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Results of Insect Control Evaluations on Corn, Sorghum and Cotton in Texas Coastal Bend Counties & Gulf Coast Crop Hybrid/Variety Comparisons

Texas Cooperative Extension, Dr. Edward G. Smith, Interim Director, The Texas A&M University System, College Station, Texas

TRIBUTE TO THE BEHMANN BROTHERS FOUNDATION

The Behmann Brothers Foundation has provided grant funds supporting Extension educational programs in production agriculture for over 25 years. Their generosity led to greatly expanded applied research activity. Behmann funding has been used for purchase of farm tractors, farming implements, sprayers, trailers to haul equipment, grain threshers, moisture meters, fertilizer spreaders, scales to weigh cotton and grain samples, repairs to our laboratory gin stands, and other items too numerous to mention. Some funding has also been applied to ensure that the equipment is properly maintained, and it sustains a portion of the salary of one employee.

Behmann Foundation funding has become so essential to the operation of the Texas Cooperative Extension program, that we recognize that virtually every demonstration or applied research project is assisted through it. The support by the Behmann Brothers Foundation of agricultural productivity in South Texas is hereby acknowledged.

FOREWORD

This document contains reports of applied research/demonstration projects conducted by Texas Cooperative Extension dealing with management of arthropod pests and production practices. Objectives of the studies were to find more cost effective ways to manage pests and to improve production practices. 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. Eleven projects were conducted at the Texas Agricultural Experiment Station at Corpus Christi.

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 judgements concerning the economic returns.

Gulf Coast hybrid/variety evaluations for corn, sorghum and cotton are included in the appendix. These research/demonstration projects were conducted by County Extension Agents, Extension Agronomists and Extension Agent-IPM. Special thanks are extended to Dr. Stephen D. Livingston, Extension Agronomist, for compiling most of these studies. The stacked cotton variety experiments were conducted by Extension Agents in cooperation with Dr. Robert Lemon, Extension State Cotton Specialist and Dan D. Fromme, Extension Agent-IPM.

Reports are also available at the following web site http://agfacts.tamu.edu/~rparker/rpmaster.htm. If you have comments or questions about the reports contained herein, contact:

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USE OF GRANULAR AZTEC ON CORN WITH AND WITHOUT PONCHO TREATED SEED FOR CHINCH BUG AND MEXICAN CORN ROOTWORM

Hernandez Farms, Goliad County, 2004

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Corpus Christi and Goliad, Texas

SUMMARY: Granular Aztec was evaluated on corn at 100, 75, and 50% of the labeled rate with and without Poncho 250 treated seed. The evaluation was made since Aztec has proved to be highly effective on Mexican corn rootworm (MCR) and Poncho has been shown to be highly effective on chinch bug. Unfortunately, expected field infestations of the insect pests did not occur although they had been present in high numbers in previous years at the test site. No adverse effects were noted on the corn with any of the combinations evaluated. Numerically, there was slightly greater damage in the nontreated corn to roots by MCR as measured by both the old and new Iowa State University root damage rating scales. Likewise, yield was lowest in the nontreated corn, but dollar returns based on the numerical differences were mostly negative.

OBJECTIVE: The corn experiment was designed to compare effectiveness of combinations of granular Aztec and the seed treatment Poncho for control of chinch bug and MCR and to determine if there were any adverse affects of the combination on plant development.

MATERIALS/METHODS: Pioneer 32R25 corn hybrid was planted on March 12, 2004 with a John Deere 7300 MaxEmerge plus planter at a seeding rate of 19,500 kernels/acre. Plots were 4 rows by 350 ft, and treatments were replicated 3 times in a randomized complete block design. The row spacing was 38 inches, and location of the field study was the "Pettus Place" off Long Road northwest of Goliad. Planting conditions consisted of 61°F soil temperature, excellent moisture, and a planter speed of 6 mph. Corn had been planted on the site for at least 6 years. The clay loam soil (36% sand, 27% silt, and 37% clay) contained 2.7% organic matter with a slightly alkaline pH of 8.0.

Fertilizer applied was 420 lb/acre of 18-9-3. Herbicide applied on the planting date was Roundup at 28.4 oz/acre. Later, Accent 75WDG (0.154 oz) + Oracle 4E (2.5 oz/acre) herbicides were applied for grass and broadleaf weeds.

Treatments were assessed by (1) counting the number of corn plants on 13.75 ft row on each of the center 2 rows in plots on March 29, (2) examining plants for chinch bugs on March 29 and again on April 9 [counts were so low they were not recorded], (3) digging 6 plants from the center 2 rows in plots May 11 for examination of the root system for

MCR damage using the Iowa State University 1-6 and 0-3 root-rating scales, (4) harvesting entire plots with a commercial combine for yield on August 3 with plot weights adjusted for moisture to 15%, and (5) determining dollar return or loss based on numerical yield levels.

RESULTS/DISCUSSION: Insect numbers in the field for the first time in years were extremely low. Chinch bug numbers were so low that counts were only made in nontreated plots on the two inspection dates and are not reported. No statistical differences were found in plant stand, root damage by MCR, or yield (Table 1). There were, however, trends in that root damage ratings were greater in the nontreated corn as measured by both rating scales, and greater yields were obtained with the insecticide treatments. The numerical yield increase was generally not great enough to pay for the treatment except for the two lower rates of Aztec used alone and the Poncho 1250; it cannot be implied that these returns were due to treatment since statistical differences could not be measured in insect numbers or root damage.

Additional experiments of this nature are needed to determine the most cost effective way to reduce damage when chinch bug and MCR occur in the same field. Aztec for MCR and Poncho for chinch bug are thought to be an excellent combination but must be proved in future field studies of this nature where greater numbers of pest insects occur.

ACKNOWLEDGMENTS: Thanks are extended to the Louis Hernandez Family for providing land, labor and equipment for conduct of the study. Special thanks are given to Stanley Schilling and Phillip Thomas, Schilling Supply, for providing electronic scales and labor to assist with weighing the corn. Bayer and Gustafson companies are acknowledged for their assistance in conduct of the study.

Table 1. Plant stand and effect of Mexican corn rootworm on corn roots in a field treated with various rates of granular Aztec with and without Poncho seed treatment, Hernandez Farms, Goliad County, TX, 2004.

Treatment (rate)	Plant stand 1000's/acre	Root damage, Mexican corn rootworm: Old[a]	Root damage, Mexican corn rootworm: New[b]	Yield bu/acre	$ return over nontreated[c]
Aztec 2.1G (6.7 oz/1000 row-ft)	18.8 a	1.28 a	0.02 a	107.5 a	- 5.43
Aztec 2.1G (5.02 oz/1000 row-ft)	19.3 a	1.56 a	0.04 a	110.6 a	5.56
Aztec 2.1G (3.25 oz/1000 row-ft)	19.0 a	1.21 a	0.01 a	107.6 a	0.98
Aztec 2.1G + Poncho 250 (6.7 oz/1000 row-ft)	18.7 a	1.32 a	0.03 a	105.0 a	- 15.47
Aztec 2.1G + Poncho 250 (5.02 oz/10000 row-ft)	18.5 a	1.57 a	0.08 a	106.2 a	- 9.33
Aztec 2.1G + Poncho 250 (3.25 oz/1000 row-ft)	18.7 a	1.19 a	0.01 a	107.1 a	- 3.96
Poncho 1250 (1.25 Mg AI/seed)	18.3 a	1.11 a	0.01 a	110.6 a	3.85
Nontreated	19.8 a	1.84 a	0.20 a	104.7 a	
LSD (P = 0.05)	NS	NS	NS	NS	
P > F	.1873	.1058	.3780	.8566	

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

[a] Old method - Iowa State 1-6 root-rating scale: 1 = no visible feeding damage, 2 = feeding scars, 3 = at least 1 root eaten to within 1.5 inches of stalk, 4 = 1 complete node of roots eaten, 5 = 2 complete node of roots eaten, and 6 = 3 or more nodes of roots eaten.

[b] New method - Iowa State 0 - 3 node-injury scale: 0 = no feeding damage, 1 = 1 node of roots eaten within 2 inches of the stalk, 2 = 2 nodes of roots eaten and 3 = 3 or more nodes of roots eaten

[c] Corn value based on $3.00/bu; Costs include Poncho 250 ($3.66/acre at 19,500 seed/acre) and Aztec 2.1G ($12.33, $9.25 and $6.17 for 3 rates used, respectively) and $0.25/acre for application of Aztec. Harvesting/hauling cost based on custom rate of $0.80/cwt.

EVALUATION OF SYNGENTA TRANSGENIC CORN HYBRID FOR MEXICAN CORN ROOTWORM CONTROL

Hernandez Farms, Goliad County, 2004

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SUMMARY: No differences were found in plant emergence between Syngenta corn MIR604 (transgenic Bt corn for Mexican corn rootworm) and negative isolines treated with various seed or granular insecticides. Although Mexican corn rootworm (MCR) damage to roots was relatively low in the non-insecticide negative isoline corn treatment, statistically significant differences were observed. Lowest damage was found in the MIR604 hybrid with or without Cruiser seed treatment. MCR numbers were not great enough to obtain extensive data.

OBJECTIVE: The field study was established to evaluate the effectiveness of MIR604 transgenic Bt corn cultivar on MCR compared with the negative isoline treated with Cruiser, Poncho, Force, Aztec, or Counter.

MATERIALS/METHODS: Syngenta corn hybrids were planted on the Hernandez Farm, "Pettus Place" off Long Road northwest of Goliad on March 26, 2004 with a 2-row John Deere 7100 MaxEmerge planter on 38-inch centers equipped with cone seed distributors. The prepackaged seed was planted at the rate of 25 seed/22 row ft in 2-row plots with treatments arranged in a randomized complete block design with 4 replications. Following planting, herbicide was broadcast (Atrazine 4F at 3 pints/acre + Dual II Magnum at 1.3 pints/acre) in a total volume of 22 gpa through AI 11003 nozzle tips at 40 psi with the sprayer travel speed at 4 mph. Asana XL 0.66EC (5.8 oz/acre) was included in the application for cutworms. Planting conditions consisted of 68°F soil temperature, wet soil, and a planter speed of 2.5 mph. The clay loam soil (36% sand, 27% silt, and 37% clay) contained 2.7% organic matter with a slightly alkaline pH of 8.0. Fertilizer applied was 420 lb/acre of 18-9-3.

Treatments were assessed by (1) determining plant emergence by counting all plants in each of the 2-row plots on April 9, (2) examining plants for unusual growth habit on April 9 and May 17, and (3) digging 6 plants from each plot on May 17 for examination of the root system for MCR damage using the Iowa State University 1-6 and 0-3 root-rating scales. Following digging of plants for root examination the entire test plot was cut down and plowed due to regulatory requirements associated with the transgenic traits being tested.

RESULTS/DISCUSSION: Statistical differences were not observed in plant emergence (Table 1) where emergence ranged from 94.0% (nontreated negative isoline) up to

98.5% (Force treated negative isoline). Germination was probably enhanced by the late planting date associated with warm soil conditions for corn. Although MCR damage to roots was lower than expected, statistical differences were observed in treatments. Two negative isoline corn insecticide treatments (Cruiser 0.125 MG AI/seed and Force 3G 5.0 oz/1000 row ft) were not different from the nontreated isoline corn as measured by both root-rating scales. The MIR604 transgenic corn hybrids exhibited the lowest root damage compared to all other treatments. Additional testing under more severe infestation will be needed to more accurately assess the various treatments.

ACKNOWLEDGMENTS: Appreciation is expressed to Syngenta Crop Protection, Inc. for their support of this work and especially to Dr. Brad Minton, Research Scientist, for his many suggestions. We acknowledge the Louis Hernandez Family for providing land and working around the small test area.

Table 1. Comparison of Syngenta Company genetically engineered corn, negative isoline hybrid, and seed and granular at-plant insecticide treatments for effect on Mexican corn rootworm, Hernandez Farms, Goliad County, TX, 2004.

Treatment	Rate[a]	Plants % emergence[b]	Root damage, Mexican corn rootworm Old[c]	Root damage, Mexican corn rootworm New[d]
MIR604		96.0 a	1.15 e	.017 c
MIR604 + Cruiser	0.125 MG AI/S	98.0 a	1.28 de	.019 c
MIR604 + Cruiser	0.75 MG AI/S	98.0 a	1.27 de	.016 c
Neg. Isoline + Cruiser	0.125 MG AI/S	93.0 a	2.39 ab	.227 ab
Neg. Isoline + Cruiser	0.75 MG AI/S	94.5 a	1.70 cd	.043 c
Neg. Isoline + Cruiser	1.25 MG AI/S	95.0 a	1.70 cd	.048 c
Neg. Isoline + Poncho	1.25 MG AI/S	95.5 a	1.90 bc	.110 bc
Neg. Isoline + Force 3G	5.0 oz	98.5 a	1.62 cde	.047 c
Neg. Isoline + Aztec 2.1G	6.7 oz	96.0 a	1.87 bc	.061 c
Neg. Isoline + Counter 15G	8.0 oz	94.5 a	2.15 abc	.156 abc
Neg. Isoline (nontreated)		94.0 a	2.66 a	.317 a
LSD (P = 0.05)		NS	.539	.1716
P > F		.7394	.0001	.0157

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

[a] MG AI/S = milligrams active ingredient/seed; oz = ounces/1000 row ft.

[b] Seed packages contained 25 seed/22 ft.

[c] Old method - Iowa State 1-6 root-rating scale: 1 = no visible feeding damage, 2 = feeding scars, 3 = at least 1 root eaten to within 1.5 inches of stalk, 4 = 1 complete node of roots eaten, 5 = 2 complete node of roots eaten, and 6 = 3 or more nodes of roots eaten.

[d] New method - Iowa State 0 - 3 node-injury scale: 0 = no feeding damage, 1 = 1 node of roots eaten within 2 inches of the stalk, 2 = 2 nodes of roots eaten and 3 = 3 or more nodes of roots eaten.

COMPARISON ON CORN OF GRANULAR AZTEC AT TWO RATES FOR CONTROL OF MEXICAN CORN ROOTWORM APPLIED WITH AND WITHOUT SEED TREATED WITH PONCHO 250 FOR CONTROL OF CHINCH BUG

Jim Pettus Farm, Goliad County, 2004

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SUMMARY: The field study was established to evaluate granular Aztec at the full and half rate for control of Mexican corn rootworm (MCR) and to measure the impact of Poncho 250 treated seed on chinch bug. Chinch bug plant damage ratings were reduced by all insecticide treatments, and their actual numbers were greatly reduced 18 days after planting in plots where Poncho 250 treated seed had been used. However, by 29 days after planting there were no differences in chinch bug numbers in the treatments. MCR root damage ratings were significantly reduced in all Aztec treatments compared with nontreated and Poncho 250 used alone. MCR damage was relatively low in 2004 compared to previous years. Significant reduction in plant stand was observed in nontreated corn. All insecticide treatments produced significantly more corn compared with the nontreated corn, and greater yields occurred in plots where Poncho 250 seed was used, probably as a result of superior chinch bug control. Dollar returns ranged from $8.09/acre (Aztec 2.1G at 6.7 oz/1000 row ft) up to $47.36/acre (Poncho 250 treated seed).

OBJECTIVE: The experiment was designed to measure the impact of Poncho 250 on chinch bug and Aztec on MCR used alone and in combination. Impact of treatments on yield and dollar return was calculated.

MATERIALS/METHODS: Pioneer 32R25 hybrid corn was planted on March 11, 2004 with a John Deere 7300 MaxEmerge plus planter at a seeding rate of 20,500 kernels/acre. Plots were 4 rows by 400 ft, and treatments were replicated 3 times in a randomized complete block design. Rows were spaced on 38-inch centers, and location of the field study was on Newton Powell Road in northwest Goliad County. Corn had been grown on the site in 2003 and sorghum in 2002. Planting conditions consisted of 67°F soil temperature, excellent moisture conditions, and a planter speed of 5.5 mph. The clay loam soil (28% sand, 41% silt, and 31% clay) contained 3.03% organic matter with a moderately alkaline pH of 8.1. Herbicide used was Glystar Extra (3.0 pints/acre) + Atrazine 90 (1.25 lb/acre) at planting and Exceed (1.0 oz/acre) on April 4.

Treatments were assessed by (1) counting the number of corn plants on 13.75 ft row on each of the center 2 rows in plots on March 29, (2) counting the number of chinch bugs [all adults] on 20 plants/plot on March 29 [18 days after planting = DAP] and again on

April 9 [29 DAP], (3) assigning a damage rating to plots on March 29 [1 = excellent growth up to 5 = stunted uneven growth and yellowing], (4) examining 6 corn roots dug from the center 2 rows in plots on May 11 for MCR damage using the Iowa State University 1-6 and 0-3 root rating scales, (4) harvesting each plot with a commercial combine for yield on August 5 with plot weights adjusted for moisture to 15%, and (5) determining dollar return based upon numerical yield level, less insecticide and harvesting/hauling cost compared to the nontreated corn.

RESULTS/DISCUSSION: Plant damage rating, primarily for chinch bug, was significantly greater in nontreated corn than any of the insecticide treatments (Table 1). Chinch bug numbers 18 DAP were significantly lower compared with nontreated corn in all treatments where Poncho 250 treated seed was included, but by 29 DAP no differences were detected in their numbers. Two treatments (Poncho 250 treated seed and nontreated corn) had significantly more damage from MCR compared with other treatments. Treatments with Aztec showed the reduced rootworm damage. These results were apparent as measured by both root damage rating scales. One treatment (Aztec at 3.35 oz/1000 row ft) did not differ statistically in plant stand from nontreated corn, but all other treatments had significantly higher plant stands (Table 2). Numerically, greater yields were produced in corn where Poncho treated seed was used, and all insecticide treated corn produced statistically more grain than nontreated corn. These yields seemed to reflect returns from chinch bug control more than MCR. Another factor affecting dollar return was the cost of the insecticides; the lower rate of Aztec and Poncho alone provided the greatest dollar return.

ACKNOWLEDGMENTS: Thanks are extended to Bayer and Gustafson companies for support of the field study. A special thanks is extended to Fred Pena in establishment and maintenance of the experiment and to Jim Pettus for providing land, equipment, time, and his interest in the work. Stanley Schilling, Schilling Supply, is acknowledged for assistance in obtaining seed, providing electronic weigh scales, and helping to weigh the plots. We thank Howard Taff, custom harvest operator, from Ballinger, Texas, for his assistance.

Table 1. Plant stand, chinch bug number, and root damage rating in corn treated with Aztec (2 rates) with and without Poncho 250 seed treatment, Jim Pettus Farm, Goliad County, TX, 2004.

Treatment (rate)	Plant da rating[a]	Chinch bugs/ 20 plants		Root damage, Mexican corn rootworm	
		18 DAP[b]	29 DAP	Old[c]	New[d]
Aztec 2.1G (3.35 oz/1000 ft)	1.3 b	5.0 abc	24.7 a	2.31 b	.117 b
Aztec 2.1G (6.7 oz/1000 ft)	1.3 b	8.0 ab	50.7 a	2.16 b	.107 b
Aztec 2.1G + Poncho 250 (3.35 oz/1000 ft + 0.25 mg AI/seed)	1.3 b	1.3 c	26.0 a	2.02 b	.085 b
Aztec 2.1G + Poncho 250 (6.7 oz/1000 ft + 0.25 mg AI/seed)	1.0 b	1.0 c	26.7 a	1.76 b	.058 b
Poncho 250 (0.25 mg AI/seed)	1.0 b	2.7 bc	46.0 a	3.52 a	.652 a
Nontreated	2.7 a	10.7 a	42.7 a	3.86 a	.934 a
LSD (P = 0.05)	0.92	6.61	NS	0.705	0.3034
P > F	.0205	.0455	.0830	.0002	.0002

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

[a] Damage ratings: 1 = excellent plant growth up to 5 = stunted uneven growth and yellowing.

[b] DAP = days after planting. Plants were 6 inches tall 18 DAP and 14 inches tall 29 DAP.

[c] Old method - Iowa State 1-6 root-rating scale: 1 = no visible feeding damage, 2 = feeding scars, 3 = at least 1 root eaten to within 1.5 inches of stalk, 4 = 1 complete node of roots eaten, 5 = 2 complete node of roots eaten, and 6 = 3 or more nodes of roots eaten.

[d] New method - Iowa State 0 - 3 node-injury scale: 0 = no feeding damage, 1 = 1 node of roots eaten within 2 inches of the stalk, 2 = 2 nodes of roots eaten and 3 = 3 or more nodes of roots eaten.

Table 2. Corn plant population, yield and dollar return as affected by Aztec and Poncho insecticides, Jim Pettus Farm, Goliad County, TX, 2004.

Treatment (rate)	Plants 1000's/ acre	Yield bu/acre	Increase over nontreated (bu)	$ return over nontreated[a]
Aztec 2.1G (3.35 oz/1000 ft)	19.5 bc	102.5 bc	12.3	25.23
Aztec 2.1G (6.7 oz/1000 ft)	20.5 ab	98.2 c	8.0	8.09
Aztec 2.1G + Poncho 250 (3.35 oz/1000 ft + 0.25 mg AI/seed)	20.8 a	109.1 a	18.9	38.14
Aztec 2.1G + Poncho 250 (6.7 oz/1000 ft + 0.25 mg AI/seed)	21.0 a	106.1 ab	15.9	24.31
Poncho 250 (0.25 mg AI/seed)	21.0 a	110.3 a	20.1	47.36
Nontreated	19.2 c	90.2 d		
LSD (P = 0.05)	1.29	6.57		
P > F	.0328	.0035		

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

[a] Corn value based on $3.00/bu; costs include Poncho 250 ($3.94/acre at a 21,000/acre seeding rate), and Aztec 2.1 G ($2.14/lb = $6.16 and $12.33/acre, respectively, for the low and high rates used in the study). Harvesting/hauling cost was based on a custom rate of $0.80/cwt. Application cost for granular Aztec was calculated at $0.25/acre.

COUNTER AND PONCHO FOR CONTROL OF MEXICAN CORN ROOTWORM AND CHINCH BUG ON CORN

Fred and Chad Hahn Farm, DeWitt County, 2004

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SUMMARY: The experiment to compare Counter and Poncho 1250 (Mexican corn rootworm rate) was planted in a field that had been in corn for many years and had a history of significant problems with the Mexican corn rootworm (MCR). However, MCR occurred in low numbers in the test field, and even though a statistically greater amount of damage was found in nontreated corn, the root rating barely exceeded a "2" as measured by the Iowa State University root-rating scale (old method). A "2" rating on that scale amounts to the presence of feeding scars on roots. Additionally, the root damage was low as measured by the new node-injury scale. Early in the season the nontreated corn sustained a higher chinch bug damage rating, but their numbers were less than half the recommended level requiring treatment. Therefore, no yield differences were detected.

OBJECTIVE: The comparison was conducted to compare effectiveness of Counter and Poncho 1250 on MCR and chinch bug.

MATERIALS/METHODS: The field experiment was conducted on the Fred and Chad Hahn Farm on Highway 119, five miles northwest of Yorktown. Garst 8270 RR corn hybrid was planted on rows with 30-inch centers at 20,000 seed/acre with a John Deere 1760 Vacuum planter on March 9, 2004. Plots were 5 rows by 1165 ft, and treatments were replicated 3 times in a randomized complete block design. Corn had been grown in the field for many years. Planting conditions consisted of 72°F soil temperature, wet soil conditions, and the field was no-till. The sandy clay loam soil (64% sand, 13% silt, and 23% clay) contained 1.8% organic matter with a mildly alkaline pH of 7.9. Fertilizer applied was 400 lb/acre of 21-7-3 + micromix. Herbicides applied were Atrazine 4F (1.25 quart/acre) + 2,4-D (1.25 quart/acre) pre-plant followed in season by Clearout (glyphosate) at 20 oz/acre.

Treatments were assessed by (1) counting the number of corn plants on 17.424 ft row on 2 of the center 3 rows in each plot on March 30, (2) examining 20 plants/plot for chinch bugs on March 30 [21 days after planting = DAP], (3) estimating chinch bug damage on April 20 [42 DAP] by assigning a rating of damage based on 1 = no damage observed up to 5 = stunting, uneven plant growth and/or poor plant color, (4) digging 6 plants from the center 3 rows of plots on May 8 for root damage ratings using the Iowa State University root-rating scale [old method] and the node-injury scale [new method], and (5) harvesting the 5 row plots with a commercial combine on August 3. Plot weights were adjusted for moisture to 15%.

RESULTS/DISCUSSION: Differences were not found in plant stand or chinch bug numbers 21 DAP, but the nontreated corn exhibited a higher damage rating (Table 1). This elevated damage was not high even though it was statistically greater than in insecticide treated corn. Statistically more MCR damage was found in nontreated corn compared with both Counter and Poncho 1250 treated corn by the 1-6 root-rating scale, and Poncho 1250 had statistically less damage compared with the untreated as measured by the 0-3 node-injury scale. Although these differences were observed even in the nontreated corn, the damage was mostly feeding scars. As a result of low insect infestation, no differences were found in corn yields; only 3 bushels/acre separated the highest from the lowest yield.

ACKNOWLEDGMENTS: Appreciation is expressed to Fred and Chad Hahn for their long term commitment to conducting field studies on their farm. A special thanks is extended to Victor Eder, Garst Seed Company, for assisting with test establishment and helping to weigh the harvested corn. Weighing of this test and three others did not get underway until after 10 p.m.

Table 1. Comparison of Counter and Poncho for control of chinch bug and Mexican corn rootworm, Fred and Chad Hahn Farm, DeWitt County, TX, 2004.

Treatment	Plant stand[a] 1000's/acre	Chinch bugs[a] per 20 plants	Plant da.[b] rating	Root damage, Mexican corn rootworm Old[c]	New[d]	Yield bu/acre
Poncho 1250	20.5 a	0.0 a	1.0 b	1.53 b	.05 b	116 a
Counter 20CR	21.0 a	4.0 a	1.0 b	1.63 b	.08 ab	115 a
Nontreated	19.7 a	3.3 a	2.7 a	2.07 a	.10 a	117 a
LSD (P=0.05)	NS	NS	0.76	0.388	0.026	NS
P > F	.2984	.0968	.0055	.0377	.0209	.6301

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

[a] Counts were made at two locations/plot on March 30.

[b] Damage ratings made on April 20 range from 1 = no damage observed up to 5 = stunting, uneven plant growth and/or poor plant color.

[c] Old method - Iowa State 1-6 root-rating scale: 1 = no visible feeding damage, 2 = feeding scars, 3 = at least 1 root eaten to within 1.5 inches of stalk, 4 = 1 complete node of roots eaten, 5 = 2 complete node of roots eaten, and 6 = 3 or more nodes of roots eaten.

[d] New method - Iowa State 0 - 3 node-injury scale: 0 = no feeding damage, 1 = 1 node of roots eaten within 2 inches of the stalk, 2 = 2 nodes of roots eaten and 3 = 3 or more nodes of roots eaten.

COMPARISON OF INSECTICIDES ON CORN FOR CONTROL OF CHINCH BUG AND MEXICAN CORN ROOTWORM

Lawrence Hinze Farm, Lavaca County, 2004

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SUMMARY: Chinch bug numbers were heavy in the experiment, but Mexican corn rootworm (MCR) damage was relatively low. Poncho 1250 significantly reduced chinch bug numbers compared with Aztec and Counter, 20 and 26 days after planting (DAP). Although Aztec was not expected to provide a high level of chinch bug control, Counter 15G was expected to provide better control than it did. Plant damage ratings were improved by all 3 insecticides, and significantly more MCR damage was found on roots from the nontreated corn. MCR damage in the nontreated corn was not very high, however. The yield was significantly greater in Poncho 1250 treated corn, which reflected the superior chinch bug control provided by this seed treatment. Poncho provided a $17.14/acre return.

OBJECTIVE: The field study was conducted to evaluate the effects of Poncho, Aztec, and Counter on soil insect pests (especially chinch bugs) and Mexican corn rootworm (MCR), and to determine dollar returns from use of the insecticides.

MATERIALS/METHODS: The experiment was conducted in Lavaca County on the Lawrence Hinze Farm "Home Place" northeast of Shiner, one mile east of Highway 95 just off of FM Road 1891**.** B&H 9012 hybrid corn was seeded on March 10, 2004 at 19,000 kernels/acre in rows with 38-inch centers with a 4-row IH87 blackland planter equipped with Nobel granular insecticide boxes. Conditions at planting included 72°F soil temperature, excellent soil moisture, and the sandy clay loam soil (55% sand, 14% silt, and 31% clay) had 1.5% organic matter with a 7.6 pH. Granular insecticides were applied in a "T-band". Treatments were arranged in 4-row plots with 3 replications in a randomized complete block design. Plots were 0.29 acres in size. Corn had been grown at the site for at least 7 years. Fertilizer applied was 99-27-9+9S and 2 quarts of 15% zinc/acre. Herbicide consisted of Atrazine 4F (1.25 quarts/acre) applied in a 12-inch band.

Treatments were assessed by (1) determining plant stand by counting plants on 13.75 ft row in each of the 2 center rows/plot on April 5, (2) counting chinch bugs on 20 plants/plot in the center 2 rows on March 30 and April 15 [20 and 26 DAP, respectively], (3) scoring plant damage 26 and 51 DAP where 1 = no damage observed up to 5 = stunted uneven plant growth and yellowing, (4) digging around 20 plants in each plot to count chinch bugs 20 and 26 DAP, (5) digging and washing corn roots of 6 plants/plot from the center 2 rows to examine for MCR damage on May 5 using the Iowa State

University 1-6 root-rating scale [old method] and the 0-3 node-injury scale [new method], (6) harvesting entire plots with a commercial combine on August 7 and adjusting plot weights for moisture to 15%.

RESULTS/DISCUSSION: At 20 DAP chinch bug numbers were significantly higher in nontreated corn compared to their numbers in the insecticide treatments, but by 26 DAP there was no difference in their numbers in Aztec treated and nontreated corn (Table 1). Chinch bug numbers were much greater than the suggested treatment threshold level of 40 bugs/100 plants up to 6 inches tall in all treatments except Poncho at 20 DAP. By 26 DAP Poncho treated corn had also exceeded the 40 bug/100 plants threshold, but plants were much taller by that date and probably could stand a higher population. Plant damage ratings for all insecticide treatments were significantly improved on 2 inspection dates. Root damage ratings for MCR were significantly improved by all insecticides based on the 1-6 root-rating scale, but there were no statistical differences as measured by the 0-3 node-injury scale; although nontreated corn numerically had the highest damage rating by this method.

Plant population, grain moisture at harvest, yield and dollar return are provided in Table 2. Aztec and Counter treated corn plant populations were significantly higher than in the other treatments, but only nontreated corn appeared to have too low of a population for the relatively good moisture year encountered. No differences were found in grain moisture at harvest. Yield was significantly improved in Poncho 1250 plots compared with the other treatments, and Aztec and Counter treated corn yields were statistically greater than that from the nontreated plots. Bushel increase for insecticide treated corn ranged from 5.1 bu/acre (Aztec) up to 11.0 bu/acre (Poncho). Dollar return was much greater for the Poncho treatment and is believed to reflect superior chinch bug control of the product over the other 2 insecticides.

ACKNOWLEDGMENTS: BASF, Gustafson, and Bayer companies are acknowledged for their support of the field study. A special thanks is given to Mr. and Mrs. Hinze for their continued interest in insect management evaluations and for providing equipment and labor in connection with conduct of the study. Appreciation is likewise expressed to Bart Hajovsky, B-H Genetics, for his keen interest and for providing the weighing equipment and his personal assistance during harvest.

Table 1. Effect of seed and granular at-plant insecticides on chinch bug numbers, plant damage rating and protection of corn roots from Mexican corn rootworm, Lawrence Hinze Farm, Lavaca County, TX, 2004.

Treatment (rate)	Chinch bugs/ 20 plants		Plant damage rating[b]		Root damage, Mexican corn rootworm	
	20 DAP[a]	26 DAP	26 DAP	51 DAP	Old[c]	New[d]
Poncho 1250 (1.25 mg AI/seed)	4.3 c	14.7 c	1.0 b	1.0 b	1.6 b	.05 a
Aztec 2.1G (6.7 oz/1000 ft)	36.3 ab	78.7 ab	1.3 b	1.3 b	1.4 b	.02 a
Counter 15G (8.0 oz/1000 ft)	25.0 b	71.0 b	1.3 b	1.0 b	1.6 b	.04 a
Nontreated	44.0 a	96.0 a	2.7 a	2.7 a	2.4 a	.22 a
LSD (P = 0.05)	16.05	24.51	1.10	0.69	0.53	NS
P > F	.0042	.0009	.0391	.0029	.0204	.1586

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

[a] DAP = days after planting

[b] Damage ratings: 1 = excellent plant growth up to 5 = stunted uneven growth and yellowing.

[c] Old method - Iowa State 1-6 root-rating scale: 1 = no visible feeding damage, 2 = feeding scars, 3 = at least 1 root eaten to within 1.5 inches of stalk, 4 = 1 complete node of roots eaten, 5 = 2 complete node of roots eaten, and 6 = 3 or more nodes of roots eaten.

[d] New method - Iowa State 0 - 3 node-injury scale: 0 = no feeding damage, 1 = 1 node of roots eaten within 2 inches of the stalk, 2 = 2 nodes of roots eaten and 3 = 3 or more nodes of roots eaten.

Table 2. Effect of seed and granular insecticide treatments on plant population, grain moisture at harvest, yield and dollar return, Lawrence Hinze Farm, Lavaca County, TX, 2004.

Treatment (rate)	Plants 1000's/acre	% grain moisture	Yield bu/acre	Increase bu over nontreated	$ return over nontreated[a]
Poncho 1250 (1.25 mg AI/seed)	16.2 b	14.1 a	104.0 a	11.0	17.14
Aztec 2.1G (6.7 oz/1000 ft)	17.5 a	14.1 a	98.1 b	5.1	0.44
Counter 15G (8.0 oz/1000 ft)	17.8 a	14.0 a	99.5 b	6.5	2.93
Nontreated	15.5 b	14.1 a	93.0 c		
LSD (P = 0.05)	0.69	NS	3.33		
P > F	.0005	.0012	.0012		

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

[a] Corn value based on $3.00/bu; costs include Poncho 1250 ($10.93/acre at 19,000 seed/acre planting rate), Aztec ($12.33/acre), and Counter 15G ($13.41/acre). Harvesting/hauling cost was based on a custom rate of $0.80/cwt. Application of granular insecticides based on $0.25/acre.

MONSANTO TRANSGENIC CORN AND INSECTICIDE TREATMENT EFFECTS ON MEXICAN CORN ROOTWORM

Lawrence Hinze Farm, Lavaca County, 2004

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SUMMARY: Transgenic hybrids, Yield Guard rootworm RR (MON 863) and an experimental (MON88017) were compared with a Roundup Ready hybrid that was either without insecticide, treated with granular Force, or seed treated with Poncho 1250. Differences were not found in plant stand, and greater than 98% seed germination was achieved in all treatments. Chinch bug numbers were significantly less in Poncho 1250 treated corn and, for unknown reasons, in Yield Guard rootworm (MON 863) 14 days after planting (DAP). By 28 DAP there were no statistical differences in chinch bug numbers, but the Poncho 1250 treatment exhibited numerically several fold fewer chinch bugs than found in the other treatments. Mexican corn rootworm (MCR) damage was very low as measured by both root damage rating methods. The least MCR damage was in the transgenic rootworm hybrids and the level was significantly less than the nontreated corn. Yields could not be taken due to the experimental requirements of the study.

OBJECTIVE: The objective of the experiment was to compare Monsanto transgenic hybrid MON 88017 with currently available insect control methods (Yield Guard MON 863, RR hybrid + Force, RR hybrid + Poncho 1250, RR hybrid without insecticide) for control of MCR.

MATERIALS/METHODS: The Monsanto corn hybrids were evaluated in Lavaca County on the Lawrence Hinze Farm “Home Place” northeast of Shiner, one mile east of Highway 95 just off of FM Road1891. The corn was planted on March 22, 2004 at 44 seed/30 ft plot in rows on 38-inch centers with a 2-row John Deere MaxEmerge planter. Plots were 4 rows wide and treatments were arranged in a randomized complete block design with 4 replications. Granular Force was applied in a “T-band”. Conditions at planting included 61°F soil temperature, excellent soil moisture, and the sandy clay loam soil (55% sand, 14% silt, and 31% clay) had 1.5% organic matter with a 7.6 pH. Corn had been grown at the site for at least the past 7 years. Fertilizer applied was 99-27-9+9S and 2 quarts of 15% zinc/acre.

Treatments were assessed by (1) counting all emerged plants in the center 2 rows of plots on April 5 [14 DAP], (2) Counting chinch bugs around 20 plants/plot on April 5 [14 DAP] and on April 19 [28 DAP], and (3) digging and washing the roots of 6 plants from the 2 center rows of each plot on May 17 for MCR damage evaluation using the Iowa

State University 1-6 root-rating scale [old method] and the 0-3 node-injury scale [new method].

RESULTS/DISCUSSION: Seed germination was greater than 98% for all treatments, and no differences were detected in plant stands (Table 1). Chinch bug numbers 14 DAP were reduced, as expected, in the Poncho 1250 treated corn, and unexpectedly their numbers were significantly lower in the MON 863 treatment. By 28 DAP statistical differences were not found in chinch bug numbers, but numerically, Poncho 1250 treated corn plots contained several fold fewer numbers of the insect. Rootworm damage was significantly reduced in the transgenic rootworm hybrids and in the Force treated corn as measured by the 1-6 root-rating scale; likewise, the same treatments with the addition of the Poncho 1250 treatment had statistically less root damage as measured by the 0-3 node-injury scale. In both root damage rating methods the lowest damage, numerically, was in the transgenic rootworm hybrids.

ACKNOWLEDGMENTS: Appreciation is expressed to the Monsanto Company for support of this work. Mr and Mrs. Hinze are thanked for their continued interest and work in connection with conduct of studies involving the small plots and trouble associated with maintaining these type plots.

Table 1. Comparison of transgenic corn hybrids and insecticide treatments for effect on Mexican corn rootworm and chinch bug numbers, Lawrence Hinze Farm, Lavaca County, TX, 2004.

Treatment	Plants/30 ft & (% emergence)		Chinch bugs/ 20 plants		Root damage, Mexican corn rootworm	
			14 DAP[a]	28 DAP	Old[b]	New[c]
Yield Guard Rootworm RR (MON 863)	43.3 a	(98.3 a)	2.5 b	12.0 a	1.1 b	.006 b
Experimental (MON 88017)	43.3 a	(98.3 a)	10.0 a	21.0 a	1.1 b	.007 b
Roundup Ready (RR) (Force 3G at 5 oz/1000ft)	43.4 a	(98.6 a)	16.5 a	33.0 a	1.2 b	.016 b
Roundup Ready (RR) (Poncho 1250)	43.1 a	(98.0 a)	0.5 b	4.5 a	1.3 ab	.023 b
Roundup Ready (RR)	43.3 a	(98.3 a)	10.0 a	21.5 a	1.5 a	.046 a
LSD (P = 0.05)	NS	NS	6.92	NS	.2534	.0218
P > F	.9702	.9660	.0019	.0852	.0097	.0114

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

[a] DAP = days after planting, 4/5 and 4/19, respectively.

[b] Old method - Iowa State 1-6 root-rating scale: 1 = no visible feeding damage, 2 = feeding scars, 3 = at least 1 root eaten to within 1.5 inches of stalk, 4 = 1 complete node of roots eaten, 5 = 2 complete node of roots eaten, and 6 = 3 or more nodes of roots eaten.

[c] New method - Iowa State 0 - 3 node-injury scale: 0 = no feeding damage, 1 = 1 node of roots eaten within 2 inches of the stalk, 2 = 2 nodes of roots eaten and 3 = 3 or more nodes of roots eaten.

EVALUATION OF VARIOUS RATES OF PONCHO AND CRUISER SEED TREATMENTS ON CORN FOR CONTROL OF SOIL INSECT PESTS

Bruce McDonald and Nunley Brothers Farms, Victoria and Calhoun Counties, 2004

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SUMMARY: Damaging levels of pest insects occurred in the experiment to evaluate Poncho and Cruiser seed treatments on corn at the Victoria County site, but none were found at the Calhoun County test site. In the Victoria County experiment, southern corn rootworm, chinch bug, and Mexican corn rootworm caused damage. Southern corn rootworm and chinch bug appeared to cause the most damage. Use of Poncho and Cruiser seed treatments at all rates tested resulted in yield increase and dollar returns ranging from $70.69 up to $81.86/acre. There was no dollar benefit from use of these seed treatments at the Calhoun County location.

OBJECTIVE: Field studies were established to measure impact of Poncho and Cruiser seed treatments and rates on corn insect pests and to determine economic return from the treatments.

MATERIALS/METHODS: B-H Genetics provided seed and arranged for the seed treatments for two field studies. Treatments consisted of three rates of Cruiser and two rates of Poncho insecticide applied to BH 9011 RR hybrid corn. Both field experiments were planted in 6-row plots and treatments were replicated 3 times in a randomized complete block design.

Test 1. The Victoria County experiment was planted on the Bruce McDonald Farm on Guadalupe Road 0.75 miles west of Highway 87. It was planted on March 12, 2004 on a site that had been in corn for the previous 3 years with a John Deere 1720 MaxEmerge Plus planter on rows with 38-inch centers at a seeding rate of 18,000 kernels/acre. Plots were approximately 1,100 ft long. Conditions on the planting date included 63°F soil temperature with excellent soil moisture and the clay loam soil (42% sand, 25% silt, and 33% clay) contained 2.06% organic matter which was mildly alkaline at 7.2 pH. Fertilizer consisted of 570 lb/acre (25-2-2-2S + 1.0 quarts of zinc). Additional fertilizer at-planting included 90 lb/acre of 9-30-0. Guardsman Max was applied at 1.0 quarts/acre in an 18-inch band at-planting for weed control.

Treatments were assessed by (1) counting the plant stand on 13.75 ft row in each of the 2 center rows/plot, determining the number of southern corn rootworm damaged plants in the plant stand count, and examining 20 plants/plot for chinch bugs on March 30 [18 days after planting = DAP], (2) assigning a damage rating [1 = excellent plant growth up to 5 = poor plant growth] to each plot and again counting chinch bugs on 20 plants/plot on April 14 [33 DAP], (3) digging 6 plants on May 13 from the center 2 rows in plots and cleaning the root system for analysis of MCR damage using the Iowa State University 1-6 root-rating scale [old method] and the 0-3 node-injury scale [new method], (4) harvesting all but the ends of the 6-row plots with a commercial machine on July 29 and adjusting plot weights for moisture to 15%, and (5) determining economic return by subtracting seed treatment and harvest/hauling (custom rate of $0.80/cwt used) costs from the gross return based on bushels produced above the nontreated corn.

Test 2. The Calhoun County experiment was planted on the Nunley Brothers Farm at the intersection of FM Road 1679 and Sanders Road. It was planted late (March 25, 2004) due to wet soil conditions on a site that had been in cotton the previous year with a planter made from lower units of a Kinze with IH air planter seed boxes on rows with 40-inch centers at a seeding rate of 22,000 kernels/acre. Plots were 0.75 acres in size. Conditions at planting included very warm soil, excellent moisture, and the clay soil (28% sand, 21% silt, and 51% clay) contained 2.62% organic matter which was mildly acidic at 6.3 pH. Fertilizer applied was 300 lb of 32N + 30P + 0K, and Atrazine 4F at 1.0 lb/acre was applied for weed control.

Treatments were assessed by (1) counting the number of corn plants on 13.1 ft row at 2 locations in the center rows of plots, (2) examining plants in the nontreated corn for chinch bug and southern corn rootworm on the same date and 2 other times [numbers were so low that formal plot counts were never taken], and (3) harvesting entire plots with a commercial machine and weighing the grain on electronic scale equipment on August 4. Plot weights were adjusted for moisture to 15%.

RESULTS/DISCUSSION: Three species of damaging insects were found at the McDonald Farm test site in Victoria County, but none were detected at the Nunley Farm test site in Calhoun County.

Test 1. In the Victoria County test, excellent southern corn rootworm control was achieved with Poncho and Cruiser at all rates tested as reflected by their damage and plant stands (Table 1). At the Victoria site, chinch bug numbers were significantly reduced in counts made 18 days after planting (DAP) in comparison with the nontreated corn, but by 33 DAP numbers in the corn treated with the low rate of Cruiser were not different from the nontreated. The low rate of Cruiser (0.125mg AI/seed) did not seem to be adequate compared with the other insecticide rates. By 33 DAP only the Poncho 1250 treatment had maintained the high chinch bug infestation below the treatment threshold. The Mexican corn rootworm was also present at this test site, but statistical differences were not found in root damage levels. Therefore, yield differences due to insecticide were believed to have been caused by southern corn rootworm and chinch bug (Table 2). There were no differences in bushel weights or moisture of the grain.

Yield was greatly improved by the 2 seed treatments at all rates tested. Poncho at both rates and Cruiser at the high rate were not different statistically in yield level, but the yield level for Cruiser (0.250 mg AI/seed) was not statistically as good as Poncho (1.250 mg AI/seed). The yield level for Cruiser (0.125 mg AI/seed) was statistically lower than all other insecticide treatments. Dollar return was good for all insecticide treatments with Poncho at both rates being the highest.

Test 2. As mentioned earlier, soil insect pests were not found in the Calhoun County test. There were no differences in plant stand, grain moisture at harvest, or yield (Table 3). Unlike in the Victoria County experiment, there was no dollar benefit from use of the insecticide seed treatments. It cost more for insecticide than was returned based on cost analysis. A grower must determine over the years whether at-planting insecticide will be profitable. Generally, over years it does pay for Coastal Bend corn producers to use an insecticide seed or in-furrow treatment.

ACKNOWLEDGMENTS: Appreciation is expressed to Bart Hajovsky, B-H Genetics, for providing the treated seed for these two experiments and his continued interest in finding cost effective products for producer use. Chris Hajovsky is especially thanked for assisting with harvest of the Calhoun County test and providing the electronic weigh scales for that work. Bruce and Harvey McDonald are thanked for providing time, land, and equipment for establishing, maintaining, and harvest, and likewise, John and Dwain Nunley are thanked for their support. Bruce McDonald, Duane Kainer, and Greg Wright, members of the Victoria County Crop Committee, are recognized for their assistance on a very hot day in digging corn plants for analysis of the root systems at the Victoria County test site.

Table 1. Effectiveness of new seed treatments for control of chinch bug, southern corn rootworm, and Mexican corn rootworm, Bruce McDonald Farm, Victoria County, TX, 2004.

Treatment	Plants 1000's/acre		Damage	Chinch bugs/ 20 plants		Root damage, Mexican corn rootworm	
(mg AI/seed)	Plants	SCR[a] da	rating[b]	18 DAP[c]	33 DAP	Old[d]	New[e]
Poncho (0.250)	17.0 a	0.3 b	1.0 c	7.3 c	42.7 b	2.13 a	.154 a
Poncho (1.250)	16.3 a	0.5 b	1.0 c	6.3 c	19.3 c	2.33 a	.155 a
Cruiser (0.125)	16.8 a	1.5 b	3.0 ab	31.3 b	60.3 a	2.67 a	.255 a
Cruiser (0.250)	16.7 a	0.2 b	2.0 bc	30.3 b	45.3 b	2.69 a	.172 a
Cruiser (1.250)	17.2 a	0.3 b	1.3 c	14.0 c	33.3 bc	2.49 a	.161 a
Nontreated	12.2 b	4.7 a	4.3 a	42.0 a	59.3 a	3.06 a	.328 a
LSD (P = 0.05)	2.36	2.03	1.36	8.15	14.28	0.841	0.213
P > F	.0061	.0040	.0015	.0001	.0006	.2816	.4073

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

[a] SCR = Southern corn rootworm damaged plants (1000's/acre).

[b] Damage ratings: 1 = excellent plant growth to 5 = poor plant growth. Ratings 33 days after planting.

[c] DAP = days after planting

[d] Old method - Iowa State 1-6 root-rating scale: 1 = no visible feeding damage, 2 = feeding scars, 3 = at least 1 root eaten to within 1.5 inches of stalk, 4 = 1 complete node of roots eaten, 5 = 2 complete node of roots eaten, and 6 = 3 or more nodes of roots eaten.

[e] New method - Iowa State 0-3 node-injury scale: 0 = no feeding damage, 1 = 1 node of roots eaten within 2 inches of the stalk, 2 = 2 nodes of roots eaten and 3 = 3 or more nodes of roots eaten.

Table 2. Corn production and dollar return as affected by various rates of Poncho and Cruiser insecticide seed treatments, Bruce McDonald Farm, Victoria County, TX, 2004.

Treatment (mg AI/seed)	Bushel weight	Grain % moisture	Yield bu/acre	$ return over nontreated[a]
Poncho (0.250)	60.0 a	16.1 a	97.6 ab	81.86
Poncho (1.250)	60.0 a	15.9 a	99.2 a	78.97
Cruiser (0.125)	60.0 a	15.9 a	85.8 c	71.66
Cruiser (0.250)	60.0 a	15.8 a	93.4 b	70.69
Cruiser (1.250)	60.3 a	16.0 a	97.7 ab	74.58
Nontreated	60.7 a	15.8 a	64.2 d	
LSD (P = 0.05)	NS	NS	4.70	
P > F	.1191	.5204	.0001	

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

[a] Corn value based on $3.00/bu; costs include Poncho (0.250 mg AI/seed = $3.38/acre and 1.250 mg AI/seed = $10.35/acre), Cruiser (0.125 mg AI/seed = $3.71/acre, 0.250 mg AI/seed = $3.83/acre, and 1.250 mg AI/seed = $10.91/acre). Cost of seed treatments based on 18,000 seed planting rate. Harvesting/hauling cost was based on a custom rate of $0.80/cwt.

Table 3. Evaluation of insecticide seed treatments on corn, Nunley Brothers Farms, Calhoun County, TX, 2004.

Treatment (mg AI/seed)	Plants 1000's/acre	Grain % moisture	Yield bu/acre	$ return over nontreated[a]
Poncho (0.250)	21.7 a	14.5 a	78.9 a	- 0.61
Poncho (1.250)	21.0 a	14.4 a	78.9 a	- 10.30
Cruiser (0.125)	19.8 a	14.5 a	76.8 a	- 6.43
Cruiser (0.250)	21.8 a	14.5 a	77.1 a	- 5.83
Cruiser (1.250)	20.0 a	14.4 a	74.3 a	- 24.02
Nontreated	20.0 a	14.5 a	77.3 a	
LSD (P = 0.05)	NS	NS	NS	
P > F	.3543	.6403	.4999	

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

[a] Corn value based on $3.00/bu; costs include Poncho 0.250 ($4.69/acre), Poncho 1.250 ($14.38/acre), Cruiser 0.125 ($5.15/acre), Cruiser 0.250 ($5.32/acre), and Cruiser 1.250 ($15.15/acre) based on a seeding rate of 25,000 kernels/acre. Harvest/hauling cost was based on a custom rate of $0.80/cwt.

EFFECT OF PONCHO AND COUNTER ON SOUTHERN CORN ROOTWORM IN CORN

Fritz Leopold Farm, Colorado County, 2004

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SUMMARY: Southern corn rootworm reduced plant stand in nontreated corn which contained a final population of 13,800 plants/acre compared to 21,000 or more plants/acre in insecticide treated corn. Poncho 1250, Poncho 1250 + Counter 20CR (3.0 oz/acre) and Counter 20CR (6.0 oz/acre) treated corn produced significantly more grain than the nontreated corn. Returns over costs associated with treatment compared with the nontreated plot yield ranged from $31.77 to $38.56/acre.

OBJECTIVE: The experiment was originally established to evaluate insecticides for Mexican corn rootworm which occurred at so low numbers that the test objective was changed due to presence of southern corn rootworm attack on seedling plants. Seedling attack is the normal way this insect damages corn along the Texas Gulf Coast.

MATERIALS/METHODS: The experiment was conducted in Colorado County on the Fritz Leopold Farm about 1 mile west of Nada. Golden Acres 8412 was planted at 26,000 kernels/acre on March 23, 2004 with a John Deere 7100 MaxEmerge planter in rows spaced on 40-inch centers. Treatments were arranged in 6-row plots which were 0.87 acres each with 3 replications in a randomized complete block design. Conditions at-planting included 62°F soil temperature, wet soil, and the silty clay soil (14% sand, 41% silt, and 45% clay) had 2.92% organic matter which was moderately acidic at 5.7 pH. Granular Counter was applied in a "T-band," and the test site had been in corn for more than 15 years. Fertilizer applied as a preplant liquid was 140-50-5, and Harness Extra (1.0 quart/acre) was banded at-planting followed later with Atrazine 4F (1.0 quart/acre).

Treatments were assessed by (1) counting the number of corn plants on 13.1 ft row on each of the 2 center rows in plots April 19, (2) determining the number of southern corn rootworm damaged plants in the plant stand count made on the same date, (3) digging 6 plants from the center 2 rows in the nontreated corn and washing the root system for analysis for Mexican corn rootworm damage to determine if damage was great enough to dig the entire test [almost no damage was detected], and (4) harvesting entire plots with a commercial machine on August 4 for yield. Plot weights were adjusted for moisture to 15%.

RESULTS/DISCUSSION: Southern corn rootworm significantly reduced plant stand in nontreated corn amounting to a 6,300 /acre plant loss; whereas, no damage was detected in insecticide treated plots (Table 1). Final plant stands in insecticide treated corn was 21,000 or more plants/acre, but in nontreated corn the plant stand was reduced to 13,800 plants/acre. A reduction in yield was expected and did occur under these test conditions (Table 2). Dollar returns ranged from $31.77 up to $38.56/acre through use of the insecticides.

ACKNOWLEDGMENTS: Fritz Leopold of Leopold Grain and his family are thanked for their interest and time in conducting the study and their willingness to show the plots to anyone interested in the observations. They also supplied equipment to conduct the study and harvested all plots without our help. BASF and Gustafson are thanked for their support.

Table 1. Evaluation of at-plant granular and seed treatment insecticides on southern corn rootworm, Fritz Leopold Farm, Colorado County, TX, 2004.

Treatment (rate)	Plants (1000's/acre)		
	Total	Damaged by SCR[a]	Final stand
Poncho 1250 (1.25 mg A/seed)	22.2 a	0.0 b	22.2 a
Poncho 1250 + Counter 20CR (1.25 mg AI/seed + 3.0 oz/1000 ft)	22.2 a	0.0 b	22.2 a
Counter 20CR (6.0 oz/1000 ft)	21.0 a	0.0 b	21.0 a
Nontreated	20.2 a	6.3 a	13.8 b
LSD (P = 0.05)	NS	2.51	3.90
P > F	.4628	.0018	.0052

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

[a] SCR = southern corn rootworm

Table 2. Corn production, moisture, yield, and dollar return as affected by Poncho insecticide seed treatment and Counter granular at-plant insecticides, Fritz Leopold Farm, Colorado County, TX, 2004.

Treatment (rate)	Grain % moisture	Yield (bu/acre)	Increase over nontreated (bu)	$ return[a] over nontreated
Poncho 1250 (1.25 mg A/seed)	13.8 b	105.1 a	20.8	38.27
Poncho 1250 + Counter 20CR (1.25 mg AI/seed + 3.0 oz/1000 ft)	14.0 b	105.2 a	20.9	31.77
Counter 20CR (6.0 oz/1000 ft)	14.1 ab	104.5 a	20.2	38.56
Nontreated	14.4 a	84.3 b		
LSD (P = 0.05)	0.35	9.72		
P > F	.0347	.0045		

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

[a] Corn value based on $3.00/bu; costs include Poncho ($14.95/acre at a 26,000 seeding rate) and Counter 20CR ($12.74/acre at 6 oz/1000 ft and $6.37/acre at 3 oz/1000 ft). Application cost for Counter was figured at $0.25/acre. Harvesting/hauling cost was calculated at $0.80/cwt.

EVALUATION OF A CORN EARWORM RESISTANT CORN HYBRID

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: Corn earworms cause damage by feeding on developing kernels, especially on the tips of ears, where they generally first enter the ear after feeding for a while on silks. Generally, along the Texas Gulf Coast all corn ears exhibit some feeding by corn earworm. Moths lay most of their eggs on green silks on which hatching larvae initiate feeding. Less damage has been observed on corn hybrids that have extended, tight shuck cover. It has also been demonstrated that feeding by the corn earworm results in higher levels of aflatoxin. The objective of the current study was to evaluate damage level to corn kernels in a hybrid exhibiting resistance characteristics compared with two commercial hybrids and to measure grain production level.

Significantly less injury to kernels was found in experimental hybrid S1WC3 than the two commercial hybrids. Further, Pioneer hybrid P3317 showed less earworm damage than Garst 8278W. Lodging due to charcoal rot was more prevalent, bushel weight was lower, and total yield was significantly lower in the earworm resistant hybrid (S1WC3).

OBJECTIVE: Corn hybrids were compared for levels of earworm damage, certain characteristics of plant growth, and production to determine if the resistant hybrid could be used for South Texas dryland corn production.

MATERIALS/METHODS: Three corn hybrids (S1WC3, P33T17, and Garst 8278W) were planted on March 24, 2004 in two-row by 40 ft plots with 4 replications in a randomized complete block experimental design. Plot size was limited due to land restrictions at the test site (Meaney Annex of the Texas Agricultural Experiment Station at Corpus Christi).

Treatments were assessed by (1) counting the number of plants on 13.75 ft row on both rows in each plot on April 4, (2) harvest of 13.75 ft row from each row in plots for yield on July 21 (lodged corn plants in plots were also harvested and kept separate), and (3) evaluating all harvested ears for earworm damage using the ear injury rating scale, slightly modified, developed by Neil Widstrom (J.E.E. 60:791-794) by measuring the number of centimeters of damage beyond the ear tip at the maximum distance of damage. Corn samples were threshed on a research machine, and grain weights were adjusted for moisture to 15%.

RESULTS/DISCUSSION: Plant population data, number of harvested ears (standing and lodged), and corn earworm injury measurements are provided in Table 1.

Statistically significant differences were not observed in plant stand, total number of harvested ears, or number of lodged plants. Numerically, however, the number of lodged plants were 5.5 and 61 times less in the P33t17 and Garst 8278W hybrids, respectively. Significantly fewer ears were harvested from the S1WC3 hybrid; charcoal rot, although present in all three hybrids, resulted in more lodging in the S1WC3 hybrid. Corn earworm injury was much less in the S1WC3 hybrid, and Garst 8278W hybrid sustained less corn earworm damage than did the P33T17 hybrid.

Results of corn harvest are provided in Table 2. Grain moisture was significantly less at harvest in P33T17 hybrid, indicating a faster maturity type hybrid compared to the other hybrids. Bushel weight, standing harvest yield, and total yield were significantly less in the corn earworm resistant hybrid (S1WC3). The yield level in this hybrid was more than 40% less the other two hybrids. Even though much less earworm damage was observed in the S1WC3 hybrid, it had lower yield and greater tendency to lodge under these growing conditions.

ACKNOWLEDGMENTS: The support of Rudy Alaniz and Mike Hiller, Demonstration Assistants, Clint Livingston, Technician I, and Bradley Moore, Student Worker, are thanked for their assistance in conducting the experiment.

Table 1. Evaluation of corn hybrids for plant stand, lodging and corn earworm damage to ears, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Hybrid	Plants[a] 1000's/acre	Ears harvested/27.5 ft standing	lodge	total	Corn earworm ear injury[b]
S1WC3	25.5 a	25.0 b	18.3 a	43.3 a	1.43 c
P33T17	23.4 a	46.0 a	3.3 a	49.3 a	3.70 a
Garst 8278W	23.1 a	48.8 a	0.3 a	49.0 a	2.46 b
LSD (P = 0.05)	4.13	15.77	NS	NS	.269
P > F	.3658	.0196	.0752	.5713	.0001

Means in a column followed by the same letter are not significantly different by ANOVA.
[a] Average of counts made on 13.75 ft row in each row of plots on April 4.
[b] Modified ear injury rating scale by Neil Widstrom (centimeters feeding beyond tip).

Table 2. Grain production from selected corn hybrids, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Hybrid	Harvest grain moisture (%)	Bushel wt. (lb)	Yield (bushels/acre)		
			standing	lodge	total
S1WC3	15.4 a	54.0 b	34 b	19 a	53 b
P33T17	12.3 b	56.8 a	96 a	5 a	101 a
Garst 8278W	14.9 a	58.1 a	92 a	0 a	92 a
LSD (P = 0.05)	1.25	1.56	26.4	NS	22.9
P > F	.0019	.0018	.0021	.0713	.0051

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

PRELIMINARY REPORT ON THE EVALUATION OF INSECTICIDES FOR CONTROL OF INSECTS IN STORED CORN: FIRST 12 MONTHS

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SUMMARY: Two formulations of spinosad (Secure) and 2 formulations of diatomaceous earth (Protect-it and Insecolo) were evaluated for control of insect pests in stored corn during a 12-month period. No differences were detected in grain temperature until June (month 6) when nontreated grain was significantly warmer than all other treatments. Similar results occurred for each succeeding month thereafter through the 12 month storage period. Grain moisture levels were significantly lower in diatomaceous earth treatments on all 12 inspection dates. Significant differences were not found in total insect pest numbers until month 5 (May) when more insects were observed in nontreated corn; insect numbers in nontreated corn remained significantly higher than all other treatments through the remaining months of the storage period. May was the first month any treatment (nontreated) exceeded 5 total insect pests/quart sample. It was followed each month thereafter, except for June, by a steady increase in insect numbers in the nontreated corn, reaching a high of 92.0/quart sample in month 12. The nontreated corn averaged nearly 20 insects/quart sample for the 12 month period; whereas, average numbers in the other 4 treatments for the year amounted to 0.33 insects/quart sample. The rice weevil first exceeded 1.0/quart sample in the nontreated corn in month 5 (May) followed by increasing numbers in this treatment through month 12. Rice weevils averaged slightly more than 10/quart sample in the nontreated corn for the year. Rice weevils exceeded 1.0/quart sample in month 11 (November) in the Secure (0.5% AI) treatment; no other treatment reached that level. All insecticide treatments except for Secure (0.5% AI formulation) provided excellent protection of the grain for the 12 month period.

OBJECTIVES: The experiment was conducted to evaluate the effectiveness of selected insecticides for control of insects in stored corn.

MATERIALS/METHODS: Commercially cleaned corn that was in excellent condition and had been in storage for approximately 1 year was obtained from the Bee County Coop, Tynan, Texas. Sorghum measured in 50 lb increments was treated on November 25, 2003 in mixtures applying equivalent to 5 gallons of liquid/1000 bushels in a stainless steel cement mixer modified with added baffels for seed mixing. Four 50 lb samples of each treatment were placed in 30 gallon plastic drums (200 lb total sorghum/drum). Drums were covered with 0.5-inch hardware cloth to keep out birds, rodents and other unwanted animals. Following treatment and loading of drums, Phostoxin 1 pellet/30 gallon drum was placed into the center of the grain mass in early December. Drums were then sealed with 6 ml polyethylene sheeting and tape. Drums were sealed for 5 days and then aerated for 5 days. Sampling of 3 drums per replication revealed no live insects. The natural infestation was supplemented after aeration by placing 10 adults in each drum of 4 species (rice weevil, red flour beetle, lesser grain borer and rusty grain beetle). These insects were obtained from Oklahoma State University. Each treatment was replicated 4 times and drums, arranged in a randomized complete design, were placed on a concrete floor inside a building. Insects from grain inside and outside the building could have access to the experimental grain.

Treatments were assessed each month by (1) measuring the temperature with a 12-inch thermometer placed 11.5 inches deep into the middle of each drum, (2) probing grain in each drum at 6 locations/drum with a grain probe to obtain a one quart sample for insect inspection and moisture content, and (3) using a Seedburo Equipment Company sieve (8/64 - inch triangle holes) to separate insects from the grain. Insects were separated by species and then counted under a Circline magnifier lamp.

RESULTS/DISCUSSION: Although differences were observed in grain temperature 1 month after treatment (Table 1), once temperatures stabilized, there were no differences among the treatments until month 6 (June). Nontreated grain, reflecting the higher insect infestation level, had significantly warmer grain temperature from month 6 through 12. Moisture level of the stored corn treated with diatomaceous earth (Protect-It and Insecolo) was significantly lower than all other treatments on each inspection date for the 12 month period (Table 2). The nontreated corn tended to exhibit higher moisture content, and it was significantly higher for the 12 month average compared with all other treatments. Grain temperature and moisture content readings were increased in treatments containing the greatest insect numbers. Significant differences were not found in total pest insect numbers until month 5 (May) at which time more were detected in the nontreated corn (Table 3). Thereafter, similar results were observed through the 12 month storage period. Month 5 was also the first time insect numbers exceeded 5 per quart sample in the nontreated grain. None of the other treatments exceeded 5 insects per quart sample during the 12 month storage period. Their numbers in the nontreated corn increased rapidly reaching 92 per quart sample in month 12 (December). Nontreated corn averaged nearly 20 insects per quart sample for the 12 months, but the other treatments averaged 0.33 insects per quart sample for the same period. The rice weevil was the only primary pest insect found in substantial numbers during the 12 month storage period (Table 4). Rice weevils exceeded 1 per quart sample in nontreated corn in May (month 5) and steadily increased in this treatment, reaching nearly 54 per quart sample in month 12. Significantly fewer rice weevils were detected in the other treatments. Of the insecticide treatments, only Secure (0.5% AI formulation) exceeded 1 rice weevil per quart sample in months 11 and 12 of the storage period.

ACKNOWLEDGMENTS: We acknowledge Craig Jakob, Hedley Technologies, Inc., and Terry Pitts, Gustafson, Inc. for assisting in establishing the experiment and support of the project. Darwin Anderson, General Manger, Bee County Coop, is thanked for his continued interest, support and providing corn for the project. Rudy Alaniz and Mike Hiller, Demonstration Assistants, are thanked for their continued involvement.

Table 1. Temperature levels in stored corn treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment	Rate (lb/1000 bu)	Temperature (°F) at months post-treatment												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Secure 0.5% AI	11.2	58.0 ab	65.0 a	71.8 a	75.0 a	80.3 a	90.3 b	88.8 b	90.0 b	90.5 b	84.5 b	70.5 b	74.5 b	78.2 b
Secure 8.66% AI	0.6	58.3 a	65.0 a	71.8 a	75.0 a	80.3 a	90.5 b	88.5 b	89.8 b	90.3 b	84.3 b	70.0 b	73.0 bc	78.0 b
Protect-It 100% AI	56.0	57.0 c	65.5 a	71.8 a	75.5 a	80.3 a	90.3 b	88.8 b	90.0 b	90.3 b	84.8 b	70.0 b	72.5 c	78.0 b
Insecolo 97% AI	56.0	57.5 bc	65.0 a	72.0 a	75.5 a	80.3 a	90.5 b	88.8 b	90.0 b	90.0 b	84.3 b	70.0 b	73.3 bc	78.1 b
Nontreated		57.8 ab	65.3 a	72.0 a	75.5 a	81.0 a	93.0 a	92.8 a	93.8 a	94.5 a	88.8 a	76.0 a	84.0 a	81.2 a
LSD (P = 0.05)		0.61	NS	NS	NS	NS	0.86	0.72	0.51	0.70	0.72	1.19	1.65	0.35
P > F		.0076	.5767	.8656	.1937	.3705	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001

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

Table 2. Moisture levels in stored corn treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment	Rate (lb/1000 bu)	Moisture (%) at months post-treatment												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Secure 0.5% AI	11.2	11.5 a	11.6 a	12.4 a	11.8 a	12.4 a	12.8 ab	12.1 a	12.9 ab	12.3 ab	11.4 a	11.4 a	11.4 ab	12.0 b
Secure 8.66% AI	0.6	11.5 a	11.6 a	11.9 b	11.9 a	12.6 a	12.4 b	12.2 a	12.7 b	11.9 b	11.7 a	11.2 a	11.3 b	11.9 b
Protect-It 100% AI	56.0	10.2 b	10.8 b	11.2 c	10.6 b	11.1 b	11.4 c	10.9 b	11.8 c	10.6 c	10.2 b	10.1 b	9.9 c	10.7 c
Insecolo 97% AI	56.0	10.6 b	10.7 b	11.2 c	10.5 b	11.4 b	11.2 c	11.0 b	11.4 c	10.6 c	10.3 b	10.0 b	10.1 c	10.8 c
Nontreated		11.5 a	11.6 a	12.3 a	11.9 a	12.6 a	13.0 a	12.4 a	13.3 a	12.4 a	11.4 a	11.6 a	11.9 a	12.2 a
LSD (P = 0.05)		0.43	0.67	0.32	0.27	0.39	0.40	0.44	0.51	0.39	0.38	0.47	0.53	0.13
P > F		.0001	.0171	.0001	.0001	.0001	.0001	.0001	0001	.0001	.0001	.0001	.0001	.0001

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

Table 3. Total number pest insects in stored corn treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment	Rate (lb/1000 bu)	Total insects/quart sample at months post-treatment												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Secure 0.5% AI	11.2	0.0 a	0.0 a	0.0 a	0.5 a	0.3 b	0.8 b	0.0 b	0.3 b	0.0 b	0.0 b	3.5 b	4.0 b	0.77 b
Secure 8.66% AI	0.6	0.0 a	0.0 a	0.3 a	0.0 a	0.0 b	0.5 b	0.3 b	0.0 b	0.0 b	0.0 b	0.5 b	0.0 b	0.13 b
Protect-It 100% AI	56.0	0.0 a	0.0 a	0.0 a	0.0 a	1.0 b	0.5 b	0.3 b	0.0 b	0.3 b	0.3 b	0.0 b	0.3 b	0.21 b
Insecolo 97% AI	56.0	0.0 a	0.0 a	0.3 a	0.3 a	0.3 b	0.5 b	0.0 b	0.3 b	0.0 b	0.0 b	0.5 b	0.3 b	0.19 b
Nontreated		0.0 a	0.0 a	1.3 a	1.3 a	5.0 a	4.0 a	6.0 a	17.8 a	22.3 a	36.0 a	53.0 a	92.0 a	19.88 a
LSD (P = 0.05)		NS	NS	NS	NS	1.97	1.76	1.41	6.88	6.75	5.43	7.08	8.90	1.92
P > F		1.000	1.000	.3498	.1417	.0006	.0032	.0001	.0003	.0001	.0001	.0001	.0001	.0001

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

Table 4. Rice weevils in stored corn treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment	Rate (lb/1000 bu)	Rice weevils/quart sample at months post-treatment												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Secure 0.5% AI	11.2	.00 a	.00 a	.00 a	.25 a	.00 a	.00 a	.00 a	.00 b	.00 b	.00 b	3.25 b	3.50 b	0.58 b
Secure 8.66% AI	0.6	.00 a	.00 a	.25 a	.00 a	.00 a	.00 a	.00 a	.00 b	.00 b	.00 b	.00 b	0.00 b	0.02 b
Protect-It 100% AI	56.0	.00 a	.00 a	.00 a	.00 a	1.00 a	.25 a	.25 a	.00 b	.25 b	.25 b	.00 b	0.25 b	0.19 b
Insecolo 97% AI	56.0	.00 a	.00 a	.25 a	.25 a	.00 a	.50 a	.00 a	.00 b	.00 b	.00 b	.25 b	0.25 b	0.13 b
Nontreated		.00 a	.00 a	.00 a	.50 a	1.50 a	2.00 a	3.00 a	6.25 a	6.50 a	18.50 a	30.00 a	53.75 a	10.17 a
LSD (P = 0.05)		NS	NS	NS	NS	NS	NS	NS	2.13	3.85	8.07	7.66	7.07	2.22
P > F				.6114	.6464	.1078	.2188	.0673	.0001	.0106	.0009	.0001	.0001	.0001

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

COMPARISON OF SYSTEMIC INSECTICIDE SEED TREATMENTS ON SORGHUM

Darby and Howard Salge Farm, Bee County, 2004

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SUMMARY: Cruiser, Gaucho, and Poncho seed treatments were evaluated on sorghum to determine effectiveness in controlling soil and aphid pest insects on sorghum. The plant stand in nontreated sorghum was significantly less than measured in the insecticide treated plots. These findings indicate a pest insect problem, but counts were not made at a time to determine which insect caused the stand reduction except for 1,500 plants/acre lost to southern corn rootworm. Yellow sugarcane aphid numbers were low and the greenbug was not detected. Even so, significant yield increase was obtained with all seed treatment insecticides tested. The yield increase ranged from 541 lb/acre in the Cruiser treatment up to 787 lb/acre in the Poncho treatment.

OBJECTIVE: The objective of the field experiment was to compare effectiveness of Cruiser, Gaucho, and Poncho systemic insecticide treatments on sorghum in providing control of soil insects and aphids.

MATERIALS/METHODS: The location for the experiment was in Bee County 0.75 miles south of the intersection of FM Roads 796 and 888. Pioneer 84G62 hybrid sorghum was planted on March 23, 2004 at 5 lb/acre in rows on 30-inch centers with a John Deere MaxEmerge II 7300 vacumeter planter. Plots were 6 rows by 1,100 ft arranged in a randomized complete block design with 3 replications. Soil moisture at planting was excellent. After planting, excessive rainfall was received for several weeks. The sandy clay loam soil (52% sand, 13% silt, and 35% clay) contained 1.53% organic matter and was mildly alkaline at 7.1 pH. Fertilizer applied was 200 lb/acre of 24-6-0. The previous crop was sorghum.

Treatments were assessed by (1) counting the number of plants on 10 row-ft at 4 locations in the center 2 rows of plots on April 9, (2) determining number of yellow sugarcane aphid and greenbug infested plants by examination of 20/plot in the center rows on April 20, (3) counting the number of southern corn rootworm infested plants by examination of 20/plot on April 20, and (4) harvesting 0.344 acres in each plot with a commercial combine, weighing samples on electronic scales on July 13, and adjusting plot weights for moisture to 14%.

RESULTS/DISCUSSION: Excessive rainfall prevented early evaluation in the study. Due to these conditions, growth was slow for several weeks after emergence. Plant stand was significantly reduced in the nontreated sorghum compared to the insecticide treatments, and although the amount of stand loss could not all be accounted for by southern corn rootworm, this insect is suspected to have caused most of the stand reduction (Table 1). Yellow sugarcane aphids occurred in low numbers, and greenbugs were not detected during the most critical part of plant growth. Grain moisture at harvest was significantly higher, and yield was significantly lower in the nontreated sorghum. The yield increase ranged from 541 lb/acre (Cruiser treatment) up to 787 lb/acre (Poncho treatment). Note: Poncho does not currently have a label for use on sorghum.

ACKNOWLEDGMENTS: Thanks are extended to Darby and Howard Salge for providing land, time, equipment, and their continued willingness to conduct field studies of this nature. Vernon Nedbalek and Cory Brown, Sorghum Partners, are acknowledged for providing the electronic weighing scales and their time at harvest. Syngenta Company is thanked for their support of this project.

Table 1. Sorghum insecticide seed treatment impact on insect numbers and yield, Darby Salge Farm, Bee County, TX, 2004.

Treatment (rate)	Plants 1000's/acre	% Infested plants (28 DAP[a]) YSA[b]	GB[c]	SCR[d]	% grain moisture	Yield lb/acre
Cruiser 5FS (5.2 oz/cwt seed)	59.1 a	0.0 a	0.0 a	0.0 a	20.7 b	2923 a
Gaucho 480FS (8.0 oz/cwt seed)	59.2 a	0.0 a	0.0 a	0.0 a	20.5 b	3115 a
Poncho 5FS[e] (5.2 oz/cwt seed)	59.8 a	0.0 a	0.0 a	0.0 a	20.3 b	3169 a
Nontreated	40.9 b	1.5 a	0.0 a	1.5 a	21.3 a	2382 b
LSD (P = 0.05)	6.47	NS	NS	NS	0.47	508.7
P > F	.0009	.4547	1.000	.4547	.0094	.0311

Means in a column followed by the same letter are not significantly different by ANOVA.
[a] DAP = days after planting
[b] YSA = yellow sugarcane aphid
[c] GB = greenbug
[d] SCR = southern corn rootworm
[e] Poncho currently does not have a sorghum label.

EFFECT OF CRUISER INSECTICIDE SEED TREATMENT ON SORGHUM INSECT PESTS AND YIELD

Jim Pettus Farm, Goliad County, 2004

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SUMMARY: Cruiser insecticide seed treatment on sorghum was compared with nontreated sorghum to determine if use of the product was justified. Significantly lower plant stand was measured in the nontreated sorghum, but stands in both treatments were judged to be acceptable for maximum production. The nontreated sorghum exhibited yellow sugarcane infestation just below the suggested treatment level 25 days after planting (DAP). The Cruiser treated sorghum produced 394 lb/acre more than the nontreated sorghum which was a statistically significant difference.

OBJECTIVE: The test objective was to determine whether purchase of Cruiser treated seed could be justified and to measure the impact of Cruiser on target insect pests.

MATERIALS/METHODS: Pioneer 82G63 hybrid sorghum was planted March 26, 2004 with a John Deere 7300 MaxEmerge plus planter at a seeding rate of 71,000 kernels/acre. Plots were 4 rows by more than 1000 ft, and treatments were replicated 4 times in a randomized complete block design. Rows were spaced on 38-inch centers, and location of the field study was on Newton Powell Road in northwest Goliad County. Corn had been grown in the field the previous season. Planting conditions consisted of 71°F soil temperature, excellent moisture conditions, and the clay loam soil (40% sand, 23% silt, and 37% clay) contained 2.11% organic matter with a mildly alkaline pH of 7.7. Fertilizer applied was 102-0-0 and herbicide used was Atrazine (1.0 qt/acre).

Treatments were assessed by (1) counting sorghum plants on the center 2 rows of plots on April 9 [14 DAP], (2) examining 20 plants/plot on April 20 [25 DAP] and on May 11 [46 DAP] to determine number infested with yellow sugarcane aphid, (3) estimating the number of corn leaf aphids/plant whorl on May 11, and (4) harvest of 700 ft row of each plot with a commercial combine on July 31 with plot weights adjusted for moisture to 14%.

RESULTS/DISCUSSION: Plant stand in the Cruiser treatment was significantly improved over that counted in the nontreated sorghum (Table 1). AT 25 DAP yellow sugarcane infested plant percentage was statistically greater in nontreated plots. The infestation level was judged to be just below the treatment threshold level on that date. By 46 DAP 25% of the Cruiser treated plants and 30% of the nontreated plants exhibited yellow sugarcane infestation. By this time sorghum plants were large enough to sustain higher infestation rate; furthermore, the intensity of the infestation was not high. Although corn leaf aphid is not considered a major pest of sorghum, significantly more were found in the nontreated sorghum 46 DAP. Cruiser treated sorghum produced 394 lb/acre more grain than the nontreated, and it was a statistically significant yield increase. The increase was above the breakeven point to pay for treatment. Many times infestation levels of early season pest insects exceed those found in the current study; therefore, it is our general suggestion that a systemic insecticide seed or in-furrow insecticide be used on sorghum.

ACKNOWLEDGMENTS: Thanks are extended to Jim Pettus for providing land, equipment, time, and interest in the experiment and to Fred Pena, for his assistance in establishing and maintaining the study. Stanley Shilling, Shilling Supply, is acknowledged for obtaining the seed needed for the study. Special appreciation is given Vernon Nedbalek, Sorghum Partners, and Victor Eder, Garst Seed Company, for assistance in harvest and providing electronic scales for weighing plots. We thank Howard Taff, custom harvest operator, from Ballinger, Texas for his assistance.

Table 1. Effect of Cruiser on sorghum insect pests and yield, Jim Pettus Farm, Goliad County, TX, 2004.

Treatment (rate)	Plants 1000's/acre	% YSA[a] infested plants		CLA[b]/plant whorl (46 DAP)	Yield lb/acre
		25 DAP[c]	46 DAP		
Cruiser 5FS (5.1 oz/cwt seed)	64.7 a	5.0 b	25 a	2.5 b	4312 a
Nontreated	57.6 b	11.3 a	30 a	52.5 a	3918 b
LSD (P = 0.05)	5.48	5.13	NS	37.4	252.3
P > F	.0264	.0305	.6134	.0238	.0156

Means in a column followed by the same letter are not significantly different by ANOVA.
[a] YSA = yellow sugarcane aphid
[b] CLA = corn leaf aphid
[c] DAP = days after planting

EVALUATION ON SORGHUM OF SYSTEMIC INSECTICIDE SEED TREATMENTS AND A GRANULAR INSECTICIDE

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: Cruiser, Gaucho, and Poncho systemic insecticide seed treatments and granular Counter insecticide were compared in a test on sorghum for effect on early season insect pests. Pest insect numbers were not great enough for differences to be measured. There was a numerical trend for more yellow sugarcane aphid and southern corn rootworm numbers in the nontreated plots, and the same trend was followed on 2 inspection dates for plant damage ratings. No yield differences were observed.

OBJECTIVE: The test objective was to compare the effects of insecticide treatments on early season insect pests of sorghum.

MATERIALS/METHODS: The field study was conducted on the Meaney Annex of the Texas Agricultural Experiment Station, Corpus Christi. Pioneer 84G62 hybrid sorghum seed at 70,000 kernels/acre on rows with 38-inch centers was seeded with a "blackland" type planter equipped with plot cone seed distributors on March 24, 2004. Plots were 4-rows by 40 ft arranged in a randomized complete block design with 4 replications. Soil moisture and temperature at-planting were excellent, and cotton had been planted on the site in 2003. The soil was a clay loam (43% sand, 21% silt, and 36% clay) containing 1.1% organic matter with a mildly alkaline pH of 7.8. Granular Counter 15G (4.0 oz/1000 row ft) was applied through tractor mounted electric motor driven Gandy boxes. Atrazine 4F (1.0 quart/acre) + Dual II Magnum (1.0 pint/acre) herbicides were broadcast for weed control. Fertilizer applied was 102-0-0.

Treatments were assessed by (1) counting plants on 13.75 ft row on each of the 2 center rows/plot on April 4 [11 days after planting = DAP], (2) counting the number of yellow sugarcane aphid and southern corn rootworm damaged plants by examination of 20 plants/plot on April 4, (3) examining plants for damage [1 = no damage up to 5 = severe stunting, uneven growth and yellowing] April 4 [11 DAP] and April 13 [20 DAP], and (4) harvesting by hand 13.75 ft row on each of the 2 center rows in plots on July 21 and threshing the grain on a laboratory machine and adjusting plot weights to 14% moisture.

RESULTS/DISCUSSION: Significant differences did not occur in any of the measurements made except for a higher plant damage rating in nontreated sorghum on April 4 (Table 1). There was a trend for higher percentage damaged plants by yellow sugarcane aphid and southern corn rootworm in the nontreated sorghum. Pest insect numbers were simply not great enough at the test site to cause meaningful plant effects. No differences occurred in the yield data nor did there seem to be trends therein.

ACKNOWLEDGMENTS: Thanks are extended to Syngenta Crop Protection for support of this work. Rudy Alaniz and Mike Hiller, Demonstration Assistants, are acknowledgments for their help in all aspects of conducting the study.

Table 1. Evaluation on sorghum of insecticide seed treatments, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment (rate)	Plants 1000's/acre	% infested or damaged plants YSA[a]	SCR[b]	Plant da. rating[c] 4/4	4/13	Yield lb/acre
Cruiser 5FS (200 g/100 kg seed)	67.6 a	0.0 a	0.0 a	1.0 b	1.3 a	4413 a
Gaucho 480FS (250 g/100 kg seed)	67.6 a	0.0 a	0.4 a	1.0 b	1.3 a	4438 a
Poncho 5SC (200 g/100 kg seed)	65.9 a	0.0 a	0.0 a	1.0 b	1.3 a	4209 a
Counter 15G (4.0 oz/1000 row ft)	70.4 a	0.0 a	0.4 a	1.0 b	1.3 a	4430 a
Nontreated	69.3 a	1.5 a	1.8 a	2.3 a	1.3 a	4242 a
LSD (P = 0.05)	NS	NS	NS	.345	NS	NS
P > F	.9666	.0631	.0716	.0001	1.000	.7544

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

[a] YSA = yellow sugarcane aphid

[b] SCR = Southern corn rootworm

[c] Damage ratings range from 1 = no damage to 5 = severe stunting, uneven growth and yellowing.

DIMETHOATE EFFECT ON THE SORGHUM PLANT

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: There is wording on the dimethoate insecticide label which states that the product cannot be applied to sorghum after heading. No evidence could be found that the restriction was due to a residue problem. It is more likely that the insecticide had shown an adverse effect on certain sorghum hybrids. Furthermore, it is labeled for sorghum midge which must be applied after heading. A study was undertaken to see if use of elevated rates after heading would affect sorghum, especially yield. Three treatments were applied beginning at early bloom. No effects were found on number of heads produced, plant damage rating, grain moisture at harvest, or yield.

OBJECTIVE: The test objective was to determine if dimethoate had any adverse affects on plant growth and head development of Pioneer 8313 hybrid sorghum.

MATERIALS/METHODS: Pioneer 8313 hybrid sorghum was planted with a 4-row blackland type planter on the Meaney Annex of the Texas Agricultural Experiment Station, Corpus Christi on march 30, 2004. Treatments were 4 rows by 40 ft with 4 replications, and the experiment was arranged in a randomized complete block design. Dimethoate 4E (0.5, 1.0, and 2.0 pints/acre) and Baythroid 2E (0.9 oz/acre) treatments were applied on June 3, 10 and 17 with a Spider Trac self propelled sprayer in a total volume of 5.5 gpa while traveling 5 mph through 4X hollowcone nozzles at a pressure of 40 psi.

Treatment effects were assessed by (1) assigning on July 2 a damage rating to plants ranging from 1 = no damage up to 5 = stunting, uneven growth, leaf burn, or abnormal heads, (2) counting harvested grain heads during hand harvest on July 20, and (3) harvesting 13.75 ft row from each of the center 2 rows in plots on July 20. Harvested heads were threshed on a laboratory plot machine, and grain was cleaned with a Kice air cleaner. Plot grain weights were converted to 14% moisture.

RESULTS/DISCUSSION: Plant evaluation and yield data are provided in Table 1. No differences in plant ratings, number of grain heads produced and harvested, grain moisture at harvest, or yield were observed. At least for Pioneer 8313 hybrid under conditions tested, no adverse affects of dimethoate use on sorghum were found.

Table 1. Evaluation of dimethoate for effect on the sorghum plant and yield, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment (rate)	Plant damage rating[a]	Grain heads 1000's/acre	Harvest grain moisture (%)	Yield lb/acre
Dimethoate 4E (0.5 pt/acre)	2.8 a	68.6 a	14.6 a	3998 a
Dimethoate 4E (1.0 pt/acre)	1.5 a	63.9 a	14.9 a	4252 a
Dimethoate 4E (2.0 pt/acre)	1.5 a	67.5 a	14.2 a	4271 a
Baythroid 2E (0.9 oz/acre)	1.8 a	62.4 a	14.1 a	4349 a
Nontreated	2.5 a	64.8 a	14.6 a	4211 a
LSD (P = 0.05)	NS	NS	NS	NS
P > F	.2295	.5993	.2229	.8055

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

[a] Damage ratings range from 1 = no damage to 5 = stunting, uneven growth, leaf burn, or abnormal heads.

SORGHUM MIDGE DAMAGE ON RESISTANT AND SUSCEPTIBLE HYBRIDS AND IMPACT ON YIELD WITH AND WITHOUT INSECTICIDE TREATMENT

Texas Agricultural Experiment Station, Nueces County, 2004

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Corpus Christi, Texas

SUMMARY: Two sorghum midge resistant hybrids were compared with 4 susceptible hybrids which were either treated and nontreated with Baythroid. The number of insecticide treatments required to cover the bloom period varied by hybrid. Three hybrids required 5 treatments and 2 hybrids required 4 treatments. One hybrid (NK KS310) was treated only once since bloom was not detected until it reached 59%. This hybrid also completed bloom in a short number of days. The average number of sorghum midge/head in treatments during blooming periods ranged from 19.1 to 27.4, with slightly more in treated plots. The resistant hybrids provided more dollar return whether treated or not, compared to the treated susceptible hybrids. Three of the nontreated susceptible hybrids did not produce any grain, and susceptible treated hybrid yields did not return near as many dollars/acre. The only exception was for insecticide treated Garst 5515, which returned $1.76/acre more than one of the nontreated resistant hybrids.

OBJECTIVE: The objective of this work was to evaluate the effect of sorghum hybrid and insecticide treatment on sorghum midge damage, production, and dollar return.

MATERIALS/METHODS: Sorghum hybrids were planted April 13, 2004 on the Meaney Annex at the Texas Agricultural Experiment Station, Corpus Christ, in 4-row by 40-ft plots with 4 replications arranged in a randomized complete block design. A blackland type planter with attached research cone seed distributors was used to place approximately 5 seed/ft in rows which were on 38-inch centers. The late planting date was selected to assure sorghum midge infestation. Cotton had been planted on the site the previous season. Atrazine (1.0 qt/acre) was applied for weed control. Iron sulphate (5 lb/acre) was applied on May 25 in 11.5 gpa total spray volume. Fertilizer applied was 102-0-0.

Baythroid 2E (0.9 oz/acre) insecticide was broadcast over the center 2 rows in each plot with a Spider self propelled plot sprayer traveling at 5.0 mph, with two 4X hollow cone nozzles/row delivering 5.5 gpa at 40psi.

The experiment was statistically analyzed as a factorial. Treatments were assessed by (1) counting the number of sorghum midge/head on 5 blooming heads/plot in the center 2 rows of plots on June 18, 21, 24, 28 and July 2 [only average midge numbers during the blooming period of each hybrid will be reported], (2) estimating % bloom level in each plot on June 18, 21, 24, 28 and July 8, (3) estimating % midge damage in plots by visual observation on July 22, and (4) harvesting 13.75 ft row in each of the 2 center rows in plots on August 11. Grain moisture levels were measured with a Dole 400 moisture tester and plot weights were adjusted to 14% moisture.

RESULTS/DISCUSSION: Blooming rates are shown for hybrids in the test (Table 1). The NK KS310 hybrid was beyond 58% bloom before other hybrids initiated bloom, and there were some statistically significant differences in the length of bloom among the remaining hybrids. The 2 midge resistant hybrids (ATx640*Tx2882 and A8PR1013*Tx2882) and the susceptible hybrid Garst 5515 required an additional application of Baythroid due to a slightly longer blooming period than the NK X410 and ATx2752*RTx430 susceptible hybrids.

The average number of sorghum midge/head during the blooming period for each hybrid, grain yield, and dollar return are shown in Table 2. Insecticide significantly reduced midge damage in the susceptible hybrids. Although damage was not reduced statistically by insecticide treatments in the 2 resistant hybrids, numerically less midge damage was evident. In fact, midge damage in the resistant hybrids, regardless of insecticide use, was lower than any in of the susceptible hybrid treatments. It was evident that the midge hybrids provided a high degree of protection from sorghum midge and that insecticide provided an added benefit when applied to the resistant hybrids. Based on percentage improvement in yield, insecticide added much more yield to the susceptible hybrids, but dollar return was greater in all but one case for the midge resistant hybrids (Garst 5515 treated with insecticide returned $1.76/acre more than one of the nontreated resistant hybrids).

Results indicate that the resistant hybrids will produce more yield when planted 3-4 weeks late and are attacked by substantial numbers of sorghum midge. The resistant hybrids should be compared with susceptible hybrids under these conditions in large scale acreage to determine if results are the same as in the small plot experiment.

ACKNOWLEDGMENTS: The Sorghum PROFIT initiative project funded by the Texas Legislature and promoted by the Texas Grain Sorghum Producers Association are acknowledged for assistance. Dr. Gary Peterson and Dr. Bill Rooney, Sorghum Breeders with the Texas Agricultural Experiment Station are thanked for providing seed and their interest in the project. Rudy Alaniz and Mike Hiller, Demonstration Assistants and Bradley Moore, Student Worker, are thanked for their help with the field study. Appreciation is expressed to Bayer CropScience for providing the Baythroid insecticide.

Table 1. Bloom dates of sorghum hybrids evaluated with and without insecticide applied for sorghum midge control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Hybrid	Midge insecticide	% bloom by dates				
		6/18	6/21	6/24	6/28	7/8
ATx640*Tx2882	Yes [c]	0 b	0 b	21.5 e	48.3 d	86 b
	No	0 b	0 b	21.8 cde	48.8 d	84 b
A8PR1013*Tx2882	Yes [c]	0 b	0 b	20.3 e	47.5 d	80 b
	No	0 b	0 b	22.0 cde	49.5 d	83 b
Garst 5515	Yes [c]	0 b	0 b	21.5 e	47.0 d	84 b
	No	0 b	0 b	21.3 e	50.0 cd	85 b
NK KS310[a]	Yes [b]	27 a	59 a	92.3 a	100.0 a	100 a
	No	27 a	58 a	89.0 a	100.0 a	100 a
NK X410	Yes [d]	0 b	0 b	29.3 b	58.8 b	99 a
	No	0 b	0 b	26.0 bcd	57.5 b	100 a
ATx2752*RTx430	Yes [d]	0 b	0 b	26.3 bc	55.8 bc	98 a
	No	0 b	0 b	26.5 b	59.3 b	98 a
LSD (P = 0.05)		2.44	2.95	4.26	5.86	8.36
P > F		.0001	.0001	.0001	.0001	.0001

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

[a] Note: This hybrid bloomed early and was not treated until 59% bloom stage resulting in significant midge damage

[b] Baythroid 2E (0.9 oz/acre) was applied June 21.

[c] Baythroid 2E (0.9 oz/acre) was applied June 24, 28; July 2, 5 and 8.

[d] Baythroid 2E (0.9 oz/acre) was applied June 24, 28; July 2 and 5.

Table 2. Effect of midge on sorghum hybrids with and without insecticide treatment, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Entry #	Hybrid	Midge insecticide	Avg midge/head during bloom[e]	% midge damage	Yield lb/acre	$ return/ acre[f]
1	ATx640*Tx2882	Yes [c]	20.3	1.9 f	3994 a	145.35
		No	24.5	8.6 ef	3318 cd	139.36
2	A8PR1013*Tx2882	Yes [c]	19.2	3.2 f	3796 ab	137.03
		No	27.4	9.8 ef	3042 de	127.76
3	Garst 5515	Yes [c]	19.1	10.2 ef	3581 bc	128.00
		No	23.9	84.3 b	558 g	23.44
4	NK KS310[a]	Yes [b]	20.8	42.5 d	2779 e	111.20
		No	25.9	99.2 a	0 h	0.00
5	NK X410	Yes [d]	20.2	60.4 c	1521 f	35.88
		No	26.3	98.6 a	0 h	0.00
6	ATx2752*RTx430	Yes [d]	22.1	18.1 e	3502 bc	119.08
		No	23.6	97.8 a	0 h	0.00
	LSD (P = 0.05)			11.95	365.2	
	P > F			.0001	.0001	

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

[a] Note: This hybrid bloomed early and was not treated until 59% bloom stage resulting in significant midge damage

[b] Baythroid 2E (0.9 oz/acre) was applied June 21.

[c] Baythroid 2E (0.9 oz/acre) was applied June 24, 28; July 2, 5 and 8.

[d] Baythroid 2E (0.9 oz/acre) was applied June 24, 28; July 2 and 5.

[e] Not analyzed.

[f] Sorghum value based on $5.00/cwt. Costs include Baythroid 2E (0.9 oz/acre) at $2.35/acre, application cost was $3.25/acre (4 treatments on entries 1, 2 and 3; 1 treatment on entry 4, and 5 treatments on entries 5 and 6) and harvesting/hauling ($0.80/cwt).

ROW SPACING AND PLANT POPULATION EFFECTS ON SORGHUM PRODUCTION

Robert Barlow Farm, San Patricio County, 2004

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SUMMARY: The 2004 field study marked the first time in this series of experiments on the Barlow Farm where a row spacing other than 19-inch clearly produced more sorghum and returned more dollars/acre. Excessive rainfall received during the growing season resulted in below normal yields. Net dollar value over seed/harvest costs averaged \$107.60 for the 19-inch, \$125.15 for the 30-inch, and \$110.02 for the 38-inch row spacings. Additionally, the higher plant population tended to produce the higher yield. When the increased cost of Gaucho and Concep are considered this difference is much less. Unanswered questions remain as a result of the differences from past studies on the Barlow Farm.

OBJECTIVE: The series of field studies over the years was conducted to determine the effect of row spacing and seeding rate on yield and dollar return of sorghum.

MATERIALS/METHODS: The field study was conducted on the Robert Barlow Farm 0.75 miles north of the intersection of FM Roads 1944 and 1074. Asgrow A571 hybrid sorghum, Gaucho and Concep treated, was planted on March 22, 2004 in row spacings of 19-, 30-, and 38-inch with target populations of 48-, 68-, and 88-thousand plants/acre for each row spacing. Treatments were arranged in a randomized complete block design with 3 replications, and plots were 2,614 ft long. All treatments were planted flat (no beds). The 19- and 38-inch row spacing treatments were planted using a John Deere MaxEmerge vacumeter model 1730 planter, and the 30-inch row spacing treatment was planted with a 12-row Kinsey planter. The Victoria clay soil (8.0 pH) was warm on the planting date and moisture was excellent. Cotton had been grown at the site in 2003. Fertilizer applied was 400 lb/acre of 24-8-0.

Effects of treatments were assessed by (1) counting the number of plants on 10 row ft row at 6 locations/plot on April 16, and (2) harvesting 984 row ft in plots, with a commercial combine and weighing grain on electronic scales. Grain weights were converted to the 14% moisture standard

RESULTS/DISCUSSION: The actual field plant populations did not match the planned target in all cases, but good separation in the number of plants/acre was achieved within each of the 3 row spacings (Table 1). No differences were observed in grain moisture at harvest which did not match what was found in the 2002 study on the

Barlow farm. In the 2002 field study, grain moisture was found to be consistently greater as populations decreased due to production of grain on suckers. However, in the 2002 test the average plant population across all row spacings only averaged 52-thousand/acre; whereas, in the current study the average plant population across all row spacings averaged 67-thousand/acre. The 15-thousand/acre increase in plant population in the 2004 test, resulted in fewer suckers being produced which probably accounts (in part) for the different result.

Excessive rainfall (April 24-25 = 7.5 inches, May 1 = 1.5 inches, May 13-14 =2.3 inches) over a sustained period and water standing in the field greatly reduced yield potential. Total rainfall after planting amounted to 20.6 inches. Since soils were excessively wet early in the growing season, no cultivation of the crop occurred. It was the first time in this series of experiments where a row spacing other than 19-inch clearly produced more sorghum and returned more dollars/acre (Table 1). Average returns for the row spacings were $107.60 (19-inch), $125.15 (30-inch), and $110.02 (38-inch) per acre. The 30-inch spacing produced $17.55 and $15.13 more net dollars over seed and harvest cost compared to the 19-inch and 38-inch row spacings, respectively. Generally there was a 200 lb/acre or more increase in production at the higher plant population; this too is different from past studies on this farm and in other area studies where the lower populations produced the highest yield. Yields would be expected to be better where water was not a limiting factor, but in this case too much water seems to be the problem. However, when increased cost of the seed is considered, especially for Gaucho and Concep, the difference is much closer.

The intention was to end these studies in 2004, but unanswered questions remain due to the change in results this season.

ACKNOWLEDGMENTS: The Sorghum PROFIT Initiative Project and the Texas Grain Sorghum Producers Association is acknowledged for their support. Appreciation is expressed to Robert Barlow for his time, land, equipment, and patience in conducting this study. Special thanks are extended to Marvin Beyer for supplying the 30-inch planter and spending the time to plant those plots. Vernon Nedbalek, Sorghum Partners, is thanked for supplying the electronic weigh scale and assisting with harvest on a very hot day.

Table 1. Row spacing and plant population effects on grain sorghum production and dollar returns, Robert Barlow Farm, San Patricio County, TX, 2004.

Row spacing	Plants (1000's/acre) target[a]	Plants (1000's/acre) actual	% grain moisture	Yield lb/acre	Net $ value over seed/harvest cost[b]
19-inch	48	51.3	16.3 a	2865 de	109.45
	68	69.1	16.0 a	2861 e	104.75
	88	87.2	16.1 a	3060 bcde	108.59
30-inch	48	54.5	16.0 a	3297 ab	127.59
	68	70.5	15.9 a	3203 bc	119.12
	88	88.0	15.7 a	3540 a	128.75
38-inch	48	45.3	16.1 a	2822 e	107.64
	68	62.0	15.9 a	3015 cde	111.22
	88	76.0	15.9 a	3122 bcd	111.19
LSD (P = 0.05)			0.35	256.7	
P > F			.0975	.0003	

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

[a] Target seeding rates were 56.5, 80.0, and 103.5 thousand seed per acre at 85% germination with target plant stand objectives as shown.

[b] Net $ value over seed and harvest cost. Seed was Gaucho and Concep treated; the cost was $2.60/lb at a seed count of 13,500/lb and total acre cost was based on seeding rates provided in footnote "a". Harvesting and hauling costs were figured at $0.80/cwt. Sorghum value was based on $5.00/cwt.

EVALUATION OF INSECTICIDES FOR CONTROL OF INSECTS IN STORED SORGHUM THROUGH NINETEEN MONTHS: PART I

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: Temperature of stored sorghum was generally higher in the treatments containing the greatest numbers of insects. Generally moisture was not affected by the treatments. Nine species of stored grain insect pests were detected, including rusty grain beetle, red flour beetle, rice weevil, lesser grain borer, sawtoothed grain beetle, hairy fungus beetle, Indian meal moth, corn sap beetle, and Angoumois grain moth. Individual data were prepared for the total number of insects in samples and the first 5 insect species as listed above. The reduction in dollar value of grain from the initial 200lb/drum starting weight was significantly reduced by treatments containing Actellic, Diacon II and Spintor at the end of 14 months compared to all other treatments. The greatest loss in value occurred in nontreated grain; this loss was significantly greater than all other treatments except for DEB.

OBJECTIVE: The experiment was initiated to compare the effectiveness of selected grain protectants on stored sorghum against important insect species under conditions of the Texas Gulf Coast (Coastal Bend Region). Grain temperature and moisture, and insect numbers were measured on a monthly basis.

MATERIALS/METHODS: Sorghum that had been in storage for approximately 3 months was obtained from the Planters Grain Coop, Odem, Texas. Grain was commercially cleaned for one treatment. Sorghum measured in 50 lb increments was treated on Oct 2, 2002 in mixtures applying equivalent to 5 gallons of liquid/1000 bushels in a stainless steel cement mixer modified with added baffels for seed mixing. Four 50 lb samples of each treatment were placed in 30 gallon plastic drums (200 lb total sorghum/drum). Drums were covered with 0.5-inch hardware cloth to keep out birds, rodents and other unwanted animals. Following treatment and loading of drums, Phostoxin pellet (1 per 30 gal drum) was placed into the center of the grain mass, followed by sealing with 6 ml polyethylene sheeting and tape. Drums were sealed for 5 days and then aerated for 5 days. Sampling of 3 drums per replication revealed no live insects. The natural infestation was supplemented in late Oct 2002 by placing 10 adults in each drum of 4 species (rice weevil, red flour beetle, lesser grain borer and rusty grain beetle). These insects were obtained from Oklahoma State University. Each treatment was replicated 4 times and drums, arranged in a randomized complete design, were placed on a concrete floor inside a building. Insects from grain inside and outside the building had access to the experimental grain.

Treatments were assessed each month by (1) measuring the temperature with a 12-inch thermometer placed 11.5 inches deep into the middle of each drum, (2) probing grain in each drum at 6 locations/drum with a grain probe to obtain a one quart sample for insect inspection and moisture content, and (3) using a Seedburo Equipment Company sieve (8/64 - inch triangle holes) to separate insects from the grain. Insects were separated by species and then counted under a Circline magnifier lamp.

RESULTS/DISCUSSION: Temperature of stored sorghum was generally higher in treatments with the greatest number of insects with the first differences between treatments noted after 7 months of storage (Table 1). The average temperature for the first 12 month period was significantly lower in Actellic and Secure treated grain compared with temperature in the remaining insecticide treatments and nontreated sorghum. However, only the Actellic + Diacon II treated sorghum remained consistently at a lower temperature than the untreated sorghum from the 13th through the 19th month. Surprisingly, the Actellic (used alone) treated grain averaged the highest temperature numerically over that 7 month period which reflected a very high level of lesser grain borer infestation. Although statistical differences were not observed in grain moisture among the various treatments in individual months, it was significant for 12 month average data (Table 2). A significant difference was not found in any of the individual months through 19 months of storage nor was the average moisture for the last 7 months statistically different.

Pest insect species detected during the 19 month storage period included rusty grain beetle, red flour beetle, rice weevil, lesser grain borer, sawtoothed grain beetle, hairy fungus beetle, Indian meal moth, corn sap beetle, and Angoumois grain moth. Individual tables were prepared only for the first 5 species in this report. However, all pest insects were combined for reporting in Table 3. Five insects/quart sample were first exceeded in nontreated grain in month 3, in DEB and DES treatments in month 6, in both Secure treatments in month 9, in Actellic and Storcide treated grain in month 12, and in the Secure + Reldan treatment in month 17. Actellic + Diacon II never exceeded 5 total insect pests/quart sample during the 19 month storage period.

Rusty grain beetle numbers were significantly greater in nontreated grain at the end of 6 months in storage; the DES treatment was the only other treatment not different from the nontreated sorghum at the 12 month storage average count (Table 4). Through the next 7 months the nontreated grain averaged significantly higher numbers of rusty grain beetles.

Likewise, red flour beetle numbers, although not significantly different, exceeded 5/quart sample in the 6th storage month (Table 5). By 8 months, red flour beetle numbers were statistically greater in the DEB, DES, and nontreated sorghum. Generally, the results were similar through 19 months.

The rice weevil caused considerable damage in many of the treatments (Table 6). After 6 months in storage, rice weevil numbers averaged 10 or more per quart sample in the

DEB, DES, and nontreated grain, (1 per quart sample of these primary pest species is considered as a treatment threshold). Except for these 3 treatments, rice weevil numbers generally remained low through the first 12 months of storage. Through 19 months of storage, however, rice weevil numbers reached extremely high numbers in all treatments except in the Actellic and Actellic + Diacon II treated grain.

Except for the untreated grain, lesser grain borer numbers remained relatively low during the first 12 months (Table 7). However, by the end of 13 months, lesser grain borer numbers were high in Actellic (alone) and nontreated grain (44.3 and 58.0/quart sample in these treatments respectively). Lesser grain borer numbers continued to increase rapidly in Actelic (alone) and nontreated sorghum. By the end of 19 months, lesser grain borer numbers in the Actellic (alone) treatment were nearly double that in the nontreated grain. The high number of lesser grain borer in the Actellic treatment may have been due to the lack of competition with other stored grain insects All other treatments contained relatively few lesser grain borer numbers.

Sawtoothed grain beetles were not found until month 8 of storage, and significant differences were not measured between treatments until month 11 (Table 8). Two treatments (Storcide and nontreated grain) consistently had the higher number of sawtoothed grain beetles after 12 months.

At least 2 species of insect parasitoids (insects that are parasites of certain stored grain insects) were detected during the 19 month storage period (Tables 9 and 10). Statistical differences were not found in *Anisopteromalus calandrae* numbers until month 14 when the DEB treatment averaged 2.8/quart sample (Table 9). The parasitoid *Choetospila elegans* was generally present in greater numbers throughout the study period (Table 10). Generally both parasitoid species were present in greater numbers in treatments containing the highest number of insect pests. Their survival apparently was not as high in the more effective stored grain insecticide treatments. However, they appeared to reduce, or at least stabilize, the number of rice weevils (for example). Even so, rice weevil numbers remained at damaging levels through the duration of the study.

Grain in each drum was weighted at 19 months with results shown as a percentage of starting weight (Table 11). The smallest weight reductions occurred in Actellic, Actellic + Diacon II, Secure (cleaned grain), and the Secure + Reldan treatments.

Samples from each treatment were graded after 14 months by the Corpus Christi Grain Exchange. Significant reduction in bushel weights were detected in treatments which contained the heaviest insect infestations. Almost no reduction was found in the Actellic + Diacon II treatment (Table 12). Differences were not found in BKFM or FM in the samples. Total damage was generally greater in treatments containing the highest insect infestations. Actellic and Secure treated grain graded number 2 or better.

The reduction in dollar value of grain from the initial 200lb/drum starting weight was significantly reduced by treatments containing Actellic, Diacon II and Spintor at the end of 14 months compared to all other treatments. The greatest loss in value occurred in nontreated grain; this loss was significantly greater than all other treatments except for DEB.

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Table 1. Temperature levels in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2002 - October 2003.

Treatment	Temperature (°F) at months post-treatment[c]												
(rate)	1	2	3	4	5	6	7	8	9	10	11	12	Avg
Actellic 5E (11.5 oz/1000 bu)	71.1 a	60.5 a	59.0 a	56.0 a	70.8 a	76.3 a	82.0 c	86.4 d	84.8 bc	88.3 cd	83.5 b	82.0 b	75.1b
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	71.2 a	60.8 a	59.5 a	55.8 a	70.0 a	76.0 a	82.0 c	86.3 d	84.8 bc	88.0 d	83.0 b	81.8 b	74.9b
Secure 2SC (1.9 oz/1000 bu)	71.1 a	61.3 a	58.5 a	55.8 a	70.5 a	76.3 a	82.0 c	86.5 d	84.3 c	89.0 abc	83.3 b	82.0 b	75.1b
Secure 2SC[a] (1.9 oz/1000 bu)	70.7 a	60.8 a	59.5 a	55.8 a	70.8 a	76.5 a	82.0 c	86.5 d	84.3 c	88.5 bcd	83.5 b	82.0 b	75.1b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	71.4 a	61.0 a	59.0 a	56.0 a	70.3 a	76.0 a	82.0 c	86.6 cd	85.3 ab	88.3 cd	83.3 b	81.3 b	75.0b
Storcide (11.2 oz/1000 bu)	71.4 a	61.0 a	58.5 a	56.0 a	70.5 a	76.0 a	82.0 c	86.9 bcd	85.3 ab	89.3 ab	84.5 a	85.3 a	75.5a
DEB[b] (1.7 grams/50 lb)	71.4 a	60.8 a	58.5 a	55.5 a	70.8 a	76.5 a	82.4 b	88.0 a	85.8 a	89.5 a	84.8 a	85.0 a	75.8a
DES[b] (2.83 grams/50 lb)	71.4 a	61.0 a	59.5 a	56.0 a	70.5 a	76.8 a	82.5 ab	87.5 ab	85.5 ab	89.3 ab	84.8 a	84.3 a	75.8a
Nontreated	71.1 a	60.8 a	59.5 a	55.5 a	70.5 a	76.8 a	82.8 a	87.3 bc	85.5 ab	89.5 a	85.0 a	85.3 a	75.8a
LSD (P = 0.05)	0.93	0.83	1.6	0.65	0.87	0.72	0.37	0.73	0.92	0.93	0.81	1.20	0.36
P > F	0.8672	0.7685	0.6715	0.5605	0.6799	0.1997	0.0008	0.0004	0.0166	0.0093	0.0001	0.0001	0.0001

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month "1" was November 2002.

Table 1 (continued). Temperature levels in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2003 - May 2004.

Treatment	Temperature (°F) at months post-treatment[c]							
(rate)	13	14	15	16	17	18	19	Avg
Actellic 5E (11.5 oz/1000 bu)	80.8 de	61.8 a	67.3 a	72.3 a	79.8 a	85.0 a	89.3 ab	76.6 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	78.5 g	59.5 a	64.8 a	65.3 a	71.8 c	76.0 c	81.8 e	71.1 c
Secure 2SC (1.9 oz/1000 bu)	79.5 fg	60.5 a	65.8 a	66.5 a	73.5 c	77.8 bc	83.5 de	72.4 bc
Secure 2SC[a] (1.9 oz/1000 bu)	80.0 ef	61.8 a	65.5 a	67.0 a	73.8 c	78.8 bc	84.8 cde	73.1 bc
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	79.3 fg	59.8 a	65.3 a	66.0 a	72.3 c	77.8 bc	85.8 bcd	72.3 bc
Storcide (11.2 oz/1000 bu)	81.3 cd	61.3 a	66.5 a	69.5 a	78.8 ab	85.5 a	91.8 a	76.4 a
DEB[b] (1.7 grams/50 lb	83.5 a	62.0 a	66.5 a	68.5 a	75.8 abc	79.8 bc	86.3 bcd	74.6 ab
DES[b] (2.83 grams/50 lb)	82.3 bc	62.8 a	66.5 a	68.0 a	74.5 bc	79.3 bc	85.3 cde	74.1 ab
Nontreated	83.0 ab	60.8 a	66.0 a	67.5 a	75.8 abc	81.0 ab	87.5 bc	74.5 ab
LSD (P = 0.05)	1.16	NS	NS	NS	4.75	4.69	3.64	2.81
P > F	0.0001	0.1070	0.0841	0.3435	0.0233	0.0034	0.0004	0.0059

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month "13" was November 2003.

Table 2. Moisture levels in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2002 - October 2003.

Treatment (rate)	Moisture (%) at months post-treatment[c]												
	1	2	3	4	5	6	7	8	9	10	11	12	Avg
Actellic 5E (11.5 oz/1000 bu)	12.0 a	12.4 a	12.2 a	12.4 a	12.3 a	13.2 a	13.0 a	13.3 a	12.9 a	13.4 a	12.9 a	12.9 a	12.73 bc
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	12.2 a	12.4 a	12.5 a	12.5 a	12.3 a	13.1 a	12.9 a	13.5 a	13.4 a	13.6 a	12.8 a	12.9 a	12.84 a
Secure 2SC (1.9 oz/1000 bu)	11.9 a	12.1 a	12.5 a	12.5 a	12.2 a	13.1 a	12.9 a	13.5 a	13.4 a	13.3 a	13.0 a	12.8 a	12.77 ab
Secure 2SC[a] (1.9 oz/1000 bu)	12.0 a	12.3 a	12.5 a	12.4 a	12.3 a	13.2 a	12.9 a	13.6 a	13.3 a	13.5 a	12.5 a	12.9 a	12.78 ab
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	12.0 a	12.3 a	12.2 a	12.4 a	12.3 a	13.0 a	13.0 a	13.7 a	13.4 a	13.4 a	12.8 a	12.8 a	12.78 ab
Storcide (11.2 oz/1000 bu)	12.0 a	12.3 a	12.4 a	12.4 a	12.3 a	13.1 a	13.0 a	13.8 a	13.0 a	13.3 a	13.0 a	12.6 a	12.77 ab
DEB[b] (1.7 grams/50 lb)	11.9 a	12.1 a	12.4 a	12.5 a	12.4 a	13.3 a	12.9 a	13.0 a	13.0 a	13.4 a	12.8 a	12.6 a	12.71 bc
DES[b] (2.83 grams/50 lb)	11.8 a	12.2 a	12.4 a	12.5 a	12.3 a	13.0 a	12.7 a	13.3 a	13.5 a	13.2 a	12.8 a	12.4 a	12.67 c
Nontreated	11.8 a	12.4 a	12.4 a	12.5 a	12.4 a	13.2 a	13.0 a	13.7 a	13.1 a	13.5 a	13.1 a	12.9 a	12.84 a
LSD (P = 0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.88
P > F	0.4582	0.9040	0.9203	0.8494	0.8255	0.6176	0.3050	0.1574	0.5080	0.8703	0.9546	0.0936	0.0117

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month "1" was November 2002.

Table 2 (continued). Moisture levels in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2003 - May 2004.

Treatment (rate)	Moisture (%) at months post-treatment[c]							
	13	14	15	16	17	18	19	Avg
Actellic 5E (11.5 oz/1000 bu)	13.1 a	12.4 a	12.6 a	12.2 a	12.8 a	13.4 a	13.8 a	12.9 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	13.2 a	12.2 a	12.3 a	12.3 a	12.6 a	12.9 a	13.1 a	12.6 a
Secure 2SC (1.9 oz/1000 bu)	13.2 a	12.2 a	12.0 a	12.2 a	13.1 a	13.0 a	13.0 a	12.7 a
Secure 2SC[a] (1.9 oz/1000 bu)	13.1 a	12.3 a	12.5 a	12.8 a	13.1 a	13.0 a	13.0 a	12.8 a
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	13.3 a	12.1 a	12.4 a	12.2 a	12.9 a	13.1 a	13.0 a	12.7 a
Storcide (11.2 oz/1000 bu)	13.1 a	12.1 a	12.4 a	12.3 a	12.8 a	13.2 a	13.1 a	12.7 a
DEB[b] (1.7 grams/50 lb	13.1 a	12.1 a	12.5 a	12.2 a	12.8 a	13.3 a	13.0 a	12.7 a
DES[b] (2.83 grams/50 lb)	13.0 a	12.2 a	12.5 a	12.3 a	13.2 a	13.0 a	13.2 a	12.8 a
Nontreated	13.2 a	12.7 a	12.1 a	12.4 a	13.1 a	13.4 a	13.2 a	12.8 a
LSD (P = 0.05)	NS	NS	NS	NS	NS	NS	NS	NS
P > F	0.9397	0.1547	0.1745	0.4581	0.5602	0.8469	0.6874	0.7312

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “13" was November 2003.

Table 3. Total insects in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2002 - October 2003.

Treatment	Total insects/quart sample at months post-treatment[c]												
(rate)	1	2	3	4	5	6	7	8	9	10	11	12	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 c	0.0 c	0.0 c	0.3 c	0.3 c	0.3 d	0.0 d	0.5 b	8.0 d	0.77 d
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 c	0.0 c	0.0 c	0.0 c	0.0 c	0.3 d	0.3 d	0.0 b	0.0 d	0.04 d
Secure 2SC (1.9 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 c	0.0 c	1.5 c	2.0 bc	3.5 c	11.5 cd	13.0 cd	10.8 b	12.0 cd	4.52 d
Secure 2SC[a] (1.9 oz/1000 bu)	0.3 b	0.8 b	0.0 b	0.0 c	0.3 bc	0.5 c	1.0 c	2.8 c	6.5 d	4.3 d	10.8 b	12.3 cd	3.27 d
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 c	0.0 c	0.0 c	0.0 c	0.3 c	1.8 d	0.5 d	1.5 b	0.8 d	0.40 d
Storcide (11.2 oz/1000 bu)	0.3 b	0.0 b	0.0 b	0.0 c	0.0 c	0.0 c	0.0 c	1.0 c	2.0 d	1.8 d	0.8 b	6.0 d	0.98 d
DEB[b] (1.7 grams/50 lb)	0.3 b	0.0 b	1.0 b	2.5 b	2.0 bc	10.0 bc	5.5 bc	16.5 b	23.5 bc	22.0 bc	35.5 a	27.3 ab	12.16 c
DES[b] (2.83 grams/50 lb)	0.3 b	0.3 b	1.0 b	3.0 b	3.0 ab	22.5 ab	17.0 b	24.8 ab	43.0 a	38.3 a	35.5 a	25.8 bc	17.85 ba
Nontreated	1.8 a	2.8 a	6.0 a	5.8 a	5.8 a	38.8 a	40.3 a	28.3 a	30.8 ab	35.5 ab	37.3 a	41.0 a	22.81 a
LSD (P = 0.05)	0.67	1.27	1.67	1.77	2.96	16.69	15.00	10.16	13.88	15.50	14.98	14.29	4.52
P > F	0.0003	0.0023	0.0001	0.0001	0.0040	0.0004	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “1" was November 2002.

Table 3 (continued). Total insects in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2003 - May 2004.

Treatment (rate)	Total insects/quart sample at months post-treatment[c] 13	14	15	16	17	18	19	Avg
Actellic 5E (11.5 oz/1000 bu)	44.8 b	50.3 b	56.5 b	76.5 bc	80.0 cd	148.5 abc	120.8 c	82.5 bcd
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.5 c	0.0 d	0.5 d	0.5 d	0.5 d	0.8 d	1.0 d	0.5 e
Secure 2SC (1.9 oz/1000 bu)	16.0 bc	14.3 bcd	31.3 bcd	46.0 bcd	80.0 cd	88.8 bcd	140.0 c	59.5 cde
Secure 2SC[a] (1.9 oz/1000 bu)	15.3 bc	7.8 cd	9.0 bcd	11.3 cd	22.5 d	49.3 cd	124.3 c	34.2 de
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	4.8 bc	1.3 d	4.0 cd	3.5 cd	11.0 d	57.5 cd	153.3 c	33.6 de
Storcide (11.2 oz/1000 bu)	29.3 bc	40.0 bcd	35.8 bcd	65.3 bcd	205.0 ab	246.8 a	271.3 ab	127.6 ab
DEB[b] (1.7 grams/50 lb	22.8 bc	52.3 b	42.8 bcd	99.8 ab	170.5 abc	148.3 abc	175.5 bc	101.7 bc
DES[b] (2.83 grams/50 lb)	36.8 bc	43.0 bc	52.5 bc	98.3 ab	130.0 bc	193.8 ab	229.8 abc	112.0 bc
Nontreated	103.8 a	106.8 a	121.8 a	162.5 a	241.0 a	247.5 a	328.8 a	187.4 a
LSD (P = 0.05)	44.23	41.18	48.83	74.99	106.57	108.06	115.19	66.04
P > F	0.0030	0.0003	0.0011	0.0023	0.0004	0.0004	0.0003	0.0002

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “13" was November 2003.

Table 4. Rusty grain beetles in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2002 - October 2003.

Treatment (rate)	Rusty grain beetles/quart sample at months post-treatment[c]												
	1	2	3	4	5	6	7	8	9	10	11	12	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 c	0.0 b	0.0 b	0.0 c	0.0 e	0.0 d
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 c	0.0 b	0.0 b	0.0 c	0.0 e	0.0 d
Secure 2SC (1.9 oz/1000 bu)	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.3 b	1.0 c	2.0 b	2.3 b	3.8 bc	6.3 bc	1.3 bc
Secure 2SC[a] (1.9 oz/1000 bu)	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	0.3 b	0.0 b	0.8 c	0.8 b	0.8 b	4.0 bc	7.0 bc	1.1 bcd
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 c	0.0 b	0.0 b	0.0 c	0.0 e	0.0 d
Storcide (11.2 oz/1000 bu)	0.3 b	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 c	0.0 b	0.0 b	0.0 c	1.0 de	0.1 cd
DEB[b] (1.7 grams/50 lb)	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.3 b	2.0 bc	3.5 b	6.5 b	9.0 b	5.5 cd	2.2 b
DES[b] (2.83 grams/50 lb)	0.0 b	0.0 a	0.0 a	0.3 a	0.0 a	0.0 b	2.3 b	4.5 ab	13.8 a	15.5 a	17.5 a	12.0 a	5.5 a
Nontreated	0.8 a	0.0 a	0.3 a	0.0 a	0.3 a	3.0 a	12.0 a	6.8 a	10.8 a	15.8 a	8.5 b	10.5 ab	5.7 a
LSD (P = 0.05)	0.365	NS	NS	NS	NS	1.07	3.202	2.673	5.181	6.666	5.751	4.915	1.29
P > F	0.0033	1.0000	0.4613	0.4613	0.4613	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “1" was November 2002.

Table 4 (continued). Rusty grain beetles in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County,

TX, November 2003 - May 2004.

Treatment (rate)	Rusty grain beetles/quart sample at months post-treatment[c]							
	13	14	15	16	17	18	19	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 c	0.0 c	0.0 b	0.0 b	0.0 d	3.8 cd	0.0 c	0.5 d
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 c	0.0 c	0.0 b	0.0 b	0.0 d	0.3 d	0.0 c	0.0 d
Secure 2SC (1.9 oz/1000 bu)	2.5 bc	2.5 c	4.0 b	3.3 b	10.3 cd	6.5 cd	25.8 abc	7.8 cd
Secure 2SC[a] (1.9 oz/1000 bu)	3.0 bc	4.3 c	1.8 b	1.5 b	5.3 cd	4.5 cd	13.8 bc	4.9 cd
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 c	0.0 c	0.0 b	0.0 b	0.0 d	0.0 d	0.0 c	0.0 d
Storcide (11.2 oz/1000 bu)	0.5 bc	0.0 c	0.0 b	0.0 b	7.5 cd	32.8 bc	35.8 ab	10.9 bc
DEB[b] (1.7 grams/50 lb	3.5 bc	4.3 c	1.0 b	12.0 b	21.0 bc	19.3 bcd	17.5 bc	11.2 bc
DES[b] (2.83 grams/50 lb)	5.3 b	12.3 b	5.8 b	16.5 b	28.8 b	40.0 ab	30.5 abc	19.9 b
Nontreated	13.8 a	22.3 a	20.5 a	45.3 a	50.8 a	71.0 a	49.0 a	38.9 a
LSD (P = 0.05)	4.967	4.663	5.930	16.941	17.923	31.287	31.052	9.740
P > F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0009	0.0271	0.0001

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “13" was November 2003.

Table 5. Red flour beetles in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2002 - October 2003.

Treatment	Red flour beetles/quart sample at months post-treatment[c]												
(rate)	1	2	3	4	5	6	7	8	9	10	11	12	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 a	0.0 b	0.0 a	0.0 b	0.0 a	0.0 b	0.0 a	0.0 b	0.0 d	0.0 c	0.0 c	0.0 c	0.0 e
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 a	0.0 b	0.0 a	0.0 b	0.0 a	0.0 b	0.0 a	0.0 b	0.0 d	0.0 c	0.0 c	0.0 c	0.0 e
Secure 2SC (1.9 oz/1000 bu)	0.0 a	0.0 b	0.0 a	0.0 b	0.0 a	1.3 b	1.5 a	1.0 b	4.5 ab	3.5 ab	3.0 b	0.8 c	1.3 cd
Secure 2SC[a] (1.9 oz/1000 bu)	0.3 a	0.0 b	0.0 a	0.0 b	0.0 a	0.3 b	0.8 a	1.3 b	3.3 bc	2.3 abc	2.0 bc	0.5 c	0.9 de
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 a	0.0 b	0.0 a	0.0 b	0.0 a	0.0 b	0.0 a	0.0 b	1.8 cd	0.5 c	0.5 bc	0.0 c	0.2 e
Storcide (11.2 oz/1000 bu)	0.0 a	0.0 b	0.0 a	0.0 b	0.0 a	0.0 b	0.0 a	0.5 b	1.8 cd	1.3 bc	0.5 bc	0.3 c	0.4 de
DEB[b] (1.7 grams/50 lb)	0.3 a	0.0 b	0.0 a	0.3 b	0.0 a	0.3 b	1.8 a	8.5 a	5.8 a	4.0 a	6.5 a	4.8 ab	2.7 ab
DES[b] (2.83 grams/50 lb)	0.3 a	0.3 b	0.0 a	0.0 b	0.0 a	0.0 b	1.5 a	6.5 a	6.0 a	3.8 ab	2.3 bc	3.0 b	2.0 bc
Nontreated	0.5 a	1.0 a	0.5 a	1.0 a	0.3 a	5.8 a	2.5 a	8.0 a	6.3 a	4.5 a	6.3 a	5.3 a	3.5 a
LSD (P = 0.05)	NS	0.47	NS	0.44	NS	3.13	NS	4.19	2.45	2.62	2.68	2.16	0.95
P > F	0.4123	0.0023	0.4613	0.0013	0.4613	0.0151	0.1754	0.0002	0.0001	0.0037	0.0001	0.0001	0.0001

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “1" was November 2002.

Table 5 (continued). Red flour beetles in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County,

TX, November 2003 - May 2004.

Treatment (rate)	Red flour beetles/quart sample at months post-treatment[c]							
	13	14	15	16	17	18	19	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 c	0.0 b	0.0 c	0.0 c	0.0 c	0.0 a	0.0 a	0.0 b
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 c	0.0 b	0.0 c	0.0 c	0.0 c	0.0 a	0.5 a	0.1 b
Secure 2SC (1.9 oz/1000 bu)	1.8 bc	0.5 b	0.5 bc	0.0 c	0.3 c	0.3 a	3.8 a	1.0 b
Secure 2SC[a] (1.9 oz/1000 bu)	1.0 bc	0.5 b	0.0 c	0.0 c	0.3 c	0.0 a	1.0 a	0.4 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.5 c	0.0 b	0.0 c	0.0 c	0.0 c	0.0 a	0.3 a	0.1 b
Storcide (11.2 oz/1000 bu)	0.0 c	0.3 b	0.3 bc	0.0 c	1.0 bc	5.8 a	19.0 a	3.8 b
DEB[b] (1.7 grams/50 lb	3.8 ab	2.8 b	1.8 ab	4.0 a	4.0 ab	2.3 a	9.0 a	3.9 ab
DES[b] (2.83 grams/50 lb)	2.3 bc	1.8 b	0.3 bc	0.0 c	1.0 bc	3.0 a	3.3 a	1.6 b
Nontreated	5.5 a	8.0 a	2.5 a	2.0 b	5.5 a	7.5 a	25.0 a	8.0 a
LSD (P = 0.05)	2.850	4.420	1.540	1.580	3.280	NS	NS	4.080
P > F	0.0046	0.0188	0.0179	0.0001	0.0127	0.1565	0.0925	0.0061

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “13" was November 2003.

Table 6. Rice weevils in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2002 - October 2003.

Treatment (rate)	Rice weevil/quart sample at months post-treatment[c]												
	1	2	3	4	5	6	7	8	9	10	11	12	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 c	0.3 c	0.0 b	0.3 d	0.0 b	0.0 c	0.0 c	0.04 b
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 c	0.0 c	0.0 b	0.0 d	0.3 b	0.0 c	0.0 c	0.02 b
Secure 2SC (1.9 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.3 c	0.3 c	1.0 b	2.3 abc	4.3 ab	2.0 bc	2.3 bc	1.02 b
Secure 2SC[a] (1.9 oz/1000 bu)	0.0 a	0.8 a	0.0 a	0.0 b	0.0 b	0.0 c	0.0 c	0.3 b	0.5 cd	0.0 b	0.0 c	2.3 bc	0.31 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 c	0.0 c	0.0 b	0.0 d	0.0 b	0.0 c	0.3 c	0.02 b
Storcide (11.2 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 c	0.0 c	0.0 b	0.0 d	0.0 b	0.0 c	0.3 c	0.02 b
DEB[b] (1.7 grams/50 lb)	0.0 a	0.0 a	1.0 a	2.3 a	1.8 ab	9.8 bc	3.3 c	2.8 b	1.5 bcd	5.0 a	4.8 ab	10.8 a	3.56 a
DES[b] (2.83 grams/50 lb)	0.0 a	0.0 a	1.0 a	2.8 a	3.0 a	22.5 ab	11.5 a	7.3 a	3.8 a	5.8 a	2.3 bc	3.3 bc	5.25 a
Nontreated	0.0 a	0.5 a	3.0 a	4.0 a	4.3 a	27.3 a	7.0 b	2.0 b	2.5 ab	4.3 ab	6.0 a	5.8 b	5.54 a
LSD (P = 0.05)	NS	NS	NS	2.12	2.72	16.77	3.74	2.82	1.9	4.61	2.92	3.80	2.22
P > F	1.0000	0.3568	0.0851	0.0015	0.0164	0.0071	0.0001	0.0003	0.0021	0.0333	0.0006	0.0001	0.0001

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “1" was November 2002.

Table 6 (continued). Rice weevils in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2003 - May 2004.

Treatment (rate)	Rice weevil/quart sample at months post-treatment[c]							
	13	14	15	16	17	18	19	Avg
Actellic 5E (11.5 oz/1000 bu)	0.3 d	0.3 c	0.3 b	0.3 c	0.5 d	1.5 f	2.5 c	0.8 d
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.5 d	0.0 c	0.3 b	0.5 c	0.3 d	0.5 f	0.5 c	0.4 d
Secure 2SC (1.9 oz/1000 bu)	8.3 bcd	10.8 bc	21.7 ab	40.3 abc	68.3 bcd	77.3 cde	99.5 b	46.6 bc
Secure 2SC[a] (1.9 oz/1000 bu)	2.8 bcd	1.8 c	4.5 b	7.5 bc	16.8 cd	43.5 ef	99.0 b	25.1 cd
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	1.3 cd	1.0 c	3.0 b	3.3 bc	11.0 d	57.5 de	153.0 ab	32.9 c
Storcide (11.2 oz/1000 bu)	1.3 cd	12.8 bc	22.8 ab	60.3 ab	192.8 a	176.0 a	144.8 ab	87.2 a
DEB[b] (1.7 grams/50 lb	10.3 bc	40.8 a	38.5 a	80.5 a	136.0 ab	109.5 bc	127.0 b	77.5 ab
DES[b] (2.83 grams/50 lb)	20.0 a	25.0 ab	42.3 a	80.5 a	99.5 bc	142.8 ab	188.0 a	85.4 a
Nontreated	12.0 ab	30.8 ab	37.3 a	60.3 ab	100.3 bc	104.3 bcd	151.8 ab	70.9 ab
LSD (P = 0.05)	9.40	20.21	25.13	57.24	86.48	49.44	56.29	31.80
P > F	0.0019	0.0013	0.0033	0.0148	0.0007	0.0001	0.0001	0.0001

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month "13" was November 2003.

Table 7. Lesser grain borers in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2002 - October 2003.

Treatment (rate)	Lesser grain borer/quart sample at months post-treatment[c]												
	1	2	3	4	5	6	7	8	9	10	11	12	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.5 b	8.0 ab	0.71 b
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.00 b
Secure 2SC (1.9 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.00 b
Secure 2SC[a] (1.9 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.00 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.00 b
Storcide (11.2 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.3 b	0.02 b
DEB[b] (1.7 grams/50 lb)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.00 b
DES[b] (2.83 grams/50 lb)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.00 b
Nontreated	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	1.3 a	0.5 a	1.0 a	0.8 a	3.0 a	8.8 a	14.8 a	2.50 a
LSD (P = 0.05)	NS	NS	NS	NS	NS	0.73	0.28	0.40	0.47	1.86	2.71	9.69	0.92
P > F	1.0000	1.0000	1.0000	1.0000	1.0000	0.0251	0.0176	0.0003	0.0424	0.0424	0.0001	0.0375	0.0001

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “1" was November 2002.

Table 7 (continued). Lesser grain borers in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County,

TX, November 2003 - May 2004.

Treatment (rate)	Lesser grain borrer/quart sample at months post-treatment[c]							
	13	14	15	16	17	18	19	Avg
Actellic 5E (11.5 oz/1000 bu)	44.3 a	50.0 a	56.3 a	76.3 a	79.5 a	143.3 a	117.0 a	80.93 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 b	0.0 b	0.3 b	0.0 b	0.0 b	0.0 b	0.0 b	0.04 b
Secure 2SC (1.9 oz/1000 bu)	0.0 b	0.0 b	0.3 b	0.3 b	0.0 b	0.0 b	0.0 b	0.07 b
Secure 2SC[a] (1.9 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.00 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.00 b
Storcide (11.2 oz/1000 bu)	0.0 b	0.3 b	0.3 b	0.0 b	0.0 b	0.0 b	5.5 b	0.86 b
DEB[b] (1.7 grams/50 lb	0.3 b	0.3 b	0.0 b	0.0 b	0.0 b	0.0 b	3.8 b	0.61 b
DES[b] (2.83 grams/50 lb)	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.00 b
Nontreated	58.0 a	35.3 a	53.3 a	51.8 b	64.3 a	32.8 b	45.3 b	48.64 a
LSD (P = 0.05)	35.27	30.95	35.99	47.72	47.87	79.74	61.69	46.44
P > F	0.0074	0.0118	0.0050	0.0146	0.0053	0.0165	0.0081	0.0086

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “13" was November 2003.

Table 8. Sawtoothed grain beetles in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2002 - October 2003.

Treatment (rate)	Sawtoothed grain beetles/quart sample at months post-treatment[c]												
	1	2	3	4	5	6	7	8	9	10	11	12	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.3 a	0.0 a	0.0 a	0.0 c	0.0 a	0.02 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.3 a	0.0 a	0.0 c	0.0 a	0.02 a
Secure 2SC (1.9 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.5 a	2.8 a	3.0 a	1.8 c	2.0 a	0.83 a
Secure 2SC[a] (1.9 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.3 a	2.0 a	1.3 a	4.5 bc	1.8 a	0.81 a
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.3 a	0.0 a	0.0 a	0.5 c	0.3 a	0.08 a
Storcide (11.2 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.5 a	0.3 a	0.5 a	0.3 c	2.3 a	0.31 a
DEB[b] (1.7 grams/50 lb)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	2.3 a	11.3 a	5.3 a	14.8 a	3.0 a	3.04 a
DES[b] (2.83 grams/50 lb)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	5.3 a	19.0 a	13.3 a	12.5 ab	5.0 a	4.58 a
Nontreated	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	2.5 a	5.8 a	3.5 a	7.0 abc	2.8 a	1.79 a
LSD (P = 0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.16	NS	NS
P > F	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.3531	0.3344	0.1904	0.0115	0.0558	0.0716

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “1" was November 2002.

Table 8 (continued). Sawtoothed grain beetles in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2003 - May 2004.

Treatment (rate)	Sawtoothed grain beetles/quart sample at months post-treatment[c]							
	13	14	15	16	17	18	19	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 a	0.0 c	0.0 b	0.0 c	0.0 b
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 a	0.0 c	0.0 b	0.0 c	0.0 b
Secure 2SC (1.9 oz/1000 bu)	1.8 b	0.0 b	2.8 b	1.8 a	1.3 bc	1.8 b	5.5 bc	2.1 b
Secure 2SC[a] (1.9 oz/1000 bu)	5.8 b	1.0 b	0.5 b	2.0 a	0.0 c	1.3 b	9.0 bc	2.9 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 a	0.0 c	0.0 b	0.0 c	0.0 b
Storcide (11.2 oz/1000 bu)	23.0 a	25.5 a	9.3 a	4.0 a	3.8 b	25.8 a	50.3 a	23.9 a
DEB[b] (1.7 grams/50 lb	2.3 b	2.3 b	1.0 b	3.0 a	2.8 bc	7.8 b	7.3 bc	4.1 b
DES[b] (2.83 grams/50 lb)	4.0 b	1.5 b	3.8 b	1.0 a	0.8 bc	5.3 b	2.8 bc	2.9 b
Nontreated	6.8 b	6.5 b	3.3 b	3.0 a	11.0 a	12.3 ab	27.0 ab	10.9 b
LSD (P = 0.05)	11.32	13.05	4.85	NS	3.20	15.08	25.23	11.34
P > F	0.0081	0.0089	0.0114	0.3055	0.0001	0.0273	0.0051	0.0039

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “13" was November 2003.

Table 9. *Anisopteromalus clandrae* (Howard) parasitoids in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2002 - October 2003.

Treatment (rate)	Number/quart sample at months post-treatment[c]												
	1	2	3	4	5	6	7	8	9	10	11	12	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
Secure 2SC (1.9 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
Secure 2SC[a] (1.9 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
Storcide (11.2 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
DEB[b] (1.7 grams/50 lb)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	1.0 a	0.0 a	0.8 a	0.3 a	0.0 a	2.8 a	0.4 a
DES[b] (2.83 grams/50 lb)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	1.0 a	2.5 a	0.3 a
Nontreated	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	4.0 a	0.3 a	1.0 a	0.0 a	1.8 a	4.5 a	1.00 a
LSD (P = 0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
P > F	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0937	0.4613	0.5726	0.4613	0.4613	0.4330	0.1443

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “1" was November 2002.

Table 9 (continued). *Anisopteromalus clandrae* (Howard) parasitoids in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2003 - May 2004.

Treatment (rate)	Number/quart sample at months post-treatment[c] 13	14	15	16	17	18	19	Avg
Actellic 5E (11.5 oz/1000 bu)	0.3 a	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	2.3 b	0.36 c
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 a	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.00 c
Secure 2SC (1.9 oz/1000 bu)	0.5 a	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.07 c
Secure 2SC[a] (1.9 oz/1000 bu)	0.0 a	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.00 c
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 a	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.00 c
Storcide (11.2 oz/1000 bu)	0.5 a	0.0 b	0.0 a	0.0 a	4.8 a	1.3 a	7.8 a	2.04 a
DEB[b] (1.7 grams/50 lb	3.5 a	2.8 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.89 abc
DES[b] (2.83 grams/50 lb)	1.8 a	0.0 b	0.0 a	0.0 a	0.0 a	0.0 a	1.3 b	0.43 bc
Nontreated	6.8 a	0.5 b	2.5 a	0.0 a	0.3 a	0.0 a	3.5 ab	1.93 ab
LSD (P = 0.05)	NS	1.15	NS	NS	NS	NS	4.92	1.51
P > F	0.4404	0.0006	0.1392	1.0000	0.4732	0.4613	0.0454	0.0389

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month "13" was November 2003.

Table 10. *Choetospila elegans* Westwood, parasitoids in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2002 - October 2003.

Treatment (rate)	Number/quart sample at months post-treatment[c]												
	1	2	3	4	5	6	7	8	9	10	11	12	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.3 b	0.0 b	0.0 a	0.0 a	0.0 b	0.02 d
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 a	0.0 a	0.0 b	0.00 d
Secure 2SC (1.9 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	2.5 b	0.8 a	0.0 a	0.0 b	0.27 cd
Secure 2SC[a] (1.9 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 a	0.0 a	0.0 b	0.00 d
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 a	0.0 a	0.0 b	0.00 d
Storcide (11.2 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b	0.0 a	0.0 a	0.0 b	0.00 d
DEB[b] (1.7 grams/50 lb)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.8 b	2.3 b	2.8 b	0.3 a	0.8 a	3.0 b	0.81 c
DES[b] (2.83 grams/50 lb)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	2.8 b	12.0 a	2.5 b	2.3 a	0.3 a	2.0 b	1.81 b
Nontreated	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	15.5 a	6.0 ab	7.5 a	1.3 a	2.5 a	13.3 a	3.83 a
LSD (P = 0.05)	NS	NS	NS	NS	NS	NS	6.90	7.34	3.88	NS	NS	5.02	0.77
P > F	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0016	0.0267	0.0073	0.1504	0.1943	0.0002	0.0001

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “1" was November 2002.

Table 10 (continued). *Choetospila elegans* Westwood, parasitoid in stored sorghum treated with grain protectants, Texas Agricultural Experiment Station, Nueces County, TX, November 2003 - May 2004.

Treatment (rate)	Number/quart sample at months post-treatment[c]							
	13	14	15	16	17	18	19	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 c	0.0 c	0.3 d	0.0 d	0.04 c
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 c	0.0 c	0.0 d	0.0 d	0.00 c
Secure 2SC (1.9 oz/1000 bu)	1.0 b	0.0 b	4.5 b	11.0 bc	16.5 bc	14.0 cd	30.5 abc	11.07 b
Secure 2SC[a] (1.9 oz/1000 bu)	0.5 b	0.3 b	0.0 b	0.8 c	4.0 c	9.5 d	17.5 cd	4.64 c
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	1.0 b	0.0 b	0.0 b	0.5 c	0.5 c	0.0 d	0.0 d	0.29 c
Storcide (11.2 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 c	2.5 c	0.0 d	19.8 bcd	3.18 c
DEB[b] (1.7 grams/50 lb	3.8 ab	10.0 a	3.8 b	32.5 a	44.0 a	58.0 a	23.5 bc	25.07 a
DES[b] (2.83 grams/50 lb)	2.8 b	12.3 a	2.5 b	22.8 ab	36.0 a	42.3 ab	44.5 a	23.29 a
Nontreated	8.0 a	9.5 a	11.5 a	12.8 b	32.3 ab	29.5 bc	38.8 ab	20.32 a
LSD (P = 0.05)	4.67	6.33	6.26	11.98	17.60	16.84	19.78	6.18
P > F	0.0274	0.0003	0.0128	0.0001	0.0001	0.0001	0.0002	0.0001

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

[a] Grain was commercially cleaned for this treatment.

[b] Experimental formulations

[c] Month “13" was November 2003.

Table 11. Characteristics of sorghum after 14 months in storage, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment (rate)	Grain samples (grams/quart) total	cleaned	particles	dust	Total grain % original wt.[b]
Actellic 5E (11.5 oz/1000 bu)	782.3 abc	726.3 bcd	29.3 a	25.2 a	98.0 abc
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	833.6 a	811.1 a	20.2 b	2.0 a	100.0 a
Secure 2SC (1.9 oz/1000 bu)	730.3 bcd	708.3 b-e	16.0 bc	5.0 a	97.3 bcd
Secure 2SC[a] (1.9 oz/1000 bu)	775.1 abc	764.9 abc	6.1 d	2.8 a	99.5 ab
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	801.0 ab	777.7 ab	18.2 bc	4.3 a	98.3 abc
Storcide (11.2 oz/1000 bu)	692.5 d	668.1 de	12.9 bcd	10.3 a	92.5 f
DEB[b] (1.7 grams/50 lb	712.1 cd	689.5 de	15.4 bc	6.8 a	94.1 ef
DES[b] (2.83 grams/50 lb)	718.6 cd	695.8 cde	15.6 bc	6.1 a	96.6 cd
Nontreated	665.7 d	638.3 e	11.3 cd	15.0 a	95.6 de
LSD (P = 0.05)	71.88	72.75	8.66	NS	2.23
P > F	0.0010	0.0010	0.0015	0.0606	0.0001

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

[a] The sorghum in this treatment was cleaned before treatments were applied

[b] Each drum contained 200 lb of number 1 sorghum at the initiation of the experiment.

Table 12. Grading factors[a] after 14 months in storage of sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment (rate)	Bushel weight	% BKFM[c]	% FM[d]	% Total da.	% replicates that were sample grade[e]	$ change in value/200 lb
Actellic 5E (11.5 oz/1000 bu)	58.9 ab	3.0 a	0.3 a	4.2 cd	0	-0.16 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	60.3 a	2.7 a	0.2 a	1.7 d	0	0.00 a
Secure 2SC (1.9 oz/1000 bu)	57.8 bc	2.5 a	0.2 a	5.5 bcd	0	-0.29 a
Secure 2SC[b] (1.9 oz/1000 bu)	59.3 ab	1.4 a	0.2 a	2.0 d	0	-0.04 a
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	59.3 ab	2.0 a	0.3 a	2.6 d	0	-0.14 a
Storcide (11.2 oz/1000 bu)	56.6 c	1.9 a	0.2 a	9.0 bc	25	-0.89 b
DEB[b] (1.7 grams/50 lb	52.0 d	2.1 a	0.2 a	9.5 b	50	-1.07 bc
DES[b] (2.83 grams/50 lb)	52.3 d	2.0 a	0.2 a	9.9 b	50	-0.90 b
Nontreated	51.3 d	2.7 a	0.3 a	15.2 a	75	-1.40 c
LSD (P = 0.05)	1.75	NS	NS	5.08		0.457
P > F	0.0001	0.1211	0.9970	0.0001		0.0001

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

[a] Graded by the Corpus Christi Grain Exchange

[b] The sorghum in this treatment was cleaned before treatments were applied

[c] BKFM = broken kernels, foreign materials, and other grains

[d] FM = foreign material

[e] Other samples were number 2 or better sorghum.

EVALUATION OF INSECTICIDES FOR CONTROL OF INSECTS IN STORED SORGHUM THROUGH TWENTY-FOUR MONTHS: PART II

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: This report is a continuation of the study reported earlier as Part I, and it contains results of the last 5 month of a 2-year evaluation of insecticides for control of insects in stored sorghum. Three treatments were dropped from the original experiment as that grain had been effectively destroyed by insects. Temperature levels averaged over the 5 months were significantly higher in the Actellic and nontreated sorghum, which directly reflected significantly more insects in those 2 treatments. Insects in the Actellic treatment were almost all lesser grain borer; moisture level was also elevated in this treatment. The Actellic + Diacon II treatment had the lowest number of insects/quart sample over the last 5 months of the 24-month study (6.1/quart), but this number was not significantly lower than Secure used alone or in combination with Reldan (60.5/quart average for the 3 treatments). However the distinct trend was obvious. Both Actellic treatments averaged significantly fewer rusty grain beetles and rice weevils compared with the other treatments. The other insecticide treatments contained fewer rusty grain beetles than the nontreated grain. Red flour beetle numbers were significantly greater in the nontreated and Actellic (alone) treatment compared with the remaining treatments. Two parasitoids (*Anisopteromalus calandrae* and *Choetospila elegans)* and one predator (warehouse pirate bug) were detected during the study. These insects feed on various stored grain insect species. Bushel weight was significantly higher, total damage was significantly lower, grain in all replicates had a higher grade, and the final grain weight changed the least in the Actellic + Diacon II treatment compared with all other treatments at the end of 24 months. In fact, there was no change in the starting and ending weight of grain treated with the Actellic + Diacon II. Of the remaining treatments, only the Actellic (alone) treatment lost as much of the original weight as the nontreated grain. In the case of the Actellic treatment weight loss was due to lesser grain borer. Bushel weight in the nontreated grain was significantly reduced relative to the other treatments. Significantly greater loss in dollar value for the initial 200 lb grain weight/drum occurred in nontreated drums which was not statistically different from the Actillic (alone) treatment. Actellic + Diacon II showed a positive $0.02 value/200 lb, but this value was not statistically greater than treatments where Spintor was used.

OBJECTIVE: The experiment was initiated to compare the effectiveness of selected grain protectants on stored sorghum against important insect species under conditions of the Texas Gulf Coast (Coastal Bend Region). Grain temperature, moisture, and insect numbers were measured on a monthly basis.

MATERIALS/METHODS: Sorghum that had been in storage for approximately 3 months was obtained from the Planters Grain Coop, Odem, Texas. Grain was commercially cleaned for one treatment. Sorghum measured in 50 lb increments was treated on Oct 2, 2002 in mixtures applying equivalent to 5 gallons of liquid/1000 bushels in a stainless steel cement mixer modified with added baffles for seed mixing. Four 50 lb samples of each treatment were placed in 30 gallon plastic drums (200 lb total sorghum/drum). Drums were covered with 0.5-inch hardware cloth to keep out birds, rodents and other unwanted animals. Following treatment and loading of drums, Phostoxin pellet (1 per 30 gal drum) was placed into the center of the grain mass, followed by sealing with 6 ml polyethylene sheeting and tape. Drums were sealed for 5 days and then aerated for 5 days. Sampling of 3 drums per replication revealed no live insects. The natural infestation was supplemented in late Oct 2002 by placing 10 adults in each drum of 4 species (rice weevil, red flour beetle, lesser grain borer and rusty grain beetle). These insects were obtained from Oklahoma State University. Each treatment was replicated 4 times and drums, arranged in a randomized complete design, were placed on a concrete floor inside a building. Insects from grain inside and outside the building had access to the experimental grain.

Treatments were assessed each month by (1) measuring the temperature with a 12-inch thermometer placed 11.5 inches deep into the middle of each drum, (2) probing grain in each drum at 6 locations/drum with a grain probe to obtain a one quart sample for insect inspection and moisture content, and (3) using a Seedburo Equipment Company sieve (8/64 - inch triangle holes) to separate insects from the grain. Insects were separated by species and then counted under a Circline magnifier lamp.

This report is for the last 5 months of the 24 month study less 3 treatments which were not continued beyond 19 months.

RESULTS/DISCUSSION: Generally, grain temperature was elevated in the nontreated and Actellic (alone) treatments during the last 5 months of storage of the 2 year study (Table 1). The increased temperatures reflected the higher insect numbers in these 2 treatments, and the significantly lower temperatures reflected the better protection provided by the other 4 treatments. Similar results were measured in moisture content as affected by the various treatments (Table 2).

Significantly fewer total pest insects were counted in the Actellic + Diacon II, both Secure treatments, and Secure + Reldan treatments compared to those in Actellic (alone) and nontreated sorghum (Table 3). The Actellic + Diacon II treated grain numerically contained far fewer insects pests through the end of the 24 month storage period. No rusty grain beetles were found in this treatment, and very low numbers of this species were detected in the Actellic (alone) treatment (Table 4). The 3 treatments with Secure also contained fewer rusty grain beetles as measured by the average count for months 20 through 24. Red flour beetle numbers were significantly reduced by all insecticide treatments, but for the 5 month average, there was no difference between nontreated and Actellic (alone) treated sorghum (Table 5). Rice weevil numbers were significantly lower in both Actellic treatments compared with the other treatments, and

Secure used alone (both treatments) contained fewer rice weevils than nontreated sorghum for the 5 month average (Table 6). Actellic appeared to be more effective on the rice weevil. It was obvious that Actellic (alone) was not effective on lesser grain borer (Table 7). In fact, the average number of lesser grain borers for the 5 month period was 2.8 fold greater in this Actellic treatment compared with the number in nontreated grain. With the combination of Actellic + Diacon II, excellent control of lesser grain borer was obtained; lesser grain borer numbers did not exceed 1 per quart sample until month 21 of the storage period in this treatment. The Secure treatments were also very effective on lesser grain borer. The most effective treatments on saw toothed grain beetle were both Actellic treatments and Secure + Reldan (Table 8).

Two parasitoids, *Anisopteormalus clandrae* (Howard) and *Choetospila elegans* Westwood, were found in the experiment (Tables 9 and 10). *Choetospila elegans* was the most abundant of the 2 species. A statistical difference was found among treatments only for the 5 month average. These parasitoids were not effective in reducing pest insect numbers; they may have prevented even greater numbers of certain pest species.

The warehouse pirate bug was found in all except the Actellic treatments (Table 11). This beneficial insect was not detected until month 20 of the storage period. Numerically, more warehouse pirate bugs were found in nontreated and Secure (alone) treatments.

The bushel weight was down to 51.3 in the nontreated sorghum but remained at 60.4 in the Actellic + Diacon II treatment by the end of the experiment (Table 12). A significantly higher percentage of BKFM occurred in the Actellic (alone) treatment compared with all other treatments. Significant differences were not measured in FM. Total damage was greatest in the nontreated and Actellic (alone) treatments. Dockage was significantly higher in the Actellic (alone) treatment. By the end of the 24 month storage period, only the Actellic + Diacon II treated grain graded number 1 sorghum; all the other treatments were 75 or 100% sample grade. The amount of dust, created mostly by lesser grain borer, was significantly greater in the Actellic (alone) treatment (Table 13). There was no difference in the starting and ending weight of grain treated with Actellic + Diacon II; all other treatments weighed significantly less than the grain treated with this mixture.

Significantly greater loss in dollar value for the initial 200 lb grain weight/drum occurred in nontreated drums which was not statistically different from the Actillic (alone) treatment. Actellic + Diacon II showed a positive $0.02 value/200 lb, but this value was not statistically greater than treatments where Spintor was used.

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Table 1. Temperature levels in sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, June 2004 - October 2004.

Treatment	Temperature (°F) at months post-treatment[a]					
(rate)	20	21	22	23	24	Avg
Actellic 5E (11.5 oz/1000 bu)	96.8 ab	96.3 a	97.5 a	98.5 a	95.5 a	96.9 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	90.8 c	91.3 a	90.8 b	90.5 c	85.3 c	89.7 b
Secure 2SC (1.9 oz/1000 bu)	93.8 abc	91.8 a	92.5 b	92.8 bc	86.5 bc	91.4 b
Secure 2SC[b] (1.9 oz/1000 bu)	93.8 abc	92.3 a	93.5 b	94.0 b	89.0 b	92.5 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	93.5 bc	91.5 a	92.5 b	92.0 bc	86.3 bc	91.2 b
Nontreated	98.3 a	97.5 a	99.5 a	98.8 a	93.0 a	97.4 a
LSD (P = 0.05)	4.64	NS	3.45	3.22	3.62	3.32
P > F	0.0461	0.0523	0.0005	0.0002	0.0001	0.0006

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

[a] Month “20" was June 2004.

[b] The sorghum in this treatment was cleaned before treatments were applied.

Table 2. Moisture levels in sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, June 2004 - October 2004.

Treatment (rate)	Moisture % at months post-treatment[a]					
	20	21	22	23	24	Avg
Actellic 5E (11.5 oz/1000 bu)	14.1 a	14.1 a	14.5 a	15.0 a	14.9 a	14.6 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	13.3 a	13.0 b	12.9 a	13.1 a	12.9 b	13.0 b
Secure 2SC (1.9 oz/1000 bu)	13.7 a	13.1 b	13.6 a	14.1 a	12.9 b	13.5 b
Secure 2SC[b] (1.9 oz/1000 bu)	13.8 a	13.0 b	14.1 a	13.8 a	13.6 b	13.7 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	13.6 a	13.4 b	13.6 a	13.7 a	13.2 b	13.5 b
Nontreated	13.5 a	13.4 b	14.2 a	13.9 a	13.8 b	13.8 b
LSD (P = 0.05)	NS	0.70	NS	NS	1.12	0.79
P > F	0.2161	0.0254	0.2585	0.0813	0.0136	0.0231

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

[a] Month “20" was June 2004.

[b] The sorghum in this treatment was cleaned before treatments were applied.

Table 3. Total insect in sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, June 2004 - October 2004.

Treatment (rate)	Total insects/quart sample at months post-treatment[a]					
	20	21	22	23	24	Avg
Actellic 5E (11.5 oz/1000 bu)	82.5 b	113.3 ab	91.8 b	171.3 a	197.5 a	131.3 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	3.3 c	9.3 c	3.3 c	3.0 b	11.5 b	6.1 b
Secure 2SC (1.9 oz/1000 bu)	67.5 b	64.5 bc	46.8 bc	38.5 b	61.8 b	55.8 b
Secure 2SC[b] (1.9 oz/1000 bu)	64.5 b	63.8 bc	54.3 bc	64.5 b	61.3 b	61.7 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	83.5 b	72.3 abc	68.8 bc	47.0 b	48.8 b	64.0 b
Nontreated	132.5 a	147.8 a	204.3 a	153.5 a	132.5 a	154.1 a
LSD (P = 0.05)	42.52	77.27	68.55	64.75	66.49	59.22
P > F	0.0005	0.0291	0.0004	0.0003	0.0003	0.0010

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

[a] Month “20" was June 2004.

[b] The sorghum in this treatment was cleaned before treatments were applied.

Table 4. Rusty grain beetles in sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, June 2004 - October 2004.

Treatment (rate)	Rusty grain beetles/quart sample at months post-treatment[a]					
	20	21	22	23	24	Avg
Actellic 5E (11.5 oz/1000 bu)	1.5 a	3.5 c	5.0 c	1.5 c	8.3 bc	4.0 c
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 a	0.0 c	0.0 c	0.0 c	0.0 c	0.0 c
Secure 2SC (1.9 oz/1000 bu)	7.3 a	17.8 b	14.5 c	17.5 b	14.8 b	14.4 b
Secure 2SC[b] (1.9 oz/1000 bu)	6.8 a	15.0 b	20.0 bc	28.8 ab	13.5 bc	16.8 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.8 a	21.0 ab	39.0 b	24.3 ab	16.0 b	20.2 b
Nontreated	8.8 a	29.3 a	83.8 a	34.0 a	33.5 a	37.9 a
LSD (P = 0.05)	NS	10.29	24.14	13.74	14.47	9.60
P > F	0.1421	0.0002	0.0001	0.0003	0.0052	0.0001

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

[a] Month "20" was June 2004.

[b] The sorghum in this treatment was cleaned before treatments were applied.

Table 5. Red flour beetles in sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, June 2004 - October 2004.

Treatment (rate)	Red flour beetles/quart sample at months post-treatment[a]					
	20	21	22	23	24	Avg
Actellic 5E (11.5 oz/1000 bu)	1.3 b	4.0 b	17.3 b	63.0 a	76.3 a	32.35 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.8 b	2.8 b	1.5 b	1.8 a	3.0 b	1.95 b
Secure 2SC (1.9 oz/1000 bu)	1.8 b	3.5 b	6.8 b	7.3 a	10.3 b	5.90 b
Secure 2SC[b] (1.9 oz/1000 bu)	3.5 b	8.3 b	11.5 b	13.3 a	6.3 b	8.55 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.3 b	1.8 b	6.3 b	8.3 a	4.0 b	4.10 b
Nontreated	29.8 a	47.0 a	53.8 a	53.5 a	42.5 ab	45.30 a
LSD (P = 0.05)	16.32	23.97	18.38	NS	44.27	22.67
P > F	0.0098	0.0072	0.0002	0.1226	0.0152	0.0038

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

[a] Month “20" was June 2004.

[b] The sorghum in this treatment was cleaned before treatments were applied.

Table 6. Rice weevils in sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, June 2004 - October 2004.

Treatment (rate)	Rice weevils/quart sample at months post-treatment[a]					
	20	21	22	23	24	Avg
Actellic 5E (11.5 oz/1000 bu)	2.5 d	9.0 cd	4.0 bc	1.3 c	7.8 a	4.9 c
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	2.3 d	3.5 d	1.5 c	1.0 c	7.5 a	3.1 c
Secure 2SC (1.9 oz/1000 bu)	53.8 bc	37.3 ab	19.0 a	6.5 bc	28.8 a	29.0 b
Secure 2SC[b] (1.9 oz/1000 bu)	45.5 c	23.8 bc	17.3 ab	10.8 ab	31.8 a	25.8 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	81.3 a	47.3 a	18.8 a	12.0 ab	28.8 a	37.6 a
Nontreated	62.3 b	41.0 ab	24.3 a	16.5 a	16.5 a	32.1 ab
LSD (P = 0.05)	16.36	18.29	13.83	6.02	NS	8.50
P > F	0.0001	0.0005	0.0169	0.0003	0.0578	0.0001

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

[a] Month "20" was June 2004.

[b] The sorghum in this treatment was cleaned before treatments were applied.

Table 7. Lesser grain borers in sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, June 2004 - October 2004.

Treatment (rate)	Lesser grain borers/quart sample at months post-treatment[a]					
	20	21	22	23	24	Avg
Actellic 5E (11.5 oz/1000 bu)	76.3 a	96.0 a	65.5 a	104.0 a	105.3 a	89.4 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.3 b	3.0 b	0.3 b	0.3 c	1.0 c	1.0 b
Secure 2SC (1.9 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 c	1.3 c	0.3 b
Secure 2SC[b] (1.9 oz/1000 bu)	0.0 b	0.0 b	0.0 b	0.0 c	0.0 c	0.0 b
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.8 b	0.0 b	0.3 b	0.0 c	0.0 c	0.2 b
Nontreated	22.8 b	22.3 b	34.0 ab	42.8 b	37.0 b	31.8 b
LSD (P = 0.05)	41.30	58.60	38.67	32.94	21.43	34.84
P > F	0.0070	0.0192	0.0091	0.0001	0.0001	0.0003

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

[a] Month "20" was June 2004.

[b] The sorghum in this treatment was cleaned before treatments were applied.

Table 8. Saw toothed grain beetles in sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, June 2004 - October 2004.

Treatment (rate)	Saw toothed grain beetles/quart sample at months post-treatment[a]					
	20	21	22	23	24	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 b	0.0 a	0.0 a	1.5 b	0.0 a	0.3 c
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 b	0.0 b	0.0 a	0.0 b	0.0 a	0.0 c
Secure 2SC (1.9 oz/1000 bu)	4.5 ab	5.3 b	6.5 a	7.3 ab	6.8 a	6.1 ab
Secure 2SC[b] (1.9 oz/1000 bu)	8.8 a	16.3 b	5.5 a	11.8 a	9.8 a	10.4 a
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 b	1.8 b	4.5 a	2.5 b	0.0 a	1.8 bc
Nontreated	5.8 ab	7.3 b	8.5 a	6.8 ab	3.0 a	6.3 ab
LSD (P = 0.05)	6.42	8.58	NS	7.68	NS	4.74
P > F	0.0417	0.0085	0.2595	0.0452	0.0671	0.0016

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

[a] Month "20" was June 2004.

[b] The sorghum in this treatment was cleaned before treatments were applied.

Table 9. *Anisopteromalus clandrae* (Howard) parasitoids in sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, June 2004 - October 2004.

Treatment (rate)	Number/quart at months post-treatment[a]					
	20	21	22	23	24	Avg
Actellic 5E (11.5 oz/1000 bu)	0.3 a	2.3 a	0.0 a	0.0 a	0.0 a	0.5 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 a	1.5 a	0.0 a	0.0 a	0.3 a	0.4 a
Secure 2SC (1.9 oz/1000 bu)	0.8 a	1.8 a	0.0 a	0.0 a	0.0 a	0.5 a
Secure 2SC[b] (1.9 oz/1000 bu)	0.5 a	2.5 a	0.5 a	0.0 a	0.8 a	0.9 a
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 a	3.3 a	3.3 a	0.5 a	1.0 a	1.6 a
Nontreated	0.8 a	2.0 a	2.5 a	0.0 a	0.0 a	1.1 a
LSD (P = 0.05)	NS	NS	NS	NS	NS	NS
P > F	0.7412	0.9884	0.0980	0.4509	0.2189	0.3664

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

[a] Month “20" was June 2004.

[b] The sorghum in this treatment was cleaned before treatments were applied.

Table 10. *Choetospila elegans* Westwood, parasitoids in sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, June 2004 - October 2004.

Treatment (rate)	Number/quart at months post-treatment[a]					
	20	21	22	23	24	Avg
Actellic 5E (11.5 oz/1000 bu)	3.5 a	0.0 a	0.0 a	0.3 a	0.0 a	0.8 bc
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 c
Secure 2SC (1.9 oz/1000 bu)	2.3 a	4.0 a	2.5 a	2.0 a	2.8 a	2.7 ab
Secure 2SC[b] (1.9 oz/1000 bu)	0.0 a	4.8 a	3.0 a	4.0 a	1.5 a	2.7 ab
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 a	2.0 a	0.0 a	0.8 a	1.3 a	0.8 bc
Nontreated	7.0 a	3.8 a	1.8 a	1.3 a	3.8 a	3.5 a
LSD (P = 0.05)	NS	NS	NS	NS	NS	2.38
P > F	0.4955	0.5457	0.1789	0.2552	0.3754	0.0397

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

[a] Month “20" was June 2004.

[b] The sorghum in this treatment was cleaned before treatments were applied.

Table 11. Warehouse pirate bugs in sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, June 2004 - October 2004.

Treatment (rate)	Warehouse pirate bugs/quart sample at months post-treatment[a]					
	20	21	22	23	24	Avg
Actellic 5E (11.5 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 b	0.0 a	0.0 a
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.0 b	0.0 a	0.0 a
Secure 2SC (1.9 oz/1000 bu)	1.0 a	3.8 a	7.8 a	6.5 a	1.0 a	4.0 a
Secure 2SC[b] (1.9 oz/1000 bu)	0.0 a	1.5 a	0.0 a	1.0 b	2.0 a	0.9 a
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	0.0 a	0.0 a	0.0 a	0.8 b	2.0 a	0.6 a
Nontreated	0.0 a	5.0 a	9.0 a	0.5 b	0.0 a	2.9 a
LSD (P = 0.05)	NS	NS	NS	3.38	NS	NS
P > F	0.4509	0.5647	0.4509	0.0070	0.5390	0.3949

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

[a] Month “20" was June 2004.

[b] The sorghum in this treatment was cleaned before treatments were applied.

Table 12. Grading factors[a] after 24 months in storage of sorghum treated with various insecticides for stored grain insects, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment (rate)	Bushel weight	% BKFM[c]	% FM[d]	% Total da.	% Dockage	% replicates that were sample grade
Actellic 5E (11.5 oz/1000 bu)	57.4 b	8.0 a	0.3 a	41.7 ab	11.3 a	75
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	60.4 a	3.3 b	0.2 a	0.8 c	0.8 b	0 [e]
Secure 2SC (1.9 oz/1000 bu)	55.9 b	3.2 b	0.3 a	8.8 bc	1.7 b	100
Secure 2SC[b] (1.9 oz/1000 bu)	56.9 b	2.0 b	0.3 a	5.5 c	0.8 b	100
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	57.5 b	3.1 b	0.3 a	5.9 c	1.3 b	100
Nontreated	51.3 c	2.9 b	0.2 a	52.7 a	5.1 b	100
LSD (P = 0.05)	2.33	3.79	NS	34.68	6.06	
P > F	0.0001	0.0497	0.4155	0.0225	0.0128	

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

[a] Graded by the Corpus Christi Grain Exchange

[b] The sorghum in this treatment was cleaned before treatments were applied

[c] BKFM = broken kernels, foreign materials, and other grains

[d] FM = foreign material

[e] All replications were No. 1 sorghum

Table 13. Characteristics of sorghum after 24 months in storage, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment (rate)	Grain samples (grams/quart) total	cleaned	particles	dust	Total grain % original wt.	$ change in value/200 lb
Actellic 5E (11.5 oz/1000 bu)	724.0 b	628.4 b	24.5 a	69.2 a	90.5 bc	-3.10 bc
Actellic 5E + Diacon II (11.5 + 6.6 oz/1000 bu)	794.5 a	774.3 a	17.7 b	2.1 b	100.3 a	0.02 a
Secure 2SC (1.9 oz/1000 bu)	736.7 b	718.4 a	13.0 bc	5.9 b	94.7 b	-1.54 ab
Secure 2SC[a] (1.9 oz/1000 bu)	743.6 b	734.0 a	4.9 d	4.2 b	94.9 b	-1.43 ab
Secure 2SC + Reldan 4E (1.9 + 5.4 oz/1000 bu)	748.5 b	726.9 a	14.0 bc	6.7 b	94.3 b	-1.45 ab
Nontreated	667.6 c	631.0 b	10.0 c	25.2 b	89.2 c	-3.81 c
LSD (P = 0.05)	45.16	84.51	4.87	36.87	4.59	1.841
P > F	0.0010	0.0107	0.0001	0.0103	0.0019	0.0072

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

[a] The sorghum in this treatment was cleaned before treatments were applied

EFFECT OF SYSTEMIC INSECTICIDE SEED TREATMENTS ON COTTON

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: Thrips immatures and total thrips, but not adult thrips, were significantly reduced by all tested seed treatments 20 days after planting (DAP) on 2 true leaf cotton. A total of 6 thrips/10 plants were detected in the nontreated plots which is well below the economic injury level of 20 for this number of plants. Wide variation occurred in aphid numbers making it impossible to statistically separate treatments. As expected, statistical differences in yield were not found, and numerically the nontreated cotton had the highest yield. Pest insect numbers were simply not high enough to make a difference.

OBJECTIVE: To evaluate the efficacy of systemic insecticide seed treatments on cotton and to determine effects on plant growth.

MATERIALS/METHODS: Stoneville 5599RR cotton was planted with a 4-row blackland type planter equipped with research cone seed distributors on the Texas Agricultural Experiment Station Meaney Annex on March 2, 2004. Plots were 4 rows on 38-inch centers by 40 ft, and treatments were replicated 4 times in a randomized complete block design. Sorghum had been planted in the field the previous season. The sandy clay loam soil (50% sand, 17% silt, and 33% clay) contained 1.3% organic matter at a 7.9 pH. Fertilizer applied was 102-0-0. Dual and Caparol were applied for weed control at-planting.

Treatments were assessed by (1) cutting 10 plants from the center 2 rows of plots on April 22 [22 DAP] which were at the 2 true leaf stage and storing them in jars with 70% ETOH for later examination for thrips and aphids, (2) counting the number of plants on 13.75 ft row on each of the center rows on April 29, and (3) harvesting 1 of the center rows in plots with a spindle picker on August 17, weighing the seed cotton, and selecting a sample to gin for lint percentage on a 10-saw Eagle laboratory machine.

RESULTS/DISCUSSION: All insecticide seed treatments significantly reduced thrips immatures and total (immatures + adults) numbers (Table 1). Their numbers were well below economic injury level in the nontreated cotton. The economic injury level is judged to be 20 thrips/10 plants at the 2 leaf stage of growth, and in this case, 6 thrips/10 plants were counted. Aphid numbers were very erratic although much higher numbers were found in nontreated and one of the Orthene treatments; statistical difference was not apparent. No phytotoxic effects or differences in plant stands were observed. No statistical differences in lint yield were detected; numerically, the nontreated plots produced the higher yield. Additional testing under greater insect pressure must be conducted to properly evaluate the efficacy of these treatments.

ACKNOWLEDGMENTS: Valent Corporation is acknowledged for their support of this project. Thanks are extended to Rudy Alaniz and Mike Hiller, Demonstration Assistants; and to Clint Livingston, Technician, for their assistance.

Table 1. Effect of systemic insecticide seed treatments on cotton, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment (rate)	Plants 1000's/ acre	Number per 10 pants, 20 DAP[a]				Yield, lb lint/acre
		thrips				
		immatures	adults	total	aphids	
Orthene 97SI (30 oz/cwt seed)	36.3 a	0.0 b	1.0 a	1.0 b	91.0 a	1179 a
Orthene 97SI (22 oz/cwt seed)	46.8 a	0.0 b	0.0 a	0.0 b	7.0 a	1182 a
Cruiser 600FS (0.30 mg AI/seed)	38.5 a	0.0 b	1.0 a	1.0 b	4.0 a	1137 a
Cruiser 600FS (0.34 mg AI/seed)	40.5 a	0.0 b	1.0 a	1.0 b	5.0 a	1256 a
Gaucho 600FS (250 grams/100 kg seed)	40.3 a	0.0 b	1.0 a	1.0 b	6.0 a	1136 a
Nontreated	39.3 a	4.0 a	2.0 a	6.0 a	106.0 a	1352 a
LSD (P = 0.05)	NS	0.00	NS	3.25 2	NS	NS
P > F	.7026	-	.7675	.037 7	.5877	.5238

Means in a column followed by the same letter are not significantly different by ANOVA.
[a] DAP = days after planting.

EARLY SEASON INSECT EFFICACY WITH GRANULAR SYSTEMIC INSECTICIDES ON COTTON

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: The study was designed to compare granular Temik and KC791230 against early season insect pests of cotton. Thrips and aphids were at the lowest levels ever observed at this location, and as a result no advantage was gained from use of the systemic insecticides.

OBJECTIVE: The objective was to compare the effectiveness of Temik (2 rates) with KC791230 (2 rates) on thrips, aphids, and other early season arthropod pests.

MATERIALS/METHODS: DPL 444BGRR variety cotton was planted on the Texas Agricultural Experiment Station, Meaney Annex on April 1, 2004 with a 4-row blackland type planter equipped with research cone distributors. Plots were 4 rows on 38-inch centers by 40 ft, and treatments were replicated 4 times in a randomized complete block design. The granular insecticides were applied through Gandy electric motor driven boxes. Sorghum had been planted on the site the previous season. The sandy clay soil (50% sand, 17% silt, and 33% clay) contained 1.3% organic matter at 7.9 pH. Fertilizer applied was 102-0-0. Dual and Caparol were applied for weed control at-planting.

Treatment effects were assessed by (1) cutting 10 plants from the center 2 rows of plots on April 18 [17 days after planting = DAP] which were at the 2 true leaf stage and storing them in jars containing 70% ETOH for later examination for thrips and aphids, (2) counting the number of plants on 13.75 ft row on each of the center rows in plots on April 29, and (3) harvesting 1 of the center rows in plots with a spindle picker on August 17, weighing the seed cotton, selecting a sample to gin for lint percentage, and processing the sample on a 10-saw Eagle laboratory gin. More extensive data were not taken due to lack of arthropod pests.

RESULTS/DISCUSSION: No differences were found in any data obtained from plots (Table 1). Thrips and aphid numbers were far below the economic injury level. They did not exceed 0.2/plant on 2 true leaf cotton which represents the lowest numbers ever observed at this test location. Additionally, warm growing conditions resulted in rapid sustained plant growth. Excellent lint yields were obtained, and no statistical differences were observed. Additional studies under higher insect numbers must be made to obtain useful data.

ACKNOWLEDGMENTS: Bayer Crop Science is thanked for their support. Appreciation is expressed to Rudy Alaniz and Mike Hiller, Demonstration Assistants; and to Clint Livingston, Technician, for their assistance.

Table 1. Evaluation of at-plant granular systemic insecticide formulations and rates on cotton, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment (rate)	Plants 1000's/acre	Number per 10 pants, 17 DAP[a] thrips	aphids	Yield lb lint/acre
Temik 15G (5.8 oz/1000 ft)	42.1 a	1.5 a	3.0 a	1351 a
Temik 15G (4.0 oz/1000 ft)	43.0 a	1.5 a	2.8 a	1253 a
KC791230 15G (5.8 oz/1000 ft)	45.3 a	1.0 a	5.0 a	1336 a
KC791230 15G (4.0 oz/1000 ft)	41.9 a	1.0 a	6.0 a	1223 a
Nontreated	37.6 a	0.5 a	2.5 a	1430 a
LSD (P = 0.05)	NS	NS	NS	NS
P > F	.5580	.8266	.7938	.4259

Means in a column followed by the same letter are not significantly different by ANOVA.
[a] DAP = days after planting; cotton was in the 2 true leaf stage.

DETERMINATION OF THE IMPACT OF SYSTEMIC INSECTICIDES ON COTTON FLEAHOPPER

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: Some evidence has suggested that use of certain systemic insecticides applied as seed treatments or granular in-furrow at-planting formulations have an effect on fleahopper numbers. Fleahopper infestations may have developed too late in the growth of cotton in this experiment to adequately identify such impact. Thrips numbers were so low that an Orthene treatment scheduled for that purpose was omitted until fleahoppers appeared. The reason for statistically fewer thrips in this Orthene treatment cannot be explained since that treatment was not actually made until after thrips samples were taken. Although statistical differences in fleahopper numbers were not observed on any inspection date, nor were their numbers very high in any treatment, there seemed to be a trend for fewer in plots treated with Cruiser, along with the foliar Orthene treatment. The statistical differences in lint yield cannot be explained. Conditions in the experiment made it impossible to draw any conclusions with regard to effects of the at-planting systemic insecticides on cotton fleahopper.

OBJECTIVE: To measure the effect, if any, of systemic seed or granular at-planting insecticides on fleahopper numbers.

MATERIALS/METHODS: Stoneville 5599BR cotton was planted with a 4-row blackland type planter equipped with research cone seed distributors on the Texas Agricultural Experiment Station, Meaney Annex on March 24, 2004. Plots were 4 rows on 38-inch centers by 40 ft, and treatments were replicated 4 times in a randomized complete block design. Granular Temik was applied through Gandy electric motor driven boxes. Sorghum had been planted on the site the previous season, and the sandy clay loam soil (50% sand, 17% silt, and 33% clay) contained 1.3% organic matter at 7.9 pH. Fertilizer applied was 102-0-0. Dual and Caparol were applied for weed control at-planting.

Treatments evaluated included seed treatments with Cruiser (2 rates) and Gaucho, Temik 15G placed into the seed furrow at-planting, and Orthene 90S (4.0 oz/acre). The Orthene was applied with a Spider Trac motor driven sprayer traveling at 5 mph with a total spray volume of 5.5 gpa at a pressure of 40 psi through 4X hollow cone nozzles (2/row). The Orthene was not applied until June 3.

Treatments were assessed by (1) counting the number of plants on 13.75 ft row on each of the center 2 rows on April 3, (2) assigning a damage rating [1= no damage up to 5= severe stunting and leaf curling] on April 3 and May 20, (3) cutting 10 plants at the 2 true leaf stage from the center 2 rows in plots on April 18 and placing them into jars containing 70% ETOH for later examination for thrips and aphids, (4) counting fleahopper nymphs and adults separately on 20 plant terminals/plot on April 29, May 13, 20, 29, and June 3, and (5) harvesting 1 of the center rows in plots with a spindle picker on August 6, weighing the seed cotton, selecting a sample to gin for lint percentage, and processing the sample on a 10-saw Eagle laboratory machine.

RESULTS/DISCUSSION: The reason for statistically fewer thrips in the Orthene treatment (it was not applied until June 3) cannot be explained (Table 1). Although there was a measured difference in thrips numbers, they were far below the economic injury level even in the nontreated cotton. During late April and most of May, no fleahoppers were found in the test. Inspections for fleahoppers on May 29 and June 3 did not reveal differences in fleahoppers in the treatments (Table 2). Numerically, there seemed to be a trend for fewer in the Cruiser and Orthene treated cotton. No differences were observed in plant population or plant vigor on 2 dates, but differences were detected in lint production (Table 3). The yield differences cannot be explained. Conclusions about insect control could not be drawn from the experiment.

ACKNOWLEDGMENTS: Syngenta Crop Protection is thanked for their support. Appreciation is expressed to Rudy Alaniz and Mike Hiller, Demonstration Assistants; Clint Livingston, Technician; and Bradley Moore, Student Worker, for their assistance.

Table 1. Thrips, aphid and fleahopper numbers in cotton treated with seed, granular or foliar systemic insecticides, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment (rate)	Number/10 plants, 2 leaf stage				Fleahoppers/100 plant terminals		
	thrips						
	immatures	adults	total	aphids	4/29	5/13	5/20
Cruiser 5FS (0.30 mg AI/seed)	0.0 b	1.0 a	1.0 b	0.0 b	0 a	0 a	0 a
Cruiser 5FS (0.34 mg AI/seed)	0.0 b	1.5 a	1.5 b	0.3 b	0 a	0 a	0 a
Gaucho 600 FS (4 oz/cwt seed)	0.0 b	1.0 a	1.0 b	3.5 b	0 a	0 a	0 a
Temik 15G (4.0 oz/1000 ft)	0.0 b	2.0 a	2.0 b	1.8 b	0 a	0 a	0 a
Orthene 90S[a] (4.0 oz/acre)	2.5 a	5.0 a	7.5 a	11.8 a	0 a	0 a	0 a
Nontreated	1.0 b	2.3 a	3.3 b	3.3 b	0 a	0 a	0 a
LSD (P=0.05)	1.178	NS	3.087	4.534	NS	NS	NS
P > F	.0017	.0530	.0032	.0006	1.000	1.000	1.000

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

[a] Orthene 90S was not applied until fleahopper numbers increased (6/3).

Table 2. Fleahopper numbers in cotton treated with seed, granular or foliar systemic insecticides, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment (rate)	Fleahoppers/100 plant terminals					
	May 29			June 6 (3 DAT)[b]		
	nymphs	adults	total	nymphs	adults	total
Cruiser 5FS (0.30 mg AI/seed)	10.0 a	0.0 a	10.0 a	1.3 a	1.3 a	2.5 a
Cruiser 5FS (0.34 mg AI/seed)	6.3 a	1.3 a	7.5 a	2.5 a	0.0 a	2.5 a
Gaucho 600 FS (4 oz/cwt seed)	11.3 a	3.8 a	15.0 a	6.3 a	0.0 a	6.3 a
Temik 15G (4.0 oz/1000 ft)	8.8 a	2.5 a	11.3 a	3.8 a	0.0 a	3.8 a
Orthene 90S[a] (4.0 oz/acre)	8.8 a	2.5 a	11.3 a	0.0 a	0.0 a	0.0 a
Nontreated	12.5 a	2.5 a	15.0 a	5.0 a	1.3 a	6.3 a
LSD (P=0.05)	NS	NS	NS	NS	NS	NS
P > F	.8889	.7858	.8426	.3006	.4509	.3988

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

[a] Orthene 90S was not applied until fleahopper numbers increased (6/3).

[b] DAT - days after Orthene treatment

Table 3. Plant population, vigor rating and lint production in cotton treated with seed, granular or foliar systemic insecticides, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Treatment (rate)	Plants 1000's/acre	Plant vigor rating[b] 4/3	Plant vigor rating[b] 5/20	Yield lb lint/acre
Cruiser 5FS (0.30 mg AI/seed)	62.6 a	1.75 a	2.25 a	906 c
Cruiser 5FS (0.34 mg AI/seed)	61.1 a	1.75 a	1.25 a	1214 a
Gaucho 600 FS (4 oz/cwt seed)	66.4 a	1.00 a	1.75 a	1093 ab
Temik 15G (4.0 oz/1000 ft)	66.4 a	1.25 a	1.50 a	1124 ab
Orthene 90S[a] (4.0 oz/acre)	54.5 a	2.50 a	1.75 a	941 bc
Nontreated	59.6 a	2.00 a	2.50 a	962 bc
LSD (P=0.05)	NS	NS	NS	185.2
P > F	.1898	.0560	.1130	.0179

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

[a] Orthene 90S was not applied until fleahopper numbers increased (6/3).

[b] Vigor ratings range from: 1 = no damage up to 5 = severe stunting and leaf curling.

COTTON FLEAHOPPER CONTROL IN A LOW INFESTATION ENVIRONMENT

Gary Underbrink Farm, Kleberg County, 2004

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SUMMARY: Two insecticide treatments were made to cotton 7 days apart to measure the impact on fleahopper numbers and to determine impact on yield. Fleahopper numbers exceeded 15/100 plant terminals during the evaluation period only 1 time (nontreated cotton, 3 days after treatment 2 = 3 DAT-2). Post-treatment averages for insecticide treated cotton ranged from 2.2 up to 5.0/100 plant terminals, and the nontreated cotton averaged 11.3/100 terminals during the same period. Except for the low rate, Diamond appeared to be just as effective as other insecticides under the low infestation pressure encountered in the study. There was no impact on yield by cotton fleahopper under the infestation levels present in this study, additional evidence that the published threshold level for treatment is not set too high.

OBJECTIVE: The test objective was to evaluate the impact of Diamond insecticide (a chitin inhibitor in a chemical class known as benzolphenyl ureas) on cotton fleahopper and to measure the impact on cotton yield.

MATERIALS/METHODS: The field study was conducted on the Gary Underbrink Farm, “Rosse Field” at the intersection of County Roads 1080 and 2140. The DPL 491 variety cotton was planted on 36-inch rows and was at the 1/3 grown square stage when the first insecticide treatment was applied for fleahopper control. Plots were 6 rows by 40 ft, but only the center 4 rows were treated. The experiment included 4 replications, and treatments were arranged in a randomized complete block design. Ten ft skips where no insecticide was applied were left at the end of each plot, and 3 additional buffer rows were included between the test and the rest of the field.

Insecticide treatments were made with a Spider Trac self propelled sprayer to the 4-row plots through 4X hollow cone nozzles (2/row) at 40 psi in a total volume of 5.5 gpa at 5.0 mph. All insecticide treatments included crop oil concentrate at 1% vv. Insecticide treatments were made on May 21 (late 1/3 grown square stage) and again 7 days later (first bloom).

Treatments were assessed by (1) counting the number of fleahopper nymphs and adults on 20 plant terminals/plot on May 21 (pretreatment count), May 24 (3 DAT-1), May 27 (6 DAT-1), May 31 (3 DAT-2), and June 3 (6 DAT-2), (2) harvesting 14.5 ft row in each plot by hand on August 2 and again on August 6, and (3) processing seed cotton samples on a 10-saw Eagle laboratory gin.

RESULTS/DISCUSSION: At the late 1/3 grown square stage, fleahopper numbers appeared to be increasing; therefore, the first treatments were applied. Counts made 3 DAT-1 did not indicate increasing fleahopper numbers (Tables 1-3). Fleahopper nymphs were reduced significantly by all insecticide treatments 6 DAT-1, 3 DAT-2, and 6 DAT-2 (Table 1), but a statistical difference was not detected on any inspection for adults (Table 2). Except for Diamond at the 6 oz/acre rate, insecticides significantly reduced total fleahopper numbers (nymphs + adults) 3 DAT-2, and by 6 DAT-2. Insecticide treated cotton had statistically fewer total numbers than the nontreated cotton (Table 3). Even with these reductions, however, fleahopper numbers were not considered high enough to have an impact on lint production. No differences were found in lint production under conditions of the study, nor did there seem to be a trend for a yield increase.

ACKNOWLEDGMENTS: Thanks are extended to Gary Underbrink for providing the testing site and his patience in working around the study site. Cromptom Corporation, manufactures of Diamond, are acknowledged for providing funding.

Table 1. Number of fleahopper **nymphs** in cotton treated with insecticide, Gary Underbrink Farm, Kleberg County, TX, 2004.

		Fleahopper nymphs/100 plant terminals					
Treatment[a]	Rate oz/acre	Pretreat.	3 DAT-1[b]	6 DAT-1	3 DAT-2	6 DAT-2	Post trt. avg.
Diamond 0.83E	6.0	2.5 a	2.5 a	0.0 b	3.8 b	1.3 b	1.9 b
Diamond 0.83E	9.0	2.5 a	0.0 a	0.0 b	3.8 b	1.3 b	1.3 b
Diamond 0.83E + Bidrin 8E	6.0 3.2	1.3 a	0.0 a	1.3 b	1.3 b	0.0 b	0.6 b
Intruder 70WP	0.6	3.8 a	1.3 a	0.0 b	0.0 b	0.0 b	0.3 b
Nontreated		3.8 a	2.5 a	8.8 a	11.3 a	7.5 a	7.5 a
LSD (P = 0.05)		NS	NS	3.92	5.71	4.04	3.35
P > F		.8266	.3784	.0013	.0092	.0081	.0029

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

[a] Treatments were made on May 21 (1/3 grown square stage) and May 28 (first bloom). Crop oil concentrate was applied with insecticide at 1% VV.

[b] DAT = days after treatment

Table 2. Number of fleahopper **adults** in cotton treated with insecticide, Gary Underbrink Farm, Kleberg County, TX, 2004.

		Fleahopper adults/100 plant terminals					
Treatment[a]	Rate oz/acre	Pretreat.	3 DAT-1[b]	6 DAT-1	3 DAT-2	6 DAT-2	Post trt. avg.
Diamond 0.83E	6.0	5.0 a	3.8 a	1.3 a	5.0 a	2.5 a	3.2 a
Diamond 0.83E	9.0	8.8 a	1.3 a	2.5 a	2.5 a	0.0 a	1.6 a
Diamond 0.83E + Bidrin 8E	6.0 3.2	6.3 a	1.3 a	3.8 a	2.5 a	0.0 a	1.9 a
Intruder 70WP	0.6	3.8 a	1.3 a	2.5 a	1.3 a	2.5 a	1.9 a
Nontreated		8.8 a	5.0 a	2.5 a	5.0 a	2.5 a	3.8 a
LSD (P = 0.05)		NS	NS	NS	NS	NS	NS
P > F		.7139	.4449	.9522	.6323	.4940	.6358

Means in a column followed by the same letter are not significantly different by ANOVA.
[a] Treatments were made on May 21 (1/3 grown square stage) and May 28 (first bloom). Crop oil concentrate was applied with insecticide at 1% VV.
[b] DAT = days after treatment

Table 3. Number of fleahopper **nymphs and adults** in cotton treated with insecticide, Gary Underbrink Farm, Kleberg County, TX, 2004.

		Fleahopper (nymphs + adults)/100 plant terminals					
Treatment[a]	Rate oz/acre	Pretreat.	3 DAT-1[b]	6 DAT-1	3 DAT-2	6 DAT-2	Post trt. avg.
Diamond 0.83E	6.0	7.5 a	6.3 a	1.3 a	8.8 ab	3.8 b	5.0 b
Diamond 0.83E	9.0	11.3 a	1.3 a	2.5 a	6.3 b	1.3 b	2.8 b
Diamond 0.83E + Bidrin 8E	6.0 3.2	7.5 a	1.3 a	5.0 a	3.8 b	0.0 b	2.5 b
Intruder 70WP	0.6	7.5 a	2.5 a	2.5 a	1.3 b	2.5 b	2.2 b
Nontreated		12.5 a	7.5 a	11.3 a	16.3 a	10.0 a	11.3 a
LSD (P = 0.05)		NS	NS	NS	9.12	5.22	5.80
P > F		.6932	.1988	.0792	.0325	.0108	.0260

Means in a column followed by the same letter are not significantly different by ANOVA.
[a] Treatments were made on May 21 (1/3 grown square stage) and May 28 (first bloom). Crop oil concentrate was applied with insecticide at 1% VV.
[b] DAT = days after treatment

Table 4. Plant population and lint production in cotton treated for fleahopper, Gary Underbrink Farm, Kleberg County, 2004.

Treatment[a]	Rate oz/acre	Plants 1000's/acre	Lb lint/acre H_1[b]	Lb lint/acre H_2	Lb lint/acre Total
Diamond 0.83E	6.0	36.3 a	1320 a	197 a	1517 a
Diamond 0.83E	9.0	38.3 a	1229 a	210 a	1438 a
Diamond 0.83E + Bidrin 8E	6.0 3.2	37.8 a	1328 a	214 a	1542 a
Intruder 70WP	0.6	41.0 a	1351 a	231 a	1582 a
Nontreated		37.0 a	1342 a	188 a	1530 a
LSD (P = 0.05)		NS	NS	NS	NS
P > F		.7563	.5169	.9441	.2954

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

[a] Treatments were made on May 21 (1/3 grown square stage) and May 28 (first bloom). Crop oil concentrate was applied with insecticide at 1% VV.

[b] H_1 = harvest 1 on 8/2 and H_2 = harvest 2 on 8/6.

EVALUATION OF INSECTICIDES FOR CONTROL OF COTTON FLEAHOPPER

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: Fleahopper numbers in the nontreated cotton were somewhat erratic throughout the testing period. Additionally, the first treatment applied was near first bloom which is near the stage of plant growth where the fleahoper is not as likely to cause significant damage. Intruder, Vydate, Centric, and Diamond compared in the study significantly reduced fleahopper nymphs and adults, and although the post treatment total fleahopper numbers averaged 18.5/100 plant terminals in nontreated cotton, statistically significant yield increases were not obtained.

OBJECTIVE: The experiment was conduct to compare various rates of Intruder, and Diamond for effectiveness on cotton fleahopper and to measure the impact of control on lint production.

MATERIALS/METHODS: Stoneville 5303R variety cotton was divided into 4-row by 40-ft plots for the evaluation on the Texas Agricultural Experiment Station, Corpus Christi. Treatments were replicated 4 times in a randomized complete block design and the foliar spray treatments were applied to the center 2 rows of each plot.

Insecticide treatments were made with a Spider Trac self propelled sprayer through 4X hollow cone nozzles (2/row) at 40 psi in a total volume of 5.5 gpa at 5.0 mph. All insecticide treatments except for Vydate included crop oil concentrate at 1.0 pint/acre. Treatments were made June 9 (first bloom) and June 17 (17 days into bloom).

Treatments were assessed by (1) counting separately the number of fleahopper nymphs and adults on 20 plant terminals/plot on June 6 [pretreatment count], June 12 [3 DAT-1], June 17 [8 DAT-1], June 20 [3 DAT-2], and June 23 [6 DAT-2], (2) counting the number of pirate bugs on 20 plant terminals/plot on June 12, 20, and 23, (3) estimating the number of cotton aphids by examination of 10 leaves/plot on June 20 and 23, (4) harvesting the center 2 rows in each plot with a 2-row picker, weighing the seed cotton and ginning a sample on a 10-saw Eagle Laboratory machine to obtain % lint.

RESULTS/DISCUSSION: It appeared that fleahopper numbers were building up rapidly on June 6; therefore, on June 9 treatments were applied. Fleahoper numbers in all plots declined by the first inspection date 3 DAT-1, and no statistical differences were detected (Tables 1-3). By 8 DAT-1 significantly more adult fleahoppers were found in the nontreated cotton, and the same was true for the nymph and adult combined count (Table 2-3). For adults, the high rate of Intruder and the Centric treatment numerically contained the fewest number. Fleahopper numbers were also reduced on both inspection dates following the second treatment (Table 3). Fewer pirate bugs were found in Intruder and Centric treated cotton (Table 4). No differences or trends were found in lint production.

ACKNOWLEDGMENTS: Thanks are extended to Kenneth Schaefer, Research Associate; Rudy Alaniz and Mike Hiller, Demonstration Assistants; and Clint Livingston, Technician for their assistance in conducting the project. DuPont Crop Protection and Crompton Corporation are thanked for their support.

Table 1. Number of fleahopper **nymphs** in cotton treated with various insecticides, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

		Number/100 plant terminals					
Treatment[a]	Rate oz/acre	6/6 near bloom	6/12 3 DAT-1[b]	6/17 8 DAT-1	6/20 3 DAT-2	6/23 6 DAT-2	Post trt. avg.
Intruder 70WP	0.41	20.8 a	3.8 a	5.0 a	0.0 b	0.0 b	2.2 b
Intruder 70WP	0.59	17.8 a	2.5 a	2.5 a	0.0 b	1.3 b	1.6 b
Intruder 70WP	0.90	14.8 a	0.0 a	1.3 a	0.0 b	0.0 b	0.3 b
Intruder 70WP + Vydate C-LV	0.59 + 8.5	10.0 a	0.0 a	3.8 a	0.0 b	0.0 b	0.9 b
Vydate 3.77 C-LV	8.50	21.8 a	0.0 a	5.0 a	0.0 b	2.5 b	1.9 b
Centric 40WG	2.00	18.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b
Diamond 0.83EC	6.00	19.8 a	1.3 a	3.8 a	0.0 b	0.0 b	1.3 b
Diamond 0.83EC	9.00	22.0 a	3.8 a	6.3 a	0.0 b	3.8 b	3.5 b
Diamond 0.83EC + Bidrin 8E	6.0 + 3.2	20.5 a	1.3 a	2.5 a	0.0 b	3.8 b	1.9 b
Nontreated		18.5 a	6.3 a	11.3 a	10.0 a	15.0 a	10.6 a
LSD (P = 0.05)		NS	NS	NS	5.62	7.22	5.70
P > F		.6805	.5190	.3430	.0234	.0061	.0367

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

[a] Treatments were applied 6/9 (first bloom) and on 6/17 (17 days into bloom). Crop Oil Concentrate (1.0 pt/acre) included with all treatments except those containing Vydate.

[b] DAT = days after treatment.

Table 2. Number of fleahopper **adults** in cotton treated with various insecticides, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

		Number/100 plant terminals					
Treatment[a]	Rate oz/acre	6/6 near bloom	6/12 3 DAT-1[b]	6/17 8 DAT-1	6/20 3 DAT-2	6/23 6 DAT-2	Post trt. avg.
Intruder 70WP	0.41	6.3 a	6.3 a	3.8 b	0.0 a	1.3 bc	2.8 bcd
Intruder 70WP	0.59	6.3 a	1.3 a	6.3 b	0.0 a	0.0 c	1.9 bcd
Intruder 70WP	0.90	5.0 a	2.5 a	1.3 b	0.0 a	0.0 c	1.0 d
Intruder 70WP + Vydate C-LV	0.59 + 8.5	7.5 a	0.0 a	3.8 b	0.0 a	1.3 bc	1.3 cd
Vydate 3.77 C-LV	8.50	5.0 a	1.3 a	2.5 b	0.0 a	3.8 ab	1.9 bcd
Centric 40WG	2.00	13.8 a	2.5 a	2.5 b	0.0 a	1.3 bc	1.6 bcd
Diamond 0.83EC	6.00	6.3 a	1.3 a	6.3 b	2.5 a	0.0 c	2.5 bcd
Diamond 0.83EC	9.00	6.3 a	6.3 a	6.3 b	0.0 a	1.3 bc	3.5 b
Diamond 0.83EC + Bidrin 8E	6.0 + 3.2	8.8 a	5.0 a	5.0 b	2.5 a	0.0 c	3.2 bc
Nontreated		7.5 a	6.3 a	16.3 a	3.8 a	5.0 a	7.8 a
LSD (P = 0.05)		NS	NS	5.22	NS	3.15	1.99
P > F		.5403	.1273	.0003	.0632	.0318	.0001

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

[a] Treatments were applied 6/9 (first bloom) and on 6/17 (17 days into bloom). Crop Oil Concentrate (1.0 pt/acre) included with all treatments except those containing Vydate.

[b] DAT = days after treatment.

Table 3. Number of fleahopper **nymphs and adults** in cotton treated with various insecticides, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

		Number/100 plant terminals					
Treatment[a]	Rate oz/acre	6/6 near bloom	6/12 3 DAT-1[b]	6/17 8 DAT-1	6/20 3 DAT-2	6/23 6 DAT-2	Post trt. avg.
Intruder 70WP	0.41	27.0 a	10.0 a	8.8 bc	0.0 b	1.3 b	5.1 b
Intruder 70WP	0.59	24.0 a	3.8 a	8.8 bc	0.0 b	1.3 b	3.5 b
Intruder 70WP	0.90	19.8 a	2.5 a	2.5 c	0.0 b	0.0 b	1.3 b
Intruder 70WP + Vydate C-LV	0.59 + 8.5	17.5 a	0.0 a	7.5 bc	0.0 b	1.3 b	2.2 b
Vydate 3.77 C-LV	8.50	26.8 a	1.3 a	7.5 bc	0.0 b	6.3 b	3.8 b
Centric 40WG	2.00	31.8 a	2.5 a	2.5 c	0.0 b	1.3 b	1.6 b
Diamond 0.83EC	6.00	26.0 a	2.5 a	10.0 bc	2.5 b	0.0 b	3.8 b
Diamond 0.83EC	9.00	28.3 a	10.0 a	12.5 b	0.0 b	5.0 b	6.9 b
Diamond 0.83EC + Bidrin 8E	6.0 + 3.2	29.3 a	6.3 a	7.5 bc	2.5 b	3.8 b	5.0 b
Nontreated		26.0 a	12.5 a	27.5 a	13.8 a	20.0 a	18.5 a
LSD (P = 0.05)		NS	NS	9.72	5.60	8.95	6.30
P > F		.6208	.1325	.0013	.0006	.0034	.0004

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

[a] Treatments were applied 6/9 (first bloom) and on 6/17 (17 days into bloom). Crop Oil Concentrate (1.0 pt/acre) included with all treatments except those containing Vydate.

[b] DAT = days after treatment.

Table 4. Pirate bugs, aphids, and lint yield in cotton treated for fleahoppers with various insecticides, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

		Pirate bugs/100 terminals				Aphids/leaf		
Treatment[a]	Rate oz/acre	6/12 3 DAT-1[b]	6/20 3 DAT-2	6/23 6 DAT-2	Avg.	6/20 3 DAT-2	6/23 6 DAT-2	Lint lb/acre
Intruder 70WP	0.41	1.3 a	5.0 ab	1.3 a	2.5 bcd	0.0 c	0.1 d	833 a
Intruder 70WP	0.59	0.0 a	0.0 b	1.3 a	0.4 d	0.1 c	0.6 cd	880 a
Intruder 70WP	0.90	1.3 a	0.0 b	0.0 a	0.4 d	0.0 c	0.0 d	877 a
Intruder 70WP + Vydate C-LV	0.59 + 8.5	0.0 a	5.0 ab	3.8 a	2.9 bcd	0.6 c	1.1 bcd	859 a
Vydate 3.77 C-LV	8.50	1.3 a	0.0 b	5.0 a	2.1 cd	18.0 a	14.8 a	912 a
Centric 40WG	2.00	6.3 a	0.0 b	0.0 a	2.1 cd	0.1 c	0.2 d	854 a
Diamond 0.83EC	6.00	3.8 a	6.3 a	7.5 a	5.8 abc	10.0 b	9.3 abc	780 a
Diamond 0.83EC	9.00	6.3 a	8.8 a	3.8 a	6.3 ab	10.8 ab	7.8 a-d	896 a
Diamond 0.83EC + Bidrin 8E	6.0 + 3.2	0.0 a	5.0 ab	1.5 a	2.2 bcd	13.8 ab	9.8 ab	888 a
Nontreated		6.3 a	10.0 a	5.0 a	7.1 a	13.8 ab	9.5 abc	853 a
LSD (P = 0.05)		NS	6.13	NS	4.09	7.53	9.03	NS
P > F		.2932	.0084	.4078	.0172	.0001	.0109	.6989

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

[a] Treatments were applied 6/9 (first bloom) and on 6/17 (17 days into bloom). Crop Oil Concentrate (1.0 pt/acre) included with all treatments except those containing Vydate.

[b] DAT = days after treatment.

EVALUATION OF VIPCOT TRANSGENIC Bt COMPARED TO COKER 312 NON-Bt COTTON VARIETIES FOR EFFECT ON CATERPILLAR PESTS AND PRODUCTION CHARACTERISTICS

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: Heliothine egg lay was sustained for over a month (June 18 - July 22) resulting in an average of 15.4 larvae, mostly bollworm, over that period in the nontreated Coker 312 (non-Bt) cotton and 6.3 larvae in the insecticide treated Coker 312 cotton. Bollworm larval numbers in the 3 VipCot varieties remained at low levels throughout the testing period. Likewise, damaged square counts averaged more than 5% in insecticide treated non-Bt cotton and over 14% in the nontreated non-Bt cotton. Similar results were found in season average boll damage counts where nearly 26% boll damage occurred in the nontreated non-Bt plots. Yield data generally reflected the bollworm damage, but lint production when considering only the 3 VipCot varieties tended to be reduced on VipCot 202 and 203 compared to production of VipCot 102. This result was unexpected based on bollworm damage numbers and must reflect less production potential in 202 and 203. Furthermore, plant vigor ratings generally indicated less favorable growth in 202 and 203, seed/boll was significantly lower in 202, staple length was statistically lower in 202 than the other varieties, and lint weight/boll was lowest in 203 compared with all other treatments except insecticide treated 202. Micronaire differences were present, but the key finding was that micronaire was too high in all treatments.

Three plant mappings using the P-MAP procedure were conducted during early boll set (June 21), just when first bolls began to open (July 22), and at harvest (August 23). Key results of plant mapping during early bloom were as follows: There were significantly more fruiting branches in Coker 312. VipCot 202 exhibited greater number of nodes above white flower, more squares at position 1, fewer bolls on the first 5 fruiting branches along with less total boll production, and a lower number of bolls in position 1 compared with all other tested varieties. The early mapping included only the varieties since insecticide treatments had not been initiated by that date. The second mapping at first open boll revealed some changes in plant growth and fruiting characteristics. The number of fruiting branches were no longer greater in Coker 312. VipCot 102 tended to have the shorter plants. Nontreated Coker 312 had the fewest number of bolls on branches 6-10, the least number at fruiting position 1, and the lowest % retention of bolls at fruiting position 1 compared with the other treatments. These results were reflected well in lint production. For the August 23 plant mapping, boll retention percentage and bolls/plant on fruiting branches 1-5 was highest in VipCot 102. The increased lint production in VipCot 102 was therefore related to more lint/boll and equal or more bolls in fruiting positions 1 and 2. The percentage boll retention in positions 1

and 2 was also highest in VipCot 102.

OBJECTIVES: The experiment was designed to evaluate and compare the efficacy of VipCot 102, 202, and 203 with Coker 312 on caterpillar pests and to assess agronomic characteristics of the varieties in insecticide treated and nontreated plots.

MATERIALS/METHODS: Coker 312 (non-Bt) and 3 transgenic Bt cotton varieties (VipCot 102, 202, and 203) were planted on the Texas Agricultural Experiment Station Meaney Annex near Corpus Christi, Texas on April 16, 2004. A 4-row blackland type planter equipped with research cone seed distributors was used to plant the 4-row by 40 ft plots with rows on 38-inch centers. The experimental design was a randomized complete block in a factorial arrangement with treatments replicated 4 times. The entire experiment was surrounded by a 40-ft cotton buffer to meet USDA and EPA regulatory requirements. Dual and Caparol were broadcast at-planting for weed control.

Denim 0.16 EC (12.0 oz/acre) was applied to Coker 312 treated plots on June 24 and 28, July 5 and 19, to VipCot 102 treated plots on July 5 and 19, and to VipCot 202 and 203 treated plots on July 19. Insecticides treatments were applied to all 4 rows of plots with a Spider Trac self-propelled machine traveling at 5.0 mph at a pressure of 40 psi through 4X hollow cone nozzles (2/row) in a total volume of 5.5 gpa.

Treatments were assessed by (1) counting the number of plants on 13.75 ft row on each of the center two rows/plot on April 24, (2) assigning a vigor rating to each plot on April 24, June 3, and July 5 [1 = excellent growth with good color and early fruiting up to 5 = slow growth and delayed fruiting], (3) counting the number of Heliothine eggs and larvae on 25 plants/plot and number of worm damaged squares/ 25 examined on June 18, 27, July 2, 10, 15, 19 and 22, (4) examining 25 plant terminals/plot for caterpillar damage on June 18 and 27, and on July 2, 10, and 15, (4) examining 25 bolls/plot for caterpillar damage on June 27 and on July 2, 10 15, 19, and 22, (5) mapping using the P-MAP procedure, plant growth and fruiting pattern of 5 plants/plot at early boll set [June 21], first open boll [July 22], and at harvest [August 23], (6) harvesting 1 row in each plot with a spindle picker on August 26, weighing the seed cotton, and submitting a sample of the seed cotton to Syngenta Company for ginning and determination of cotton fiber characteristics, and (7) collecting 25 boll samples from each plot (Charlie Cook) to determine boll characteristics.

RESULTS/DISCUSSION: Bollworm/tobacco budworm egg laying was sustained for slightly over a month (Table 1). Bollworm made up 90.6, 87.5 and 32.0% of the larval population compared with tobacco budworm on July 3, 13, and 22, respectively, as determined by larval collections in plots. Subsequent larval numbers were relatively high in Coker 312 nontreated cotton on 6 of the 7 inspection dates, but their numbers were reduced significantly on most inspection dates in Denim treated Coker 312 plots (Table 2). Significantly more terminal damage caused by caterpillar feeding was observed for the season average in nontreated Coker 312 which was higher than treated Coker 312, both of which were greater damage levels than the VipCot varieties

(Table 3). VipCot 102 had a significantly higher level of terminal damage compared with the other 2 VipCot varieties. Similar results were observed in season average square damage (Table 4). Boll damage (Table 5) was also similar, but boll damage in nontreated VipCot 102 cotton did not separate statistically from Denim treated Coker 312. VipCot 202 and 203 plant stands were generally lower than the Coker or VipCot 102 stands (Table 6). Plant vigor ratings on 3 dates revealed generally less vigor in VipCot 202 compared with the other varieties.

Significantly more lint was produced in VipCot 102, Denim treated VipCot 102, and Denim treated Coker 312 compared to treated VipCot 202 and 203, and nontreated Coker 312 (Table 6). Furthermore, the nontreated VipCot 202 yield was numerically lower. These results (lower yield) in VipCot 202 and 203 were unexpected given the reduced bollworm damage observed in these varieties. The VipCot 202 and 203 varieties used here must be lacking agronomically. These 2 varieties also exhibited lower boll weights and generally lower seed weight (Table 7). Differences in fiber characteristics were only observed in micronaire and staple length readings (Table 8). Micronaire was generally unacceptable (high) for all varieties. VipCot 202 had significantly shorter staple than the other varieties.

Plant mappings were conducted on June 21 (Tables 9 - 12), July 22 (Tables 13 - 16), and August 23 (Tables 17 - 20). On the first mapping, significantly fewer reproductive branches were observed in Coker 312 which may have resulted from the higher terminal damage caused by bollworm (Table 9). VipCot 202 was not as near cutout as the other varieties. Statistical differences were not found in square or boll production except for fewer total bolls/plant and bolls in position 1 in VipCot 202 (Tables 11 - 12). By the July 22 plant mapping, VipCot 202 had greater numbers of reproductive branches/plant, was generally taller, but had recovered somewhat in numbers of bolls/plant compared with the earlier plant mapping (Table 13). However, these bolls were later which would delay harvest. Possibly the most important observation was the greater boll production at position 1 in the VipCot varieties compared with Coker 312 (Table 15). Boll set at positions 1 and 2 were especially reduced in nontreated Coker 312 (Tables 15 - 16). The final plant mapping was accomplished on August 23.

The final plant mapping on August 23 (Tables 17 -20) generally reflected earlier plant mapping results with influence on plant growth due to boll load. For example, internode length and plant heights tended to be shorter in treatments producing the most lint cotton (Table 17). The number of bolls/plant, however, did not always reflect yield level, which indicated more lint/boll in certain varieties such as VipCot 102 compared to VipCot 202. Boll retention percentage and bolls/plant on fruiting branches 1-5 was highest in VipCot 102 (Table 18). The increased lint production in VipCot 102 was therefore related to more lint/boll (Table 7) and equal or more bolls in fruiting positions 1 and 2 (Table 19). The percentage boll retention in positions 1 and 2 was also highest in VipCot 102 (Table 20).

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Table 1. Bollworm eggs in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	Bollworm eggs/100 terminals[b]							
		6/18	6/27	7/2	7/10	7/15	7/19	7/22	Avg
Coker 312	No	28 a	34 a	20 a	4 a	20 abc	19 a	5 a	18.4 a
VipCot 102	No	15 a	35 a	15 a	5 a	13 d	4 a	1 a	12.5 bc
VipCot 202	No	15 a	30 a	11 a	5 a	15 bcd	5 a	0 a	11.6 bc
VipCot 203	No	23 a	34 a	16 a	3 a	16 bcd	14 a	3 a	15.4 ab
Coker 312	Yes	16 a	31 a	26 a	10 a	26 a	13 a	3 a	17.9 a
VipCot 102	Yes	11 a	25 a	20 a	3 a	15 bcd	10 a	1 a	12.1 bc
VipCot 202	Yes	16 a	14 a	11 a	8 a	21 ab	5 a	1 a	10.9 c
VipCot 203	Yes	9 a	29 a	19 a	10 a	14 cd	5 a	1 a	12.3 bc
LSD (P = 0.05)		NS	NS	NS	NS	7.48	NS	NS	3.79
P > F		.0766	.1796	.1857	.3042	.0156	.1435	.3454	.0016

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

[b] Data were rounded to the nearest whole number except for season average to save space.

Table 2. Bollworm larvae in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	Bollworm larvae/100 terminals[b]							
		6/18	6/27	7/2	7/10	7/15	7/19	7/22	Avg
Coker 312	No	4 ab	31 a	40 a	18 a	1 b	9 a	5 a	15.4 a
VipCot 102	No	1 b	1 b	4 c	0 b	1 b	0 c	0 b	1.0 c
VipCot 202	No	0 b	1 b	1 c	0 b	0 b	0 c	0 b	0.3 c
VipCot 203	No	0 b	0 b	0 c	0 b	0 b	0 c	0 b	0.0 c
Coker 312	Yes	8 a	8 b	15 b	3 b	8 a	4 b	0 b	6.3 b
VipCot 102	Yes	0 b	1 b	1 c	1 b	0 b	0 c	0 b	0.5 c
VipCot 202	Yes	0 b	1 b	0 c	0 b	0 b	0 c	0 b	0.2 c
VipCot 203	Yes	1 b	0 b	0 c	0 b	0 b	0 c	0 b	0.2 c
LSD (P = 0.05)		3.82	7.51	9.68	3.64	2.41	2.95	2.12	2.11
P > F		.0047	.0001	.0001	.0001	.0001	.0001	.0006	.0001

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

[b] Data were rounded to the nearest whole number except for season average to save space.

Table 3. Bollworm damaged plant terminals in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	% bollworm damaged plant terminals[b]					
		6/18	6/27	7/2	7/10	7/15	Avg
Coker 312	No	8 a	35 a	38 a	48 a	56 a	36.8 a
VipCot 102	No	3 b	14 c	11 bc	9 bc	13 c	9.8 c
VipCot 202	No	0 b	3 e	3 c	6 c	0 c	2.3 d
VipCot 203	No	1 b	1 e	6 bc	3 c	3 c	2.8 d
Coker 312	Yes	10 a	19 b	19 b	19 b	28 b	18.8 b
VipCot 102	Yes	0 b	8 d	15 bc	11 bc	14 bc	9.5 c
VipCot 202	Yes	0 b	0 e	3 c	3 c	1 c	1.3 d
VipCot 203	Yes	0 b	0 e	5 c	5 c	0 c	2.0 d
LSD (P = 0.05)		4.44	4.86	13.03	10.63	14.50	4.77
P > F		.0003	.0001	.0002	.0001	.0001	.0001

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

[b] Data were rounded to the nearest whole number except for season average to save space.

Table 4. Bollworm damaged squares in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	% bollworm damaged squares[b]							
		6/18	6/27	7/2	7/10	7/15	7/19	7/22	Avg
Coker 312	No	1 a	29 a	34 a	19 a	10 a	4 a	4 a	14.3 a
VipCot 102	No	0 a	3 c	6 bc	3 b	0 b	0 b	0 a	1.6 c
VipCot 202	No	0 a	3 c	0 c	0 c	0 b	0 b	0 a	0.3 d
VipCot 203	No	0 a	0 c	0 c	0 c	0 b	0 b	0 a	0.0 d
Coker 312	Yes	3 a	11 b	9 b	3 b	9 a	4 a	1 a	5.5 b
VipCot 102	Yes	0 a	4 c	3 bc	0 c	0 b	0 b	0 a	0.9 cd
VipCot 202	Yes	0 a	0 c	0 c	0 c	0 b	0 b	0 a	0.0 d
VipCot 203	Yes	0 a	0 c	1 c	0 c	0 b	0 b	0 a	0.2 d
LSD (P = 0.05)		NS	4.79	6.34	2.49	5.05	1.70	NS	1.19
P > F		.1503	.0001	.0001	.0001	.0004	.0001	.1308	.0001

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

[b] Data were rounded to the nearest whole number except for season average to save space.

Table 5. Bollworm damaged bolls in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	% bollworm damaged bolls[b]							
		6/18	6/27	7/2	7/10	7/15	7/19	7/22	Avg
Coker 312	No		33 a	36 a	39 a	19 a	11 a	16 a	25.6 a
VipCot 102	No		1 c	3 b	4 b	3 b	0 b	0 b	1.7 bc
VipCot 202	No		0 c	0 b	0 b	1 b	0 b	0 b	0.2 c
VipCot 203	No		0 c	0 b	0 b	0 b	0 b	0 b	0.0 c
Coker 312	Yes		14 b	3 b	4 b	4 b	4 b	1 b	4.8 b
VipCot 102	Yes		0 c	0 b	3 b	1 b	0 b	0 b	0.6 c
VipCot 202	Yes		0 c	0 b	0 b	0 b	0 b	0 b	0.0 c
VipCot 203	Yes		0 c	0 b	0 b	0 b	0 b	0 b	0.0 c
LSD (P = 0.05)			9.34	9.88	7.93	6.29	4.01	3.63	3.86
P > F			.0001	.0001	.0001	.0001	.0001	.0001	.0001

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

[b] Data were rounded to the nearest whole number except for season average to save space.

Table 6. Plant population, vigor ratings and lint production in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	Plants 1000's/acre	Plant vigor rating[b] 4/24	6/3	7/5	Yield lb lint/acre
Coker 312	No	69.1 a	1.0 b	1.0 d	1.8 bc	598 e
VipCot 102	No	66.8 a	1.1 b	1.3 d	1.5 bc	909 a
VipCot 202	No	50.5 b	1.9 a	3.0 a	3.5 a	792 bc
VipCot 203	No	51.1 b	1.3 b	2.3 b	1.5 bc	745 cd
Coker 312	Yes	58.9 ab	1.0 b	1.0 d	1.3 c	869 ab
VipCot 102	Yes	65.9 a	1.0 b	1.0 d	2.1 bc	882 ab
VipCot 202	Yes	48.6 b	2.0 a	3.0 a	4.0 a	688 de
VipCot 203	Yes	52.1 b	1.3 b	1.8 c	2.4 b	768 cd
LSD (P = 0.05)		10.45	.317	.471	1.085	100.8
P > F		.0010	.0001	.0001	.0002	.0001

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

[b] Vigor ratings range from 1 = excellent growth with good color and early fruiting to 5 = slow growth and delayed fruiting.

Table 7. Characteristics of cotton bolls produced by transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	% 5 lock bolls	Boll size grams	Lint wt/25 bolls (g)	Seed grams/ 100	Seed/ boll	Turnout %
Coker 312	No	12.0 cd	4.9 a	44.7 a	12.6 a	24.1 a	36.3 bc
VipCot 102	No	10.0 d	4.6 b	41.3 bc	11.1 c	25.5 a	36.0 bc
VipCot 202	No	41.0 a	4.1 c	38.7 cd	9.9 d	25.1 a	37.5 a
VipCot 203	No	20.0 cd	4.0 c	34.7 e	11.0 c	22.9 a	34.8 d
Coker 312	Yes	9.0 d	4.8 ab	43.5 ab	12.2 ab	24.0 a	36.6 b
VipCot 102	Yes	11.0 d	4.7 ab	41.4 bc	11.6 bc	25.1 a	35.5 cd
VipCot 202	Yes	36.0 ab	3.9 c	36.3 de	9.5 d	25.4 a	36.8 ab
VipCot 203	Yes	24.0 bc	3.9 c	34.0 e	11.1 c	22.3 a	34.8 d
LSD (P = 0.05)		12.78	0.32	3.02	0.69	NS	0.89
P > F		.0001	.0001	.0001	.0001	.0940	.0001

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

Table 8. Characteristics of cotton fiber produced by transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	Micronaire	Length inches	Uniformity	Strength g/tex	Elongation %
Coker 312	No	5.3 a	1.18 a	85.4 a	31.6 a	5.1 a
VipCot 102	No	4.7 c	1.17 a	83.9 a	32.3 a	5.2 a
VipCot 202	No	5.2 a	1.13 b	84.0 a	32.3 a	4.9 a
VipCot 203	No	5.0 b	1.20 a	84.9 a	32.4 a	5.1 a
Coker 312	Yes	5.3 a	1.18 a	85.1 a	32.0 a	5.0 a
VipCot 102	Yes	4.9 bc	1.17 a	84.3 a	32.0 a	5.2 a
VipCot 202	Yes	5.3 a	1.11 b	83.9 a	32.8 a	4.9 a
VipCot 203	Yes	5.0 b	1.17 a	85.0 a	33.4 a	5.2 a
LSD (P = 0.05)		0.20	0.032	NS	NS	NS
P > F		.0001	.0002	.0598	.2107	.5212

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

Table 9. Plant growth characteristics on June 21 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Internode length	Reproductive branches/plant	Nodes above white flower	Plant height inches
Coker 312	1.3 a	10.3 b	6.0 b	20.0 a
VipCot 102	1.2 a	11.3 a	6.5 b	19.4 a
VipCot 202	1.0 a	11.5 a	7.5 a	18.9 a
VipCot 203	1.1 a	11.3 a	6.0 b	18.8 a
LSD (P = 0.05)	NS	0.78	0.84	NS
P > F	.1822	.0311	.0091	.8799

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

Table 10. Square production on June 21 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

	Squares/plant by branch groups			Squares/plant by position			
Cultivar	1-5	6-10	11-15	1	2	3	4
Coker 312	9.0 a	6.9 a	0.6 a	7.0 b	5.8 a	3.2 a	0.7 a
VipCot 102	7.6 a	7.6 a	1.5 a	7.3 b	5.6 a	3.0 a	0.6 a
VipCot 202	10.8 a	7.6 a	1.7 a	9.5 a	5.8 a	4.0 a	0.8 a
VipCot 203	9.5 a	7.3 a	1.4 a	7.9 b	5.8 a	3.5 a	0.9 a
LSD (P = 0.05)	NS	NS	NS	1.29	NS	NS	NS
P > F	.1622	.9041	.1277	.0077	.9844	.6866	.8399

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

Table 11. Boll distribution on fruiting branches on June 21 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

	Bolls/plant by branch groups		% bolls retention by branch groups		
Cultivar	1-5	6-10	1-5	6-10	Total bolls/ plant
Coker 312	2.7 a	0.0 a	85.0 a	90.7 a	2.8 a
VipCot 102	3.4 a	0.1 a	78.5 a	86.1 a	3.5 a
VipCot 202	0.7 b	0.0 a	78.6 a	84.8 a	0.7 b
VipCot 203	2.5 a	0.1 a	86.5 a	86.5 a	2.5 a
LSD (P = 0.05)	1.35	NS	NS	NS	1.44
P > F	.0077	.6310	.3441	.7600	.0099

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

Table 12. Boll distribution by fruiting position on June 21 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

	Bolls/plant by position			% bolls retention by position			
Cultivar	1	2	3	1	2	3	Total % boll retention
Coker 312	2.4 a	0.2 a	0.0 a	90.4 a	82.1 a	91.5 a	87.4 a
VipCot 102	3.0 a	0.5 a	0.0 a	91.0 a	79.7 a	67.4 a	82.6 a
VipCot 202	0.7 b	0.0 a	0.0 a	88.2 a	71.1 a	84.3 a	82.0 a
VipCot 203	2.3 a	0.3 a	0.0 a	91.1 a	79.1 a	90.7 a	87.3 a
LSD (P = 0.05)	0.91	NS	NS	N S	NS	NS	NS
P > F	.0017	.3496	1.000	.7993	.4785	.0907	.4843

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

Table 13. Plant growth characteristics on July 22 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	Internode length	Reproductive branches/ plant	Nodes above white flower	Plant height inches	Bolls/ plant
Coker 312	No	1.5 a	13.7 b	4.5 abc	28.8 cd	5.2 c
VipCot 102	No	1.4 a	13.5 b	4.0 c	25.2 e	8.2 bc
VipCot 202	No	1.5 a	15.3 a	4.5 abc	31.7 ab	11.9 ab
VipCot 203	No	1.5 a	14.5 ab	4.3 bc	29.7 bc	11.2 ab
Coker 312	Yes	1.5 a	13.5 b	3.8 c	28.0 cd	8.3 bc
VipCot 102	Yes	1.4 a	14.1 ab	4.3 bc	26.4 de	11.1 ab
VipCot 202	Yes	1.5 a	15.4 a	5.3 ab	32.3 a	11.5 ab
VipCot 203	Yes	1.5 a	14.8 ab	5.5 a	30.1 abc	12.9 a
LSD (P = 0.05)		NS	1.34	1.00	2.60	3.73
P > F		.1468	.0378	.0215	.0001	.0049

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

Table 14. Percentage fruit retention and boll distribution by branch groups on July 22 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	% fruit retention by branch groups: 1-5	6-10	11-15	Bolls/plant by branch groups: 1-5	6-10	11-15
Coker 312	No	30.4 a	41.5 c	59.6 bc	2.9 a	1.6 c	0.2 c
VipCot 102	No	42.7 a	46.2 c	39.5 d	4.2 a	3.8 b	0.3 bc
VipCot 202	No	35.7 a	49.1 bc	60.0 bc	4.3 a	5.1 ab	1.4 a
VipCot 203	No	34.5 a	50.8 bc	59.9 bc	4.3 a	4.8 ab	0.9 ab
Coker 312	Yes	36.3 a	62.6 a	77.6 a	3.9 a	3.8 b	0.3 bc
VipCot 102	Yes	39.3 a	44.5 c	51.1 cd	5.3 a	4.1 ab	1.1 a
VipCot 202	Yes	35.4 a	59.2 ab	71.4 ab	4.3 a	4.9 ab	0.8 abc
VipCot 203	Yes	41.3 a	60.3 ab	72.6 ab	5.7 a	5.6 a	0.4 bc
LSD (P = 0.05)		NS	11.43	16.36	NS	1.64	0.63
P > F		.1653	.0050	.0019	.0534	.0021	.0057

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

Table 15. Boll distribution by fruiting position on July 22 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	Bolls/plant by fruiting position 1	2	3	4
Coker 312	No	2.5 c	1.6 c	0.6 a	0.0 c
VipCot 102	No	5.8 a	1.9 bc	0.3 a	0.1 c
VipCot 202	No	6.1 a	2.8 ab	1.3 a	0.4 abc
VipCot 203	No	5.6 a	2.9 ab	1.1 a	0.3 bc
Coker 312	Yes	4.1 b	2.3 bc	1.6 a	0.2 bc
VipCot 102	Yes	6.1 a	2.5 bc	1.5 a	0.5 ab
VipCot 202	Yes	5.4 a	2.5 abc	1.6 a	0.3 bc
VipCot 203	Yes	5.5 a	3.6 a	1.8 a	0.8 a
LSD (P = 0.05)		1.38	1.09	NS	0.42
P > F		.0002	.0320	.0890	.0150

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

Table 16. Percentage boll retention by fruiting position on July 22 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	% boll retention by position 1	2	3	4
Coker 312	No	34.5 c	36.7 bc	59.4 a	78.8 a
VipCot 102	No	53.2 ab	35.2 bc	33.3 a	8.3 c
VipCot 202	No	58.4 ab	39.4 bc	38.3 a	28.9 bc
VipCot 203	No	56.0 ab	41.5 abc	35.5 a	52.6 ab
Coker 312	Yes	51.6 b	51.1 a	65.3 a	73.1 a
VipCot 102	Yes	55.4 ab	31.4 c	40.6 a	61.3 a
VipCot 202	Yes	58.3 ab	45.3 ab	49.9 a	61.8 a
VipCot 203	Yes	59.9 a	51.8 a	50.6 a	63.1 a
LSD (P = 0.05)		8.09	10.67	NS	29.12
P > F		.0001	.0050	.0937	.0009

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

Table 17. Plant growth characteristics on August 23 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	Internode length	Reproductive branches/ plant	Plant height inches	Bolls/plant
Coker 312	No	1.4 abc	14.5 b	27.1 ab	5.1 c
VipCot 102	No	1.3 c	13.1 bc	23.2 b	7.1 b
VipCot 202	No	1.5 ab	16.1 a	31.7 a	8.9 a
VipCot 203	No	1.4 bc	14.1 b	27.3 ab	7.6 ab
Coker 312	Yes	1.5 ab	12.5 c	25.8 b	7.4 ab
VipCot 102	Yes	1.3 c	13.1 bc	22.6 b	7.4 ab
VipCot 202	Yes	1.5 a	14.2 b	25.9 b	7.4 ab
VipCot 203	Yes	1.4 ab	13.1 bc	27.4 ab	7.8 ab
LSD (P = 0.05)		0.15	1.45	5.14	1.81
P > F		0.0184	0.0012	0.0432	0.0285

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

Table 18. Percentage boll retention and boll distribution by branch groups on August 23 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	% boll retention by branch groups			Bolls/plant by branch groups		
		1-5	6-10	11-15	1-5	6-10	11-15
Coker 312	No	24.8 d	10.7 c	3.9 a	3.0 c	1.5 d	0.3 a
VipCot 102	No	41.1 ab	24.5 ab	7.5 a	4.5 ab	2.2 cd	0.3 a
VipCot 202	No	29.5 cd	30.3 a	4.4 a	3.7 bc	4.4 a	0.4 a
VipCot 203	No	35.1 bc	23.6 ab	5.9 a	4.0 abc	2.8 bc	0.3 a
Coker 312	Yes	29.2 cd	31.0 a	3.6 a	3.7 bc	2.9 bc	0.2 a
VipCot 102	Yes	43.6 a	22.1 b	4.8 a	5.0 a	2.2 cd	0.2 a
VipCot 202	Yes	28.2 cd	26.1 ab	3.8 a	3.5 bc	3.3 b	0.2 a
VipCot 203	Yes	32.4 cd	28.7 ab	10.5 a	3.7 bc	3.2 b	0.4 a
LSD (P = 0.05)		8.28	7.42	NS	1.11	0.89	NS
P > F		.0012	.0003	.3803	.0427	.0001	.7205

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

Table 19. Boll distribution by fruiting position on August 23 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	Bolls/plant by fruiting position 1	2	3	4
Coker 312	No	2.4 c	1.0 c	1.1 a	0.3 a
VipCot 102	No	5.6 a	1.1 c	0.3 a	0.0 a
VipCot 202	No	5.6 a	2.2 a	0.6 a	0.1 a
VipCot 203	No	5.3 a	1.3 bc	0.5 a	0.1 a
Coker 312	Yes	3.4 bc	2.3 a	0.8 a	0.3 a
VipCot 102	Yes	4.4 ab	2.0 a	0.9 a	0.0 a
VipCot 202	Yes	4.7 ab	1.7 ab	0.5 a	0.1 a
VipCot 203	Yes	4.3 ab	2.2 a	0.8 a	0.2 a
LSD (P = 0.05)		1.42	0.62	NS	NS
P > F		.0014	.0005	.4970	.2544

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

Table 20. Percentage boll retention by fruiting position on August 23 measured by P-MAP in transgenic Bt (VipCot) and non-transgenic cotton cultivars with and without foliar insecticide for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Cultivar	Foliar insecticide[a]	% boll retention by position			
		1	2	3	4
Coker 312	No	17.1 c	9.3 e	20.3 a	6.1 a
VipCot 102	No	42.6 a	12.8 de	12.5 a	0.0 a
VipCot 202	No	34.9 ab	18.5 bcd	9.5 a	2.1 a
VipCot 203	No	37.1 ab	13.8 cde	11.8 a	8.3 a
Coker 312	Yes	28.2 b	25.0 a	20.0 a	29.2 a
VipCot 102	Yes	33.8 ab	23.4 ab	28.7 a	0.0 a
VipCot 202	Yes	33.4 ab	16.2 cd	10.3 a	1.9 a
VipCot 203	Yes	34.6 ab	20.0 abc	22.3 a	34.2 a
LSD (P = 0.05)		10.51	6.33	NS	NS
P > F		.0039	.0005	.2949	.1892

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

[a] Denim 0.16 EC (12.0 oz/acre) was applied to (1) Coker 312 treated plots on 6/24, 6/28, 7/5 and 7/19; (2) VipCot 102 treated plots on 7/5 and 7/19; and (3) VipCot 202 and 203 treated plots on 7/19.

CATERPILLAR CONTROL AND PRODUCTION CHARACTERISTICS OF WIDESTRIKE TRANSGENIC Bt COTTON

Texas Agricultural Experiment Station, Nueces County, 2004

Roy D. Parker
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SUMMARY: PHY 470 WR transgenic Bt cotton (Widestrike) was compared with PHY 410 R cotton in which one of the tested treatments included insecticide applied to both varieties when bollworm numbers reached treatment threshold in the non-Bt cotton, and in which another set of plots of both varieties would be treated when caterpillar numbers reached threshold in the transgenic Bt cotton. The latter level was never reached, but to have a set of plots treated differently, one insecticide application was applied to a set of plots as a substitute for the planned Bt threshold treatment. These plots were treated following collection of all insect count data with only a possibility of affecting yield data.

Bollworm egg lay sustained over about a 19 day period resulted in treatable levels of larvae in the non-Bt cotton. Tracer was used for the bollworm because it had been demonstrated in the area that these caterpillars were tolerant to pyrethroid insecticide. Significantly greater numbers of bollworm were found in non-Bt nontreated and non-Bt cotton that was only treated once compared with the transgenic Bt and non-Bt cotton treated 3 times with Tracer. These differences were generally reflected in damaged terminals, damaged squares, and damaged bolls. Additionally, omnivorous leafroller terminal damage was significantly reduced in the Bt cotton and non-Bt cotton treated 3 times. Statistical differences were observed in lint yield in that the Bt cotton produced a higher yield than all other treatments except for the non-Bt cotton treated 3 times.

Micronaire and percentage fiber elongation readings were consistently better in Widestrike plots, but were not in every case statistically different from the non-Bt cotton. Boll retention almost by every measurement favored the Widestrike treatments. Generally, only the non-Bt cotton where 3 Tracer treatments were applied set bolls somewhat similar to Widestrike. Some compensation by the other 2 non-Bt cotton treatments was found on the 4th fruiting position off the main stem.

OBJECTIVES: The field study was conducted on Widestrike cotton (transgenic Bt) to (1) evaluate caterpillar control, (2) compare performance with and without insecticide applied for caterpillar control, (3) gain experience with the variety, and (4) determine plant growth and developmental characteristics of the variety.

MATERIALS/METHODS: PHY 410 R (non-Bt) and PHY 470 WR (Bt transgenic) cotton varieties were planted on the Texas Agricultural Experiment Station Meaney Annex near Corpus Christi, Texas on April 30, 2004, and then replanted due to heavy rainfall on May 6. Planting was accomplished with a 4-row blackland type planter with research cone seed distributors. Plots were 4 rows on 38-inch centers by 40-ft long with 4 replications in a randomized complete block design. The entire experiment was surrounded by a 40-ft buffer planted in the PHY 410 R variety to meet USDA and EPA regulatory requirements. Temik 15G (4.0 oz/acre) was applied into the seed furrow at-planting. Dual and Caparol were broadcast at-planting for weed control. Tracer 4SC (2.9 oz/acre) was applied July 2 and 15 based on the non-Bt threshold, and July 26 to the same plots as well as plots designated for the Bt threshold (that threshold was never reached). Note that the July 26 treatment was applied after insect counts had been completed and accounts for the lack of any insect measured impact in plots receiving only 1 treatment. Insecticide was applied to all 4 rows in plots with a Spider Spray Trac self-propelled machine traveling at 5.0 mph at a pressure of 40 psi through 4X hollow cone nozzles (2/row) in a total volume of 5.5 gpa..

Treatments were assessed by (1) counting the number of plants on 13.75 ft row on each of the center rows on plots on May 27, (2) rating plots for plant vigor [1 = excellent growth up to 5 = slow growth] on May 27, (3) counting the number of Heliothine eggs, larvae, plant terminal damage, and damaged squares on 25 plants/plot on July 2, 7, 13, and 21, (4) collecting larvae from nontreated non-Bt plots on July 3, 21, and 25 to determine percentage of bollworm and tobacco budworm, (5) examining 25 bolls/plot for caterpillar damage on the same dates as listed in the previous section except for July 7 [few bolls were present], (6) determining nodes above white flower based on 6 plants/plot on July 22, (7) examining 25 plant terminals/plot on July 27 for damage by the omnivorous leafroller, (8) plant mapping (P-MAP) 5 plants/plot after bolls were open on September 10, (9) harvesting 1 of the center rows in plots with a spindle picker, weighing the seed cotton, and ginning a sample on a 10-saw Eagle laboratory machine for turnout to determine lint yield, and (10) selecting a 40 gram lint sample for fiber characteristic analysis by the International Textile Center at Lubbock, Texas.

RESULTS/DISCUSSION: Heliothine egg lay was sustained for about 19 days (July 2-21) with the period averaging 17.8 eggs/100 plant terminals on 4 inspection dates (Table 1). Bollworm made up 95.5%, 28.6%, and 0.0% of the larval population compared to tobacco budworm on July 3, 21, and 25, respectively. Except for 1 date (July 13), statistically fewer Heliothine larvae were counted in Widestrike plots on each inspection date (Table 2). Except for the pretreatment count in the treatment where 3 Tracer applications were made, larval numbers were not different from that found in the Widestrike cotton. These findings were reflected in the season averages. Percentage larval damage to terminals generally followed the same pattern (Table 3). Recall that counts in plots receiving 1 Tracer treatment were made before the treatment was applied except for omnivorous leafroller damage which was counted the next day and would not have had time to affect the terminal damage. In the season average data, fewer damaged squares occurred in the Widestrike plots, and it was also reduced in non-Bt cotton where 3 Tracer treatments were applied (Table 4). Boll damage was statistically the same and lower in all Widestrike cotton and in the non-Bt cotton receiving 3 Tracer treatments (Table 5). No differences were observed in nodes above white flower (NAWF), plant stand, or plant vigor rating (Table 6). Omnivorous leafroller terminal damage was reduced best by Widestrike and 3 Tracer treatments. Statistically higher yields occurred in Widestrike plots, but that yield was not statistically better than what was produced where 3 Tracer treatments were applied to the non-Bt cotton. Statistical differences did not occur in lint characteristics for staple length, % fiber uniformity, or strength (Table 7). Micronaire readings were consistently better in Widestrike plots, although they did not in every case separate statistically from readings for the non-Bt cotton. Widestrike micronaire ranged from 4.4 to 4.5; whereas, the non-Bt cotton micronaire ranged from 4.7 to 4.9. The lower readings are preferred. Likewise, fiber elongation readings were better for Widestrike.

A summary of plant growth and fruiting measurements conducted September 10 just before harvest is provided in Tables 8 - 10. No differences were found in plant height, internode length, number of vegetative or fruiting nodes on plants, or total nodes (Table 8). There were several differences in boll retention depending upon treatment (Table 9). The percentage of bolls retained on fruiting positions 1 + 2 of the fruiting branches were significantly greater in the transgenic Bt cotton treatments compared to all non-Bt treatments except in plots where Tracer was applied 3 times to the non-Bt cotton. Percentage boll retention for the whole plant followed generally the same pattern, but there were fewer statistical differences. Boll retention was generally greater on fruiting branches 1 - 5 in the transgenic Bt plots, but significant differences were not observed in boll retention on fruiting branches 6 - 10 or 11 - 15. Boll retention on positions 1 through 4 indicated a significantly higher percentage at position 1 for the transgenic Bt cotton except, as before, for non-Bt cotton where 3 Tracer treatments were applied (Table 10). No differences were found on positions 2 or 3, but greater percentage boll set was observed on nontreated and plots receiving 1 Tracer treatment in the non-Bt cotton. This increased boll set was an indication of compensation on plants with fewer bolls on the first 3 fruiting positions.

ACKNOWLEDGMENTS: Bobby Haygood, Dow AgroSciences, is thanked for his assistance in conduct of the experiment and encouragement when poor weather threatened the study. Appreciation is expressed to Rudy Alaniz and Mike Hiller, Demonstration Assistants, and to Clint Livingston, Technician, for their untiring work in the experimental plots.

Table 1. Bollworm eggs in Widestrike (PHY 470 WR transgenic Bt) and PHY 410 R (non-transgenic) cotton varieties with and without Tracer treatment for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Variety	Variety type	# worm trts.[a]	Bollworm eggs/100 terminals[b]				
			7/2	7/7	7/13	7/21	Avg
PHY 410 R	Non-Bt	0	9 a	13 a	30 a	18 a	17.2 a
PHY 410 R	Non-Bt	3	4 a	4 a	34 a	21 a	15.6 a
PHY 410 R	Non-Bt	1	4 a	8 a	31 a	20 a	15.6 a
PHY 470 WR	Bt	0	3 a	3 a	33 a	26 a	15.9 a
PHY 470 WR	Bt	3	10 a	13 a	41 a	18 a	20.3 a
PHY 470 WR	Bt	1	10 a	13 a	39 a	28 a	22.2 a
LSD (P = 0.05)			NS	NS	NS	NS	NS
(P > F)			.2796	.3269	.7819	.5946	.1192

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

[a] Tracer 4SC (2.9 oz/acre) was applied July 2, 15, and 26 based on a non-Bt threshold and on July 26 based on a Bt threshold.

[b] Data were rounded to the nearest whole number (except for the season average) to save space.

Table 2. Bollworm larvae in Widestrike (PHY 470 WR transgenic Bt) and PHY 410 R (non-transgenic) cotton varieties with and without Tracer treatment for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Variety	Variety type	# worm trts.[a]	Bollworm larvae/100 plants[b]				
			7/2	7/7	7/13	7/21	Avg
PHY 410 R	Non-Bt	0	8 a	11 a	6 b	18 a	10.7 a
PHY 410 R	Non-Bt	3	6 a	0 b	3 b	3 b	2.8 b
PHY 410 R	Non-Bt	1	6 a	14 a	14 a	14 a	11.9 a
PHY 470 WR	Bt	0	0 b	0 b	1 b	0 b	0.3 b
PHY 470 WR	Bt	3	0 b	0 b	0 b	0 b	0.0 b
PHY 470 WR	Bt	1	0 b	1 b	0 b	1 b	0.6 b
LSD (P = 0.05)			2.86	5.07	7.31	9.69	3.59
(P > F)			.0001	.0001	.0079	.0036	.0001

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

[a] Tracer 4SC (2.9 oz/acre) was applied July 2, 15, and 26 based on a non-Bt threshold and on July 26 based on a Bt threshold.

[b] Data were rounded to the nearest whole number (except for the season average) to save space.

Table 3. Bollworm damaged plant terminals in Widestrike (PHY 470 WR transgenic Bt) and PHY 410 R (non-transgenic) cotton varieties with and without Tracer treatment for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Variety	Variety type	# worm trts.[a]	% bollworm damaged plant terminals[b]				
			7/2	7/7	7/13	7/21	Avg
PHY 410 R	Non-Bt	0	40 a	55 ab	60 a	54 b	52.2 b
PHY 410 R	Non-Bt	3	51 a	43 b	30 b	24 c	36.9 c
PHY 410 R	Non-Bt	1	51 a	60 a	55 a	74 a	60.0 a
PHY 470 WR	Bt	0	3 b	6 c	9 c	9 d	6.6 d
PHY 470 WR	Bt	3	8 b	3 c	5 c	0 d	3.8 d
PHY 470 WR	Bt	1	9 b	4 c	6 c	10 d	7.2 d
LSD (P = 0.05)			12.42	12.83	11.86	12.61	5.68
(P > F)			.0001	.0001	.0001	.0001	.0001

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

[a] Tracer 4SC (2.9 oz/acre) was applied July 2, 15, and 26 based on a non-Bt threshold and on July 26 based on a Bt threshold.

[b] Data were rounded to the nearest whole number (except for the season average) to save space.

Table 4. Bollworm damaged squares in Widestrike (PHY 470 WR transgenic Bt) and PHY 410 R (non-transgenic) cotton varieties with and without Tracer treatment for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Variety	Variety type	# worm trts.[a]	% bollworm damaged squares[b] 7/2	7/7	7/13	7/21	Avg
PHY 410 R	Non-Bt	0	10 b	13 a	15 a	26 a	16.0 a
PHY 410 R	Non-Bt	3	15 a	4 b	3 b	4 b	6.3 b
PHY 410 R	Non-Bt	1	13 ab	18 a	24 a	26 a	20.0 a
PHY 470 WR	Bt	0	1 c	0 b	3 b	1 b	1.3 bc
PHY 470 WR	Bt	3	1 c	0 b	0 b	0 b	0.3 c
PHY 470 WR	Bt	1	0 c	0 b	3 b	3 b	1.3 bc
LSD (P = 0.05)			4.28	6.91	10.10	10.23	5.16
(P > F)			.0001	.0001	.0007	.0001	.0001

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

[a] Tracer 4SC (2.9 oz/acre) was applied July 2, 15, and 26 based on a non-Bt threshold and on July 26 based on a Bt threshold.

[b] Data were rounded to the nearest whole number (except for the season average) to save space.

Table 5. Bollworm damaged bolls in Widestrike (PHY 470 WR transgenic Bt) and PHY 410 R (non-transgenic) cotton varieties with and without Tracer treatment for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Variety	Variety type	# worm trts.[a]	% bollworm damaged bolls[b]				
			7/2	7/7	7/13	7/21	Avg
PHY 410 R	Non-Bt	0	1 a		10 a	6 ab	5.9 a
PHY 410 R	Non-Bt	3	0 a		1 b	3 bc	1.3 b
PHY 410 R	Non-Bt	1	0 a		11 a	9 a	6.7 a
PHY 470 WR	Bt	0	0 a		0 b	0 c	0.0 b
PHY 470 WR	Bt	3	0 a		0 b	0 c	0.0 b
PHY 470 WR	Bt	1	0 a		0 b	1 bc	0.4 b
LSD (P = 0.05)			NS		5.27	5.77	2.97
(P > F)			.4509		.0003	.0259	.0003

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

[a] Tracer 4SC (2.9 oz/acre) was applied July 2, 15, and 26 based on a non-Bt threshold and on July 26 based on a Bt threshold.

[b] Data were rounded to the nearest whole number (except for the season average) to save space.

Table 6. Plant growth characteristics and lint production in Widestrike (PHY 470 WR transgenic Bt) and PHY 410 R (non-transgenic) cotton varieties with and without Tracer treatment for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Variety	Variety type	# worm trts.[a]	NAWF[b] (7/22)	% OLR[c] terminal damage (7/27)	Plants 1000's/acre	Plant vigor rating[d]	Yield lb lint/acre
PHY 410 R	Non-Bt	0	3.0 a	20.0 a	49.8 a	1.8 a	553 bc
PHY 410 R	Non-Bt	3	3.6 a	3.8 bc	50.3 a	2.0 a	672 ab
PHY 410 R	Non-Bt	1	3.8 a	17.5 a	47.9 a	2.5 a	417 c
PHY 470 WR	Bt	0	3.1 a	5.0 bc	47.9 a	2.0. a	756 a
PHY 470 WR	Bt	3	3.0 a	0.0 c	50.6 a	1.5 a	820 a
PHY 470 WR	Bt	1	3.2 a	10.0 b	51.5 a	2.0 a	768 a
LSD (P = 0.05)			NS	7.18	NS	NS	191.3
(P > F)			.1506	.0001	.9918	.6703	.0036

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

[a] Tracer 4SC (2.9 oz/acre) was applied July 2, 15, and 26 based on a non-Bt threshold and on July 26 based on a Bt threshold.

[b] NAWF = nodes above white flower

[c] OLR = Omnivorous leafroller

[d] Vigor ratings range from 1 = excellent growth up to 5 = slow growth.

Table 7. Fiber characteristics in Widestrike (PHY 470 WR transgenic Bt) and PHY 410 R (non-transgenic) cotton varieties with and without Tracer treatment for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Variety	Variety type	# worm trts.[a]	Micronaire	Length (inches)	Uniformity %	Strength	Elongation
PHY 410 R	Non-Bt	0	4.7 ab	1.10 a	84.3 a	33.1 a	6.45 c
PHY 410 R	Non-Bt	3	4.7 ab	1.08 a	83.8 a	33.7 a	6.53 c
PHY 410 R	Non-Bt	1	4.9 a	1.08 a	83.8 a	33.5 a	6.70 bc
PHY 470 WR	Bt	0	4.4 c	1.07 a	83.9 a	32.9 a	7.15 a
PHY 470 WR	Bt	3	4.5 bc	1.07 a	84.1 a	32.1 a	7.10 a
PHY 470 WR	Bt	1	4.4 c	1.09 a	83.5 a	33.0 a	7.07 ab
LSD (P = 0.05)			0.20	NS	NS	NS	0.395
(P > F)			.0017	.0943	.6558	.6014	.0039

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

[a] Tracer 4SC (2.9 oz/acre) was applied July 2, 15, and 26 based on a non-Bt threshold and on July 26 based on a Bt threshold.

Table 8. Plant growth and fruiting characteristics in Widestrike (PHY 470 WR transgenic Bt) and PHY 410 R (non-transgenic) cotton varieties with and without Tracer treatment for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

			Inches		Nodes/plant		
Variety	Variety type	# worm trts.[a]	plant height	internode length	veg.	fruiting	total
PHY 410 R	Non-Bt	0	35.5 a	2.0 a	5.7 a	11.5 a	17.3 a
PHY 410 R	Non-Bt	3	34.8 a	2.2 a	5.8 a	10.6 a	16.4 a
PHY 410 R	Non-Bt	1	35.3 a	2.1 a	5.4 a	11.7 a	17.1 a
PHY 470 WR	Bt	0	35.7 a	2.1 a	5.5 a	11.5 a	17.0 a
PHY 470 WR	Bt	3	33.5 a	2.0 a	5.7 a	11.0 a	16.6 a
PHY 470 WR	Bt	1	35.5 a	2.2 a	5.4 a	10.9 a	16.3 a
LSD (P = 0.05)			NS	NS	NS	NS	NS
(P > F)			.7979	.4575	.3500	.4905	.5518

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

[a] Tracer 4SC (2.9 oz/acre) was applied July 2, 15, and 26 based on a non-Bt threshold and on July 26 based on a Bt threshold.

Table 9. Plant growth and fruiting characteristics in Widestrike (PHY 470 WR transgenic Bt) and PHY 410 R (non-transgenic) cotton varieties with and without Tracer treatment for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

			% boll retention		Boll retention on fruiting branches (%)		
Variety	Variety type	# worm trts.[a]	positions 1&2	whole plant	1-5	6-10	11-15
PHY 410 R	Non-Bt	0	22.2 c	22.6 c	31.2 c	13.0 a	4.2 a
PHY 410 R	Non-Bt	3	30.0 b	28.3 bc	33.2 c	22.6 a	0.0 a
PHY 410 R	Non-Bt	1	20.8 c	22.9 c	29.8 c	16.0 a	12.3 a
PHY 470 WR	Bt	0	33.9 ab	31.5 ab	45.6 ab	14.8 a	0.0 a
PHY 470 WR	Bt	3	30.3 b	28.2 bc	37.2 bc	18.4 a	0.0 a
PHY 470 WR	Bt	1	37.5 a	35.3 a	49.4 a	19.6 a	0.0 a
LSD (P = 0.05)			6.80	6.39	10.49	NS	NS
(P > F)			.0006	.0051	.0050	.1334	.1971

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

[a] Tracer 4SC (2.9 oz/acre) was applied July 2, 15, and 26 based on a non-Bt threshold and on July 26 based on a Bt threshold.

Table 10. Plant growth and fruiting characteristics in Widestrike (PHY 470 WR transgenic Bt) and PHY 410 R (non-transgenic) cotton varieties with and without Tracer treatment for caterpillar control, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

Variety	Variety type	# worm trts.[a]	% boll retention on fruiting branches			
			Position 1	Position 2	Position 3	Position 4
PHY 410 R	Non-Bt	0	21.2 c	23.6 a	18.3 a	64.6 a
PHY 410 R	Non-Bt	3	36.8 b	18.7 a	23.4 a	0.0 b
PHY 410 R	Non-Bt	1	20.8 c	20.9 a	33.8 a	56.7 a
PHY 470 WR	Bt	0	39.3 b	26.3 a	16.6 a	0.0 b
PHY 470 WR	Bt	3	37.2 b	20.0 a	26.2 a	0.0 b
PHY 470 WR	Bt	1	47.4 a	20.8 a	16.8 a	16.7 b
LSD (P = 0.05)			6.31	NS	NS	38.01
(P > F)			.0001	.6182	.7340	.0040

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

[a] Tracer 4SC (2.9 oz/acre) was applied July 2, 15, and 26 based on a non-Bt threshold and on July 26 based on a Bt threshold.

EVALUATION OF COTTON PLANTED IN CONVENTIONAL AND SKIP-ROW PATTERN AT TWO POPULATION LEVELS

Arthur Mahalitc and Sons Farm, Colorado County, 2004

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Wharton, Columbus, and Corpus Christi, Texas

SUMMARY: Cotton yield was significantly reduced (238 lb lint/acre) in skip-row when compared with conventional planted cotton. No differences were found in lint yield when comparing 2 plant population levels under both planting patterns (43.5 thousand and 38.4 thousand plants/acre). Similar results were found on the Mahalitc Farm in 2003. Net returns were higher for the conventional planted cotton in both years.

OBJECTIVES: Certain inputs are reduced in skip-row cotton which led to comparison of this planting pattern with a conventional planting pattern. The field study was conducted to compare the yield and net returns of skip-row (2 planted with 1 skip) with conventional (solid) planted cotton.

MATERIALS/METHODS: The field study was conducted on the Mahalitc Farm south of Eagle Lake on FM Road 950, 0.5 miles south of the intersection of Highway 102. DPL 444 BG/RR variety cotton was planted in 8-row by 950 ft plots arranged in a 2x2 factorial experiment in a randomized complete block design with 3 replications. The experiment was planted in rows spaced on 36-inch centers with an 8-row John Deere MaxEmerge II vacumeter planter on March 30, 2004 on land where corn had been grown in 2003. In order to obtain analysis of similar plant populations/acre, seeding rates to achieve target populations of 52.3 thousand and 34.8 thousand plants/acre (66% of the higher population) were planted. The skip-row pattern was achieved by not planting single rows outside the center 2 rows (rows 3 and 6), and all data including yield for both row spacings were collected from the center rows of plots.

Treatment effects were assessed by (1) counting the number of plants on 14.52 row feet in the solid planted and 9.68 row feet in the skip-row at 3 locations in each plot, (2) determining flowering dates and nodes above white flower with COTMAN, (3) measuring final plant height, and (4) harvesting the center 2 rows in plots with a spindle picker and weighing these samples on a portable scale weigh wagon on September 23 and obtaining samples to gin on a 10-saw Eagle Laboratory machine for % lint, and (4) sending lint samples to the International Textile Center at Lubbock for fiber analysis.

A partial budget was developed for the economic analysis. Only the costs that vary between the treatments were considered in this approach. Net advantage per acre was considered to be the difference in treatment variable costs subtracted from the difference in the crop value for the respective treatments.

Input savings included seed, technology fee, in-furrow insecticide, banded herbicide application and picking charge per acre. The test was planted at (52,300 seeds per acre conventional and 34,800 seeds per acre skip-row). These same 2 plant populations were repeated on each planting pattern. Temik 15G was applied at 3.0 lbs/acre.

Four row harvesting equipment was used, and it was assumed that four rows of cotton were picked without operating a picker head in an unplanted row. The efficiency of the skip-row picking operation was assumed to increase 24% in relation to conventional planted due to this modification. The cost of the assumed picker modification was included in the partial budget.

RESULTS/DISCUSSION: Days to cutout were not statistically affected by plant population or planting pattern (Table 1). Numerically, the skip-row cotton was 1.5 days later to cutout. Final plant height was not affected by plant population or planting pattern (Table 2), although numerically, the skip-row cotton was slightly taller. Significantly more cotton lint was produced in the solid-plant pattern (Table 3). Except for elongation, no differences were found in cotton fiber characteristics (Table 4).

Net returns for conventional planted cotton were $88.36 per acre higher than skip-row due to increased lint and cotton seed yields when valued at loan rate (Table 5). Calculated loan rates using 41-4 color and leaf along with HVI measurements was 54.60 cents/lb for both conventional and skip-row cotton. The $88.36 per acre advantage for conventional planted cotton takes into account lower outlays for seed and technology fees, in furrow insecticide cuts, banded herbicides costs, increased picking efficiency, and lower ginning costs per acre for skip-row production.

ACKNOWLEDGMENTS: We appreciate the Mahalitc family for their continued support, labor, and equipment in conducting this field study. A special thanks is given to Jim Bosch, Technical Service Agronomist, Delta Pine Land Company, for his help with harvest.

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Table 1. Days to cutout in skip-row and conventional planted row patterns at 2 population levels, Mahalitc Farm, Colorado County, TX, 2004.

Plant population (1000's/acre)				
target	actual	Skip-row	Solid-plant	P > F .8833
52.3	43.5	105.3	105.7	105.5 a
34.8	38.4	107.3	104.0	105.7 a
P > F .2174		106.3 a	104.8 a	

Table 2. Final plant height in skip-row and conventional planted row patterns at 2 population levels, Mahalitc Farm, Colorado County, TX, 2004.

Plant population (1000's/acre)				
target	actual	Skip-row	Solid-plant	P > F .3765
52.3	43.5	39.0	38.0	38.5 a
34.8	38.4	39.7	37.3	38.5 a
P > F 1.000		39.3 a	37.7 a	

Table 3. Cotton lint (lb/acre) from skip-row and conventional planted row patterns at 2 population levels, Mahalitc Farm, Colorado County, TX, 2004.

Plant population (1000's/acre)				
target	actual	Skip-row	Solid-plant	P > F .9493
52.3	43.5	924	1185	1055 a
34.8	38.4	943	1159	1051 a
P > F .0062		934 b	1172 a	

Means in columns and lines followed by the same letter are not significantly different by ANOVA factorial analysis at (P = 0.05).

Table 4. Cotton fiber characteristics from skip-row and conventional planted row patterns at 2 population levels, Mahalitc Farm, Colorado County, TX, 2004.

Plant population (1000's/acre)		Row-spacing			
target	actual	skip-row	solid-plant	Avg.	P > F
		micronaire			
52.3	43.5	4.167	4.133	4.150 a	.6452
34.8	38.4	4.167	4.233	4.200 a	
P > F = .8770		4.167 a	4.183 a		
		staple length			
52.3	43.5	1.17	1.16	1.16 a	.0683
34.8	38.4	1.15	1.15	1.15 a	
P > F = .3097		1.16 a	1.15 a		
		uniformity			
52.3	43.5	84.4	84.6	84.5 a	.9786
34.8	38.4	84.3	84.7	84.5 a	
P > F = .6518		84.4 a	84.7 a		
		strength			
52.3	43.5	32.7	31.8	32.2 a	.4569
34.8	38.4	31.4	31.6	31.5 a	
P > F = .7112		32.0 a	31.7 a		
		elongation			
52.3	43.5	6.3	6.5	6.4 a	.5239
34.8	38.4	6.4	6.6	6.5 a	
P > F = .0262		6.3 b	6.6 a		

Means in columns and lines followed by the same letter are not significantly different by ANOVA factorial analysis at (P = 0.05).

Table 5. Partial budget production costs for conventional and skip-row planted cotton, Texas Upper Gulf Coast, 2004.

	Conventional	Skip-Row	
Yield (lint pounds/acre)	1185	943	
Turnout	36.00%	36.00%	
Seed cotton yield (lbs per acre)	3292	2619	
Cotton seed yield (lbs per acre)	1896	1509	
Lint value per acre at loan	$ 647.01	$ 514.88	$ 132.13
Cotton seed value per acre @ $90/ton	$ 85.32	$ 67.91	$ 17.41
Seed cost ($ per acre)	$ 20.91	$ 13.91	($ 7.00)
Technology fee ($ per acre)	$ 26.86	$ 17.87	($ 8.99)
In furrow insecticide cost ($ per acre)	$ 9.90	$ 6.60	($ 3.30)
Banded herbicide cost ($ per acre)	$ 8.09	$ 5.39	($ 2.70)
Calculated picking charge ($ per acre)	$ 64.15	$ 46.74	($17.41)
Ginning cost per acre	$106.65	$ 84.87	($21.78)
Advantage for conventional per acre			$ 88.36

BOLLWORM AND TOBACCO BUDWORM PHEROMONE TRAP CATCHES

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: Pheromone traps for bollworm and tobacco budworm were inspected daily for 27 weeks beginning March 18 extending through September at the Texas Agricultural Experiment Station near Corpus Christi, Texas. The abundance of bollworm far exceeded that of tobacco budworm in 2004; trap catch averaged 11.2 and 0.6 moths/day for bollworm and tobacco budworm, respectively. Generally, the trap catch reflected the higher relative abundance of bollworm in cotton fields in the Lower Coastal Bend until mid-July when tobacco budworm made up the highest percentage of the 2 species in nearby cotton fields. However, only a slight increase in tobacco budworm moths was observed during that period in pheromone traps.

The most valuable aspect of pheromone trap operation in 2004 was a collecting source for bollworm moths to be tested for susceptibility to pyrethroid insecticide and Cry1Ac protein. Increased tolerance to pyrethroid insecticide was observed about the same time that less effectiveness was observed in cotton fields south of Corpus Christi. The observation increased confidence in the decision to switch to other chemistry for control of field populations of the species. Additionally, bollworm moths were sent to the USDA Laboratory at Stoneville, MS for Cry1Ac protein (Bt) susceptibility testing.

OBJECTIVES: Pheromone traps were operated to measure the relative abundance of moths attracted to the traps and to obtain a supply of bollworm moths for testing susceptibility to pyrethroid insecticide. In addition, bollworm moths were sent to the USDA Laboratory in Stoneville, MS to monitor susceptibility of the species to Cry1Ac protein of *Bacillus thuringiensis* (Bt). The male moths captured in pheromone traps were mated with lab reared moths at Stoneville to obtain larvae for the evaluation.

MATERIALS/METHODS: Two Hardstack Moth-ZV 30-inch screen wire cone traps each were deployed and equipped with pheromone for the bollworm and tobacco budworm at the Texas Agricultural Experiment Station, Corpus Christi, Texas. Traps were checked daily from March 18 through September 30 and pheromone was changed on a monthly basis. When enough bollworm moths were captured, live samples were sent to the USDA Laboratory at Stoneville, MS for determination of susceptibility to Cry1Ac protein (Bt), or moths were tested for susceptibility to pyrethroid insecticide at our location.

RESULTS/DISCUSSION: The average daily pheromone trap catch each week for bollworm and tobacco budworm is shown in Fig. 1. Abundance of bollworm far exceeded that of tobacco budworm. Trap catches averaged 11.2 and 0.6 moths/day for bollworm and tobacco budworm respectively. It was not until late July that the tobacco budworm count was equal or slightly greater than bollworm. No observable peaks of tobacco budworm were defined until these late dates. Peak bollworm moth numbers occurred April 9, May 7 and 28, and June 18. Generally cotton field infestations reflected the predominance of bollworm until after mid-July when cotton field infestations were nearly all tobacco budworm; generally these infestations were confined to the very latest planted cotton.

Bollworm moths were used to measure their susceptibility to pyrethroid insecticide. Increased tolerance was observed in these moths at about the same time it became more difficult to obtain a high level control of bollworm in cotton fields south of Corpus Christi. Results of those studies are reported elsewhere. Bollworm moths were also sent to the USDA Laboratory at Stoneville, MS for susceptibility to Bt Cry1Ac protein. Results of the Cry1Ac testing are reported each year at the Beltwide Cotton Conferences and are published in the proceedings.

ACKNOWLEDGMENTS: Thanks are extended to Mike Hiller, Demonstration Assistant, for his help in maintaining traps, changing pheromone, counting and testing moths, packaging moths for shipment, and other help with trap operation.

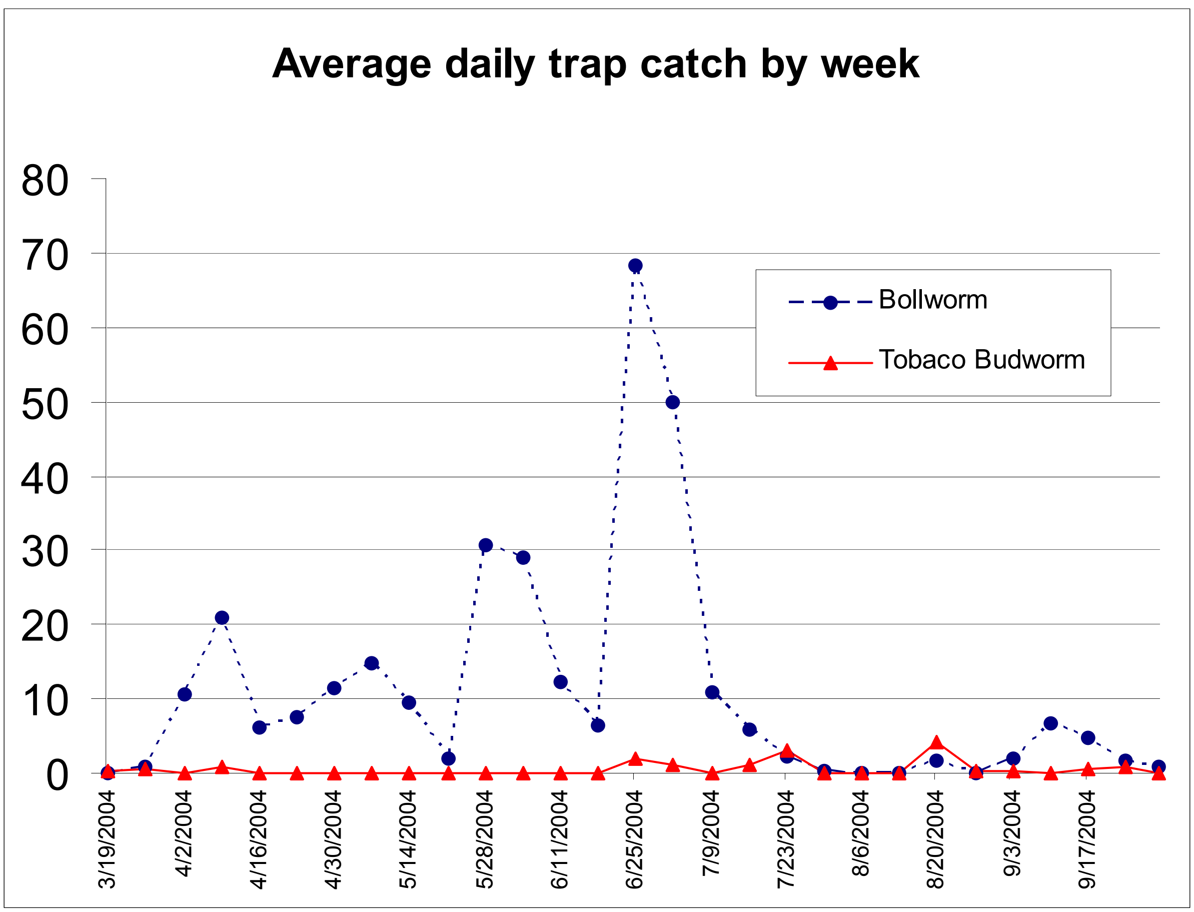

Fig. 1. Bollworm and tobacco budworm moths captured in pheromone traps, Texas Agricultural Experiment Station, Nueces County, TX, 2004.

PERSPECTIVES ON BOLLWORM MANAGEMENT IN COTTON GROWN IN THE COASTAL BEND REGION OF TEXAS DURING 2003 AND 2004

Texas Agricultural Experiment Station, Nueces County, 2004

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SUMMARY: Cotton bollworm, *Helicoverap zea* (Boddie),was problematic in cotton grown in the Coastal Bend region of Texas during 2003 and 2004. Infestations of this pest species in cotton over the past two growing seasons have been both unusually high in density and prolonged in presence. The first pyrethroid insecticides applied to cotton provided effective control, but for the second growing season in a row it became more difficult to obtain a high level of bollworm control with the pyrethroids during the month of June. It was not uncommon for cotton fields to experience bollworm egg-lays and development of multi-instar larval populations for continuous periods of 3 or more weeks. Additionally, cotton grown during these two seasons was subjected to frequent rainfall making it difficult to optimize insecticidal control of bollworm due to delays in making needed insecticide applications, reduced residual effectiveness of foliar-applied insecticides (i.e., "wash-off" effect), and mitigated insecticidal coverage of bollworm feeding sites due to lushness of plant canopy. Also similar to 2003, substantial acreage of sorghum had been treated for headworm (bollworm) about one month before field failures were experienced in cotton.

Moths collected from pheromone traps in Nueces County and exposed to 8 different pyrethroid concentrations in treated vials showed them to have increased tolerance to the insecticide. Unlike 2003, generally higher insecticide rates were used in cotton from the beginning; therefore, the lack of control is generally not suspected of being caused by inadequate rates on the targeted larvae.

Bollworm larvae exposed in the vials had a higher tolerance to the pyrethroid insecticide than from any of the other 6 Texas locations. However, by late season moth susceptibility to the insecticide had returned to much more moderate levels. The high tolerance levels probably will not carry into the 2005 season, but pest managers should be vigilant in watching for signs of more difficulty in killing high percentages of bollworm especially during June. We plan to conduct tests on moths which might alert the community to developing problems.

OBJECTIVE: Due to the relative low cost of pyrethroid insecticide and past effectiveness, it is considered to be an important product for management of bollworm in cotton. Bollworm moths were tested to monitor susceptibility to pyrethroid insecticide.

MATERIALS/METHODS: During the 2003 and 2004 growing seasons, resistance levels were quantified/qualified by conducting the standardized bollworm adult vial test with pheromone trap collected moths.

Moths collected early each morning from wire cone Hartstack traps baited with pheromone lures were fed a 10% sugarwater solution for 0 to 50 minutes. Following this resting period, one moth each was placed into insecticide coated 20 ml glass scintillation vials and held 24 hours for evaluation. In 2004 moths were exposed to cypermethrin concentrations of 0, 0.3, 1, 3, 5, 10, 30, 60 and 100 micrograms per vial. Vials were placed in a rack and held at room temperature (74-75°F) at a 45° 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 the Toxicology Laboratory, Department of Entomology, Texas A&M University, College Station, Texas for further analysis.

A total of 1,368 moths were tested (152 moths/exposure level) over the period beginning April 23 through September 14. This number of moths is enough to provide an acceptable assessment of the susceptibility status through early July. The fewer moths tested in September (108 or 12 at each concentration) may not have been adequate.

RESULTS/DISCUSSION: A significant portion of the bollworm population was found to exhibit elevated levels of tolerance/resistance to pyrethroids (Fig. 1). Mortality of moths and resulting probit analysis from 7 Texas counties (including Nueces) is shown in Fig. 1. Lines more to the right in the figure indicate lower mortality rates. It was evident from the individual test date data that Nueces County moths were more difficult to kill during June, but it does not indicate what the situation will be in early 2005. Similar mortality lines were found in 2003 (Fig. 2). Results from this adult vial test monitoring program showed that, during the months of June and July, survival levels in test-populations of bollworm moths commonly exceeded 20% at diagnostic cypermethrin dosages of 5 and/or 10 µg per vial. Results from the local adult vial test monitoring program, coupled with the seasonal timing of difficulty in obtaining adequate control of bollworm with pyrethroids, suggests that resistance to pyrethroids by bollworm in Coastal Bend cotton may be somewhat ephemeral (short lived), and aggravated by the spraying of pyrethroids in locally grown grain sorghum. Results from the adult vial test program during 2004 showed that moth survival levels at 5 and/or 10 µg dosages were well below 20% during the early/middle months of cotton growth (i.e., March - May), greater than 20% during middle/late stages of the season (June and July), and then receding to < 20% by early September (Fig. 3).

In 2004, it was estimated that 78% of the grain sorghum grown in Nueces County received at least one pyrethroid application for stink bugs and/or headworms (bollworm) during the month of May. The widespread use of pyrethroids in Coastal Bend grain sorghum may have been a key source of selection pressure, inducing increased levels of pyrethroid resistance in bollworm populations destined to move into local cotton during June through early-July. Beginning at about the 2nd/3rd week of flowering in Coastal Bend cotton, the presence of significant levels of pyrethroid-resistance necessitated the switch to insecticides with action mechanisms different from that of pyrethroids, e.g., emamectin (Denim™), indoxacarb (Steward™) and spinosad (Tracer™). Tank-mixtures of the aforementioned "alternative" chemistries with low egg/larval rates of pyrethroids also proved to be effective vs. pyrethroid-resistant bollworms in Coastal Bend cotton during 2004 (i.e., the small amount of pyrethroid in the mixture contributing to contact-active kill of eggs, hatchlings and moths).

ACKNOWLEDGMENTS: Appreciation is expressed to Dr. Patricia Pietrantonio and to Terry Junek, 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 presentation. Dr. Pietrantonio is the leader for this project for the state of Texas.

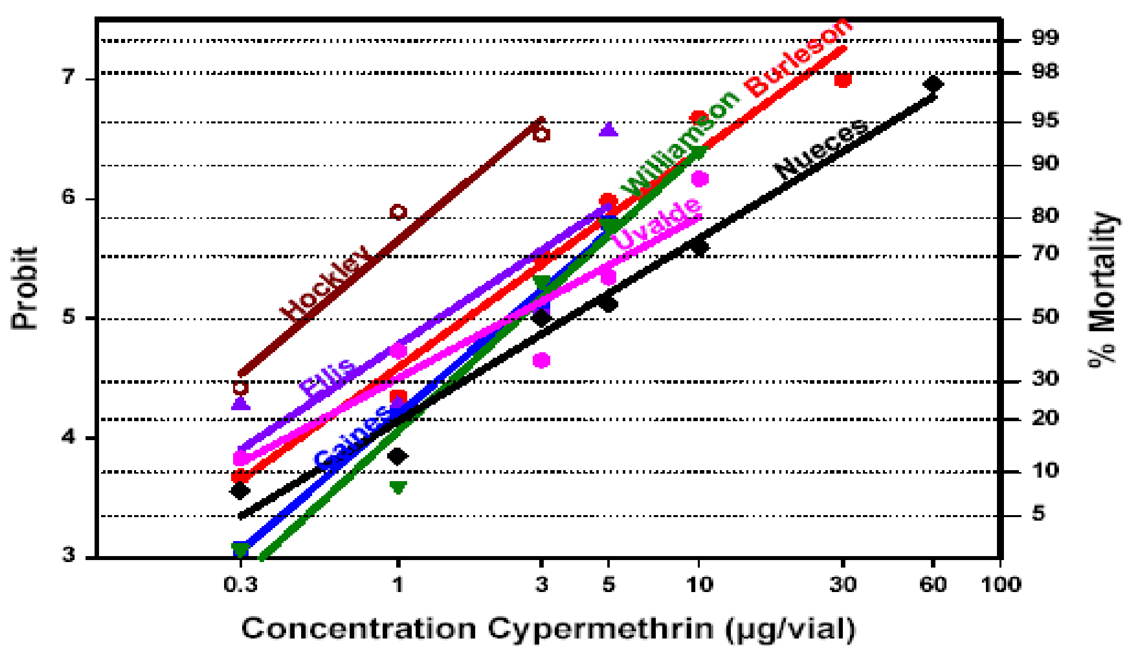

Fig. 1. Cypermethrin mortality regression lines at 24 hours for male bollworm moths collected in various Texas counties, 2004.

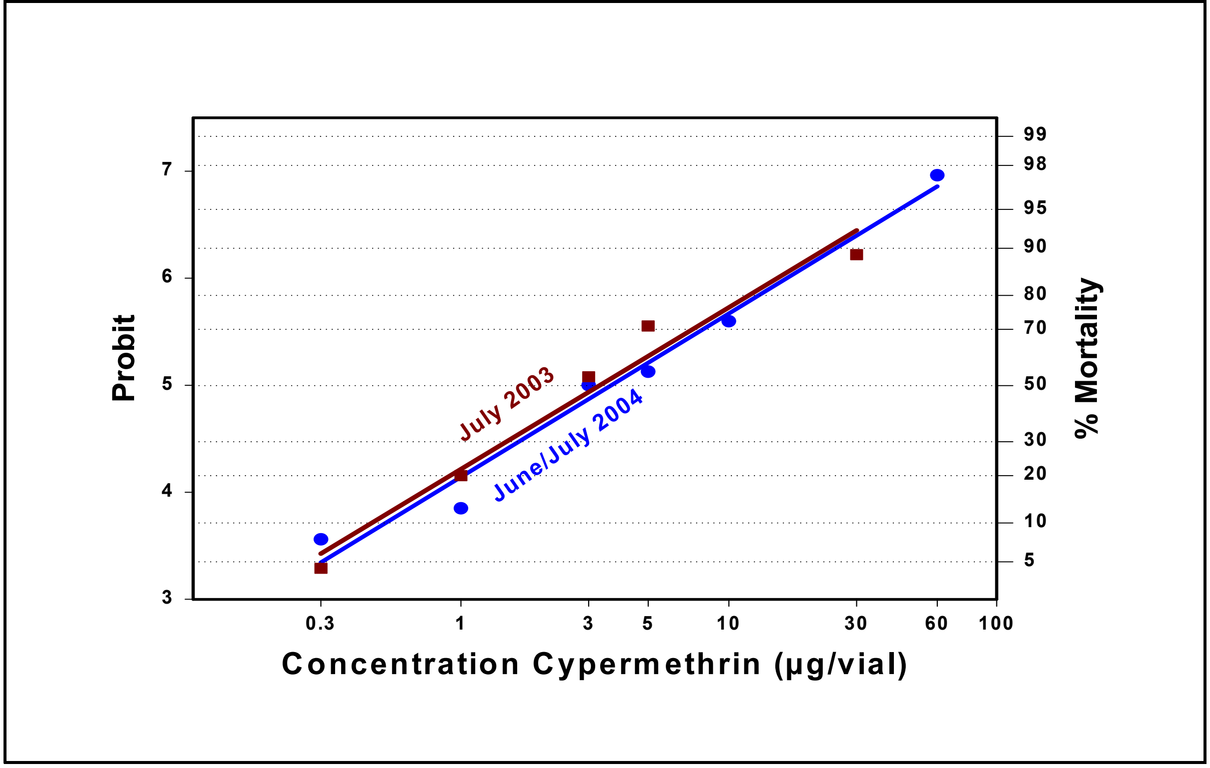

Fig. 2. Cypermethrin mortality regression lines at 24 ours of male bollworm moths from Nueces County comparing 2003 and 2004.

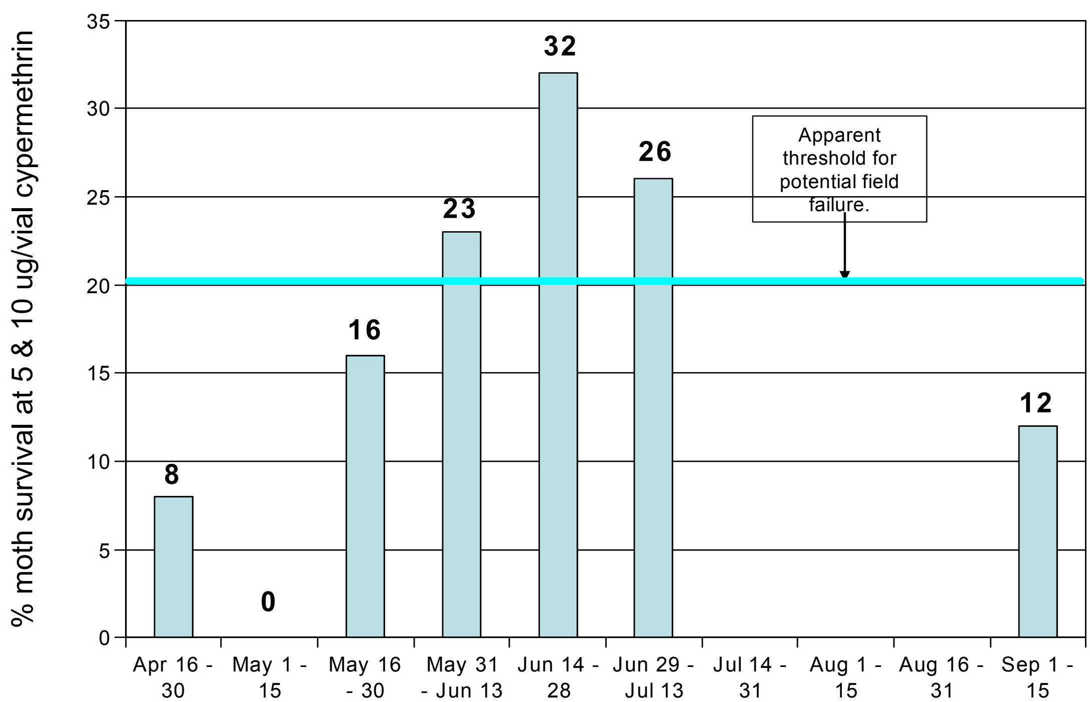

Fig. 3. Bollworm moth survival at 5 and 10 ug/vial cypermethrin in adult vial test, Nueces County, 2004.

The following paper was published in the 2004 proceedings of the Beltwide Cotton Conferences. Participation from our area consisted of moths sent during the 2003 season to USDA, Stonvelle, MS, for evaluation. A long list of authors and their affiliations were not included except for the USDA authors who headed the studies.

BACILLUS THURINGIENSIS RESISTANCE MONITORING PROGRAM FOR TOBACCO BUDWORM AND BOLLWORM IN 2003

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Abstract
The susceptibility of the tobacco budworm (*Heliothis virescens* [F.]) and bollworm *(Helicoverpa zea* [Boddie]) populations from 14 cotton-producing states to Cry1Ac protein of *Bacillus thuringiensis* was monitored for the eighth consecutive year in 2003. The survivorship of first generation larvae obtained from mass mating males captured in pheromone traps near cotton fields (wild population) with laboratory-adapted females (susceptible strain), was determined at 2 diagnostic concentrations for each species plus an untreated control. Survivorship of those larvae was compared to survivorship of the laboratory strain.

Survival of the 40 strains of *Heliothis virescens* and 97 strains of *Helicoverpa zea* tested between April and October, 2003 was not elevated above that in the susceptible strain using current methodology. However, the current method does have limitations, and additions and modifications to that methodology are discussed.

Introduction
Controversy about insect resistance management (IRM) has arisen since the deployment of transgenic cotton, but at the grower level, acceptance of this technology has been rapid constituting an example of how these plants can transform the agricultural landscape. In the U.S. currently, transgenic cotton represents 73% of the planted area (Aldhous 2003) Because transgenic cotton constantly expresses the Cry1Ac protein from *Bacillus thuringiensis* Berliner (Bt), and the widespread and prolonged exposure to Bt proteins provides a constant selection pressure, representing one of the largest selections for resistance development in insect populations the world has ever seen (Tabashnik et al. 2003). In the U.S., an IRM strategy for Bt cotton was mandated by the Environmental Protection Agency that is based on the premise that the transgenic plants express a “high dose” of the protein and implementation of a structured refuge will mitigate the likelihood of resistance evolution (Environmental Protection Agency 2001). This strategy is believed to have helped maintain the susceptibility of target pests such as tobacco budworm and pink bollworm (*Pectinophora gossypiella* [Sauders]) to the Cry1Ac protein in current commercial varieties (BollGard®). The detection of resistance development to transgenic cotton plants expressing *Bacillus thuringiensis* toxins is an important consideration for the

preservation of this technology. Since 1996, a program has been conducted yearly in the major cotton areas of the U.S. to monitor resistance of target insects to the *Bacillus thuringiensis* Cry1Ac protein in transgenic cotton plants. This program, which has been continuously expanded and improved, now covers 14 states, and involves more than 30 researchers who contribute important information to industry and the US Environmental Protection Agency. Results from this program in 2003 are included in this report.

Materials and Methods

For the Beltwide monitoring program, male bollworms (*Helicoverpa zea* [Boddie]) and tobacco budworms were captured in pheromone traps near cotton fields throughout the U.S. cotton region (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia) (Table 1) and shipped overnight to the Southern Insect Management Research Unit, of the USDA Agricultural Research Service in Stoneville, MS in pint-size cardboard containers (< 40 males / container). Those moths were mass-mated with laboratory reared females (Cry1Ac susceptible colony) in carton buckets containing < 40 males and 40 females each. Moths were fed 10% sugar solution and maintained at 28 ± 2 ºC , 65 ± 5% RH, under 14:10 h L:D luminosity. Females, in general, laid eggs on a piece of cheese cloth on top of each bucket. Egg sheets were replaced daily. On the second day of high oviposition, generally the 4th day after placing males and females together, eggs were washed from the cloths, dried on filter paper and set to hatch inside a 472-ml clear plastic container in an incubator under the same environmental conditions as previously described. Cry1Ac protein, obtained from MVP II® insecticide, was incorporated into Bio-Serv® diet at 0.05 and 0.1 µg of Cry1Ac per ml of diet for tobacco budworm and 100 and 250 µg per ml for bollworm. Neonates were placed on each treatment in individual 30-ml diet cups containing either 5 ml of Cry1Ac treated or 10 ml of control diet. In addition, neonates from a susceptible colony were placed on diet with each concentration. Larvae were kept in a room with controlled environmental conditions as previously described. Mortality, assessed as larvae not moving after probed, was recorded 7 days later. Data presented in this report, except for Table 5, have not been transformed.

Additions and Modifications Made in 2003

1) To lower the mortality occurring on control diet, the survivorship and development of tobacco budworms and bollworms was compared between 4 replications of 15 30-ml cups containing either 5 ml or 10 ml of diet and 4 replications of 16 1-ml micro-wells. These tests were repeated 3 times for the first and 4 times for the second mentioned insect. Larval mortality and weight was recorded 7 days later.
2) The rating mortality was evaluated by comparing values obtained considering larval “death,” if it was not able to move after being probed, versus larvae “weighing equal to or less than” the original neonate weight (new method). For these tests (10 performed on tobacco budworm and 4 on bollworm), 4 replications of 15 30-ml cups or 4 replications of 16 1-ml micro-wells were setup with each diagnostic concentration. Mortality was assessed 7 days after inoculation.
3) One extra diagnostic concentration was incorporated into the program for each

species following discussions with key stakeholders of this program. The new diagnostic concentrations were 0.1 µg of Cry1Ac / ml of diet for *H. virescens* and 100 µg / ml for *H. zea*. Rates utilized in the past (0.05 µg for TBW and 250 µg for BW) were retained throughout the entire season. The goal of including these concentrations was to test an intermediate value for BW and a higher one for TBW that perhaps more accurately discriminate resistant individuals. New concentrations may be further adjusted in 2004 to provide a more accurate discrimination of "tolerant" individuals.

Results and Discussion

Based on results of the experiments of different containers [1)], testing was conducted on 30-ml cups instead of the previously used 16-microwell plates. This change was implemented in June 2003 and lasted for the duration of the testing season. Mortality on non-treated diet was significantly reduced in 30-ml cups compared to 16-microwell plates (Table 2). This change decreased confinement of larvae and simplified preparation and larval inoculation for the laboratory personnel. In the mortality rating experiment [2)], mortality values were higher for both diagnostic concentrations using larval weight as a measure of survivorship, while percent mortality on non-treated diet was not affected (Table 3). The impact was less apparent with tobacco budworm than with bollworm. This is probably a result of differences in the relative susceptibility of these species to *B. thuringiensis* (Luttrell et al. 1999). Individually weighing each surviving larvae is a time-consuming task, but results obtained from this methodology will increase our knowledge of the performance of these insects exposed to Bt-treated diet. In 2003, 40 strains of tobacco budworm and 97 strains of bollworm were tested. The majority of the strains (100% tobacco budworm and 94.8% bollworm) did not demonstrate increased tolerance to Cry1Ac compared with the susceptible colony. All data not included, only averages (Table 4). However, there were 5 strains of bollworm (1 from FL, 2 from LA, and 2 from VA) that exhibited elevated tolerance (>10%) to at least one diagnostic concentration. Mortality on Cry1Ac treated diet ranged from 10.8% to 65.5% on the 100 µg / ml concentration and 6.4% to 41.8% on the 250 µg / ml concentration. Mortality of these strains on each treatment was corrected for mortality on the non-treated diet using Abbott's formula (Abbott 1925). Corrected mortality in those strains was compared to corrected mortality in the susceptible strain using a two sample paired t-test. Differences between field strains and the laboratory strain were not significantly different ($P>0.05$) (Table 5). Small changes in tolerance to Cry1Ac in bollworm have been already documented with the data generated from this program (Hardee et al. 2001). The limitation of utilizing this methodology restricted us to detect resistance to Cry1Ac only if the resistance trait in males coming from the field is dominant or sex-linked. Additional changes to the program will address these issues in the future.

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Disclaimer

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Table 1. Counties / Parishes represented by State in the *Bacillus thuringiensis* resistance monitoring program for 2003.

STATE	COUNTY / PARISH
ALABAMA	Henry.
ARKANSAS	Ashley, Desha, Drew, Little River, and Mississippi.
FLORIDA	Gadsden.
GEORGIA	Berriem, Burke, Colquitt, Irwin, Montgomery, Tift, Turner and Sumter.
LOUISIANA	Catahoula, Franklin, Rapides, Richland, and Tensas.
MISSISSIPPI	Calhoun, Lee, Monroe, Noxabee, and Washington.
NORTH CAROLINA	Washington.
NEW MEXICO	Curry.
OKLAHOMA	Harmon and Jackson.
SOUTH CAROLINA	Darlington, Dillon, Florence, Lee, Marion, Marlboro, Mitchell, and Sumter.
TENNESSEE	Madison
TEXAS	Burleson, Lubbock, and Nueces.
VIRGINIA	Accomack, Essex, King and Queen, New Kent, Northampton, Prince George,Southampton, and Suffolk.

Table 2. Percent control mortality and larval weight 7 days after the initiation of the bioassay comparing neonates confined in 30-ml diet cups[1] and micro-wells[2].

30-ml cups with 5 ml of diet		30-ml cups with 10 ml of diet		Micro-wells with 1 ml of diet	
% Mortality	Larval weight (g)	% Mortality	Larval weight (g)	% Mortality	Larval weight (g)
		***Helicoverpa zea*[3]**			
7.8	0.0522	9.9	0.1033	33.1	0.0633
		Heliothis virescens			
6.6	0.0930	10.0	0.1237	7.8	0.1486

[1]Solo® cups.
[2]C-D International, Inc.
[3]Average of 4 tests.

Table 3. Differences in percent mortality obtained utilizing 2 assessment criteria: 1) inspecting larvae for mobility (larva moves after probing) and 2) failure to gain weight (≤ to the initial neonate weight).

***Helicoverpa zea* Percent Mortality[1]**					
Larva moves			Larva does not gain weight		
Control diet	100 µg/ml	250 µg/ml	Control diet	100 µg/ml	250 µg/ml
5.3 %	43.9 %	67.3 %	5.3 %	68.3 %	90.0 %
***Heliothis virescens* Percent Mortality[2]**					
Control diet	0.05 µg/ml	0.1 µg/ml	Control diet	0.05 µg/ml	0.1 µg/ml
19.7 %	42.1 %	40.5 %	20.2 %	45.9 %	45.2 %

[1]Average of 4 tests.
[2]Average of 10 tests.

Table 4. Average mortality of *Helicoverpa zea* and *Heliothis virescens* larvae exposed to different diagnostic concentrations containing *Bacillus thuringiensis* Cry1Ac protein for 7 days.

	Field strain[1]			Susceptible colony		
	Helicoverpa zea					
Location (number of tests)	**0 µg**	**100 µg**	**250 µg**	**0 µg**	**100 µg**	**250 µg**
ALABAMA (1)	0.0	80.0	73.0	6.3	81.8	86.3
ARKANSAS (14)	9.8	73.2	79.6	4.6	72.2	77.8
FLORIDA (3)	7.0	61.0	66.0	4.0	72.0	79.0
GEORGIA (1)	8.0	90.0	93.0	1.0	92.0	93.0
LOUISIANA (4)	4.0	67.0	90.0	6.0	92.5	96.0
MISSISSIPPI (20)	5.3	86.3	88.3	5.3	85.5	89.1
NORTH CAROLINA (3)	16.0	79.0	88.0	6.0	80.0	88.0
NEW MEXICO (2)	3.0	80.0	97.0	6.0	92.0	93.0
OKLAHOMA (8)	5.0	79.0	80.0	8.0	79.0	84.0
SOUTH CAROLINA (2)	1.0	74.0	74.0	12.0	79.0	78.0
TENNESSEE (5)	8.0	86.0	88.0	9.0	80.0	88.0
TEXAS (27)	13.0	71.0	74.0	9.0	80.0	84.0
VIRGINIA (7)	7.0	68.0	74.0	5.0	78.0	86.0
	Heliothis virescens					
	0 µg	**0.05 µg**	**0.1 µg**	**0 µg**	**0.05 µg**	**0.1 µg**
ALABAMA (2)	15.0	35.0	38.0	3.0	12.0	18.0
ARKANSAS (4)	14.5	37.0	39.5	16.5	44.5	58.0
FLORIDA (1)	0.0	7.0	20.0	3.0	12.0	18.0
MISSISSIPPI (10)	20.3	63.0	62.2	7.0	42.9	51.6
TEXAS (22)	14.0	42.0	52.5	12.5	46.0	52.5

[1]F1 progeny obtained by crossing wild males captured in pheromone traps with Cry1Ac susceptible females reared under laboratory conditions.

Table 5. Analysis (Two sample paired t-test) of *Helicoverpa zea* mortality of field[1] strains that demonstrated elevated survivorship to 2 *Bacillus thuringiensis* Cry1Ac protein diagnostic concentrations compared with a laboratory (susceptible) strain.

	100 µg/ml		250 µg/ml	
Location and date of cross	**Field**	**Susceptible**	**Field**	**Susceptible**
Florida (21 Aug 03)	41.7 a *P*=0.8892	50.8 a	48.4 a *P*=0.9857	64.1 a
Louisiana (17 Jul 03)	58.8 a *P*= 0. 9654	92.5 a	83.8 a *P*= 0.8911	98.2 a
Louisiana (20 Jul 03)	71.6 a *P*= 0.9315	91.4 a	86.6 a *P*= 0.8732	93.3 a
Virginia (22 Jul 03)	81.2 a *P*= 0.7880	91.4 a	70.6 a *P*= 0.9829	93.3 a
Virginia (05 Sep 03)	56.6 a *P*= 0.9901	89.5 a	74.9 a *P*= 0.9868	98.2 a

[1] First generation obtained from mass mating males obtained from pheromone traps near cotton fields with laboratory adapted (susceptible) females.
Means in a row by treatment followed by the same letter are not significantly different (*P*= 0.05).

BOLL WEEVIL NUMBERS IN PHEROMONE TRAPS IN NUECES AND SAN PATRICIO COUNTIES COMPARING YEARS BEFORE AND DURING THE ERADICATION PROGRAM

Roy D. Parker
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Corpus Christi, Texas

SUMMARY: The year 2004 marked the 7th full season of the boll weevil eradication effort in the South Texas/Wintergarden Boll Weevil Eradication Zone. Progress each year until the 2004 season was evident in our traps, but eradication progress was slowed this season. The 2004 year marked the first year since initiation of the program that a decline in their numbers was not achieved. Trap catches in 2004 were slightly lower than 2002, and it amounted to 8.3 times as many/trap as captured in 2003. The current situation is of great concern since boll weevil numbers have increased. All captures represented in the Texas Cooperative Extension traps occurred east of Alfred in Jim Wells County. This trap line appears to be just north of substantial catches in the southern areas of the eradication zone.

OBJECTIVE: Pheromone traps were operated to evaluate the impact of boll weevil eradication on relative population levels.

MATERIALS/METHODS: A total of 18 traps were operated at 3 locations from 1988 - 2001. Since 2002 a total of 24 traps have been in place. Traps are deployed as follows: Welder Wildlife Foundation north of Sinton (10 traps), south of Orange Grove and east of Alfred (5 traps) and west of Clarkwood (9 traps). Traps were inspected weekly and pheromone + insecticide strip were changed every other week. The data used before eradication was collected by Segers et al. during a 6-year period (1977-1982).

RESULTS/DISCUSSION: Early season boll weevil numbers were actually higher in 1998, the first full season of boll weevil eradication (BWE), compared with the pre-eradication trap captures (Table 1). A series of warm winters is believed to have contributed to increased boll weevil activity just before and in the early years of BWE. The BWE program was operated as a “fall” treatment program in the South Texas/Wintergarden zone in 1996 and 1997. During the mid-season of 1999 boll weevils increased to greater numbers than 1998 for the last 5 months of the year. Favorable weather conditions, rainfall that resulted in poor stalk destruction and relatively high thresholds for treatments all contributed to this increase. In 2000 a more aggressive treatment program was initiated; since that time boll weevil numbers have steadily declined based on the month by month comparison until the 2004 season. In 2004, boll weevil numbers for the season averaged 8.3 times the numbers captured in pheromone traps in 2003.

A summary of boll weevil numbers captured in BWE Foundation traps through December, 2004 is provided in Table 2. Increased numbers of boll weevils were observed by all district offices, except Victoria, within the zone (Table 2). Areas of particular concern include the Uvalde and Kingsville districts. Factors accounting for the increased problems include (1) larger numbers migrating form the Lower Rio Grande Valley in both 2003 and 2004, (2) more favorable weather conditions for winter survival and reproduction in late 2003, (3) increased rainfall which interfered with early season insecticide application, (4) fields that were not initially found by Foundation personnel, and (5) other logistical problems with program operation.

ACKNOWLEDGMENTS: Thanks are extended to Rudy Alaniz and Mike Hiller for inspecting traps on certain dates during the year.

Table 1. Boll weevils per pheromone trap per month, Texas Cooperative Extension operated traps, 1998-2004.

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

[a] Traps operated by Segers et al.

Table 2. Boll weevil pheromone trap catches, year to date through October 31, 2004 Texas Boll Weevil Eradication Foundation.

	Year					
Location	1999	2000	2001	2002	2003	2004
Uvalde	1.92	0.13	0.03	0.034	0.468	3.02
Robstown	1.34	1.47	0.06	0.022	0.048	0.14
Sinton	1.16	0.84	0.03	0.003	0.004	0.01
Kingsville	0.88	1.77	0.45	0.802	0.423	1.96
Victoria	1.61	1.00	0.34	0.266	0.214	0.11
Zone total	1.35	1.14	0.16	0.135	0.138	0.66

2004 LOWER GULF COAST STANDARD GRAIN SORGHUM HYBRID TEST
CONDUCTED BY
TEXAS COOPERATIVE EXTENSION, D-11 & 12

PARTICIPATING SEED COMPANIES AND HYBRIDS ENTERED IN 2004:

Asgrow Seed Co: A571
Boomerang Seeds: BB 444
Croplan Genetics: 614
DEKALB: DKS 36-00
Garst Seed Co: 5624
Warner Seeds Inc: W851DR
Golden Acres Genetics: 3827
NC+ Hybrid Co: 7R83
Pioneer Hi-Bred Int'l: 84G62
Sorghum Partners, Inc: NK 7633
Triumph Seed Co, Inc: TR 465
UAP Dyna-Gro: DG780B

LOCATION COOPERATORS

COUNTY	TOWN	AGENT	PRODUCER
Bee	Beeville	Donnie Montemayor	Gaitan Farm
DeWitt	Cuero	Anthony Netardus	Respondek Farm
Hidalgo	Edinburg	Brad Cowan	Aguilar Farm
Jim Wells	Alice	Rogelio Mercado	Gwosdz III Hoelscher Farm Nock Farms
Karnes	Karnes City	Dennis Hale	Terry Tam Farm
Nueces	Robstown	Harvey Buehring	McNair Farms Ordner Farms TAMU-CC
Refugio	Refugio	Mike Mauldin	Lenhart Brothers Tommy Zabel Farm
San Patricio	Sinton	Jeff Stapper	Schneider Farm TAES-Hunt
Wilson	Floresville	Charles Pfluger	Laskowski Farm

2004 Lower Gulf Coast Standard Grain Sorghum Hybrid Test, Texas Cooperative Extension, Coastal Bend District 11 & 12

Hybrid	DeWitt Respondek[AT]	Hidalgo Aguilar[AT]	Jim Wells Gwosdz III[AT]	Jim Wells Hoelscher	Jim Wells Nock[AT]	Karnes Tam[AT]	Nueces McNair[AT]	Nueces Tam-CC[R]	Nueces Ordner[AT]	Refugio Zabel	San Pat Hunt[R]	San Pat Schneider[AT]	Wilson Laskowski	Average
84G62	5151	4548	5216	4441	4367	2098	5787	5994	5126	3230	6663	5265	5505	5283
A 571	5216	4769	5159	4254	3977	1928	6022	6353	4836	3435	6234	4838	5067	5174
7R83	5169	--	4977	4413	4014	2269	4960	5981	4846	3493	6198	5045	5449	5085
3827	5450	4480	5288	4488	3777	2445	4924	5936	5007	3007	5879	4700	5269	5054
DKS 36-00	4922	4650	4881	4338	4047	2487	5681	5691	4861	2995	5957	--	5184	5043
614	5116	4101	5327	4056	4390	2258	5724	5279	4694	3040	5689	4838	4924	4953
W851DR	4916	4432	5224	3775	4368	1654	4427	5749	5193	--	6380	5025	4975	4931
BB 444	5082	3805	5163	4263	4062	1942	5298	5671	4875	2517	6104	4916	5194	4908
DG780B	5222	4002	4593	4338	4130	1230	5732	5924	4597	--	5367	5185	5082	4871
NK 7633	5210	4378	5029	4085	4089	1924	4319	5178	4160	3538	5951	4242	5151	4771
TR 465	5116	3688	4994	3972	3964	2465	4258	5193	4992	2798	6075	4694	4833	4754
5624	--	4029	4462	4094	3897	1646	4963	4392	5049	2425	5370	4418	4995	4570
Average	5143	4262	5026	4210	4090	2029	5175	5612	4853	3048	5989	4833	5136	4950

(1) All data adjusted to 14% moisture. All locations were machine or hand harvested. TAM-CC and San Patricio (Hunt) were replicated in a randomized block design.

(2) -- denotes lost data or unplanted hybrid or damaged plot. To avoid unfair weighting by location, the mean location average has been used in summarizing regional yields of individual hybrids. Locations with an AT denotes accuracy testing, R denotes replication.

(3) No standard plots were planted in Brooks, Fayette, Goliad, Gonzales, Kleberg, Lavaca, and Live Oak Counties, due to low row crop acreages or use of local testing arrangements. Test lost in Refugio County (Lenhart) from Staple chemical damage. Karnes (Tam) had excessive weed pressure. Bee County test not measured.

(4) Data compiled by Steve Livingston, Agronomy Specialist, in cooperation with County Extension Agents in Coastal Bend Extension Districts 10, 11, and 12, Texas A&M University Agricultural Research and Extension Center, 10345 Agnes, Corpus Christi, TX, 78406-9704, Ph-361/265-9203.

(5) It generally requires 350-500 lbs/ac change in yield for one hybrid to be statistically different from another.

(6) Late arrivals of seed/mis-communications affected presence of some entries in this test. Some seed entries arrived too late to be planted in the majority of locations. See individual county tests for add-on hybrids.

(7) BH Genetics entry deleted from test due to hybrid production problems.

2004 UPPER GULF COAST STANDARD GRAIN SORGHUM HYBRID TEST
CONDUCTED BY
TEXAS COOPERATIVE EXTENSION, D-9 & 11

PARTICIPATING SEED COMPANIES AND HYBRIDS ENTERED IN 2004:

Asgrow Seed Co: A571
B-H Genetics: BH 5703
Boomerang Seeds: BB 555
Croplan Genetics: 614
DEKALB: DKS 54-00
Garst Seed Co: 5624
Golden Acres Genetics: 3827
NC+ Hybrid Co: 8R18
Pioneer Hi-Bred Int'l: 83G88
Sorghum Partners Inc: NK 8416
Triumph Seed Co: TR461
UAP DynaGro: DG 780B
Warner Seeds Inc: W851DR

LOCATION COOPERATORS

COUNTY	TOWN	AGENT	PRODUCER
Brazoria	Angleton	Wayne Thompson	Texas Department of Criminal Justice-Darrington Unit
Calhoun	Port Lavaca	Zan Matthies	Jimmy Hays Farm
Fort Bend	Rosenberg	R. Glenn Avriett	Texas Department of Criminal Justice-Darrington Unit
Jackson	Edna	Chris Schneider	Kenneth Rasmusson Farm
Liberty	Liberty	Ron Holcomb	Double S. Farms
Matagorda	Bay City	Brent Batchelor	Brent & Lisa Batchelder
Victoria	Victoria	Joe Janak, Jr.	Duane Kainer Farm

2004 Upper Gulf Coast Standard Grain Sorghum Hybrid Test,
Texas Cooperative Extension, Coastal Bend District 9 & 11

Variety	Brazoria[A] TDC	Calhoun[A] Hayes	Liberty	Matagorda[A] Batchelder	Victoria[A] Brandl	Average
DG 780B	1738	4821	3938	6272	4594	4273
DKS 54-00	1493	4802	--	6227	4606	4109
614	1530	5033	--	5774	4686	4088
8R18	1445	4395	--	5923	5219	4080
A571	1632	4647	--	6209	4404	4062
NK 8416	1437	5412	3079	5284	4746	3992
W851DR	1546	4683	--	5436	4597	3936
3827	1759	4210	3834	5377	4190	3874
83G88	1417	3895	3507	5982	3934	3747
BH 5703	1587	4636	2574	5293	4523	3723
BB 555	1545	4185	--	5533	3802	3696
TR461	1551	3885	--	5859	3555	3653
5624	1500	4342	3567	5200	3625	3647
Average	1552	4534	3417	5721	4345	3914

(1) All data adjusted to 14% moisture. All locations were machine harvested strip tests.
(2) - - denotes lost data or unplanted hybrid. To avoid unfair weighting by location, the mean location average has been used in summarizing regional yields of individual hybrids. Locations with an “A” denotes that accuracy testing was used. “R” indicates replicated plots.
(3) Jackson County test (Hays) was lost due to wet weather. Fort Bend County (TDC) and Wharton County (Berndt) were not planted. No standard plots were planted in Austin, Colorado, Fayette, Galveston, Lavaca or Washington Counties because of low sorghum acreage.
(4) Data was compiled by Steve Livingston, Agronomy Specialist, in cooperation with County Extension Agents in Coastal Bend Extension Districts 9, 10 and 11, Texas A&M University Research and Extension Center, 10345 Agnes, Corpus Christi, TX 78406-1412. Ph-361/265-9203.
(5) It generally requires 350-500 lbs/ac change in yield for one hybrid to be statistically different from another.
(6) Late arrivals of seed/mis-communications may have affected the presence of some entries at individual test locations.

2004 LOWER GULF COAST STANDARD CORN HYBRID TEST
CONDUCTED BY
TEXAS COOPERATIVE EXTENSION, D-11 & 12

PARTICIPATING SEED COMPANIES AND HYBRIDS ENTERED IN 2004:

BH Genetics: BH9011RR
Croplan Genetics: 818RRBt
DeKalb Genetics Corp: DKC 66-80
Garst Seed Co: 8213RR
Warner Seeds Inc: W4705BR
Golden Acres Genetics: GA2980RR
NC+ Hybrid Co: NC+ 7371RR
Triumph Seed Co, Inc: T2011RR

LOCATION COOPERATORS

COUNTY	TOWN	AGENT	PRODUCER
Bee	Beeville	Donnie Montemayor	Gaitan Farm
DeWitt	Cuero	Anthony Netardus	Fred & Chad Hahn
Goliad	Goliad	Brian Yanta	Luis Hernandez
Jim Wells	Alice	Rogelio Mercado	Gwosdz III Farm
Karnes	Karnes City	Dennis Hale	Terry Tam
Nueces	Robstown	Harvey Buehring	TAMU-CC
Refugio	Refugio	Mike Mauldin	Venture Farms
San Patricio	Sinton	Jeff Stapper	Rieder Farm Ring Brothers Farm
Wilson	Floresville	Charles Pfluger	Laskowski Farm

2004 Lower Gulf Coast Standard Corn Hybrid Test, Texas Cooperative Extension, Coastal Bend District 11 & 12

Hybrid	Bee Gaitan	DeWitt Hahn	Goliad Hernandez	Jim Wells Gwosdz III[AT]	Karnes Tam[AT]	Nueces TAM-CC[R]	Refugio Venture	San Pat Ring[AT]	San Pat Rieder[AT]	Wilson Laskowski	Average
W4705BR	68	129	104	129	140	171	112	147	152	131	128
818RRBt	77	127	90	130	139	141	110	155	130	125	122
DKC66-80	57	116	89	113	144	156	102	123	116	119	114
GA2980RR	58	109	91	111	129	162	95	127	113	111	111
NC+7371RR	60	108	98	106	125	159	95	115	111	114	109
T2011RR	66	112	90	105	126	150	95	118	112	113	109
BH9011RR	45	106	86	102	135	145	91	119	111	116	106
8213RR	52	106	103	106	121	141	92	114	109	112	106
Average	60	114	94	113	132	153	99	127	119	118	113

(1) All data adjusted to 15% moisture. All locations were machine or hand harvested. TAM-CC was replicated in a randomized block design.

(2) -- denotes lost data or unplanted hybrid. To avoid unfair weighting by location, the mean location average has been used in summarizing regional yields of individual hybrids. Locations with an AT denotes accuracy testing, R denotes replication.

(3) No standard plots were planted in Brooks, Fayette, Goliad, Gonzales, Kleberg, Lavaca, and Live Oak Counties, due to low row crop acreage or use of local testing arrangements. Test not planted in Bee, Nueces (off-station) and eastern Refugio County due to wet weather at planting.

(4) Data compiled by Steve Livingston, Agronomy Specialist, in cooperation with County Extension Agents in Coastal Bend Extension Districts 10, 11, and 12, Texas A&M University Agricultural Research and Extension Center, 10345 Agnes, Corpus Christi, TX, 78406-9704, Ph-361/265-9203.

(5) It generally requires 350-500 lbs/ac change in yield for one hybrid to be statistically different from another.

(6) Late arrivals of seed/mis-communications affected presence of some entries in this test. Some seed entries arrived too late to be planted in the majority of locations. See individual county tests for add-on hybrids.

2004 UPPER GULF COAST REGIONAL CORN HYBRID TEST
CONDUCTED BY
TEXAS COOPERATIVE EXTENSION, D-9 AND 11

PARTICIPATING SEED COMPANIES AND HYBRIDS ENTERED IN 2004:

BH Genetics: BH 99011RR
Croplan Genetics: 818BT/RR
DeKalb Genetics Corp: DKC 69-71
Dyna-Gro: 58K22
Garst Seed Co: 8225YG/RR
Warner Seeds Inc: W4705BR
Golden Acres Genetics: 2980RR
NC+ Hybrid Co: NC+ 7371RR
Triumph Seed Co, Inc: 1866RR

LOCATION COOPERATORS

COUNTY	TOWN	AGENT	PRODUCER
Brazoria	Angleton	Wayne Thompson	Texas Department of Criminal Justice-Darrington Unit
Calhoun	Port Lavaca	Zan Matthies	Shannon Farms
Colorado	Columbus	Dale Rankin	Fritz Leopold Farm
Fort Bend	Rosenberg	Glenn Avriett	Texas Department of Criminal Justice-Darrington Unit
Jackson	Edna	Chris Schneider	Dave Allen Farm
Victoria	Victoria	Joe Janak	Adamek Farm
Wharton	Wharton	Rick Jahn	Larry Kalina

2004 Upper Gulf Coast Regional Corn Hybrid Test,
Texas Cooperative Extension, D-9 and 11

Variety	Brazoria[A] TDCJ	Calhoun[A] Klump	Victoria[A] Adamek	Colorado Leopold	Average
1866RR	121	160	111	104	124
818BT/RR	109	173	115	98	123
GA 2980RR	117	152	95	110	119
DKC 69-71	115	164	79	116	118
W4705BR	--	160	93	107	118
8225YG1/RR	106	162	97	105	117
NC+7371RR	111	148	95	102	114
58K22	--	159	77	103	113
99011RR	--	153	85	99	113
Average	113	159	94	105	118

(1) All data adjusted to 15% moisture. All locations were machine harvested strip tests.

(2) - - denotes lost data or unplanted hybrid. To avoid unfair weighting by location, the mean location average has been used in summarizing regional yields of individual hybrids. Locations with an (A) denote that accuracy testing was used. (R) indicates replicated plots.

(3) Corn plots were not established in Austin, Fayette, Fort Bend, Lavaca, Washington and Wharton Counties. Corn plots were established but lost in Jackson and Matagorda Counties due to wet field conditions.

(4) Data compiled by Steve Livingston, Agronomy Specialist, in cooperation with County Extension Agents in Coastal Bend Extension Districts 9, 10 and 11, Texas A&M Research and Extension Center, 10345 Agnes, Corpus Christi, TX 78406-1412. 361-265-9203.

(5) It generally requires 10 bu/ac change in yield for one hybrids to be statistically different from another.

(6) Late arrivals of seed/mis-communications affected the presence of some entries in this test.

2004 LOWER GULF COAST REGIONAL COTTON VARIETY PERFORMANCE TEST
CONDUCTED BY
TEXAS COOPERATIVE EXTENSION, D-11 AND 12

PARTICIPATING SEED COMPANIES AND VARIETIES ENTERED IN 2004:

Bayer Crop Science: FM 800B2R, FM 800R, FM832LL, FM 960BR, FM 960R, FM 960B2R, FM 991B2R

Delta & Pine Land: DP 432R, DP 434R, DP 444 BR, DP 488BR, DP 491, DP 494R

Stoneville Seed Co: ST 2448R, ST 4646B2R, ST 5242BR, ST 5599BR

Beltwide Cotton Genetics: BCG 30R, BCG 50R

LOCATION COOPERATORS

County	Town	Agent	Producer
Jim Wells	Alice	Rogelio Mercado	David Hoelscher Farm
Kleberg	Kingsville	John Ford	Jeff Yaklin Farm
Nueces	Robstown	Harvey Buehring	Edward Jungman Farm Mark Morris Farm Jon Prince Farm TAMU Meaney Annex
Refugio	Refugio	Mike Mauldin	Jimmy Rathkamp Farm
San Patricio	Sinton	Jeff Stapper	Clarence Chopelas Farm Joel Hoskinson Farm Robert Rieder Farm

Table 1. Lint yield (lb/acre) in 19 commercial cotton varieties, 2004 Lower Gulf Coast Regional Cotton Variety Performance Test, Texas Cooperative Extension, D-11 & 12.

Variety	Jim Wells[A] Hoelscher	Kleberg[R] Yaklin	Nueces[A] Jungman	Nueces[R] Monster	Nueces[R] TAES	Nueces[A] Morris	Nueces[A] Prince	Refugio Rathkamp	San Pat[R] Chopelas	San Pat[A] Hoskinson	San Pat[R] Rieder	Average
ST 5599BR	525	1571	1199	1146	1076	1152	1401	824	1789	1588	1166	1222
DP 444BR	589	1560	1195	1099	998	1360	1061	789	1687	1825	1224	1217
DP 434R	772	1170	--	1214	1065	1326	1215	634	1588	1625	930	1152
DP 432R	544	1159	1342	1069	874	1200	1234	760	1615	1481	947	1130
FM 960BR	433	1225	1126	1141	1066	1147	1099	757	1653	1444	1169	1115
ST 5242BR	606	--	1331	1160	1006	1059	904	790	1539	1405	1164	1105
FM 960R	344	1548	--	978	1066	1145	1036	721	1518	1452	1058	1091
FM 832LL	--	--	--	1117	993	1143	1082	--	1509	--	1165	1081
DP 488BR	723	--	1122	1069	1027	1176	929	538	1580	1489	950	1072
FM 960B2R	328	1400	--	1038	941	1084	1109	814	1740	1242	1053	1065
DP 491	762	830	1119	1151	1076	1199	1139	649	1424	--	959	1062
ST 4646 B2R	375	1069	--	999	947	1094	1034	678	1835	1271	1156	1054
FM 800B2R	293	1528	1082	1036	880	1090	1078	645	1454	1229	1005	1029
DP 494R	593	741	1040	1064	982	1232	1021	562	1651	1439	937	1024
FM 991B2R	444	1448	--	844	--	1020	872	641	--	1129	--	1013
FM 800R	464	894	--	1049	953	1141	954	573	--	1255	959	996
BCG 30R	221	708	1115	1019	947	1263	--	619	1498	1375	--	988
BCG 50R	535	966	1031	831	880	1044	--	--	1276	1204	--	960
ST 2448R	366	--	909	819	782	892	900	649	--	887	882	896
Average	495	1188	1134	1044	976	1146	1063	687	1585	1373	1045	1067

(1) Spaces indicated by -- reflect loss of data or the variety was not included at that location. Location averages were used as artificial data to avoid weighting by location.

(2) Data compiled by Steve Livingston, Agronomy Specialist, in cooperation with Extension Agents in Coastal Bend Extension Districts 11 and 12, Texas A&M University Agricultural Research and Extension Center, 10345 Agnes, Corpus Christi, TX, 78406-1412.

(3) All locations were machine harvested except the Yaklin and Hoelscher plots, which were hand harvested. Jungman, Morris and Prince locations were stripper harvested. Locations with an (R) denotes replication was used. Locations with an (A) denotes accuracy testing was used.

(4) Standardized cotton variety performance tests were not conducted in Bee, DeWitt, Goliad, or Karnes Counties.

Table 2. Micronaire values for 19 commercial cotton varieties, 2004 Lower Gulf Coast Regional Cotton Variety Performance Test, Texas Cooperative Extension, D-11 and 12.

Variety	Yield Ranking	Jim Wells[A] Hoelscher	Kleberg Yaklin	Nueces[A] Jungman	Nueces[R] Monster	Nueces[R] TAES	Nueces[A] Morris	Nueces[A] Prince	Refugio Rathkamp	San Pat[R] Chopelas	San Pat[A] Hoskinson	San Pat[R] Rieder	Average
DP 432R	4	4.1	4.5	4.8	5.4	5.3	4.7	5.4	4.6	4.5	5.4	4.1	4.8
ST 5599BR	1	3.8	4.8	5.3	5.0	5.2	4.7	4.2	4.2	4.8	5.4	3.8	4.7
BCG 50R	18	4.4	4.6	4.7	5.5	4.9	4.9	--	--	4.7	4.8	--	4.7
FM 960BR	5	4.4	3.8	5.1	5.2	5.1	4.7	4.6	4.1	4.5	5.2	3.9	4.6
ST 5242BR	6	4.1	--	5.3	5.1	4.8	4.5	4.5	4.4	4.7	5.2	4.2	4.6
FM 960B2R	10	3.8	4.5	--	5.0	5.1	4.6	4.4	4.4	4.7	5.3	3.6	4.6
ST 4646 B2R	11	4.2	4.4	--	4.8	5.1	4.9	4.5	4.3	4.6	5.3	3.9	4.6
DP 494R	14	4.5	4.7	4.0	4.7	5.1	4.7	4.8	4.4	4.6	5.3	4.2	4.6
FM 800R	17	4.4	4.5	--	4.9	4.8	4.7	4.7	4.4	4.3	5.2	4.1	4.6
ST 2448R	19	4.1	--	5.2	5.1	4.9	4.6	4.6	4.1	--	4.4	4.8	4.6
DP 434R	3	4.3	4.2	--	4.8	4.8	4.4	4.5	4.3	4.5	5.2	4.0	4.5
DP 488BR	8	4.3	--	4.7	5.0	4.8	4.2	4.6	4.3	4.3	4.9	3.8	4.5
FM 832LL	9	3.6	--	--	5.0	5.0	4.5	4.7	--	4.2	--	4.2	4.5
DP 491	12	4.3	4.1	4.4	4.7	4.9	4.5	4.6	4.2	4.5	--	3.8	4.5
FM 991B2R	15	4.0	4.0	--	4.9	--	4.4	4.3	4.4	--	5.0	--	4.5
BCG 30R	16	4.0	4.2	4.5	5.1	5.0	4.8	--	3.9	4.3	5.1	--	4.5
DP 444BR	2	3.8	4.1	5.1	4.9	4.7	4.4	4.6	4.1	4.2	5.0	3.7	4.4
FM 960R	7	3.9	4.5	--	4.8	4.6	4.3	4.4	3.8	4.1	4.7	3.5	4.3
FM 800B2R	13	3.6	4.1	5.3	4.5	4.7	4.3	4.4	3.9	3.6	5.2	3.8	4.3
Average		4.1	4.3	4.9	5.0	4.9	4.6	4.6	4.2	4.4	5.1	4.0	4.5

Table 3. Fiber strength values for 19 commercial cotton varieties, 2004 Lower Gulf Coast Regional Cotton Variety Performance Test, Texas Cooperative Extension, D-11 and 12.

Variety	Yield Ranking	Jim Wells[A] Hoelscher	Kleberg Yaklin	Nueces[A] Jungman	Nueces[R] Monster	Nueces[R] TAES	Nueces[A] Morris	Nueces[A] Prince	Refugio Rathkamp	San Pat[R] Chopelas	San Pat[A] Hoskinson	San Pat[R] Rieder	Average
FM 800R	17	34.0	36.6	--	33.9	33.7	34.1	33.8	34.6	34.2	34.7	33.9	34.0
FM 800B2R	13	34.6	35.8	30.8	34.9	33.3	35.7	33.3	34.9	33.1	33.2	32.7	33.8
DP 494R	14	33.3	36.4	31.3	32.4	33.0	34.6	32.0	35.3	33.6	33.8	32.6	33.5
FM 960BR	5	33.3	36.6	28.7	34.3	32.5	32.1	33.3	33.8	32.1	32.9	31.6	32.8
FM 960R	7	35.9	36.2	--	31.6	31.2	32.7	32.2	31.6	32.8	33.4	31.3	32.7
DP 491	12	29.9	37.3	32.0	33.8	31.9	34.5	30.9	33.0	31.8	--	31.1	32.6
DP 488BR	8	31.6	--	31.9	32.9	33.5	32.5	31.3	32.6	31.9	32.0	30.8	32.3
FM 832LL	9	32.3	--	--	32.2	32.0	32.9	30.6	--	33.1	--	32.2	32.3
FM 960B2R	10	29.9	35.0	--	31.0	32.4	32.6	32.2	32.2	33.2	34.4	31.4	32.3
ST 2448R	19	33.2	--	30.1	31.3	31.2	33.6	29.1	35.7	28.8	33.6	31.4	32.0
FM 991B2R	15	30.2	34.2	--	31.7	--	32.3	31.1	32.7	--	31.9	31.4	31.8
BCG 50R	18	32.1	33.6	31.4	31.7	30.0	29.1	--	--	31.9	32.6	--	31.6
DP 432R	4	28.7	33.5	30.1	32.6	32.4	30.6	29.8	33.3	31.6	31.8	32.7	31.6
BCG 30R	16	27.2	33.3	31.4	30.1	31.1	32.0	--	33.9	31.4	31.2	--	31.2
ST 5242BR	6	30.0	--	29.2	31.7	29.0	29.3	28.9	30.9	--	28.9	30.0	30.4
DP 444BR	2	30.1	30.8	29.5	29.8	29.7	32.3	28.8	30.7	31.2	29.8	29.6	30.2
ST 4646 B2R	11	28.1	33.2	--	29.0	29.0	30.6	28.8	30.6	29.4	31.1	29.4	30.0
ST 5599BR	1	27.6	32.2	30.7	30.8	28.0	28.9	26.0	31.2	30.0	32.0	30.8	29.8
DP 434R	3	25.6	32.0	--	29.0	30.5	30.5	30.0	29.7	29.3	30.9	29.4	29.8
Average		30.9	34.4	30.6	31.8	31.4	32.2	30.7	32.7	31.7	32.2	31.3	31.8

Table 4. Fiber length values for 19 cotton varieties, 2004 Lower Gulf Coast Regional Cotton Variety Performance Test, Texas Cooperative Extension, D-11 and 12.

Variety	Yield Ranking	Jim Wells[A] Hoelscher	Kleberg Yaklin	Nueces[A] Jungman	Nueces[R] Monster	Nueces[R] TAES	Nueces[A] Morris	Nueces[A] Prince	Refugio Rathkamp	San Pat[R] Chopelas	San Pat[A] Hoskinson	San Pat[R] Rieder	Average
FM 800B2R	13	1.18	1.20	1.17	1.18	1.20	1.19	1.18	1.19	1.22	1.16	1.19	1.19
FM 832LL	9	1.18	--	--	1.13	1.16	1.18	1.15	--	1.19	--	1.21	1.16
FM 800R	17	1.13	1.21	--	1.14	1.12	1.16	1.14	1.19	1.18	1.09	1.18	1.15
DP 491	12	1.13	1.23	1.17	1.15	1.12	1.20	1.12	1.17	1.15	--	1.16	1.15
FM 960B2R	10	1.12	1.17	--	1.15	1.14	1.16	1.14	1.16	1.18	1.15	1.19	1.15
DP 434R	3	1.10	1.17	--	1.11	1.13	1.16	1.16	1.19	1.17	1.14	1.17	1.15
DP 494R	14	1.12	1.19	1.10	1.14	1.12	1.16	1.12	1.17	1.16	1.08	1.16	1.14
DP 488BR	8	1.15	--	1.13	1.11	1.15	1.16	1.11	1.17	1.18	1.10	1.16	1.14
FM 991B2R	15	1.17	1.17	--	1.12	--	1.16	1.10	1.15	--	1.10	--	1.14
BCG 30R	16	1.13	1.17	1.16	1.12	1.12	1.12	--	1.15	1.16	1.10	--	1.14
FM 960R	7	1.14	1.12	--	1.10	1.11	1.12	1.12	1.13	1.16	1.08	1.14	1.12
ST 2448R	19	1.13	--	1.08	1.07	1.08	1.12	1.09	1.15	--	1.08	--	1.12
DP 432R	4	1.10	1.15	1.08	1.07	1.13	1.12	1.07	1.17	1.14	1.04	1.14	1.11
BCG 50R	18	1.12	1.13	1.11	1.05	1.07	1.04	--	--	1.13	1.08	--	1.10
DP 444BR	2	1.09	1.12	1.12	1.07	1.08	1.11	1.07	1.15	1.14	1.06	1.14	1.10
ST 4646 B2R	11	1.10	1.14	--	1.08	1.08	1.08	1.08	1.12	1.11	1.05	1.15	1.10
FM 960BR	5	1.07	1.19	1.02	1.07	1.07	1.12	1.07	1.09	1.10	1.06	1.11	1.09
ST 5599BR	1	1.06	1.13	1.08	1.07	1.08	1.10	1.04	1.13	1.11	1.05	1.16	1.09
ST 5242BR	6	1.11	--	1.05	1.08	1.06	1.10	1.07	1.10	1.10	1.05	1.11	1.09
Average		1.12	1.17	1.11	1.11	1.11	1.13	1.11	1.15	1.15	1.09	1.16	1.13

2004 UPPER GULF COAST REGIONAL COTTON VARIETY PERFORMANCE TEST CONDUCTED BY TEXAS COOPERATIVE EXTENSION, D-9 AND 11, CORPUS CHRISTI, TEXAS

PARTICIPATING SEED COMPANIES AND VARIETIES ENTERED IN 2004:

Bayer Crop Science: FM 800B2R, FM 960B2R, FM 989BR

Beltwide Cotton Genetics: BCG 24R, BCG 28R, BCG 30R, BCG 245, BCG 295

Delta & Pine Land: DP 444BR, DP 449BR, DP 488BR, DP424B2R

Stoneville Seed Co: ST 4646B2R, ST 4892BR, ST 5242BR, ST 5599BR

LOCATION COOPERATORS

County	Town	Agent	Producer
Calhoun	Port Lavaca	Zan Matthies	Danny May Farm
Colorado	Columbus	Dale Rankin	Al Mahalitc Farm
Fort Bend	Rosenberg	Glen Avriett	Allen Stasney Farm
Matagorda	Bay City	Brent Batchelor	Batchelder Farm
Wharton	Wharton	Rick Jahn	WCYF-Wharton County Youth Fair

Table 1. Lint yield (lb/acre) in 12 commercial cotton varieties, 2004, Upper Gulf Coast Regional Cotton Variety Performance Test, Texas Cooperative Extension, D-9 and 11.

Variety	Calhoun[A] May	Colorado[A] Mahalitc	Matagorda Batchelder	Wharton[R] TAES	Average
ST 5599BR	1146	1256	1262	1190	1214
ST 4892BR	1154	1112	1284	989	1135
DP 444BR	817	1234	1287	1089	1107
ST 5242BR	1016	1131	1199	1040	1097
ST 4646B2R	961	1097	1202	1074	1084
DP 488BR	983	993	1185	1134	1074
DP 449BR	--	1186	--	966	1059
Phy 410R	--	--	1107	1105	1059
FM 800B2R	--	836	1189	1145	1049
FM 989BR	1071	965	--	1028	1031
DP 424B2R	1048	1000	1059	960	1017
FM 960B2R	--	866	1164	935	997
Average	1025	1061	1194	1055	1084

(1) Spaces indicated by -- reflect loss of data or the variety was not included at that location. Location averages were used as artificial data to avoid weighting by location.
(2) Tests were not established in Victoria or Dewitt counties. Plots were lost in Brazoria County due to prolonged wet weather. Locations with an “A” denotes that accuracy testing was used. “R” indicates replicated plots. Actual values were used in compiling average yield for testing location, but test average used to compute average yields.
(3) Data compiled by Steve Livingston, Agronomy Specialist, in cooperation with Extension Agents in Coastal Bend Extension Districts 9 and 11, Texas A&M University Agricultural Research and Extension Center, 10345 Agnes, Corpus Christi, TX 78406-1412, 361-265-9203.

Table 2. Micronaire values for 12 commercial cotton varieties, 2004 Upper Gulf Coast Regional Cotton Variety Performance Test, Texas Cooperative Extension, D-9 and 11.

Variety	Yield Ranking	Calhoun[A] May	Colorado[A] Mahalitc	Matagorda Batchelder	Wharton[R] TAES	Average
ST 4892BR	2	4.4	4.8	4.7	4.4	4.6
ST 5242BR	4	4.6	4.6	4.6	4.8	4.6
FM 960B2R	10	--	4.8	4.8	4.1	4.6
ST 5599BR	1	4.7	4.7	4.4	4.3	4.5
DP 449BR	7	--	4.4	--	4.2	4.5
Phy 410R	8	--	--	4.4	4.6	4.5
DP 424B2R	11	4.8	4.7	4.4	4.3	4.5
FM 989BR	12	4.5	4.4	--	4.2	4.5
DP 488BR	6	4.2	4.5	4.7	4.2	4.4
DP 444BR	3	4.5	4.2	4.0	4.2	4.2
ST 4646B2R	5	3.9	4.7	4.5	3.8	4.2
FM 800B2R	9	--	4.1	4.3	3.7	4.2
Average		4.5	4.5	4.5	4.2	4.4

Table 3. Fiber strength values for 12 commercial cotton varieties, 2004 Upper Gulf Coast Regional Cotton Variety Performance Test, Texas Cooperative Extension, D-9 and 11.

Variety	Yield Ranking	Calhoun[A] May	Colorado[A] Mahalitc	Matagorda Batchelder	Wharton[R] TAES	Average
FM 800B2R	9	--	34.9	35.4	33.1	34.3
DP 488BR	6	36.2	33.0	31.7	31.3	33.0
FM 960B2R	10	--	32.9	32.0	31.4	32.6
DP 449BR	7	--	32.6	--	31.3	32.3
FM 989BR	12	33.9	31.5	--	32.0	32.2
Phy 410R	8	--	--	31.0	32.2	32.2
DP 424B2R	11	30.1	31.2	32.0	30.1	30.9
ST 4892BR	2	31.9	31.3	30.1	29.8	30.7
DP 444BR	3	31.1	32.3	30.7	29.6	30.7
ST 4646B2R	5	30.0	31.1	30.7	30.7	30.6
ST 5599BR	1	32.4	31.5	31.0	29.2	30.6
ST 5242BR	4	30.8	29.0	27.7	28.2	29.1
Average		32.1	31.9	31.2	30.7	31.5

Table 4. Fiber length values for 12 commercial cotton varieties, 2004 Upper Gulf Coast Regional Cotton Variety Performance Test, Texas Cooperative Extension, D-9 and 11.

Variety	Yield Ranking	Calhoun[A] May	Colorado[A] Mahalitc	Matagorda Batchelder	Wharton[R] TAES	Average
FM 800B2R	9	--	1.20	1.19	1.20	1.17
DP 488BR	6	1.16	1.13	1.18	1.15	1.15
FM 960B2R	10	--	1.18	1.16	1.17	1.15
DP 444BR	3	1.11	1.15	1.14	1.14	1.14
FM 989BR	12	1.10	1.13	--	1.13	1.13
Phy 410R	8	--	--	1.13	1.11	1.12
ST 4646B2R	5	1.09	1.12	1.13	1.12	1.11
DP 449BR	7	--	1.11	--	1.09	1.11
DP 424B2R	11	1.13	1.10	1.12	1.10	1.11
ST 5599BR	1	1.10	1.13	1.13	1.09	1.10
ST 4892BR	2	1.10	1.11	1.14	1.09	1.10
ST 5242BR	4	1.07	1.09	1.09	1.10	1.09
Average		1.11	1.13	1.14	1.12	1.13

2004 Meaney Monster Cotton Test Lint Yields, Performance Factors and Fiber Quality Characteristics, Texas Cooperative Extension, Corpus Christi, TX.

	Variety	Lint lb/acre	% Turnout	Mic	Length	UR	Strength	Elong
1	XBCG P 0704	1,263.10	40.50	4.6	1.11	84.0	31.5	4.40
2	DPLX 02X39BR	1,244.85	43.45	4.7	1.07	82.2	32.0	4.75
3	DP 434 RR	1,213.55	43.55	4.8	1.11	84.1	29.0	6.30
4	XBCG P 1404	1,191.63	43.53	4.8	1.12	82.6	31.4	5.30
5	ST 5242 BR	1,159.55	42.43	5.1	1.08	82.7	31.7	5.45
6	DP 491	1,150.68	43.50	4.7	1.15	83.6	33.8	4.75
7	ST 5599 BR	1,146.38	40.18	5.0	1.07	82.7	30.8	4.65
8	FM 960 BR	1,141.43	40.63	5.2	1.07	84.1	34.3	3.75
9	DPLX 01 W93BR	1,134.23	42.83	4.9	1.09	83.8	31.6	6.95
10	XBCG P 2204	1,132.38	39.73	4.7	1.11	84.9	35.3	4.10
11	XBCG P 1904	1,125.68	42.78	5.3	1.06	83.1	28.8	6.20
12	FM 989 BR	1,117.38	40.63	4.9	1.05	83.3	31.0	5.50
13	FM 832 LL	1,116.83	40.28	5.0	1.13	84.3	32.2	4.15
14	XBCG P 1504	1,103.35	40.05	4.4	1.16	83.3	32.6	4.90
15	DP 444 BG-RR	1,099.10	43.40	4.9	1.07	83.3	29.8	5.75
16	Syn DX24119	1,098.93	41.48	4.6	1.14	82.6	30.7	6.45
17	Syn DX 24706	1,096.58	42.75	5.6	1.06	83.9	31.7	5.80
18	XBCG P 2304	1,081.85	40.38	5.1	1.08	83.0	31.5	4.25
19	BCG 245	1,080.63	38.58	4.4	1.17	84.3	35.4	4.50
20	Syn DX 241203	1,078.95	41.63	5.1	1.15	83.3	32.7	5.00
21	DP 488 BG/RR	1,068.73	41.90	5.0	1.11	82.8	32.9	5.00
22	DP 432 RR	1,068.63	41.70	5.4	1.07	83.9	32.6	7.10
23	Syn DX 99197	1,066.70	39.85	5.4	1.02	82.3	31.2	4.90
24	DP494 RR	1,064.20	42.10	4.7	1.14	84.4	32.4	5.40
25	XBCG P 1704	1,061.05	39.13	5.3	1.11	83.2	31.4	4.00
26	DP 449 BG/RR	1,058.93	40.75	5.1	1.07	83.3	31.5	4.95
27	DP 424 BGII/RR	1,053.55	39.68	4.9	1.08	83.6	30.0	6.60
28	FM 800 RR	1,048.58	41.10	4.9	1.14	85.3	33.9	4.75
29	XBCG P 2104	1,046.75	41.75	5.2	1.07	82.5	31.1	5.10
30	DP 555 BG/RR	1,045.43	44.18	4.7	1.06	81.6	29.8	4.30
31	XBCG P 1204	1,037.65	39.33	5.0	1.12	83.5	33.6	5.00
32	FM 960 B2R	1,037.60	41.03	5.0	1.15	83.6	31.0	4.00
33	FM 800 B2R	1,035.55	40.30	4.5	1.18	83.9	34.9	5.05
34	XBCG P 1104	1,027.05	39.13	4.8	1.14	84.9	32.8	5.10
35	BCG 30R	1,018.53	39.35	5.1	1.12	83.4	30.1	5.70

(Continued) 2004 Meaney Monster Cotton Test Lint Yields, Performance Factors and Fiber Quality Characteristics, Texas Cooperative Extension, Corpus Christi, TX.

	Variety	Lint lb/acre	% Turnout	Mic	Length	UR	Strength	Elong
36	FM 966 LL	1,017.90	43.00	4.8	1.11	83.0	33.0	4.00
37	PSC 355	1,011.20	41.48	5.4	1.05	83.8	31.6	7.20
38	XBCG P 1304	1,011.18	40.08	4.9	1.11	83.5	31.6	4.50
39	Syn DX 25105N	1,008.03	43.70	5.1	1.13	82.8	31.9	5.85
40	ST 4646 B2R	999.28	41.28	4.8	1.08	82.9	29.0	5.35
41	XBCG P 0504	990.88	40.23	4.4	1.08	82.6	30.4	6.45
42	FM 981 LL	987.03	39.75	4.9	1.12	82.8	32.7	5.00
43	XBCG P 1804	985.38	40.40	4.8	1.12	83.7	31.1	5.00
44	XBCG P 2004	982.53	40.03	4.8	1.09	81.2	28.7	5.45
45	FM 960 RR	978.30	40.48	4.8	1.10	82.8	31.6	3.90
46	FM 958	976.65	42.13	4.9	1.12	83.6	32.4	4.00
47	XBCG P 0204	975.03	37.83	5.0	1.07	82.8	30.3	5.85
48	AFD 2485	974.40	42.05	5.0	1.12	83.8	32.4	3.90
49	FM 958 LL	966.30	42.10	5.3	1.08	83.0	33.8	4.40
50	XBCG P 1004	958.05	39.85	5.3	1.14	84.3	31.0	4.85
51	XBCG P 1604	955.10	40.58	4.4	1.05	81.2	30.2	4.80
52	XBCG P 0404	952.13	41.68	4.5	1.09	82.4	31.8	4.95
53	BCG 295 PAL/CCB	951.08	38.88	5.1	1.11	84.6	31.9	4.90
54	AFD 3602 RR	943.73	38.58	4.9	1.08	83.1	29.8	4.70
55	XBCG P 2504	942.50	38.78	4.7	1.16	84.0	30.2	4.10
56	XBCG P 2404	930.60	37.23	4.3	1.12	82.8	30.5	5.65
57	PSC 410 RR	928.78	40.80	5.2	1.08	83.7	30.9	7.00
58	XBCG P 0304	894.53	38.98	4.6	1.09	82.2	27.8	4.20
59	XBCG P 0104	887.65	36.60	5.0	1.04	83.1	31.1	6.15
60	DPLX 02T57R	879.08	40.93	5.2	1.06	84.0	31.3	7.05
61	FM 991 B2R	843.58	39.00	4.5	1.12	83.1	31.7	4.20
62	BCG 28R PAL	838.68	39.30	5.3	1.07	83.5	27.8	5.20
63	BCG 50R	830.80	38.05	5.5	1.05	82.4	31.7	6.10
64	ST 2448 R	818.93	38.75	5.1	1.07	82.9	31.3	5.70
65	AFD 3511 RR	770.35	37.18	5.1	1.06	82.9	30.2	5.50
66	RG Demo Red RR	295.00	38.10	3.8	1.10	84.2	29.3	6.50

Colorado County Uniform Stacked Gene Cotton Variety Trial, 2004

Mahalitic Farm

Dan Fromme, Extension Agent-IPM Wharton, Matagorda, Jackson Counties
Dale Rankin, Extension Agent-Agriculture and Natural Resources Colorado County
Dr. Robert Lemon, Professor and Extension Cotton Specialist
D. Joel Pigg, Extension Assistant

Variety	Lint Yield lbs/A	Turnout %	Length inches	Micronaire	Strength g/tex	Uniformity %	Lint quality premiums	Value/A $
ST 5599 BR	1256 a	34.8 bc	1.13 bc	4.70 bc	31.5	81.3 cd	3.88	697 a
DPL 444 BR	1234 a	35.7 a	1.15 b	4.17 g	32.3	83.7 a	3.32	678 a
DPL 449 BR	1186 ab	33.8 ef	1.11 cde	4.43 f	32.6	82.3 bc	4.63	667 a
ST 5242 BR	1131 bc	34.1 cde	1.09 e	4.57 de	29.0	83.0 ab	2.88	617 b
ST 4892 BR	1112 bc	35.0 ab	1.11 cde	4.83 a	31.3	82.3 bc	3.95	618 b
ST 4646 B2R	1097 c	33.8 de	1.12 bcd	4.67 cd	31.1	82.3 bc	3.47	604 bc
DPL 424 B2R	1000 d	32.2 g	1.10 de	4.67 cd	31.2	82.3 bc	3.27	548 d
DPL 488 BR	993 d	34.6 bcd	1.13 bcd	4.47 ef	33.0	81.0 d	4.72	559 cd
FM 989 BR	965 d	32.8 g	1.13 bcd	4.43 f	31.5	82.3 bc	3.88	536 d
FM 960 B2R	866 e	33.0 fg	1.18 a	4.80 ab	32.9	82.3 bc	3.47	477 e
FM 800 B2R	836 e	32.3 g	1.20 a	4.13 g	34.9	83.7 a	5.52	477 e
Location Mean	**1061**	**33.8**	**1.13**	**4.53**	**31.9**	**82.4**	**3.91**	**589**
P>F	0.0001	0.0001	0.0001	0.0001	0.1054	0.0514	0.1529	0.0001
LSD (P=0.10)	75.59	0.772	2.89	0.128	NS	1.31	NS	46.97
Standard Deviation	53.67	0.548	2.05	0.091	1.859	0.93	1.03	33.35
CV%	5.06	1.62	1.81	2	5.82	1.13	26.36	5.66

Fort Bend County Uniform Stacked Gene Cotton Variety Trial, 2004

Allan Stasny Farm

Glen Avriett, County Extension Agent Agriculture and Natural Resources (formerly Fort Bend County)
Dan Fromme, Extension Agent-IPM Wharton/Matagorda/Jackson Counties
Dr. Robert Lemon, Professor and Extension Cotton Specialist
Wayne Thompson, County Extension Agent Agriculture and Natural Resources Brazoria County
D. Joel Pigg, Extension Assistant

Variety	Lint Yield		Turnout		Micronaire		Length		Strength	Uniformity	Loan Value		Lint Value	
	lbs/A		%				inches		g/tex	%	cents/lb.		$/A	
Delta Pine 449 BR	1141	a	36.0	b	4.77	de	1.08	e	30.10	81.1	54.03	bc	617	a
Delta Pine 555 BR	1129	a	40.4	a	4.87	bcd	1.11	b-e	27.93	81.8	55.33	ab	624	a
Stoneville 4892 BR	1051	ab	37.3	b	5.07	a	1.09	cde	30.27	82.5	50.73	d	535	b
Stoneville 5599 BR	1019	abc	37.1	b	4.97	abc	1.10	b-e	29.13	82.7	52.33	cd	533	b
Stoneville 5242 BR	1007	abc	37.3	b	4.80	de	1.11	bcd	29.83	82.4	54.97	ab	554	ab
Stoneville 4646 B2R	992	bc	36.4	b	4.77	de	1.11	bcd	30.13	82.1	54.27	bc	538	b
FiberMax 989 BR	970	bc	35.7	bc	4.70	e	1.12	bc	29.27	82.6	54.38	b	527	b
Delta Pine 424 B2R	953	bc	32.7	c	4.80	de	1.08	de	30.80	82.1	54.01	bc	514	b
Delta Pine 488 BR	942	bc	36.4	b	4.83	cde	1.13	b	29.73	82.4	55.75	ab	526	b
FiberMax 960 B2R	927	bc	36.9	b	5.00	ab	1.11	b-e	30.63	81.6	51.78	d	480	b
Delta Pine 444 BR	907	c	36.9	b	4.37	f	1.13	b	30.97	82.0	54.57	b	495	b
FiberMax 800 B2R	896	c	34.6	bc	4.70	e	1.18	a	31.07	82.6	56.70	a	508	b
Location Mean	**994**		**36.5**		**4.80**		**1.11**		**29.99**	**82.2**	**54.07**		**538**	
P>F	0.0279		0.0427		0.0001		0.0008		0.5891	0.6359	0.0005		0.0526	
LSD (P=0.10)	120.747		2.8902		0.143		0.0302		NS	NS	1.81		70.69	
Standard Deviation	86.129		2.0616		0.102		0.0215		1.678	0.938	1.29		50.42	
CV%	8.66		5.65		2.13		1.93		5.6	1.14	2.39		9.38	

Wharton County Uniform Stacked Gene Cotton Variety Trial, 2004

Michael Beard Farm

Dan Fromme, Extension Agent-IPM Wharton/Matagorda/Jackson Counties
Dr. Robert Lemon, Professor and Extension Cotton Specialist
D. Joel Pigg, Extension Assistant

Variety	Yield		Turnout		Micronaire		Length		Strength		Uniformity		Loan Value		Lint Value	
	lbs/A		%				inches		g/tex		%		cents/lbs.		$/A	
Delta Pine 444 BR	1216	a	35.53	bc	4.07	e	1.16	ab	30.67	bc	83.40	ab	55.65	ab	675	a
Stoneville 5242 BR	1187	ab	36.20	b	4.50	bc	1.12	cd	29.40	c	82.87	abc	55.38	ab	657	a
Delta Pine 449 BR	1133	abc	35.69	bc	4.40	cd	1.10	de	32.13	ab	82.60	abc	55.45	ab	628	ab
Stoneville 5599 BR	1110	a-d	36.19	b	4.47	c	1.12	cd	30.13	bc	82.33	bc	54.23	bc	602	abc
FiberMax 989 BR	1101	a-d	33.23	e	4.20	e	1.16	ab	31.43	bc	83.13	abc	56.70	a	624	ab
Delta Pine 424 B2R	1073	bcd	33.35	de	4.50	bc	1.12	cd	31.07	bc	82.33	bc	56.11	ab	602	abc
Stoneville 4892 BR	1062	bcd	34.94	bcd	4.67	ab	1.10	de	30.83	bc	83.27	abc	54.05	bc	574	bcd
Delta Pine 555 BR	1023	cde	38.71	a	4.73	a	1.08	e	29.40	c	81.07	d	52.30	c	534	cd
Delta Pine 488 BR	1011	cde	35.96	bc	4.40	cd	1.15	ab	31.63	bc	82.93	abc	55.51	ab	561	bcd
Stoneville 4646 B2R	985	de	33.73	de	4.50	bc	1.11	cd	31.57	bc	82.13	c	53.85	bc	531	cd
FiberMax 960 B2R	978	de	33.53	de	4.43	c	1.14	bc	31.20	bc	82.50	abc	55.93	ab	547	cd
FiberMax 800 B2R	910	e	34.50	cde	4.23	de	1.18	a	33.80	a	83.63	a	55.60	ab	506	d
Location Mean	**1066**		**35.13**		**4.43**		**1.13**		**31.11**		**82.68**		**55.06**		**587**	
P>F	0.0059		0.0001		0.0001		0.0002		0.0709		0.0318		0.0779		0.0030	
LSD (P=0.10)	116.029		1.483		0.16		0.0307		2.034		1.06		2.09		65	
Standard Deviation	82.764		1.058		0.114		0.0219		1.451		0.756		1.49		46.5	
CV%	7.77		3.01		2.59		1.94		4.66		0.91		2.71		7.92	

Matagorda County Uniform Stacked Gene Cotton Variety Trial, 2004

Batchelder Farms

Brent Batchelor, County Extension Agent Agriculture and Natural Resources Matagorda County
Dan Fromme, Extension Agent - IPM Wharton/Matagorda/Jackson Counties
Dr. Robert Lemon, Professor and Extension Cotton Specialist

Variety	Lint Yield		Turnout		Micronaire		Length		Strength		Uniformity		Loan Value		Lint Value	
	lbs/acre		%				32nds		g/tex		%		cents/lb.		$/A	
Delta Pine 555 BR	901	a	41.7	b	4.33	e	34.7	abc	30.10	a	81.00	bc	56.42	a	428	a
Delta Pine 444 BR	879	b	39.6	c	4.23	e	34.3	bcd	29.63	abc	82.30	a	54.45	b	396	c
Delta Pine 449 BR	870	b	43.7	a	4.67	d	33.7	de	28.20	c	80.00	c	56.12	a	414	b
Stoneville 4892 BR	840	c	39.3	c	5.20	a	34.0	cde	29.93	a	82.30	a	51.38	c	352	ef
Stonveille 5242 BR	807	d	39.3	c	4.70	d	34.3	bcd	28.50	bc	80.70	bc	56.15	a	377	d
Stoneville 4646 B2R	774	e	38.4	d	4.83	bc	33.3	e	28.33	c	81.30	ab	56.05	a	360	e
Stoneville 5599 BR	773	e	39.3	c	4.93	b	34.3	bcd	29.87	ab	81.00	bc	54.42	b	348	f
Delta Pine 488 BR	761	e	39.4	c	4.93	b	35.3	a	30.10	a	81.70	ab	55.13	ab	348	f
FiberMax 960 B2R	759	ef	38.2	d	4.63	d	35.0	ab	30.67	a	81.00	bc	56.38	a	354	ef
Delta Pine 424 B2R	745	f	36.8	e	4.73	cd	33.7	de	28.20	c	81.70	ab	54.00	b	328	g
Location Mean	**811**		**39.6**		**4.72**		**34.3**		**29.35**		**81.30**		**55.05**		**370**	
P>F	0.0001		0.0001		0.0001		0.0025		0.0204		0.0144		0.0001		0.0001	
LSD (P=.10)	13.91		0.3961		0.105		0.71		1.315		0.98		1.4438		10.41	
Standard Deviation	9.83		0.2798		0.074		0.5		0.929		0.69		1.0198		7.35	
CV%	1.21		0.71		1.57		1.45		3.16		0.85		1.85		1.98	

PROFIT

Productive Rotations on Farms in Texas