas AgriLife Research

David Kerns, Megha Parajulee, Monti Vandiver, Manda Cattaneo, Kerry Siders and Bo Kesey
Extension Entomologist-Cotton, Research Entomologist-Cotton, EA-IPM Bailey/Parmer Counties, EA-IPM Gaines County, EA-IPM Hockley/Cochran Counties and Extension Program Specialist-Cotton

Gaines, Hockley, Lubbock, Crosby, Hale and Bailey Counties

Summary:

Thrips are a significant economic pest of cotton during the pre-squaring stage of growth and development in most of the cotton growing areas of the United States. On the Texas High Plains, the western flower thrips, *Frankliniella occidentalis* (Pergande), is the predominate thrips species comprising 95% of the population infesting cotton. In irrigated cotton where thrips populations are historically high many growers opt to utilize preventative insecticide treatments such as in-furrow applications or seed treatments to control thrips. However, where thrips populations are not "guaranteed" to be especially troublesome, preventive treatments may not be necessary and represent an unnecessary expense. In these situations, well timed banded foliar insecticide applications for thrips control may be more profitable. In this study we studied the impact of different foliar spray intervals targeting thrips in seedling cotton on yield. Using this data we hope to develop a robust action threshold for management of thrips in seedling cotton with foliar insecticides. The current Texas AgriLife Extension action threshold for thrips in cotton is: 1 thrips per plant from plant emergence to 1 true leaf, 2 thrips per plant at the 2 true leaf stage, 3 thrips per plant at the 3 true leaf stage, and 4 thrips per plant at the 4 true leaf stage. In 2007, temperatures were cool (lower 50s to lower 80s ^{o}F) and we observed a significant yield reduction due to thrips impact during the first two week following plant emergence. Correlation analysis suggested that the current action threshold of 1 thrips per true leaf is too high under these environmental conditions, and that the threshold should probably be closer to 0.5 thrips per plant. Waiting until the current action threshold was reached did not prevent yield loss. In 2008, temperatures were much warmer than in 2007, and despite greater thrips

densities in 2008, there was no observable impact on yield that was attributable to thrips. Under warm conditions, (upper 50s to lower 90s ^{o}F) the current action threshold appears to be too low. It is evident that the current action threshold is inadequate and that a threshold dependent on temperatures is needed.

Objectives:

The objectives of this study were to 1) determine at what population density western flower thrips should be subjected to control tactics to prevent yield reduction and significant delayed maturity and 2) compare action thresholds for thrips with and without the 30% thrips larvae requirement.

Materials and Methods:

This study was conducted in irrigated cotton in Bailey County in 2007 and in Bailey, Crosby, Gaines, Hale, Hockley and Lubbock counties in 2008 (Table 1). Plots at all locations were 2-rows wide × 100-ft long, except for Gaines County which had 50-ft long plots. Plots were arranged in a RCB design with 4 replicates. The foliar treatment regimes are outlined in Table 2. All foliar sprays consisted of Orthene 97 S applied at 3 oz-product/acre with a CO_2 pressurized hand boom calibrated to deliver 10 gallons/acre.

Thrips were counted weekly by counting the number of larvae and adult thrips from 10 plants per plot. Whole plants were removed and inspected in the field. Once the cotton was beyond the thrips susceptibly window 10 whole plants were removed from each plot and transported to the laboratory where plant height was measured from cotyledon to the last true leaf, leaf area was measured using a LICOR leaf area indexer. Additionally, percent square set was estimated at this same time by counting the total number of square sites divided by the number of set squares. Each plot was harvested in entirety in 2007, using a stripper with a burr extractor, and a 1/1000th acre portion was harvested from each plot using an HB hand stripper from tests in 2008.

Grab samples were taken by plot and ginned at the Texas AgriLife Research and Extension Center at Lubbock to determine gin turnouts. Lint samples were submitted to the International Textile Center at Texas Tech University for HVI analysis, and USDA Commodity Credit Corporation (CCC) Loan values were determined for each treatment by plot.

Data were analyzed using linear regression models and PROC MIXED with means separated using an F protected LSD ($P \leq 0.05$).

Results and Discussion:

In 2007, we had only one test site. At this location the thrips numbers were relatively low throughout the test period (Figure 1). The thrips did not exceed the action threshold in the untreated plots until week 3. All of the treatment regimes that were sprayed during week 1 yielded significantly more lint than the untreated (Figure 2), although the thrips populations were below 0.5 thrips per plant during this period (Figure 1). Although both of the threshold treatment regimes were sprayed at the same time, and did not differ from each other, the threshold regime that did not depend on the occurrence of thrips larvae yielded significantly more than the untreated. The treatment regime sprayed on weeks 2 and 3 failed to produce significantly more lint than the untreated. Temperatures at the 2007 Bailey County site were cool and the plants were slow growing (Table 3). It is likely that the cotton plants could not out grow the thrips damage under the temperatures experienced.

Based on a standard four parameter logistic curve, there was a significant correlation between the thrips population and yield at the 1 and 2 true leaf stages. At the 1 true leaf stage there was a distinct break between yields and thrips numbers at approximately 0.3 to 0.5 thrips per plant (Figure 3), which is ≤ 50% of the current recommended threshold.

There was also a significant correlation between thrips numbers at the 2 true leaf stage to yield (Figure 4). At this stage of growth the break between high and low yields was less distinctive but appeared to be about 0.6 and 0.8 thrips per plant, or 0.3 and 0.4 thrips per true leaf. Again, well below the current action threshold of 1 thrips per true leaf. Regression analyses at the cotyledon and 4 leaf stage were non-significant at the Bailey County 2007 test site.

At the Bailey County location in 2008, the thrips populations never exceeded threshold for any of the treatment regimes (Figure 5) and we could not detect any differences among treatment regime in leaf damage (Figure 6) or yield (Figure 7).

Thrips populations at the Hale County test site were high relative to other 2008 test sites with the untreated averaging 1.5, 3.0, 5.5 and 2.6 thrips per plant on weeks 1, 2, 3 and 4 respectively (Figure 8). Leaf damage was evident at this location, and the plots received the week 1 application did appear to be least damage, although not statistically different from several other regimes (Figure 9). However, no differences were detected in yield (Figure 10).

Similar to the Bailey County site, thrips were low at the Hockley County location and none of the treatments exceeded threshold (Figure 11). Subsequently we did not detect any differences among treatments in damage (Figure 12) and although there were some differences among treatments in yield, these differences did not appear to follow a logical pattern (Figure 13).

The thrips population was also low at the Lubbock County site with no treatments exceeding threshold (Figure 14). However, differences were observed for leaf area and yield. Plot that received insecticide applications at week 2 and weeks 2 and 3 appeared to have less damage than the other treatment regimes (Figure 15). However, the difference observed for yield did not appear to match any sort of pattern or trend with regard to thrips density or insecticide use. (Figure 16).

During the first few weeks post emergence at the Crosby County site, the thrips population was relatively high and exceeded the threshold on week 1 (Figure 17). Differences in leaf damage suggest that timing an insecticide application at week 1 when the thrips population was high did protect the plants from damage relative to the untreated (Figure 18). However, no differences in yield were detected (Figure 19). The temperatures at the Crosby County site were especially high and the plants were growing very rapidly and likely out grew the thrips damage. (Table 3).

Gaines County was the earliest planted and most southerly test site. At this location thrips were fairly low, but the non-immature consideration threshold treatment regime did trigger an insecticide application on week 2 (Figure 20). However, no leaf damage

(Figure 21) or yield differences were detected (Figure 22). Similar to the other 2008 test sites, temperatures were fairly hot at the Gaines County site (Table 3).

For the 2008 tests, the data for thrips densities and yields were pooled across locations in attempt to detect trends. Additionally, yields were normalized across locations to account for variation due to other factors. In 2008, overall thrips densities where greater than in 2007, particularly during the first 2 weeks of development (Figure 23). Based on the pooled data pooled across locations, there were significant differences in the thrips populations among treatments during weeks 2 and 3. Invariably, plots receiving an insecticide application the previous week tended to have lower thrips numbers than those than were not treated. Despite higher thrips numbers, unlike 2007 there were no significant differences in yield across tests when pooled (Figure 24). Similarly, regression analyses of the 2008 data could not detect any significant relationships between thrips density and yield.

The lack of impact of thrips on yield in 2008 despite higher thrips densities during the first few weeks of plant development (critical time period based on 2007), appears to be related to temperature and subsequent rapidity of plant growth (Table 3). Although sites such as Hale County in 2008 had temperatures similar to those experienced at week 1 in Bailey County in 2007, subsequent temperatures were much warmer.

Acknowledgments:

Appreciation is expressed to the Texas Department of Agriculture - Food and Fiber Research for funding of HVI testing at the Texas Tech University - Fiber and Biopolymer Research Institute, and to Cotton Incorporated Texas State Support and Plains Cotton Growers for financial support of this project.

Disclaimer Clause:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Test sites and details.

County	Year	Variety	Row spacing	Planting date
Bailey	2007	FM 960BR	30 inch	17 May
Bailey	2008	FM 9063B2F	30 inch	13 May
Crosby	2008	FM 9063B2F	40 inch	23 May
Gaines	2008	FM 9063B2F	40 inch	13 May
Hale	2008	FM 9063B2F	40 inch	13 May
Hockley	2008	FM 9063B2F	40 inch	22 May
Lubbock	2008	DP 141B2RF	40 inch	14 May

Table 2. Foliar treatment regime timings.

1) Untreated check
2) Automatic treatment on week 1
3) Automatic treatment on weeks 1 and 2 (only week 2 in 2008)
4) Automatic treatment on weeks 1, 2 and 3
5) Automatic treatment on weeks 2 and 3
6) Treatment based on the Texas AgriLife Extension Threshold
(One thrips per plant from plant emergence through the first true leaf stage, and one thrips per true leaf thereafter until the cotton has 4 to 5 true leaves)
7) Treatment based on the Texas AgriLife Extension Threshold with 30% larvae consideration
(One thrips per plant from plant emergence through the first true leaf stage, and one thrips per true leaf with at least 30% larvae until the cotton has 4 to 5 true leaves)

Table 3. Test sites plant growth and climatic conditions.

County	Week 1 Growth stage Avg Temp oF (min-max)	Week 2 Growth stage Avg Temp oF (min-max)	Week 3 Growth stage Avg Temp oF (min-max)	Week 4 Growth stage Avg Temp oF (min-max)
2007				
Bailey	Cotyledon	1 true leaf	2 true leaves	4 true leaves
	52-79	54-82	57-82	56-86
2008				
Bailey	Cotyledon	2 true leaves	4 true leaves	6 true leaves
	68-100	61-93	62-97	62-90
Crosby	Cotyledon	2 true leaves	5 true leaves	--
	68-102	66-95	67-98	--
Gaines	Cotyledon	1 true leaf	2 true leaves	5 true leaves
	59-95	63-91	68-102	65-95
Hale	Cotyledon	1 true leaf	3 true leaves	5 true leaves
	56-74	58-93	57-93	60-94
Hockley	Cotyledon	2 true leaves	4 true leaves	6 true leaves
	67-103	64-95	67-100	63-90
Lubbock	Cotyledon	2 true leaves	4 true leaves	5 true leaves
	61-91	68-96	65-95	70-99

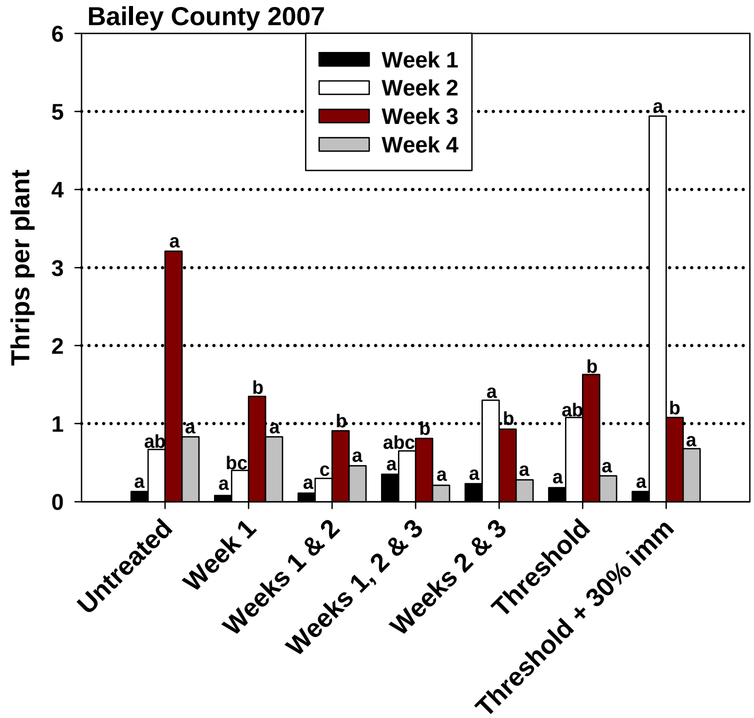


Figure 1. Mean number of thrips subjected to 7 treatment regimes at the Bailey Co. test site in 2007. Same colored bars capped by the same letter are not significantly different based on an F protected LSD ($P < 0.05$). The treatment threshold was 1 thrips on weeks 1 and 2, 2 thrips on week 3, and 4 thrips on week 4. Both threshold treatments were treated on week 2.

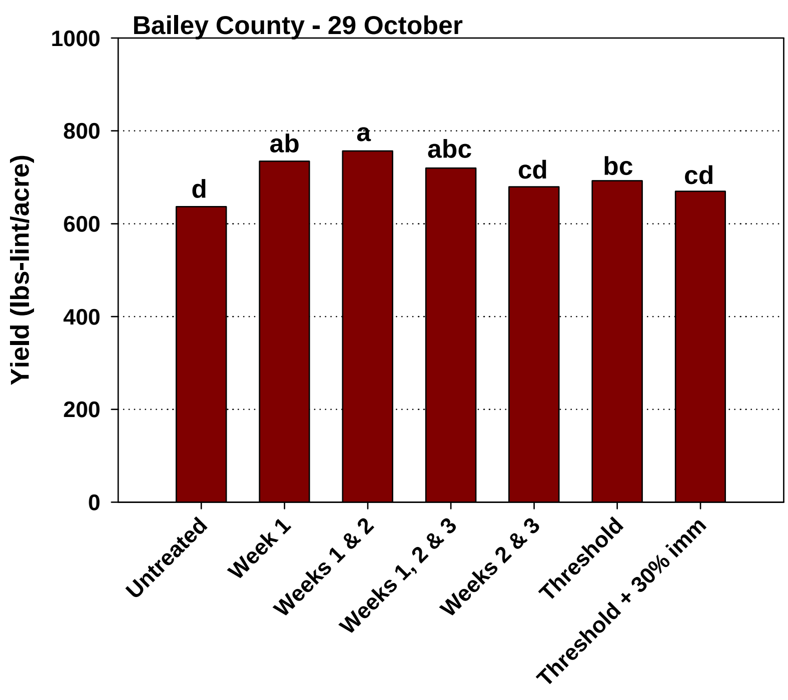


Figure 2. Mean yield of plots subjected to 7 treatment regimes at the Bailey Co. test site in 2007. Bars capped by the same letter are not significantly different based on an F protected LSD ($P < 0.05$).

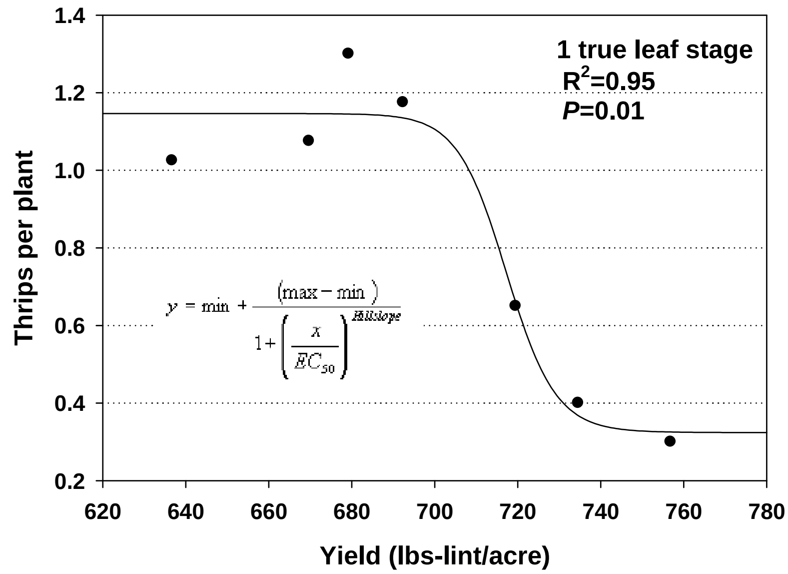


Figure 3. Relationship between thrips density and yield at the 1 true leaf stage.

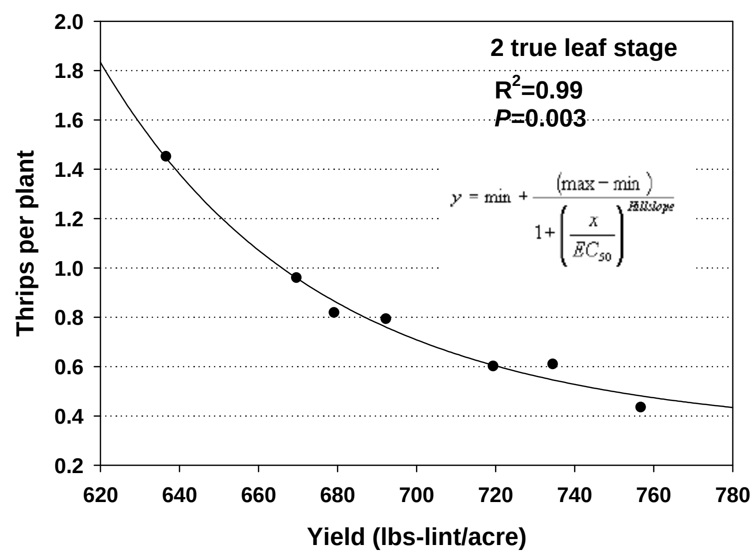


Figure 4. Relationship between thrips density and yield at the 2 true leaf stage.

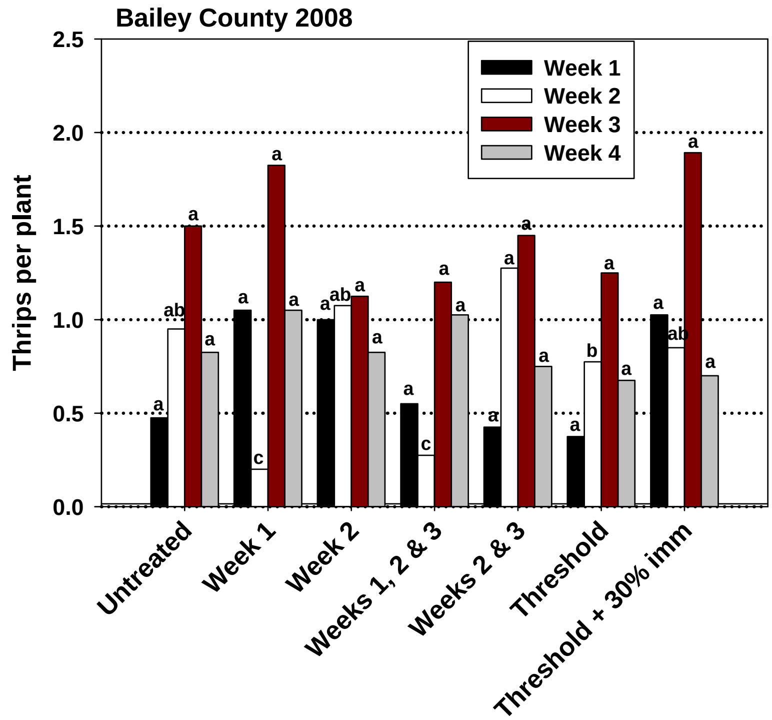


Figure 5. Mean number of thrips subjected to 7 treatment regimes at the Bailey Co. test site in 2008. Same colored bars capped by the same letter are not significantly different based on an F protected LSD (*P* < 0.05). The treatment threshold was 1 thrips on week 1, 2 thrips on week 2, and 4 thrips on week 3. Neither threshold treatments were treated.

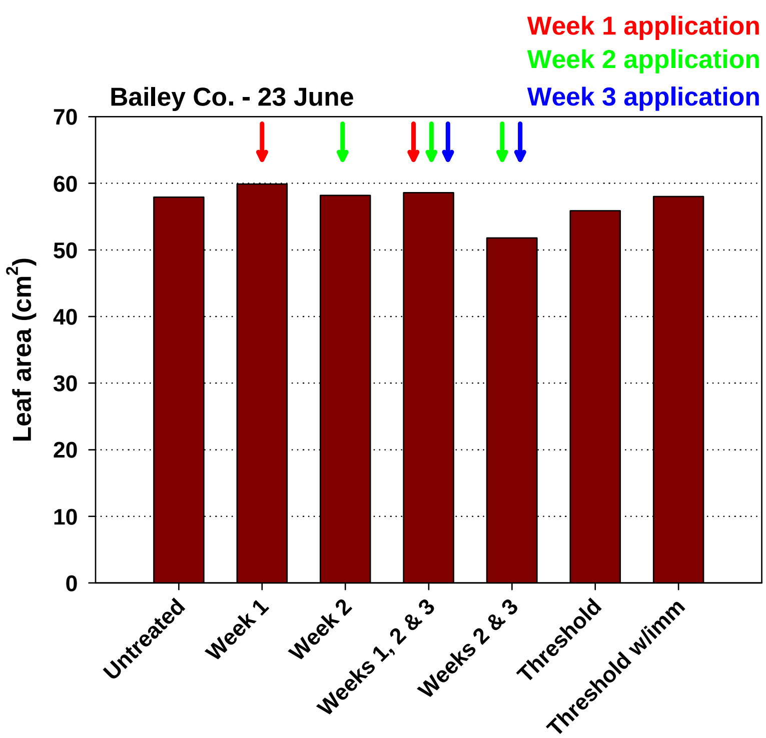


Figure 6. Mean leaf area plots subjected to 7 treatment regimes at the Bailey Co. test site in 2008. No significant differences based on an F protected LSD (*P* < 0.05).

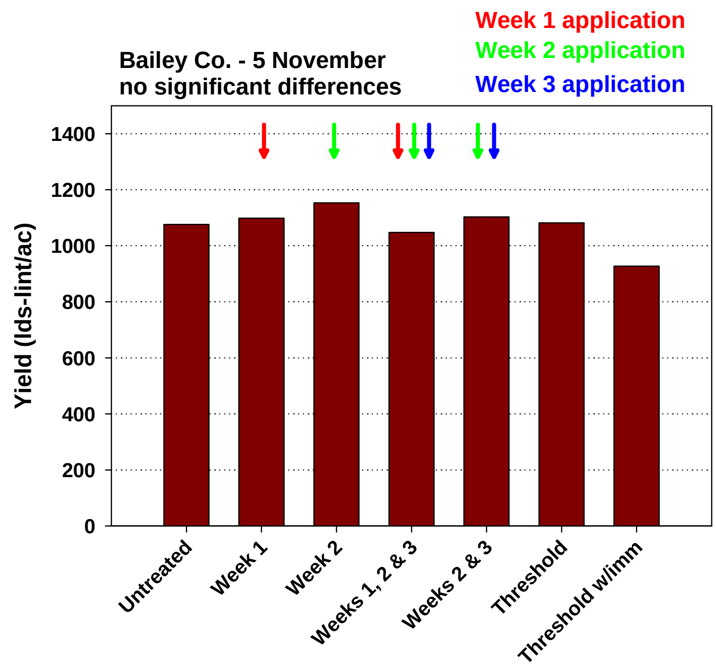


Figure 7. Mean yield of plots subjected to 7 treatment regimes at the Bailey Co. test site in 2008. No significant differences based on an F protected LSD ($P < 0.05$).

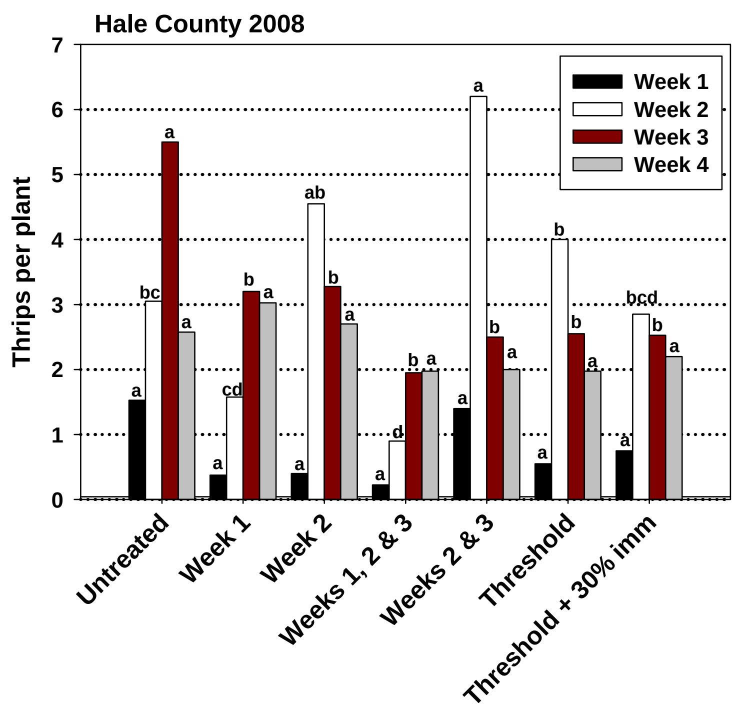


Figure 8. Mean number of thrips subjected to 7 treatment regimes at the Hale Co. test site in 2008. Same colored bars capped by the same letter are not significantly different based on an F protected LSD ($P < 0.05$). The treatment threshold was 1 thrips on weeks 1 and 2, and 2.5 thrips on week 3. Both threshold treatments were treated on weeks 2 and 3.

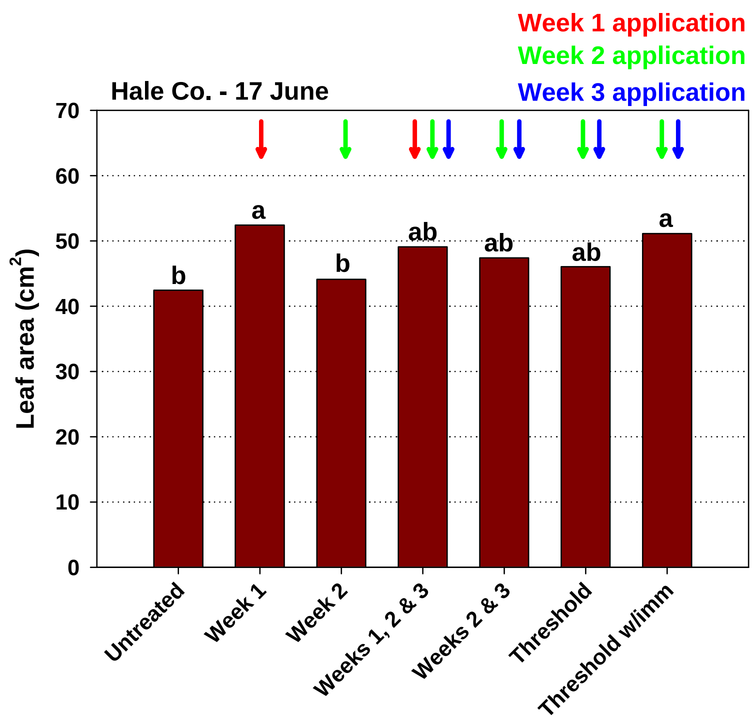


Figure 9. Mean leaf area plots subjected to 7 treatment regimes at the Hale Co. test site in 2008. Bars capped by the same letter are not significantly different based on an F protected LSD (P < 0.05).

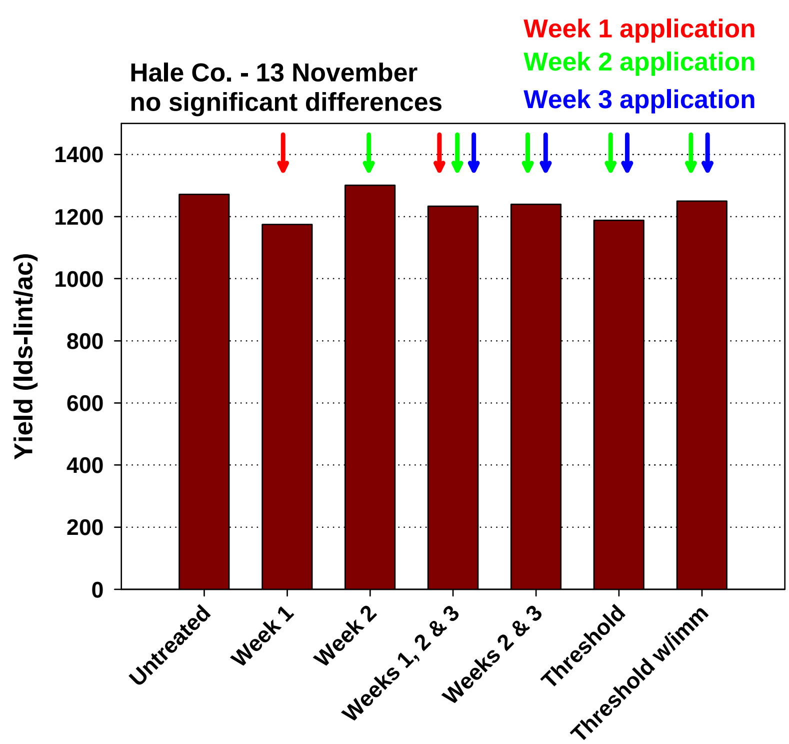


Figure 10. Mean yield of plots subjected to 7 treatment regimes at the Hale Co. test site in 2008. No significant differences based on an F protected LSD (P < 0.05).

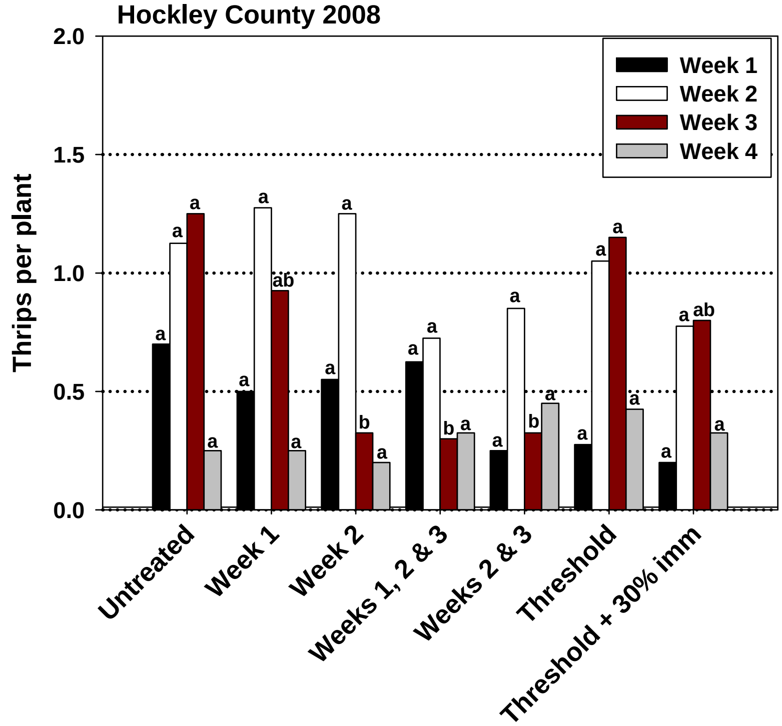


Figure 11. Mean number of thrips subjected to 7 treatment regimes at the Hockley Co. test site in 2008. Same colored bars capped by the same letter are not significantly different based on an F protected LSD ($P < 0.05$). The treatment threshold was 1 thrips on week, 2 thrips on week 2, and 4 thrips on week 3. Neither threshold treatments were treated.

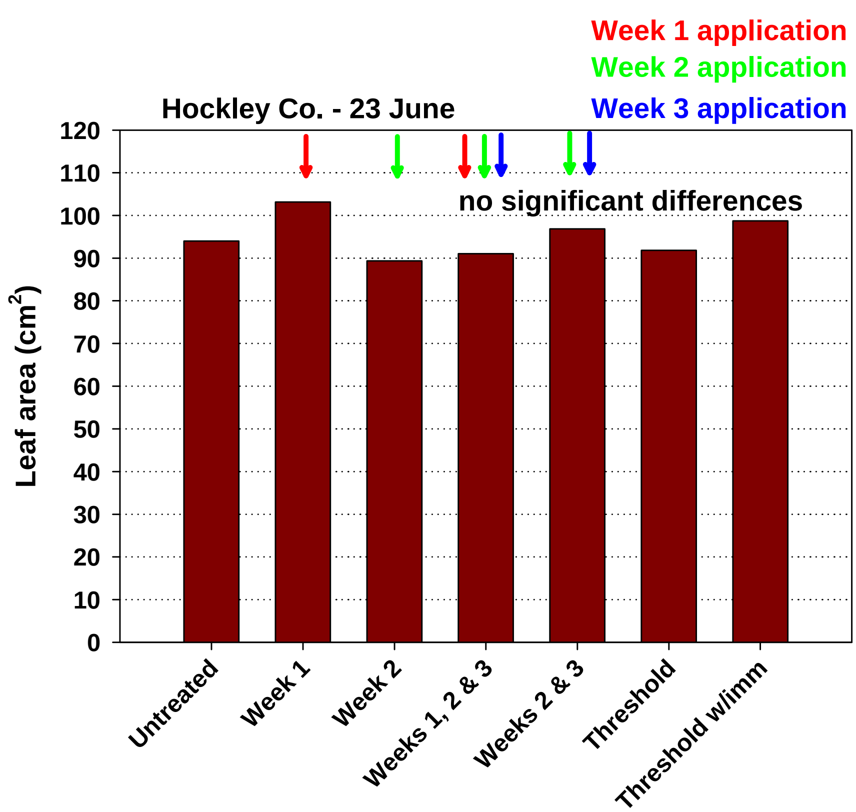


Figure 12. Mean leaf area plots subjected to 7 treatment regimes at the Hockley Co. test site in 2008. No significant differences based on an F protected LSD ($P < 0.05$).

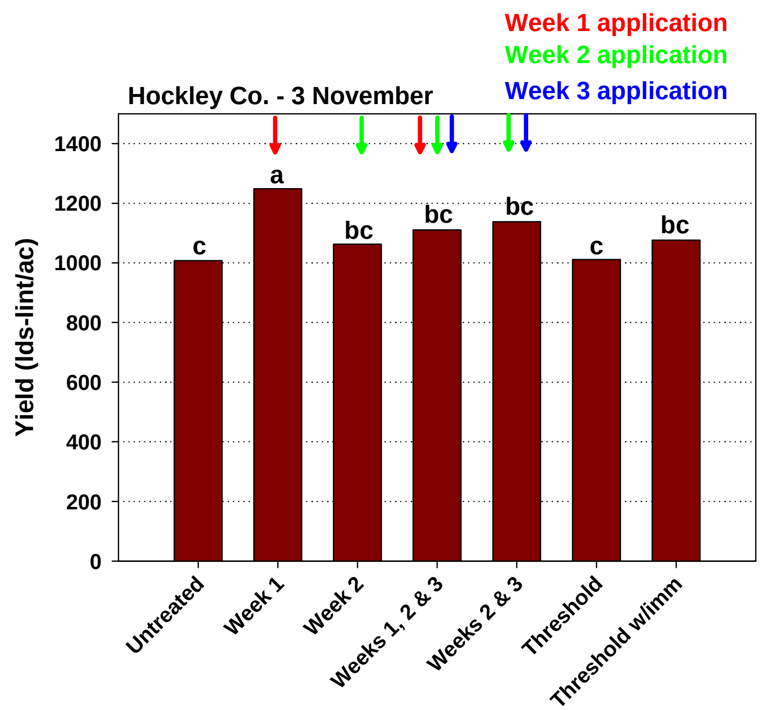


Figure 13. Mean yield of plots subjected to 7 treatment regimes at the Hockley Co. test site in 2008. Bars capped by the same letter are not significantly different based on an F protected LSD ($P < 0.05$).

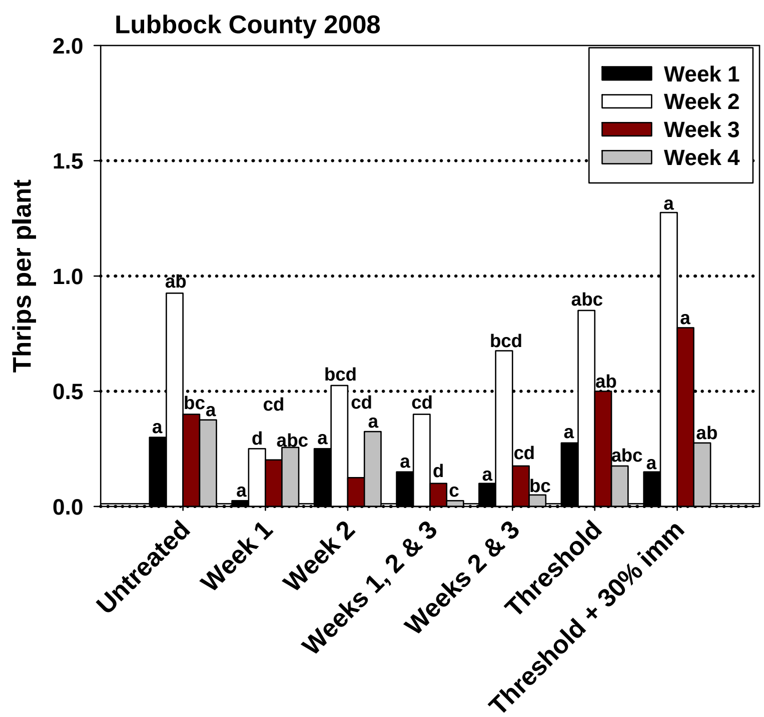


Figure 14. Mean number of thrips subjected to 7 treatment regimes at the Hockley Co. test site in 2008. Same colored bars capped by the same letter are not significantly different based on an F protected LSD ($P < 0.05$). The treatment threshold was 1 thrips on week 1, 2 thrips on week 2, and 4 thrips on week 3. Neither threshold treatments were treated.

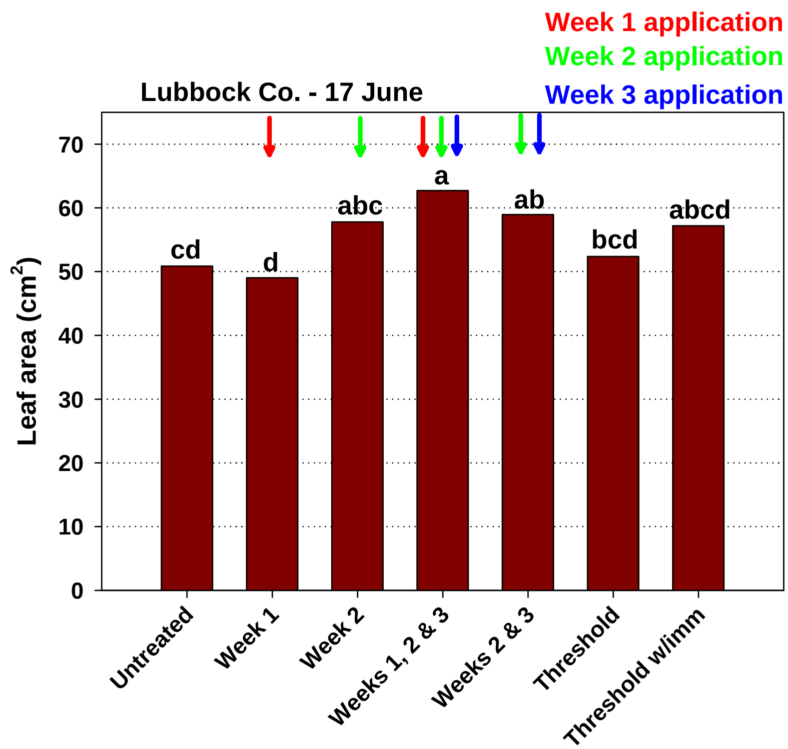


Figure 15. Mean leaf area plots subjected to 7 treatment regimes at the Lubbock Co. test site in 2008. Bars capped by the same letter are not significantly different based on an F protected LSD ($P < 0.05$).

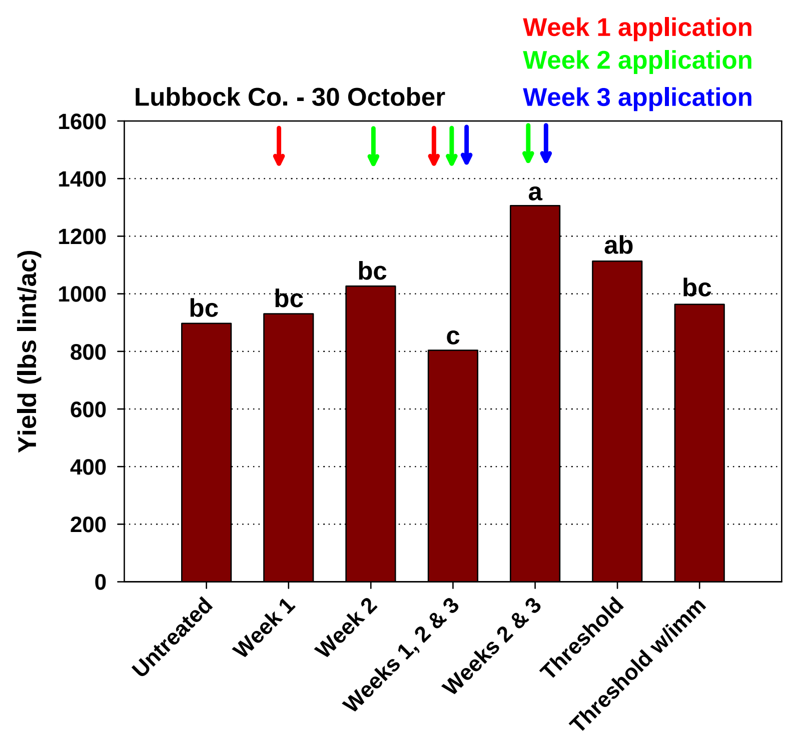


Figure 16. Mean yield of plots subjected to 7 treatment regimes at the Lubbock Co. test site in 2008. Bars capped by the same letter are not significantly different based on an F protected LSD ($P < 0.05$).

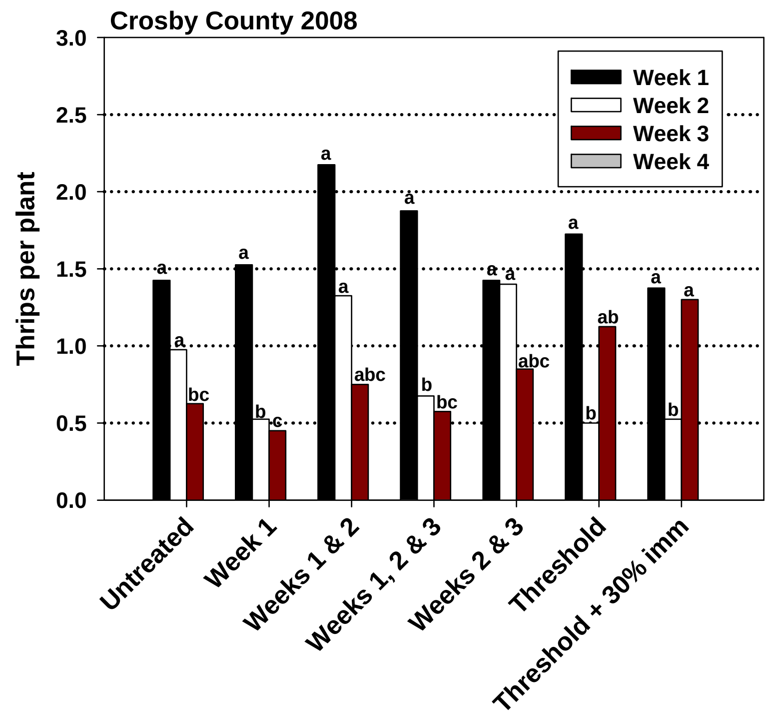


Figure 17. Mean number of thrips subjected to 7 treatment regimes at the Crosby Co. test site in 2008. Same colored bars capped by the same letter are not significantly different based on an F protected LSD ($P < 0.05$). The treatment threshold was 1 thrips on week 1, and 2 thrips on week 2. Plants were beyond susceptibility at week 3. Both threshold treatments were treated on week 1.

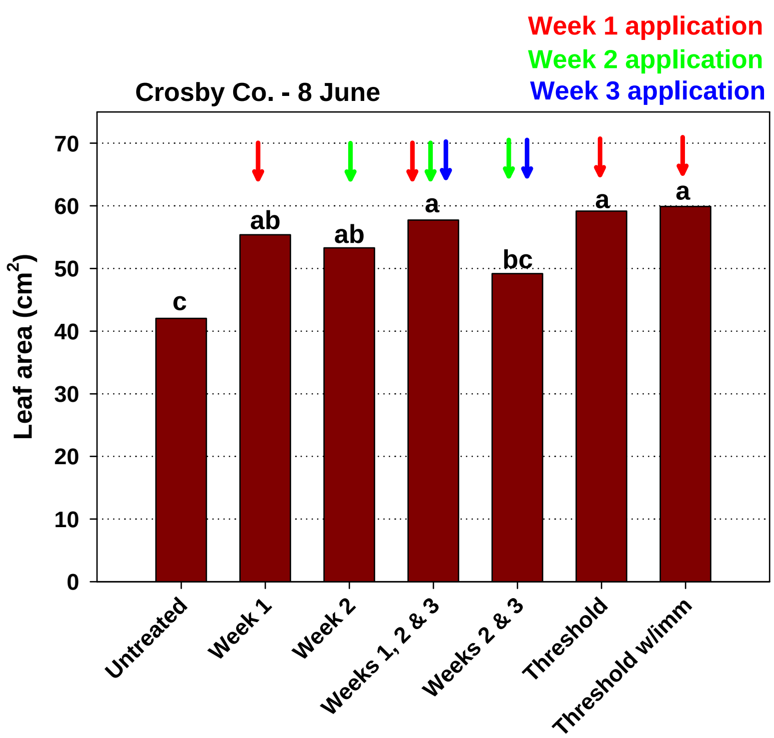


Figure 18. Mean leaf area plots subjected to 7 treatment regimes at the Crosby Co. test site in 2008. Bars capped by the same letter are not significantly different based on an F protected LSD ($P < 0.05$).

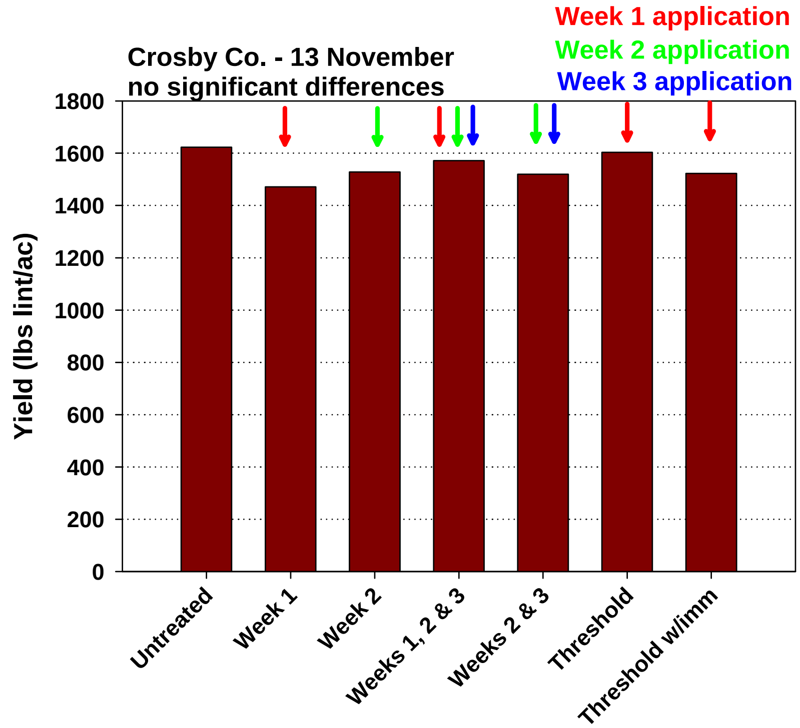


Figure 19. Mean yield of plots subjected to 7 treatment regimes at the Crosby Co. test site in 2008. No significant differences based on an F protected LSD (*P* < 0.05).

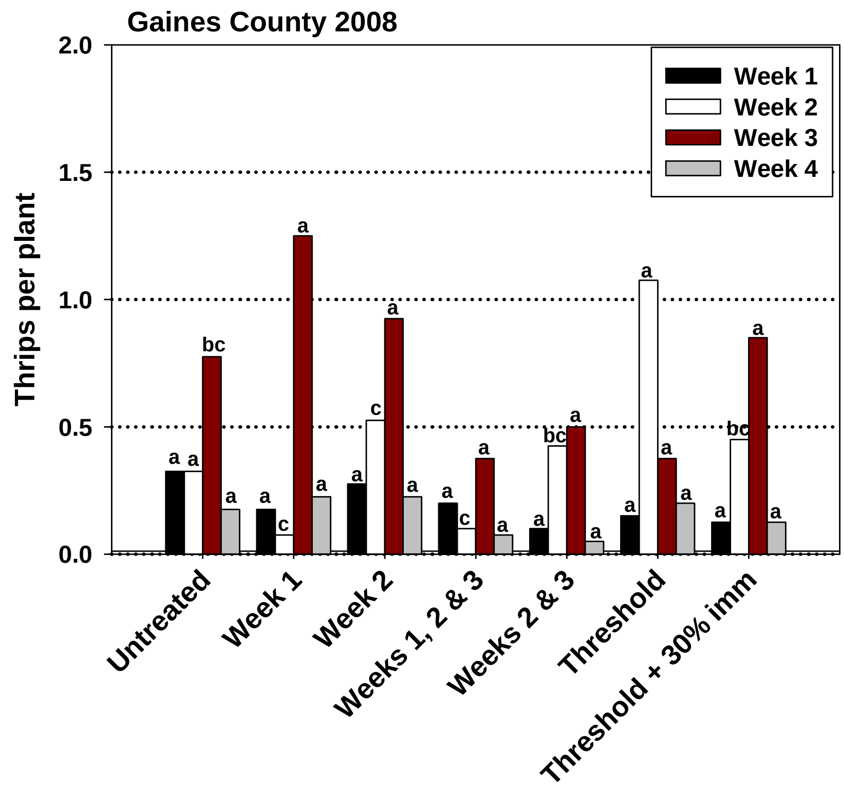


Figure 20. Mean number of thrips subjected to 7 treatment regimes at the Gaines Co. test site in 2008. Same colored bars capped by the same letter are not significantly different based on an F protected LSD (*P* < 0.05). The treatment threshold was 1 thrips on weeks 1 and 2, and 2 thrips on week 3, and 4 thrips on week 3. The threshold without immature consideration was treated on week 2.

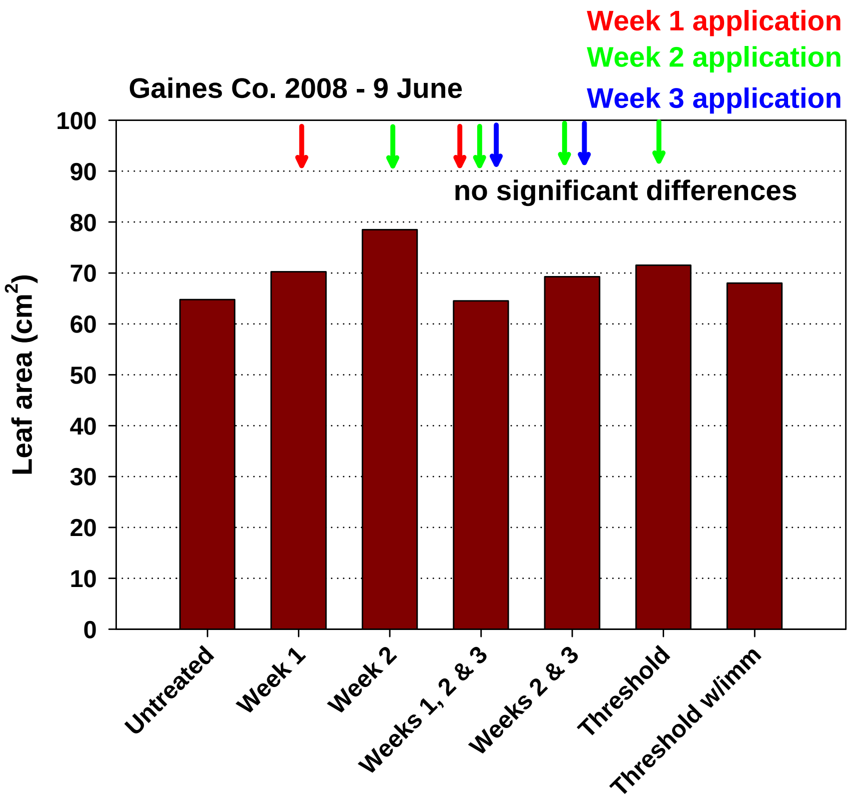


Figure 21. Mean leaf area plots subjected to 7 treatment regimes at the Gaines Co. test site in 2008. No significant differences based on an F protected LSD ($P < 0.05$).

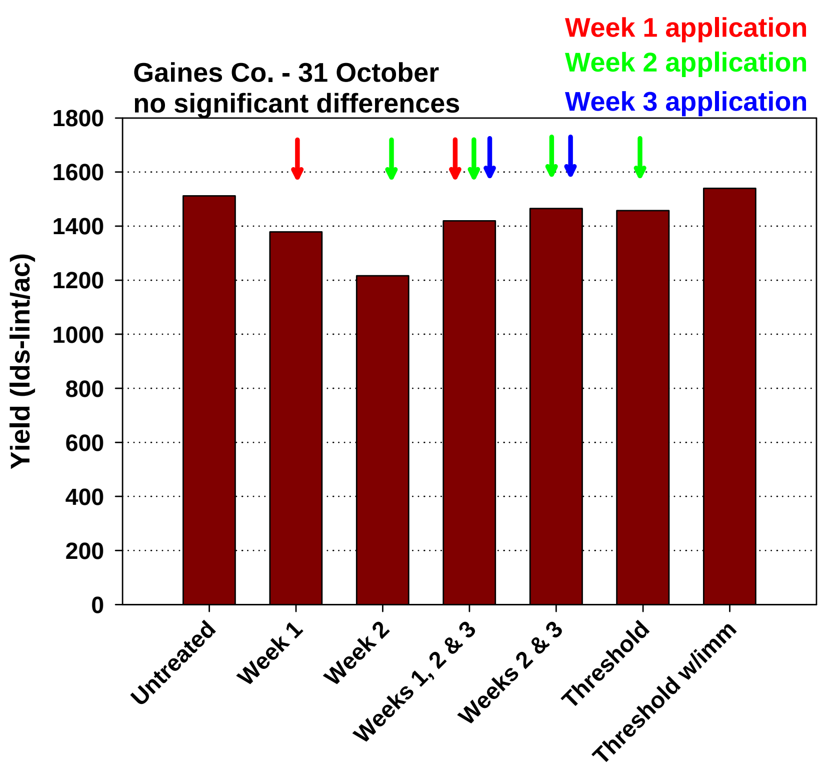


Figure 22. Mean yield of plots subjected to 7 treatment regimes at the Gaines Co. test site in 2008. No significant differences based on an F protected LSD ($P < 0.05$).

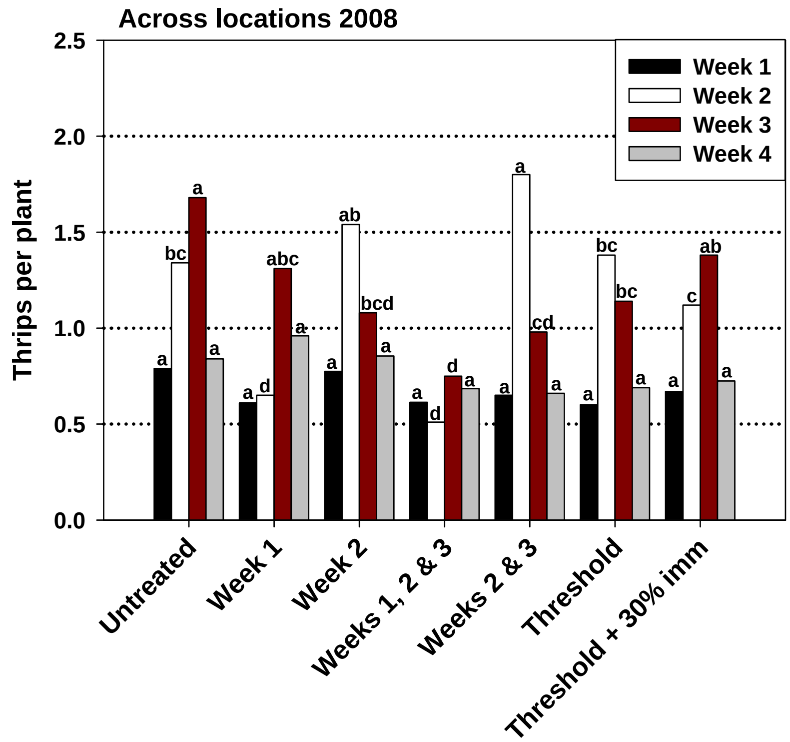


Figure 23. Mean number of thrips subjected to 7 treatment regimes across locations in 2008. Same colored bars capped by the same letter are not significantly different based on an F protected LSD ($P < 0.05$).

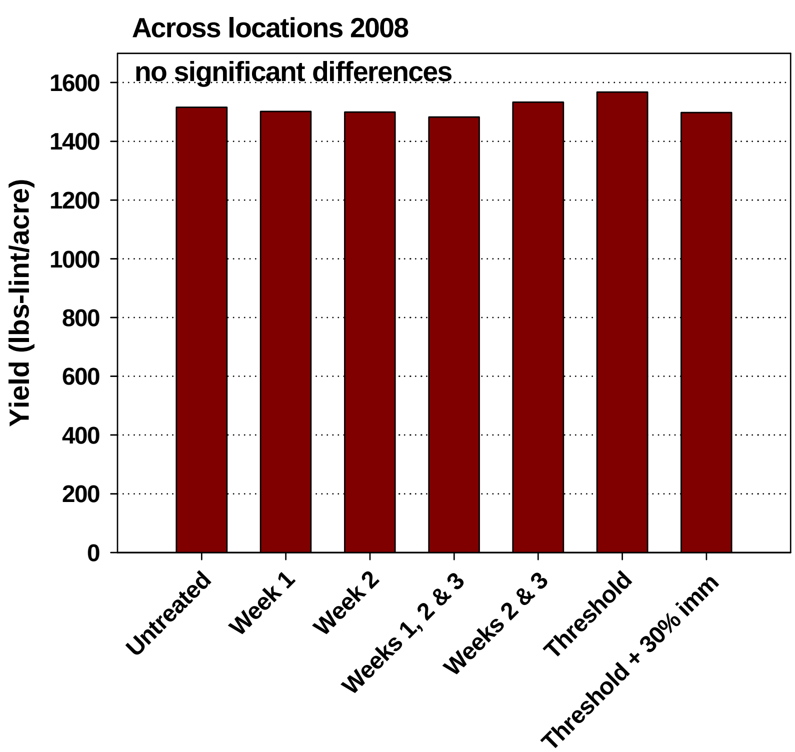


Figure 24. Mean yield of plots subjected to 7 treatment regimes at across locations in 2008. No significant differences were detected among treatments based on an F protected LSD ($P < 0.05$).

Evaluation of Insecticides for Cotton Fleahopper Control - 2008

**Cooperators: Brad Kleman Farm, Cotton Grower/
Texas AgriLife Extension Service**

**David Kerns, Emilio Nino and Bo Kesey
Extension Entomologist-Cotton, EA-IPM Castro/Lamb Count
and Extension Program Specialist-Cotton**

Castro County

Summary:

The cotton fleahopper, *Pseudatomoscelis seriatus* (Reuter), is an occasional pest of cotton in the High Plains of Texas. Although fleahoppers were scarce in most cotton on the High Plains in 2008, they were prevalent in some late, re-planted cotton in portions of Castro County. Insecticides tested included: Brigadier, Carbine, Centric, Endigo, Leverage and Orthene. Endigo, Brigadier, Centric and Orthene all preformed well at the rates tested. Leverage performed well at 5.0 fl-oz but appeared somewhat weak at the 3.8 fl-oz rate. Carbine, which performed well at the same rate in our 2007 fleahopper test, did not perform well in this test.

Objective:

To determine the efficacy of insecticides toward cotton fleahoppers in cotton.

Materials and Methods:

This test was conducted in a commercial cotton field managed by Brad Kleman near Dimmitt, TX. The field was planted on 6 Jun on 30-inch rows, and was irrigated using a pivot irrigation system. The variety was 'FiberMax 9058F'. The test was a randomized complete block design with four replications. Plots were 4-rows wide × 60 ft in length. Insecticides were applied with a CO_2 pressurized hand-boom sprayer calibrated to deliver 10 gpa through Teejet 8001VS TwinJet nozzles (2 per row) at 40 psi. Insecticides were applied to the entire plot on 22 Jul (see tables for insecticides tested and rates).

About the insecticides. Brigadier is a new insecticide mix that contains the pyrethroid bifenthrin (Brigade) mixed with imidacloprid, which is the same active ingredient as Trimax Pro. Leverage is similar to Brigadier is that it is a mixture of a pyrethoird and imidacloprid, but in this case the pyrethroid is cyfluthirn, or Baythroid. Endigo is another mixture of a pyrethroid and a neonicotinoid, but used lambda-cyhalothrin (Karate) as the pyrethroid and thiamethoxam (Centric) as the neonicotinoid. Carbine is a fairly new insecticide that constitutes the sole entry in its own class of insecticide, flonicamid. It acts as an anti-feedent, which results in starvation and/or desiccation of the pest. Orthene was included as a standard comparison.

Treatments were evaluated inspecting entire plants and counting the number of cotton fleahopper, *Pseudatomoscelis seriatus* (Reuter), adults and nymphs from 10 plants per plot. Square set was estimated at 0 and 14 DAT by counting the number of squares present and absent from 10 entire plants per plot.

Data were analyzed using linear regression models and PROC MIXED with means separated using an F protected LSD ($P \leq 0.05$).

Results and Discussion:

On 22 Jul, prior to insecticide application, the total number of fleahoppers was averaging 4.39 per 10 plants across all treatments, and there were no significant differences in fleahopper nymphs, adults or nymphs + adults (Table 1). At no time were significant differences among treatments detected for fleahopper adults. At 3 DAT, there were statistical differences among treatments for fleahopper nymphs and total fleahoppers. At this time the all of the treatments except Carbine had fewer fleahoppers than the untreated. Carbine was not expected to demonstrate much activity at this time since it is an anti-feedent and requires time for the insects to starve and/or desiccate.

At 7 DAT, the fleahopper population had declined, averaging 1 fleahopper per 10 plants in the untreated (Table 2). The only treatments that had fewer fleahopper nymphs and total fleahoppers than the untreated were Centric alone, both rates of Endigo and Leverage at 5.0 fl-oz. Carbine had statistically more fleahopper nymphs than all other insecticide treatments, and more total fleahoppers than all the other insecticides except Leverage at 3.8 fl-oz. Carbine performed better in 2007 tests. It is not known why it did not look good in this study.

There were no significant differences among treatments for fleahopper nymphs, adults or total at 14 DAT. At 0 and 14 DAT, no significant differences were detected among treatment for % square set or % change in square set 0 vs 14 DAT (Table 3). No phytotoxicity from any insecticide was observed in this test.

Acknowledgments:

Appreciation is expressed to the Plains Cotton Growers for financial support of this project.

Disclaimer Clause:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the

Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Mean number of cotton fleahopper nymphs, adults and total fleahoppers prior to treatment and 2 DAT, Brad Kleman Farm, Dimmitt, TX, 2008.

		Number of cotton fleahoppers per 10 plants					
	Rate amt	22 Jul (pre-treatment)			24 Jul (2 DAT)		
Treatment/formulation[a]	product/acre	nymphs	adults	total	nymphs	adults	Total
Untreated	--	3.00a	0.00a	3.00a	3.75a	0.00a	3.75a
Brigadier + COC	3.8 fl-oz	2.75a	0.25a	3.00a	0.00b	0.00a	0.00b
Carbine 50WG + COC	1.7 oz	5.75a	0.50a	6.25a	3.00a	0.00a	3.00a
Centric 40WG	1.5 oz	4.75a	0.50a	5.25a	0.50b	0.00a	0.50b
Centric 40WG + COC	1.5 oz	4.00a	0.25a	4.25a	0.25b	0.25a	0.50b
Endigo ZC + COC	3.4 fl-oz	3.75a	0.75a	4.50a	0.00b	0.00a	0.00b
Endigo ZC + COC	4.0 fl-oz	6.00a	0.25a	6.25a	0.50b	0.00a	0.50b
Leverage 2.7SE + COC	3.8 fl-oz	3.25a	0.00a	3.25a	0.75b	0.00a	0.75b
Leverage 2.7 SE + COC	5.0 fl-oz	2.75a	0.00a	2.75a	0.25b	0.00a	0.25b
Orthene 97S + COC	4.00 oz	5.00a	0.25a	5.25a	0.25b	0.00a	0.25b

Values in a column followed by the same letter are not significantly different based on LSD ($P \leq 0.05$).
[a]COC, Crop oil concentrate was included at 1% v/v.

Table 2. Mean number of cotton fleahopper nymphs, adults and total fleahoppers at 7 and 14 DAT, Brad Kleman Farm, Dimmitt, TX, 2008.

		Number of cotton fleahoppers per 10 plants					
	Rate amt	29 Jul (7 DAT)			5 Aug (14 DAT)		
Treatment/formulation[a]	product/acre	nymphs	adults	total	nymphs	adults	Total
Untreated	--	1.00ab	0.00a	1.00ab	2.00a	0.00a	0.00a
Brigadier + COC	3.8 fl-oz	0.25bc	0.25a	0.50bc	0.00a	0.25a	0.22a
Carbine 50WG + COC	1.7 oz	1.50a	0.00a	1.50a	1.00a	0.00a	0.00a
Centric 40WG	1.5 oz	0.00c	0.00a	0.00c	0.00a	0.00a	0.00a
Centric 40WG + COC	1.5 oz	0.25bc	0.00a	0.25bc	0.25a	0.00a	0.00a
Endigo ZC + COC	3.4 fl-oz	0.00c	0.00a	0.00c	0.00a	0.00a	0.00a
Endigo ZC + COC	4.0 fl-oz	0.00c	0.00a	0.00c	0.50a	0.00a	0.00a
Leverage 2.7SE + COC	3.8 fl-oz	0.50bc	0.25a	0.75abc	0.25a	0.00a	0.00a
Leverage 2.7 SE + COC	5.0 fl-oz	0.00c	0.00a	0.00c	0.50a	0.00a	0.00a
Orthene 97S + COC	4.00 oz	0.50bc	0.00a	0.50bc	0.75a	0.25a	1.00a

Values in a column followed by the same letter are not significantly different based on LSD ($P \leq 0.05$).
[a]COC, Crop oil concentrate was included at 1% v/v.

Table 3. Damage due to cotton fleahoppers, Brad Kleman Farm, Dimmitt, TX, 2008.

		% square set		
Treatment/formulation[a]	Rate amt product/acre	22 Jul (pre-treatment)	5 Aug (14 DAT)	% change in square set
Untreated	--	97.06a	89.20a	-7.86a
Brigadier + COC	3.8 fl-oz	94.75a	92.81a	-1.94a
Carbine 50WG + COC	1.7 oz	94.88a	91.49a	-3.39a
Centric 40WG	1.5 oz	95.72a	92.33a	-3.38a
Centric 40WG + COC	1.5 oz	96.72a	93.18a	-3.54a
Endigo ZC + COC	3.4 fl-oz	95.24a	92.34a	-2.91a
Endigo ZC + COC	4.0 fl-oz	92.22a	94.47a	+2.25a
Leverage 2.7SE + COC	3.8 fl-oz	97.42a	93.50a	-3.39a
Leverage 2.7 SE + COC	5.0 fl-oz	92.84a	89.70a	-3.14a
Orthene 97S + COC	4.00 oz	92.36a	93.17a	+0.81a

Values in a column followed by the same letter are not significantly different based on LSD ($P \leq 0.05$).
[a]COC, Crop oil concentrate was included at 1% v/v.

Efficacy of Insecticides Targeting Cotton Aphids and Impact on Key Aphid Predators - 2008

Cooperators: Texas AgriLife Research & Extension Center – Lubbock

David Kerns, Brant Baugh, and Bo Kesey
Extension Entomologist-Cotton, EA-IPM Lubbock County, and Extension Program Specialist-Cotton

Lubbock County

Summary:

Cotton aphids, *Aphis gossypii* Glover are a common pest of cotton grown in the High Plains of Texas. An aphicide efficacy test was conducted at the Texas AgriLife Research and Extension Center in Lubbock, Texas. In addition to impact on aphids, the aphicides were evaluated for impact on key aphid predators. At 3 days after treatment (DAT) and 5 days after the pretreament counts were taken, aphids in the untreated plots had increased 96.94%, averaging 54.12 aphids per leaf; slightly over threshold. All of the aphicides had fewer aphids than the untreated throughout the plant canopy. There were no differences among the aphicides for aphids on the 3 to 4th node leaves, but Bidrin and Intruder had fewer aphids on the mid to lower canopy leaves than Carbine. Convergent lady beetle, *Hippodamia convergens* Guérin-Méneville, and common green lacewing, *Chrysoperla plorabunda* (Fitch), were the most prevalent predators present in the test. Although the data for lacewing larvae were inconclusive, none of the treatments differed from the untreated, aphicide impact on lady beetle larvae was clearer. At 3 DAT, the number of lady beetle larvae did not differ between the Carbine, Bidrin or the untreated plots, while all of the neonicotinoids (Centric, Intruder and Trimax Pro) contained fewer lady beetle larvae than the untreated. Trimax Pro had fewer lady beetle larvae than either Carbine or Bidrin. At 5 DAT, aphid numbers in the untreated were slightly lower than at the 3 DAT evaluation. All of the treatments had significantly fewer aphids than the untreated; however, Trimax Pro did not differ from the untreated in the number of aphids infesting the mid to lower canopy. Based on the mean number of aphids from both leaf locations, Trimax Pro did not perform as well as the other aphicides. Aphid numbers in the Trimax Pro plots on the mid to lower canopy leaves increased 181.62% from 3 DAT to 5 DAT. None of the other treatments exhibited an increase in aphid numbers. The increase in aphids in the Trimax Pro plots may have been due to its impact on lady beetles. No significant differences among treatments were observed in lint yield. However a significant correlation between aphids per leaf and lint yield per acre was observed based on non-linear regression. Lint yield decreased as the population increased over 50 aphids per leaf which validates the

Texas AgriLife Extension Service threshold.

Objective:

To determine the efficacy of insecticides targeting cotton aphids and their impact on aphid predators.

Materials and Methods:

This test was conducted at the Texas AgriLife Research and Extension Center in Lubbock, Texas. Cotton ‘DeltaPine 174 RF’ was planted on 4 June 2008 on 40-inch rows and irrigated using furrow run irrigation. Plots were 4-rows wide × 25-feet long. Plots were arranged in a randomized complete block design with 4 replicates. An aphid outbreak was induced by overspraying the entire test area with Karate 1EC (lambda cyhalothrin) at 4.0 fl-oz per acre on 18 July and 7 August. The aphicide treatments and rates are outlined in the tables. All treatments were applied with a CO_2 pressurized hand boom calibrated to deliver 10 gallons/acre. All treatment included crop oil concentrate at 1% v/v. The boom consisted of 2 hollow cone TX-6 nozzles per row spaced at 20 inches.

Treatments were applied on 21 August 2008 when the aphid population was approaching the action threshold of 50 aphids per leaf.

The aphid population was estimated by counting the number of aphids per leaf. Ten 3 to 4 node terminal and ten mid to lower canopy leaves were randomly sampled per plot.

Predators were estimated utilizing a 36-inch x 40-inch black drop cloth. Drop cloths were laid between the rows and approximately 1.5 row-ft of cotton were shaken onto the drop cloth from each row, and the type and number of predators were counted.

The plots were hand harvested on 19 November using a HB stripper, and the cotton ginned at the Texas AgriLife Research and Extension Center in Lubbock. Grab samples were taken by plot and ginned at the Texas AgriLife Research and Extension Center at Lubbock to determine gin turnouts. Lint samples were submitted to the International Textile Center at Texas Tech University for HVI analysis, and USDA Commodity Credit Corporation (CCC) Loan values were determined for each treatment by plot.

All data were analyzed using PROC MIXED and the means were separated using an F protected LSD ($P \leq 0.05$).

Results and Discussion:

On 21 August, the aphid population was averaging across all plot, 46.66, 19.82 and 33.24 aphids per leaf on the mid to lower canopy leaves, 3 to 4th node leaves, and averaged across both leaf locations respectively. There were no statistical differences among treatments at this time (Table 1).

Although the aphid population was not at the treatment threshold, since the population appeared to be rapidly increasing treatments were initiated on 23 August.

On 26 August, 3 days after treatment (DAT) and 5 days after the pretreament counts were collected; aphids in the untreated plots had increased 96.94%, averaging 54.12 aphids per leaf; slightly over threshold. All of the aphicides had fewer aphids than the untreated throughout the plant canopy (Table 1). There were no differences among the aphicides for aphids on the 3 to 4th node leaves, but Bidrin and Intruder had fewer aphids on the mid to lower canopy leaves than Carbine. Carbine was not expected to exhibit full activity at 3 DAT since this chemistry acts as an anti-feedent and requires time for the aphids to starve and/or desiccate. Aphids in the mid to lower canopy were less exposed to sun and wind and undoubtedly died slower than those near the terminal.

At 5 DAT, aphid numbers in the untreated were slightly lower than at the 3 DAT evaluation (Table 2). All of the treatments had significantly fewer aphids than the untreated; however, Trimax Pro did not differ from the untreated in the number of aphids infesting the mid to lower canopy. Based on the mean number of aphids from both leaf locations, Trimax Pro did not perform as well as the other aphicides. Aphid numbers in the Trimax Pro plots on the mid to lower canopy leaves increased 181.62% from 3 DAT to 5 DAT None of the other treatments exhibited an increase in aphid numbers. The increase in aphids in the Trimax Pro plots may have been due to its impact on lady beetles.

By 10 DAT, the aphid population had declined considerably across the entire test, and none of the treatments were exceeding threshold (Figure 5). However, aphid numbers on the mid to lower canopy leaves and averaged across both leaf locations were greater in the Trimax Pro plots relative to the other treatments, including the untreated. Aphids in the Trimax Pro plots did not differ from the untreated on the 3 to 4 the node leaves but were significantly greater than the other aphicides.

Convergent lady beetle, *Hippodamia convergens* Guérin-Méneville, and common green lacewing, *Chrysoperla plorabunda* (Fitch), were the most prevalent predators present in the test. Although the data for lacewing larvae were inconclusive, none of the treatments differed from the untreated, aphicide impact on lady beetle larvae was clearer (Table 3). At 3 DAT, the number of lady beetle larvae did not differ between the Carbine, Bidrin or the untreated plots, while all of the neonicotinoids (Centric, Intruder and Trimax Pro) contained fewer lady beetle larvae than the untreated. Trimax Pro had the fewer lady beetle larvae than either Carbine or Bidrin. Because of its broad spectrum of activity, Bidrin was expected to adversely impact lady beetle larvae. The reason they survived the Bidrin treatment is unclear but may be due to the rapid dissipation of Bidrin and its translaminar activity.

The University of Arkansas suggests that at least 0.2 lady beetle larvae or 0.3 lady beetle adults per 1 ft-row may be sufficient to biologically manage an aphid infestation. The untreated plots of this test were averaging 2.56 and 0.28 lady beetle larvae and adults, respectively, per 1 ft-row, at 3 DAT. Based on the high number of lady beetle larvae present, within a week we expected to see a reduction in aphid numbers due to predation, particularly in the untreated plots and where lady beetle larvae were selectively conserved.

No significant differences between treatments were observed in lint yield (Table 3). Additionally, we could not detect any differences among the treatments in any of the HIV analysis parameter or loan values (data not presented). However, figure 1 shows a significant correlation between aphids per leaf and lint yield per acre. This trend was evident at 5 DAT, after the aphidices had sufficient time to act and before the population crashed. Lint yield decreased as the population increased over 50 aphids per leaf which validates the Texas AgriLife Extension Service threshold.

Acknowledgments:

Appreciation is expressed to the Texas Department of Agriculture - Food and Fiber

Research for funding of HVI testing at the Texas Tech University - Fiber and Biopolymer Research Institute, and to Plains Cotton Growers for financial support of this project.

Disclaimer Clause:

Table 1. Impact of aphicides on cotton aphids in cotton prior treatments and 3 DAT, Lubbock, 2008.

		21 Aug (pre-treatment)			26 Aug (3 DAT)		
		Aphids per leaf			Aphids per leaf		
Treatment/ formulation[1]	Rate amt product/acre	$3\text{-}4^{th}$ node leaf	lower canopy leaf	total	$3\text{-}4^{th}$ node leaf	lower canopy leaf	total
Untreated	--	14.13 a	40.83 a	34.44 a	40.85 a	67.38 a	54.12 a
Carbine 50WG	1.5 oz	16.93 a	43.38 a	30.16 a	16.60 b	35.00 b	25.80 b
Intruder 70WP	0.75 oz	7.52 a	30.78 a	19.15 a	2.05 b	3.45 c	2.75 c
Centric 40WP	2.0 oz	40.35 a	63.93 a	52.14 a	4.03 b	21.18 bc	14.11 bc
Trimax Pro 4.44SC	1.8 fl-oz	19.93 a	52.20 a	36.07 a	8.85 b	16.05 bc	12.45 bc
Bibrin 8EC	8 fl-oz	20.05 a	48.83 a	34.44 a	2.18 b	6.73 c	4.45 c

Values in a column followed by the same letter are not significantly different based on an F-protected LSD ($P \le 0.05$).
[1]All treatments included COC at 1% v/v.

Table 2. Impact of aphicides on cotton aphids in cotton at 5 and 10 DAT, Lubbock, 2008.

		28 Aug (5 DAT)			2 Sep (10 DAT)		
		Aphids per leaf			Aphids per leaf		
Treatment/ formulation[1]	Rate amt product/acre	$3\text{-}4^{th}$ node leaf	lower canopy leaf	total	$3\text{-}4^{th}$ node leaf	lower canopy leaf	total
Untreated	--	31.60 a	63.63 a	47.62 a	1.38 ab	1.10 b	1.24 b
Carbine 50WG	1.5 oz	0.73 b	10.08 b	5.41 c	0.08 b	0.15 b	0.11 b
Intruder 70WP	0.75 oz	0.13 b	1.08 b	0.60 c	0.08 b	0.25 b	0.16 b
Centric 40WP	2.0 oz	5.03 b	18.03 b	11.53 c	0.63 b	1.75 b	1.19 b
Trimax Pro 4.44SC	1.8 fl-oz	4.95 b	45.20 a	25.08 b	2.52 a	6.72 a	4.62 a
Bibrin 8EC	8 fl-oz	2.42 b	5.13 b	3.78 c	0.27 b	0.18 b	0.26 a

Values in a column followed by the same letter are not significantly different based on an F-protected LSD ($P \le 0.05$).
[1]All treatments included COC at 1% v/v.

Table 3. Impact of aphicides on key predators of cotton aphids, Lubbock, 2008.

Treatment/formulation[1]	Rate amt product/acre	No. per 6 ft-row on 26 Aug (3 DAT) Lady beetle larvae	Lacewing larvae	Yield (lbs-lint/ac)
Untreated	--	10.25 a	5.50 abc	749.93a
Carbine 50WG	1.5 oz	9.00 ab	7.25 ab	922.00a
Intruder 70WP	0.75 oz	3.75 cd	9.50 a	963.36a
Centric 40WP	2.0 oz	4.75 bcd	2.00 c	764.96a
Trimax Pro 4.44SC	1.8 fl-oz	1.50 d	3.75 bc	868.50a
Bibrin 8EC	8 fl-oz	7.00 abc	5.50 abc	936.90a

Values in a column followed by the same letter are not significantly different based on an F-protected LSD ($P \leq 0.05$).

[1]All treatments included COC at 1% v/v.

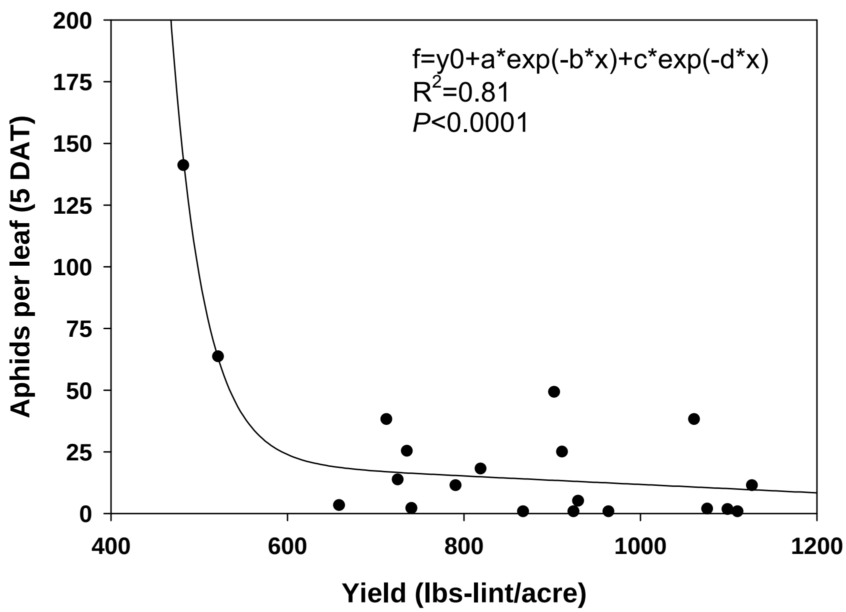


Figure 1. Non-linear regression depicting the trend towards lower yields with increasing aphid numbers at 5 DAT.

AgriLIFE EXTENSION
Texas A&M System

Efficacy of a Range of Rates of Carbine and Intruder on Cotton Aphids - 2008

Cooperators: Texas AgriLife Research & Extension Center – Lubbock

David Kerns and Bo Kesey
Extension Entomologist-Cotton and Extension Program Specialist-Cotton

Lubbock County

Summary:

Cotton aphids, *Aphis gossypii* Glover are a common pest of cotton grown in the High Plains of Texas. In the past, Bidrin was a common product for managing aphids in High Plain's cotton, but in recent years the neonicotinoids have dominated this market. Bidrin was surpassed by the neonicotinoids largely because of resistance problems. In the last two years, there has been concern in some portions of the cotton belt with aphids developing resistance to the neonicotinoids. In this study, we evaluated a range of rates of the neonicotinoid Intruder for aphid control in comparison to a newer, novel aphid active insecticide, Carbine, as well as to Bidrin. All of the rates Intruder and Carbine, and the single rate of Bidrin, all exhibited excellent activity. Resistance to Intruder does not appear to be a problem on the Texas High Plains, and resistance to Bidrin appears to have subsided.

Objective:

To determine the efficacy of a range of rates of several insecticides targeting cotton aphids.

Materials and Methods:

This test was conducted at the Texas AgriLife Research and Extension Center in Lubbock, TX. The field was planted on 14 May on 40-inch rows, and was irrigated using row irrigation. The test was a RCB design with four replications. Plots were 4-rows wide × 50 ft in length.

The insecticide evaluated included 4 rates of Carbine, 4 rates of Intruder, and a single rate of Bidrin (see tables for rates). Insecticides were applied with a CO_2 pressurized hand-boom sprayer calibrated to deliver 10 gpa through TX-6 hollow cone nozzles (2 per row) at 40 psi. The insecticides to be evaluated were applied to the all four rows of each plot on 31 Jul. A crop oil concentrate was added to each treatment at 1% v/v.

Treatments were evaluated by counting the number of aphids from 10, 3 to 4th node leaves (top leaf sample) and 10 leaves from the lower 50% of the plant canopy (lower leaf sample) per plot on 31 Jul and 4, 8 and 15 Aug.

All data were analyzed using PROC MIXED and the means were separated using an F protected LSD ($P \leq 0.05$).

Results and Discussion:

On 21 Aug, the aphid population was averaging across all plot, 29.81, 35.93 and 32.87 aphids per leaf on the mid to lower canopy leaves, 3 to 4th node leaves, and averaged across both leaf locations respectively. There were no statistical differences among treatments at this time (Table 1).

On 4 Aug, 3 days after treatment (DAT), aphids in the untreated plots had increased and was averaging 98.78 aphids per leaf. All of the insecticides had fewer aphids than the untreated throughout the at the 3-4th node leaf position, and across both leaf positions, but no differences were detected for the mid - lower canopy leaves.

At 7 DAT, aphid numbers in the untreated had increased to 131.25 aphids per leaf across both leaf potions. At this time all of the treatments had statistically fewer aphids than the untreated but did not differ from each other (Table 2).

Aphid numbers had decreased sharply by 14 DAT, and results were similar to the 7 DAT evaluation.

All of the products evaluated demonstrated good mixing and handling characteristics and no phytotoxicity was observed.

Acknowledgments:

Appreciation is expressed to Plains Cotton Growers for financial support of this project and to Dr. Jane Dever for granting access to her cotton where this study was conducted.

Disclaimer Clause:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Impact of aphicides on cotton aphids in cotton prior treatments and 3 DAT, Lubbock, 2008.

		31 Jul Aug (pre-treatment)			4 Aug (3 DAT)		
		Cotton aphids per leaf			Cotton aphids per leaf		
Treatment/formulation	Rate amt product/acre	3-4th node leaf	lower canopy leaf	total	3-4th node leaf	lower canopy leaf	total
Untreated	--	42.05 a	42.35 a	42.20 a	83.38 a	114.17 a	98.78 a
Carbine 50WG	1.4 oz	34.10 a	31.2 a	32.65 a	29.42 b	27.26 a	28.34 b
Carbine 50WG	1.7 oz	31.08 a	25.28 a	28.18 a	29.23 b	10.18 a	19.71 b
Carbine 50WG	2.0 oz	28.60 a	31.00 a	29.80 a	16.59 b	8.40 a	12.50 b
Carbine 50WG	2.3 oz	26.25 a	35.30 a	30.78 a	17.70 b	8.93 a	13.32 b
Intruder 70WP	0.6 oz	47.95 a	30.23 a	39.09 a	4.23 b	8.38 a	6.31 b
Intruder 70WP	0.75 oz	30.18 a	19.75 a	24.97 a	3.20 b	2.90 a	3.05 b
Intruder 70WP	0.9 oz	20.75 a	18.55 a	19.65 a	1.25 b	1.93 a	1.59 b
Intruder 70WP	1.1 oz	29.15 a	21.78 a	25.47 a	1.08 b	1.15 a	1.12 b
Bibrin 8EC	8 fl-oz	78.53 a	39.73 a	59.13 a	11.28 b	7.58 a	9.43 b

Values in a column followed by the same letter are not significantly different based on an F-protected LSD ($P \leq 0.05$).

Table 2. Impact of aphicides on cotton aphids in cotton at 7 and 14 DAT, Lubbock, 2008.

		8 Aug (7 DAT)			15 Aug (14 DAT)		
		Cotton aphids per leaf			Cotton aphids per leaf		
Treatment/formulation	Rate amt product/acre	3-4th node leaf	lower canopy leaf	total	3-4th node leaf	lower canopy leaf	total
Untreated	--	116.30 a	146.25 a	131.28 a	2.03 a	5.05 a	3.54 a
Carbine 50WG	1.4 oz	5.47 b	14.57 b	10.02 b	0.15 b	0.17 b	0.16 b
Carbine 50WG	1.7 oz	5.55 b	11.95 b	8.75 b	0.23 b	0.00 b	0.12 b
Carbine 50WG	2.0 oz	7.00 b	6.53 b	6.77 b	0.18 b	0.05 b	0.12 b
Carbine 50WG	2.3 oz	3.55 b	7.48 b	5.52 b	0.13 b	0.05 b	0.09 b
Intruder 70WP	0.6 oz	1.45 b	4.18 b	2.82 b	0.05 b	0.15 b	0.10 b
Intruder 70WP	0.75 oz	1.30 b	1.53 b	1.42 b	0.05 b	0.03 b	0.04 b
Intruder 70WP	0.9 oz	1.18 b	2.45 b	1.82 b	0.05 b	0.00 b	0.03 b
Intruder 70WP	1.1 oz	1.05 b	1.20 b	1.13 b	0.03 b	0.00 b	0.02 b
Bibrin 8EC	8 fl-oz	7.75 b	16.85 b	12.30 b	1.38 b	0.53 b	0.96 b

Values in a column followed by the same letter are not significantly different based on an F-protected LSD ($P \leq 0.05$).

AgriLIFE EXTENSION
Texas A&M System

Efficacy of Insecticides towards a Sub-threshold, Chronic Infestation of Lygus - 2008

Cooperators: Glenn Farms, Cotton Grower/Dana Palmer, Private Consultant

David Kerns and Bo Kesey
Extension Entomologist-Cotton and Extension Program Specialist-Cotton

Hockley County

Summary:

The western tarnished plant bug, *Lygus hesperus* (Knight), is an common pest of cotton in the High Plains of Texas. Lygus are usually most severe in cotton located near alfalfa which serves as a reservoir and source of Lygus, especially following cutting of the alfalfa. However, prior to cutting the alfalfa, it is not uncommon for low populations of Lygus to leave the alfalfa for nearby cotton at sub-threshold levels resulting in long-term chronic infestations. An insecticide efficacy test targeting Lygus was conducted at one such location near Levelland, Texas. When this test was initiated, the Lygus population was comprised primarily of migratory adults and was averaging large sized larvae. After 7 days, all of the insecticides tested appeared to have good activity towards low/chronic populations of Lygus. These insecticides included: Carbine, Centric, Holster (cypermethrin), Vydate, Orthene and Diamond.

Objective:

To determine the efficacy of insecticides targeting a sub-threshold, but chronic infestation of western tarnished plant bugs in cotton.

Materials and Methods:

This test was conducted in a commercial cotton field managed by Glenn Farms near Levelland, TX. Cotton, 'FiberMax 9063B2F' was planted in late May on 40-inch rows, and irrigated using a pivot irrigation system. The test was a randomized complete block design with four replications. Plots were 4-rows wide × 60 ft in length. Insecticides were applied with a CO_2 pressurized hand-boom sprayer calibrated to deliver 10 gpa through TX-6 hollow cone nozzles (2 per row) at 40 psi. Insecticides were applied to all four rows of each plot on 13 Aug. A crop oil concentrate was added to each treatment at 1% v/v.

The western tarnished plant bug, *Lygus hesperus* (Knight), population was estimated on

13, 15 and 20 Aug utilizing a 36-inch x 40-inch black drop cloth. Drop cloths were laid between the rows and approximately 1.5 row-ft of cotton were shaken onto the drop cloth from each row; four drop cloth samples were taken per plot.

Data were analyzed with PROC MIXED, and means were separated using an F-protected LSD ($P \leq 0.05$).

Results and Discussion:

On 13 Aug (pretreatment count), the Lygus population was comprised primarily of migratory adults and was averaging 2.26 total Lygus per 6 ft-row across all plots. No statistical differences were detected among treatments at this time (Table 1). Although the Lygus population was below the threshold of 4 Lygus per 6 ft-row, the population had been constant for several weeks. It was evident that the Lygus were moving into the field on a regular basis from an adjacent circle of alfalfa.

At 2 DAT, all of the insecticide treatments had fewer nymphs and total Lygus than the untreated. Among the insecticide treatments, Vydate had fewer total Lygus than Diamond, but Diamond was not expected to exhibit much activity at 2 DAT. Diamond is an IGR that is active only towards nymphal stages, and usually takes more than 2 days to demonstrate activity.

At 7 DAT, the Lygus population had declined, but all of the insecticides had fewer Lygus nymphs than the untreated.

At low Lygus populations, all of the insecticides evaluated appeared to have adequate activity towards western tarnished plant bugs.

Acknowledgments:

Appreciation is expressed to Plains Cotton Growers for financial support of this project.

Disclaimer Clause:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Impact of insecticides towards western tarnished plant bugs, Glenn Farms, Levelland, TX, 2008.

Treatment/ formulation[a]	Rate amt product/acre	Number of western tarnished plant bugs per 6 ft-row								
		13 Aug (pre-treatment)			15 Aug (2 DAT)			20 Aug (7 DAT)		
		nymphs	adults	total	nymphs	adults	total	nymphs	adults	total
Untreated	--	1.75a	0.25a	2.00a	2.25a	0.75a	3.00a	1.38a	1.13a	2.50a
Carbine 50WG	2.3 oz	1.50a	0.03a	1.53a	0.63b	0.25a	0.88bc	0.50b	0.38a	0.88a
Holster 2.5EC	5.1 fl-oz	2.75a	0.50a	3.25a	0.25b	0.00a	0.25bc	0.38b	0.38a	0.75a
Orthene 97	0.75 lb	2.00a	0.75a	2.75a	0.13b	0.25a	0.38bc	0.13b	1.88a	2.00a
Vydate C-LV	17 fl-oz	1.13a	0.63a	1.76a	0.00c	0.00a	0.00c	0.00b	0.50a	0.50a
Centric 40WP	2.5 oz	1.38a	0.38a	1.76a	0.88b	0.25a	1.13bc	0.50b	1.63a	2.13a
Diamond 0.83EC	10.5 fl-oz	1.63a	1.13a	2.76a	0.88b	0.63a	1.50b	0.50b	2.00a	2.50a

Values in a column followed by the same letter are not significantly different based on an F-protected LSD ($P \leq 0.05$).
[a]All treatments included a COC at 1% v/v.

Chemical Management of Lygus in Late-Season Cotton and Impact on Yield - 2008

Cooperators: Glenn Farms, Cotton Grower/Dana Palmer, Private Consultant/ Texas AgriLife Extension Service/Texas AgriLife Research/Depart. of Plant and Soil Science, Texas Tech University

David Kerns, Abhilash Balachandran, Brant Baugh, Megha Parajulee and Bo Kesey
Extension Entomologist-Cotton, Research Assistant, EA-IPM Lubbock County, Research Entomologist and Extension Program Specialist-Cotton

Hockley County

Summary:

Overall, western tarnished plant bug, *Lygus hesperus* (Knight), populations were low across the High Plains of Texas in 2008. However, where ever alfalfa – cotton systems exists, there is high chance of an infestation of Lygus. Being a highly mobile insect, Lygus exhibits back and forth movement between alfalfa and cotton depending on phenological stage of the crop. Since our study was conducted in such a system where the adjacent field of alfalfa acted as the major source of Lygus; even in late season cotton (8 NAWF), it was evident that yield could be affected if not managed in a timely manner. We observed a 239 lbs-lint/acre reduction beween the highest yielding treatment and the untreated. All insecticides except Centric and Diamond had a significant impact in reducing Lygus populations below threshold at 3 DAT, continuing until 13 DAT. Centric and Diamond showed activity at 6 DAT. Percentage of bolls (at 150-200 HU maturity) with external and internal injury did not vary among insecticides initially, but after treatment showed a sharp decline relative to the untreated beginning at 6 DAT. Holster recorded the least amount of Lygus injury to the bolls. The currently recommended threshold of 4 Lygus/6 ft-row appears to follow the yield response curve, adding validity to the threshold. Additionally, because of the tight linear relationship where approximately 50% of 150-200 HU aged bolls with external injury resulted in internal injury, a threshold based on external injury using this boll age cohort is may be possible. With further evaluation, an action threshold of 25% bolls with external injury could be used as a scouting measure for the population threshold of 4 Lygus/6 ft-row. Orthene proved to be the best insecticide considering the lint yield, overall effect in reducing the Lygus population, injury to bolls, and net return.

Objective:

To determine the efficacy of insecticides targeting a sub-threshold, but chronic infestation of western tarnished plant bugs in cotton.

Materials and Methods:

The field trial was conducted in southeastern Hockley County, TX. The cotton field had adjacent vegetation of alfalfa, cotton, weeds and trees. The alfalfa had high numbers of Lygus which acted as source for Lygus in the cotton. The experiment was a randomized complete block design with seven treatments and four replications. The plots were of 4 rows x 60 ft; 'FiberMax 9063B2F' was the variety and was planted on 40-inch rows. The field was irrigated using a sub-surface drip irrigation system. The insecticides evaluated and rates are listed in the tables; the control plots were untreated. During the experiment, cotton was at approximately the 8 nodes above white flower stage.

The Lygus population was estimated by drop cloth method (3 ft x 2 ft) and expressed as mean density/6-ft row. Bolls of approximately 10-20 mm dia. (~150 – 200 HU maturity) were collected at random from the plots for damage assessment. Pre-treatment observations on Lygus densities and boll samples were taken on Aug 20, 2008. Approximately 30 bolls were collected from each plot to assess external and internal damage. The samples were collected in Ziploc bags and stored in a refrigerator until damage observations were recorded. The insecticide application was made on Aug 23 using a four nozzle CO_2 pressurized hand boom sprayer with a discharge rate of 10 gallons/acre. Population counts were made at 3, 6 and 13 DAT, and boll samples were collected at 6 and 13 DAT. The boll samples consisted of 20 bolls/plot. The external damage assessment was made by counting the number of feeding punctures using a 10x magnifying lens. For internal damage, bolls were cut cross sectional with two cuts, one at about one third and next at two thirds from the tip. The number of locules damaged were counted and recorded as internal damage. The plots were harvested on Nov 11 using an HB hand stripper. A 1/1000th acre section was harvested from the middle two rows of each plot.

Grab samples were taken by plot and ginned at the Texas AgriLife Research and Extension Center at Lubbock to determine gin turnouts. Lint samples were submitted to the International Textile Center at Texas Tech University for HVI analysis, and USDA Commodity Credit Corporation (CCC) Loan values were determined for each treatment by plot.

Data were analyzed using SAS PROC MIXED and means separated using protected LSD ($P \leq 0.05$). The internal and external damage were expressed in % number of bolls affected.

Results and Discussion:

Pre-treatment counts of Lygus by drop cloth method showed no significant differences among treatments (Table 1). Population densities (Lygus nymphs and adults) were above treatment threshold (4 Lygus/6-ft row) in all plots. Post-treatment observations (3, 6 and 13 DAT) showed a sharp decline in Lygus densities across all treated plots, while the densities increased in untreated plots (Tables 1 & 2). The population in the untreated plots remained above threshold through 13 DAT (Table 2). Holster (cypermethrin), Vydate, Orthene and Carbine were able to reduce the Lygus populations below threshold at 3 DAT, after which the population continued to remain low through 13 DAT (Tables 1 & 2). Centric and Diamond reduced the population below threshold at 6 DAT

(Table 1). The results clearly indicate that Lygus population in the Texas High Plains could be suppressed effectively by insecticidal application and that softer insecticides like Carbine and Diamond could be utilized.

Boll damage based on % bolls with external and internal injury/damaged locules did not differ among plots in pre-treatment observations (Table 3). At 6 DAT, the percentage of bolls with external and internal injury decreased in all treated plots, whereas damage in untreated plots increased. Plots treated with Holster had the least damage which may be due to its longer residual effect. Among the treatments, only the 6 DAT sample had significant differences among treatments for both internal and external injury, whereas at the 13 DAT sample, when the Lygus population had declined across the entire test, did not show differences between treatments. Of the treatments, Centric, Vydate and Diamond demonstrated the least amount of boll protection although they had significantly less damaged bolls than in untreated plots.

The external and internal injury on the bolls showed a linear relationship. A simple linear regression of % bolls with external injury and % bolls with internal injury demonstrated a strong positive relationship ($R^2 = 0.97$, $P < 0.0001$) (Figure 1). Results indicated that approximately 50% of the bolls with external damage suffered internal damage. Because of the tightness of this relationship, one can reasonably assume that 50% of bolls sampled within the 150-200 HU age cohort with external injury will have internal damage.

Simple linear regression analysis also demonstrated a good relationship between Lygus density and external injury ($R^2=0.82$, $P<0.0001$) (Figure 2). At a threshold of 4 Lygus/6 row ft., the % bolls with external injury would be around 25%. Thus it is possible that a threshold based on external boll injury in the presence of Lygus could be developed. Such a threshold may make sampling for Lygus easier and less time consuming.

Significant yield differences were observed among treatments (Table 3). Orthene recorded the highest lint yield (958 lbs/acre), but did not differ significantly from Holster or Diamond. The lowest yields were recorded in the Centric and untreated plots at 687 and 719 lbs/acre, respectively. In addition to the untreated, Centric did not statistically differ from Carbine or Vydate. The reason the yields were poor in the Centric plots is not known.

A sigmoidal 3 parameter Chapman simple linear regression analysis indicated a significant correlation between Lygus/6 ft-row and yield (lbs-lint/acre); $R^2 = 0.48$ ($P < 0.0004$) (Figure 3). A threshold of 4 Lygus/6 ft-row appears to be well situated to prevent the steepest portion of the curve toward yield reduction.

For the most part, HVI analysis showed no differences among treatments for all parameters tested with the exception of micronaire (Table 4). Mike was highest in the untreated plots, but did not differ from Carbine or Diamond. It is plausible that mike was greatest in the untreated because those plots suffered high yield loss most likely due to aborted bolls. Since the bolls that were aborted were among the last to be viable for harvest, they would naturally have a lower mike, especially with the early freeze on 21 October. Thus, the low mike bolls were essentially eliminated from the untreated plots resulting in a higher mike average. The reason Carbine and Diamond did not differ from the untreated is uncertain, but it is curious that both of these products tend to be slow acting, although Carbine did not appear slow in this study. Additionally, one might expect Centric to exhibit a higher mike average since its yield was the lowest in the test, but for unexplained reasons, its mike was the lowest in the test.

Based on the cost of the insecticides, crop oil concentrate and estimated application, along with yield and loan values for each plot, the net return was calculated for each treatment. Keep in mind that these values will change along with the price of the product and other inputs. For application cost, we chose a cost of $4.00/acre which should be somewhere in the middle of the range between self application and aerial application. Orthene resulted in the greatest net return at $105.14/acre, but did not statistically differ from Diamond at $66.28/acre. As one might expect due to its low yield and low mike, the Centric treated plots had the lowest net return with a loss of $32.56, which did not statistically differ from the untreated or Vydate. Other benefits not expressed in this study are the impact on insect natural enemies and potential for flaring aphids or mites. Both Carbine and Centric have aphid activity, and Carbine appears to be very soft on beneficials. Centric is soft on some beneficials as well, but is harsh towards lady beetle larvae and thrips. It impact on thrips has been implicated in contributing to mite outbreaks under some conditions, but this relationship is not fully understood. Diamond is also very soft on insect natural enemies, and has activity on many lepidopterous pests as well.

Acknowledgments:

Appreciation is expressed to the Texas Department of Agriculture - Food and Fiber Research for funding of HVI testing at the Texas Tech University - Fiber and Biopolymer Research Institute, and to Plains Cotton Growers for financial support of this project.

Disclaimer Clause:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Efficacy of insecticides towards Lygus before spraying and 3 DAT, Glenn Farms, Wolfforth, TX, 2008.

		Western tarnished plant bugs per 6 ft-row					
		20 Aug (pre-treatment)			26 Aug (3 DAT)		
Treatment/ formulation[a]	Rate amt product/acre	nymphs	adults	total	nymphs	adults	total
Untreated	--	11.63a	2.00a	13.63a	18.63a	3.50a	22.13a
Carbine 50WG	2.3 oz	9.00a	1.13a	10.13a	2.50bc	0.75bc	3.25bc
Holster 2.5EC	5.1 fl-oz	11.13a	1.25a	12.38a	1.00c	0.25bc	1.25c
Orthene 97	0.75 lb	8.63a	1.00a	9.63a	0.63c	0.00c	0.63c
Vydate C-LV	17 fl-oz	9.50a	1.25a	10.75a	1.88bc	0.63bc	2.51bc
Centric 40WP	2.5 oz	10.63a	0.50a	11.13a	3.75bc	1.13b	4.88bc
Diamond 0.83EC	10.5 fl-oz	8.88a	1.00a	9.88a	5.75b	1.00bc	6.75b

Values in a column followed by the same letter are not significantly different based on an F-protected LSD ($P \leq 0.05$).
[a]All treatments included crop oil concentrate at 1% v/v.

Table 2. Efficacy of insecticides towards Lygus at 6 and 13 DAT, Glenn Farms, Wolfforth, TX, 2008.

		Western tarnished plant bugs per 6 ft-row					
		29 Aug (6 DAT)			5 Sep (13 DAT)		
Treatment/ formulation[a]	Rate amt product/acre	nymphs	adults	total	nymphs	adults	total
Untreated	--	12.50a	3.25a	15.75a	3.50a	0.75a	4.25a
Carbine 50WG	2.3 oz	0.50b	0.13c	0.63b	0.63c	0.38ab	1.00bc
Holster 2.5EC	5.1 fl-oz	0.38b	0.00c	0.38b	0.13c	0.00b	0.13c
Orthene 97	0.75 lb	0.00b	0.00c	0.00b	0.13c	0.13b	0.25c
Vydate C-LV	17 fl-oz	0.75b	0.13c	0.88b	0.13c	0.38ab	0.50c
Centric 40WP	2.5 oz	2.00b	1.50b	3.50b	2.00b	0.00b	2.00b
Diamond 0.83EC	10.5 fl-oz	1.00b	0.38bc	1.38b	0.25c	0.25b	0.50c

Values in a column followed by the same letter are not significantly different based on an F-protected LSD ($P \leq 0.05$).
[a]All treatments included crop oil concentrate at 1% v/v.

Table 3. Impact of insecticides targeting Lygus on subsequent external and internal boll damage and yield, Glenn Farms, Wolfforth, TX, 2008.

		Percentage of injured bolls						
		20 Aug (pre-treatment)		29 Aug (6 DAT)		5 Sep (13 DAT)		
Treatment/ formulation[a]	Rate amt product/acre	external	internal	external	internal	external	internal	Yield (lbs-lint./acre)
Untreated	--	43.97a	25.00a	47.50a	30.00a	12.93a	8.62a	719.15cd
Carbine 50WG	2.3 oz	41.38a	22.41a	18.75bc	8.75b	6.90a	1.73a	814.84bcd
Holster 2.5EC	5.1 fl-oz	48.28a	23.28a	12.50c	5.00b	7.76a	4.31a	850.47abc
Orthene 97	0.75 lb	54.31a	31.03a	15.00bc	8.75b	8.62a	2.59a	957.69a
Vydate C-LV	17 fl-oz	60.35a	32.76a	23.75bc	13.75b	10.35a	6.90a	764.96bcd
Centric 40WP	2.5 oz	50.00a	28.45a	27.50b	16.25ab	8.62a	4.31a	687.21d
Diamond 0.83EC	10.5 fl-oz	41.38a	18.11a	22.50bc	12.50a	12.07a	4.31a	888.73ab

Values in a column followed by the same letter are not significantly different based on an F-protected LSD ($P \leq 0.05$).
[a]All treatments included crop oil concentrate at 1% v/v.

Table 4. Impact of insecticides targeting Lygus on HVI fiber properties, Glenn Farms, Wolfforth, TX, 2008.

Treatment/ formulation[a]	Rate amt product/acre	Mike	Staple length (32nds)	% length uniformity	Strength (g/tex)	% elongation	Rb (% reflec)	+b (yellowness)	Leaf grade
Untreated	--	3.13a	1.20a	81.23a	28.68a	10.83a	1.75a	77.98a	21.25a
Carbine 50WG	2.3 oz	2.85ab	1.18a	80.48a	29.35a	10.68a	2.25a	77.83a	19.00a
Holster 2.5EC	5.1 fl-oz	2.70b	1.19a	80.50a	28.75a	10.85a	1.75a	77.90a	19.00a
Orthene 97	0.75 lb	2.68b	1.18a	80.35a	29.23a	10.68a	2.25a	77.28a	21.00a
Vydate C-LV	17 fl-oz	2.63b	1.17a	79.18a	28.25a	10.65a	1.75a	77.28a	21.75a
Centric 40WP	2.5 oz	2.58b	1.20a	80.20a	28.73a	10.55a	2.00a	78.48a	21.25a
Diamond 0.83EC	10.5 fl-oz	2.85ab	1.19a	80.08a	28.78a	10.43a	2.00a	79.15a	21.00a

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).
[a]All treatments included crop oil concentrate at 1% v/v.

Table 5. Impact of insecticides targeting Lygus on loan value and net return, Glenn Farms, Wolfforth, TX, 2008.

Treatment/ formulation[a]	Rate amt product/acre	Cost[b] ($/acre)	Loan[c] value ($/lb)	Net return[d] ($/acre)
Untreated	--	0.00	0.52a	0.00cd
Carbine 50WG	2.3 oz	18.16	0.50a	27.36bc
Holster 2.5EC	5.1 fl-oz	15.51	0.48a	47.76bc
Orthene 97	0.75 lb	11.41	0.49a	105.14a
Vydate C-LV	17 fl-oz	16.84	0.47a	5.92cd
Centric 40WP	2.5 oz	19.95	0.47a	-32.56d
Diamond 0.83EC	10.5 fl-oz	19.08	0.50a	66.28ab

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).
[a]All treatments included crop oil concentrate at 1% v/v.
[b]In addition to insecticide costs, the cost/acre included the cost of the COC ($1.95/acre), and application cost of $4.00/acre.
[c]Loan value based on HIV parameters in table 4.
[d]Net return based on yield, loan value, chemical costs and application costs.

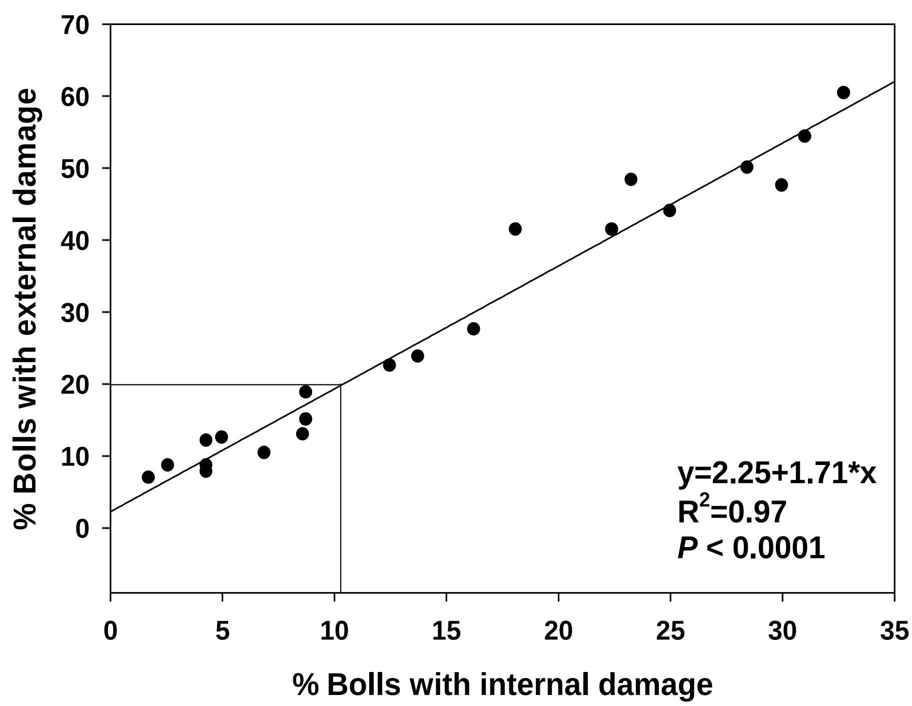


Figure 1. Relation between external and internal injury on bolls.

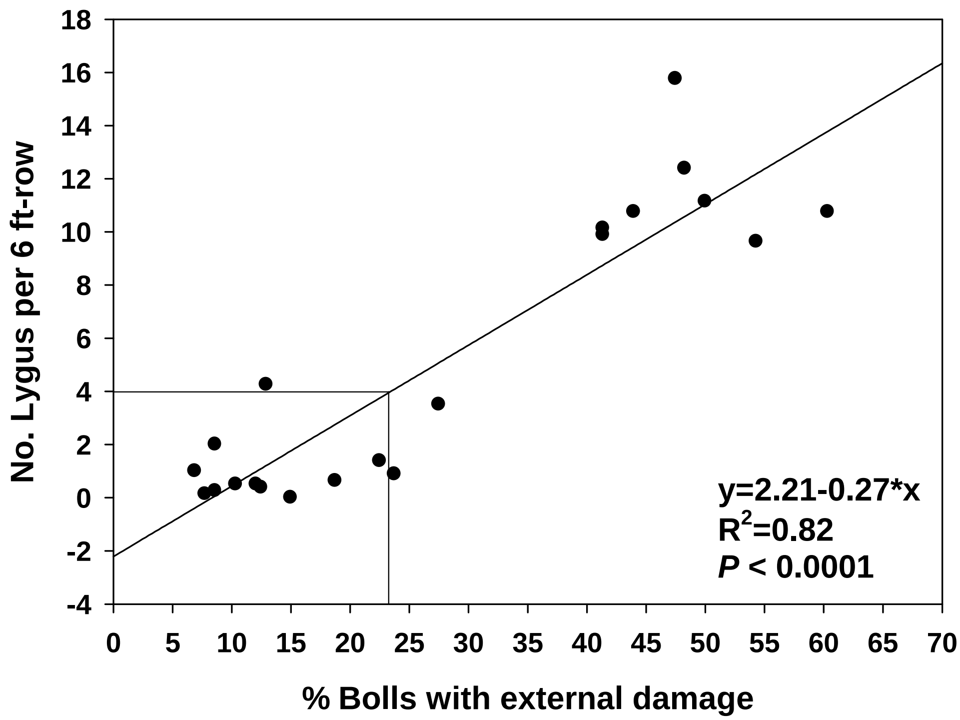


Figure 2. Relation between Lygus population and external injury on bolls.

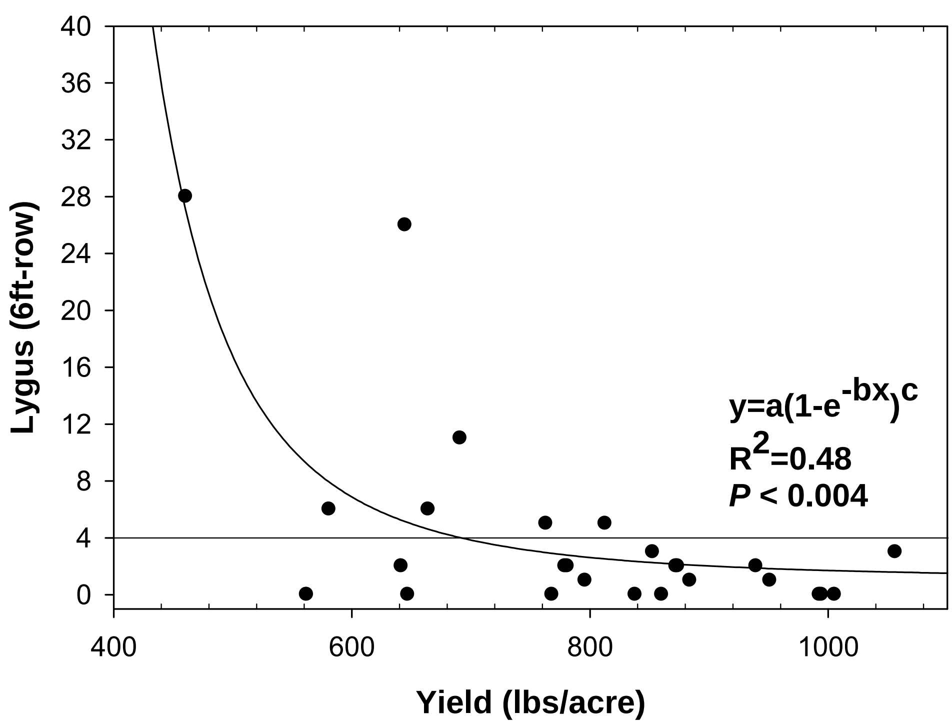


Figure 3. Relation between Lygus population and yield.

Efficacy of Insecticides for Beet Armyworm Control in Cotton - 2008

Cooperators: Texas AgriLife Research & Extension Center – Lubbock

David Kerns, Brant Baugh, and Bo Kesey
Extension Entomologist-Cotton, EA-IPM Lubbock County,
and Extension Program Specialist-Cotton

Lubbock County

Summary:

Beet armyworm, *Spodoptera exigua* (Hübner) is an occasional pest on non-Bt cotton grown in the High Plains of Texas. An insecticide efficacy test targeting beet armyworms was conducted at the Texas AgriLife Research and Extension Center in Lubbock, Texas. When this test was initiated, the armyworm population was comprised primarily of large sized larvae. Belt, Coragen, Demin, Intrepid, Diamond and Steward all exhibited very good activity toward all the larval sizes, while Cobalt appeared to be active primarily towards small larvae. When evaluating total larvae, Tracer was also somewhat weaker relative to the other treatments. The reason Tracer did not perform well is not certain, but perhaps the rate, although at its maximum, may be too low for large armyworms where coverage is difficult.

Objective:

To determine the efficacy of insecticides targeting cotton aphids and their impact on aphid predators.

Materials and Methods:

This test was conducted at the Texas AgriLife Research and Extension Center in Lubbock, Texas. Cotton 'DeltaPine 174 RF' was planted on 4 June 2008 on 40-inch rows and irrigated using furrow run irrigation. Plots were 4-rows wide × 80-feet long. Plots were arranged in a randomized complete block design with 4 replicates. A beet armyworm outbreak was induced by overspraying the entire test area with Karate 1EC (*lambda* cyhalothrin) at 4.0 fl-oz per acre on 18 July and 7 August. The insecticide treatments and rates are outlined in the tables. All treatments were applied with a CO_2 pressurized hand boom calibrated to deliver 10 gallons/acre. All treatment included the non-ionic surfactant Liberate at 0.156% v/v except one treatment of Belt, which included methylated seed oil at 1.88% v/v. The spray boom consisted of 2 hollow cone TX-6 nozzles per row spaced at 20 inches.

Treatments were applied on 25 August 2008. The application should probably have been applied 5-7 days earlier, but heavy rainfall prevented access to the field.

The beet armyworm, *Spodoptera exigua* (Hübner), population was estimated utilizing a 36-inch x 40-inch black drop cloth. Drop cloths were laid between the rows and approximately 1.5 row-ft of cotton were shaken onto the drop cloth from each row, and the number and size, small (< 0.25 inch), medium (0.25-0.625 inch) and large (> 0.625 inch), of beet armyworm larvae were counted. Data were analyzed with PROC MIXED, and means were separated using an F-protected LSD ($P \leq 0.05$).

Results and Discussion:

Prior to insecticide application, the armyworm population was averaging 4.87 larvae per 6-ft-row. At this time there were no significant differences among treatments (Table 1). Additionally, the armyworm population was comprised primarily of large larvae, followed by medium sized and small. It was evident that insecticides should have been applied earlier since in general smaller larvae are more easily controlled.

At 4 DAT, all of the insecticide treatments contained fewer small larvae than the untreated, and there were no differences among treatments for medium sized larvae.

The untreated did not differ from any of the insecticide treatments for large larvae, but Cobalt had more large larvae than the other insecticide treatments. It appears that Cobalt is efficacious towards small larvae, but may be somewhat weak against larger larvae. This is not necessarily surprising since Cobalt is a mixture of two older chemistries, Lorsban and the pyrethroid *gamma*-cyhalothrin, which are known to be most active on smaller sized larvae. Additionally, Cobalt is probably harsher towards the natural enemies relative to the other insecticides, which have influenced it performance.

When evaluating total larvae, Tracer was also somewhat weaker relative to the other treatments. Tracer in known to have exceptional activity towards beet armyworms, especially in vegetable crops. The reason it did not perform well here is not certain, but perhaps the rate, although at its maximum, may be too low for large armyworms where coverage is difficult.

All of the other insecticides performed equally well at the rates tested. We did not see any benefit in this test from including a methylated seed oil with Belt over a non-ionic surfactant.

A high level of parasitism was evident in this test which undoubtedly suppressed the number of larger larvae in the untreated at 4 DAT. The number of small larvae in the untreated had increased since the initial evaluation indicating that egg laying was still occurring. Shortly after the 4 DAT evaluation the beet armyworm population crashed due to predation and parasitism.

Acknowledgments:

Appreciation is expressed to Plains Cotton Growers for financial support of this project.

Disclaimer Clause:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Impact of various insecticides toward small, medium and large sized beet armyworms.

Treatment/ formulation[a]	Rate amt product/acre	Number of beet armyworms per 6 ft-row							
		25 Aug (pre-treatment)				29 Aug (4 DAT)			
		small	medium	large	total	small	medium	large	total
Untreated	--	0.50a	1.00a	1.75a	3.25a	2.75a	1.25a	1.25ab	5.25a
Belt 480SC	3 fl-oz	0.50a	1.25a	3.75a	5.50a	0.25b	0.25a	0.50b	1.00b
Belt 480SC + MSO	3 fl-oz	0.25a	0.75a	2.50a	3.50a	0.00b	0.25a	0.00b	0.25b
Cobalt	38 fl-oz	1.00a	1.50a	4.00a	6.50a	0.25b	1.00a	3.00a	4.25a
Coragen 1.67SC	5 fl-oz	1.50a	2.00a	2.50a	6.00a	0.00b	0.75a	0.00b	0.75b
Demin 0.16EC	8 fl-oz	0.25a	0.75a	2.50a	3.50a	0.00b	0.00a	0.50b	0.50b
Diamond 0.83EC	12 fl-oz	2.00a	2.00a	2.00a	6.00a	0.25b	0.25a	0.25b	0.75b
Intrepid 2F	6 fl-oz	0.25a	2.50a	3.25a	6.00a	0.50b	0.50a	0.00b	1.00b
Steward 1.25EC	11.3 fl-oz	1.50a	1.00a	1.25a	3.75a	0.50b	0.00a	0.25b	0.75b
Tracer 4SC	2.9 fl-oz	2.75a	0.75a	1.25a	4.75a	0.00b	1.75a	1.50b	3.25ab

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$)

[a]All treatments, except Belt 480SC + MSO at 1.88% v/v, included the non-ionic surfactant Liberate at 0.156 % v/v.

Evaluation of New Chemistries for Bollworm Management in the Texas High Plains - 2008

Cooperators: Kenneth Schilling, Cotton Grower/Texas AgriLife Extension Service

David Kerns, Emilio Nino, Brant Baugh,
Greg Cronholm, Steve Young, and Bo Kesey
Extension Entomologist-Cotton, EA-IPM Castro/Lamb Counties,
EA-IPM Lubbock County, EA-IPM Hale/Swisher Counties,
CEA-ANR Castro County, and Extension Program Specialist-Cotton

Castro County

Summary:

The cotton bollworm, *Helicoverpa zea* (Boddie), is one of the most damaging pests of cotton in the Texas High Plains. Traditionally, pyrethroids are the products of choice for managing bollworms. However, when concurrent infestations of beet armyworms, *Spodoptera exigua* (Hübner) are encountered, pyrethroids are not a stand only choice since they lack efficacy towards beet armyworms. At 5 DAT, Belt, Coragen, Steward and Karate, all had significantly fewer larvae than the untreated, but none of the treatments had reduced the bollworm population to sub-threshold levels. By 9 DAT, all of the insecticides had significantly fewer larvae than the untreated, but at this time only Karate had reduced the population below threshold. Results were similar at 15 DAT. The temperature during the test averaged a high of 80ºF and a low of 58ºF, whereas the long-term average for this time of year is an approximate high of 85ºF and a low of 58ºF. Since much of the activity for Belt and Coragen, and to a lesser extent Steward, is derived from ingestion, the cool temperatures may have reduced feeding activity to a point where some efficacy appeared to be somewhat compromised. Yield data was not entirely supportive of the findings based on bollworm counts. Belt was the only treatment to significantly yield more cotton than the untreated, but did not differ from Coragen. Consequently, Belt resulted in the greatest net return relative to the untreated, although it did not differ from Coragen. It is plausible that although the larvae in the Belt plots were alive, feeding may have been minimal. Thus, it appears that Belt, Coragen and Steward all exhibit good activity towards beet armyworms, and in addition to Karate, express efficacy towards bollworms when targeting small larvae. More research is required to determine the efficacy of these products toward larger sized bollworm larvae.

Objective:

To determine the efficacy of insecticides targeting cotton bollworm that also exhibit activity towards beet armyworm relative to a standard bollworms material that does not have substantial beet armyworm activity.

Materials and Methods:

This test was conducted in Castro County near Dimmitt, TX. Cotton 'FiberMax 9058 F' was planted on 19 May 2008 on 30-inch rows. The plots were 4-rows wide × 60-feet long. In both tests, plots were arranged in a randomized complete block design with 4 replicates. The insecticide treatments and rates are outlined in Table 1. All treatments were applied with a CO2 pressurized hand boom calibrated to deliver 10 gallons/acre. The boom consisted of 2 TwinJet 8001VS nozzles per row. Treatments were applied on 27 August 2008.

Bollworm, *Helicoverpa zea* (Boddie), populations were estimated by counting the number of bollworms from 10 whole plant inspections per plot. On both tests larvae size was estimated by length; small larvae (<1/4 inch), medium larvae (1/4 to 5/8 inch) and large (>5/8 inch). The bollworm test was harvested on 7 November 2008, using a 28-inch HB hand basket stripper. A 1/1000th acre portion was harvested from the middle two rows of each plot.

Grab samples were taken by plot and ginned at the Texas AgriLife Research and Extension Center at Lubbock to determine gin turnouts. Lint samples were submitted to the International Textile Center at Texas Tech University for HVI analysis, and USDA Commodity Credit Corporation (CCC) Loan values were determined for each treatment by plot.

All data were analyzed using PROC MIXED and the means were separated using an F protected LSD ($P \leq 0.05$).

Results and Discussion:

The bollworm population was extremely high and was initially comprised of primarily small larvae. Thus, based on label recommendations, the timing for using Steward for bollworm control was optimal. On 27 August (pretreatment) plots were averaging 20,750, 4,500 and 1,500 small, medium and large larvae per acre respectively, and there were no statistical differences among treatments (Table 1). The Texas AgriLife Extension Service action threshold for bollworms post bloom is 10,000 small larvae per acre and 5,000 medium and large larvae per acre. Thus we were exceeding the action threshold for bollworms in this test.

Medium larvae were the predominant size at 5 DAT. At this time the all of the insecticides had fewer small and total larvae than the untreated; there were no differences for medium and large size larvae. However, none of the treatments had reduced the bollworm population to sub-threshold levels.

At 9 DAT, large larvae were the most numerous size. All of the insecticides has significantly fewer medium, large and total larvae than the untreated, but did not differ for small larvae (Table 2). Among the insecticides, Karate and Steward contained significantly fewer medium sized larvae than Coragen, but did not differ from Belt. Karate was the only treatment that was below the action threshold.

At 15 DAT, all of the insecticides contained fewer large and total bollworms than the untreated, but did not differ among each other. There were no differences in small of medium size larvae. Although 15 days had passed since application, Karate was the only treatment that reduced the bollworm population below the action threshold. However, based on yields, crop protection may not have been compromised in the other treatments. Plots treated with Belt produced the most cotton at 1,011 lbs-lint/acres, but did not differ from Coragen. Belt was the only treatment that differed from the untreated, which yielded 876 lbs-lint/acre. It is plausible that although the larvae in the Belt plots were alive feeding may have been minimal (Table 3).

There were no detectable differences among treatments regarding any HVI traits (Table 4).

Acknowledgments:

Appreciation is expressed to the Texas Department of Agriculture - Food and Fiber Research for funding of HVI testing at the Texas Tech University - Fiber and Biopolymer Research Institute, and to Plains Cotton Growers for financial support of this project.

Disclaimer Clause:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Efficacy of insecticides towards bollworms before treatment and 5 DAT, Kenneth Schilling Farm, Dimmitt, TX 2008.

Treatment/ formulation[a]	Rate amt product/acre	Number of bollworm larvae per plant							
		27 Aug (pre-treatment)				1 Sep (5 DAT)			
		small	medium	large	total	small	medium	large	total
Untreated	--	0.55a	0.05a	0.10a	0.70a	0.28a	0.50a	0.13a	0.90a
Belt 480SC	3 fl-oz	0.42a	0.10a	0.05a	0.57a	0.13b	0.33a	0.23a	0.68ab
Coragen 1.67SC	5 fl-oz	0.45a	0.10a	0.00a	0.55a	0.05b	0.18a	0.23a	0.45bc
Karate 1EC	3.85 fl-oz	0.60a	0.20a	0.00a	0.80a	0.05b	0.18a	0.03a	0.25c
Steward 1.25EC	11.3 fl-oz	0.75a	0.15a	0.05a	0.95a	0.10b	0.33a	0.13a	0.55abc

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).
[a]All treatments included the non-ionic surfactant Liberate at 0.156 % v/v.

Table 2. Efficacy of insecticides towards bollworms at 9 and 15 DAT, Kenneth Schilling Farm, Dimmitt, TX 2008.

Treatment/ formulation[a]	Rate amt product/acre	Number of bollworm larvae per plant							
		5 Sep (9 DAT)				11 Sep (15 DAT)			
		small	medium	large	total	small	medium	large	total
Untreated	--	0.08a	0.32a	0.45a	0.85a	0.00a	0.22a	0.97a	1.19a
Belt 480SC	3 fl-oz	0.03a	0.10bc	0.18b	0.30b	0.00a	0.06a	0.38b	0.44b
Coragen 1.67SC	5 fl-oz	0.03a	0.20b	0.08b	0.30b	0.00a	0.03a	0.19b	0.22b
Karate 1EC	3.85 fl-oz	0.00a	0.00c	0.08b	0.08b	0.07a	0.00a	0.10b	0.10b
Steward 1.25EC	11.3 fl-oz	0.00a	0.05c	0.18b	0.23b	0.00a	0.09a	0.25b	0.41b

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).
[a]All treatments included the non-ionic surfactant Liberate at 0.156 % v/v.

Table 3. Impact of insecticides targeting bollworms on yield, turnout, loan value and profit, Kenneth Schilling Farm, Dimmitt, TX 2008.

Treatment/ formulation[a]	Rate amt product/acre	Yield (lbs-lint/ac)	% turnout	Loan value[b] ($/lb)	Net return[c] ($/ac)
Untreated	--	876.00b	22.50a	0.48a	0.00b
Belt 480SC	3 fl-oz	1010.08a	22.50a	0.46a	61.69a
Coragen 1.67SC	5 fl-oz	922.49ab	22.75a	0.46a	20.42ab
Karate 1EC	3.85 fl-oz	892.25ab	22.25a	0.46a	7.44b
Steward 1.25EC	11.3 fl-oz	847.49ab	22.00a	0.46a	-12.02b

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).
[a]All treatments included the non-ionic surfactant Liberate at 0.156 % v/v.
[b]Loan values based on HVI quality parameters reported in table 4.
[c]Profit is the amount of value added due to the insecticide application relative to the untreated, based on yield and loan value; insecticide and application costs were not included in this estimation.

Table 4. Impact of insecticides targeting bollworms on HVI fiber properties, Kenneth Schilling Farm, Dimmitt, TX 2008.

Treatment/ formulation[a]	Rate amt product/acre	Mike	Staple length (32nds)	% length uniformity	Strength (g/tex)	% elongation	Rb (% reflec)	+b (yellowness)	Leaf grade
Untreated	--	2.83a	1.17a	80.98a	27.60a	9.98a	76.45bc	9.65a	3.25a
Belt 480SC	3 fl-oz	2.55a	1.19a	80.58a	28.25a	9.80a	77.50a	9.70a	3.00a
Coragen 1.67SC	5 fl-oz	2.65a	1.17a	80.55a	28.13a	9.85a	77.20ab	9.40a	4.25a
Karate 1EC	3.85 fl-oz	2.58a	1.17a	80.05a	27.83a	9.88a	77.35ab	9.65a	3.50a
Steward 1.25EC	11.3 fl-oz	2.65a	1.16a	80.53a	27.68a	9.90a	76.25c	9.65a	3.75a

Values in a column followed by the same letter are not different based a Proc Mixed analysis with an F protected LSD ($P \geq 0.05$).
[a]All treatments included the non-ionic surfactant Liberate at 0.156 % v/v.

Boll Damage Survey of Bt and non-Bt Cotton Varieties in the South Plains Region of Texas 2007-08

Cooperators: Texas AgriLife Extension Service

David Kerns, Monti Vandiver, Emilio Nino, Tommy Doederlein, Manda Cattaneo, Greg Cronholm, Kerry Siders, Brant Baugh and Scott Russell
Extension Entomologist-Cotton, EA-IPM Bailey/Parmer Counties, EA-IPM Castro/Lamb Counties, EA-IPM Lynn/Dawson Counties, EA-IPM Gaines County, EA-IPM Hale/Swisher Counties, EA-IPM Hockley/Cochran Counties, EA-IPM Lubbock County and EA-IPM Terry/Yoakum Counties

South Plains

Summary:

Late-season boll damage surveys were conducted in 2007 and 2008 to evaluate the amount of Lepidoptera induced damage in Bt cotton varieties relative to non-Bt cotton varieties. Additional, data was collected on the number of insecticide applications required for these varieties to manage lepiopterous pests. Boll damage was light in 2007; however, more damaged bolls where found in the non-Bt fields (3.11%) than in the Bollgard (0.52%) and Bollgard II (0.25%) fields, but did not differ from the Widestrike fields (1.29%). Very few insecticide applications were made targeting bollworm in any of the 2007 survey fields and there were no significant differences among variety types. None of the Bt cotton fields were treated for bollworms, whereas 9% on the non-Bt field received a single insecticide application. Late season bollworm damage in 2008 was similar to 2007. All of the Bt cotton variety types had significantly fewer damaged bolls than the non-Bt varieties and none of the Bt varieties required insecticide applications for lepidopterous pests, but unlike 2007, more non-Bt cotton was treated for bollworm and/or beet armyworms in 2008 (41% of the fields received a single insecticide application).

Objective:

The objective of this study was to compare the qualitative value of Bollgard II, Widestrike and Bollgard insect control traits in grower fields relative to each other and to non-Bt cotton varieties.

Materials and Methods:

In 2007 and 2008, boll damage surveys were conducted to quantify bollworm damage in late season Bt and non-Bt cotton varieties. Although the source of the damage is not certain, most of it is suspected to have come from cotton bollworms although beet armyworms were present in some fields in 2008. Two of the non-Bt were treated for a mixed population of bollworms and beet armyworms in Bailey County in 2008. The survey was conducted late season because Bt levels in mature/senescent cotton tends to deteriorate relative to rapidly growing plants. Thus, late season would represent the time period when Bt levels would be less intensely expressed and damage would be more likely to occur.

Grower fields of non-Bt, Bollgard, Bollgard II and Widestrike cotton were sampled throughout the South Plains region of Texas (Table 1). Samples were taken after the last possible insecticide applications and before approximately 20% of the boll were open. Three distinct areas were sampled within each field, and 100 consecutive harvestable bolls were sampled from each location. Each field by variety type served as a replicate. Bolls were considered damaged if the carpal was breached through to the lint. The insecticide history in regard to insecticides targeting bollworms was recorded.

All data were analyzed using PROC MIXED and the means were separated using an F protected LSD ($P \leq 0.10$).

Results and Discussion:

In 2007, damage was very light across all of the field types. However, more damaged bolls where found in the non-Bt fields (3.11%) than in the Bollgard (0.52%) and Bollgard II (0.25%) fields, but did not differ from the Widestrike fields (1.29%) (Table 2). Damage in the Widestrike fields did not differ from the Bollgard and Bollgard II fields. The fact that Widestrike did not differ from the non-Bt fields does not appear to indicate a lack of efficacy, but probably indicates a lack of area wide bollworm pressure. Very few insecticide applications were made targeting bollworm in any of the 2007 survey fields and there were no significant differences among variety types. None of the Bt cotton fields were treated for bollworms, whereas 9% on the non-Bt field received a single insecticide application.

Late season bollworm damage in 2008 was similar to 2007. All of the Bt cotton variety types had significantly fewer damaged bolls than the non-Bt varieties (Table 3). There were no differences in boll damage among the Bt types. Similar to 2007, none of the Bt varieties required insecticide applications for bollworms, but unlike 2007, more non-Bt cotton was treated for bollworms and/or beet armyworms in 2008 (41% of the fields received a single insecticide application).

Based on these data, Bt cotton appears to continue to be highly effective in preventing boll damage by lepidopterous pests in the South Plains region of Texas.

Acknowledgments:

Appreciation is expressed to the Monsanto Company for financial support of this project.

Disclaimer Clause:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Number of fields sampled by county and Bt trait in 2007-08.

County	Non-Bt	Bollgard	Bollgard II	Widestrike
Year 2007				
Bailey	0	3	1	0
Castro	4	0	3	0
Dawson	1	3	2	4
Floyd	3	0	4	0
Gaines	0	0	0	1
Hale	7	0	6	3
Hockley	3	2	2	2
Lubbock	1	5	2	1
Parmer	2	1	0	1
Terry	1	0	3	4
TOTAL	22	14	23	16
Year 2008				
Bailey	5	0	5	0
Castro	6	0	6	1
Dawson	0	0	0	2
Gaines	4	0	3	10
Hale	3	0	2	1
Hockley	5	5	5	3
Lubbock	6	0	5	0
TOTAL	29	5	26	17

Table 2. Percentage of damaged bolls and insecticide applications for non-Bt and various Bt technology varieties grown in the South Plains of Texas, 2007.

Variety type	n[a]	% damaged bolls[b]	Mean no. sprays per site[c]
Non-Bt	22	3.11 a	0.09 a
Bollgard	14	0.52 b	0.00 a
Bollgard II	23	0.25 b	0.00 a
WideStrike	14	1.29 ab	0.00 a

Means in a column followed by the same letter are not significantly different based on an F protected Mixed Procedure LSD ($P \leq 0.10$).
[a]Number of fields sampled.
[b]Percentage of damaged bolls from three locations in each field, 100 bolls sampled per locations, 300 bolls per field.
[c]Mean number of insecticide applications targeting lepidopterous pests per site.

Table 3. Percentage of damaged bolls and insecticide applications for non-Bt and various Bt technology varieties grown in the South Plains of Texas, 2008.

Variety type	n[a]	% damaged bolls[b]	Mean no. sprays per site[c]
Non-Bt	29	3.16 a	0.41 a
Bollgard	5	0.53 b	0.00 b
Bollgard II	26	0.04 b	0.00 b
WideStrike	17	0.18 b	0.00 b

Means in a column followed by the same letter are not significantly different based on an F protected Mixed Procedure LSD ($P \leq 0.10$).
[a]Number of fields sampled.
[b]Percentage of damaged bolls from three locations in each field, 100 bolls sampled per locations, 300 bolls per field.
[c]Mean number of insecticide applications targeting lepidopterous pests per site.

AgriLIFE EXTENSION
Texas A&M System

Fusarium Wilt Trials Results from 2007 - 2008

Jason Woodward, Mitchell Ratliff, and Ira Yates
Extension Plant Pathologist, Technician, Technician
Texas AgriLife Extension, Lubbock

Terry Wheeler, Evan Arnold, Victor Mendoza, Lindsi Clark, and Justin Carthal
Professor, Technician, Technician, Technician, Technician
Texas AgriLife Research, Lubbock

Field trials were conducted in 2008 to evaluate commercially available cotton varieties in fields with a history of Fusarium wilt. A total of six trials were conducted; however, four were lost to the hot, dry, windy conditions experienced in early June. In addition, one of the remaining trials (Dawson County Trial) had to be replanted due to harsh environmental conditions. Disease pressure at this location was very low, and the results from the trial were somewhat inconsistent with what was observed in 2007. A preliminary ranking of varieties tested is listed in Table 5. Continued screening will take place during the 2009 growing season. If you have any questions pertaining to the selection of cotton varieties with regard to Fusarium wilt, please contact Jason Woodward via phone (806) 746-4053, or e-mail jewoodward@ag.tamu.edu.

Table 1. Lint yields, net returns, loan values, turnout, disease ratings for cotton varieties evaluated in Gaines County, TX, 2008[a]

Variety	Lint yield (lb/A)	Net return ($/A)[b]	Loan value ($/lb)	% Lint	Verticillium wilt (%)	Fusarium wilt (% death)[c]	Root-knot (nematodes/pint soil)
DP 174RF	1733 a[d]	862 a	0.528	35.8	22.3 a	0.0	353
ST 5458B2RF	1423 b	650 b	0.501	35.2	11.7 a-h	0.0	1367
ST 4554B2RF	1136 bc	546 bc	0.537	35.3	17.2 a-d	0.0	1467
NG 3410RF	1068 cd	524 bcd	0.531	33.5	4.0 gh	0.3	1500
AT Apex B2RF	1041 cde	505 b-e	0.540	33.4	12.0 a-h	1.0	2320
DP 164B2RF	930 c-f	452 c-g	0.553	32.3	7.0 c-h	0.7	2547
AM 1532B2RF	924 c-f	450 c-g	0.552	34.6	13.6 a-g	1.3	3080
DP 161B2RF	915 c-f	449 c-g	0.559	31.8	6.1 d-h	3.6	2767
FM 9160B2RF	914 c-f	432 c-h	0.542	35.6	1.8 h	0.0	2220
AT Orbit RF	881 c-g	445 c-g	0.553	29.7	5.7 e-h	0.0	2447
DP 104B2RF	868 c-g	392 d-i	0.523	33.3	3.9 gh	5.1	1667
AT Patriot RF	854 d-g	407 c-h	0.527	32.8	7.7 b-h	0.0	3267
AFD 5065B2RF	848 d-h	411 c-h	0.552	32.2	5.8 e-h	2.3	2000
DP 143B2RF	833 d-h	344 e-k	0.489	32.7	12.3 a-h	1.9	2327
FM 9063B2RF	817 d-i	379 d-j	0.542	34.5	5.9 d-h	1.9	3007
FM 9180B2RF	809 d-i	376 d-j	0.543	32.7	5.0 fgh	3.3	1827
AM 1622B2RF	807 d-i	365 e-j	0.527	31.3	13.9 a-g	6.5	3133
PG 485WRF	788 d-j	341 f-k	0.500	32.0	18.2 abc	3.1	1460
DP 147RF	773 d-j	365 e-j	0.540	34.5	8.7 b-h	1.3	1153
FM 1880B2RF	764 e-j	327 f-k	0.512	33.1	4.6 fgh	0.3	3973
NG 4370B2RF	762 e-j	339 f-k	0.522	33.6	7.8 b-h	9.8	2100
CG 4020B2RF	737 f-j	340 f-k	0.547	31.8	12.9 a-h	2.1	4520
AT Titan B2RF	717 f-j	338 f-k	0.551	29.2	11.1 a-h	5.0	2233
AT Epic RF	685 f-j	327 f-k	0.540	34.9	16.0 a-f	18.7	2020
AM 1550B2RF	683 f-j	302 g-k	0.531	36.4	18.7 ab	17.9	1520
CG 3035RF	614 g-j	283 h-k	0.549	34.8	16.4 a-e	9.1	2867
DP 167RF	550 hij	244 jk	0.539	30.1	4.9 fgh	0.5	1680
FM 820RF	549 hij	244 jk	0.544	33.6	4.4 gh	1.6	2253
PG 375WRF	549 ij	238 jk	0.529	34.2	9.9 b-h	3.4	2567
FM 840B2RF	513 j	208 k	0.530	32.7	6.9 c-h	22.8	1500

[a] This field had a combination of Fusarium wilt, root-knot nematode, and Verticillium wilt.
[b] Net returns = (lint yield × loan value) – (seed costs + technology fees) for 52,272 seed/acre.
[c] The percentage of plants within a plot killed by *Fusarium oxysporum* f. sp. *vasinfectum.*
[d] Data are the means from four replications. Means within a column followed by the same letter are not different according to Fisher's protected least significant differences test (*P*=0.05).

Table 2. Fiber quality parameters for cotton varieties evaluated in a Fusarium wilt trial in Gaines County TX, 2008

Variety	Micronaire	Length	Uniformity	Strength	Elongation	Rd	+b	Leaf
AFD 5065B2RF	4.5	1.11	82.7	28.6	10.3	78.2	6.9	3.0
AM 1532B2RF	4.4	1.10	81.6	26.5	10.0	77.2	7.2	2.5
AM 1550B2RF	4.2	1.07	81.7	26.6	9.9	75.3	7.8	3.0
AM 1622B2RF	4.3	1.05	82.3	26.4	10.2	76.6	7.4	3.0
AT Apex B2RF	4.3	1.13	82.4	26.7	10.1	77.0	7.5	4.0
AT Epic RF	3.9	1.07	80.9	27.3	11.0	76.1	8.3	3.5
AT Orbit RF	4.1	1.14	82.2	28.7	10.4	77.6	7.5	3.0
AT Patriot RF	4.4	1.13	81.9	28.5	10.2	76.7	7.5	4.0
AT Titan B2RF	4.0	1.16	82.3	28.3	9.9	77.7	7.1	3.5
CG 3035RF	3.6	1.08	81.9	28.3	10.7	76.3	8.2	2.0
CG 4020B2RF	4.0	1.09	81.7	26.1	10.0	76.7	7.7	3.0
DP 104B2RF	4.1	1.10	82.9	29.1	10.4	75.7	7.2	4.5
DP 143B2RF	3.6	1.12	80.3	27.0	9.4	74.5	7.0	5.0
DP 147RF	3.9	1.13	81.3	28.9	8.8	76.3	7.1	3.5
DP 161B2RF	4.1	1.17	83.0	30.3	8.8	77.8	7.5	2.5
DP 164B2RF	4.0	1.15	81.8	29.3	8.8	77.9	7.6	3.0
DP 167RF	3.7	1.12	81.3	28.1	9.0	77.2	7.1	2.5
DP 174RF	4.3	1.14	81.9	27.5	10.3	76.1	7.6	3.5
FM 1880B2RF	3.6	1.11	81.4	29.5	9.6	75.7	6.4	4.5
FM 820RF	3.8	1.15	81.7	30.5	8.5	78.5	6.8	2.5
FM 840B2RF	3.8	1.15	81.5	30.5	9.3	77.0	6.6	4.5
FM 9063B2RF	4.5	1.14	81.8	29.8	8.9	78.1	6.8	2.0
FM 9160B2RF	4.1	1.13	82.9	28.9	8.4	77.8	7.0	2.5
FM 9180B2RF	4.3	1.13	82.6	29.7	9.4	77.9	6.7	3.5
NG 3410RF	4.1	1.14	83.2	30.1	9.6	74.4	7.5	4.5
NG 4370B2RF	4.2	1.09	82.6	27.3	9.8	74.1	7.6	4.5
PG 375WRF	4.0	1.07	81.3	27.3	9.8	75.0	7.2	3.5
PG 485WRF	4.3	1.09	82.1	28.0	10.7	72.7	7.4	5.0
ST 4554B2RF	4.7	1.10	83.0	29.3	11.8	75.1	7.9	2.5
ST 5458B2RF	4.4	1.10	81.5	29.4	9.3	73.5	7.8	5.0

Table 3. Disease ratings, yields, loan values, and net returns for cotton varieties evaluated in a Fusarium wilt trial in Dawson, TX, 2008

Variety	Disease incidence (%)[a]	Lint yield (lb/A)	% Lint	Loan value ($/lb)	Net return ($/A)[b]
DP 104B2RF	1.5 cdefg[c]	1110.5 ab[c]	29.3	0.474	497.90 a[c]
ST 5458B2RF	0.9 fg	1164.9 a	30.3	0.458	485.93 ab
ST 4554B2RF	1.1 defg	1090.0 abc	31.0	0.537	474.41 ab
DP 174RF	2.2 cdefg	1156.3 a	30.7	0.467	470.05 ab
ST 5327B2RF	2.1 cdefg	1014.5 abcd	34.2	0.455	448.12 abc
NG 3348B2RF	0.9 efg	926.7 bcde	30.7	0.482	431.23 abcd
PM 2141B2RF	0.5 g	905.0 cdef	30.9	0.496	406.71 abcde
AT EpicRF	4.2 a	845.9 defg	31.6	0.487	397.10 bcdef
AFD 5064F	1.5 cdefg	843.8 defgh	28.4	0.511	391.35 bcdefg
CG 3220B2RF	1.7 cdefg	872.0 defg	30.9	0.532	366.41 cdefgh
NG 3410RF	0.5 g	894.0 def	29.0	0.467	364.01 cdefgh
AM 1532B2RF	1.2 defg	875.1 defg	27.0	0.532	357.88 cdefgh
ST 4498B2RF	0.7 g	861.1 defg	29.2	0.496	353.13 cdefgh
DP 161B2RF	1.5 cdefg	741.6 efghijk	26.8	0.474	329.41 efghij
CG 3035RF	4.1 ab	794.7 efghi	29.0	0.524	310.58 fghij
DP 141B2RF	1.6 cdefg	770.5 efghij	28.9	0.482	307.41 fghij
PG 315RF	3.0 abcd	783.9 efghij	32.1	0.455	301.38 fghij
AM 1550B2RF	2.7 abcdef	733.3 fghijk	31.7	0.540	300.26 ghij
FM 1880B2RF	1.2 defg	726.7 fghijk	30.4	0.507	293.59 hij
FM 9058RF	2.8 abcde	720.3 fghijk	29.7	0.496	279.17 hij
FM 9180B2RF	0.9 fg	740.0 efghijk	29.1	0.523	278.73 hij
AFD 5065B2RF	1.0 defg	694.0 ghijk	28.2	0.540	274.20 hij
PG 375WRF	3.3 abc	563.2 k	30.3	0.488	248.96 j
FM 9063B2RF	0.7 g	593.2 jk	29.5	0.455	248.91 j
ST 5283RF	3.4 abc	650.6 hijk	28.4	0.496	242.30 j

[a] The percentage of plants within a plot exhibiting Fusarium wilt symptoms.
[b] Net returns = (lint yield × loan value) – (seed costs + technology fees) for 55,023 seed/acre.
[c] Data are the means from four replications. Means within a column followed by the same letter are not different according to Fisher's protected least significant differences test (*P*=0.05).

Table 4. Fiber quality parameters for cotton varieties evaluated in a Fusarium wilt trial in Dawson, TX, 2008

Variety	Micronaire	Length	Uniformity	Strength	Elongation	Leaf	Rd	+b
AFD 5064F	3.55	1.08	80.3	28.5	10.2	2.5	81.7	7.95
AFD 5065B2RF	3.40	1.10	79.6	28.9	10.8	2.0	83.0	7.65
AM 1532B2RF	2.90	1.11	79.3	25.6	9.9	1.0	83.3	8.45
AM 1550B2RF	3.05	1.07	79.3	26.2	10.2	1.0	81.8	8.90
AT EpicRF	3.20	1.07	79.9	26.4	10.9	1.0	82.7	8.80
CG 3035RF	3.05	1.07	79.4	26.6	10.6	1.5	82.4	8.85
CG 3220B2RF	3.10	1.09	79.2	26.0	10.4	1.5	82.5	8.65
DP 104B2RF	3.25	1.12	82.0	28.5	11.1	2.5	81.9	8.10
DP 141B2RF	2.75	1.10	78.9	28.0	9.6	2.0	82.1	8.30
DP 161B2RF	3.55	1.10	78.3	26.4	9.5	1.0	83.4	8.05
DP 164B2RF	3.00	1.09	77.0	26.5	9.2	1.5	82.9	8.40
DP 174RF	2.80	1.13	80.4	26.9	10.5	2.5	82.3	7.70
FM 1880B2RF	2.95	1.10	79.0	28.8	9.4	1.0	83.8	8.15
FM 9058RF	3.25	1.12	78.1	27.4	8.6	2.0	82.1	7.70
FM 9063B2RF	3.25	1.13	80.1	29.3	9.4	1.0	84.3	7.65
FM 9180B2RF	3.15	1.12	81.0	29.0	10.0	1.0	84.6	7.40
NG 3348B2RF	3.55	1.12	81.6	28.7	10.1	2.0	81.5	8.55
NG 3410RF	3.10	1.16	81.0	28.5	9.7	1.5	81.1	7.90
PG 315RF	3.20	1.03	78.4	25.5	9.4	1.5	81.4	8.90
PG 375WRF	3.35	1.03	78.3	25.3	9.7	1.5	82.0	8.45
PM 2141B2RF	3.50	1.10	80.4	27.5	10.0	4.0	78.4	7.40
ST 4498B2RF	3.00	1.11	81.5	28.7	11.7	1.5	82.2	8.70
ST 4554B2RF	3.15	1.10	80.5	28.7	11.5	2.0	81.2	9.15
ST 5283RF	3.00	1.06	79.5	27.8	10.2	2.0	81.5	8.95
ST 5327B2RF	3.00	1.08	79.9	27.5	10.1	2.5	80.8	8.50
ST 5458B2RF	3.30	1.10	79.6	27.7	9.9	2.5	80.9	8.65

Table 5. Ranking (by yield and net value) of cotton varieties tested in Fusarium wilt trials from 2007 and 2008*

Variety	Number of trials	Rank by yield	Rank by net value
AFD 5064F	3	10	10
AFD 5065B2RF	4	20	19
All-Tex Apex B2RF	3	11	13
All-Tex Arid B2RF	2	29	29
All-Tex EpicRF	2	19	18
All-Tex Titan B2RF	3	17	16
AM 1532B2RF	2	9	9
AM 1550B2RF	2	28	28
Americot 1622B2RF	3	18	17
Americot 2220RF	2	30	30
CG 3035RF	2	25	25
Deltapine 104B2RF	2	4	4
Deltapine 143B2RF	3	5	5
Deltapine 147RF	3	24	24
Deltapine 161B2RF	2	12	11
Deltapine 164B2RF	3	3	3
Deltapine 167RF	3	23	22
Deltapine 174RF	**4**	**1**	**1**
Fibermax 1740B2F	2	33	33
Fibermax 1840B2F	2	7	7
Fibermax 1880B2RF	4	15	15
Fibermax 9058RF	2	31	31
Fibermax 9063B2RF	4	21	20
Fibermax 9068F	2	14	14
Fibermax 9180B2RF	3	22	21
NexGen 3410RF	2	8	8
Phytogen 375WRF	2	32	32
Phytogen 485WRF	3	27	27
Stoneville 4554B2RF	**4**	**6**	**6**
Stoneville 5327B2F	2	16	23
Stoneville 5458B2RF	**2**	**2**	**2**
Stoneville 6611B2F	2	26	26
Stoneville 6622F	2	13	12

* Varieties in bold have performed consistently well across years and/or locations.

Verticillium Wilt Trials Results from 2007 - 2008

Terry Wheeler, Evan Arnold, Victor Mendoza, Lindsi Clark, and Justin Carthal
Professor, Technician, Technician, Technician, Technician
Texas AgriLife Research, Lubbock

Jason Woodward
Extension Plant Pathologist
Texas AgriLife Extension, Lubbock

Small plot trials were conducted near Floydada, Ropesville, Slaton, Lamesa, Seminole, and Garden City. Plot size was 35 ft. long and two-rows wide, with 32 varieties at a site, replicated four times. The first Table provides an average of how a variety performed in all the sites that it was tested from 2007 – 2008. There are 10 sites between the two years and a variety had to be present in at least two sites to be included in Table 1.

Table 1. The relative value[1], relative yield and relative wilt ratings averaged over all sites tested in 2007 and 2008.

Variety	# of sites	Relative value	Rank of value	Relative yield	Rank of yield	Relative wilt	Rank of wilt
NexGen 2549B2RF	3	1.01	1	1.06	1	0.42	5
Fibermax 9058RF	8	0.87	2	0.91	2	0.69	48
AFD 5064F	7	0.86	3	0.87	4	0.42	7
NexGen 3348B2RF	3	0.84	4	0.88	3	0.46	11
Fibermax 9180B2RF	8	0.83	5	0.86	5	0.55	29
Fibermax 9063B2RF	10	0.82	6	0.85	7	0.49	18
Deltapine 167RF	3	0.79	7	0.82	11	0.63	41
NexGen 1551RF	3	0.78	8	0.74	23	0.59	36
Fibermax 9160B2RF	3	0.78	9	0.83	9	0.46	13
Deltapine 104B2RF	5	0.77	10	0.86	6	0.49	16
Stoneville 4288B2RF	3	0.77	11	0.83	10	0.64	44
Stoneville 5288B2RF	2	0.75	12	0.85	8	0.52	23
Paymaster 2141B2RF	2	0.74	13	0.81	12	0.28	1
Fibermax 1880B2RF	5	0.74	14	0.80	13	0.38	2
Deltapine 161B2RF	2	0.74	15	0.80	14	0.49	17
Fibermax 1740B2RF	5	0.74	16	0.80	15	0.56	30
Deltapine 164B2RF	6	0.73	17	0.78	16	0.49	19
Phytogen 425RF	5	0.73	18	0.76	19	0.54	28
Deltapine 174RF	4	0.73	19	0.77	18	0.64	43
AFD 5065B2F	8	0.72	20	0.74	22	0.48	14
All-Tex Patriot RF	2	0.72	21	0.72	26	0.58	34
Deltapine 143B2RF	3	0.69	22	0.78	17	0.84	56
Cropland Genetics 4020B2RF	3	0.67	23	0.73	24	0.57	32
NexGen 1572RF	6	0.67	24	0.75	21	0.84	55
Deltapine 147RF	3	0.66	25	0.75	20	0.98	58
Phytogen 485WRF	5	0.66	26	0.72	25	0.73	50
All-Tex Orbit RF	3	0.65	27	0.68	40	0.46	12
NexGen 3550RF	3	0.65	28	0.71	29	0.53	24
Stoneville 4554B2RF	10	0.64	29	0.71	30	0.58	33
Phytogen 375WRF	5	0.64	30	0.71	27	0.54	27
Deltapine 121RF	3	0.64	31	0.68	39	0.60	37
Cropland Genetics 3520B2RF	3	0.62	32	0.71	31	0.56	10
Deltapine 117B2RF	4	0.62	33	0.71	28	0.60	38
Cropland Genetics 3020B2RF	3	0.62	34	0.70	34	0.43	8

Table 1. cont.

Variety	# of sites	Relative value	Rank of value	Relative yield	Rank of yield	Relative wilt	Rank of wilt
Stoneville 5283RF	6	0.62	35	0.67	41	0.75	51
Phytogen 315RF	3	0.61	36	0.69	36	0.39	3
Stoneville 5327B2RF	6	0.61	37	0.69	37	0.64	45
Deltapine 141B2RF	2	0.61	38	0.70	33	0.82	53
Americot 1532B2RF	2	0.61	39	0.66	43	0.44	9
NexGen 3273B2RF	4	0.61	40	0.69	38	0.54	26
Stoneville 5458B2RF	2	0.60	41	0.69	35	0.48	15
Stoneville 4498B2RF	3	0.59	42	0.70	32	0.52	22
Americot 1662B2RF	5	0.58	43	0.65	45	0.51	20
All-Tex Apex B2RF	5	0.58	44	0.64	46	0.62	39
NexGen 4377B2RF	4	0.58	45	0.67	42	0.56	31
All-Tex Arid B2RF	4	0.58	46	0.65	44	0.62	40
NexGen 3538RF	3	0.57	47	0.60	52	0.69	47
NexGen 1556RF	3	0.56	48	0.58	55	0.54	25
All-Tex Titan B2RF	3	0.56	49	0.63	48	0.58	35
Americot 1664B2RF	4	0.54	50	0.63	49	0.42	6
Stoneville 4427B2RF	5	0.54	51	0.64	47	0.42	4
NexGen 4370B2RF	3	0.53	52	0.62	50	0.51	21
NexGen 3331B2RF	3	0.52	53	0.61	51	0.65	46
Americot 1504B2RF	3	0.49	54	0.59	53	0.63	42
Americot 1550B2RF	2	0.48	55	0.58	54	0.83	54
Cropland Genetics 3220B2RF	2	0.47	56	0.57	57	0.72	49
Cropland Genetics 3035RF	3	0.47	57	0.57	56	0.87	57
All-Tex Epic RF	2	0.46	58	0.54	58	0.76	52

[1]Value is calculated as the yield (lbs of lint/acre) x loan value ($/lb) – (seed + technology fees [$/acre]). Relative value is the value of a variety at a site divided by the highest average value for a variety at that site. Relative yield is the yield at a site divided by the highest average yield that occurred at that site. Relative wilt is the wilt incidence at a site divided by the highest average wilt rating that occurred at that site.

Table 2. Performance of varieties in a Verticillium wilt field near Ropesville in 2008

Variety	Value[2] /acre ($/acre)	Lbs of Lint/acre	% Lint	% Wilt 26 Aug.	Loan Value ($/lb)	Stand Plants/ ft row	RKN[3]
AFD 5064F	485 a[1]	977 ab	27.9	20.7 a-d	0.546	2.6 ab	167
NexGen 2549B2RF	448 a	995 a	29.4	13.3 cd	0.509	2.4 a-e	300
NexGen 3348B2RF	367 b	894 abc	28.5	20.7 a-d	0.476	2.3 b-f	567
Fibermax 9180B2RF	349 bc	824 cd	28.2	15.1 bcd	0.501	2.8 a	767
NexGen 1551RF	345 bc	678 efg	27.7	25.8 a-d	0.576	2.4 a-d	167
Stoneville 4288B2RF	341 bcd	827 cd	28.1	17.7 bcd	0.489	2.0 c-i	33
Deltapine 104B2RF	328 bcd	840 bcd	26.4	17.1 bcd	0.465	2.4 a-d	800
Fibermax 9058RF	304 b-e	761 cde	26.9	24.4 a-d	0.471	2.4 a-f	2600
AFD 5065B2F	303 b-e	724 def	25.2	24.8 a-d	0.488	2.2 b-h	467
Fibermax 9063B2RF	297 c-f	677 e-h	27.3	18.0 bcd	0.533	2.4 a-f	1767
Paymaster 2141B2RF	290 c-f	752 def	27.2	18.7 bcd	0.477	2.3 b-g	600
NexGen 3410RF	277 def	680 efg	24.3	21.9 a-d	0.471	2.1 c-h	200
All-Tex Orbit RF	261 efg	635 f-i	23.4	21.3 a-d	0.480	2.0 c-i	533
NexGen 1572RF	256 e-h	638 e-i	26.8	32.9 abc	0.468	2.4 a-e	533
NexGen 3538RF	243 e-i	575 g-j	23.6	35.9 ab	0.502	1.6 ij	233
Phytogen 315RF	235 f-i	613 f-j	27.4	9.7 d	0.469	2.5 abc	1233
Cropland Genetics 4020B2RF	209 g-j	573 g-k	25.3	21.4 a-d	0.474	2.1 b-h	1033
Cropland Genetics 3020B2RF	202 g-j	539 h-m	25.6	15.7 bcd	0.491	1.8 hij	1167
Deltapine 117B2RF	200 g-j	569 g-k	26.0	16.2 bcd	0.461	2.1 c-h	433
Cropland Genetics 3520B2RF	200 g-j	538 h-m	25.5	14.8 bcd	0.488	2.1 b-h	867
NexGen 1556RF	199 h-k	471 klm	23.6	18.3 bcd	0.518	2.4 a-d	1750
Stoneville 5327B2RF	193 h-l	563 g-l	27.2	13.6 cd	0.455	1.9 e-j	633
Phytogen 375WRF	166 jkl	471 klm	24.7	15.7 bcd	0.463	2.3 b-h	1000
Americot 1504B2RF	149 jkl	438 klm	23.4	28.2 a-d	0.477	1.9 f-j	1233
Stoneville 4498B2RF	146 jkl	478 j-m	25.2	15.2 bcd	0.437	2.0 d-j	1033
NexGen 3273 B2RF	146 jkl	462 klm	24.4	21.8 a-d	0.441	1.8 hij	333
Cropland Genetics 3220B2RF	131 lm	418 m	26.1	28.7 a-d	0.465	1.8 g-j	1467
NexGen 3331B2RF	131 lm	426 lm	25.9	10.5 d	0.444	2.0 d-j	1267
Stoneville 4554B2RF	128 lm	416 mn	25.6	23.3 a-d	0.460	1.6 ij	1233
Cropland Genetics 3035RF	67 m	278 n	26.1	42.4 a	0.436	1.5 j	583

[1]Different letters mean that varieties are significantly different at $P = 0.05$.

[2]$/acre was calculated as the yield (lbs/acre) x loan value ($/lb) minus seed and technology fees for planting four seed/ft row on 40-inch centers (52,272 seed/acre).

[3]RKN is root-knot nematodes/500 cm3 soil, taken on 19 September.

Table 3. Fiber ratings for varieties in a Verticillium wilt field near Ropesville in 2008

Variety	Micronaire	Length	Uniformity	Strength	Elongation	Leaf	Rd	+b
AFD 5064F	3.80	1.09	80.9	29.6	11.4	3.5	80.2	7.6
AFD 5065B2F	2.85	1.13	79.8	29.9	11.3	2.0	81.9	7.1
Americot 1504B2F	2.45	1.15	79.8	28.1	10.9	1.5	82.1	7.6
All-Tex Orbit RF	2.55	1.16	80.0	29.2	11.0	2.5	80.8	8.8
Cropland Genetics 3020B2RF	2.80	1.10	80.2	26.3	10.9	1.5	81.7	8.0
Cropland Genetics 3035RF	2.50	1.06	78.1	27.1	10.8	3.0	79.5	9.0
Cropland Genetics 3220B2RF	2.50	1.11	78.3	26.3	10.6	2.0	81.6	8.1
Cropland Genetics 3520B2RF	2.65	1.11	79.0	26.8	11.3	2.0	82.0	8.0
Cropland Genetics 4020B2RF	2.70	1.12	77.8	26.5	10.4	2.5	81.8	8.1
Deltapine 104B2RF	2.60	1.12	80.4	29.2	11.2	3.0	80.8	7.8
Deltapine 117B2RF	2.60	1.13	79.5	29.4	9.8	4.0	77.7	7.9
Fibermax 9058RF	2.90	1.20	80.5	29.6	9.5	4.0	81.2	7.5
Fibermax 9063B3RF	3.20	1.20	81.9	31.5	9.7	1.5	83.6	7.2
Fibermax 9180B2RF	2.80	1.17	81.0	31.8	9.9	3.0	71.8	7.5
NexGen 1551RF	3.80	1.11	81.3	31.0	10.4	1.5	79.1	8.4
NexGen 1556RF	3.00	1.13	81.9	32.0	10.3	2.5	79.1	7.9
NexGen 1572RF	2.55	1.12	80.2	27.9	10.4	3.5	79.8	7.4
NexGen 2549B2RF	3.15	1.07	82.4	29.7	11.3	3.0	79.8	8.0
NexGen 3273B2RF	2.55	1.08	78.5	25.3	10.6	2.0	81.5	8.0
NexGen 3331B2RF	2.45	1.10	79.3	27.9	10.0	4.0	78.7	8.3
NexGen 3348B2RF	2.75	1.15	81.9	30.8	10.7	4.0	79.8	8.1
NexGen 3410RF	2.60	1.18	79.7	29.3	9.8	3.0	79.8	8.2
NexGen 3538RF	2.65	1.14	80.0	29.8	9.9	1.5	80.6	8.0
Phytogen 315RF	2.55	1.10	77.9	28.7	9.9	3.0	81.3	8.1
Phytogen 375WRF	2.40	1.11	78.8	27.2	9.9	2.5	81.6	7.9
Paymaster 2141B2RF	2.85	1.12	81.2	28.9	10.5	3.5	79.2	7.0
Stoneville 4288B2RF	2.70	1.13	79.2	29.2	10.7	1.5	81.5	8.4
Stoneville 4498B2RF	2.35	1.09	79.7	27.4	11.2	4.0	80.5	8.3
Stoneville 4554B2RF	2.50	1.10	79.0	28.7	11.7	3.0	80.3	8.7
Stoneville 5327B2RF	2.40	1.09	79.1	28.5	10.8	2.5	80.0	8.8

Table 4. Performance of varieties in a Verticillium wilt field near Garden City in 2008

Variety	Lbs of Lint/a	Value /acre ($)[2]	% Lint	Loan Value ($/lb)	% Wilt 13 Aug.	Stand Plants /ft row
Fibermax 9160B2RF	1,917 ab	947 ab	28.4	0.527	24.0 h	2.5 a-d
Fibermax 1740B2RF	1,763 cd	896 bc	30.7	0.542	48.1 a-e	3.0 ab
Fibermax 9180B2RF	1,796 bc	894 bc	27.5	0.533	44.2 a-h	2.7 a-d
Deltapine 164B2RF	1,731 cde	883 bcd	29.4	0.545	36.7 c-h	2.6 a-d
Deltapine 161B2RF	1,715 cde	842 cde	29.4	0.527	36.1 c-h	2.7 a-d
Cropland Genetics 4020B2RF	1,600 ef	822 c-f	28.3	0.553	45.1 a-g	2.8 a-d
AFD 5065B2RF	1,589 ef	792 d-g	26.3	0.535	42.6 b-h	3.0 ab
Fibermax 1880B2RF	1,661 c-f	789 efg	28.3	0.514	26.4 fgh	2.9 abc
Fibermax 9063B2RF	1,625 def	788 e-h	25.1	0.524	40.9 b-h	3.1 a
Deltapine 141B2RF	1,642 def	784 e-h	26.4	0.515	41.7 b-h	2.3 a-d
NexGen 3348B2RF	1,540 fg	783 e-h	28.7	0.547	25.8 gh	2.2 bcd
Phytogen 375WRF	1,598 ef	781 e-i	30.7	0.521	36.6 c-h	2.4 a-d
Deltapine 174RF	1,555 fg	755 e-j	28.9	0.542	46.7 a-f	2.3 a-d
Deltapine 143B2RF	1,645 c-f	745 f-k	29.7	0.491	60.2 ab	2.1 cd
Fibermax 840B2RF	1,589 ef	745 f-k	29.3	0.509	32.4 d-h	2.5 a-d
Deltapine 104B2RF	1,555 fg	745 f-k	27.8	0.519	34.0 c-h	2.6 a-d
All-Tex Orbit RF	1,408 ghi	730 f-l	24.0	0.549	29.5 e-h	2.5 a-d
Americot 1532B2RF	1,433 ghi	725 h-l	28.6	0.549	35.7 c-h	2.4 a-d
Fibermax 820RF	1,545 fg	722 g-l	29.0	0.503	40.3 b-h	2.1 cd
Phytogen 485WRF	1,514 fgh	712 h-m	26.2	0.505	43.3 b-h	2.6 a-d
All-Tex Patriot RF	1,369 hij	702 g-n	25.2	0.542	38.0 c-h	2.3 a-d
Stoneville 4554B2RF	1,423 ghi	695 h-n	28.7	0.532	39.1 c-h	2.0 d
Deltapine 147RF	1,540 fg	687 i-n	26.2	0.479	60.5 ab	2.2 bcd
Americot 1622B2RF	1,375 hij	668 j-o	27.3	0.530	49.8 a-e	2.7 a-d
Stoneville 5458B2RF	1,430 ghi	654 k-n	28.3	0.502	41.2 b-h	2.4 a-d
NexGen 3273B2RF	1,365 hij	648 l-o	26.3	0.519	40.8 b-h	2.1 cd
NexGen 4377B2RF	1,338 ij	624 mno	27.7	0.510	36.2 c-h	2.3 a-d
All-Tex Titan B2RF	1,298 ij	618 no	25.8	0.520	46.0 a-g	2.7 a-d
All-Tex Epic RF	1,252 j	609 no	28.3	0.522	53.2 abc	2.4 a-d
Americot 1550B2RF	1,256 j	582 o	29.6	0.512	64.4 a	2.4 a-d

[1]Different letters mean that varieties are significantly different at $P = 0.05$.

[2]$/acre was calculated as the yield (lbs/acre) x loan value ($/lb) minus seed and technology fees for planting four seed/ft row on 40-inch centers (52,272 seed/acre).

Table 5. Fiber ratings for varieties in a Verticillium wilt field near Garden City in 2008

Variety	Micronaire	Length	Uniformity	Strength	Elongation	Rd	+b	Leaf
AFD 5065B2F	3.4	1.13	79.6	28.4	10.7	75.8	8.3	1.0
Americot 1532B2RF	3.5	1.15	80.8	27.5	9.6	78.1	7.8	1.5
Americot 1550B2RF	3.2	1.10	79.3	27.4	9.8	77.2	7.7	3.0
Americot 1622B2RF	3.2	1.11	80.6	26.6	10.1	78.0	8.0	1.5
All-Tex Epic RF	3.4	1.09	79.5	27.5	10.5	76.0	9.0	2.0
All-Tex Orbit RF	3.5	1.17	82.0	28.2	11.0	76.6	8.6	1.5
All-Tex Patriot RF	3.6	1.16	81.0	28.8	10.6	75.7	8.2	2.0
All-Tex Titan B2RF	3.5	1.17	80.9	28.5	10.1	76.8	7.3	1.5
Cropland Genetics 4020B2RF	3.5	1.13	80.1	26.8	10.2	78.6	7.6	2.0
Deltapine 104B2RF	3.4	1.12	80.7	28.8	10.6	75.0	8.4	2.5
Deltapine 141B2RF	3.0	1.15	78.8	28.4	9.6	76.8	8.1	3.0
Deltapine 143B2RF	3.0	1.15	78.6	27.8	9.0	77.0	8.2	3.0
Deltapine 147RF	3.0	1.15	79.1	28.5	8.4	76.0	8.6	2.5
Deltapine 161B2RF	3.2	1.18	80.1	29.3	9.3	77.8	8.3	2.5
Deltapine 164B2RF	3.3	1.17	80.1	29.8	9.0	78.0	7.8	1.5
Deltapine 174RF	3.5	1.16	80.0	27.9	9.7	75.7	7.9	3.0
Fibermax 1740B2RF	3.5	1.14	80.7	29.3	9.2	78.6	7.3	2.0
Fibermax 1880B2RF	3.2	1.14	79.7	29.8	9.4	78.8	7.4	3.0
Fibermax 820RF	3.1	1.19	80.1	30.6	8.9	76.4	7.5	2.5
Fibermax 840B2RF	3.3	1.19	80.8	31.0	9.5	77.9	6.8	3.5
Fibermax 9063B2RF	3.2	1.19	81.1	31.6	9.0	77.3	7.8	2.0
Fibermax 9180B2RF	3.4	1.17	81.8	30.9	9.2	76.9	7.8	2.0
Fibermax 9160B2RF	3.0	1.15	80.2	30.0	8.4	77.9	7.9	2.5
NexGen 3273B2RF	3.4	1.13	80.6	26.9	10.3	79.7	6.8	2.5
NexGen 3348B2RF	3.5	1.14	81.6	30.1	9.6	75.6	8.4	3.5
NexGen 4377B2RF	3.4	1.10	81.2	28.0	10.5	74.7	7.8	3.5
Phytogen 375WRF	3.3	1.12	80.2	28.0	9.5	77.3	7.6	2.5
Phytogen 485WRF	3.7	1.15	82.8	29.5	11.0	74.2	7.3	4.5
Stoneville 4554B2RF	3.2	1.13	80.1	29.6	11.5	76.1	8.5	3.0
Stoneville 5458B2RF	3.2	1.10	78.0	28.2	9.3	75.8	8.5	2.5

Table 6. Performance of varieties in a Verticillium wilt field in Lynn County in 2008

Variety	Lbs of Lint/a	$/Acre[2]	Loan Value ($/lb)	% Lint	% Wilt on 29 Aug.	Stand Plants/ ft. row
AFD 5064F	943 ab	466 a	0.546	26.2	13.6 d-h	2.9 a-e
Stoneville 5288B2RF	989 a	417 ab	0.487	28.1	11.7 fgh	2.7 c-g
Phytogen 425RF	866 a-e	415 abc	0.540	26.6	17.7 c-h	3.1 ab
Deltapine 104B2RF	935 ab	404 a-d	0.498	27.2	20.2 b-f	3.1 a
Fibermax 1740B2RF	899 abc	398 a-e	0.513	29.0	20.2 b-f	3.0 abc
Fibermax 9058RF	906 ab	397 a-e	0.499	27.4	24.5 bc	2.9 a-f
Fibermax 1880B2RF	825 a-f	375 b-f	0.531	25.4	12.3 e-h	2.7 a-f
Fibermax 9180B2RF	848 a-f	363 b-g	0.503	26.6	14.6 d-h	2.9 a-d
Fibermax 9063B2RF	787 b-g	356 b-h	0.532	26.8	20.5 b-f	2.9 a-d
Stoneville 4554B2RF	776 b-g	353 b-h	0.536	26.1	17.6 c-h	2.1 jk
Stoneville 4288B2RF	830 a-f	348 b-i	0.504	27.7	14.3 d-h	2.8 a-f
NexGen 1572B2RF	891 a-d	343 b-i	0.433	30.5	37.4 a	2.5 d-i
NexGen 1551RF	712 e-i	338 c-i	0.538	25.2	21.9 bcd	2.5 d-i
Fibermax 9160B2RF	807 b-g	332 d-i	0.491	28.5	11.8 fgh	2.6 d-i
Stoneville 4498B2RF	776 b-g	326 d-j	0.502	26.8	21.1 b-e	2.8 a-f
Cropland Genetics 3520B2RF	772 b-g	326 d-j	0.503	26.0	12.6 e-h	2.9 a-e
NexGen 4377B2RF	780 b-g	318 f-k	0.482	25.3	19.7 b-g	2.5 f-j
Stoneville 5283RF	735 c-h	314 f-l	0.502	27.4	19.7 b-g	2.5 e-i
Phytogen 375WRF	733 c-h	309 f-l	0.493	27.2	16.4 c-h	2.6 c-g
Cropland Genetics 3020B2RF	729 d-h	298 f-m	0.495	24.3	13.0 d-h	2.3 g-j
Stoneville 5327B2RF	717 e-i	292 g-m	0.496	27.6	24.6 bc	2.2 ijk
NexGen 4370B2RF	690 f-i	292 g-m	0.508	23.3	16.6 c-h	2.6 c-h
Americot 1504B2RF	682 f-i	277 i-m	0.494	23.5	16.9 c-h	2.7 a-f
NexGen 3331B2RF	692 f-i	276 i-m	0.483	26.7	19.0 b-g	2.2 ijk
Phytogen 315RF	690 f-i	275 i-m	0.483	24.0	10.7 gh	2.9 a-d
Cropland Genetics 3035RF	708 e-i	257 j-m	0.436	25.8	26.9 b	2.1 j
NexGen 1556RF	578 hi	250 j-m	0.511	22.5	18.7 b-g	2.9 a-d
Americot 1664B2RF	595 hi	248 j-m	0.520	26.0	12.9 d-h	2.6 d-h
Stoneville 4427B2RF	648 ghi	243 lm	0.474	24.3	10.7 gh	2.2 hij
NexGen 3538RF	554 i	226 m	0.491	20.7	18.1 b-h	2.1 jk

[1]Different letters mean that varieties are significantly different at $P = 0.05$.

[2]$/acre was calculated as the yield (lbs/acre) x loan value ($/lb) minus seed and technology fees for planting four seed/ft row on 40-inch centers (52,272 seed/acre).

Table 7. Fiber ratings for varieties in a Verticillium wilt field in Lynn County in 2008

Variety	Micronaire	Length	Uniformity	Strength	Elongation	Leaf	Rd	+b
AFD 5064F	3.7	1.13	81.4	30.9	10.2	2.5	77.4	7.3
Americot 1504B2RF	3.0	1.15	80.0	27.6	10.2	2.0	80.6	7.2
Americot 1664B2RF	3.1	1.14	80.1	27.3	10.7	2.0	78.5	7.5
Cropland Genetics 3020B2RF	2.9	1.09	80.0	26.3	10.1	1.0	80.9	7.4
Cropland Genetics 3035RF	2.6	1.07	78.5	27.2	10.5	1.0	78.1	8.4
Cropland Genetics 3520B2RF	3.1	1.13	79.6	27.1	10.4	2.5	78.1	7.7
Deltapine 104B2RF	3.0	1.15	81.0	29.3	10.8	2.5	78.3	7.5
Fibermax 1740B2RF	3.0	1.12	80.3	29.3	9.9	1.0	80.1	7.3
Fibermax 1880B2RF	3.1	1.18	81.1	30.5	9.2	2.0	80.2	7.6
Fibermax 9058RF	3.0	1.18	79.8	28.7	8.8	1.5	78.8	7.1
Fibermax 9063B2RF	3.2	1.20	80.9	32.2	8.9	1.5	80.5	6.9
Fibermax 9160B2RF	2.9	1.19	81.6	30.3	8.7	1.0	80.3	7.1
Fibermax 9180B2RF	2.8	1.16	80.4	31.3	9.3	1.0	80.9	7.2
NexGen 1551RF	3.6	1.15	80.4	32.0	9.6	1.5	77.0	8.1
NexGen 1556RF	3.2	1.15	81.8	31.7	9.8	2.5	77.2	7.8
NexGen 1572RF	2.6	1.13	79.3	29.2	10.0	3.0	78.5	6.7
NexGen 3331B2RF	2.7	1.11	80.4	29.2	9.3	2.0	77.3	8.3
NexGen 3538RF	2.8	1.19	81.3	31.3	9.2	1.0	78.9	7.7
NexGen 4370B2RF	3.1	1.13	80.4	28.0	10.5	1.5	78.6	8.1
NexGen 4377B2RF	2.8	1.13	81.1	28.1	10.4	3.0	77.3	7.9
Phytogen 315RF	2.9	1.11	78.6	26.7	9.3	3.0	78.8	7.7
Phytogen 375WRF	2.9	1.13	79.1	27.7	9.5	2.0	79.5	7.7
Phytogen 425RF	3.5	1.15	81.5	28.7	10.8	2.5	76.2	8.1
Stoneville 4427B2RF	2.7	1.10	78.4	27.9	9.3	1.5	78.3	8.1
Stoneville 4288B2RF	3.1	1.15	79.0	29.4	10.2	2.0	78.3	8.1
Stoneville 4498B2RF	3.0	1.16	80.8	31.0	10.6	3.5	78.2	7.9
Stoneville 4554B2RF	3.3	1.16	80.7	29.3	10.9	1.5	77.9	8.5
Stoneville 5283RF	2.8	1.12	79.1	30.2	9.8	2.0	77.9	8.5
Stoneville 5288B2RF	2.8	1.12	77.6	28.6	9.5	2.5	79.6	7.1
Stoneville 5327B2RF	3.0	1.14	80.3	30.5	9.7	1.0	76.5	8.2

Table 8. Performance of varieties in a Verticillium wilt field in Floyd County in 2008

Variety	Lbs of Lint/a	$/ Acre[2]	% Lint	Loan Value ($/lb)	% Wilt on 28 Aug.	Plants / ft. row
Fibermax 9180B2RF	1,579 a[1]	798 a	33.0	0.545	12.2 de	3.7 ab
Fibermax 9058RF	1,488 abc	693 b	32.3	0.502	13.7 cde	3.6 abc
NexGen 2549B2RF	1,514 ab	681 bc	32.3	0.489	20.7 a-e	3.3 d-i
Fibermax 9063B2RF	1,476 a-d	672 bcd	30.2	0.499	12.2 de	3.4 a-e
NexGen 1551RF	1,313 c-f	650 b-e	31.5	0.530	15.0 cde	3.4 a-f
Stoneville 4288B2RF	1,346 b-e	628 b-f	32.7	0.514	29.4 ab	2.8 kl
AFD 5065B2RF	1,320 c-f	620 b-f	29.9	0.513	19.6 a-e	3.1 e-k
Stoneville 4554B2RF	1,306 c-f	604 c-g	32.0	0.510	26.3 abc	2.8 kl
Paymaster 2141B2RF	1,311 c-f	595 c-h	33.1	0.500	9.3 e	3.7 a
NexGen 1572RF	1,284 d-g	583 d-i	32.6	0.487	20.0 a-e	3.3 c-g
Cropland Genetics 3020B2RF	1,275 efg	567 e-j	29.8	0.494	14.1 cde	3.1 e-k
NexGen 3273B2RF	1,263 e-h	553 f-k	29.2	0.485	17.1 a-e	2.8 kl
Deltapine 104B2RF	1,302 c-f	545 f-l	30.4	0.466	11.4 de	3.5 a-e
NexGen 3550RF	1,311 c-f	541 f-m	29.9	0.446	14.0 cde	3.2 d-j
Stoneville 5288B2RF	1,251 e-h	541 f-m	32.8	0.483	20.5 a-e	3.3 c-h
Phytogen 315RF	1,236 e-i	541 f-m	31.2	0.480	15.8 b-e	3.5 a-d
Stoneville 4498B2RF	1,280 efg	528 g-m	30.9	0.462	15.1 cde	3.1 e-k
Cropland Genetics 3520B2RF	1,229 e-j	522 g-m	28.8	0.476	16.3 a-e	3.5 a-d
Deltapine 117B2RF	1,246 e-h	520 g-m	29.1	0.467	18.6 a-e	3.3 c-h
Phytogen 375WRF	1,211 e-j	519 g-m	30.7	0.472	17.8 a-e	3.7 a
NexGen 1556RF	1,106 g-k	510 h-n	28.0	0.503	17.3 a-e	3.0 g-l
Americot 1664B2RF	1,139 f-k	508 h-n	29.4	0.499	14.1 cde	3.0 f-l
Cropland Genetics 3035RF	1,174 e-k	507 h-n	32.0	0.480	23.6 a-d	2.9 kl
NexGen 3538RF	1,042 jk	501 i-n	26.2	0.524	20.0 a-e	2.1 m
Deltapine 121RF	1,093 g-k	496 i-n	29.9	0.502	17.3 a-e	3.3 b-g
NexGen 4370B2RF	1,141 f-k	485 j-n	29.8	0.475	16.8 a-e	2.8 kl
NexGen 4377B2RF	1,153 e-k	466 k-o	30.3	0.455	17.4 a-e	2.7 l
NexGen 3331B2RF	1,074 h-k	462 l-o	30.9	0.485	29.5 a	2.9 h-l
Stoneville 5327B2RF	1,051 ijk	458 l-o	30.6	0.496	20.4 a-e	3.0 g-l
Stoneville 5283RF	1,041 jk	448 mno	31.0	0.482	21.3 a-e	2.9 i-l
Stoneville 4427B2RF	1,095 g-k	427 no	28.8	0.447	19.4 a-e	2.9 jkl
Americot 1504B2RF	990 k	386 o	26.5	0.451	20.6 a-e	3.3 c-g

[1]Different letters mean that varieties are significantly different at $P = 0.05$.
[2]$/acre was calculated as the yield (lbs/acre) x loan value ($/lb) minus seed and technology fees for planting four seed/ft row on 40-inch centers (52,272 seed/acre).

Table 9. Fiber ratings for varieties in a Verticillium wilt field in Floyd County in 2008

Variety	Micronaire	Length	Uniformity	Strength	Elongation	Rd	+b	Leaf
AFD 5065B2F	3.7	1.11	80.9	28.4	10.7	74.3	7.3	4.0
Americot 1504B2RF	3.2	1.19	82.0	27.5	10.1	72.8	7.0	5.0
Americot 1664B2RF	3.2	1.13	81.3	26.2	10.7	72.5	7.6	3.0
Cropland Genetics 3020B2RF	3.2	1.10	81.4	26.1	10.3	74.5	7.8	2.0
Cropland Genetics 3035RF	2.9	1.10	81.4	28.1	10.8	73.7	8.3	3.5
Cropland Genetics 3520B2RF	3.1	1.10	80.9	26.4	10.5	72.8	7.3	4.0
Deltapine 104B2RF	3.2	1.10	82.5	29.2	10.8	73.2	7.5	5.5
Deltapine 117B2RF	3.4	1.10	81.2	29.3	10.8	71.5	7.6	4.5
Deltapine 121RF	3.5	1.13	82.2	28.3	10.4	71.8	7.7	4.5
Fibermax 9058RF	3.3	1.17	81.7	29.2	8.8	74.3	7.0	4.0
Fibermax 9063B2RF	3.5	1.19	81.5	30.7	9.5	72.5	7.5	4.0
Fibermax 9180B2RF	3.7	1.17	83.1	30.7	9.6	75.2	7.4	3.0
NexGen 1551RF	4.2	1.08	82.6	29.5	9.9	71.6	8.1	4.0
NexGen 1556RF	3.7	1.10	82.6	30.5	9.8	72.4	7.6	3.0
NexGen 1572RF	3.3	1.08	80.5	27.0	9.8	73.1	7.3	5.0
NexGen 2549B2RF	3.7	1.07	82.4	27.5	11.0	72.0	7.2	5.5
NexGen 3273B2RF	3.1	1.13	80.8	25.9	10.4	75.6	7.6	2.5
NexGen 3331B2RF	3.1	1.12	81.9	28.5	9.9	72.2	8.0	4.5
NexGen 3538RF	3.4	1.16	82.6	30.1	9.4	74.4	7.6	3.0
NexGen 3550RF	3.3	1.11	79.4	29.0	10.4	70.7	7.7	5.5
NexGen 4370B2RF	3.1	1.11	81.5	28.1	10.0	72.2	7.8	4.5
NexGen 4377B2RF	2.9	1.09	81.4	26.9	10.4	72.4	7.7	4.5
Phytogen 315RF	3.0	1.11	81.1	27.2	10.1	73.0	7.7	3.5
Phytogen 375WRF	2.9	1.12	80.9	27.1	10.1	74.4	7.7	3.5
Paymaster 2141B2RF	3.8	1.09	81.7	27.1	10.1	72.8	7.4	5.0
Stoneville 4288B2RF	3.7	1.12	81.1	27.4	10.2	73.5	7.7	5.0
Stoneville 4427B2RF	2.9	1.11	81.4	28.9	9.6	72.3	7.7	5.0
Stoneville 4498B2RF	3.2	1.12	81.5	28.1	11.1	72.1	8.1	5.0
Stoneville 4554B2RF	3.4	1.12	81.7	27.4	10.4	72.7	7.6	4.0
Stoneville 5283RF	3.0	1.11	81.8	28.9	10.4	72.8	7.9	3.0
Stoneville 5288B2RF	3.4	1.10	80.6	28.1	9.9	73.9	6.9	4.0
Stoneville 5327B2RF	3.0	1.12	81.1	29.1	9.8	71.7	8.0	4.0

Table 10. **Performance of varieties in a Verticillium wilt field near Lamesa in 2008**

Variety	\$/ Acre[2]	Lbs of Lint/acre	% Lint	Loan Value (\$/lb	% Wilt 17 Sept.	Plants/ ft. row
NexGen 2549B2RF	441 a[1]	1,141 a	27.1	0.438	3.2 f	3.1 a-e
NexGen 3348B2RF	337 b	833 bc	25.0	0.474	8.6 b-f	2.7 a-i
Deltapine 104B2RF	330 bc	869 b	24.0	0.452	9.6 b-f	3.0 a-g
All-Tex Patriot RF	299 b-e	722 c-f	24.1	0.473	11.0 b-e	2.6 d-j
Fibermax 9063B2RF	290 b-f	713 c-g	24.9	0.497	5.7 c-f	3.1 a-f
All-Tex AridB2RF	282 b-g	740 cde	24.4	0.454	12.4 a-d	2.7 a-i
Fibermax 1880B2RF	277 c-h	716 c-g	22.7	0.476	7.5 b-f	2.9 a-g
Fibermax 9160B2RF	276 c-h	708 d-g	25.2	0.479	12.2 a-d	2.6 d-j
Phytogen 375WRF	271 d-i	738 c-f	24.6	0.438	11.5 b-e	3.1 a-f
Fibermax 960B2R	267 d-j	668 d-h	24.0	0.480	10.3 b-e	2.8 a-i
NexGen 3273B2RF	257 d-k	704 d-g	23.7	0.449	8.5 b-f	2.6 c-i
All-Tex Apex B2RF	248 e-l	661 d-i	21.6	0.462	10.8 b-e	2.8 a-i
Deltapine 161B2RF	246 e-m	669 d-h	20.5	0.460	8.3 b-f	3.1 a-d
Americot 1622B2RF	234 f-m	652 e-i	21.7	0.456	6.7 b-f	3.2 ab
Cropland Genetics 4020B2RF	230 g-n	642 e-j	20.9	0.456	8.8 b-f	3.2 abc
Fibermax 1740B2RF	222 h-n	624 e-k	25.1	0.441	5.5 def	2.9 a-h
Stoneville 5458B2RF	216 i-o	617 f-l	21.3	0.453	6.2 c-f	2.9 a-g
Fibermax 9180B2RF	214 j-o	582 h-m	23.4	0.477	9.0 b-f	2.7 a-i
All-Tex Orbit RF	206 k-o	525 j-o	19.3	0.474	7.4 b-f	2.5 f-j
Stoneville 4554B2RF	200 l-p	595 g-m	22.7	0.442	10.5 b-e	2.6 d-j
Phytogen 485WRF	199 l-p	549 h-o	20.9	0.458	13.5 ab	2.7 a-i
Deltapine 164B2RF	198 l-q	558 h-n	20.8	0.466	10.1 b-f	2.4 hij
NexGen 4377B2RF	192 m-r	543 i-o	23.1	0.461	10.9 b-e	2.1 j
Americot 1532B2RF	191 m-r	550 h-o	21.0	0.457	6.6 b-f	3.2 a
Cropland Genetics 3220B2RF	163 o-s	501 l-p	20.9	0.450	12.5 abc	2.6 b-i
Deltapine 141B2RF	163 o-s	492 m-p	20.6	0.458	19.0 a	2.7 a-i
Americot 1550B2RF	146 p-s	478 m-p	19.0	0.431	12.6 abc	2.6 d-j
NexGen 4370B2RF	138 rs	451 nop	20.7	0.434	8.4 b-f	2.6 d-j
All-Tex Epic RF	120 s	381 p	19.0	0.428	13.5 ab	2.6 e-j

[1]Different letters mean that varieties are significantly different at $P = 0.05$.

[2]\$/acre was calculated as the yield (lbs/acre) x loan value (\$/lb) minus seed and technology fees for planting four seed/ft row on 40-inch centers (52,272 seed/acre).

Table 11. Fiber ratings for varieties in a Verticillium wilt field near Lamesa in 2008

Variety	Micronaire	Length	Uniformity	Strength	Elongation	Leaf	Rd	+b
Americot 1532B2RF	2.20	1.11	78.8	25.9	9.9	2.5	83.4	7.7
Americot 1550B2RF	2.15	1.06	77.5	25.3	9.9	1.0	82.7	9.0
Americot 1622B2RF	2.35	1.08	80.1	26.0	10.7	2.0	83.7	8.0
All-Tex Orbit RF	2.35	1.11	80.8	27.4	11.3	2.0	84.1	8.4
All-Tex Patriot RF	2.60	1.10	78.9	28.5	10.8	1.5	83.5	8.1
All-Tex Epic RF	2.10	1.06	77.5	26.5	10.0	2.0	83.4	8.5
All-Tex Apex B2RF	2.25	1.11	78.5	25.8	9.9	1.5	83.8	8.0
All-Tex Arid B2RF	2.50	1.07	79.7	27.4	10.3	2.5	83.3	7.6
Fibermax 9160B2RF	2.25	1.14	80.7	29.1	9.7	1.0	83.7	8.1
Cropland Genetics 3220B2RF	2.20	1.08	78.3	26.3	10.3	1.5	83.8	8.2
Cropland Genetics 4020B2RF	2.25	1.10	78.0	26.0	9.8	2.5	82.6	7.8
Deltapine 104B2RF	2.45	1.10	80.7	29.0	11.0	3.5	82.6	7.8
Deltapine 141B2RF	2.15	1.12	78.2	27.6	9.8	3.5	80.9	8.0
Deltapine 161B2RF	2.20	1.10	77.1	26.4	9.5	2.0	83.3	8.2
Deltapine 164B2RF	2.20	1.12	77.0	26.5	9.6	2.0	83.2	7.7
Fibermax 1740B2RF	2.40	1.06	78.4	26.5	10.0	1.0	84.9	8.0
Fibermax 1880B2RF	2.30	1.14	79.8	28.6	9.7	2.0	83.1	7.9
Fibermax 9063B2RF	2.65	1.16	80.8	30.4	9.9	1.5	84.5	7.6
Fibermax 9180B2RF	2.40	1.12	81.0	29.1	10.0	1.5	85.4	7.7
Fibermax 960B2R	2.40	1.12	80.8	29.0	8.9	1.5	84.2	7.9
NexGen 2549B2RF	2.65	1.02	79.6	27.0	11.0	2.5	81.9	8.0
NexGen 3273B2RF	2.25	1.09	78.8	26.1	10.5	2.5	84.7	7.7
NexGen 3348B2RF	2.55	1.14	80.9	29.0	10.8	3.0	82.1	8.1
NexGen 4370B2RF	2.15	1.07	78.8	26.2	9.9	4.0	80.8	8.1
NexGen 4377B2RF	2.35	1.09	80.1	26.4	10.7	3.0	82.7	8.2
Phytogen 375WRF	2.35	1.08	79.4	25.6	10.1	3.0	82.2	8.5
Phytogen 485WRF	2.35	1.11	80.0	29.1	11.1	3.5	80.0	8.4
Stoneville 4554B2RF	2.25	1.08	78.5	26.9	11.8	3.5	81.0	8.4
Stoneville 5458B2RF	2.30	1.09	78.1	28.3	9.4	2.0	80.9	8.4