AgriLIFE EXTENSION
Texas A&M System

- 2009-

Results of Insect Control Evaluations on Corn, Sorghum, Cotton & Pastures in Texas Coastal Bend Counties

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TRIBUTE TO COTTON INCORPORATED

Cotton Incorporated was organized in 1970 in response to eroding markets for cotton from synthetic fibers. It became the cotton producer's company for research, development and promotion. Cotton Incorporated's contributions through their supported activities include development of the Seal of Cotton, funding of research that led to the cotton module builder (Gary Underbrink, Kleberg County, was involved as an engineer in the development work), the fabric of our lives campaign, improvements in the acid seed delinting process (George Slater, former Corpus Christi AgriLife Research Center Director, oversaw this work), improvements in gin technique and operation, increase in demand for cotton (from 15 to 35 pounds/person over a 30 year period), development through research funding of high volume instrument classing, development of the engineered fiber selection system for the textile industry, and many others.

The agricultural research arm of Cotton Incorporated focuses on practical matters of crop yield and fiber quality; insect, disease, and weed control; and processing. It has benefited cotton growers by increasing demand and lowering costs in demonstrable ways. State Support Program Committees made up of producer representatives from the cotton states determine where best to allocate a portion of the research funds. Current representatives from our region include Danny May, Keith Bram, Marvin Beyer, Jr., and Jim Massey, IV.

In the discipline of entomology significant funding has been devoted to almost every phase of insect management technique and practice. Areas of supported work include insect resistance monitoring to chemicals and technology, boll weevil eradication research support, treatment threshold development, effects of production practices on insect population dynamics, development of the Cotton Management Expert System Software (COTMAN), and study devoted to specific cotton insect pests and beneficials.

A highlight of my career has been to attend the Cotton Incorporated report given each year at the Production Conference of the Beltwide Cotton Conferences. Additionally, personnel from Cotton Incorporated have always responded when we needed their participation on programs in our region. The information they provided was a factor which led to improvement in yield and fiber quality of the region's cotton. Cotton Incorporated is hereby thanked for their promotion of cotton and the many innovations in which they have had a part.

Special thanks are extended to Ms. Velma Villalon, Office Assistant for Entomology, Soil and Crop Sciences, and Agricultural Economics at the Texas AgriLife Research and Extension Center, Corpus Christi, TX for preparation of this report.

FOREWORD

This document contains reports of applied research/demonstration projects conducted by Texas AgriLife Extension Service dealing with management of arthropod pests and production practices. Objectives of the studies were to find cost effective ways to manage pests and to improve production. Experiments were conducted with commercial agricultural producers in cooperation with county Extension agents, county row crop committees, agricultural consultants, and agribusiness companies. Coastal Bend farm cooperators are acknowledged for providing land, equipment, labor, time, ideas, and other assistance in support of these projects.

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. Results from one experiment may not represent conclusive evidence that the same response would occur where conditions vary.

A few reports contain calculations of added return over treatment costs based on numerical differences in yield. It must be kept in mind that the returns attributed to treatment are not absolute, i.e. the yield differences may have been the result of other variables not associated with the treatment. The reader should always consider the statistical analysis and data from multiple tests over space and time in making judgments concerning economic returns.

This report and others are available for previous years at the following web site http://agfacts.tamu.edu/~rparker. If you have comments or questions about the reports contained herein, contact:

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EVALUATION OF CRUISER AND PONCHO TREATED CORN SEED AT THREE RATES FOR CHINCH BUG CONTROL AND EFFECT ON YIELD

Lawrence Hinze Farm, Lavaca County, Texas, 2009

Roy D. Parker and Shannon DeForest
Extension Entomologist and County Extension Agent, respectively

SUMMARY: Systemic insecticides evaluated as seed treatments on corn included 0.25, 0.5, and 1.25 mg ai/seed for Cruiser and Poncho brands. Significantly more chinch bugs were found in the nontreated corn 22 and 36 DAP (days after planting) compared to all insecticide treatments. The only insecticide treatment to exceed the treatment threshold of 40 bugs/100 plants at 22 DAP was Cruiser 250 (0.25 mg ai/seed) at which time they numbered 53/100 plants. One week later following significant rainfall, very few chinch bugs could be found at the site (counts were only made in plots without insecticide treatment and not reported herein). Chinch bug numbers declined in all plots by 36 DAP but were still above 40 per 100 plants in the nontreated corn (68 bugs/100 plants). The number of chinch bugs encountered even in the nontreated plots did not persist at high numbers long enough to significantly affect corn yield nor was enough soil moisture present to produce good yields. Even though there were statistical differences in yield, we could not determine reasons for these differences. However, there was a slight trend for the lower plant populations to produce higher yields. The yield trends may have occurred because of the very dry conditions which limited yield potential.

OBJECTIVE: Evaluations were made to compare various rates of two systemic insecticide seed treatments on chinch bug and corn yield.

MATERIALS/METHODS: Dekalb DKC67-21 hybrid corn seed was planted March 18, 2009 on the Lawernce Hinze Farm in Lavaca County. Soil temperature at 3 inch depth was 62°F, moisture content was fair, and 15,261 seed were planted/acre on the 38-inch rows. The intent was to plant 19,000 seed/acre, but incorrect planter plates were selected resulting in a lower planting rate. The test location was approximately 2 miles northeast of Shiner, Texas on a sandy loam soil (73% sand, 10% silt, 17% clay) containing 1.44% organic matter and a pH of 4.8. Individual plots were 4 rows and averaged 1257 in length planted with a 4-row IH87 buster type planter. The test was arranged in a randomized complete block design with 4 replications of the treatments.

Fertilizer applied pre-plant was 85-15-7-7S plus 0.74 lb zinc per acre. Corn had been planted at the site for over a decade. Atrazine 4L (1.2 pints/acre) was applied in a band at-planting. Later in the growing season glysophate herbicide was applied for weed control. Few weeds were present in the test on the harvest date.

Treatments were assessed by (1) counting the number of corn plants on 10-row feet in each of the center two rows in plots on April 1, (2) counting the number of chinch bugs on 10 plants/plot 22
DAP (April 9) and 36 DAP (April 23) with counts made on each end of the test field for the second set of counts, and (3) harvesting entire plots with the farmer's 4-row combine and weighing the corn on a weigh wagon on July 17. Grain moisture and bushel weights were determined for each plot and plot yields were converted to a 15% moisture standard. Data were analyzed by ANOVA at the 5% probability level with Agriculture Research Manager (ARM revision 6.1.13) software.

RESULTS/DISCUSSION: Except for a good rain when corn plants were about 1-foot tall very little rain fell for the remainder of the season. Yield potential was greatly reduced by the lack of rain and may have affected the yields obtained.

Statistical differences were observed in plant stands and in chinch bug numbers (Table 1). We cannot explain the differences in plant stand. Chinch bug numbers were significantly higher in the nontreated corn on both inspection dates. The bugs were almost 3 times the established foliar treatment threshold of 40/100 plants at 22 DAP; only one other treatment (Cruiser 0.25 mg ai/acre) exceeded the treatment threshold on the first inspection date. By 36 DAP only the nontreated corn exceeded this threshold, and even then, their numbers were moderate for the size of corn plants. In fact, chinch bug numbers had declined substantially by the second inspection date. About a week following the second set of counts heavy rainfall reduced chinch bug numbers so low that counts were only made in the nontreated plots. There numbers are not included in this report.

No differences were found in grain moisture or bushel weight, but statistical differences did occur in the yield data (Table 2). Poncho at the 0.5 mg ai/seed rate had significantly more yield than any of the other treatments except for Poncho 0.25 mg ai/seed rate. Ironically, Poncho (1.25 mg ai/acre) had the lowest yield in the test. We were not able to explain these results except for a possible trend for higher yield levels in where plant stands were lower. The drought conditions may have favored lower plant stands for grain development. Conditions were not correct in this test to make any conclusions about the economic effect of the seed treatments. We did observe, however, significant reduction in chinch bug numbers at all rates tested on both inspection dates. Additional studies must be conducted to determine the efficacy of the seed treatments and their rates.

ACKNOWLEDGMENTS: Sincere thanks are extended to Mr. and Mrs. Lawrence Hinze for their long-time support of field studies on corn. Appreciation is expressed to the Monsanto Company for providing funds for conduct of the study and special help with weighing the corn from each of the 28 plots.

Table 1. Plant stand and chinch bug numbers as affected by systemic insecticide treatments applied to corn seed, Lawrence Hinze Farm, Lavaca County, TX, 2009.

Treatment	Rate mg ai/seed	Plants 1000's/acre	Chinch bugs/10 plants	
			22 DAP[1/]	36 DAP
Poncho	0.25	14.5[cd]	2.3[b]	0.3[b]
	0.50	14.5[cb]	3.3[b]	0.0[b]
	1.25	16.4[a]	2.3[b]	0.1[b]
Cruiser	0.25	15.9[ab]	5.3[b]	1.5[b]
	0.50	15.1[bcd]	1.0[b]	0.1[b]
	1.25	14.2[d]	3.5[b]	1.5[b]
Nontreated		15.4[bc]	11.8[a]	6.8[a]
LSD (P = 0.05)		1.02	6.27	1.75
P > F		.0021	.0373	.0001

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]DAP = Days After Planting

Table 2. Moisture, bushel weight, and yield of corn as affected by systemic insecticide treatments applied to seed, Lawrence Hinze Farm, Lavaca County, TX, 2009.

Treatment	Rate mg ai/seed	% moisture at harvest	Bushel Weight	Yield bu/acre[1/]
Poncho	0.25	10.7[a]	54.7[a]	47.7[ab]
	0.50	10.9[a]	54.3[a]	49.8[a]
	1.25	11.2[a]	54.6[a]	44.0[d]
Cruiser	0.25	10.8[a]	54.5[a]	47.0[bc]
	0.50	10.7[a]	54.7[a]	45.1[bcd]
	1.25	10.9[a]	54.4[a]	44.6[cd]
Nontreated		10.7[a]	54.1[a]	44.7[cd]
LSD (P = 0.05)		NS[2/]	NS	2.58
P > F		.3578	.1396	.0016

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/] Yield corrected to 15% moisture
[2/] NS = Not Significant

SYSTEMIC INSECTICIDES APPLIED TO CORN SEED FOR CONTROL OF SOIL DWELLING INSECT PESTS

M Plus Land Company Farm, Colorado County, Texas, 2009

Roy D. Parker
Extension Entomologist

SUMMARY: No chinch bugs were observed in the field study at 20 days after planting (DAP), but by 29 DAP low numbers were observed in the nontreated corn. None were found in the insecticide treated corn. No statistical differences among the treatment were found in plant stand, vigor rating, number of harvested corn ears, grain moisture at harvest, or grain yield. A statistically difference was observed in bushel weight, but this difference was thought largely to be due to uneven production caused by extreme drought conditions. The yield average across the entire test was only 14.1 bushels/acre.

OBJECTIVES: The field study was designed to compare the effectiveness of Cruiser and Poncho on soil insect pests (chinch bug), and to evaluate three rates of each product.

MATERIALS/METHODS: Dekalb DKC67-21 hybrid corn seed was planted March 25, 2009 on the M Plus Land Company Farm in Colorado County. The test site was located next to Strickland Lane just north of FM 2614. The planter was a John Deere 7100 2-row equipped with research Almaco 31 cell cones to deliver 45 seed in each row of the plots. Individual plots were 4 rows by 30 feet arranged in a randomized complete block design with 4 replications.

The soil temperature at planting depth was 63ºF, soil moisture content was good, and 20,634 seed were planted/acre on the 36-inch rows. The soil was a silt loam (33% sand, 52% silt, 15% clay) containing 1.65% organic matter and a pH of 8.1. The herbicides Dual II Magnum (1.3 pints/acre) + Atrazine 4L (1.0 quart/acre) were broadcast over the test site immediately following planting. Fertilizer consisted of 130 units of anhydrous ammonia applied at the end of April. One good rain event occurred at the test site before the end of May.

Treatments were assessed by (1) counting the number of plants on 10-row feet in each of the center 2 rows of plots on April 7, (2) counting the number of chinch bugs around 10 plants/plot on April 14 and 23, (3) estimating plant vigor on May 1 at 36 DAP [1= excellent with no observed plant growth affects up to 5= severe stunting, uneven plant growth, wilting, and yellow color], and (4) harvesting by hand 27.5 feet/plot [half from each of the center 2 rows] on July 21. Plot samples were threshed on a research machine and grain weights were adjusted to 15% moisture for presentation. Agriculture Research Manager (ARM revision 6.1.13) software was used to conduct analysis of variance, and means were separated by LSD.

RESULTS/DISCUSSION: No chinch bugs were observed in plots 20 DAP; although there were significantly more found in the nontreated corn at 29 DAP (Table 1). Their numbers were nevertheless well below the established economic treatment threshold. No differences were measured in plant stand or vigor rating.

Harvest data is given in Table 2. No differences were found in the number of ears harvested, grain moisture, or yield. There were statistical differences in bushel weights, but there was no consistency in the data and the differences were not believed to be due to the treatment. Meaningful data was not obtained from the test due to very low chinch bug numbers and severe drought. Additional tests are needed to compare the two seed treatments at the rates outlined in this study to determine cost effectiveness.

ACKNOWLEDGMENTS: Thanks are extended to Al, Calvin, Raymond, Stephen, and Chad Mahalitc for their interest in conducting field studies. They give willingly of their time, provide equipment, make suggestions, and exhibit a warm spirit even when times are bad such as the drought conditions that existed at the test location. Appreciation is expressed to Monsanto for their support.

Table 1. Chinch bug numbers and plant vigor ratings in corn treated with systemic insecticide applied to corn seed, M Plus Land Company Farm, Colorado County, TX, 2009.

Treatment	Rate mg ai/seed	Plants 1000's/acre	Chinch bugs/10 plants 20 DAP[2/]	Chinch bugs/10 plants 29 DAP	Vigor rating[3/]
Poncho	0.25	20.5[a]	0.0[a]	0.0[b]	1.8[a]
	0.50	20.0[a]	0.0[a]	0.0[b]	3.1[a]
	1.25	22.3[a]	0.0[a]	0.0[b]	1.6[a]
Cruiser	0.25	20.9[a]	0.0[a]	0.0[b]	2.4[a]
	0.50	21.1[a]	0.0[a]	0.0[b]	2.0[a]
	1.25	21.1[a]	0.0[a]	0.0[b]	2.3[a]
Nontreated		20.1[a]	0.0[a]	1.5[a]	2.1[a]
LSD (P = 0.05)		NS[1/]	NS	0.72	NS
P > F		.5844	1.000	.0024	.5439

Means in a column followed by the same letter are not significantly different by ANOVA.

[1/] NS = Not Significant

[2/] DAP = Days After Planting on April 14 and 23, respectively.

[3/] Vigor Ratings: 1 = No observed plant growth affects up to 5 = severe stunting, uneven plant growth, wilting and yellow color.

Table 2. Ear production, grain bushel weight and moisture, and yield in corn treated with systemic insecticide applied to corn seed, M Plus Land Company Farm, Colorado County, TX, 2009.

Treatment	Rate mg ai/seed	Harvested corn ears/27.5 ft	Bushel weight	Grain moisture %	Yield bu/acre[2/]
Poncho	0.25	19.3[a]	49.5[c]	14.4[a]	14.3[a]
	0.50	17.8[a]	50.3[b]	15.1[a]	13.0[a]
	1.25	17.0[a]	49.5[c]	11.8[a]	13.4[a]
Cruiser	0.25	19.8[a]	51.3[a]	14.0[a]	18.4[a]
	0.50	22.0[a]	50.5[b]	14.9[a]	13.4[a]
	1.25	16.8[a]	50.5[b]	14.6[a]	13.7[a]
Nontreated		14.8[a]	50.5[b]	15.5[a]	12.6[a]
LSD (P = 0.05)		NS[1/]	0.45	NS	NS
P > F		.9885	.0001	.7475	.9876

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]NS = Not Significant
[2/]Low yield due to very dry conditions

EVALUATION OF CORN HYBRIDS FOR LEVEL OF PROTECTION AGAINST CORN EARWORM

M Plus Land Company Farm, Colorado County, Texas, 2009

Roy D. Parker
Extension Entomologist

SUMMARY: VT3Pro (DKC67-21) hybrid corn significantly reduced corn earworm numbers and damage compared to two standard BT hybrids and a non-BT hybrid. Corn earworm numbers were found to be nearly 86% lower, ear damage was reduced by an average of 75%, and significantly less kernel and ear tip damage was found in the VT3Pro hybrid. Ear tip damage was significantly greater in the non-BT hybrid. Even though no yield differences were measured statistically, the lowest yield occurred in the non-BT hybrid planting. Aflatoxin levels were numerically lower in the VT3Pro hybrid, but statistical analysis was not possible since the readings represented composite of the corn from each of the 4 replications.

OBJECTIVE: The study was conducted to assess the impact of BT corn on caterpillars (corn earworm) and to determine subsequent aflatoxin levels.

MATERIALS/METHODS: Four corn hybrids were planted on March 23, 2009 on the M Plus Land Company Farm with a 7300 MaxEmerge 2 Vacumeter 8-row planter delivering 22,000 seed/acre. The test site was located along Strickland Lane north of FM 2614. Row spacing was 36 inches and plots were 660 feet long by 8 rows wide with 4 replications of each hybrid arranged in a randomized complete block experimental design. All seed was treated with Poncho 1250, soil moisture at planting was good at a temperature of 62º F, and cotton had been planted on the site the previous season. The soil was a silt loam (33% sand, 52% silt, 15% clay) containing 1.65% organic matter at a pH of 8.1.

Fertilizer consisted of 11-34-0 at 4 gpa + Nutrapack (1.0 quart/acre). Anhydrous ammonia at 130 units/acre was applied at the end of April. One good rain event occurred at the test site before the end of May. Herbicide applied at planting in a 16-inch band was Atrazine 4F (1.1 quarts/acre) + Dual (1.0 quarts/acre) + permethrin (3.6 ounces/acre). The permethrin was applied for potential black cutworm.

Treatments were assessed by (1) counting the number of plants in 10-row feet on each of the center two rows in each plot on April 3, (2) examining 10 ears/plot from the center rows on June 15 at the brown silk stage for ear tip damage and number of caterpillars, (4) harvesting 25 ears/plot from the center rows on July 1 to determine damaged kernels and maximum depth of damage from the ear tip, and (5) examining 10 stalks/plot for sugarcane and Mexican rice borer damage. The 8-row plots were harvested with a commercial machine and the grain was weighted on a seed company weigh wagon on July 28. Samples (3-5 lb) were obtained for aflatoxin analysis. Moisture and bushel weights were determined, and the corn weights were converted to

the standard 15% moisture level. Agriculture Research Manager (ARM revision 6.1.13) software
was used to conduct analysis of variance, and means were separated by LSD at the 0.05 level.

RESULTS/DISCUSSION: DKC67-22 and DKC67-23 plant stands were significantly higher than the other two hybrids evaluated (Table 1), but reasons for the difference are unknown. Plant stands for each hybrid were adequate and ranged from 20,700 to 23,500 per acre. At brown silk significantly fewer corn earworm larvae and damaged ears were found in the DKC67-21 (VT3Pro) hybrid. No fall armyworm larvae were detected in these ear samples.

Another set of ears (25/plot) were obtained as ears began to dry down which contained significantly less damage in the VT3Pro compared with the other three hybrids (Table 2). Aflatoxin levels were numerically lowest in the VT3Pro hybrid, but since the reading was obtained from a composite sample of corn from each replication there is no way to determine if this level was any different from those from the other tested hybrids. Differences were found in bushel weight of the harvested corn, but there were no differences in the yield data. However, the non-BT hybrid (DKC67-22) had numerically a lower yield compared with the three BT hybrids. This study did demonstrate that the advanced BT hybrid (VT3Pro) would provide enhanced control of corn earworm.

ACKNOWLEDGMENTS: The Mahalitc brothers are thanked for their interest and help in conducting this field study. Monsanto is credited with monetary support of the project.

Table 1. Plant stand and caterpillar numbers at brown silk stage in corn hybrids, M Plus Land Company Farm, Colorado County, TX, 2009.

			Caterpillars/10 ears		
			Corn earworm		Fall armyworm
Hybrid	Type	Plant 1000's/acre	# larvae	% da. ears	# larvae
DKC67-21	VT3Pro	20.7[b]	1.3[b]	17.5[b]	0.0[a]
DKC67-22	RR	23.0[a]	8.5[a]	100.0[a]	0.0[a]
DKC67-23	YGCB/RR	23.5[a]	11.0[a]	92.5[a]	0.0[a]
PIO 31G96	HX1/LLRR2	21.1[b]	8.0[a]	85.0[a]	0.0[a]
LSD (P = 0.05)		1.06	3.90	16.65	NS[1/]
P > F		.0004	.0019	.0001	1.000

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/] NS = Not Significant

Table 2. Damage to ears by corn earwom, aflatoxin level and yield factors in corn hybrids, M Plus Land Company Farm, Colorado County, TX, 2009.

Hybrid	Type	# da. kernels/ear	Max. da. cm/ear tip	Aflatoxin ppb	Bushel Weight	Yield bu/acre
DKC67-21	VT3Pro	9.1[b]	1.1[c]	15.2[1/]	52.0[b]	46.1[a]
DKC67-22	RR	33.8[a]	4.4[a]	82.6	50.9[c]	39.4[a]
DKC67-23	YGCB/RR	34.2[a]	3.8[b]	307.9	51.4[c]	43.8[a]
PIO31G96	HX1/LLRR2	28.6[a]	3.7[b]	32.3	54.5[a]	46.9[a]
LSD (P = 0.05)		8.10	0.45	-	0.55	7.46
P > F		.0002	.0001	-	.0001	.1760

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Aflatoxin levels represent the composite of the corn from each of the 4 replication; therefore, statistical analysis was not possible.

EVALUATION OF AGRISURE® SYNGENTA COMPANY CORN HYBRID FOR ENHANCEMENT OF CORN EARWORM CONTROL

Alan Stasney Farm, Fort Bend County, Texas, 2009

Roy D. Parker, Brad Minton, and Joe W. Mask
Extension Entomologist; Senior Scientist, Syngenta Crop Protection; and County Extension Agent; respectively

SUMMARY: A Bt11+MIR604+GA21+ MIR1621 trait stack corn hybrid from Syngenta Seeds, Inc. provided excellent protection from fall armyworm feeding in the whorl stage and corn earworm feeding on ears. The corn hybrid with the new trait stack was compared to a standard BT hybrid and one without BT genes. Reduction of damage on ears was observed in percentage of ear tip damage, number and square centimeters of kernel damage, overall damage to ears, and aflatoxin levels were significantly reduced compared with the Agrisure GT (non-BT) hybrid. Even though the aflatoxin level was much lower (21.6 compared with 128.0 ppb) in the new BT hybrid it was not statistically different from the Agrisure 3000GT hybrid containing Bt11 event

OBJECTIVE: The field study was conducted to evaluate the effectiveness of a new genetically engineered corn hybrid for effectiveness on caterpillar pests especially those that feed on corn ears such as corn earworm and fall armyworm. A second objective was to determine if there were benefits gained through reduction in aflatoxin.

MATERIALS/METHODS: Three corn hybrids were planted May 6, 2009 on the Alan Stasney Farm north of Kendleton, Texas, with a John Deere model 7100 2-row planter equipped with cone seed dispensers. Plots were 6 rows by 24 feet, and 35 seeds were planted in each row. The test was arranged in a randomized complete block design with 6 replications of each hybrid treatment. A Garst® brand Agrisure CB/LL hybrid containing the Bt11 event was planted in 24 foot plots on each end and in 6 rows along the sides of the study.

The site was maintained under regulation by USDA rules with isolation from other corn and strict adherence to other test rules. An overhead irrigation system was used to maintain good soil moisture. Glyphosate herbicide was applied as needed to eliminate weed competition.

Treatments were assessed by (1) looking for caterpillar damage at weekly intervals from emergence until harvest, (2) counting the number of plants on the center two rows of plots on May 13 [seedling stage] and again on July 24 [dent stage], (3) evaluating damage by fall armyworm by examining 20 plants/plot at the whorl stage just before tassel and scoring damage with the Davis/Wiseman system on May 27, (4) examining 10 ears/plot at the brown silk stage on June14 for caterpillars and ear tip damage [corn earworm were separated into small, medium, and large size], and (5) collecting 20 ears from each plot [not from the center two rows designated for harvest] on July 24 to evaluate damage. The number of damaged kernels was determined along with measurements for square centimeters of ear damage, and maximum centimeters from tips that caterpillars caused damage. The center two rows in plots were

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1 The MIR162 event is not currently approved for sale or use in the United States and is therefore not being offered for sale. This product will not be available for sale until all necessary regulatory approvals have been granted.

harvested with a 2-row research combine on August 31. Moisture level and bushel weight measurements were made and weights were converted to the standard at 15% moisture. All harvested grain (6 to 13.7 pounds) from each plot was ground and a sample was obtained for fine grinding with a Romar Mill (series 2a). Aflatoxin levels were then measured using a Vicam Series-4 Fluorometer Model V2 testing kit (Afla Test FGIS method).

Agriculture Research Manager (ARM revision 6.1.13) software was used to conduct analysis of variance, and means were separated by LSD at the 0.05 probability level.

RESULTS/DISCUSSION: The Bt11 + MIR162 (advanced BT) trait stack combination provided statistically the highest level of protection against fall armyworm feeding in whorl stage corn when the analysis was based upon damaged plants only (Table 1). There was no statistical difference in fall armyworm damage rating between the Bt11 hybrid and the Bt11 + MIR162 stack hybrid when all examined plants were included in the analysis; however, in all cases these hybrids had statistically less damage than did the non-BT hybrid.

The percentage of the ears damaged and total number of corn earworm larvae at the brown silk stage were not different between the Bt11 and non-BT hybrid, but the number of large larvae was statistically higher in the non-BT hybrid (Table 2). Even though the Bt11 hybrid did not reduce the total number of larvae their development was much slower on that hybrid compared to the non-BT hybrid. No corn earworm or fall armyworm live larvae were found in the Bt11 + MIR162 hybrid. Only a few fall armyworm larvae were found on ears at the test site.

Corn ears evaluated near harvest for damage, aflatoxin, and yield are given in Table 3. Ear damage was very low in the Bt11 + MIR162 stack hybrid and statistically less in all measured parameters compared to the other two hybrids. The Bt11 hybrid contained less damage when compared to the non-BT hybrid, but the protection of the ears from corn earworm in this hybrid was not near as striking as obtained by the corn hybrid containing the MIR162 event. Aflatoxin levels were significantly lower in the MIR162 hybrid compared with the non-BT hybrid but only numerically lower than the level found in the Bt11 hybrid. Bushel weight was lowest in the non-BT hybrid. The test was planted so late that pollination of ears was reduced by the high temperatures resulting in lower corn yield. Yield differences were observed, but due to the late planting date it probably has little meaning. Numerically, the lowest yielding hybrid was the non-BT hybrid.

Additional testing with planting on optimum dates for South Texas corn should be carried out. These preliminary results show dramatic reduction in damage to ears by corn earworm and lower aflatoxin levels as a result of less damage in ears in the Bt11 + MIR162 stack hybrid.

ACKNOWLEDGMENTS. Thanks are extended to Alan Stasney for providing land for establishment of the study and to Syngenta Crop Protection and Syngenta Seeds.

Table 1. Plant stand and whorl stage fall armyworm damage measurements in genetically engineered corn, Alan Stasney Farm, Ford Bend County, TX, 2009.

	Plant/24 ft.		Fall armyworm		
			Davis/Wiseman score		% damaged
Cultivar	7 DAP[1/]	79 DAP	all plants	da. plants only	plants
Bt11 + MIR604 + GA21 + MIR162 stack	33.5[a]	33.8[a]	0.0[b]	0.0[c]	0.0[b]
Agrisure 3000GT stack (BT11 + MIR604 +GA21)	33.5[a]	33.3[a]	0.2[b]	2.3[b]	4.2[b]
Agrisure GT (GA21)	33.4[a]	33.7[a]	1.4[a]	6.0[a]	21.7[a]
LSD (P = 0.05)	NS[2/]	NS	.840	2.16	10.99
P > F	.9820	.7082	.0086	.0004	.0031

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]DAP = Days After Planting
[2/]NS = Not Significant

Table 2. Evaluation of caterpillar damage to ears in genetically engineered corn, Alan Stasney Farm, Fort Bend County, TX, 2009.

Cultivar	% ears with tip damage	Corn earworm (#/10 ears)[1/]				Fall armyworm (#/10 ears)
		small	medium	large	total	
Bt11 + MIR604 + GA21 + MIR162 stack	20[b]	0.0[a]	0.0[b]	0.0[b]	0.0[b]	0.0[a]
Agrisure 3000 GT (Bt11 + MIR604 +GA21)	93[a]	1.2[a]	3.7[a]	2.5[b]	7.3[a]	0.8[a]
Agrisure GT (GA21)	100[a]	0.0[a]	0.8[b]	6.7[a]	7.5[a]	0.2[a]
LSD (P = 0.05)	12.2	NS[2/]	1.47	2.74	3.27	NS
P > F	.0001	.4019	.0006	.0010	.0006	.1160

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Brown silk
[2/]NS = Not Significant

Table 3. Corn earworm damage to ears, aflatoxin level, and yield associated with genetically engineeredAlan Stasney Farm, Bort Bend County, TX 2009.

Cultivar	# da. kernels/ear	Max da. cm/ear tip	Ear da. sq cm/ear	Aflatoxin ppb	Bushel weight	Yield bu/acre
Bt11 + MIR604 + GA21 + MIR162 stack	0.2[c]	0.1[c]	0.2[c]	21.6[b]	55.1[a]	45.7[ab]
Agrisure 3000 GT (Bt11 + MIR604 +GA21)	13.2[b]	4.3[b]	7.2[b]	128.0[ab]	54.5[a]	55.0[a]
Agrisure GT (GA21)	42.7[a]	10.0[a]	26.8[a]	268.3[a]	53.0[b]	37.3[b]
LSD (P = 0.05)	5.14	1.02	4.47	165.2	0.59	9.87
P > F	.0001	.0001	.0001	.0237	.0001	.0087

Means in a column followed by the same letter are not significantly different by ANOVA.

Agrisure® is a trademark of a Syngenta Group Company.
Garst® is a trademark of Garst Seed Company.

EVALUATION OF SORGHUM HYBRIDS, INSECTICIDE SEED TREATMENTS AND HERBICIDE PROTECTANT COMBINATIONS FOR EFFECTIVENESS AND CROP SAFETY

Gary Obenhaus Farm, Colorado County, 2009

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SUMMARY: Although there were some early season differences in plant vigor and chinch bug numbers on early inspection dates and in midge damage in one hybrid late in the season, the seed protectant packages from Bayer and Syngenta companies appeared to provide similar protection based on the yield data.

OBJECTIVE: Compare the effectiveness of insecticide, fungicide, and herbicide protectant packages from Bayer CropScience and Syngenta Crop Protection on sorghum for plant damage, effect on plant stand and insect pests, and effect on grain yield.

MATERIALS/METHODS: The field study was planted on March 25, 2009 in a field farmed by Gary Obenhaus south of Eagle Lake, Texas in Colorado County. Corn had been grown on the site for several years. Seed was planted with John Deere 7100 2-row equipment with research Almaco 31 cell cones calibrated to deliver 130 seed in each of the 30-foot plots. The test was planted in 4-row plots on rows with 38-inch centers in a randomized complete block experimental design with 4 replications of the treatments.

The soil temperature at planting depth was 60ºF, soil moisture was excellent, and 59,609 seed were planted/acre. The soil was clay (33% sand, 26% silt, 41% clay) containing 2.45% organic matter and had a pH of 7.6. Herbicide applied broadcast immediately following planting consisted of Atrazine 4L (1.0 quart/acre) + Dual II Magnum (1.3 pints/acre). The herbicide was applied in 10 gpa volume at a pressure of 30 psi at 4 mph through 11001.5 XR nozzles. The fertility level was high enough to produce in excess of 5000 lb/acre sorghum.

Treatments were assessed by (1) evaluating plant vigor [1 = excellent plant growth with even stands and no damage up to 5 = severe stunting, uneven plant growth and yellowing plants] on April 3, 14, 29, and May 1 equivalent to 9, 20, 29, and 37 days after planting; (2) counting the number of plants on 10-row feet in each of the center two rows in plots on April 7; (3) visually estimating sorghum midge damage in plots on July 9; (4) counting the number of lodged plants in the harvest area on the day of harvest; and (5) harvesting by hand 13.75 feet of row from each of the center two rows in plots on July 9. Grain heads were threshed on an Almaco research machine, bushel weights were calculated, and grain moisture was determined. Grain weights were adjusted to 14% moisture. Agriculture Research Manager (ARM revision 6.1.13) software was used to conduct analysis of variance (ANOVA) and means were separated by least significant difference (LSD)

RESULTS/DISCUSSION: The most appropriate way to analyze these data would be as a factorial, but that analysis will not be provided in the current report.

Statistical differences in plant vigor were found only during the emergence period 9 days after planting (Table 1). At 9-DAP (days after planting) lower vigor was observed in two hybrid B treatments (one with the Bayer seed treatment package and one with the Syngenta treatment package). Hybrid A with the Syngenta seed treatment package also showed somewhat less vigor. Numerically, the best plant vigor on this early inspection date was observed in both hybrids which did not contain either of the companies herbicide seed protectants (AE0001789 from Bayer or Concep II from Syngenta). No other plant vigor differences were observed, and no differences were found in the 4-date average of these data. Likewise, no differences were found in plant lodging on the date harvest occurred.

Final plant stands did not differ statistically (Table 2), but numerical differences did range nearly 15 thousand plants/acre between hybrid A and B which did not contain a seed protectant, but both were treated with Poncho and the same fungicide package (Bayer Company). Statistically higher numbers of chinch bugs were found 20-DAP in hybrid A with the Syngenta seed treatment package. Sorghum midge damage was greater in hybrid B which may have been a reflection of later blooming in the hybrid, although no differences were found in grain moisture at harvest. The damage in hybrid A averaged 0.1% whereas in hybrid B it averaged 5.0%. Lower bushel weights were generally found in hybrid B treatments (Table 2). No differences were observed in grain yield nor did there seem to be any numerical trends

The treatments appeared to provide equal protection from the herbicides (Atrazine and Dual mixture). In hybrid A fewer chinch bugs were observed in the Poncho treated sorghum, and except for a trend for similar result in hybrid B, statistical differences were not observed in chinch bug numbers.

ACKNOWLEDGMENTS: Special thanks are extended to Gary Obenhaus for use of the site on which to conduct the study. Bayer CropScience is acknowledged for their monetary assistance.

Table 1. Sorghum plant vigor rating evaluation and plants lodged at harvest on two hybrids with three seed treatment packages, Gary Obenhaus Farm, Colorado County, TX, 2009.

Hybrid	Seed treatment	Plant vigor ratings[1/] @ days after planting					# plants lodged/13.75 ft
		9	20	29	37	4 date avg.	
A	1	2.0[c]	2.8[a]	2.3[a]	1.3[a]	2.1[a]	0.5[a]
	2	2.3[c]	1.5[a]	1.3[a]	1.8[a]	1.7[a]	0.0[a]
	3	3.0[bc]	2.8[a]	2.0[a]	1.5[a]	2.3[a]	0.5[a]
B	1	2.1[c]	2.5[a]	1.5[a]	1.3[a]	1.8[a]	0.0[a]
	2	3.8[ab]	3.3[a]	2.0[a]	1.8[a]	2.7[a]	0.3[a]
	3	4.3[a]	3.5[a]	2.3[a]	2.6[a]	3.2[a]	0.3[a]
LSD (P=0.05)		1.12	NS[2/]	NS	NS	NS	NS
P > F		.0023	.2183	.3158	.4041	.0746	.3891

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Vigor ratings range from 1 = excellent growth with even stands and no damage up to 5 = severe stunting, uneven plant growth and yellowing plants.
[2/]NS = Not Significant

Table 2. Sorghum plant population, chinch bug numbers, midge damage, and yield factors on two hybrids and three seed treatment packages, Gary Obenhaus Farm, Colorado County, TX, 2009.

Hybrid	Seed treatment	Plants 1000's/acre	Chinch bugs per 100 plants @ 20 DAP[2/]	% midge damage	% grain moisture	Lb bushel weight	Yield lb/acre
A	1	45.0[a]	7.5[b]	0.3[c]	13.3[a]	55.4[ab]	5067[a]
	2	50.8[a]	10.0[b]	0.0[c]	13.5[a]	55.9[a]	5166[a]
	3	45.7[a]	35.0[a]	0.0[c]	13.3[a]	55.4[ab]	5052[a]
B	1	59.9[a]	2.5[b]	6.0[a]	13.4[a]	54.5[b]	5144[a]
	2	47.0[a]	5.0[b]	5.0[ab]	13.5[a]	53.1[c]	4847[a]
	3	49.5[a]	10.0[b]	4.0[b]	13.3[a]	52.6[c]	4852[a]
LSD (P=0.05)		NS[1/]	12.61	1.81	NS	1.31	NS
P > F		.5744	.0008	.0001	.8781	.0003	.8555

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]NS = Not Significant
[2/]DAP = Days After Planting

EVALUATION OF INSECTICIDE TREATED AND NONTREATED SORGHUM FOR CORN LEAF APHID CONTROL

Wesley Schmidt Farm, San Patricio County, 2009

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SUMMARY: Corn leaf aphids remained at relatively high numbers for a long enough period to create concern that yield would be affected under the dry conditions in the area. For that reason it was suggested that the field be treated and that certain strips be left untreated so that response to treatment could be measured. No differences were found between the treated and untreated sorghum in grain moisture, bushel weight, or in grain yield.

OBJECTIVE: The comparison was established to determine what impact insecticide treatment for corn leaf aphid would have on grain production.

MATERIALS/METHODS: The field study was conducted near the farm headquarters of Wesley Schmidt northwest of Taft Texas. Pioneer 84G77 hybrid sorghum was planted on March 17, 2009 on 38-inch rows with a 12-row planter. Dimethoate 4E (12.0 ounces/acre) was applied to the sorghum in the pre-boot stage with a John Deere 4720 sprayer equipped with TX6 hollow cone nozzles at 60 psi delivering 4 gpa total volume/acre.

Treatments were assessed by (1) evaluating the intensity of the corn leaf aphid infestation two times 48-hours apart before insecticide was applied and again 10 days post-treatment, (2) harvesting 13.75 feet of row by hand on July 11 at 12 locations in each treatment on matched rows (same planter box), and (3) threshing samples on an Almaco plot machine. Bushel weight and moisture levels were determined and the plot yield was converted to the weight at 14% moisture. Agriculture Research Manager (ARM revision 6.1.13) software was used to conduct analysis of variance (ANOVA) and means were separated by least significant difference (LSD).

RESULTS/DISCUSSION: Exact count of corn leaf aphid numbers were not maintained but their numbers exceeded 300/leaf on most of the lower leaves, which under the very dry conditions were thought to be causing unacceptable damage. There appeared to be some improvement in sorghum plants by visual inspection following treatment with dimethoate, but a certain level of corn leaf aphids persisted for another 10-day period followed by a rapid decline in their numbers in both treated and nontreated plots. Predators in the form of lady beetle adults and larvae were present, but very few parasitic wasps were noted.

No effect was found in grain production due to treatment (Table 1). Grain moisture at harvest, bushel weight, and yields were not affected. The only factor that was close to being statistically different was the number of heads harvested; numerically fewer were harvested in the nontreated sorghum. It was not believed to have been an impact of treatment. It was more likely a chance occurrence and may in fact, have resulted in the numerically higher yield in the nontreated sorghum due to the very dry conditions which favors reduced plant population.Corn leaf aphids are not known to cause yield decrease except under very unusual circumstances. The aphid does not inject a toxin into the plant as does greenbug and yellow sugarcane aphid. The corn leaf aphid is often viewed as beneficial in that it serves as a food source for various natural enemies of pest insects. The natural enemies which develop in sorghum often move to cotton where they help to reduce certain insect pests of that crop.

ACKNOWLEDGMENTS: Thanks are extended to Wesley Schmidt for his willingness to leave rows without insecticide for the evaluation.

Table 1. Impact of corn leaf aphid control on sorghum grain production, Wesley Schmidt Farm, San Patricio County, TX, 2009.

Treatment	Harvested heads 1000's/ace	% grain moisture	Bushel weight lb	Yield lb/acre
Insecticide	50.3[a]	12.8[a]	54.1[a]	2890[a]
Nontreated	46.8[a]	12.9[a]	54.2[a]	2958[a]
LSD (P=0.05)	NS[1/]	NS	NS	NS
P > F	.0789	.7284	.8742	.7687

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]NS = Not Significant

EVALUATION ON COTTON OF VARIOUS SEED TREATMENT COMBINATIONS OR GRANULAR IN-FURROW PRODUCT FOR EARLY SEASON INSECTS

Hansen Farm, Matagorda County, 2009

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SUMMARY: Treated seed or in-furrow systemic insecticides are recommended for cotton grown in the upper Gulf Coast region due to the generally high levels of thrips. In the present study all insecticide treatments significantly reduced thrips numbers. Subsequent plant vigor ratings were significantly better in insecticide treated cotton 24 and 30 DAP (Days After Planting). Cotton aphids and spider mite numbers were generally low through 5-true leaf cotton, but numerically higher numbers were found in nontreated cotton in one replication on upper leaves at 46 DAP. Just as in previous studies, protection from early season insects had no effect on cotton fiber characteristics. All insecticide treated cotton produced significantly more lint than the nontreated cotton. The increase ranged from 99–176 lb lint/acre and averaged 144 lb lint/acre for the 11 insecticide treatments.

OBJECTIVES: To compare seed treatment combinations for control of early season insect pests and to measure treatment effects on plant growth and development.

MATERIALS/METHODS: The field study was planted on April 7, 2009 on the Hansen Farm in Matagorda County 1 mile east of FM 1095 on the north side of FM 521. The field had been planted in sorghum the previous season. A John Deere 7100 2-row planter equipped with Almaco research cone planter units delivered 130 seed into each 30 feet of the 4-row plots which were on 38-inch centers. The cotton variety was DPL 444BG/RR. Temik was applied into the seed furrow through 6-inch banders oriented parallel with the rows. The 12 treatments were replicated 4 times in a randomized complete block design.

Soil moisture at planting was good and the soil temperature at the 2-inch depth was 56ºF. The clay soil (34% sand, 17% silt, 49% clay) contained 2.72% organic matter with a pH of 7.2. Immediately following planting, herbicides Cotoran (1.0 quart/acre) + Dual II Magnum (1.3 pints/acre) were broadcast across the test.

Treatments were assessed by (1) cutting 10 plants/plot from the outside rows at the 2-3 and 4-true leaf stages [May 1 and May 7 respectively] and placing them in jars of 70% ethyl alcohol for later examination of the filtered material under a microscope for thrips, aphids, fire ants, and spider mites; (2) evaluating plant damage or vigor where 100% = no damage down to 0% = dead plants on May 1 and May 6 [24 DAP and 30 DAP]; (3) selecting 5 upper canopy leaves from each plot on May 23, placing them in ethyl alcohol for later examination; and (4) harvesting one row in each plot with a 1-rowInternational Harvester model 120A spindle picker. Seed cotton samples were weighed and a subsample was obtained and processed on a 10-saw Eagle laboratory gin to determine lint percentage. A 50 gram sample of the lint cotton was sent to the Fiber and Biopolymer Research Institute at Lubbock, Texas for fiber analysis. Agriculture Research Manager (ARM revision 6.1.13) software was used to conduct analysis of variance (ANOVA). Means were separated by least significant difference (LSD) for ease of presentation.

RESULTS/DISCUSSION: The number of larval thrips at the 2-3 true leaf stage was significantly reduced, and numerically there were fewer adults in the insecticide treated cotton (Table 1). All insecticides reduced total thrips numbers at this early growth stage. Similar data was obtained for 4 true leaf cotton except the Orthene treatment contained more thrips than some of the other treatments for larvae and total thrips. None of the insecticides differed statistically in level of thrips when the average of both thrips control evaluation dates were combined. Thrips were high enough in number, especially on the early inspection date, to cause yield loss.

No differences were found in aphid and spider mite numbers at the 2-3 leaf or at the 4-leaf stage of crop development (Table 2), and no statistical differences were found in the number of these arthropods counted on May 23 at 46 DAP (Table 3). Furthermore, their numbers were very low throughout the period except for aphid numbers which were numerically much greater in the nontreated cotton on the May 23 inspection because of one plot. Thrips larval numbers, on the other hand, were statistically greater in the nontreated cotton compared with all but two of the insecticide treatments as measured on May 23 [46 DAP]. Plant vigor ratings were significantly lower in non-insecticide treated cotton at 24 and 30 DAP.

No differences were found in fiber characteristics, but there was significant yield impact (Table 4). All insecticide treated cotton produced greater yield which ranged from 99 to 176 lb lint/acre more than the nontreated cotton. The average yield increase for the 11 insecticide treatments was 144 lb lint/acre.

Historically thrips numbers have been consistently greater over the years along the Upper Gulf Coast compared with numbers in the Lower Gulf Coast. Generally it is economically justifiable to use an insecticide seed treatment or a systemic granular insecticide such as Temik at planting.

ACKNOWLEDGMENTS: Special thanks are extended to Hansen Farm for providing land, support, interest, and welcome in conduct of the field study. Syngenta Crop Protection is thanked for providing grant funds which were instrumental in our ability to conduct the study. Rudy Alaniz and Clint Livingston, Demonstration Assistants, are thanked for their work; without them the test could not have been conducted. The Texas Department of Agriculture Food and Fibers Research Council are thanked for funding the cost for fiber analysis

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Table 1. Number of thrips on cotton treated with systemic insecticide applied to seed or placed into the seed furrow, Hansen Farm, Matagorda County, TX, 2009.

Treatment (rate)	Number thrips per 10 plants: 2-leaf (24 DAP)[1/]			4-leaf (30 DAP)			2-date avg.
	Larva	adult	total	larva	adult	total	
Cruiser 5FS (0.34 mg ai/seed)	1.8[b]	4.3[a]	6.0[b]	10.3[bc]	5.8[b]	16.0[bc]	11.0[b]
Cruiser 5FS + Avicta (0.34 + 0.15 mg ai/seed)	2.8[b]	3.0[a]	5.8[b]	5.0[c]	5.8[b]	10.8[c]	8.3[b]
Cruiser 5FS + EXC211 (0.34 + 0.06 mg ai/seed)	1.0[b]	3.0[a]	4.0[b]	9.3[bc]	4.5[b]	13.8[bc]	8.9[b]
Cruiser 5FS + A17230 (0.34 + 0.13 mg ai/seed)	0.3[b]	2.8[a]	3.0[b]	10.8[bc]	6.0[b]	16.8[bc]	9.9[b]
Cruiser 5FS + A17230 (0.34 + 0.15 mg ai/seed)	1.3[b]	3.5[a]	4.8[b]	2.5[c]	8.0[b]	10.5[c]	7.6[b]
STP15273 + STP17217 (0.375 + 0.375 mg ai/seed)	0.0[b]	2.5[a]	2.5[b]	1.8[c]	7.0[b]	8.8[c]	5.6[b]
Cruiser 5FS + A15938 (0.34 + 0.2 mg ai/seed)	1.3[b]	3.8[a]	5.0[b]	13.0[bc]	7.5[b]	20.5[bc]	12.8[b]
Cruiser 5FS + A17533 (0.34 + 0.2 mg ai/seed)	1.3[b]	3.5[a]	4.8[b]	9.3[bc]	6.5[b]	15.8[bc]	10.3[b]
Temik 15G (5.0 1b /acre)	0.8[b]	4.0[a]	4.8[b]	9.3[bc]	5.5[b]	14.8[bc]	9.8[b]
Gaucho Grande 5FS (0.375 mg ai/seed)	8.8[b]	4.3[a]	13.0[b]	14.8[bc]	7.3[b]	22.0[bc]	17.5[b]
Orthene 97 (30 oz/cwt seed)	2.8[b]	3.8[a]	6.5[b]	23.0[b]	10.3[b]	33.3[b]	19.9[b]
Nontreated	123.3[a]	9.3[a]	132.5[a]	87.3[a]	23.3[a]	110.5[a]	121.5[a]
LSD (P = 0.05)	33.41	NS[2/]	33.29	16.14	7.79	22.06	18.03
P > F	.0001	.0521	.0001	.0001	.0030	.0001	.0001

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/] DAP = Days After Planting
[2/] NS = Not Significant

Table 2. Number of aphids and mites on cotton treated with systemic insecticide applied to seed or placed in the seed furrow, Hansen Farm, Matagorda County, TX 2009.

	Number aphids/10 plants		Number mites/10 plants	
Treatment (rate)	2-leaf (24 DAP)[1/]	4-leaf (30 DAP)	2-leaf (24 DAP)	4-leaf (30 DAP)
Cruiser 5FS (0.34 mg ai/seed)	0.0[a]	0.3[a]	0.3[a]	0.3[a]
Cruiser 5FS + Avicta (0.34 + 0.15 mg ai/seed)	0.0[a]	0.3[a]	0.0[a]	0.3[a]
Cruiser 5FS + EXC211 (0.34 + 0.06 mg ai/seed)	0.0[a]	0.0[a]	0.3[a]	0.0[a]
Cruiser 5FS + A17230 (0.34 + 0.13 mg ai/seed)	0.0[a]	0.0[a]	0.0[a]	0.0[a]
Cruiser 5FS + A17230 (0.34 + 0.15 mg ai/seed)	0.0[a]	0.0[a]	0.0[a]	0.0[a]
STP15273 + STP17217 (0.375 + 0.375 mg ai/seed)	0.0[a]	1.0[a]	0.0[a]	0.0[a]
Cruiser 5FS + A15938 (0.34 + 0.2 mg ai/seed)	0.0[a]	0.5[a]	0.0[a]	0.0[a]
Cruiser 5FS + A17533 (0.34 + 0.2 mg ai/seed)	0.0[a]	0.0[a]	0.0[a]	0.8[a]
Temik 15G (5.0 lb acre)	0.0[a]	1.3[a]	0.0[a]	0.3[a]
Gaucho Grande 5FS (0.375 mg ai/seed)	0.0[a]	1.0[a]	0.5[a]	0.0[a]
Orthene 97 (30 oz/cwt seed)	0.0[a]	2.3[a]	0.0[a]	0.0[a]
Nontreated	1.3[a]	7.3[a]	0.3[a]	0.0[a]
LSD (P = 0.05)	NS[2/]	NS	NS	NS
P > F	.4671	.4430	.6984	.6228

Means in a column followed by the same letter are not significantly different by ANOVA.

[1/] DAP = Days After Planting

[2/] NS = Not Significant

Table 3. Number of aphids, mites and thrips, and plant vigor ratings on cotton treated with systemic insecticide applied to seed or placed in the seed furrow, Hansen Farm, Matagorda County, TX, 2009.

Treatment (Rate)	Number/5-leaves (46 DAP P[1/])					Vigor ratings[2/]	
			thrips				
	aphids	mites	larva	adult	total	24 DAP	30 DAP
Cruiser 5FS (0.34 mg ai/seed)	0.0[a]	0.0[a]	0.3[b]	0.3[a]	0.5[a]	75[a]	76[ab]
Cruiser 5FS + Avicta (0.34 + 0.15 mg ai/seed)	0.0[a]	0.0[a]	0.0[b]	0.0[a]	0.0[a]	80[a]	78[ab]
Cruiser 5FS + EXC211 (0.34 + 0.06 mg ai/seed)	0.0[a]	0.0[a]	0.0[b]	0.5[a]	0.5[a]	78[a]	76[ab]
Cruiser 5FS + A17230 (0.34 + 0.13 mg ai/seed)	0.8[a]	0.0[a]	0.0[b]	0.3[a]	0.3[a]	75[a]	73[b]
Cruiser 5FS + A17230 (0.34 + 0.15 mg ai/seed)	0.5[a]	0.0[a]	0.0[b]	0.0[a]	0.0[a]	75[a]	79[a]
STP15273 + STP17217 (0.375 + 0.375 mg ai/seed)	0.8[a]	0.0[a]	0.3[b]	0.0[a]	0.3[a]	74[a]	77[ab]
Cruiser 5FS + A15938 (0.34 + 0.2 mg ai/seed)	1.5[a]	0.0[a]	0.5[ab]	0.3[a]	0.8[a]	74[a]	76[ab]
Cruiser 5FS + A17533 (0.34 + 0.2 mg ai/seed)	0.0[a]	0.0[a]	0.3[b]	0.0[a]	0.3[a]	75[a]	78[ab]
Temik 15G (5.0 lb acre)	0.8[a]	0.0[a]	0.0[b]	1.3[a]	1.3[a]	73[a]	78[ab]
Gaucho Grande 5FS (0.375 mg ai/seed)	0.0[a]	0.0[a]	0.0[b]	1.0[a]	1.0[a]	81[a]	78[ab]
Orthene 97 (30 oz/cwt seed)	1.0[a]	0.0[a]	0.5[ab]	0.0[a]	0.5[a]	81[a]	74[ab]
Nontreated	167.5[a]	0.0[a]	1.0[a]	0.5[a]	1.5[a]	49[b]	63[c]
LSD (P = 0.05)	NS[3/]	NS	0.54	NS	NS	14.65	5.08
P > F	.4699	1.00	.0133	.2281	.2324	.0106	.0001

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/] DAP = Days After Planting
[2/] Vigor ratings range from 100% = No damage to 0% = Severe stunting and leaf curling.
[3/] NS = Not Significant

Table 4. Fiber Characteristics and yield of cotton treated with systemic insecticide applied to seed or placed in the seed furrow, Hansen Farm, Matagorda County, TX, 2009.

Treatment (rate)	Mic	Length Inches	Unif Ratio	Strength g/tex	Elong %	Lint yield lb/acre
Cruiser 5FS (0.34 mg ai/seed)	3.8[a]	1.04[a]	82.6[a]	28.0[a]	5.8[a]	906[a]
Cruiser 5FS + Avicta (0.34 + 0.15 mg ai/seed)	3.7[a]	1.07[a]	82.8[a]	28.0[a]	5.4[a]	866[a]
Cruiser 5FS + EXC211 (0.34 + 0.06 mg ai/seed)	3.8[a]	1.06[a]	82.1[a]	27.6[a]	5.7[a]	943[a]
Cruiser 5FS + A17230 (0.34 + 0.13 mg ai/seed)	3.8[a]	1.06[a]	82.0[a]	27.3[a]	5.5[a]	926[a]
Cruiser 5FS + A17230 (0.34 + 0.15 mg ai/seed)	3.9[a]	1.08[a]	82.6[a]	28.2[a]	5.7[a]	921[a]
STP15273 + STP17217 (0.375 + 0.375 mg ai/seed)	3.8[a]	1.06[a]	82.6[a]	27.5[a]	5.6[a]	879[a]
Cruiser 5FS + A15938 (0.34 + 0.2 mg ai/seed)	3.9[a]	1.04[a]	81.7[a]	26.9[a]	5.9[a]	939[a]
Cruiser 5FS + A17533 (0.34 + 0.2 mg ai/seed)	3.8[a]	1.07[a]	82.1[a]	27.8[a]	5.6[a]	913[a]
Temik 15G (5.0 lb/acre)	3.8[a]	1.06[a]	82.5[a]	28.0[a]	5.7[a]	893[a]
Gaucho Grande 5FS (0.375 mg ai/seed)	3.8[a]	1.06[a]	82.1[a]	28.3[a]	5.8[a]	923[a]
Orthene 97 (30 oz/cwt seed)	4.0[a]	1.06[a]	82.3[a]	28.3[a]	5.4[a]	911[a]
Nontreated	3.8[a]	1.05[a]	82.6[a]	27.3[a]	5.4[a]	767[b]
LSD (P = 0.05)	NS[1/]	NS	NS	NS	NS	83.3
P > F	.5447	.2375	.7496	.5429	.8221	.0133

Means in a column followed by the same letter are not significantly different by ANOVA.

COMPARISON OF SYSTEMIC INSECTICIDES APPLIED TO COTTON SEED OR APPLIED INTO THE SEED FURROW FOR EFFECT ON EARLY SEASON INSECTS

Duane Lutringer Farm, Wharton County, 2009

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SUMMARY: Thrips numbers were moderately heavy at the 2 and 4-leaf stages of cotton development in nontreated cotton, and the insecticides reduced their numbers to levels below the economic treatment threshold for the 2 true leaf stage cotton. Thrips counts exceeded the economic treatment threshold somewhat in most of the insecticide treated cotton by the 5 true leaf stage.

OBJECTIVES: The field study was conducted to evaluate systemic insecticide seed treatments and granular in-furrow applied Temik alone and in combination with the seed treatments for effect on early season insects such as thrips.

MATERIALS/METHODS: Fibermax FM 840B2F variety cotton was planted on April 14, 2009 on the Durane Lutringer Farm 1 mile north of FM 960 along CR 456. Corn had been grown on the site in the previous season. The seeding rate was 4.33/foot with a John Deere 7100 2-row planter equipped with Almaco research cone seed distributors. The field bedded land row spacing was 40-inch, but the planter was set on 38-inch centers. Individual plots were 4 rows wide by 30 feet long and treatments were arranged in a randomized complete block experimental design with 4 replications of the treatments. Temik was applied into the seed furrow through 6-inch banders oriented parallel with the rows.

Soil moisture conditions on the planting date were excellent, and at the 2-inch depth it was 61ºF. The clay loam soil (34% sand, 37% silt, 29% clay) contained 2.58% organic matter and had a 5.4 pH.

Treflan (1.0 quart/acre) was applied preplant by the grower. Immediately following planting Cotoran (1.0 quarts/acre) + Dual II Magnum (1.0 pints/acre) was broadcast over the entire test. At a later date 140 units of anhydrous ammonia fertilizer was side-dressed.

Treatments were assessed by (1) cutting 10 plants/plot at the 2-leaf stage on May 6 [22 DAP], and cutting 5 plants/plot at the 4-5 true leaf stage on May 15 [31 DAP] and placing the plants in 70% ethyl alcohol for later microscopic examination of filtered material to determine number of thrips, aphids, spider mites and fire ants; (2) estimating visually plant vigor where 1 = no damage up to 5 = severe stunting and leaf curling, and (3) harvesting 1 row of each plot with an International Harvester model 120A 1-row spindle picker on August 17. Seed cotton was weighed, a sample was taken for ginning on a 10-saw Eagle laboratory machine for lint percentage, and 50 grams of lint were sent to the Fiber and Biopolymer Research Institute at Lubbock, Texas for fiber analysis.

Agriculture Research Manager (ARM revision 6.1.13) software was used to conduct analysis of variance (ANOVA). Means were separated by least significant difference (LSD) for ease of data presentation.

RESULTS/DISCUSSION: Larval and adult thrips numbers present on 2-leaf and 4-5 leaf cotton are shown in Table 1. Significantly fewer total thrips (nymphs and adults) were found on the 2-leaf cotton in all insecticide treatments. However, adult thrips numbers at this leaf stage were not significantly different from that found in nontreated cotton in the Aeris and Gaucho Grande treatments. At the 4-5 true leaf stage larval thrips numbers were significantly lower in all insecticide treatments compared with the nontreated cotton except for the number found in the Gaucho Grande plots. The adult thrips numbers in the Aeris treatment were also not statistically different from nontreated cotton at the 4-5 true leaf stage. Total thrips (larvae + adults) numbers at the 4-5 true leaf stage in the Gaucho Grande treatment numerically exceeded the number observed in the nontreated cotton. This observation was not unexpected as it often occurs as plants age possibly due the larger leaf area seen where protection was afforded from thrips at the earlier stages of development.

No differences or noticeable trends were found in aphid or spider mite numbers on either the 2 true leaf or 4-5 true leaf cotton (Table 2). These arthropods were very low in number on both inspection dates.

Plant vigor ratings (damage ratings) were very good in all insecticide treated cotton at both 22 and 31 DAP (Table 3). All ratings were significantly better in the insecticide treatments. Lint production was not statistically different, but 6 of the 8 insecticide treatments produced more cotton than did the nontreated cotton. Gaucho Grande treated cotton did not suffer from the numerically higher thrips counts since lint production was numerically very good in the treatment. No differences were observed in cotton lint characteristics (Table 4).

ACKNOWDEDGMENTS: Thanks are extended to Duane Lutringer for providing the test site and his interest in conducting test of this type. Bayer Crop Science is thanked for providing grant funds to help pay for expenses involved in conducting the study. Rudy Alaniz and Clint Livingston, Demonstration Assistants, are acknowledged for their assistance with many phases of the work. The Texas Department of Agriculture Food and Fibers Research Council is thanked for funding the cost of fiber analysis.

Table 1. Number of thrips on cotton treated with systemic insecticide applied to seed or placed into the seed furrow, Duane Lutringer Farm, Wharton County, TX, 2009

Treatment (rate)	Number thrips per 10 plants					
	2 leaf (22 DAP)[1/]			4-5 leaf (31 DAP)		
	larva	adult	total	larva	adult	total
Aeris 5FS (0.75 mg ai/seed)	1.3^{b}	8.0^{abc}	9.3^{b}	49.5^{bc}	94.5^{abc}	144.0^{b}
Avicta CP 5FS (0.49 mg ai/seed)	0.3^{b}	4.5^{c}	4.8^{b}	14.5^{c}	91.0^{bc}	105.5^{bc}
Aeris +Temik (0.75 mg ai/seed + 3.5 lb/a.)	0.3^{b}	5.0^{c}	5.3^{b}	24.0^{c}	55.0^{de}	79.0^{bc}
Avicta CP + Temik (0.49 mg ai/seed + 3.5 lb/a.)	1.3b	7.5^{bc}	8.8^{b}	19.0^{c}	86.0^{bcd}	105.0^{bc}
Temik 15G (3.5 lb/acre)	11.0^{b}	6.0^{c}	17.0^{b}	30.0^{c}	70.5^{cde}	100.5^{bc}
Temik 15G (5.0 lb/acre)	4.3^{b}	4.5^{c}	8.8^{b}	12.0^{c}	48.5^{e}	60.5^{c}
Gaucho Grande 5FS (0.375 mg ai/seed)	4.5^{b}	11.8^{ab}	16.3^{b}	95.0^{ab}	126.5^{a}	221.5^{a}
Cruiser 5FS (0.340 mg ai/seed)	1.8^{b}	4.0^{c}	5.8^{b}	21.0^{c}	82.5^{cde}	103.5^{bc}
Nontreated	82.3^{a}	13.0^{a}	95.3^{a}	106.5^{a}	117.0^{ab}	223.5^{a}
LSD (P = 0.05)	20.21	5.10	22.8	46.83	34.35	69.14
P > F	.0001	.0078	.0001	.0011	.0013	.0002

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]DAP = Days After Planting

Table 2. Number of aphids and mites on cotton treated with systemic insecticide applied to seed or placed into the seed furrow, Duane Lutringer Farm, Wharton County, TX, 2009.

Treatment (rate)	Number aphids/10 plants		Number mites/10 plants	
	2 leaf (22 DAP)[1/]	4-5 leaf (31 DAP)	2 leaf (22 DAP)	4-5 leaf (31 DAP)
Aeris 5FS (0.75 mg ai/seed)	0.3[a]	1.0[a]	1.5[a]	0.5[a]
Avicta CP 5FS (0.49 mg ai/seed)	1.5[a]	1.0[a]	0.3[a]	0.0[a]
Aeris +Temik (0.75 mg ai/seed + 3.5 lb/a.)	0.0[a]	2.0[a]	0.5[a]	1.0[a]
Avicta CP + Temik (0.49 mg ai/seed + 3.5 lb/a.)	0.0[a]	0.5[a]	0.5[a]	0.0[a]
Temik 15G (3.5 lb/acre)	1.0[a]	0.0[a]	0.0[a]	0.0[a]
Temik 15G (5.0 lb/acre)	0.3[a]	1.5[a]	1.0[a]	0.0[a]
Gaucho Grande 5FS (0.375 mg ai/seed)	0.5[a]	2.5[a]	0.0[a]	0.0[a]
Cruiser 5FS (0.340 mg ai/seed)	1.0[a]	1.0[a]	0.0[a]	0.0[a]
Nontreated	0.3[a]	1.0[a]	0.0[a]	0.0[a]
LSD (P = 0.05)	NS[2/]	NS	NS	NS
P > F	.5564	.7926	.7101	.5538

Means in a column followed by the same letter are not significantly different by ANOVA.

[1/]DAP = Days After Planting

[2/] NS = Not Significant

Table 3. Plant damage ratings and lint production in cotton treated with systemic insecticide applied to seed or placed into the seed furrow, Duane Lutringer Farm, Wharton County, TX, 2009.

Treatment (rate)	Damage ratings[1/]		Yield
	22 DAP[2/]	31 DAP	lb lint/acre
Aeris 5FS (0.75 mg ai/seed)	1.3[b]	1.4[b]	701[a]
Avicta CP 5FS (0.49 mg ai/seed)	1.0[b]	1.5[b]	738[a]
Aeris +Temik (0.75 mg ai/seed + 3.5 lb/a.)	1.1[b]	1.5[b]	735[a]
Avicta CP + Temik (0.49 mg ai/seed + 3.5 lb/a.)	1.1[b]	1.0[b]	764[a]
Temik 15G (3.5 lb/acre)	1.4[b]	1.1[b]	717[a]
Temik 15G (5.0 lb/acre)	1.4[b]	1.6[b]	658[a]
Gaucho Grande 5FS (0.375 mg ai/seed)	1.4[b]	1.6[b]	748[a]
Cruiser 5FS (0.340 mg ai/seed)	1.1[b]	1.5[b]	753[a]
Nontreated	2.8[a]	3.3[a]	704[a]
LSD (P = 0.05)	0.64	0.72	NS[3/]
P > F	.0003	.0001	.3489

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Damage ratings range from 1 = no damage up to 5 = severe stunting and leaf curling.
[2/]DAP = Days After Planting
[3/]NS = Not Significant

Table 4. Fiber characteristics in cotton treated with systemic insecticide applied to seed or placed into the seed furrow, Duane Lutringer Farm, Wharton County, TX, 2009.

Treatment (rate)	Mic	Length inches	Unif. %	Strength g/tex	Elong. %
Aeris 5FS (0.75 mg ai/seed)	4.8[a]	1.12[a]	82.9[a]	30.7[a]	5.8[a]
Avicta CP 5FS (0.49 mg ai/seed)	4.8[a]	1.11[a]	82.4[a]	31.2[a]	5.8[a]
Aeris +Temik (0.75 mg ai/seed + 3.5 lb/a.)	4.8[a]	1.12[a]	82.8[a]	30.9[a]	5.9[a]
Avicta CP + Temik (0.49 mg ai/seed + 3.5 lb/a.)	4.8[a]	1.12[a]	83.9[a]	31.4[a]	5.7[a]
Temik 15G (3.5 lb/acre)	4.9[a]	1.12[a]	83.2[a]	32.0[a]	5.6[a]
Temik 15G (5.0 lb/acre)	4.7[a]	1.11[a]	82.8[a]	30.7[a]	5.7[a]
Gaucho Grande 5FS (0.375 mg ai/seed)	4.7[a]	1.10[a]	83.3[a]	30.3[a]	5.6[a]
Cruiser 5FS (0.340 mg ai/seed)	4.8[a]	1.12[a]	83.3[a]	31.4[a]	5.8[a]
Nontreated	4.6[a]	1.13[a]	83.6[a]	30.8[a]	5.8[a]
LSD (P = 0.05)	NS[1/]	NS	NS	NS	NS
P > F	.6025	.8069	.1722	.3022	.8253

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/] NS = Not Significant

COMPARISON OF INSECTICIDES FOR EFFECT ON COTTON FLEAHOPPER AND BENEFICIAL ARTHROPODS

Michael Watz Farm, Wharton County, 2009

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SUMMARY: Three days after the first treatment all insecticides had significantly reduced fleahopper numbers to very low levels. All insecticides were about equally effective in their effectiveness for a week following treatment. Lady beetles were the most abundant species collected in the KISS sampler, and their numbers were much greater in the two treatments containing Discipline (pyrethroid) than in any of the other treatments including the nontreated cotton.

No treatment effects were found in any of the plant mapping data. We believe the lack of impact on fruiting profile was due to the relative low number of fleahoppers present during part of the early squaring period, but further investigation is needed to determine more precisely the effect of fleahopper on cotton growth and development. No effects of treatments were found on cotton fiber characteristics or lint production.

OBJECTIVES: The field study was conducted to compare the effects of insecticides applied to cotton for fleahopper control, measure their impact on beneficial arthropods, determine if the materials had any influence on aphid numbers, and compare the effect of the Centric treatment with the nontreated cotton on plant fruiting. The impact of treatments on cotton lint characteristics and yield were also measured.

MATERIALS/METHODS: The insecticide control comparison was conducted on the Michael Watz Farm in Wharton County. The test site was southeast of El Campo, Texas on County Road 405. The Phytogen 440WRF cotton variety was planted with 12-row equipment on 39-inch spaced rows, and rainfall was limited during most of the season.

Treatments were applied to the center 8 rows of 12 row plots so as to have significant buffers between the center two rows from which fleahoppers were counted and yield was taken. Individual plots were 50 feet long with treatments arranged down the field for the individual replications. This replication arrangement was used to reduce the width of the test site area, make it easier for the grower, and allow easier harvest. Treatments were replicated 4 times in a randomized complete block design. Treatments were made with a self-propelled Spider Trac ground sprayer through 4X hollow cone nozzles (2/row) at 40 psi in a total volume of 5.1 gpa while traveling at 4.25 mph. Treatments were initiated for fleahoppers when plants averaged

7.36 leaves or when about two squares/plant were present. Insecticides were applied on May 20 and 28.

Fleahoppers were counted on 20 plant terminals/plot on May 19 [pretreatment], May 23 [3 DAT-1], May 26 [6 DAT-1], May 30 [2 DAT-2], June 2 [5 DAT-2], and on June 8 [11 DAT-2]. The test was accidently over-sprayed with a dilute mixture containing Orthene remaining in the spray tank along with a plant growth regulator just after the June 2 evaluation date. A vacuum sampler (keep it simple sampler = KISS) was used to collect insects from 50-row feet with different rows sampled on each visit excluding the center 2 rows. The KISS samples were obtained on May 20 [pretreatment], May 26 [6 DAT-1], June 2 [5 DAT-2], and on June 9 [12 DAT-2]. On the June 2 [12 DAT-2] 5 leaves were obtained from each of rows 4 and 5 and selected from the 4th one down from the terminal to obtain cotton aphid population density. The KISS samples and leaves for aphid counts were taken to the laboratory where counts were made. Plant density in the field was determined by counting the number of plants on 5 row feet on two of the rows.

Six plants were selected from non-harvest rows in the Centric and nontreated cotton plots for plant mapping after about 50% of the bolls were open. The P-MAP software program developed by Dr. Juan Landivar was used to summarize the mapping results. Data obtained in mapping included: internode length; plant height; and number of vegetative nodes, fruiting branches, and main stem nodes. The number of squares, green bolls, open bolls, total bolls, vacant sites, and % fruit retention was calculated for fruiting positions and for groups of fruiting branches.

One of the center rows in each plot was harvested on August 5 with a 1-row International Harvester model 120A spindle picker. Seed cotton samples were weighed, a subsample was selected for ginning to determine percentage lint, and the subsample was ginned on a 10-saw Eagle laboratory machine. Fifty gram samples were sent to the Fiber and Biopolymer Research Institute, Texas Tech University, Lubbock, Texas for fiber analysis.

The software program Agriculture Research Manager (ARM revision 6.1.13) was used to conduct analysis of variance of the data, and means were separated by LSD.

RESULTS/DISCUSSION: Cotton fleahopper numbers, one day before the first treatment, averaged 13.8/100 plants or slightly below the treatment threshold we currently use of 15.0/100 plants to initiate chemical control (Tables 1-3). Nearly 70% were adults. Three days after the first treatment (3 DAT-1) all insecticides significantly reduced their numbers compared with the number found in nontreated cotton, and by 6 DAT-1 nontreated cotton contained 32.5/100 plants whereas only one of the insecticide treatments (Trimax Pro) was above the treatment threshold. Fleahopper numbers declined naturally in the nontreated cotton by 2 DAT-2, but by 5 DAT-2 they had rebounded to relatively high numbers. Fleahopper numbers remained very low in all insecticide treatments. All insecticides tested provided effective fleahopper control. The test was oversprayed after the counts were made 5 DAT-2 and by 11 DAT-2 only 1 fleahopper was found in one of the nontreated plots.

Beneficial arthropods (natural enemies) were measured using a KISS vacuum sampler on 50 row feet in each plot (Tables 4-5). Statistical differences were not found in total beneficial arthropod numbers (all species) at 6 DAT-1, nor were there differences in spider number among any of the treatments on any inspection date (Table 4). Lady beetles were the most abundant beneficial arthropod present, and their numbers were significantly greater in insecticide treated plots that contained the largest number of aphids (Table 5). Aphids were more abundant in the Discipline and Bidrin + Discipline treated cotton, probably as a result of the Discipline (bifenthrin) component. Two treatments (Centric and nontreated) were selected for plant mapping (Tables 6-7) to determine if there was any impact upon fruit load and position of the fruit on plants. In previous tests insecticide applied for fleahopper control had a major impact in position of bolls on plants. Generally in previous studies, reduction of fleahopper numbers resulted in more fruit on position 1, on the first 5 fruiting branches, shorter internodes, and shorter plant height. None of these factors varied statistically in the current test, and there was no trend for a similar pattern in the current study. We believe a combination of weather conditions, square production that had occurred before fleahopper numbers exceeded the established threshold, and relatively low season fleahopper infestation (23.5/100 plant terminals for the post-treatment average) contributed to fewer impacts on the fruiting characteristics. Likewise, no effects were found in fiber characteristics or on lint production (Table 8).

ACKNOWLEDGMENTS: Thanks are extended to Michael Watz for providing the cotton field for conduct of the study and to B. B. Krenek, Crop Consultant, for assistance in locating the test site and for other help with conduct of the study. The Texas Department of Agriculture, Food and Fibers Research Council, is acknowledged for funding the cost of cotton fiber analysis. Rudy Alaniz and Clint Livingston, Demonstration Assistants, are thanked for their work on all phases of the study. Several agricultural chemical companies are thanked for providing insecticides and in some cases, grant funding.

Table 1. Fleahopper **nymphs** in insecticide treated cotton, Michael Watz Farm, Wharton County, TX, 2009.

Treatment[1/] (rate)	Mean number per 100 plant terminals						
	Pretreat	3 DAT-1[2/]	6 DAT-1	2 DAT-2	5 DAT-2	11 DAT-2	Post-treat. average
Centric 40WG (1.25 oz/acre)	5.0[a]	0.0[a]	1.3[a]	0.0[b]	0.0[b]	0.0[a]	0.3[b]
Intruder 70WP (1.0 oz/acre)	3.8[a]	0.0[a]	1.3[a]	0.0[b]	0.0[b]	0.0[a]	0.3[b]
Trimax Pro 4.44 (1.25 oz/acre)	6.3[a]	2.5[a]	7.5[a]	0.0[b]	0.0[b]	0.0[b]	2.0[b]
Orthene 97 (8.0 oz/acre)	5.0[a]	0.0[a]	1.3[a]	0.0[b]	0.0[b]	0.0[a]	0.3[b]
Bidrin 8E (3.2 oz/acre)	0.0[a]	0.0[a]	1.3[a]	0.0[b]	0.0[b]	0.0[a]	0.3[b]
Bidrin 8E+Discipline 2EC (1.6+2.6 oz/acre)	7.5[a]	0.0[a]	1.3[a]	0.0[b]	0.0[b]	0.0[a]	0.3[b]
Discipline 2EC (5.2 oz/acre)	2.5[a]	0.0[a]	0.0[a]	0.0[b]	0.0[b]	0.0[a]	0.0[b]
Nontreated	5.0[a]	5.0[a]	11.3[a]	6.3[a]	38.8[a]	1.3[a]	12.5[a]
LSD (P=0.05)	NS[3/]	NS	NS	3.27	10.69	NS	3.39
P > F	.5828	.2617	.3047	.0067	.0001	.4586	.0001

Means in a column followed by the same letter are not significantly different by ANOVA.

[1/]Treatments were applied on 5/20 and 5/28

[2/]DAT = Days After Treatment

[3/] NS = Not Significant

Table 2. Fleahopper **adults** in insecticide treated cotton, Michael Watz Farm, Wharton County, TX, 2009.

Treatment[1/] (rate)	Mean number per 100 plant terminals						
	Pretreat	3 DAT-1[2/]	6 DAT-1	2 DAT-2	5 DAT-2	11 DAT-2	Post-treat. average
Centric 40WG (1.25 oz/acre)	8.8[a]	0.0[c]	1.3[bc]	1.3[b]	0.0[b]	0.0[a]	0.5[b]
Intruder 70WP (1.0 oz/acre)	7.5[a]	0.0[c]	2.5[bc]	0.0[b]	2.5[b]	0.0[a]	1.0[bc]
Trimax Pro 4.44 (1.25 oz/acre)	11.3[a]	1.3[bc]	8.8[b]	1.3[b]	1.3[b]	0.0[b]	2.5[b]
Orthene 97 (8.0 oz/acre)	8.8[a]	0.0[c]	3.8[bc]	1.3[b]	0.0[b]	0.0[a]	1.0[bc]
Bidrin 8E (3.2 oz/acre)	11.3[a]	2.5[b]	1.3[bc]	0.0[b]	2.5[b]	0.0[a]	1.3[bc]
Bidrin 8E+Discipline 2EC (1.6+2.6 oz/acre)	11.3[a]	0.0[c]	8.8[b]	0.0[b]	0.0[b]	0.0[a]	1.8[bc]
Discipline 2EC (5.2 oz/acre)	8.8[a]	0.0[c]	0.0[c]	0.0[b]	0.0[b]	0.0[a]	0.0[c]
Nontreated	8.8[a]	8.8[a]	21.3[a]	12.5[a]	12.5[a]	0.0[a]	11.0[a]
LSD (P=0.05)	NS[3/]	2.20	7.68	5.88	3.98	NS	1.77
P > F	.9027	.0001	.0002	.0031	.0001	1.000	.0001

Means in a column followed by the same letter are not significantly different by ANOVA.

[1/]Treatments were applied on 5/20 and 5/28

[2/]DAT = Days After Treatment

[3/] NS = Not Significant

Table 3. Fleahopper **nymphs and adults** in insecticide treated cotton, Michael Watz Farm, Wharton County, TX, 2009.

Treatment[1/] (rate)	Mean number per 100 plant terminals						
	Pretreat	3 DAT-1	6 DAT-1	2 DAT-2	5 DAT-2	11 DAT-2	Post-treat. average
Centric 40WG (1.25 oz/acre)	13.8[a]	0.0[b]	2.5[c]	1.3[b]	0.0[b]	0.0[a]	0.8[b]
Intruder 70WP (1.0 oz/acre)	11.3[a]	0.0[b]	3.8[c]	0.0[b]	2.5[b]	0.0[a]	1.3[b]
Trimax Pro 4.44 (1.25 oz/acre)	17.5[a]	3.8[b]	16.3[b]	1.3[b]	1.3[b]	0.0[a]	4.5[b]
Orthene 97 (8.0 oz/acre)	13.8[a]	0.0[b]	5.0[bc]	1.3[b]	0.0[b]	0.0[a]	1.3[b]
Bidrin 8E (3.2 oz/acre)	11.3[a]	2.5[b]	2.5[c]	0.0[b]	2.5[b]	0.0[a]	1.5[b]
Bidrin 8E+Discipline 2EC (1.6+2.6 oz/acre)	18.8[a]	0.0[b]	10.0[bc]	0.0[b]	0.0[b]	0.0[a]	2.0[b]
Discipline 2EC (5.2 oz/acre)	11.3[a]	0.0[b]	0.0[c]	0.0[b]	0.0[b]	0.0[a]	0.0[b]
Nontreated	12.5[a]	13.8[a]	32.5[a]	18.8[a]	51.3[a]	1.3[a]	23.5[a]
LSD (P=0.05)	NS[3/]	4.01	11.67	8.92	12.16	NS	4.58
P > F	.1821	.0001	.0002	.0032	.0001	1.000	.0001

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Treatments were applied on 5/20 and 5/28
[2/]DAT = Days After Treatment
[3/] NS = Not Significant

Table 4. Impact of insecticides applied for cotton fleahopper on total (all species) beneficial arthropod predators, Michael Watz Farm, Wharton County, TX, 2009.

Treatment [1/] (rate)	Number beneficial arthropods per 50 row feet[2/]						
	Total				Spiders		
	Pretreat	6 DAT-1[3/]	5 DAT-2	12 DAT-2	6 DAT-1	5 DAT-2	12 DAT-2
Centric 40WG (1.25 oz/acre)	2.3[a]	3.0[a]	7.0[b]	10.3[b]	1.8[a]	2.3[a]	1.5[a]
Intruder 70WP (1.0 oz/acre)	1.5[a]	2.3[a]	6.3[b]	5.5[b]	0.5[a]	4.3[a]	1.0[a]
Trimax Pro 4.44 (1.25 oz/acre)	2.8[a]	3.8[a]	5.0[b]	14.8[b]	1.8[a]	3.0[a]	1.0[a]
Orthene 97 (8.0 oz/acre)	2.5[a]	2.0[a]	14.5[a]	15.3[a]	1.0[a]	2.8[a]	2.3[a]
Bidrin 8E (3.2 oz/acre)	2.8[a]	3.8[a]	9.0[b]	15.3[b]	1.8[a]	1.5[a]	1.0[a]
Bidrin 8E+Discipline 2EC (1.6+2.6 oz/acre)	2.5[a]	2.5[a]	5.0[b]	49.0[a]	0.5[a]	1.0[a]	0.8[a]
Discipline 2EC (5.2 oz/acre)	2.3[a]	1.8[a]	5.5[b]	67.0[a]	1.0[a]	1.8[a]	1.0[a]
Nontreated	2.3[a]	2.3[a]	7.0[b]	15.0[b]	1.8[a]	3.8[a]	3.8[a]

Means in a column followed by the same letter are not significantly different by ANOVA.

[1/]Treatments were applied on 5/20 and 5/28

[2/]Arthropods included adult and immature stages of spiders, ladybird beetles, big-eyed bugs, minute pirate bugs, damsel bugs, lacewings, and syrphid flies.

[3/]DAT = Days After Treatment

Table 5. Impact of insecticides applied for cotton fleahopper on lady beetles and development of cotton aphid populations, Michael Watz Farm, Wharton County, TX, 2009.

Treatment [1/] (rate)	Mean number insects per 50 row feet				
	Lady beetles				Aphids (4th leaf)
	Pretreat	6 DAT-1[2/]	5 DAT-2	12 DAT-2	12 DAT-2
Centric 40WG (1.25 oz/acre)	0.8[a]	0.5[a]	4.0[b]	8.3[b]	3.10[b]
Intruder 70WP (1.0 oz/acre)	0.3[a]	0.5[a]	1.5[b]	3.8[b]	.98[b]
Trimax Pro 4.44 (1.25 oz/acre)	0.8[a]	1.3[a]	1.5[b]	13.0[b]	5.05[b]
Orthene 97 (8.0 oz/acre)	1.0[a]	0.8[a]	11.0[a]	12.3[b]	5.53[b]
Bidrin 8E (3.2 oz/acre)	1.3[a]	1.3[a]	6.3[ab]	13.3[b]	2.80[b]
Bidrin 8E+Discipline 2EC (1.6+2.6 oz/acre)	1.0[a]	1.0[a]	3.8[b]	45.5[a]	7.93[b]
Discipline 2EC (5.2 oz/acre)	0.3[a]	0.8[a]	3.3[b]	59.0[a]	29.78[a]
Nontreated	1.0[a]	0.3[a]	2.8[b]	10.3[b]	4.98[b]

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Treatments were applied on 5/20 and 5/28
[2/]DAT = Days After Treatment

Table 6. Location of bolls in treated and nontreated cotton following treatment for fleahopper, Michael Watz Farm, Wharton County, TX, 2009.

Treatment[1/] (rate)	Mean number of bolls/plant						
	By fruit position			By branch group			
	1	2	3	1-5	6-10	No. veg. branch bolls	Total bolls
Centric 40WG (1.25 oz/acre)	4.2[a]	1.2[a]	0.0[a]	5.0[a]	0.4[a]	3.8[a]	9.1[a]
Nontreated	4.6[a]	1.2[a]	0.4[a]	5.3[a]	0.9[a]	2.5[a]	8.7[a]
LSD (P=0.05)	NS[2/]	NS	NS	NS	NS	NS	NS
P > F	.2628	.7277	.0788	.4835	.0689	.2783	.6314

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Treatments were applied on 5/20 and 5/28
[2/] NS = Not Significant

Table 7. Plant growth characteristics in treated and nontreated cotton following treatment for fleahopper, Michael Watz Farm, Wharton County, TX, 2009.

Treatment[1/] (rate)	Avg. internode length (inches)	Plant height (inches)	NAWB[3/]	Vegetative nodes (total)	No. fruit branches
Centric 40WG (1.25 oz/acre)	1.45 [a]	22.4[a]	5.5[a]	5.7[a]	9.8 [a]
Nontreated	1.43 [a]	22.0[a]	5.3[a]	5.1[a]	10.3 [a]
LSD (P=0.05)	NS[2/]	NS	NS	NS	NS
P > F	.8440	.8118	.6376	.06	.3937

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Treatments were applied on 5/20 and 5/28
[2/] NS = Not Significant
[3/] NAWB = Nodes Above White Bloom

Table 8. Fiber characteristics and lint yield in cotton treated for fleahopper, Michael Watz Farm, Wharton County, TX, 2009.

Treatment[1/] (rate)	Mic	Length inches	Unif. ratio	Strength g/tex	Elong. %	Yield lb lint/acre
Centric 40WG (1.25 oz/acre)	5.1[a]	1.08[a]	83.3[a]	31.5[a]	6.9[a]	944[a]
Intruder 70WP (1.0 oz/acre)	5.2[a]	1.07[a]	83.6[a]	30.7[a]	6.8[a]	953[a]
Trimax Pro 4.44 (1.25 oz/acre)	5.2[a]	1.07[a]	84.4[a]	30.7[a]	6.5[a]	1008[a]
Orthene 97 (8.0 oz/acre)	5.2[a]	1.08[a]	84.3[a]	30.4[a]	7.1[a]	971[a]
Bidrin 8E (3.2 oz/acre)	5.2[a]	1.08[a]	84.2[a]	30.9[a]	6.6[a]	957[a]
Bidrin 8E+Discipline 2EC (1.6+2.6 oz/acre)	5.2[a]	1.06[a]	83.7[a]	30.2[a]	6.8[a]	930[a]
Discipline 2EC (5.2 oz/acre)	5.2[a]	1.09[a]	84.3[a]	31.3[a]	6.9[a]	994[a]
Nontreated	5.2[a]	1.09[a]	83.8[a]	32.0[a]	6.7[a]	950[a]
LSD (P=0.05)	NS[2/]	NS	NS	NS	NS	NS
P > F	.9698	.0564	.2261	.0996	.1595	.2660

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Treatments were applied on 5/20 and 5/28.
[2/] NS = Not Significant

TIMING OF INSECTICIDE APPLICATION ON COTTON FLEAHOPPER AND SUBSEQUENT EFFECT ON FRUIT AND LINT PRODUCTION

Raymond and Jason Koudela Farm, Wharton County, 2009

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SUMMARY: Early insecticide treatment initiation resulted in fewer numbers of fleahoppers during early square production. A comparison of the most aggressive treatment to the least aggressive (3 times versus no treatment) showed that percentage fruit retention at position 1 and on fruiting branches 1-5 was numerically greater for the aggressive treatment, but these differences were not as great as were measured in previous studies. There was also a trend for shorter internode length, shorter plant height, and fewer fruiting branches in the aggressively treated cotton, all potentially a result of greater early fruit load. No effects were observed on fiber characteristics. Lint production was significantly more in the aggressive treatment compared with all other treatments, but the yield in the aggressively treated cotton was not statistically better than the 2nd week only treated cotton. It is the first test we have conducted in the timing study series in which treatment in the first squaring week resulted in the highest yield. In previous studies when fleahopper control resulted in increased production, the increase was from treatments made after the first week of squaring.

OBJECTIVES: Cotton was treated from 0-3 times on varying weeks of squaring to determine impact of fleahoppers on plant fruiting characteristics and lint production.

MATERIALS/METHODS: The cotton fleahopper treatment timing study was conducted on the Raymond and Jason Koudela Farm located in Wharton County in a field next to CR 357 approximately 1.5 miles north of State Highway 59. The planter was a 12-row; therefore, plots were set at 6 rows with treatments applied to the center 4 rows. Plots were arranged in a randomized complete block design with replication of 50-foot plot treatments down the rows. With this arrangement, the test was 24 rows wide with each replication assigned to 6 rows. The cotton variety was FM 835B2LL.

Treatments were made with a self-propelled Spider Trac ground sprayer through 4X hollow cone nozzles (2/row) at 40 psi in a total volume of 5.1 gpa while traveling at 4.25 mph. Centric 40WG (1.25 ounces/acre) was applied at various weekly timing intervals such that (1) one set of plots was treated weeks 1, 2, and 3; (2) another set was treated weeks 2 and 3; (3) plots treated week 2 only; and (4) plots treated week 3 only.

Fleahoppers were counted on 20 plant terminals/plot on May 20 [pretreatment], May 23 [3 DAT-1 or 3 days after treatment beginning week-1], May 26 [6 DAT-1], May 29 [2 DAT-2], June 2 [6 DAT-2], June 6 [2 DAT-3], June 8 [4 DAT-3]. The number of fleahopper nymphs and adults were counted separately. Six plants were selected from one of the center rows (not the harvest row) of each plot on July 20 for mapping of the fruit load. The P-MAP software program developed by Dr. Juan Landivar was used to summarize the mapping data. Data obtained included internode length; plant height; and number of vegetative nodes, fruiting branches, and main stem nodes. The number of squares, green bolls, open bolls, total bolls, vacant sites, and % fruit retention was calculated for fruiting positions and for groups of fruiting branches.

One of the center rows in each plot was harvested on August 5 with a 1-row International Harvester model 120A spindle picker. Seed cotton samples were weighed, a subsample was obtained for ginning to determine percentage lint, and the sample was ginned on a 10-saw Eagle laboratory machine. Fifty gram lint samples were sent to the Fiber and Biopolymer Research Institute, Texas Tech University, Lubbock, Texas for fiber analysis.

The software program Agriculture Research Manager (ARM revision 6.1.13) was used to conduct analysis of variance on the data, and means were separated by LSD.

RESULTS/DISCUSSION: Fleahopper nymph, adult, and total counts are provided in Tables 1-3. The number of fleahopper nymphs remained relatively low until 6 DAT-2 (Days After Treatment) at which time they numbered 38.8/100 plants in the nontreated cotton. Adult cotton fleahopper numbers were much greater, but after reaching their peak 3 DAT-1 generally declined for the rest of the test period. Once insecticide treatments were initiated their numbers were reduced in the insecticide treated cotton to below 15/100 plants in all but one case. The objective of obtaining higher levels of control with increasing levels of treatment aggressiveness was obtained as reflected in the post-treatment average of nymph and adult fleahopper counts. This figure represented counts 3 and 6 DAT-1; 2 and 6 DAT-2; and 2 and 4 DAT-3 (Table 3).

Fruit retention as measured by position or by groups of 5 fruiting branches showed no statistical differences (Table 4). There was a trend for slightly higher retention of fruit at position 1 and on the first 5 fruiting branches in the aggressive treatment (treated weeks 1, 2, and 3) compared with the retention in the nontreated cotton. In previous studies significantly greater fruit retention was obtained with the most aggressive treatment compared with the nontreated cotton. Boll numbers were also numerically, but not statistically, greater for the same plant fruiting sites (Table 5). Again, the differences were not near as great as obtained in previous years field studies. The average internode length and plant height was shorter, and the number of fruiting branches was lower numerically by a slight amount in the aggressive treatment (Table 6). Micronaire readings were significantly different, but reasons for these differences as related to treatment were not apparent (Table7). Statistical differences were not found in any of the other fiber characteristics.

Statistical differences in yield did occur in that the aggressive treatment regime (treated weeks 1-3) produced more lint than all treatments except for the cotton treated only in week 2. Other factors not associated with the treatments must have bearing upon the results especially considering that cotton treated in weeks 2 and 3 had lower yield than the nontreated cotton and that treated only in week 2. We believe factors associated with location of the plots of the week 2 and 3 treated cotton within the test confounded the results, i.e. the cotton yields were adversely affected by the chance location of this treatment. Evidence of this location effect was observed by yields obtained in of some of the surrounding plots. Excluding the treatment being discussed (week 2 and 3) dollar returns due to treatment were $54.69/acre for treatment in weeks 1, 2, 3; and $44.31 per acre for cotton treated in week 2. More in-depth study of fleahopper affects on cotton fruiting and production need to be conducted to refine factors when considering insecticide control options.

ACKNOWLEDGMENTS: We thank Raymond and Jason Koudela for allowing us to conduct this test at their cotton field. Rudy Alaniz and Clint Livingston, Farm Demonstration Assistants, are acknowledged for their assistance in conducting the study. The Texas Department of Agriculture Food and Fibers Research Council is thanked for funding the cost for cotton fiber analysis.

Table 1. Effect of insecticide treatment timing on fleahopper nymphs, Raymond & Jason Koudela Farm, Wharton County, TX 2009

Treatment made in squaring week[1/]	Number per 100 plant terminals							Post-treat. average
	Pretreat	3 DAT-1[2/]	6 DAT-1	2 DAT-2	6 DAT-2	2 DAT-3	4 DAT-3	
1, 2, 3	1.3[a]	0.0[a]	0.0[a]	0.0[a]	0.0[b]	0.0[b]	0.0[b]	0.0[b]
2, 3	2.5[a]	6.3[a]	3.8[a]	0.0[a]	1.3[b]	1.3[b]	0.0[b]	2.1[b]
2	0.0[a]	2.5[a]	2.5[a]	0.0[a]	0.0[b]	12.5[ab]	10.0[b]	4.6[b]
3	0.0[a]	1.3[a]	2.5[a]	0.0[a]	31.3[a]	0.0[b]	0.0[b]	5.8[b]
Nontreated	0.0[a]	2.5[a]	2.5[a]	1.3[a]	38.8[a]	25.0[a]	38.8[a]	18.1[a]
LSD (P = 0.05)	NS[3/]	NS	NS	NS	13.58	18.18	16.13	6.31
P > F	.1586	.0721	.6945	.4449	.0001	.0420	.0008	.0004

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Centric 40WG was applied at 1.25 oz/acre in the indicated squaring weeks.
[2/]DAT = Days After Treatment.
[3/]NS = Not Significant

Table 2. Effect of treatment timing on fleahopper **adults**, Raymond & Jason Koudela Farm, Wharton County, TX, 2009.

Treatment made in squaring week[1/]	Number per 100 plant terminals: Pretreat	3 DAT-1[2/]	6 DAT-1	2 DAT-2	6 DAT-2	2 DAT-3	4 DAT-3	Post-treat. average
1, 2, 3	16.3[ab]	0.0[b]	10.0[a]	2.5[b]	1.3[b]	2.5[a]	0.0[b]	2.7[d]
2, 3	11.3[b]	33.8[a]	23.8[a]	2.5[b]	1.3[b]	1.3[a]	0.0[b]	10.4[c]
2	15.0[ab]	35.0[a]	33.8[a]	3.8[b]	0.0[b]	3.8[a]	2.5[a]	13.1[bc]
3	20.0[a]	36.3[a]	33.8[a]	25.0[a]	10.0[b]	0.0[a]	0.0[b]	17.5[ab]
Nontreated	21.3[a]	37.5[a]	27.5[a]	32.5[a]	23.8[a]	6.3[a]	3.8[a]	21.9[a]
LSD (P = 0.05)	6.33	12.0	NS[3/]	13.56	10.73	NS	2.44	4.85
P > F	.0317	.0001	.0609	.0006	.0019	.1118	.0132	.0001

Means in a column followed by the same letter are not significantly different by ANOVA.

[1/]Centric 40WG was applied at 1.25 oz/acre in the indicated squaring weeks.

[2/]DAT = Days After Treatment.

[3/]NS = Not Significant.

Table 3. Effect of treatment timing on fleahopper **nymphs and adults**, Raymond & Jason Koudela Farm, Wharton County, TX, 2009.

Treatment made in squaring week[1/]	Number per 100 plant terminals							Post-treat. average
	Pretreat	3 DAT-1[2/]	6 DAT-1	2 DAT-2	6 DAT-2	2 DAT-3	4 DAT-3	
1, 2, 3	17.5[a]	0.0[b]	10.0[b]	2.5[b]	1.3[c]	2.5[b]	0.0[b]	2.7[d]
2, 3	13.8[a]	40.0[a]	27.5[ab]	2.5[b]	2.5[c]	2.5[b]	0.0[b]	12.5[c]
2	15.0[a]	37.5[a]	36.3[a]	3.8[b]	0.0[c]	16.3[ab]	12.5[b]	17.7[bc]
3	20.0[a]	37.5[a]	36.3[a]	25.0[a]	41.3[b]	0.0[b]	0.0[b]	23.3[b]
Nontreated	21.3[a]	40.0[a]	30.0[a]	32.5[a]	62.5[a]	31.3[a]	42.5[a]	40.0[a]
LSD (P = 0.05)	NS[3/]	12.02	17.97	13.56	12.44	20.15	17.68	9.54
P > F	.0895	.0001	.0439	.0006	.0001	.0253	.0007	.0001

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Centric 40WG was applied at 1.25 oz/acre in the indicated squaring weeks.
[2/]DAT = Days After Treatment.
[3/]NS = Not Significant.

Table 4. Effect of fleahopper insecticide treatment timing on cotton fruit retention, Raymond & Jason Koudela Farm, Wharton County, TX, 2009.

Treatment made in squaring week[1/]	% fruit retention by position					% fruit retention by branch group		
	1	2	3	4	Total	1-5	6-10	11-15
1, 2, 3	41.2[a]	9.1[a]	5.8[a]	0.0[a]	29.4[a]	34.3[a]	9.0[b]	48.3[a]
2, 3	34.6[a]	7.0[a]	7.4[a]	12.5[a]	17.1[a]	25.8[a]	6.3[b]	40.4[a]
2	39.9[a]	7.7[a]	7.5[a]	8.3[a]	25.8[a]	29.3[a]	12.1[ab]	41.9[a]
3	39.2[a]	6.4[a]	0.0[a]	0.0[a]	21.1[a]	29.1[a]	11.8[ab]	46.4[a]
Nontreated	35.3[a]	12.5[a]	2.6[a]	3.6[a]	25.0[a]	24.0[a]	17.7[a]	39.2[a]
LSD (P = 0.05)	NS[2/]	NS	NS	NS	NS	NS	6.94	NS
P > F	.1320	.5323	.3473	.6987	.2592	.1253	.0388	.6691

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Centric 40WG was applied at 1.25 oz/acre in the indicated squaring weeks.
[2/]NS = Not Significant.

Table 5. Effect of fleahopper insecticide treatment timing on cotton boll location by fruiting position off the main stem and by fruiting branch group, Raymond & Jason Koudela Farm, Wharton County, TX, 2009.

		Number of bolls/plant					
		Fruiting position			Branch group		
Treatment made in squaring week[1/]	Veg. branch	1	2	3	1-5	6-10	11-15
1, 2, 3	1.3[a]	3.8[a]	0.6[a]	0.1[a]	4.0[a]	0.5[b]	0.0[a]
2, 3	4.0[a]	3.3[a]	0.7[a]	0.3[a]	3.5[a]	0.5[b]	0.2[a]
2	2.3[a]	4.0[a]	0.6[a]	0.2[a]	3.7[a]	0.9[ab]	0.2[a]
3	3.0[a]	3.8[a]	0.4[a]	0.0[a]	3.3[a]	0.8[ab]	0.0[a]
Nontreated	4.5[a]	3.5[a]	0.8[a]	0.1[a]	3.0[a]	1.4[a]	0.1[a]
LSD (P = 0.05)	NS[2/]	NS	NS	NS	NS	0.58	NS
P > F	.1002	.4585	.8578	.3293	.2501	.0343	.3266

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Centric 40WG was applied at 1.25 oz/acre in the indicated squaring weeks.
[2/]NS = Not Significant

Table 6. Plant growth characteristics measured at early open boll in cotton treated for fleahoppers at various timings, Raymond & Jason Koudela Farm, Wharton County, TX. 2009

Treatments by squaring week[1/]	Avg. intermode length inches	Plant height inches	NAWB[2/]	Vegetative nodes (total)	No. fruit branches
1, 2, 3	1.39[a]	24.9[a]	7.3[a]	5.8[a]	12.1[a]
2, 3	1.43[a]	26.6[a]	6.8[a]	6.1[a]	12.5[a]
2	1.37[a]	25.8[a]	6.00[a]	6.1[a]	12.8[a]
3	1.44[a]	26.8[a]	6.00[a]	6.0[a]	12.5[a]
Nontreated	1.44[a]	27.4[a]	5.5[a]	6.1[a]	12.9[a]
LSD (P = 0.05)	NS[3/]	NS	NS	NS	NS
P > F	.5714	.1806	.5810	.3518	.6074

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Centric 40WG was applied at 1.25 oz/acre in the indicated squaring weeks.
[2/]NAWB = Nodes Above White Bloom
[3/]NS = Not Significant

Table 7. Effect of insecticide treatment timing on cotton fiber characteristics, yield, and dollar return, Raymond & Jason Koudela Farm, Wharton County, TX, 2009.

Treatments by squaring week[1/]	Mic	Length inches	Unif. ratio	Strength g/tex	Elong. (%)	Yield lb lint/acre	$ return over Nontreated[2/]
1, 2, 3	5.1[b]	1.08[a]	83.0[a]	30.2[a]	5.2[a]	751[a]	+54.69
2, 3	5.0[b]	1.05[a]	82.2[a]	29.8[a]	5.0[a]	582[bc]	-30.93
2	5.2[a]	1.09[a]	83.6[a]	31.1[a]	4.9[a]	699[ab]	+44.31
3	5.0[b]	1.09[a]	83.6[a]	30.6[a]	4.6[a]	556[c]	-41.57
Nontreated	5.1[ab]	1.08[a]	82.9[a]	30.5[a]	4.9[a]	600[bc]	-
LSD (P = 0.05)	0.12	NS[3/]	NS	NS	NS	135.7	-
P > F	.0448	.3503	.1876	.6407	.6213	.0385	-

Means in a column followed by the same letter are not significantly different by ANOVA.

[1/]Centric 40WG was applied at 1.25 oz/acre in the indicated squaring weeks.

[2/]Cotton value was based on $0.58/lb for lint and $0.10/lb for seed using a factor of 1.66 times lint weight to calculate seed yield. Costs include Centric 40WG (5.00/oz) and application ($2.50/acre). Harvesting/hauling/ginning cost for the extra lint above the nontreated cotton was set at $0.21/lb lint.

[3/]NS = Not Significant

BOLLWORM/TOBACCO BUDWORM PHEROMONE TRAP CATCH AND RAINFALL DURING THE TRAPPING PERIOD

Texas AgriLife Research and Extension Center, Nueces County, 2009

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SUMMARY: Pheromone traps were inspected for bollworm and tobacco budworm for 31 weeks beginning March 2 and Extending through October 3. Due to extreme drought conditions, trap catches were lower than at any period since recording from this trap line began in 2004. Generally, bollworm numbers were slightly more than 1/3 of the previous low record for a season. Tobacco budworm numbers have generally declined since 2004 and that decline continued for 2009.

OBJECTIVE: Pheromone traps were operated to measure the relative abundance of bollworm and tobacco budworm moths captured and to obtain a supply of bollworm moths for testing susceptibility to pyrethroid insecticide (cypermethrin).

MATERIALS/METHODS: Two Moth-ZV 30-inch screen wire cone traps each were deployed and equipped with pheromone for the bollworm and tobacco budworm at the Texas AgriLife Research and Extension Center, Corpus Christi, Texas. The traps were examined from March 2 through October 3 or a period of 31 weeks, and the number of captured moths were recorded. Pheromone was changed at monthly.

RESULTS/DISCUSSION: The average daily pheromone trap catch for each week for bollworm and tobacco budworm is given in Fig. 1 and 2. Just as in previous years the bollworm was many times more abundant than tobacco budworm. Trap catch for the bollworm and tobacco budworm, respectively, averaged 5.57 and 0.06 per trap per day from March 1 through October 3. The bollworm captures were slightly less than a third of the number captured in any year since recording began in 2004. The number of tobacco budworm moths captured was also lower than in any previous year. Tobacco budworm numbers have generally declined each year since 2004. A large portion of the bollworm moths (unlike previous years) were captured in September which seemed to be associated with rainfall events (Fig. 3).

Examination of effective season rainfall, defined as 0.25 or more inches per day, amounted to 1.58 inches during the period March 1 through August 31. Another 4.10 inches of rain was received during September, but it was too late for row crop production. The total rainfall of 0.25 inches or more in any 24-hour period amounted to 5.68 inches for the entire period of pheromone trap operation. Another 1.33 inches of rainfall was received in very small amounts over the entire 7 month period. The entire region was designated to be in the "extreme drought" category by the National Weather Service. Only a small percentage of the cropland had any living vegetation.

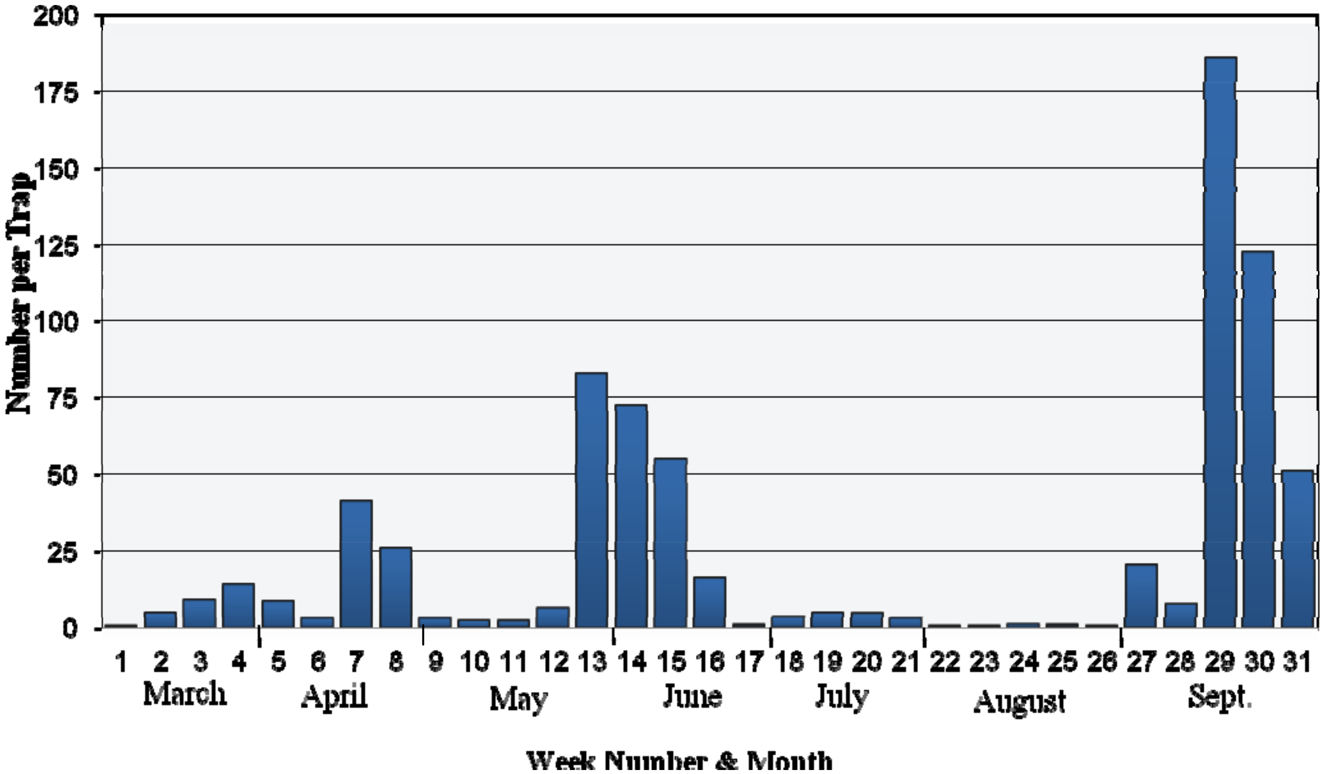

Fig. 1. Bollworm moths captured in pheromone traps per day for the indicated previous week, Nueces County, TX, 2009. Week one ending March 7 and week two ending October 3.

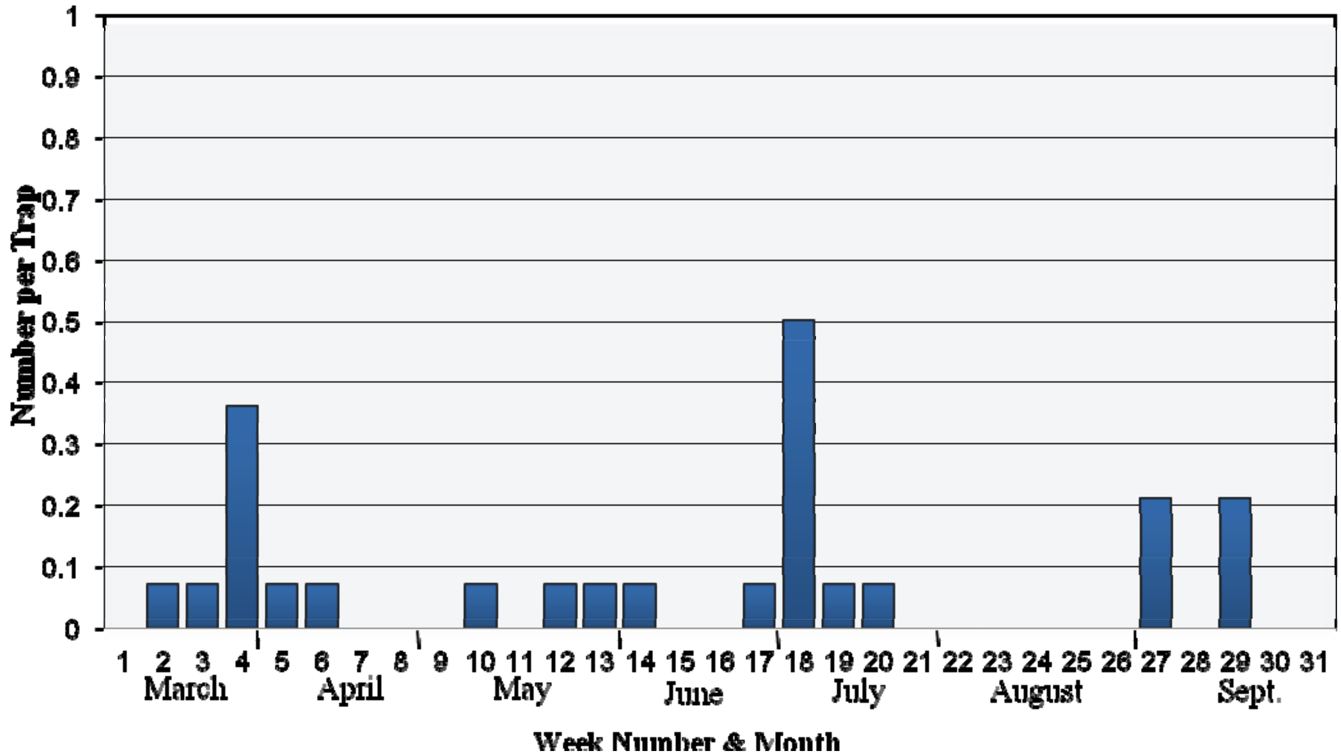

Fig. 2. Tobacco budworm moths captured in pheromone traps per day for the indicated previous week, Nueces County, TX, 2009. Week one ended March 7 and week 31 ended October 3.

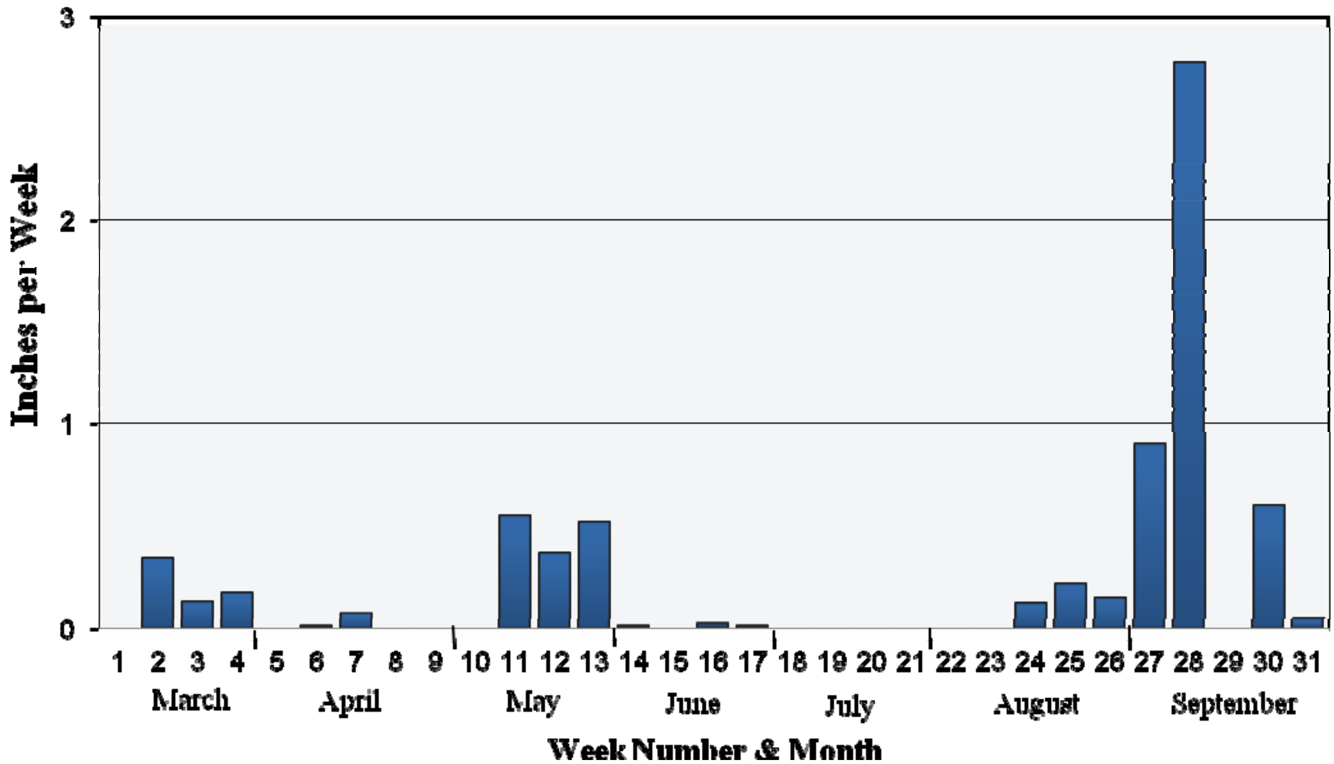

Fig. 3. Cumulative rainfall in inches per week with the first week ending March 7 and the last week ending October 3, Texas AgriLife Research & Extension Center, Nueces County, TX, 2009.

MONITORING OF RESISTANCE LEVELS IN THE BOLLWORM TO PYRETHROID INSECTICIDE IN THE COASTAL BEND OF TEXAS

Texas AgriLife Research and Extension Center, Nueces County, 2009

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SUMMARY: Testing of bollworm moths using the adult vial test (AVT) procedure was conducted to determine susceptibility of the species to the pyrethroid insecticide chemical class. Results from the 2009 tests indicate that the proportion of the bollworm population exhibiting resistance was lowest in the spring, highest in the early to mid-summer period and then receded in early fall. This is the same pattern observed since tests were initiated in 2004.

These findings over time suggest that bollworm pyrethroid resistance is fairly well entrenched in the Texas Lower Gulf Coast population. Continued vigilance in future seasons is warranted, as higher infestation levels in any given growing season could lead to occasional problems with use of pyrethroid insecticide to control bollworm in cotton or corn earworm/headworm in sorghum.

OBJECTIVES: AVT tests were conducted to determine change in susceptibility of bollworm/corn earworm/headworm to the pyrethroid insecticide class.

MATERIALS/METHODS: Moths collected early each morning from wire cone Hartstack traps baited with pheromone lures were immediately tested in the Adult Vial Test (AVT), or if there was a few hours delay in placing moths in vials, they were fed a 10% sugar-water solution for about one hour. One moth each was placed into insecticide coated 20 ml glass scintillation vials and held 24 hours for evaluation. Moths were exposed to cypermethrin concentrations of 0, 0.3, 1.0, 1.5, 2.5, 3, 5, 10, 30, and 60 micrograms per vial. Vials were placed in a rack and held at room temperature (75-76ºF) at a 45 degree angle with caps loosened. After 24 hours, moths in each vial were inspected and judged to be alive (able to fly), down but not dead, or dead. These data were recorded and sent to the Toxicology Laboratory, Department of Entomology, Texas A&M University, College Station, Texas for further analysis.

In 2009 a total of 530 moths were tested (53 moths/exposure level) over the period from late April into early September.

RESULTS/DISCUSSION: Resistance of bollworm to pyrethroid insecticide in 2009 continued to show the same trend as found since tests were initiated in 2004 (Fig. 1). The resistance level was low in the spring, increased in mid-season and declined again in late summer and early fall. The use of alternate chemistry on sorghum, where possible, for headworm control is encouraged. Additionally, use of the higher labeled rates of the pyrethroids is suggested.

ACKNOWLEDGMENTS: Appreciation is expressed to Dr. Patricia Pietrantonio and to Brad Hopkins, Department of Entomology, Texas A&M University, College Station, Texas for their support of this project. They provided all the materials necessary to carry out the vial study and processed the data for more in depth presentation. Dr. Pietrantonio is the leader for this project for Texas.

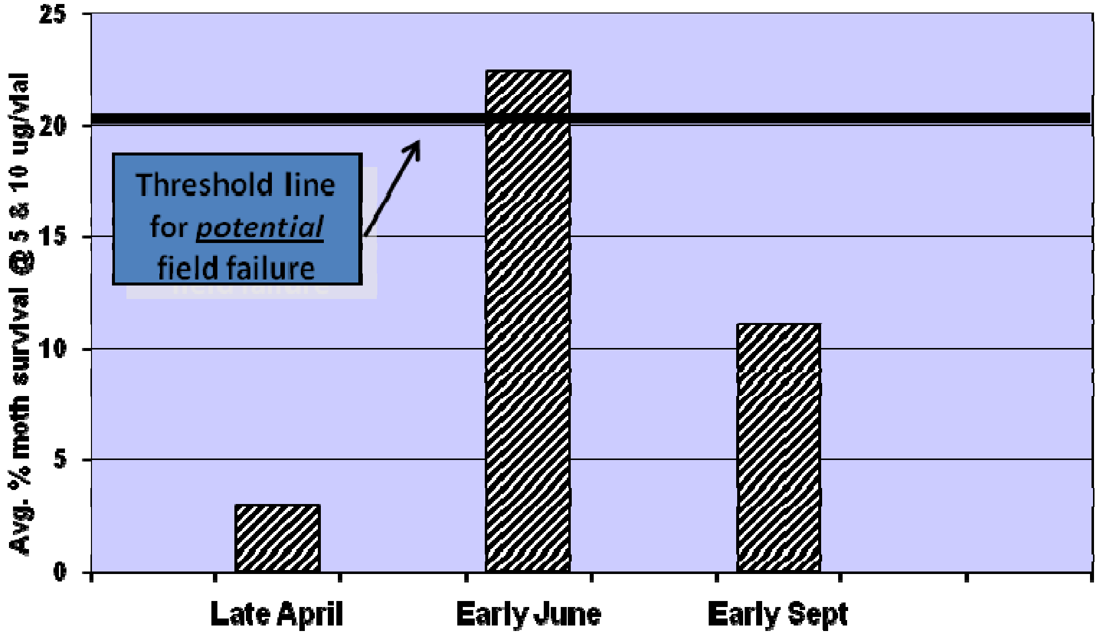

Fig. 1. Bollworm moth survival at 5 and 10 micrograms/vial cypermethrin in adult via tests (AVT) for 2009, Texas AgriLife Research and Extension Center, Nueces County.

HISTORY OF BOLL WEEVIL PHEROMONE TRAP CATCH IN COASTAL BEND COUNTIES AND PROGRESS TOWARD ERADICATION

South Texas/Winter Garden Boll Weevil Eradication Zone, 2009

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SUMMARY: Progress toward boll weevil eradication was made in 2009 due to the severe drought and much more aggressive eradication procedures by the Boll Weevil Foundation. Problems still exist in the northwestern area of the zone, but progress was also made in that area. Furthermore, fewer boll weevils are being captured along the trap lines running north along three highways across the ranchland from the Lower Rio Grande Valley.

OBJECTIVE: To maintain a record of relative boll weevil populations before and during eradication and to measure progress toward final eradication.

MATERIALS/METHODS: Boll weevil pheromone traps have been operated at 3 locations from 1998 until the present time. These traps have been deployed at the Welder Wildlife Foundation north of Sinton (10 traps), south of Orange Grove and east of Alfred (5 traps) and west of Clarkwood (3 traps). Traps were inspected weekly and pheromone was changed every other week through 2005. Since 2006 trap have been inspected every other week at which time pheromone was changed. The data shown before eradication was collected by Segers et al. during a 6-year period (1977- 1982).

RESULTS/DISCUSSION: Boll weevil numbers in the Nueces, San Patricio, and northern Jim Wells counties have been reduced dramatically compared with numbers captured in the same region from 1977 – 1982 (Table 1). In 2006 no weevils were captured on the three trap lines, but following late season extended rainfall and inability to obtain proper treatment, reproduction resulted in higher numbers in 2008. A more focused program in 2009 with emphasis on volunteer cotton growing in other crops and exceptional drought led to reductions in trap captures. An especially good sign of program effectiveness was evident during the last five months of 2009 since no boll weevils were detected in traps during that period.

Boll weevil numbers expressed as average per pheromone trap for the year through October for each of the South Texas/Winter Garden Boll Weevil Eradication Foundation district offices is shown in Table 2. Each district showed an alarming increase in weevil numbers in 2007 and 2008. The infestations carried over into 2009, but numbers were reduced greatly with the majority of the weevils in the Uvalde District. Much of the increase can be attributed to volunteer cotton growing in other crops, which until 2009 was not treated by the foundation.

Additionally, a more stringent cotton destruction law has been implemented that should provide incentive for more effective elimination of cotton stalks following harvest and prevention of hostable cotton growing in other crops. If effective elimination of cotton plants following harvest and prevention of volunteer cotton in other crops can be achieved, finishing boll weevil eradication can be achieved. Eradication and subsequent reduction in farmer cost will not occur until very effective stalk destruction and elimination of volunteer cotton is achieved.

ACKNOWLEDGMENTS: Thanks are extended to Larry Smith, Program Director, and to Darrell Dusek, Zone Manager, Texas Boll Weevil Eradication Foundation, for providing pheromone for traps and some of the data for this report. Their commitment to final elimination of boll weevils from the region is appreciated.

Table 1. Boll weevils per pheromone trap per month, Texas AgriLife Extension Service operated traps.

Month	1977-82 (6 yr avg)[a/]	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Jan	5.3	0.22	0.22	9.93	0.00	.05	.00	.00	.00	.00	.00	.00	.00
Feb	5.5	0.27	0.00	1.60	0.00	.00	.00	.00	.04	.00	.00	.00	.00
Mar	7.7	3.00	0.33	1.72	0.11	.10	.00	.04	.00	.00	.00	.17	.06
Apr	7.4	30.94	0.00	1.27	0.11	.05	.00	.00	.04	.00	.00	1.17	.17
May	2.8	22.00	0.00	0.83	0.17	.05	.00	.00	.00	.00	.00	1.00	.00
Jun	4.9	5.10	0.06	0.67	0.00	.00	.00	.00	.00	.00	.00	.17	.33
Jul	188.9	49.50	2.06	11.33	0.35	.00	.00	00	.00	.00	.00	.22	.06
Aug	645.7	48.40	45.00	14.04	0.94	.17	.04	.21	.04	.00	.00	.22	.00
Sep	309.7	2.28	40.90	1.39	0.11	.00	.00	.08	.00	.00	.00	.44	.00
Oct	165.4	1.39	5.72	0.72	0.06	.00	.00	.00	.00	.00	.04	.39	.00
Nov	55.3	0.28	28.30	0.50	0.11	.00	.00	.00	.00	.00	.00	.00	.00
Dec	15.7	0.22	13.67	0.03	0.00	.00	.00	.00	.00	.00	.17	.00	.00
Avg.	117.9	13.60	11.40	3.67	0.16	.035	.0033	.0275	.010	.00	.02	.32	.05

[a/]Traps operated by Segers, et al.

Table 2. Boll weevil pheromone trap catches, year to date through October, Texas Boll Weevil Eradication Foundation.

	YEAR										
Location	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Uvalde	1.92	0.13	0.03	0.034	0.468	3.02	1.149	0.179	3.699	5.478	1.09
Robstown	1.34	1.47	0.06	0.022	0.048	0.14	0.020	0.003	0.395	0.524	0.01
Sinton	1.16	0.84	0.03	0.003	0.004	0.01	0.001	.00001	0.015	0.067	0.004
Kingsville	0.88	1.77	0.45	0.802	0.423	1.96	0.460	.089	0.393	0.473	0.005
Victoria	1.61	1.00	0.34	0.266	0.214	0.11	0.009	.002	0.002	0.113	0.008
Zone total	1.35	1.14	0.16	0.135	0.138	0.66	0.215	.042	0.776	1.107	0.140

CONTROL OF FALL ARMYWORM ON JIGGS BERMUDAGRASS WITH SELECTED INSECTICIDES

Rudy Ramirez, Jr. Hay Pasture, Nueces County, 2009

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Corpus Christi and Robstown, Texas

SUMMARY: All insecticides tested effectively reduced fall armyworm numbers within a short period following treatment. Cost of insecticide used in the study ranged from $4.69 to $8.13 per acre.

OBJECTIVE: The study was conducted to compare effectiveness of 4 insecticides (one at two rates) for fall armyworm control in a grass hay field.

MATERIALS/METHODS: Fall armyworm larvae ranged in size from relatively small to near the last instar and averaged 40.1 per sweeps with a 15-inch net on the day (October 12, 2009) treatments were applied to jiggs Bermudagrass. The field study was conducted in a field owned by Rudy Ramirez, Jr. located on County Road 35 south of the Violet community. Very little rain was received for months followed by several inches in the previous 4-6 weeks. Fertilizer was applied to the grass after it began to grow, and by the test date it averaged about 10 inches tall.

Insecticide treatments were applied with a Spider Trac self-propelled sprayer equipped with 4X hollow cone nozzles at 19-inch spacing on a 12.5 foot boom. The equipment was operated at 40 psi and traveled 3.5 mph to deliver a total volume of 6.3 gpa. The test site was marked such that two swaths were made in each plot; therefore, one 2X hollow cone nozzle was placed at the end of the inside of the boom to assist with proper spray overlap. Flags were placed in the field to help with swath alignment.

Pretreatment counts were made the same day insecticide was applied. Treatments were assessed by counting the number of fall armyworm in 5 sweeps in each plot for the first 7 counts followed by taking 10 sweeps on the final 3 inspection dates with a 15-inch net. The 10-sweep counts were converted for analysis and presentation to the average for 5 sweeps. Post-treatment counts were made every day after treatment for the first 8 days and a final count was made 11 days after treatment (DAT).

Agriculture Research Manager (ARM revision 6.1.13) software was used to conduct analysis of variance (ANOVA). Means were separated by least significant difference (LSD) at the 5% probability level.

RESULTS/DISCUSSION: Fall armyworm pretreatment counts averaged 40.1 in 5 sweeps which was judged to be enough larvae to cause moderate damage to the jiggs grass (Table 1). Even though larval numbers declined in the nontreated grass on each inspection, except one, following treatment, their numbers appeared to be high enough to cause economic damage for the first 4 days following treatment. At 1-DAT all insecticides has significantly reduced larval numbers compared to the number found in the nontreated grass. The Intrepid treatment, as expected, had the highest number of larvae still present, but by 2-DAT their numbers were more in line with those in other insecticide treated plots. By 3-DAT the Intrepid treated grass had numerically, but not statistically, the lowest count. On all but one post-inspection date the high rate of Baythroid XL (2.8 ounces/acre) had numerically lower numbers of FAW larvae compared with the low rate (2.0 ounces/acre). Post-treatment average counts show little difference among any of the insecticides, and all counts were statistically lower than the average found in the nontreated grass.

All insecticides were judged to have effectively reduced the fall armyworm population, meaning substantial grass protection. Cost of the insecticides are also provided in Table 1; they ranged from $4.69/acre for Baythroid XL at the 2.0 ounce rate to $8.13/acre for Intrepid 2F at a 4.0 ounce rate.

Table 1. Effectiveness of insecticides for fall armyworm in Jiggs Bermudagrass, Rudy Ramirez, Jr. Hay Pasture, Nueces County, TX, 2009.

Treatment (rate)	Insecticide $ cost/acre[1/]	Fall armyworms/5 sweeps on days after treatment										Post-treat. average
		Pretreat	1	2	3	4	5	6	7	8	9	
Baythroid XL 1E (2.0 oz/acre)	4.69	35.8[a]	8.3[c]	5.0[bc]	10.0[b]	5.0[b]	5.8[ab]	6.6[a]	2.4[a]	1.5[b]	0.4[a]	5.0[b]
Baythroid XL 1E (2.8 oz/acre)	6.56	40.5[a]	3.8[c]	3.8[c]	4.8[b]	6.5[b]	4.0[b]	5.5[a]	2.3[a]	1.3[b]	0.3[a]	3.6[b]
Malathion 5E (32.0 oz/acre)	6.25	36.5[a]	8.8[bc]	7.8[bc]	8.5[b]	6.3[b]	3.0[b]	4.8[a]	1.0[a]	0.6[b]	0.4[a]	4.6[b]
Sevin 4XLR (16.0 oz/acre)	4.88	44.5[a]	5.3[c]	11.0[b]	6.5[b]	6.3[b]	4.6[b]	7.1[a]	2.8[a]	1.5[b]	0.6[a]	5.1[b]
Intrepid 2F (4.0 oz/acre)	8.13	38.5[a]	18.0[b]	5.8[bc]	3.3[b]	2.3[b]	1.8[b]	3.0[a]	1.5[a]	0.4[b]	0.1[a]	4.0[b]
Nontreated		44.5[a]	41.8[a]	28.0[a]	26.8[a]	20.3[a]	10.4[a]	12.3[a]	4.9[a]	3.4[a]	1.1[a]	16.5[a]
LSD (P = 0.05)		NS[2/]	9.52	6.84	8.95	6.83	5.00	NS	NS	1.31	NS	4.29
P > F		.2121	.0001	.0001	.0006	.0009	.0326	.1528	.1547	.0033	.0903	.0001

Means in a column followed by the same letter are not significantly different by ANOVA.
[1/]Cost of insecticide based on local dealer prices.
[2/]NS = Not Significant

BEHMANN BROTHERS FOUNDATION SUPPORT

Behmann Foundation funding has become so essential to the operation of the Texas AgriLife Extension Service program, that virtually every demonstration and applied research project is assisted through it. We acknowledge the support by the Behmann Brothers Foundation to help improve South Texas agricultural productivity.

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