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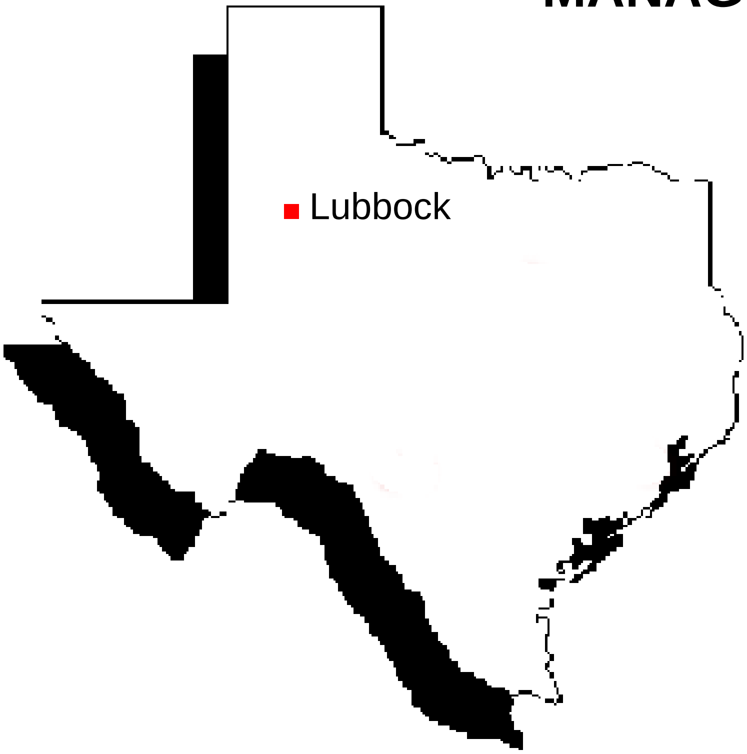
INTEGRATED PEST MANAGEMENT



2010 Lubbock County IPM Program

TEXAS IPM
Integrated Pest Management
"Partners in Nature"

LUBBOCK COUNTY
PEST MANAGEMENT PROGRAM
2010 ANNUAL REPORT

Prepared by
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Lubbock County

in cooperation with
Texas Pest Management Association

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Newsletter:	
No. Issues written	12
No. Non-Extension Clientele on Mailing List	25
No. Non-Extension Clientele on E-Mail List	64
Total Non-Extension Clientele	89
Radio Programs	38
Television Interviews	0
Newspaper Articles:	
No. Prepared	0
No. Outlets	0
Farm Visits	1,341
Scouts Trained	34
Consultants Trained	106
CEU Credits Offered	30
Pest Management Committee Meetings	2
Presentations Made:	
County	41
Field Days and Crop Tours	1
Regional Meetings	5
Schools	2
Civic Clubs	2
4-H Clubs	1
Professional Meetings	6
No. Applied Research Projects	8
No. Direct Ag Contacts	2771
Master Gardeners Trained	14
Private Applicators Trained	21

Funds Leveraged

Grants and Contracts

3 lygus bug trials	$500.00 ea.
2 Spidermite efficacy trials	$500.00 ea.
Becker Underwood seed treatment protocol	$10,000.00
Boll Damage Survey of Bt and Non-Bt Cotton Varieties	$500.00.00
Phytogen Cotton Innovation Trial	$5,000.00

REVIEW OF 2010 FIELD SCOUTING PROGRAM

COTTON

The 2010 cotton crop started off with excellent deep moisture due to the unusual wet winter. June temperatures were hot Lubbock County received 32% above normal heat unit accumulation for the month. The first two weeks of July saw cool and very wet conditions with areas in the county receiving over 10 inches of precipitation and through the end of July we were 10% lower than average on heat unit accumulations. The wet conditions in July leached the majority of the nitrogen out of the top foot of soil profile causing the area cotton crop to turn yellow. Producers that had applied all of their nitrogen pre-plant were hurt the most by the July rains and producers who put down 1/3 of the nitrogen pre plant and were applying nitrogen starting the second and third week of June came out of the July rains in decent shape. Once the fields dried out enough to apply nitrogen, the cotton was already starting to bloom and many producers missed the window of opportunity to apply nitrogen in a timely manner. 2010 saw a wide open Fall with heat unit accumulations being 10% higher than average and because of the warm Fall, 2010 will be the second largest cotton crop in history.

Early season pest pressure was light, with thrips being the predominant pest. Thrips numbers were average to below average with few foliar applications being made for this pest. Nematode pressure and damage was more prevalent in Lubbock County due to the overwintering conditions being conducive for this pest. Producers could easily see the stunting on the high side of their sandier fields. As a result, nematode resistant varieties were sold out by late February early March in 2011. During the bloom period, bollworm and Fall armyworms could be found in non bt cotton. Producers were making pyrethroid applications against this pest complex with inconsistent results. Bollworms were being controlled with the pyrethroids, but a high percentage of Fall armyworms were not being controlled. See “Controlling Mixed populations of Fall Armyworms and Bollworms” on page 47. Due to these pyrethroid applications, cotton aphid populations tended to explode if the producers elected to not add an aphicide to the mix. Twospotted spidermites were prevalent in Lubbock County starting in Early to mid August. Most of the fields were treated with 4oz. of Oberon with excellent results. See “Evauation of Miticides for Spidermite Control” page 43. Lygus bug pressure was light in Lubbock County with very few fields reaching threshold. You can read the test results of the Lygus trials on pages 16, 22 and 27.

IPM Evaluation Survey for Cotton

12 Producers participated in the 2010 IPM Scouting Program.
6 Responded to IPM Evaluation.

1) What was your average yield in 2010 *(Lbs lint/acre)*?

560 Dryland **1082.5** Irrigated

2) How many acres do you farm?

3956 Total

3) Do you regularly monitor or have your crop monitored for pests and natural enemies (please circle the appropriate answer)?

No **1** *Yes* **5**

if yes, what % of acres are monitored? **68%**

4) Does Integrated Pest Management (IPM) reduce your risks associated with crop production (please circle the appropriate answer)?

No **0** *Yes* **100%** *Unsure* **0**

if yes, please explain how in the space provided.

- *very much*
- *by applying chems at correct time & proper amount*
- *by giving me info on stage of growth, fertility, and amt pest pressure*
- *not treating when not needed*
- *less loss of production yield and cost*

5) Does IPM usually maintain or increase yields while reducing input costs resulting in increased net profits?

No **0** *Yes* **100%**

if yes, by an average of what dollar amount/acre? **$100**

6) If you were to assign a figure to represent the value of the IPM Program to your operation including monitoring crop development, pest and natural enemies, conducting applied research and demonstrations and providing educational programs, what would the value per acre be?

103.33 $ per acre

2010 APPLIED RESEARCH PROJECTS

Disclaimer Clause:

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 on field experiments do not represent conclusive evidence that the same response would occur where conditions vary.

Making a difference 2010

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Agriculture and Natural Resources

Evaluation of Insecticides for Aphid Control and Impact on Lady Beetle Larvae, 2010

Cooperators: Texas AgriLife Research and Extension Center, Lubbock

David Kerns, Brant Baugh and Dustin Patman
Extension Entomologist-Cotton, EA-IPM Lubbock County and EA-IPM Crosby/Floyd Counties

Lubbock County

Summary

The aphid population in this study was averaging over 200 aphids/leaf before curative treatments were applied. The action threshold for aphids is 50 aphids/leaf. Thus this represents a rescue type situation. However, the automatic applications of CMT-4586, applied 21 and 8 days before the other insecticide applications, prevented the aphid outbreak. These automatic applications probably eliminated the early colonizing aphids. Although all of the remaining treatments demonstrated some activity, Centric, Trimax Pro and Belay failed to reduce the aphid population below threshold within 7 days. Curative applications of CMT-4586, Intruder, Carbine, Bidrin and sulfoxaflor all exhibited excellent activity within 7 days. All of the neonicotinoid insecticides (Intruder, Centric, Belay, Trimax Pro and CMT-4586) were extremely harsh towards lady beetle larvae. Bidrin and sulfoxaflor were moderately harsh, while Carbine was least harsh towards lady beetle larvae.

Objective

The objective of this study was to evaluate the efficacy of various insecticides on aphids infesting cotton, and to evaluate their impact of lady beetle larvae.

Materials and Methods

This test was conducted at the Texas AgriLife Research and Extension Center in Lubbock, TX. The field was planted on 25 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 × 60 ft in length.

The entire study site was treated with Karate at 5 fl-oz on 20 and 28 Jul. Comparative insecticide treatments 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.

One treatment, CMT-4586 (spirotetramat + imidacloprid), received an automatic application at pinhead sized square on 7 Jul and again 15 days later on 22 Jul. The remaining treatments were applied once the action threshold of 50 aphids per leaf was exceeded on 30 July. Evaluations were made on 22 and 30 Jul, and 2, 6 and 11 Aug.

The insecticides evaluated included CMT-4586, Intruder Centric, Bidrin, Trimax Pro, Belay, Carbine and XDE-208. CMT-4586 is a mixture of imidacloprid (same active ingredient as Trimax Pro) and spirotetramat (same active ingredient in Bayer's Movento). Spirotetramat is a true systemic and similar to Vydate will move from the leaf down. It is popular in the vegetable market for aphid and whitefly control. XDE-208 is sulfoxaflor. This is a new chemistry being developed by Dow and will be sold under the name Transform. It has demonstrated excellent activity on Lygus. Belay is a neonicotinoid being marketed by Valent, and thus has the same mode of action as Intruder, Centric, and Trimax Pro.

On 22 Jul, the number of cotton aphids, *Aphis gossypii* (Glover), were counted on 10, 3 to 4th node leaves. On the remaining sample dates, in addition to 5, 3 to 4th node leaves, 5 leaves from the lower 50% of the plant canopy were also sampled.

Predators were estimated on 30 Jul and 2 Aug utilizing a 36-inch x 40-inch black drop cloth. Drop cloths were laid between the rows and approximately 1.5 ft-row of cotton were shaken onto the drop cloth from each row, after which the type and number of predators were counted. Predators counted included lady beetles, minute pirate bugs, big-eyed bugs, damsel bugs, syrphid fly larvae, lacewing larvae and spiders; only lady beetle larvae data are presented. The dominate lady beetle was *Hippodamia convergens* Guérin-Méneville.

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

Results and Discussion

Differences between the untreated and the automatic applications of CMT-4586 were non-detectable until 8 day following the second application (Table 1). At this time the untreated was averaging 179 aphids per leaf while CMT-4586 was averaging 32.6. It was evident that the two applications of CMT-4586 prevented the aphid outbreak.

At 3 days after the remaining treatments were applied, all of the treatments had fewer aphids than the untreated (Table 2). The automatic applications of CMT-4586 had the fewest aphids at 14.23 per leaf, but did not statistically differ from the threshold applications of CMT-4586, Intruder, Bidrin or XDE-208 (sulfoxaflor).

At 7 days following the threshold application, the threshold timed application of CMT-4586 had the fewest aphids, but was not statistically different from the automatic CMT-4586 application or Intruder, Centric, Bidrin, Carbine or XDE-208. Although all of the insecticides had significantly fewer aphids than the untreated, Trimax Pro and Belay at 4 and 6 fl-oz did not provide adequate control, and aphids in the Centric treated plots were still slightly above threshold.

At 21 days after the threshold timed applications, the aphid population had declined substantially, averaging only 22.28 per leaf in the untreated (Table 3). At this time the only treatments that differed from the untreated included the threshold timed application of CMT-4586, Intruder, Carbine and XDE-208.

On 30 Jul, prior to the threshold timed applications, there were fewer lady beetle larvae where the automatic CMT-4586 application occurred than in the untreated. None of the other treatment had been applied and did not differ from the untreated.

At 3 days following the threshold applications, all of the insecticide treatments had fewer lady beetle larvae than the untreated. Carbine appeared to have the least impact on lady beetle larvae, averaging 6.13 per ft-row, but did not differ from XDE-208. Belay at 6 fl-oz was harshest to lady beetle larvae, averaging 0.38 pre ft-row and did not differ from any other treatment containing a neonicotinoid (CMT-4586, Intruder, Centric and Trimax Pro). Bidrin appeared moderate in lethality toward lady beetle larvae relative to the other treatments and did not differ from Centric, Carbine or XDE-208.

Acknowledgments

Appreciation is expressed to Gowan Company Ag Chemicals, Bayer CropScience and the Plains Cotton Improvement Program for financial support of this project.

Table 1.

Treatment/ formulation	Rate amt product/acre	Timing	Aphids per leaf: 22 Jul (15 DAAP 1) 3-4th node leaf	Aphids per leaf: 30 Jul (8 DAAP 2) 3-4th node leaf	Lower canopy leaf	Mean
Untreated	--	--	34.15a	136.75a	221.20a	178.98a
CMT-4586[a] + Dyne-Amic + UAN 28%	8.0 fl-oz + 0.25% v/v + 2.5% v/v	Pinhead + 14 d	33.90a	42.45a	22.75a	32.60b
CMT-4586 + Dyne-Amic + UAN 28%	8.0 fl-oz + 0.25% v/v + 2.5% v/v	threshold	25.30	108.50	265.6	187.05
Intruder 70WP	0.6 oz	threshold	30.20	107.50	361.05	234.28
Centric 40WG	2.5 oz	threshold	27.53	151.05	539.35	345.20
Bidrin 8	8.0 fl-oz	threshold	27.20	116.30	308.85	212.58
Trimax Pro 4.44SC	1.8 fl-oz	threshold	28.03	151.80	487.50	319.65
Belay 2.13SC	4 fl-oz	threshold	26.63	114.00	260.00	187.00
Belay 2.13SC	6 fl-oz	threshold	28.83	88.15	284.75	186.45
Carbine 50WG	1.5 oz	threshold	36.18	160.40	272.90	216.65
XDE-208 50WG	0.35 oz	threshold	22.90	165.15	402.75	283.95

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

[a] Treatment was applied only at pinhead sized square stage (application 1) and again 14 days later (application 2); none of the other treatments were applied at this time and were excluded from analysis.

Table 2.

		Aphids per leaf					
		2 Aug (11 DAAP 2[a]; 3 DAAP 3)			6 Aug (15 DAAP 2[a]; 7 DAAP 3)		
Treatment/ formulation	Rate amt product/acre	3-4th node leaf	Lower canopy leaf	Mean	3-4th node leaf	Lower canopy leaf	Mean
Untreated	--	166.80a	666.70a	416.75a	90.70a	525.95a	308.33a
CMT-4586[a] + Dyne-Amic + UAN 28%	8.0 fl-oz + 0.25% v/v + 2.5% v/v	16.55f	11.90e	14.23e	27.05cd	35.75b	31.40cd
CMT-4586 + Dyne-Amic + UAN 28%	8.0 fl-oz + 0.25% v/v + 2.5% v/v	37.55ef	47.65e	42.60e	7.35d	6.15b	6.75d
Intruder 70WP	0.6 oz	43.75def	30.00e	36.88e	26.75cd	14.00b	20.38cd
Centric 40WG	2.5 oz	114.90abc	235.25bcd	175.08bcd	30.80cd	74.85b	52.83bcd
Bidrin 8	8.0 fl-oz	38.35ef	38.65e	38.50e	14.55cd	26.35b	20.45cd
Trimax Pro 4.44SC	1.8 fl-oz	104.75a-d	372.35b	238.55bcd	48.45bc	155.40b	101.93bc
Belay 2.13SC	4 fl-oz	133.60ab	338.55b	236.08b	51.40abc	153.20b	102.30bc
Belay 2.13SC	6 fl-oz	88.60b-e	295.35bc	191.98b	84.55ab	171.65b	128.10b
Carbine 50WG	1.5 oz	101.05b-e	113.20cde	107.13b	20.30cd	19.60b	19.95cd
XDE-208 50WG	0.35 oz	63.00c-f	88.25de	75.63de	18.35cd	18.25b	18.30cd

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

[a] Treatment was applied only at pinhead sized square stage (application 1)and again 14 days later (application 2); remaining treatments were applied on 30 Jul (application 3).

Table 3.

		Aphids per leaf			Lady beetle larvae per 6 ft-row	
		11 Aug (21 DAAP 2[a]; 12 DAAP 3)				
Treatment/ formulation	Rate amt product/acre	3-4th node leaf	Lower canopy leaf	Mean	30 Jul (8 DAAP 2)[a]	2 Aug (11 DAAP 2[a]; 3 DAAP 3)
Untreated	--	4.90a	39.65ab	22.28a	13.00a	9.25a
CMT-4586[a] + Dyne-Amic + UAN 28%	8.0 fl-oz + 0.25% v/v + 2.5% v/v	3.70a	31.95abc	17.83ab	2.38b	1.13d
CMT-4586 + Dyne-Amic + UAN 28%	8.0 fl-oz + 0.25% v/v + 2.5% v/v	1.20a	8.30cd	4.75bc	13.50a	1.25d
Intruder 70WP	0.6 oz	2.70a	4.30d	3.50bc	14.13a	1.63d
Centric 40WG	2.5 oz	2.55a	46.05a	24.30a	15.13a	1.88cd
Bidrin 8	8.0 fl-oz	3.05a	18.20bcd	10.63abc	11.00a	4.13bc
Trimax Pro 4.44SC	1.8 fl-oz	6.30a	39.00ab	22.65a	9.38a	1.13d
Belay 2.13SC	4 fl-oz	6.95a	32.10abc	19.53a	11.63a	1.13d
Belay 2.13SC	6 fl-oz	3.90a	35.10ab	19.50a	7.75a	0.38d
Carbine 50WG	1.5 oz	0.95a	2.90d	1.93c	11.00a	6.13b
XDE-208 50WG	0.35 oz	1.30a	2.00d	1.65c	12.13a	5.13b

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

[a] Treatment was applied only at pinhead sized square stage (application 1) and again 14 days later application 2; remaining treatments were applied on 30 Jul (application 3).

Making a difference 2010

AgriLIFE EXTENSION
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Agriculture and Natural Resources

Impact of Thiamethoxam Seed Treatments on the Efficacy of Subsequent Foliar Applications of Thiamethoxam Towards Cotton Aphids in Texas, 2010

Cooperators: Texas AgriLife Research and Extension Center – Lubbock, TX

David Kerns, Brant Baugh , Dustin Patman and Bo Kesey
Extension Entomologist-Cotton, EA-IPM – Lubbock County, EA-IPM – Crosby/Floyd Counties, Extension Program Specialist-Cotton

Lubbock County

Summary

At 30 days after planting (DAP), prior to the foliar applications, cotton that was planted with Cruiser-treated seed had fewer aphids than the untreated, and most of this activity appeared to be in the lower portion of the plant canopy. However, the aphid population was still high enough in the Cruiser–treated plots to warrant an insecticide application. These data suggest that it is possible for seed treatments to exert selective pressure on mid-season populations of cotton aphids and possibly contribute to selection of resistant individuals. However, we could not detect any impact of Cruiser seed treatment on the efficacy of subsequent foliar applications of Centric. Neither rate of Centric performed very well in this test regardless if Cruiser was used or not which may be indicative of the pre-existing resistance to Centric. The only interaction detected was for yield. All of the treatments yielded significantly more than where no insecticides were used. Centric at 2.5 oz applied over untreated seed had the highest yield, and was significantly greater than where Centric was applied at 1.5 oz without a seed treatment. However, it was not significantly different from Centric at 1.5 oz applied over Cruiser-treated seed. Why Centric at 2.5 oz without the seed treatment yielded more than Centric at 2.5 oz applied over the top of Cruiser-seed treatment is not certain. Cruiser applied with no foliar over sprays yielded equally to where Cruiser received over sprays.

Objective

The objective of this study was to determine if using a neonicotinoid seed treatment affected our ability to control aphids with similar chemistry later in the season.

Materials and Methods

This test was conducted at the Texas AgriLife Research and Extension Center in Lubbock, TX. The field was planted on 25 May on 40-inch rows, and was irrigated using row irrigation. The variety used was DP 174RF. The test was a 2×3 factorial design with four replications. Factor A treatments were an untreated and a seed treatment of Centric. Factor B consisted of an untreated and foliar applications of Cruiser at 1.5 and 2.5 oz per acre. Plots were 4-rows wide × 60 ft in length. The entire study site was treated with Karate at 5 fl-oz on 20 and 28 Jul.

Foliar insecticide treatments 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. on 30 Jul. Evaluations were made on 30 Jul, and 2, 6 and 11 Aug. The number of cotton aphids per leaf were estimated by sampling 5, 3 to 4th node leaves and 5 leaves from the lower 50% of the plant canopy. Entire plots were harvested on 11 Nov using a cotton stripper.

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

Results and Discussion

At 30 days after planting (DAP), prior to the foliar applications, cotton that was planted with Cruiser-treated seed had fewer aphids than the untreated, and most of this activity appeared to be in the lower portion of the plant canopy (Table 1). Thus it is possible for seed treatments to exert selective pressure on mid-season populations of cotton aphids and possibly contribute to selection of resistant individuals.

At 3 day after the foliar applications (DAT), both rates of Centric had fewer aphids than the untreated with the exception of the 1.5 oz rate within the lower canopy. However, the cotton aphid populations were high across all plots, exceeding the action threshold of 50 aphids per leaf.

By 7 DAT, the aphid populations had declined across the entire test but were still above the action threshold within all treatments; no differences were detected among any of the treatments (Table 2).

At 12 DAT, the cotton aphids had declined to sub-threshold levels. The influence of Cruiser seed treatment on the ability of subsequent applications of Centric to control cotton aphids was not certain and no interactions were detected. Neither rate of Centric performed very well in this test regardless if Cruiser was used or not which may be indicative of the pre-existing resistance to Centric.

The only interaction detected was for yield (Tables 2 and 3). All of the treatments yielded significantly more than where no insecticides were used (Table 2). Centric at 2.5 oz applied over untreated seed had the highest yield, and was significantly greater than where Centric was applied at 1.5 oz without a seed treatment. However, it was not significantly different from Centric at 1.5 oz applied over Cruiser-treated seed. Why Centric at 2.5 oz without the seed treatment yielded more than Centric at 2.5 oz applied over the top of Cruiser-seed treatment is not certain. Cruiser applied with no foliar over sprays yielded equally to where Cruiser received over sprays.

Acknowledgments

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

Table 4.

		Cotton aphids per leaf					
		30 Jul (30 DAP, pre-foliar)			2 Aug (3 DAT)		
	Rate amt product/acre	3-4th node leaf	Lower canopy leaf	Mean	3-4th node leaf	Lower canopy leaf	Mean
Factor A							
Untreated	--	107.58a	354.58a	231.08a	93.10a	256.03a	174.57a
Cruiser ST	0.34[a]	115.38a	154.83b	135.11b	52.55a	234.50a	143.53a
Factor B							
Untreated	--	91.55a	179.88a	135.71a	127.43a	341.25a	234.34a
Centric 40WG	1.5 oz	131.50a	270.85a	201.18a	51.20b	242.83ab	147.01b
Centric 40WG	2.5 oz	111.40a	313.40a	212.40a	39.85b	151.73b	95.79b
A*B Interaction		ns	ns	ns	ns	ns	ns

Table 5.

		Cotton aphids per leaf						
		6 Aug (7 DAT)			11 Aug (12 DAT)			11 Nov
	Rate amt product/acre	3-4th node leaf	Lower canopy leaf	Mean	3-4th node leaf	Lower canopy leaf	Mean	Yield lint (lbs/acre)
Factor A								
Untreated	--	26.88a	120.15a	73.52a	3.27a	22.55a	12.91a	1484.72a
Cruiser ST	0.34[a]	27.13a	119.62a	73.40a	2.60a	17.38a	9.99a	1540.63a
Factor B								
Untreated	--	34.00a	103.25a	68.63a	3.40a	22.03a	12.71a	1350.91b
Centric 40WG	1.5 oz	25.58a	165.13a	95.35a	2.93a	15.58a	9.25a	1550.96a
Centric 40WG	2.5 oz	21.53a	91.13a	56.40a	2.48a	22.30a	12.39a	1636.15a
A*B Interaction		ns	ns	ns	ns	ns	ns	*P* = 0.01

Table 6.

Factor A	Factor B	Rate amt product/acre	11 Nov Yield lint (lbs/acre)
Untreated	Untreated	--	1230.76c
	Centric 40WG	1.5 oz	1469.14b
	Centric 40WG	2.5 oz	1754.25a
Cruiser ST[a]	Untreated	--	1471.05b
	Centric 40WG	1.5 oz	1632.78ab
	Centric 40WG	2.5 oz	1518.05b

Values in a column followed by the same letter are not significantly different based on an F-protected LSD (*P* ≥ 0.05).
[a] rate = 0.34 mg(AI)/seed.

Making a difference 2010

AgriLIFE EXTENSION
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Evaluation of Belay and Endigo for Control of Western Tarnished Plant Bug and Stink Bugs in Cotton, 2010

Cooperators: Lance Horne, Grower

David Kerns and Brant Baugh
Extension Entomologist-Cotton and EA-IPM Lubbock County

Lubbock County

Summary

Belay (clothiadan) is a neonicotinoid insecticide similar to Intruder, Centric and Trimax Pro that has recently been labeled for use in cotton. Its target pests in cotton include aphids, fleahoppers and Lygus. Belay was also evaluated when mixed with Brigade. Endigo is a mixture of a pyrethroid (Karate) and the neonicotinoid (Centric). Endigo has been widely used for Lygus control in the Mid South. The other insecticides evaluated in this test include Voliam Xpress, which is a mixture of Karate and Coragen, its primary targets are worms, but we needed to determine if the pyrethroid component of the mixture was high enough to control Lygus in cases of mixed pest species. Unlike most neonicotinoids, Belay did demonstrate descent activity toward Lygus, but only at the high rate of 6 oz/ac. Endigo at 3.5 and 5.5 fl-oz/ac was initially effective towards Lygus but the higher rate provided control for 11 days. Belay at 3 oz/ac mixed with the pyrethoid, Brigade, was highly effective and similar to the high rate of Endigo. The pyrethoid component of Voliam Xpress did provide good initial control of Lygus, but did not provide as long of residual control as the high rate of Endigo or the Belay + Brigade mixture. The stink bug population was not as high as desired for this test, thus there is not a great deal of confidence in the results. Based on the available data, Belay + Brigade appeared to have the best activity towards stink bugs and was the only treatment to differ from the untreated.

Objective

The objective of this study was to evaluate the efficacy of Belay and Endigo towards western tarnished plant bug and stink bugs.

Materials and Methods

This test was conducted in a commercial cotton field near Lubbock, TX. The field was planted on 23 May on 40-inch rows and was drip irrigated. The test was a RCB design with four replications. Plots were 4-rows wide × 60 ft in length.

Belay (clothiadan) is a neonicotinoid insecticide similar to Intruder, Centric and Trimax Pro that has recently been labeled for use in cotton. Its target pests in cotton include aphids, fleahoppers and Lygus. Belay was also evaluated when mixed with Brigade. Endigo is a mixture of a pyrethroid (Karate) and the neonicotinoid (Centric). Endigo has been widely used for Lygus control in the Mid South. The other insecticides evaluated in this test include Voliam Xpress, which is a mixture of Karate and Coragen, its primary targets are worms, but we needed to determine if the pyrethroid component of the mixture was high enough to control Lygus in cases of mixed pest species.

Foliar sprays were applied in a broadcast pattern with a CO_2 pressurized hand-boom sprayer calibrated to deliver 10 gpa through Teejet TX-6 hollow cone nozzles (2 per row) at 40 psi. Insecticides were applied on 27 Jul. All treatments included Activator 90 non-ionic surfactant at 0.25% v/v.

Lygus, western tarnished plant bug, *Lygus hesperus* (Knight) and stink bugs, Conchuela stink bug, *Chlorochroa ligata* (Say) and green stink bug, *Acrostermnum hilare* (Say) were sampled by 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. Samples were taken on 6, 9, 12, 17 and 23 Aug.

Data were analyzed using ANOVA and means for Lygus were separated based on an F-protected LSD ($P \leq 0.05$) while stink bugs were based on an F-protected LSD ($P \leq 0.10$).

Results and Discussion

On 6 Aug (pretreatment count), the Lygus population averaged 1.86 per 6 ft-row across all plots, which was below the action threshold of 4 Lygus per 6 ft (Figure 1). No statistical differences were detected among treatments at this time.

At 3 days after treatment (DAT), the Lygus had increased in the untreated plots to 6.63 Lygus per 6 ft-row, which was significantly greater than in all of the insecticide treatments (Figure 2). Lygus populations did not differ among the insecticide treatments at this time. By 6 DAT, both rates of Endigo, Voliam Xpress and Belay + Brigade had the fewer nymphs and total Lygus but did not differ from Belay at 3 or 4 fl-oz (Figure 3).

At 11 DAT, Endigo at 5.5 fl-oz, Belay at 6 fl-oz and Belay + Brigade all had the fewest nymphs and total Lygus (Figure 4). All of the insecticide treatments had significantly fewer Lygus than the untreated. At 17 DAT, there were no significant differences among treatments at $P = 0.05$, however differences were evident if $P = 0.10$ (Figure 5). Using $p = 0.10$, all of the treatments were exceeding threshold, but were all lower than the untreated. There were no differences among the insecticides.

The stink bug population was not as high as desired for this test, thus there is not a great deal of confidence in the results (Figure 6). Based on the available data, Belay + Brigade appeared to have the best activity towards stink bugs and was the only treatment to differ from the untreated.

Acknowledgments

Appreciation is expressed to Valent U.S.A. Corporation, Syngenta Crop Protection and the Plains Cotton Improvement Program for financial support of this project.

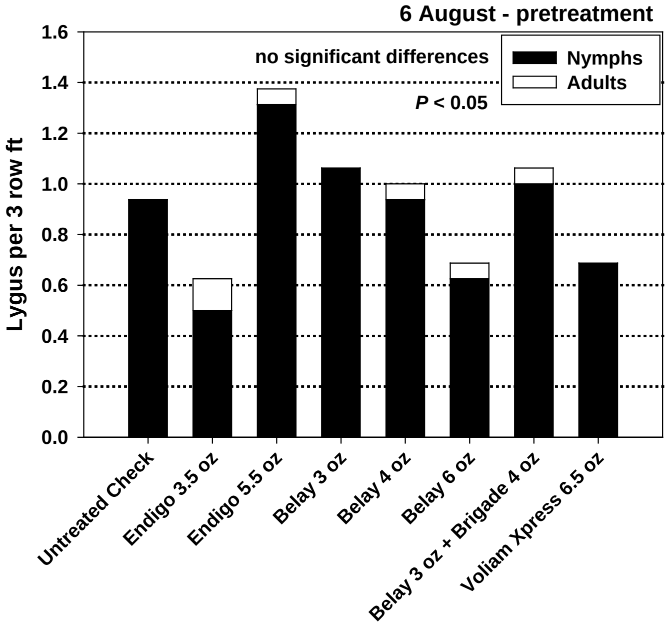

Figure 1. Lygus numbers prior to insecticide application.

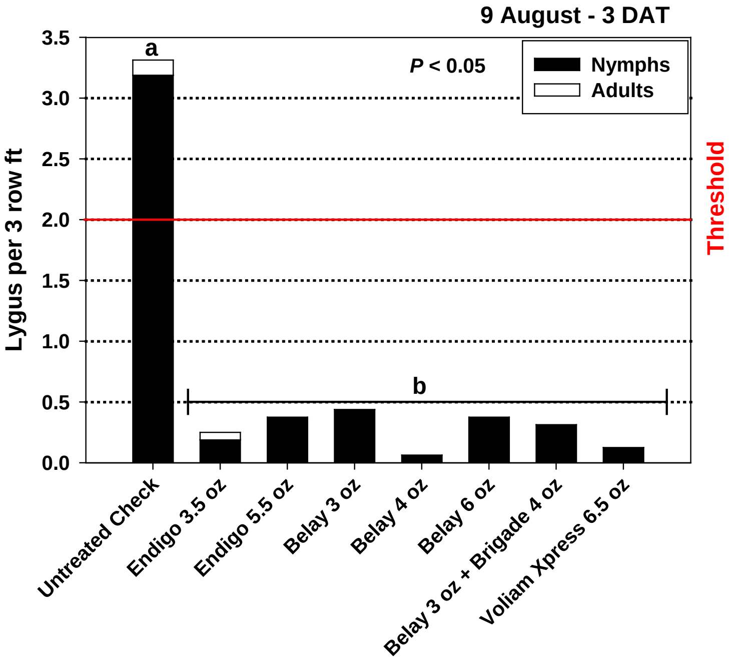

Figure 2. Lygus at 3 days after treatment; Bars capped by the same letter are not significantly different.

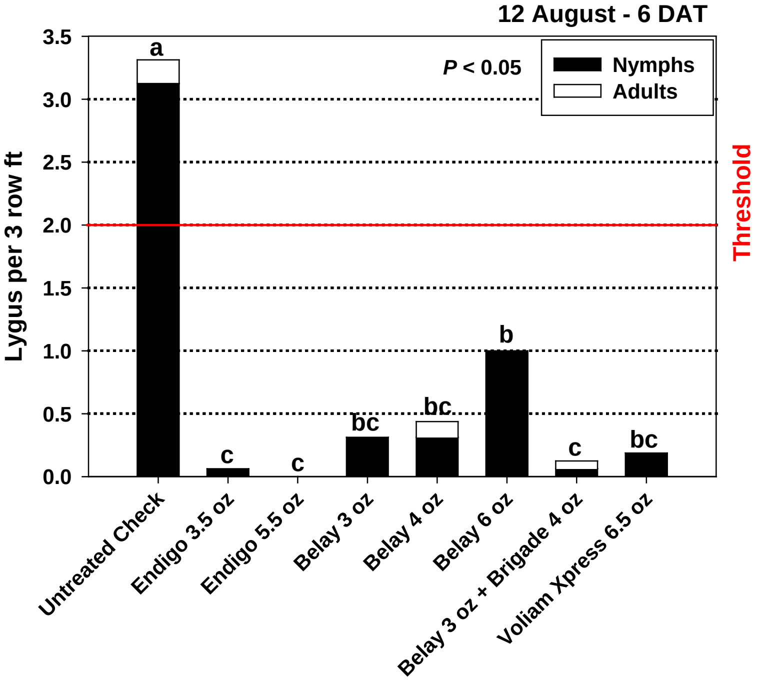

Figure 3. Lygus at 6 days after treatment; Bars capped by the same letter are not significantly different.

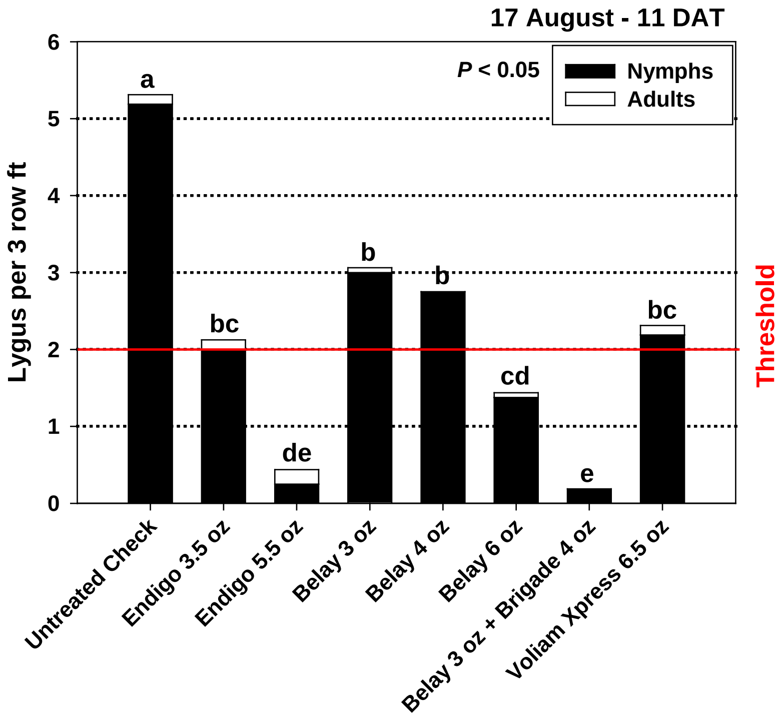

Figure 4. Lygus at 11 days after treatment; Bars capped by the same letter are not significantly different.

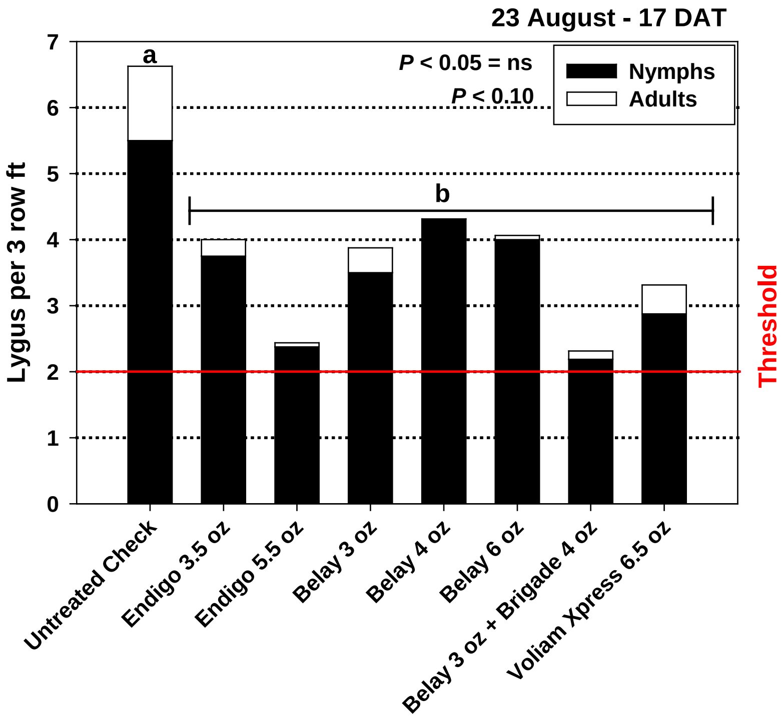

Figure 5. Lygus at 17 days after treatment; Bars capped by the same letter are not significantly different.

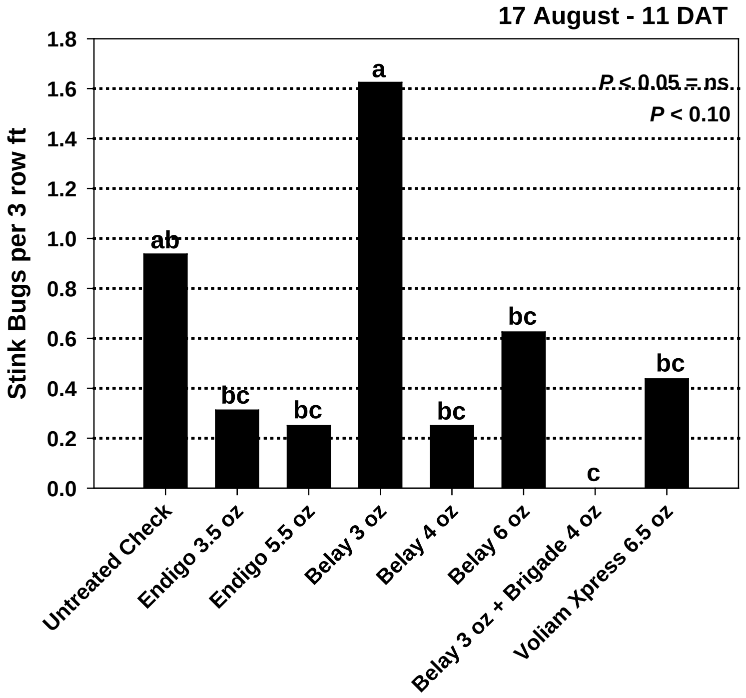

Figure 6. Stink bugs at 11 days after treatment; Bars capped by the same letter are not significantly different.

Potential for using Boll Damage as a Threshold Indicator for Lygus in the Texas High Plains, 2010

Cooperators: Texas AgriLife Research and Extension Center, Lubbock

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Extension Entomologist-Cotton, EA-IPM Crosby/Floyd Counties and EA-IPM Lubbock County

Lubbock County

Summary

These data support the current action threshold during this developmental time period of 4 Lygus per 6 ft-row using the drop cloth sampling method. Based on dime size bolls, our data suggests that 67 internally damaged locules, or 400 external stings per 100 bolls is correlated with the threshold of 4 Lygus per 6 ft-row and has potential utility as a Lygus action threshold. More data is required for confirmation.

Objective

The objectives of this study were to investigate the relationships between Lygus density, damage and yield, and to determine the possibility of developing an action threshold based on damage.

Materials and Methods

The data presented were collected from four irrigated cotton fields in the Texas High Plains in 2008-2010. All test sites consisted of insecticide efficacy tests in cotton that were beyond cutout, with the nodes above white flower = 2-4. Thus, all of the yield loss associated with these sites was the result of Lygus feeding on bolls rather than squares.

All test sites were RCB designs with 4 replicates. Plots were 4 rows X 60 ft in length. The Lygus population at each site was estimated by the drop cloth method (3 ft x 2 ft) and expressed as mean density/6 ft-row. The Lygus populations at all locations were predominately nymphs and counts were made at 0, 7, 14 and 21 DAT. To assess boll damage, 10-15 dime size bolls that were approximately 15 to 20-mm diameter (~150 to

200 HU maturity) were collected at random from each plot for damage assessment at 0 and 7 DAT. Ten to fifteen bolls were collected, sealed in Ziploc bags and stored in a refrigerator until damage observations could be made.

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 one at two-thirds of the distance from the tip. The number of damaged locules were counted and recorded as internal damage.

In 2008 and 2009, three of the tests had their plots harvested using an 28” hand basket stripper. Six samples were pulled from the middle two rows of each plot totaling 1/1000 acre. The 2010 test site had each plot harvested in its entirety using a mechanized cotton stripper. All harvest samples were ginned at the Texas AgriLife Ginning Facility in Lubbock.

In order to produce more data points, data from all four locations were pooled for analysis and the yields were normalized by converting the yields at each site into a proportion of the highest yielding plot. For correlation purposes, data from the 7 DAT evaluations and yield (lint-lbs per acre) were used for analysis. Beyond seven days, the Lygus populations at all sites did not return and should not have impacted our results. Data were analyzed using simple linear regression models (Sigma Plot 10, Systat Software Inc, 2006).

Results and Discussion

The current action threshold for Lygus on cotton after peak bloom is 4 per 6 ft-row (Table 1). However, this threshold was developed prior to cutout and represents damage associated primarily with square feeding. It is not known whether this threshold fits cotton that has reached cutout, when damage is solely from boll feeding.

Based on our test sites, yield was negatively correlated with Lygus density (Figure 1). Although the *P*-value was significant at 0.01, the R^2 value was relatively low, accounting for only 23% of the differences in yield. The reason for the low R^2 value is undoubtedly the variability in yield when Lygus densities were less than 1 per 6 ft-row. Additionally, because we are pooling data from four locations over a three year period, variability in data is expected. Thus, the low R^2 value is not necessarily indicative of a weak relationship. Using this linear relationship, we can determine the approximate number of Lygus necessary to cause various degrees of associated yield loss. Using our model, and a 10% yield reduction as the initial point of unacceptable yield loss, we find that we can tolerate no more than approximately 5 Lygus per 6 ft-row. Thus, our current threshold appears to be acceptable. However, much more data needs to be added to the model to strengthen it and increase the R^2 value.

Lygus feeding on bolls results in external feeding injury or stings. However, not all stings result in boll damage, and its internal boll damage that is of economic concern. Because of the difficulty of utilizing drop cloth or sweep net samples to estimate late season Lygus populations, many consultants have stated that they would prefer a Lygus action threshold based on damage. Also, due to the timeliness associated with boll dissection for internal damage, there is much interest in a threshold based on external stings, which are quick and easy to assess.

Before we can utilize a threshold based on external stings, we must first understand the linear relationship between external and internal damage to bolls that measure 15-20 mm in diameter (target size of the bolls to sample). As expected, there is a close relationship between external and internal injury (Figure 2). Based on this model, it appears that approximately 16% of external stings result in a damaged locule.

Internal boll damage was correlated with Lygus density (Figure 3A). Using our current action threshold of 4 Lygus per 6 ft-row, we can estimate that an insecticide application is justified if 67 damaged locules are detected per 100 bolls along with the presence of Lygus. Similarly, based on external stings, we can deduce that if 400 or more external stings are detected per 100 bolls, along with the presence of Lygus, an insecticide application is justified (Figure 3B). The number of external stings needed to trigger an insecticide application in this experiment, based on the relationship between external stings and internal damage (16% of stings result in a damaged locule) (Figure 2), equals 418 external stings.

Based on the above relationships, it appears that 67 internal damaged locules, or 400 external stings, per 100 dime to nickel size bolls along with the presence of Lygus, may be a viable action threshold. However, more data is needed to strengthen these models, especially the relationship between Lygus density and yield production.

Acknowledgments

This project was funded in part by the Plains Cotton Improvement Program.

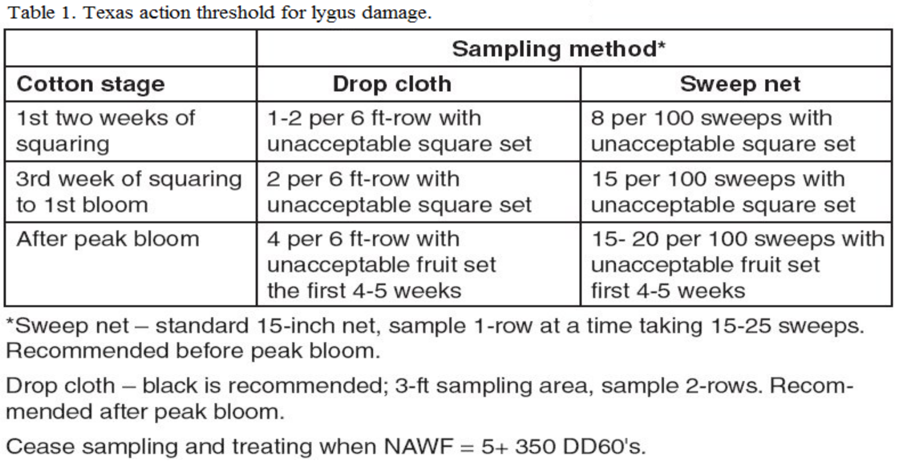

Table 1. Texas action threshold for lygus damage.

	Sampling method*	
Cotton stage	**Drop cloth**	**Sweep net**
1st two weeks of squaring	1-2 per 6 ft-row with unacceptable square set	8 per 100 sweeps with unacceptable square set
3rd week of squaring to 1st bloom	2 per 6 ft-row with unacceptable square set	15 per 100 sweeps with unacceptable square set
After peak bloom	4 per 6 ft-row with unacceptable fruit set the first 4-5 weeks	15- 20 per 100 sweeps with unacceptable fruit set first 4-5 weeks

*Sweep net – standard 15-inch net, sample 1-row at a time taking 15-25 sweeps. Recommended before peak bloom.

Drop cloth – black is recommended; 3-ft sampling area, sample 2-rows. Recommended after peak bloom.

Cease sampling and treating when NAWF = 5+ 350 DD60's.

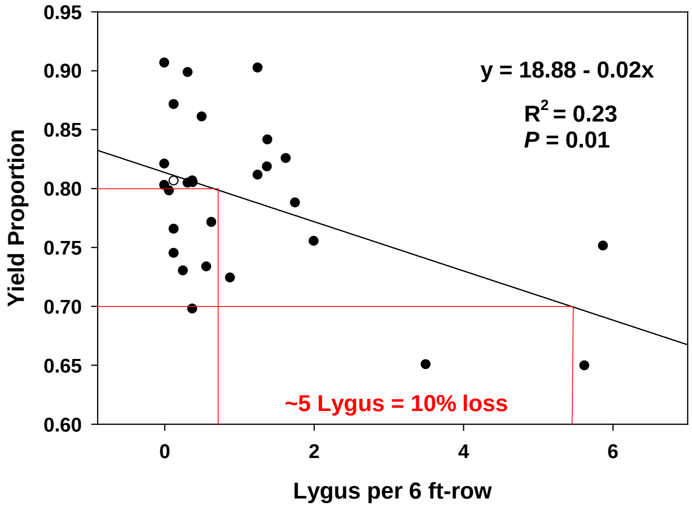

Figure 7. Linear relationship between yield and Lygus density.

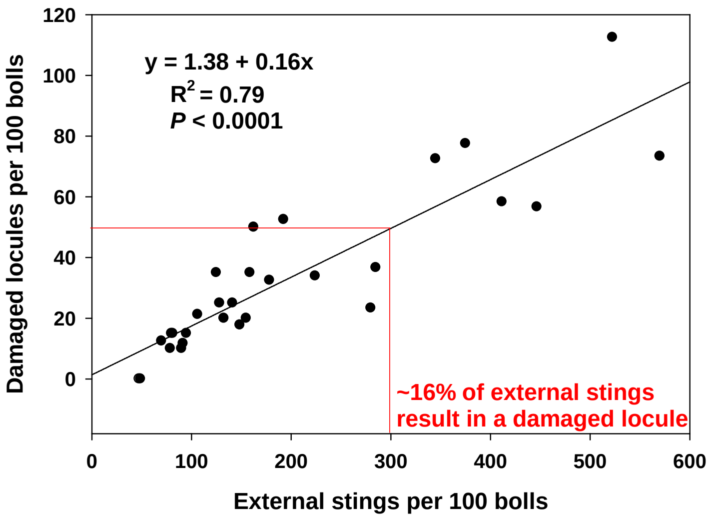

Figure 8. Relationship between the external and internal Lygus damage to dime sized (15-20 mm diameter) bolls.

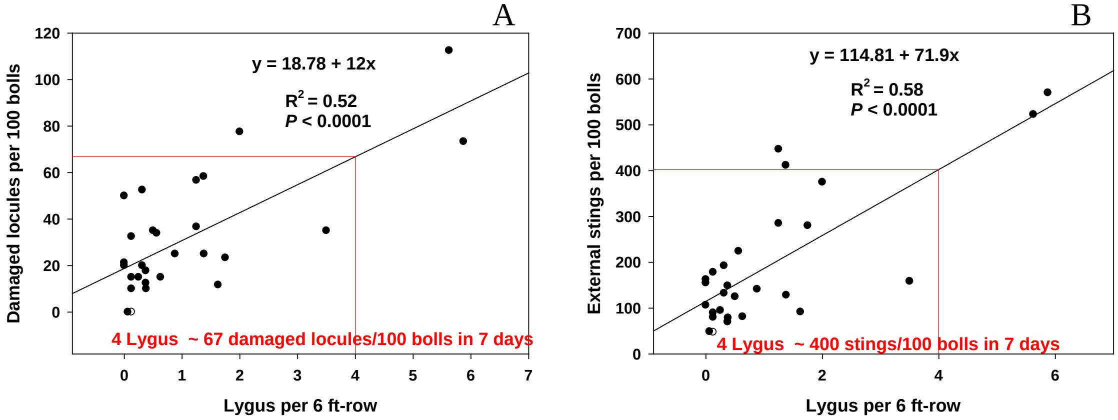

Figure 9. (A) Relationship between damaged locules and Lygus density (B) relationship between external stings and Lygus density.

Making a difference 2010

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Evaluation of Sulfoxaflor for Control of Western Tarnished Plant Bug in Cotton

Cooperators: Casey Jones, Grower

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Extension Entomologist-Cotton and EA-IPM Lubbock County

Lubbock County

Summary

Sulfoxaflor is a new insecticide chemistry developed by Dow AgroScience. It will be marketed as Transform. Relative to Carbine at 2.5 oz/ac and Orthene 97 at 1.0 lb/ac, sulfoxflor preformed equally at the low rate of 1.43 oz/ac and appeared to have longer residual efficacy at 2.14 oz/ac. At 14 days after treatment, Lygus were averaging 9.25 per 6 ft-row in the untreated, 3.38 and 3.00 per 6 ft-row in the Carbine and Orthene plots respectively; and 0.38 per 6 ft-row in the sulfoxaflor at 2.14 oz/ac plots. Based on these data sulfoxaflor has excellent potential as a Lygus management tool on the Texas High Plains.

Objective

The objective of this study was to evaluate the efficacy of sulfoxaflor relative to standard insecticides towards western tarnished plant bug.

Materials and Methods

This test was conducted in a commercial cotton (PHY 375 WRF) field near Lubbock, TX. The field was planted on 40-inch rows, and irrigated using a pivot irrigation system. The test was a RCB 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 26 Jul and 10 Aug.

The insecticides evaluated included XDE-208 (sulfoxaflor) at 0.71 and 1.07 lb-ai/ac (1.43 oz-product and 2.14 oz-product/ac. respectively), and the standards, Carbine at 1.16 lb-ai/ac (2.5 oz-product/ac)and Orthene 97 at 1.0 lb/ac. All treatments included Dyne-Amic non-ionic surfactant at 0.25% v/v.

Lygus populations were estimated on 29 Jul, and 2, 9 12, 16 and 23 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.

All plots were hand harvested on 12 Oct using a HB stripper. An area of 1/1000th acre was harvest from the center two rows of each plot.

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

Results and Discussion

The Lygus in this test were western tarnished plant bugs, *Lygus hesperus* (Knight).

Sulfoxaflor is a new chemistry being developed by Dow AgroScience for control of sucking pests.

On 26 Jul (pretreatment count), the Lygus population was averaging 5.2 per 6 ft-row across all plots, and no statistical differences were detected among treatments (Figure 1). The treatment threshold for Lygus in Texas is 4 Lygus per 6 ft-row.

At 3 and 7 days after treatment (DAT), all of the insecticide treatments had fewer nymphs, adults and total Lygus than the untreated, and were equally effective (Figure 2).

At 14 DAT, all of the insecticides contained fewer Lygus than the untreated, and XDE-208 at 1.07 lb-ai/ac had fewer Lygus than either Orthene or Carbine (Figure 3). This suggests that at the higher rate, sulfloxalfor may provide longer residual control than high rates of Carbine and Orthene.

Following the second application, all of the insecticides had fewer Lygus than the untreated at 2 and 6 DAT (Figure 4). By 7 DAT, application 2, the Lygus population had declined across the entire test and no significant differences were detected (Figure 5).

There were no differences detected for yield among any of the treatments (data not presented). Yield average 1135 lbs-lint/ac across all plots.

Based on these data sulfoxaflor has excellent potential as a Lygus management tool on the Texas High Plains.

Acknowledgments

Appreciation is expressed to Dow AgroScience and the Plains Cotton Improvement Program for financial support of this project.

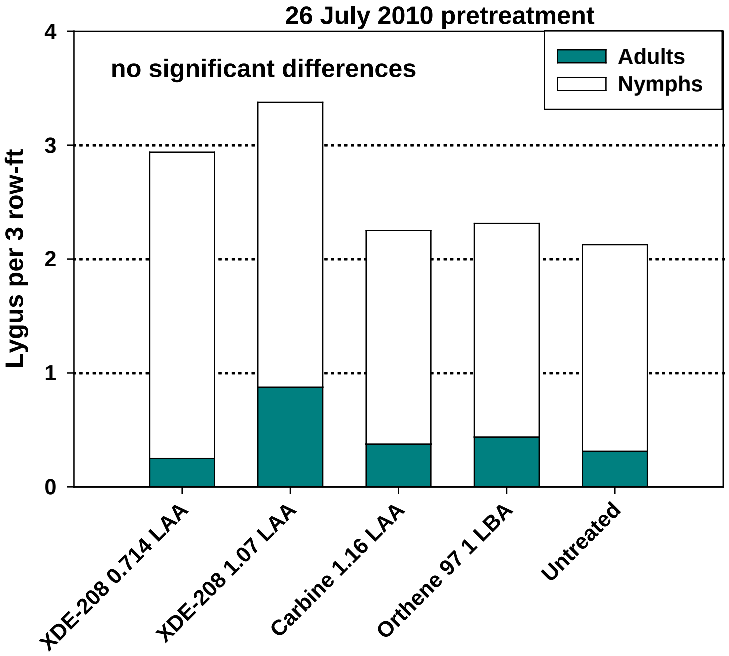

Figure 10. Number of Lygus prior to insecticide treatments.

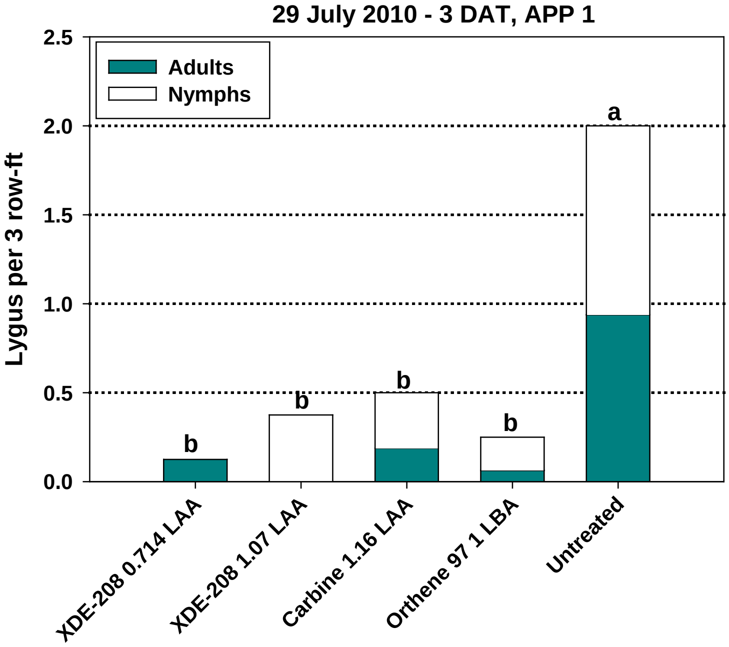

Figure 11. Number of Lygus 3 days after application 1; bars capped by the same letter are not significantly different.

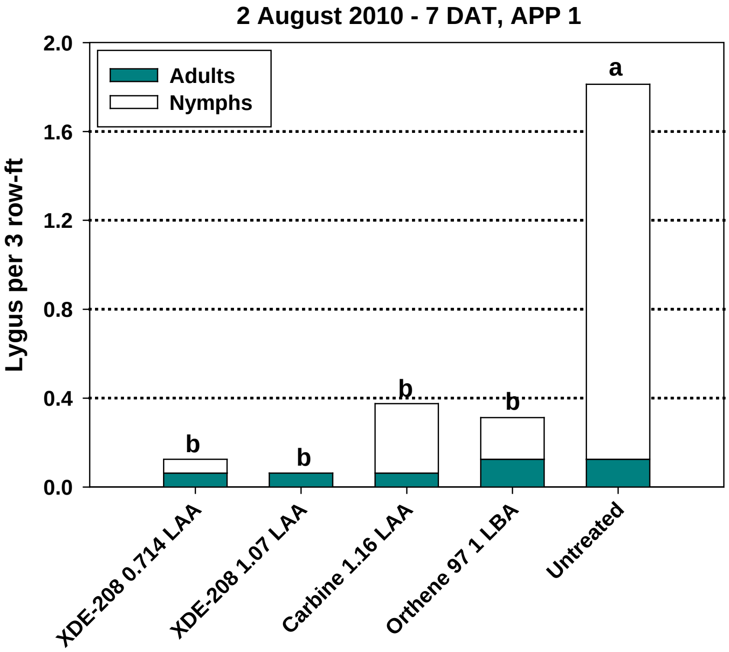

Figure 12. Number of Lygus 7 days after application 1; bars capped by the same letter are not significantly different.

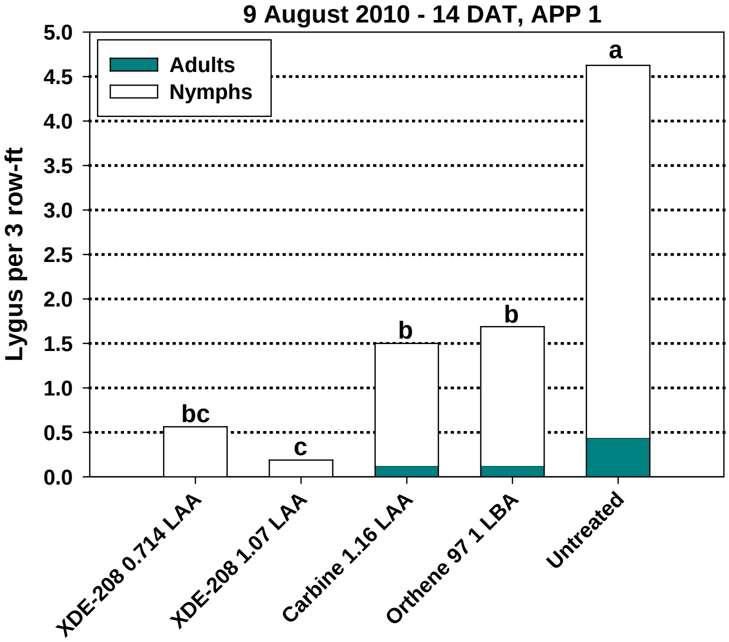

Figure 7. Number of Lygus 14 days after application 1; bars capped by the same letter are not significantly different.

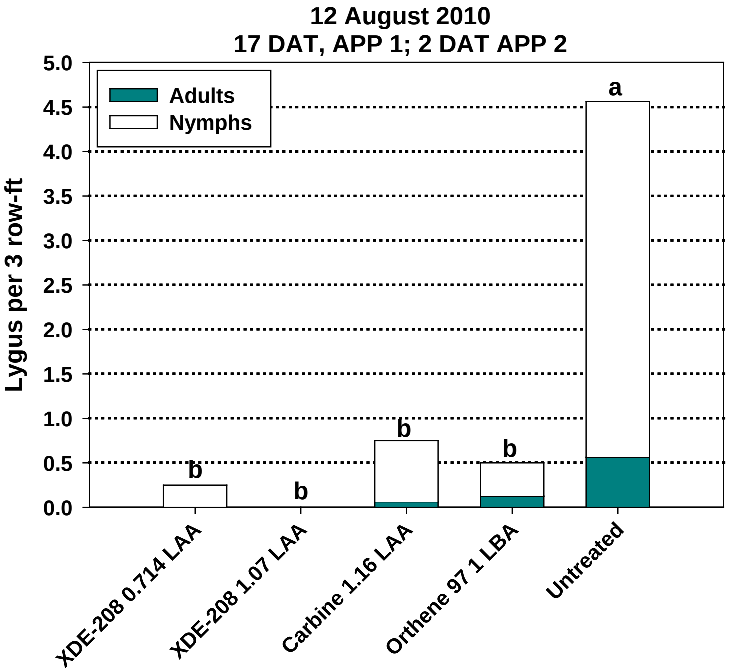

Figure 8. Number of Lygus 2 days after application 2; bars capped by the same letter are not significantly different.

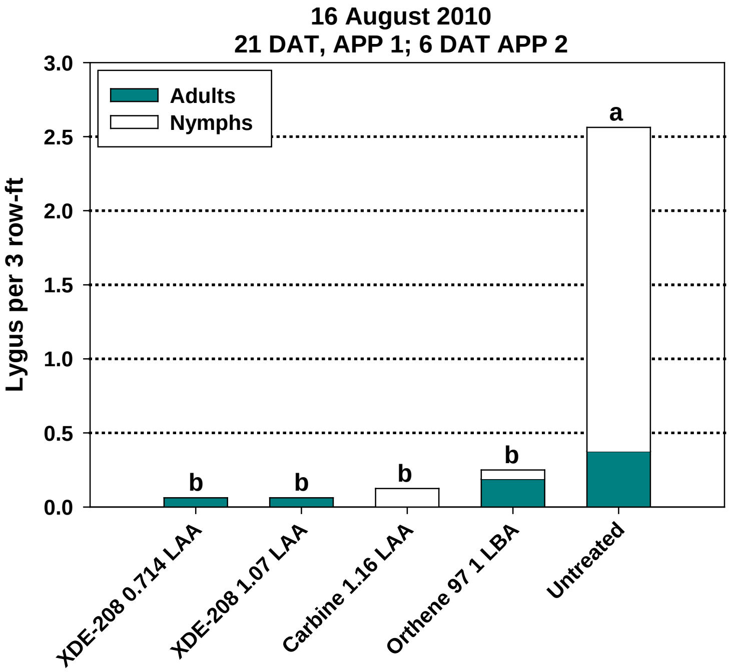

Figure 9. Number of Lygus 6 days after application 2; bars capped by the same letter are not significantly different.

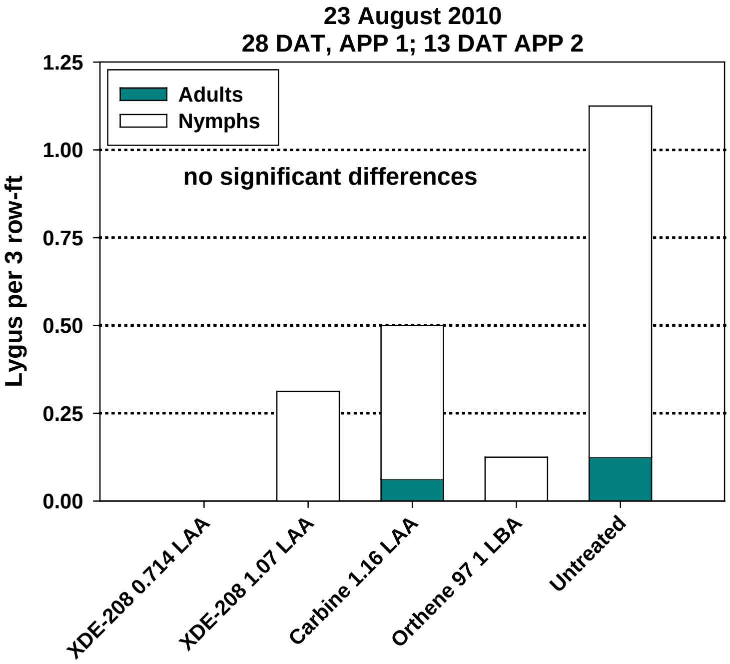

Figure 10. Number of Lygus 13 days after application 2.

Making a difference 2010

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Ability of Cotton to Compensate for Early-Season Fruit Loss and Impact on Yield and Lint Quality, 2010

Cooperators: Texas AgriLife Research and Extension Center, Lubbock

David Kerns, Tommy Doederlein, Brant Baugh and Dustin Patman
Extension Entomologist-Cotton, EA-IPM Dawson/Lynn Counties, EA-IPM Lubbock County and EA-IPM Crosby/Floyd Counties

Lubbock County

Summary

Given sufficient time, similar to that experienced during 2010, cotton can fully compensate yield from 100% square loss at 18 days into squaring. However, compensated lint may be of lower quality than non-compensated lint. Like yield, the degree of lint quality degradation in compensated lint is undoubtedly associated with length of season.

Objective

The objectives of this test were to assess the ability of cotton to compensate for early season square loss and the impact compensated fruit has on lint quality.

Materials and Methods

This test was conducted at the Texas AgriLife Research and Extension Center in Lubbock, TX. The cotton variety, ‘Phytogen 375 WRF’, was planted on 1 June 2010 on 40-inch rows and was irrigated as needed using furrow run irrigation. Plots were 1 row wide x 14-feet long. The test was a randomized complete block design with 4 replicates.

Plots were evenly thinned to 28 plants per plot (26,136 plants per acre) on 13 July 2010. All abnormally small or deformed plants were removed leaving a uniform plant population.

Treatments consisted of 0, 20, 40, 60, 80 and 100% manual square removal on pre-bloom cotton. On 13 July 2010, all of the squares in each plot were counted and numbered. The numbered squares from each plot were then randomized and removed based on the treatment percentage. Squares slated for removal were removed using fine forceps on 13 July 2010. At that time the plants were approximately 18 days into squaring and averaged 13.7 nodes across all treatments.

At harvest on 10 November 2010, 10 plants from each plot were plant mapped and the entire plot was hand harvested. Samples were ginned at the Texas AgriLife Ginning Facility in Lubbock. 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 count data were analyzed using PROC GLM and the means were separated using an F protected LSD ($P \leq 0.05$). Relationships were determined by using linear regression models.

Results and Discussion

Impact on Yield

The 2010 growing season in Lubbock was marked by wet weather in June and July, dry conditions in August, and a prolonged warm fall that facilitated cotton maturation. Thus, the possibility of achieving full compensation for yield and fiber maturity were high during this test. Consequently, we could not detect any differences in yield among the treatments. This suggests that even the 100% square removal treatment was able to compensate (Figure 1).

Impact on Bolls and Node Quantity

Although plots had as much as 100% of their early squares removed, there were no significant differences among treatments in the total number of bolls produced or the number of fruiting nodes per plant (Figures 2A & B). Thus, it appears that compensation in yield was primarily from adding bolls to replace missing fruit rather than increasing the size or quantity of the surviving fruit.

Impact on Fruiting Pattern

Plants in the 20, 40 and 100% square removal treatments had fewer bolls on the lower portion of the plant (nodes 11+) than plants where there were no squares removed (Figure 3A). This would be expected since we physically removed squares from this area. However, if the plant compensated by adding second and third position squares, primarily in this area, one would expect there to be no differences. Additionally, there were no differences among treatments in the ratio of lower bolls to upper bolls, which further supports the conclusion that replacement fruit was uniformly distributed from top to bottom (Figure 3B).

There were more first position bolls where no squares were removed, no differences in second position squares, and it appeared that third position squares increased relative to the number of squares removed . (Figure 4A). This is also evident when comparing boll distribution relative to total bolls per plant (Figure 4B). Thus, it appears that the compensated fruit were third position bolls and, based on vertical distribution (Figure 3A & B), were uniformly distributed from top to bottom.

Impact on Lint Quality

Significant differences in qualitative parameters among the square removal treatments were not detected based on GLM ($P > 0.05$), but trends were observed. Compensated bolls tended to have lower micronaire and higher fiber strength qualities (Figures 5A and B). Lower micronaire is indicative of immature cotton fibers and suggests that compensated bolls did not have sufficient time to mature. This is not uncommon for cotton with a truncated growing season, especially for fruit produced later in the season (i.e. third position bolls).
The trend detected for increased fiber strength with more square removal is a function of micronaire (Figure 5B). Increased strength is commonly associated with decreasing micronaire.

A trend was also detected for the degree of yellowness (+b) (Figure 6). Yellowness increased with increasing early square removal. Similar to low micronaire, increased yellowness is indicative of immature cotton fibers. Thus, further supporting the premise that compensated bolls are more likely to suffer qualitatively.

Although we detected trends in reduced lint quality with regard to increasing square removal (Figures 5 & 6), it did not significantly impact loan value based on GLM ($P > 0.05$) (Figure 7). Thus, even 100% pre-bloom square removal did not significantly affect yield or overall quality as it relates to loan values. However, keep in mind that these data are representative of the Lubbock area during a year with a prolonged growing season. In coolers climates or in situations favoring a shorter growing season, the impact on lint maturity and/or yield may be adversely affected.

Acknowledgments

This project was funded in part by the Plains Cotton Improvement Program.

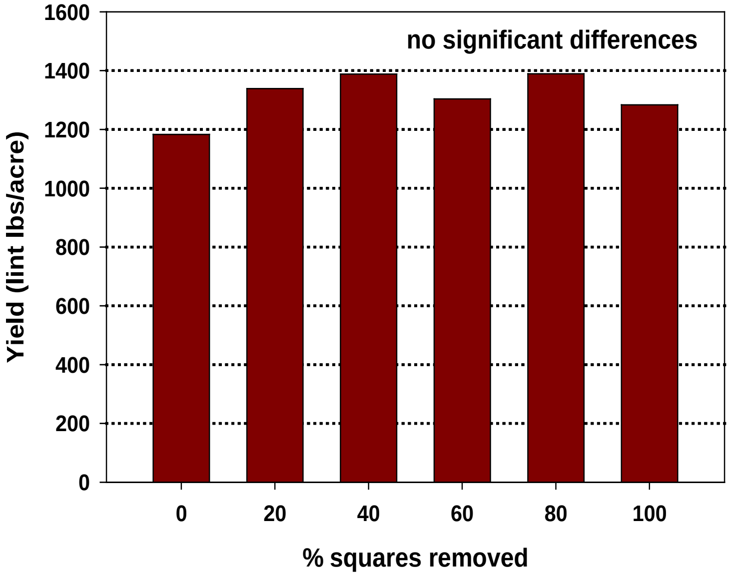

Figure 17. Impact of pre-bloom square removal on yield; no significant differences among treatments based on an F protected LSD (*P* > 0.05).

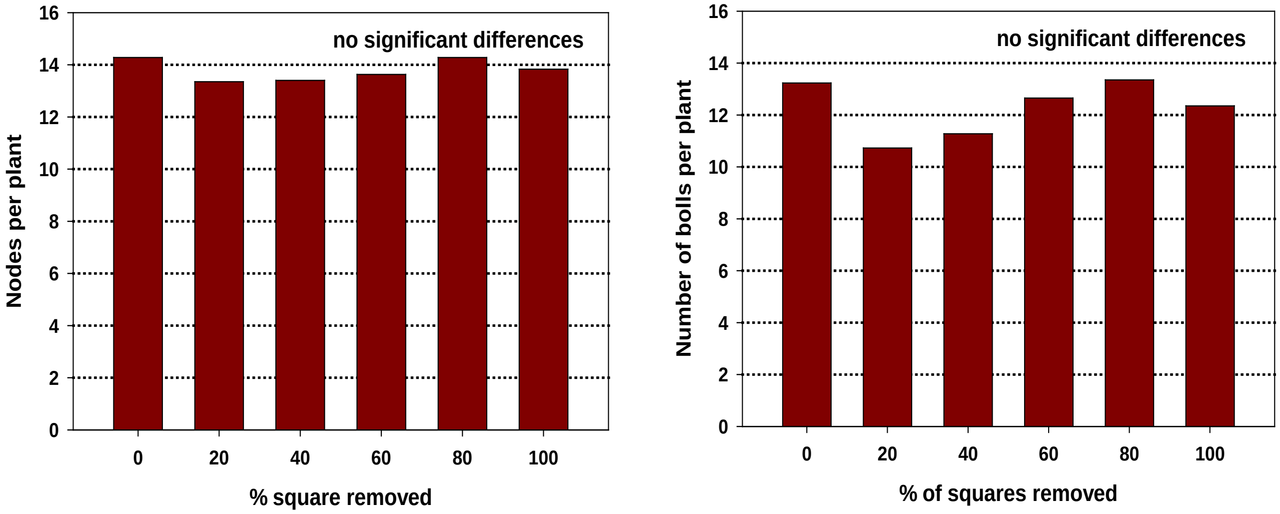

Figure 18 (A) Impact of pre-bloom square removal on the number of nodes per plant and (B) bolls per plant; no significant differences among treatments based on an F protected LSD (*P* > 0.05).

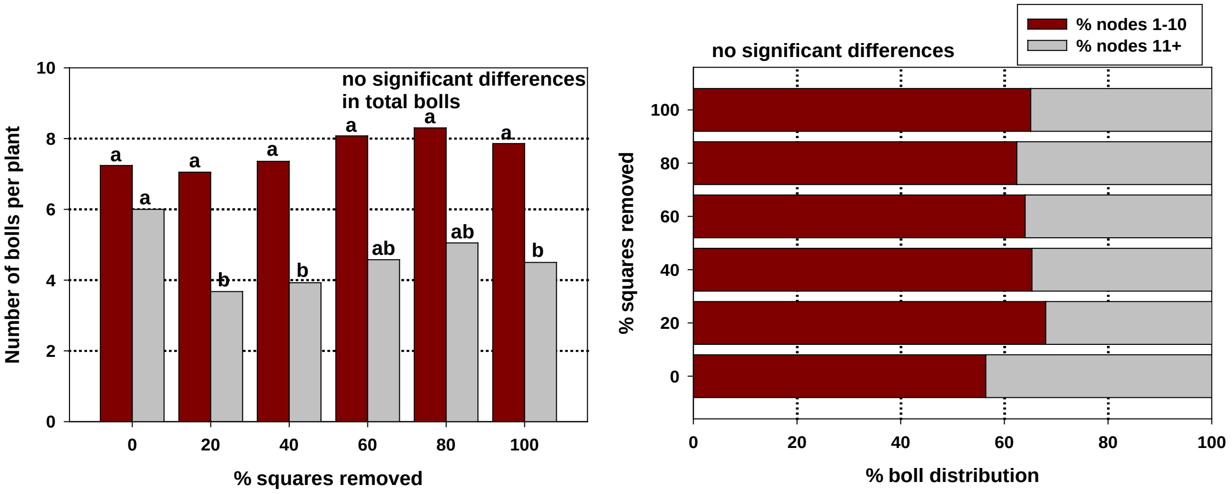

Figure 19. A) Number of bolls in the upper (nodes 1-10) and lower (nodes 11+) portions of the plant and B) vertical distribution as % of bolls within the top and bottom portions of the plant; similar colored bars capped by the same letter are not different based on an F protected LSD (*P* > 0.05).

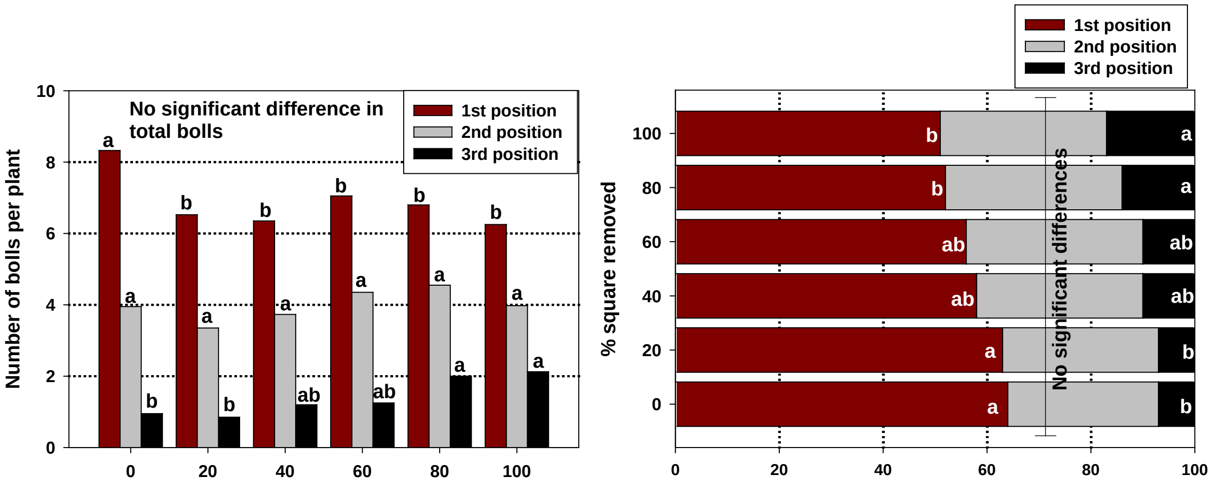

Figure 20. (A) Number of bolls in the upper (nodes 1-10) and lower (nodes 11+) portions of the plant and (B) vertical distribution as % of bolls within the top and bottom portions of the plant; similar colored bars capped by the same letter are not different based on an F protected LSD (*P* > 0.05).

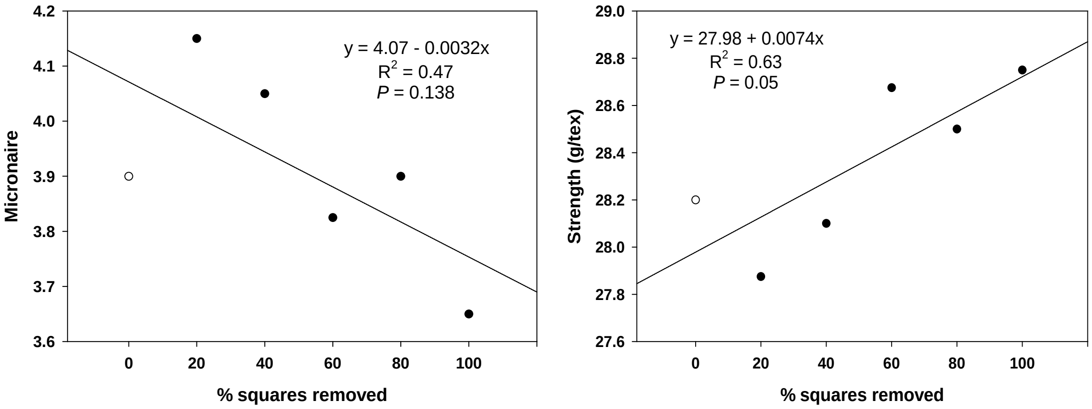

Figure 21. Linear relationships between % of squares removed and fiber (A) micronaire and (B) strength

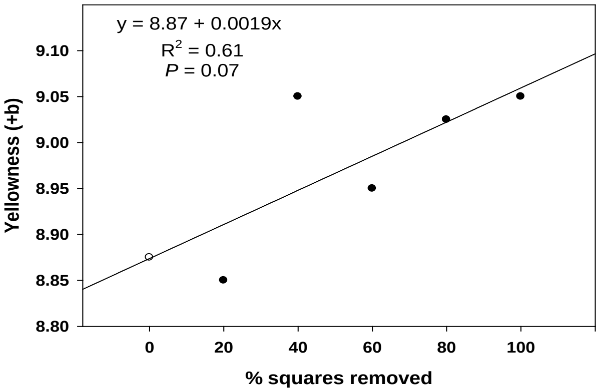

Figure 22. Linear relationship between % of squares removed and fiber yellowness.

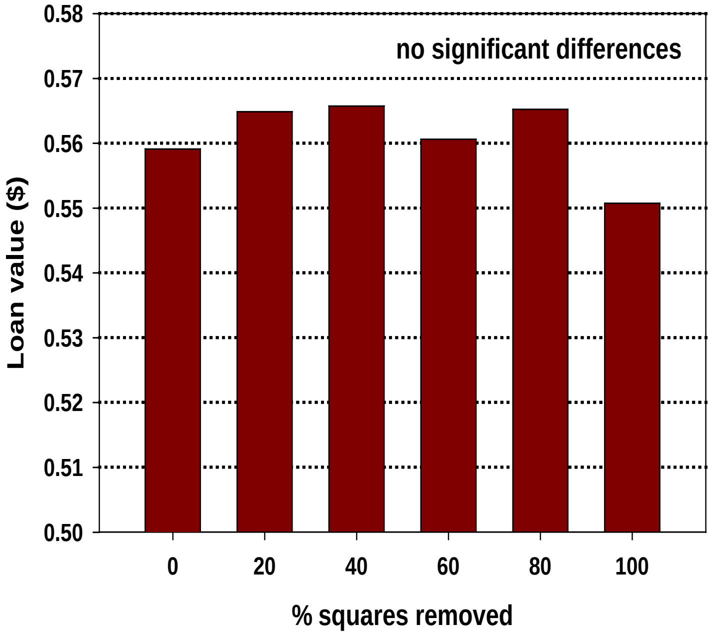

Figure 23 Impact of early square removal on loan values; no significant differences among treatments based on an F protected LSD ($P > 0.05$).

Making a difference 2010

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Field Validation of the Texas Cotton Spider Mite Action Threshold, 2010

Cooperators: Rex Isom, Grower

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

Lubbock County

Summary

Spider mites are an occasional pest of cotton in the Texas High Plains. Outbreaks of mites in cotton tend to be associated with high early-season rainfall and insecticide applications targeting other pests. There are two types of classifications for spider mite damage, phase I and phase II. Phase I is early stages of damage where only stipules appear on the leaves. Phase II damage is actual reddening of the leaves. Phase II damage is associated with decreased photosynthesis and yield loss. The current Texas action threshold is to treat when 50% of the plants observed show noticeable signs of reddening (phase II damage). However, there has not been sufficient data supporting this threshold. Based on our data, the current Texas threshold of a treatment at 50% damage is probably valid. The 50% hits treatment was the highest yielding; producing over 1250 lbs of lint per acre. The 70 and 90% hits treatments did not differ from the untreated. Future testing will determine if treatments under 50% hits are advised.

Objective

The objective of this study was to field validate the current Texas spider mite action threshold.

Materials and Methods

This test was conducted on a farm near Idalou, TX. The variety FM 9180 B2F was grown on forty-inch rows irrigated with a sub-surface drip system. The test was a randomized complete block design with four replicates. Treatments were 30, 50, 70 and 90% phase II damage. A "glance and go" method was used to calculate the ratio of hits to misses. A "hit" was recognized as apparent phase II damage and a "miss" was recognized as no apparent damage. 25 samples were recorded per plot. When the ratio of "hits" to "misses" reached the designated percentage, a treatment of Oberon at 4 fl-oz. per acre was initiated. Oberon was 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. Lint samples were taken using a hand basket stripper on 8 October. One one-thousandth of an acre was harvested and ginned at the ginning facility at the Texas AgriLife Research and Extension Center in Lubbock, TX and yields were then recorded. All data were analyzed using ANOVA, and means were separated using an F protected LSD ($P \leq 0.05$).

Results and Discussion

Based on our data, treatments initiated at each percentage stopped the damage from progressing further, while the untreated continued to increase (Figure 1). In this test, the 30% treatment was missed. The ratio of hits to misses was already over 30% when we entered the field.

Yield data suggests that the current Texas threshold of a treatment at 50% damage is probably valid. The 50% hits treatment was the highest yielding plot, yielding over 1250 lbs of lint per acre (Figure 2). The 70 and 90% hits treatments did not differ from the untreated. Future testing will determine if treatments under 50% hits are advised.

Based on the above relationships, it appears that 67 internal damaged locules, or 400 external stings, per 100 dime to nickel size bolls along with the presence of Lygus, may be a viable action threshold. However, more data is needed to strengthen these models, especially the relationship between Lygus density and yield production.

Acknowledgments

This project was funded in part by the Plains Cotton Improvement Program.

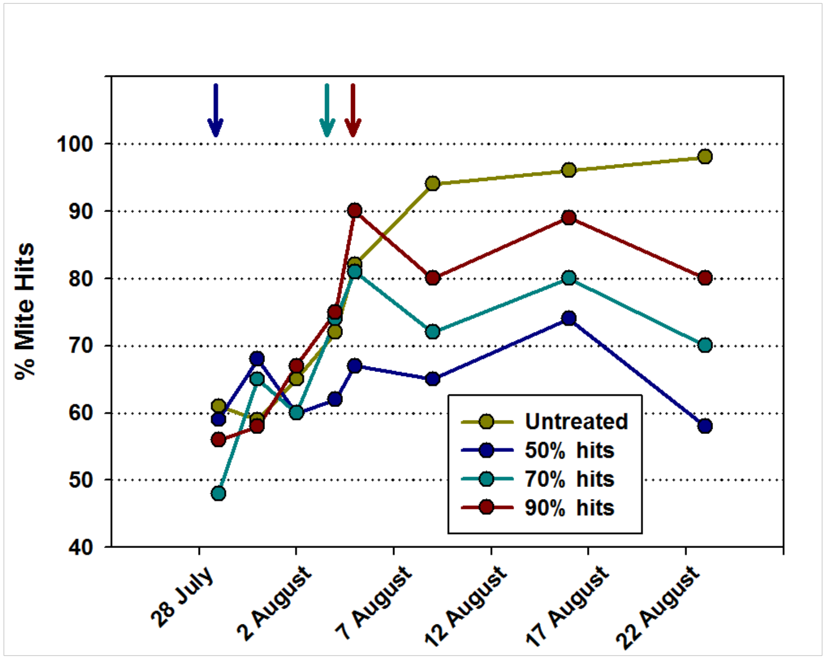

Figure 24. Percent of plants with spider mite hits in the form of leaf reddening.

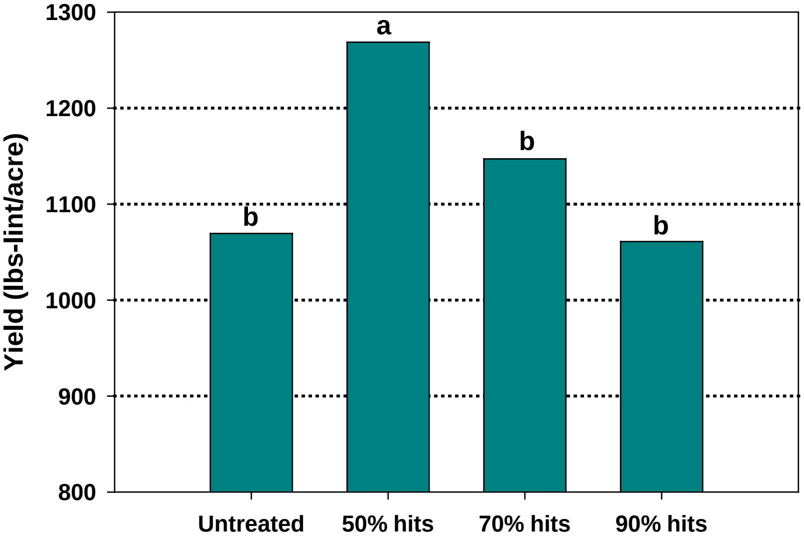

Figure 25. Columns capped with the same letter are not significantly different based on an F protected LSD ($P > 0.05$).

Making a difference 2010

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Evaluation of Miticides for Spider Mite Control in Cotton in the South Plains Region of Texas 2010 – Test A

Cooperators: Rex Isom, Grower

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

Lubbock County

Summary

Portal at 1 pt/ac, GWN-1708 (fenazaquin) at 24 fl-oz/ac, and Athena at 13.45 fl-oz all provided exceptional control of twospotted spider mites in cotton. Athena needs to be evaluated at lower rates. Brigade provided initial knockdown but experienced some mite resurgence. Although we were unable to detect differences in yield among treatments, we were able to show that yield decreased with increasing mite days. This suggests that mites negatively impacted yield at the population, and length of time experienced in this test.

Objective

The objective of this study was to investigate the efficacy of miticides at mitigating spider mite outbreaks in cotton.

Materials and Methods

This test was conducted in a commercial cotton field grown near Idalou, TX. The field was on 40-inch rows, and was irrigated using a subsurface drip irrigation system. The test was a RCB design with four replications. Plots were 4-rows wide × 60 ft in length.

Miticides 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 4 Aug. Miticides evaluated included: GWN-1708 (fenazaquin) Portal (fenproximate), Athena (abamectin + bifenthrin) and Brigade (bifenthrin).

A pre-treatment count was made on 3 Aug. Post treatment evaluations were made at 6, 12 and 19 days after treatment (DAT). Treatments were evaluated by collecting 5, mid-canopy leaves per plot and returning these to the laboratory where the mites were removed onto a liquid detergent coated glass plate with a mite brush. Mite eggs, larvae and adults were counted from the middle 1-inch diameter area of the glass plate. Mite population data discussed is the number per 1-inch diameter mite brush sample per leaf.

Mite days were calculated where : Mite-day = ((mean mites/sample on day X + mean mites/sample on day Y) / 2) Y-X. Mite days were accumulated for the time of the test.

All plots were hand harvested on 8 Oct using a HB stripper. An area of 1/1000th acre was harvest from the center two rows of each plot.

Data were analyzed using ANOVA and means were separated using an F-protected LSD ($P \leq 0.05$). Mite days were correlated with yield using a simple linear regression model.

Results and Discussion

The predominate mite species in the test appeared to be twospotted spider mite, *Tetranychus urticae*. On 3 Aug, prior to miticide application, the mite population was high, averaging 52.88 motiles across all treatments, and there were no significant differences among treatments for any mite stage (Table 1).

At 6 days after treatment (DAT), the mite population had increased in the untreated to 169.5 motiles, and all of the miticides had fewer mites of all stages than the untreated.

By 12 DAT, the mite population was in general decline (Table 2). At this time GWN-1708 at 16 fl-oz (low rate) did not differ from the untreated in eggs. Athena had the fewest eggs but was not significantly better than Portal or Brigade. Results were similar toward larvae, adults and motiles. Against motiles, Athena did not differ from Portal, Brigade or GWN-1708 at 24 fl-oz (high rate). Athena should be evaluated at lower rates.

Although lower than at the 6 DAT evaluation, the number of mites at 19 DAT remained relatively high averaging 51.75 motiles in the untreated. At this time the number of eggs and adult mites in the Brigade treated plots had increased and no longer differed from the untreated. The remaining treatments were equivalent.

All of the miticides evaluated appeared to have good knockdown activity of the mite population. However, the efficacy of Brigade appeared transitory. We have observed this with Brigade in grower fields where initial control would look good, but the mite population would resurge and require re-treatment. As long as the mite population is in or near decline, Brigade would probably demonstrate acceptable performance.

Although we were unable to detect differences in yield among treatments (Table 2), we were able to show that yield decreased with increasing mite days (Figure 1). This suggests that mites negatively impacted yield at the population, and length of time experienced in this test.

Acknowledgments

Appreciation is expressed to the Gowan Company Ag Products and the Plains Cotton Improvement Program for financial support of this project.

Table 8.

Treatment /formulation	Rate amt product/acre	3 Aug (pre-treatment)[a] eggs	larvae	adults	motiles	10 Aug (6 DAT)[a] eggs	larvae	adults	motiles
Untreated	--	75.25a	30.25a	9.50b	39.75a	70.25a	128.75a	40.75a	169.50a
GWN-1708 20SC	16 fl-oz	73.75a	36.00a	20.75b	56.75a	28.50b	31.00b	18.50b	49.50b
GWN-1708 20 SC	20 fl-oz	144.75a	54.75a	40.75a	95.50a	26.50b	27.75b	10.25b	38.00b
GWN-1708 20 SC	24 fl-oz	69.75a	21.25a	13.25b	34.50a	20.25b	18.75b	12.00b	30.75b
Portal 4 EC	1.0 pt	76.00a	31.50a	18.50b	50.00a	23.00b	22.75b	12.75b	35.50b
Athena	13.45 fl-oz	86.25a	43.00a	21.00b	64.00a	18.00b	14.75b	9.25b	24.00b
Brigade 2EC	6.4 fl-oz	77.75a	51.00a	14.50b	65.50a	18.00b	15.50b	10.50b	26.00b

Values in a column followed by the same letter are not significantly different based on an F-protected LSD ($P \leq 0.10$).

[a] Values represent the number of mites per leaf sampled using a mite brush and counting the number within a 1-inch diameter area.

Table 9.

Treatment/ formulation	Rate amt product/acre	16 Aug (12 DAT)[a] eggs	larvae	adults	motiles	23 Aug (19 DAT)[a] eggs	larvae	adults	motiles	8 Oct Yield Lint (lbs/acre)
Untreated	--	48.75a	19.75a	17.75a	37.50a	53.50a	32.00a	19.75a	51.75a	929.96a
GWN-1708 20SC	16 fl-oz	32.50ab	10.50bcd	11.00b	21.50bc	12.25b	7.50bc	8.50bc	16.00c	1067.60a
GWN-1708 20 SC	20 fl-oz	30.50b	14.25ab	8.75bc	23.00b	5.50b	7.25bc	12.75ab	20.00bc	1019.80a
GWN-1708 20 SC	24 fl-oz	24.75bc	7.75cd	5.75c	13.50cd	1.00b	2.00c	2.50bc	4.50c	1150.45a
Portal 0.4 EC	1.0 pt	18.75bcd	12.50bc	7.50bc	20.00bcd	8.00b	1.25c	7.00bc	8.25c	1199.24a
Athena	13.45 fl-oz	2.50d	6.75d	6.00c	12.75d	2.50b	2.25c	1.50c	3.75c	1068.21a
Brigade 2EC	6.4 fl-oz	8.25cd	10.75bcd	9.25bc	20.00bcd	59.25a	15.25b	19.75a	35.00ab	1139.09a

Values in a column followed by the same letter are not significantly different based on an F-protected LSD ($P \leq 0.10$).

[a] Values represent the number of mites per leaf sampled using a mite brush and counting the number within a 1-inch diameter area.

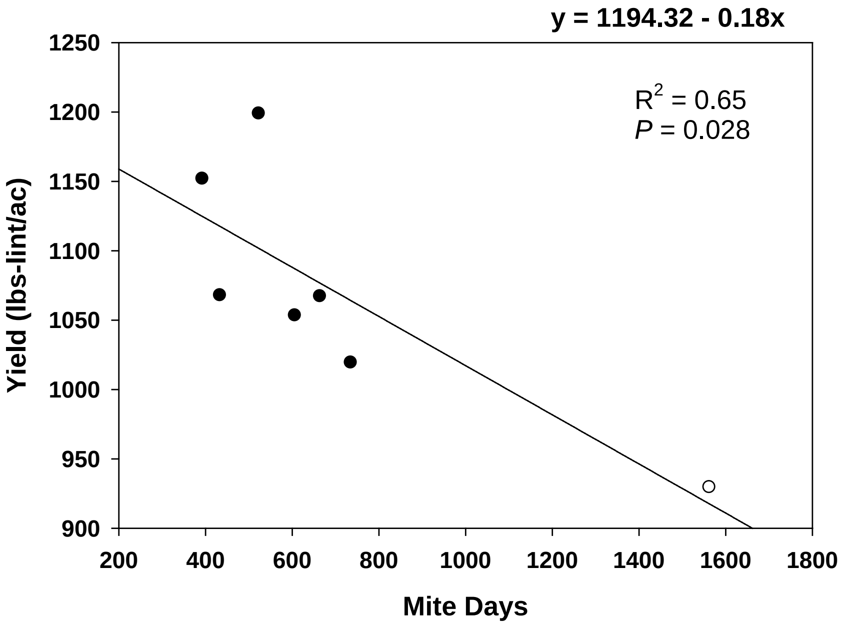

Figure 26. Relationship between mite population and length of infestation on yield.

Making a difference 2010

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Controlling Mixed Populations of Bollworm and Fall Armyworm in Non-Bt Cotton

Cooperators: Glen Shook, Grower

David Kerns, Manda Cattaneo, Brant Baugh, Dustin Patman
Extension Entomologist-Cotton, EA-IPM Gaines County, EA-IPM Lubbock County, EA-IPM Crosby/Floyd Counties

Gaines County

Summary

Non-Bt cotton comprises approximately 50% of the cotton acreage planted in the Texas High Plains, and damage caused by bollworms and fall armyworms often results in significant yield loss. When fall armyworms are present, they usually occur concurrently with bollworms. Bollworms are typically controlled using pyrethroid insecticides while fall armyworms are better controlled with alternative chemistries. In this study, several pyrethroids (Karate, Holster and a high and low rate of Mustang Max) were evaluated for their efficacy towards a mixed population of bollworms and fall armyworms. Additionally, an alternative chemistry, Belt, was tested at its low rate and mixed with the low rate of Mustang Max. At 7 DAT, all of the treatments had fewer medium and large bollworms than the untreated with the exception of Belt alone. There were no differences among the other treatments. Generally, Belt is thought to be relatively more efficacious towards fall armyworms than bollworms. As expected, at its lowest labeled rate, Belt did not provide effective bollworm control; especially in growthy cotton where many of the small larvae were feeding under bloom tags. Against fall armyworms, the only treatment that differed from the untreated was the tank mix of Mustang Max + Belt. Pyrethoids are generally considered weak against fall armyworms. Belt is known to have good activity towards fall armyworms. However, Belt at the lower rate (2.0 fl-oz/acre) failed to achieve adequate control. It is not certain if increasing the rate of Belt would alleviate this problem, but much of the difficulty in control may be related to the need for Belt to be consumed to maximize activity. Although Belt is translaminar, larvae moving from fruit to fruit are less likely to encounter toxicant than if it were a contact poison. Although Belt alone appeared to be ineffective, it did not differ in yield from the best performing treatment. Yield was negatively correlated with the total worm population. Based on this regression, approximately 9,000 larvae per acre resulted in a 10% yield reduction. The ratio of small larvae to medium and large larvae was approximately 7:3. Considering an action threshold of 10,000 small or 5,000 medium and large larvae per acre threshold, 9,000 total larvae per acre is close to the estimated threshold of 8,500 larvae based on the 7:3 ratio we encountered.

Objective

Objectives of this study were as follows: 1. Determine the efficacy of several commonly used pyrethroids for control of bollworms and fall armyworms in cotton, 2. Determine if the low labeled rate of Belt (2 fl-oz/acre) is effective in controlling bollworms and fall armyworms, 3. Determine if tank mixing a lower rate of Belt (2 fl-oz/acre) with a pyrethroid provides cost effective control.

Materials and Methods

This test was conducted on a commercial farm located in Gaines Co., south of Loop, TX. The cotton variety 'Dyna-Grow 2400RF' was grown on 40-inch rows and irrigated using a pivot irrigation system. Plots were 4-rows wide × 60-feet long. Plots were arranged in a randomized complete block design with 4 replicates. The insecticide treatments and rates are outlined in Table 1. Treatments were applied on 17 August 2010.

Bollworm and fall armyworm populations were estimated by counting the number of worms on 10 whole plants per plot.

Larvae were separated by species, and size was estimated by length: small larvae (<1/4 inch), medium larvae (1/4 to 5/8 inch) and large larvae (>5/8 inch). Small larvae were not separated by species because they could not be distinguished from one another in the field.

The test was harvested on 5 November 2010, using a 28-inch hand basket stripper. Six samples were harvested per plot and pooled. All samples were weighed, ginned and classed.

All data were analyzed using ARM and the means were separated using an F protected LSD ($P < 0.05$).

Results and Discussion

On 17 August, prior to insecticide application, the population of medium and large worms averaged 11,440 and 2,280 bollworms and fall armyworms per acre, respectively (estimated plant population = 40,000 per acre) (Figures 1A & 1B). This is well above the action threshold of 5,000 worms per acre. Although smaller worms could not be speciated, the population of small worms across both species was estimated to be 25,440 worms per acre (Figure 1C). The action threshold for small larvae is 10,000 worms per acre.

Using speciation of medium sized worms in the untreated plots at 7 DAT, the number of small bollworms and fall armyworms were estimated before treatment. The worm population at this test site was estimated to be ~70% bollworms. By size, bollworms comprised 52%, 85% and 73% of the small, medium and large sized larvae respectively (Figure 2). Total larvae across both species and all sizes averaged 38,840 worms per acre (Figure 1D). During pretreatment counts, it was noted that many of the small worms were feeding under bloom tags. Additionally, the cotton in this test was growthy (~46 inches in height); thus obtaining adequate insecticide coverage was likely to be difficult.

At 7 DAT, all of the treatments had fewer medium and large bollworms than the untreated with the exception of Belt at the lower rate (2 fl-oz/acre) (Figure 3A). There were no differences among the other treatments. Generally, Belt is thought to be relatively more efficacious towards fall armyworms than bollworms. As expected, at its lowest labeled rate, Belt did not provide effective bollworm control; especially in growthy cotton where many of the small larvae were feeding under bloom tags.

Against fall armyworms, the only treatment that differed from the untreated was the tank mix of Mustang Max + Belt (Figure 3B). Pyrethoids are generally considered weak against fall armyworms. Belt is known to have good activity towards fall armyworms. However, Belt at the lower rate (2.0 fl-oz/acre) failed to achieve adequate control. It is not certain if increasing the rate of Belt (3 fl-oz/acre) would alleviate this problem, but much of the difficulty in control may be related to the need for Belt to be consumed to maximize activity. Although Belt is translaminar, larvae moving from fruit to fruit are less likely to encounter toxicant than if it were a contact poison.

When evaluating activity across both species, because the population was predominately bollworms, the high rates of the pyrethroids and the low rate of Mustang Max + Belt all reduced the population significantly lower than the untreated (Figure 3C).

There were no significant differences in yield among the high rates of the pyrethroids, Belt alone or the tank mix of the low rate of Mustang Max + the low rate of Belt (Figure 3D).

Although Belt alone (2.0 fl-oz/acre) appeared to be ineffective, it did not differ in yield from the best performing treatment. The reason for this is not certain; it could be an aberration in the data, or Belt may be providing undetectable control. Similar results were observed in a test conducted in 2008.

Yield was negatively correlated with the total worm population (Figure 4). Based on this regression, approximately 9,000 larvae per acre resulted in a 10% yield reduction. The ratio of small larvae to medium and large larvae was approximately 7:3. Considering an action threshold of 10,000 small or 5,000 medium and large larvae per acre threshold, 9,000 total larvae per acre is close to the estimated threshold of 8,500 larvae based on the 7:3 ratio we encountered.

Acknowledgments

This project was funded in part by Bayer CropScience and the Plains Cotton Improvement Program.

Table 10. Insecticide treatments and rates.

Treatment[a]	Active Ingredient	Rate (product/ac)
1) Untreated	--	--
2) Mustang Max 0.83EC	Zeta-cypermethrin	3.6 fl-oz
3) Mustang Max 0.83EC	Zeta-cypermethrin	2.6 oz
4) Karate 1EC	Lambda-cyhalothrin	5.12 fl-oz
5) Holster 2.5EC	Cypermethrin	5.0 fl-oz
6) Belt 480SC	Flubendiamide	2.0 fl-oz
6) Mustang Max 0.83EC + Belt 480SC	Zeta-cypermethrin +Flubendiamide	2.6 fl-oz + 2.0 fl-oz

[a] *All treatments included Dyne-Amic non-ionic surfactant at 0.25% v/v.*

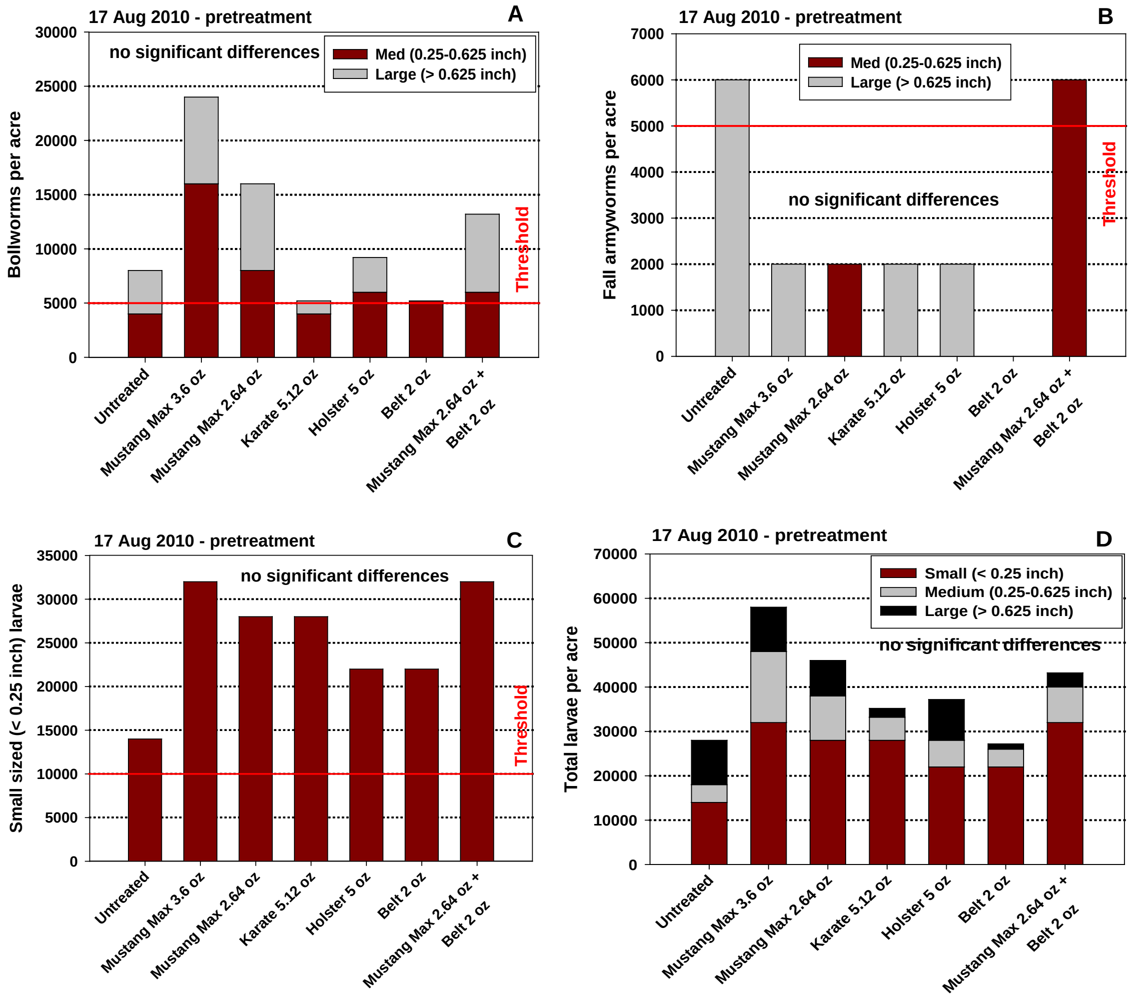

Figure 27. Number of medium and large bollworm larvae per acre before application (A), medium and large fall armyworms (B), total small larvae (C), and total larvae by size (D); no significant differences were detected among any of the treatments for any parameter based on an F protected (LSD, $P \geq 0.05$).

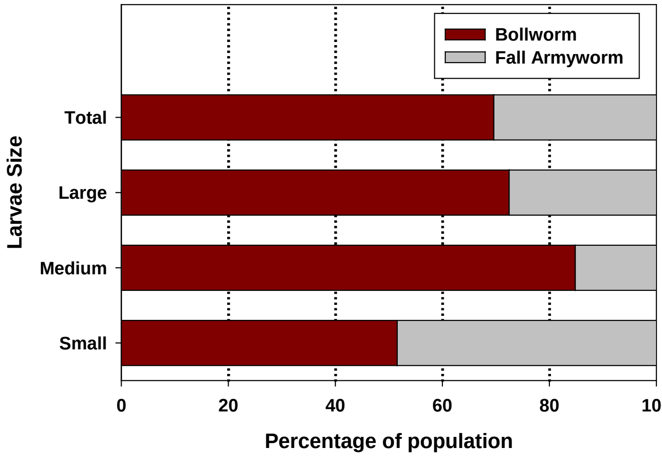

Figure 28. Percentages of bollworms and fall armyworms by size on 17 August, prior to treatment.

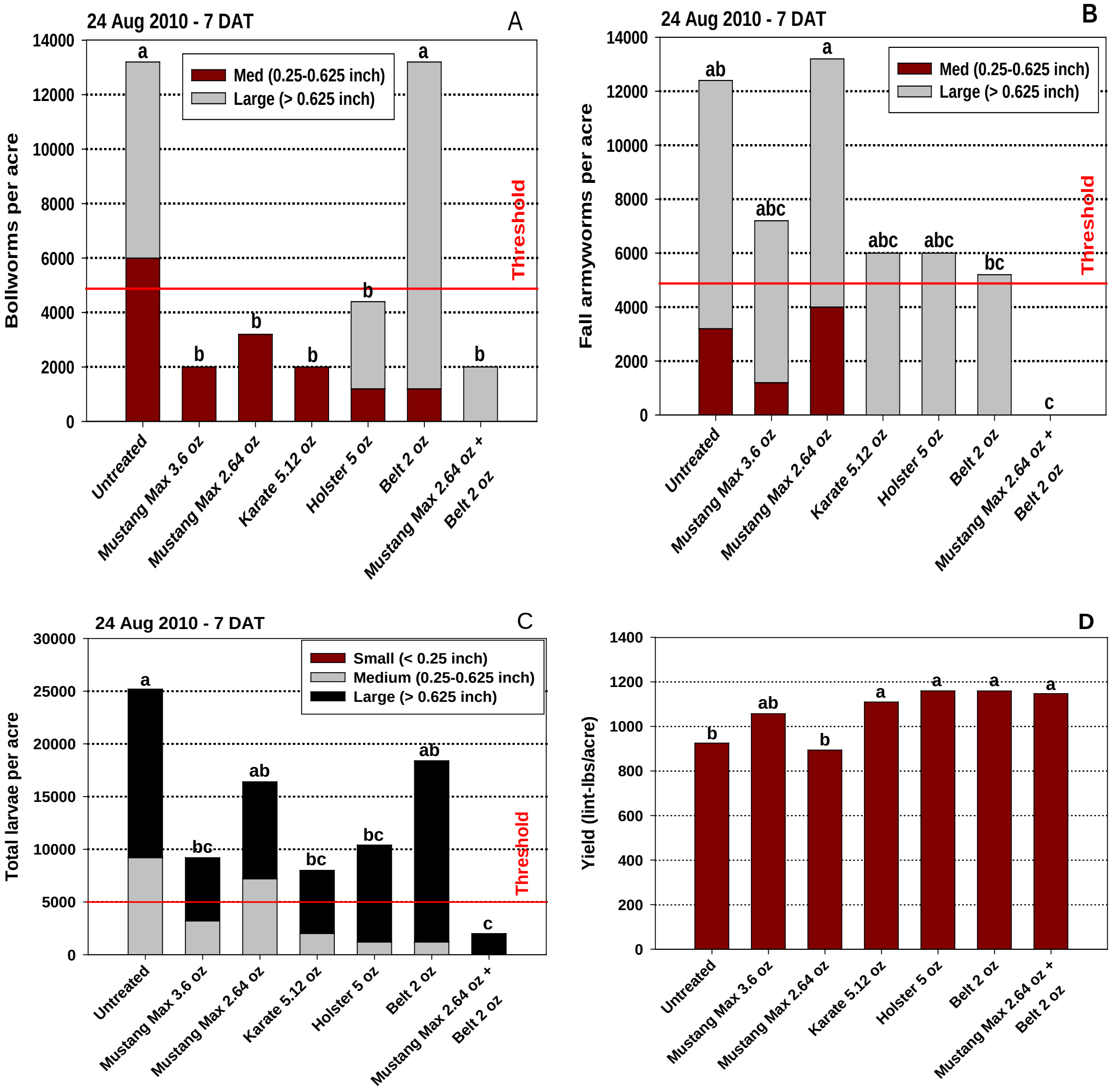

Figure 29. Number of medium and large bollworm larvae per acre 7 days after treatment (A), medium and large fall armyworms (B), total larvae (C), and yield (D); Columns within a chart capped by the same letter are not significantly different based on an F protected (LSD, *P* > 0.05).

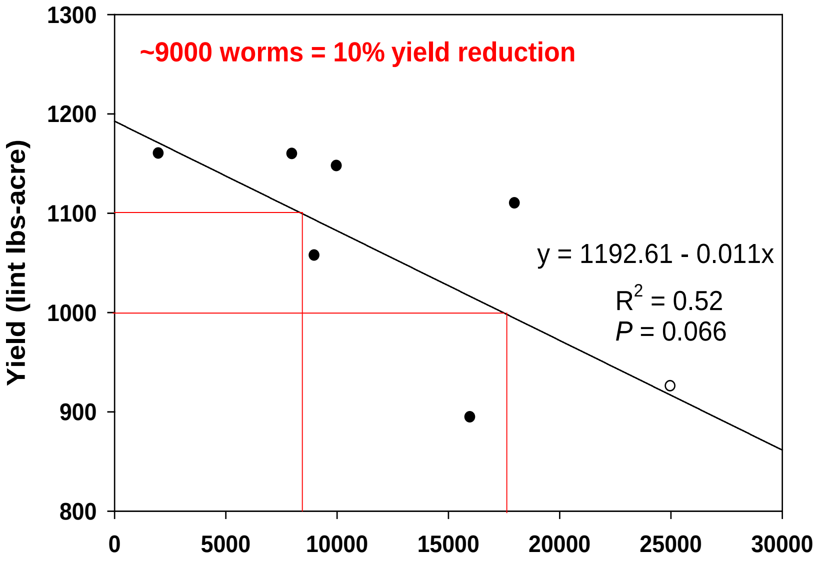

Figure 30. Linear relationship between all sizes of bollworms and fall armyworms and yield.

Making a difference 2010

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Agriculture and Natural Resources

Lubbock County Subsurface Drip Irrigation Phytogen Cotton Innovation Variety Trial, 2010

Cooperators: Casey Jones

Brant Baugh
Extension Agent –Integrated Pest Management

Lubbock County

Summary

Unbiased replicated cotton variety trials over a large geographic area are important to enable producers to make confident management decisions. Therefore, the objective of this study was to evaluate four varieties of Phytogen Cotton, 375, 367, 565 and 519 and compare growth characteristics and harvest results to Fibermax 9180.

The experimental design was a randomized block design with four replications. Plot size was 1,372 feet by eight rows**.** The test was planted on May 10 and stripper harvested on October 14.

Phytogen 367 yielded the most lint in this trial. The test average for lint yield per acre was 1,338 pounds and Phytogen 367 yielded 246 pounds more than the test average. Phytogen 367 and 375 had significantly higher percent lint turnout with 35.62 and 34.85 percent respectively when compared to the other entries (Table 2). The test average for bur cotton yield was 3,351 pounds. Phytogen 367 had the highest bur cotton yield with 3,091 pounds and Phytogen 565 and 375 had the lowest with 3,091 and 3,216 pounds respectively. There were no significant differences in micronaire between any of the varieties with a test average of 4.26. The test average for staple length was 35.98. Fibermax 9180 had the significantly longest staple length with 36.97 and phytogen 375 had the lowest with 35.08. There were not significant differences in percent uniformity with a test average of 82.74. Phytogen 375 had the lowest strength with 28.90 gms./tex and all the remaining entries did not significantly differ and were very close to the test average of 30.5. The test average for lint loan vale was $0.5374. Phytogen 375 had the lowest loan value with 0.5339 and all the remaining varieties did not significantly differ.

Objective

New varieties of cotton are currently entering the market place at a rapid pace.
In addition, varieties are being bred and genetically modified for herbicide tolerance, control of caterpillar pests and nematode and disease resistance which changes some of their inherent agronomic properties. Unbiased replicated cotton variety trials over a large geographic area are important to enable producers to make confident management decisions. Therefore, the objective of this study was to evaluate four varieties of Phytogen Cotton, 375, 367, 565 and 519 and compare growth characteristics and harvest results to Fibermax 9180.

Materials and Methods

The experimental design was a randomized block design with four replications. Plot size was 1,372 feet by eight rows**.** The test was planted on May 10 and stripper harvested on October 14. Lint samples were ginned and quality tested through Dow Chemical. Plant emergence data was taken on May 26 by counting the number of plants in 13.1 feet on the two center rows of each plot. Plant mapping data was taken on September 17th using ten plants per plot. The cotton was irrigated with subsurface drip and 100 pounds of nitrogen were applied in season through the drip tape. Nitrogen applications were applied starting at three true leaves and were terminated during the second week of square. Mepiquat chloride (4oz. per acre) was applied on all plots on May 28 and June 18th. An additional 8 oz per acre of mepiquat chloride was applied on July 2 to Phytogen 519 in all replications due to the average height to node ratio approaching 2 inches the first week in July.

Results and Discussion

The test average for the number of plants in 13.1 foot of row was 42.4. Fibermax 9180 had significantly fewer plants with 28.25 and Phytogen 367 and 375 had the highest with 49.63 and 45.75 respectively (Table 1.). Fibermax 9180 and Phytogen 367 had the lowest plant height with 26.1 and 28.9 inches respectively. Phytogen 565, 375 and 519 were the tallest varieties in this test with plant heights exceeding the 30 inch test average. There were no significant differences in the total number of nodes per plant. Phytogen 375 and 367 were setting fruit at node number six and were significantly lower than the remaining varieties which were setting their first fruit at nodes seven and eight. The test average for nodes above uppermost first position cracked boll (NACB) was 5. Phytogen 367 had significantly lower NACB with 4.02 implying that phytogen 367 is a faster maturing variety when compared to the other entries.

Phytogen 367 and 375 had significantly higher percent lint turnout with 35.62 and 34.85 percent respectively when compared to the other entries (Table 2). The test average for bur cotton yield was 3,351 pounds. Phytogen 367 had the highest bur cotton yield with 3,091 pounds and Phytogen 565 and 375 had the lowest with 3,091 and 3,216 pounds respectively. There were no significant differences in micronaire between any of the varieties with a test average of 4.26. The test average for staple length was 35.98. Fibermax 9180 had the significantly longest staple length with 36.97 and phytogen 375 had the lowest with 35.08. There were not significant differences in percent uniformity with a test average of 82.74. Phytogen 375 had the lowest strength with 28.90 gms./tex and all the remaining entries did not significantly differ and were very close to the test average of 30.5.

The test average for lint loan vale was $0.5374. Phytogen 375 had the lowest loan value with 0.5339 and all the remaining varieties did not significantly differ.

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Table 11. In season plant measurement results from the Lubbock County subsurface drip irrigation Phytogen Innovation trial, Casey Jones Farm, 2010

		End of season plant mapping for September 17			
Treatment	Number of plants in 13.1 feet for May 26	Height in inches	Total number of nodes	Node number of first fruiting branch	Nodes Above upper most first position cracked boll
Phytogen 375	45.75 ab	31.39 ab	18.25 a	6.08 c	5.28 a
Phytogen 367	49.63 a	28.9 bc	17.17 a	5.82 c	4.02 b
Phytogen 565	44.0 b	32.04 a	19.15 a	6.80 b	5.9 a
Phytogen 519	44.25 b	29.70 ab	17.88 a	7.73 a	5.18 a
Fibermax 9180	28.25 c	26.12 c	22.0 a	7.0 b	5.05 ab
Test Average	42.38	29.63	18.89	6.68	5.09
CV %	6.88	6.57	11.47	7.01	13.1
OSL	0.0001	0.0082	0.062	0.0007	0.0248
LSD	4.492	3	NS	0.722	1.027

For number of plants in 13.1 feet, numbers of plants represent the average in 13.1 ft in the middle tow rows of each plot.
CV – coefficient of variation
OSL – observed significance level, or probability of a greater F – value
LSD – least significant difference at the 0.05 level, NS – Not significant

Table 12. Harvest results from the Lubbock County subsurface drip irrigation Phytogen Innovation trial, Casey Jones Farm, 2010

Treatment	Lint turnout	Burr Cotton Yield	Lint yield	Micronaire	Staple	Uniformity	Strength	Color	Lint Loan Value
	%	Pounds	Pounds	units	32^{nds} inch	%	g/tex		….$/lb….
Phytogen 375	34.85 a	3216.0 cd	1336.0 b	4.25 a	35.08 d	82.30 a	28.90 b	23.5	0.5339 b
Phytogen 367	35.62 a	3736.5 a	1584.5 a	4.25 a	35.63 c	82.88 a	30.72 a	23.5	0.5376 a
Phytogen 565	33.53 b	3091.0 a	1233.5 c	4.25 a	35.80 c	83.08 a	30.62 a	26.0	0.5385 a
Phytogen 519	33.23 b	3371.5 b	1334.5 b	4.30 a	36.43 b	82.80 a	30.92 a	26.0	0.5385 a
Fibermax 9180	30.22 c	3340.5 bc	1201.8 c	4.25 a	36.97 a	82.65 a	31.55 a	21.0	0.5385 a
Test Average	33.0	3351.1	1338.05	4.26	35.98	82.74	30.55	24	0.5374
CV %	2.31	2.83	3.65	2.64	0.88	0.66	2.03	-----	0.28
OSL	0.0001	0.0001	0.0001	0.9559	0.0001	0.3924	0.0008	-----	0.003
LSD	1.194	145.94	75.22	0.173	0.487	0.837	0.954	-----	0.002308

CV – coefficient of variation
OSL – observed significance level, or probability of a greater F – value
LSD – least significant difference at the 0.05 level, NS – Not significant