Plains Pest Management

Integrated Pest Management Program

Hale and Swisher County

<u>2020 Annual Report</u>

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Extension Agent-IPM

TEXAS IPM

Partners with Nature

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2020 Plains Pest Management Newsletters available at: http://hale.agrilife.org/

Acknowledgements

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Plains Pest Management 2019 Advisory Committee

Ronald Groves	Mike Goss	Jerry Rieff
Jimie Reed	Jimmy Sagaser	Joe McFerrin

2020 Plains Pest Management Ag & Research IPM

Blayne Reed, Extension Agent – IPM, Hale and Swisher Counties

Relevance

Production agriculture is the foundation of the economies of Hale and Swisher Counties. Pests continually threaten production agriculture and persistently develop to overcome existing control measures. Integrated Pest Management (IPM) is an affective and environmentally sound approach to pest management that uses a combination of evolving control practices to maintain economic and environmental stability in production agriculture. The Plains Pest Management IPM Program is an educational program that strives to educate producers about the latest IPM principles and help implement sound IPM control strategies into producer's operations in Hale and Swisher Counties.

Response

The Plains Pest Management Association, made up of 16 participating grower members and steered by a chairing committee and the IPM agent, made informing the producers in Hale and Swisher Counties about the latest agriculture IPM principles, control methods and options a priority in 2020. During the year the activities included:

- Weekly field scouting for insect, weed, and disease problems of the 16 participating grower member's fields (5,798 acres of all crops) were conducted over the 2020 growing season. Information from this weekly field scouting was shared, interpreted, and IPM solution recommendations given to the participating growers via scouting reports and direct interactions.

- Data generated from the field scouting, along with pertinent IPM research and successful recommendations were shared through the Plains Pest Management Newsletter weekly throughout the growing season and periodically during the offseason. (16 issues, 427 subscribers).

- Locally conducted 16 independent agriculture IPM related research trials and assisted with district and State IPM research trials with all resulting data rapidly disseminated through newsletters, blogs, radio programs, and direct interactions.

- Gave IPM presentations at 9 grower meetings, 7 professional and peer meetings, 2 producer turn-row meeting, 1 Progressive Grower Meetings, and 1 Field Scout School where IPM was a topic (48 CEUs offered total). Made 4 Pest Patrol Hotline submissions summing a current pest situation nearing problem status area wide and gave IPM recommendations.

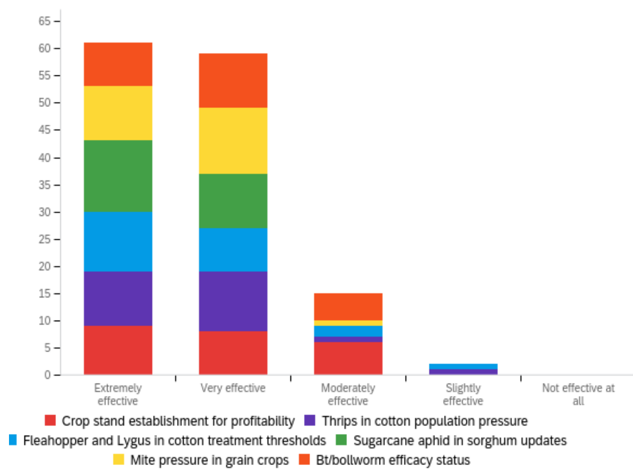
- IPM and its implementation, current pest pressure, emerging pests, and control recommendations were major topics for all in-season weekly High Plains IPM 'Radio' Podcasts (26 podcasts, 112 subscribers plus additional social media outlet releases) 4 six-minute educational spots on 900 All Ag All Day, Floydada, and 3 newspaper interviews.

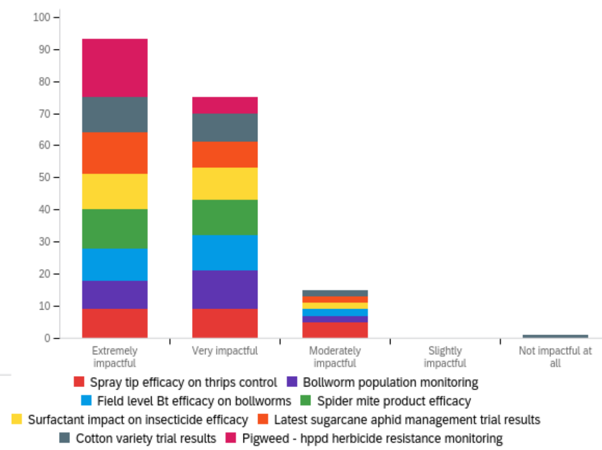
Results

A retrospective post evaluation instrument was distributed online to the subscribers of the Plains Pest Management Newsletter and was posted for all viewers of the Plains Pest Bugoshere (blog) and other social media outlets to interact with and respond to and participants in the field scout training days were polled for satisfaction following the conclusion of the season. Subscribers to the High Plains IPM 'Radio' Podcast were also evaluated voluntarily online retrospectively.

The 2020 Plains Pest Management online survey responders were made up of: **Ag Producers – 54.84%, Independent Ag Crop Consultants – 16.13%, Ag Industry – 19.35%, Ag Retail – 6.45%, Landlord, Homeowners, Gardeners & Horticulturalists – 3.23%.**

Respondents to the PP survey were asked to select the column that best reflects how effective the Plains Pest Management IPM program was during the 2020 growing season in providing useable information on emerging pests and other issues that occurred in our area during the growing season and how impactful will information be from the following research projects for the 2021 growing season?





Responders were then asked if they could assign a per acre crop production $ value to all the combined major efforts of the Plains Pest Management Association's IPM program in Hale and Swisher Counties, what would it be?

The average value response was $57.05 per crop acre.

Responders to the High Plains 'Radio' Podcast result survey were asked what value per acre the podcast had this year.

The average value response was $14.06 per respondent crop acre and $148 per crop acre for respondent specialty crop acres.

Summary

The IPM Program in Hale and Swisher Counties is proving to have real value and impact in the Hale and Swisher production agriculture economy. If the survey responder estimated **$57.05 per production acre**

estimate of the value of the IPM Program is multiplied by **half of the irrigated cotton production acres in Hale and Swisher Counties, a $14,245,385 potential IPM Program impact figure** emerges. Even if this purposely conservative survey-based estimate proved to be high, the Plains Pest Management Association is still not only important to the production agriculture economy in the Hale and Swisher area but is a significant part of that economy's maintenance and function. The addition of new podcast and remote educational efforts are also quickly showing returns and educational value results.

2020 General Horticulture, Homeowner, Gardening, & Youth IPM Education

Blayne Reed, Extension Agent – IPM, Hale & Swisher County

Relevance

Pests affect all aspects of human life. Pests continually threaten production agriculture, stored grain, human health, households, and even the stored foods in our pantries. Meanwhile, these same pests persistently develop to overcome existing pest control measures. Integrated Pest Management (IPM) has a forty plus year history of proven environmentally sound and effective approaches to pest management by utilizing a combination of established principles and evolving specific control practices to maintain pest control. The Plains Pest Management IPM Program is an educational program that strives to educate the producers and citizens of Hale and Swisher Counties about the IPM principles and the latest IPM control methods to help implement IPM into our daily pest control strategies.

Response

The Plains Pest Management Association, made up of 16 participating grower members and steered by a chairing committee and the IPM Agent, made informing the general populace of Hale and Swisher Counties about IPM principles and implementation into our daily pest control habits one of the IPM Program's focus in 2020. The year's activities included:

- Made 63 direct customer IPM visits and 172 contacts via site visits, phone calls, emails, and office visits about invading honeybees, tree borers, garden pests, cockroaches, mosquitoes, ticks, fleas, elm leaf beetles, lawn pests, bed bugs, head lice, remote insect ID, and other IPM situations. Made 1 radio program devoted to non-ag pest issues.

- Published 18 blog posts and 4 general IPM alerts and educational articles related to non-ag pests and management in the weekly Plains Pest Management Newsletter, local newspapers, and made numerous social media releases to a growing following.

- Coaching of the Hale & Swisher 4-H Entomology ID Teams (2 teams, 6 youth) with all contests and trainings being remote due to COVID restrictions.

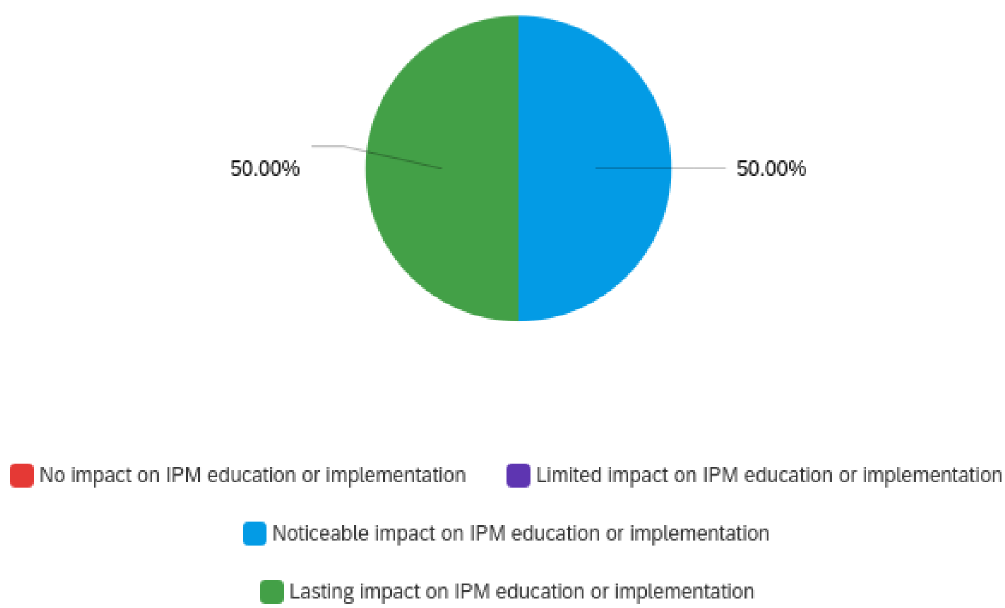
- Established Twitter and Facebook accounts primarily to serve non-ag customer base and better serve customer base remotely amid restrictions (87 friends and 47 followers). Planned and leading new 4-H Youth 4-H Entomology Photo Collection contest to better educate youth about IPM with or without future restrictions.

Results

A retrospective post evaluation instrument was distributed online to the subscribers of the Plains Pest Management Newsletter and was posted for all viewers of the Plains Pest Bugoshere (blog) and other social media outlets to interact with and respond to and participants in the field scout training days were polled for satisfaction following the conclusion of the season.

The 2020 online survey responders were made up of: **Ag Producers – 54.84%, Independent Ag Crop Consultants – 16.13%, Ag Industry – 19.35%, Ag Retail – 6.45%, Landlord, Homeowners, Gardeners & Horticulturalists – 3.23%.**

The primary educational effort allowed during the year was outdoor, face to face or one-on-one interactions and education about IPM customer specific issues with the non-ag customer base. From this effort, 63 site visits or interactions were made. The responders to the 2020 survey were asked what their impression was about the impact of these efforts.



Of the survey responders, **100% of the Landlord, Homeowner, Gardener, and Horticulturalist category considered these educational efforts had a 'lasting impact** on IPM education or implementation while not responder indicated a limited or no impact on the area.

Summary

The IPM Program's efforts in horticulture, homeowner, and gardening IPM education received not only high marks the more numerous agriculture sector responders but also from the noteworthy number of Homeowner and Horticulturalist responders. All survey responders placed a very high value on returns in the region for these IPM educational efforts and a strong conveyance to continue and expand these efforts.

2020 Hale & Swisher Bollworm Management in Cotton In-Depth

Blayne Reed, Extension Agent – IPM, Hale & Swisher County

Relevance

Production agriculture is the foundation of the economies of Hale and Swisher Counties and cotton is one of the main production crops in both counties. Pests continually threaten production agriculture and persistently develop to overcome existing control measures. The cotton bollworm, *Helicoverpa zea*, a multi-host general fruit feeder also commonly referred to as the corn earworm or even sorghum headworm, has a long history as a pest to US and Texas High Plains cotton. With its varied host choices and commonality of control measures between these host crops, the bollworm has intense selection pressure to develop resistance. To date the bollworm now has resistance confirmed to several of the available control measures including several Bt and chemical control measures. The threat of bollworms overcoming control measures in Hale and Swisher county is now imminent and requires monitoring, efficacy studies, and education. Integrated Pest Management (IPM) is an affective and environmentally sound approach to pest management that uses a combination of evolving control practices to maintain economic and environmental stability in production agriculture. The Plains Pest Management IPM Program is an educational program that strives to educate producers about the latest IPM principles and help implement sound IPM control strategies into producer's operations in Hale and Swisher Counties.

Response

The Plains Pest Management Association, made up of 16 participating grower members and steered by a chairing committee and the IPM agent, made informing the producers in Hale and Swisher Counties about the latest bollworm population pressure level, resistance status, and evolving IPM control principles a priority in 2020. During the year the activities included:

- Weekly field scouting for insect, weed, and disease problems of the 16 participating grower member's fields (4,380 acres of cotton) were conducted over the 2020 growing season. The information generated, with special emphasis on bollworms, from this weekly field scouting was shared, interpreted, and IPM solution recommendations given to the participating growers via scouting reports and direct interactions.

- Data generated from the field scouting, along with pertinent IPM research and successful recommendations were shared through the Plains Pest Management Newsletter weekly throughout the growing season and periodically during the offseason. (16 issues, 427 subscribers).

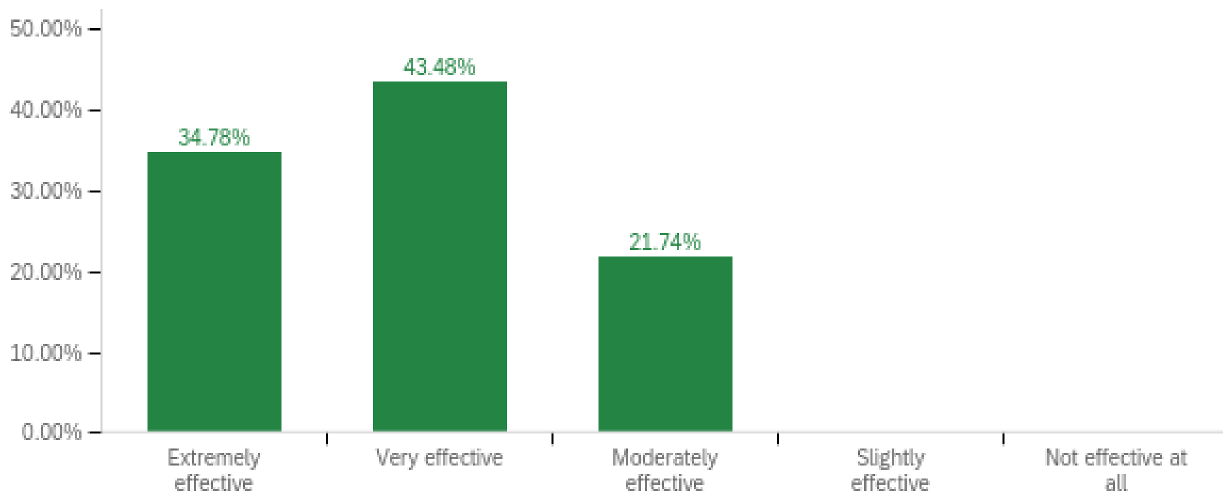
- Locally conducted 3 independent bollworm related research trials and assisted with district and State IPM research trials with all resulting data rapidly disseminated through newsletters, blogs, podcasts, radio programs, and direct interactions. Information was also shared through presentations at 9 grower meetings, 7 professional and peer meetings, 2 producer turn-row meetings, 1 Progressive Grower Meetings, 6 hands-on field scout trainings, and 1 Field Scout School.

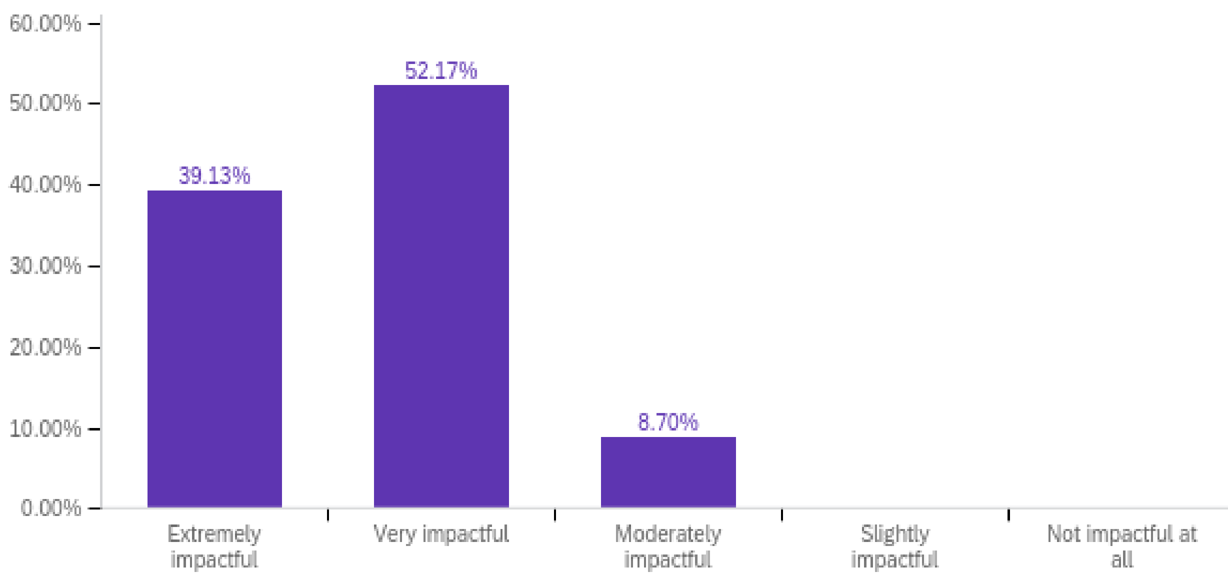
Results

A retrospective post evaluation instrument was distributed online to the subscribers of the Plains Pest Management Newsletter and was posted for all viewers of the Plains Pest Bugoshere (blog) and other social media outlets to interact with and respond to. Attendees of the Hale, Swisher Ag Day were also surveyed retrospective post via paper survey following the conference.

The 2020 Plains Pest Management online survey responders were made up of: **Ag Producers – 54.84%, Independent Ag Crop Consultants – 16.13%, Ag Industry – 19.35%, Ag Retail – 6.45%, Landlord, Homeowners, Gardeners & Horticulturalists – 3.23%.**

The 2020 PPM survey responders were asked to rate how impactful the IPM Program was in providing useable information on emerging pests and other issues that occurred in our area during the growing season and how impactful information on the Program's 2020 research trials would be. The responses to the bollworm educational efforts were:





Responders were then asked if they could assign a per acre crop production $ value to all the combined major efforts of the Plains Pest Management Association's IPM program in Hale and Swisher Counties, what would it be?

The average value response was $57.05 per crop acre.

Attendees of the Hale, Swisher Ag Day were asked how well they understood modern chemical control measures available for bollworm control after the bollworm presentations.

Program Content	Pct. at Good or Excellent Before the Program	Pct. at Good or Excellent After the Program	Pct. Point Difference (After vs. Before)	Pct. With Any Increase in Understanding
Which insecticides are effective and why.	62.5%	95.0%	32.5	60.0%

Summary

The IPM Program in Hale and Swisher Counties is proving to have real value and impact in the Hale and Swisher production agriculture economy. All survey responses to the efforts in bollworm education receive positive marks for effectivity and an increase of 60% in understanding. If the survey responder estimated **$57.05 per production acre estimate** of the value of the IPM Program is multiplied by **half of the irrigated cotton production acres in Hale and Swisher Counties, a $14,245,385 potential IPM Program impact figure** emerges. Even if this purposely conservative survey-based estimate proved to be high, the Plains Pest Management Association is still not only important to the production agriculture economy in the Hale and Swisher area but is a significant part of that economy's maintenance and function. The Program's 2020 bollworm educational efforts were a key and effective component of the overall Program efforts.

2020 In-Depth Field Scouting Education Plan

Blayne Reed, Extension Agent – IPM, Hale and Swisher Counties

Relevance

Agriculture is the foundation of the economies of Hale and Swisher Counties. Pests, both insects and weeds, continually threaten production agriculture and persistently develop resistance to overcome existing control measures. In recent years, bollworms in particular have developed resistance to several Bt traits in cotton and corn and to longtime relied upon chemical control measures for several crops. Integrated Pest Management (IPM) is an affective and environmentally sound approach to pest management for all pests that uses a combination of evolving control practices to maintain economic and environmental stability in production agriculture. Field scouting, or the monitoring of pests in the field, is critical in IPM decision making and planning but has fallen out of favor in many production situations in recent decades. Scouting has been replaced with a reliance upon traits in cotton and corn as preventative control measures for several of these pests. The time-consuming art of properly scouting production fields for pests and the latest in environmentally sound and economically proven control options are largely unknown by many younger producers and young agricultural career professionals. The Plains Pest Management IPM Program is an educational program that strives to educate producers about the latest IPM principles and help implement sound IPM control strategies into producer's operations in Hale and Swisher Counties.

Response

The Plains Pest Management Association, made up of 16 participating grower members and steered by a chairing committee and the IPM Agent, made educating early career agricultural professionals and producers in Hale and Swisher County on the latest IPM field scouting techniques in cotton, corn, and sorghum a priority. Several bollworm targeted locally conducted research projects involving the efficacy of bollworm control products and evaluations of field situations for various Bt trait situations were also an educational priority.

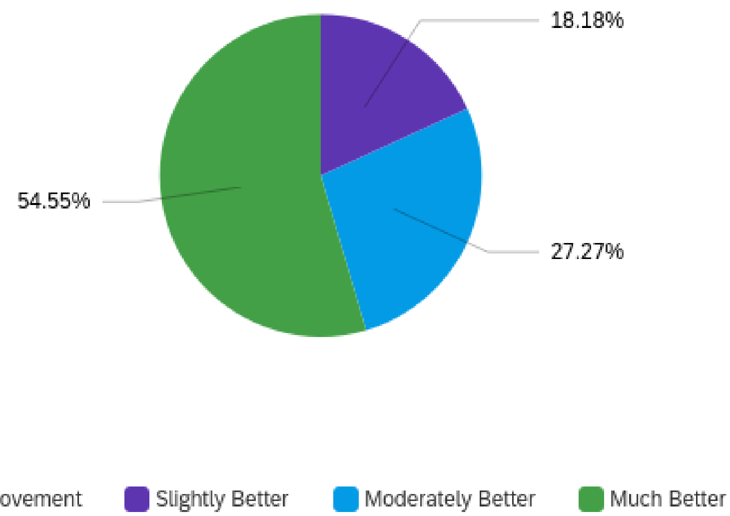
- Conducted 3 bollworm research trials in 2020 and shared results, both in person and remotely, rapidly through newsletters, blogs, radio programs, podcasts, grower meetings, producer direct interactions, professional meetings, and field days (39 CEUs offered total).
- Hosted and presented 'how to scout' presentations at a regional field scouting school. Hosted 5 field scout in-field training days that trained 10 field scouts and 12 early career agricultural professionals with hands on field experience over the full growing season.
- Data generated from the PPM field scouting program, along with helpful tips on how to scout fields for specific pests were shared through the weekly throughout the growing season Plains Pest Management Newsletter (16 issues, 427 subscribers), High Plains IPM 'Radio' podcasts (27 issues, 147 subscribers), radio programs (All Ag, All Day, 29 programs, 1,100 listeners), and several social media releases (Facebook, Twitter, Blog, LinkedIn).

Results

A retrospective post evaluation instrument was distributed online to the subscribers of the Plains Pest Management Newsletter and was posted for all viewers of the Plains Pest Bugoshere (blog) and other social media outlets to interact with and respond to and participants in the field scout training days were polled for satisfaction following the conclusion of the season.

The 2020 online survey responders were made up of: **Ag Producers – 54.84%, Independent Ag Crop Consultants – 16.13%, Ag Industry – 19.35%, Ag Retail – 6.45%, Landlord, Homeowners, Gardeners & Horticulturalists – 3.23%.**

One of the questions from the 2020 online survey dealt specifically with the Hale & Swisher IPM Unit's efforts in 2019-2020 in early career ag professional and field scout scouting educational efforts. Responders were asked, "What is your impression about the results of these educational efforts on our early career ag professionals? Do you feel the area is better prepared to meet cotton IPM challenges in the future?"



Responders were also asked to assign a per crop production acre $ value to all the combined efforts of the Plains Pest Management Association's IPM Program in Hale and Swisher County.

<u>The average value response was $57.05 per crop acre for the 2020 growing season.</u>

The early ag career professional participants in the Hands On, Field Scout Training sessions held over the summer of 2020 were asked if they would recommend the training for other professionals starting their career in the future. **<u>100% of attendees responded yes.</u>**

Summary

Educational efforts in the evolving discipline of the latest field scouting methods will likely need to continue indefinitely. These results, combined with and as part of the monetary surveyed value of the IPM Program to the area, indicate a level of success this year in educating field scouts and early career agricultural professionals in modern field scouting. The benefits of this educational training should offer returns for many years to come for the region. The results also seem to indicate that the PPM program should remain a central part of future scouting educational efforts.

2020 Educational Activities

Farm and Site Visits	2,075
Number of Newsletters Released	16
Newsletter Recipients	12,418
Direct Contacts	3,642
Radio Programs	30
Blog Releases	114
Ag Consultants, CEA, and Field Scouts Trained	32
Newspaper / Magazine / online Magazine articles (written or interviewed)	16
Research Trials Initiated	14
Research Trials Supported	14
Professional Presentations	8
Presentations / Programs / Field Days Made for Adults	15
Presentations Made to Youth	5
Pest Patrol Hotline Alerts	3
High Plains IPM 'Radio' Podcasts	26
Texas A&M AgriLife Publications Written or Revised	1
Videos Produced	1

Activity Highlights

Plains Pest Management Scouting Program
(5,798 acres)
Applied Research Projects
All Ag, All Day Radio Programs
Hale & Swisher 4-H Youth Entomology Projects
Horticulture IPM Spot Checks
Hale County Youth Ag Fair
High Plains Association of Crop Consultants
CEU training
Texas Pest Management Association
Agent Trainings
FOCUS on South Plains Agriculture
Newspaper Press Releases
Early Professional Hands On Field Scout Training

Plains Pest Management Newsletter
Plains Pest Management Bugoshere (blog)
Hale & Swisher Ag Day
West Texas Ag Chemical Meeting
Hale County BLT Program Support
Progressive Growers Breakfasts
Entomological Society of America
Field Scout Schools
IPM Video Productions
Site Scouting and IPM Recommendations
Pest Patrol Hotline
4-H Entomology ID Teams
Corteva Innovations
High Plains IPM 'Radio" Podcast

2020 at a Glance

The following is a brief overview of the 2020 growing season and pest populations in Hale & Swisher County agricultural crops. Copies of the Plains Pest Management Newsletters published in 2020 are available at http://hale.agrilife.org/ for a more in-depth look at specific pest pressure, weed situations, crop conditions, and environmental conditions at any given week of the growing season. Each growing season is unique, and the weather and pest of 2020 on the High Plains were no exception. One consistent for all crops and commodities for the 2020 season that can be mentioned broadly are the notably low prices continued from 2019. Another was the economic appearance of multiple species of pests that are not typical or annual pests to the Texas High Plains. Lastly, all fields experiences drought situations to some level. This drought situation was so severe that the abandonment rate of summer crop dryland fields fell somewhere between 95 and 99% with very few dryland fields being harvested in the area.

For the 2020 season, a higher than usual amount of wheat acres was planted in the fall of 2019. The choice to plant this much wheat stemmed from low competing commodity prices combined with a low production cost for wheat and an unusual amount of fall planting moisture available to plant following unusual fall rain events. This high amount of well-established wheat acres was soon met with a large fall flight of army cutworm moths moving down from the northwest in mid-fall. The healthy wheat was very attractive to the moths for egg laying. A near unprecedented amount of larva began attacking the wheat the following spring shortly following jointing. Scouting confirmed that the issue was regional-wide. This larval pest pressure increased in severity from seriously economic in southern areas of Hale to devastating across northern Swisher as the nocturnal larva emerged to devour vegetative growth. Due to the unfamiliarity of the pests, several fields were destroyed before the pest situation was detected or treatments could be made. Most modern labeled treatment options were unfamiliar to growers who at first opted for cheaper, older chemistries for control. Many of these treatments soon proved to be outdated and insufficient with failures frequent. Quickly an efficacy trial including all modern labeled control options was organized and conducted jointly by the entirety of the High Plains AgriLife IPM Team in northern Swisher County. The results of this trial provided timely crop saving information to growers, who were then finally armed to successfully control the pest.

The rain events of the preceding fall were some of the last moisture events for the region for months. The well irrigated and properly army cutworm treated wheat faired decently well. Dryland fields and even those without surplus irrigation resources suffered greatly in the drought. Late and dry cold fronts moved through the area late during the wheat jointing period and damaged the drought stressed fields farther, diminishing even more below profitability levels with freeze damaged heads and increasing abandonment. Fields with available irrigation resources were managed through harvest with above average grain yields for regional wheat for grain, silage, or hay. Fields suffering from the high drought stress and damage failed to complete boot stage were either utilized for cover or recouped for limited early hay or grazing returns.

During the droughty spring, area alfalfa fields were also assailed by an unusually heavy alfalfa weevil population. An extended and heavy egg lay period, likely brought about by a weather confused overwintering weevil population and a dropping of the number of alfalfa fields resulting from a lessening of irrigation resources that focused pests onto a fewer amount of acres, caused excessive damage and multiple treatments were often needed to protect the first cutting. Weevil larva emergence was documented from early March through late June in Hale and Swisher County where emergence is normally only documented for 3 to 5 weeks of April and May.

Summer commodity crop plantings were impacted by the severe drought situations. Dryland plantings of all commodity crops were delayed and eventually planted dry, usually just before insurance deadlines. Few ever received establishing moisture. The few fields that did receive moisture were promptly demolished by harsh weather events. Less than 5% of the area's intended dryland plantings were harvested for the season with the bulk being abandoned to late in the season for a secondary planting.

Irrigated crops were generally planted early compared to normal planting dates. This exposed many fields to temperatures below optimal for crop establishment and plant per acre stands suffered. Fields that failed to establish due to stand or the scattered weather events had ample time for replanting with late corn being a popular choice due to a slightly raising grain price in early summer.

Early season thrips pressure in seedling cotton was light due to the large amount of wheat acres that had desiccated early leaving much fewer acres for thrips to thrive in until dry down. Most plant bug cotton pests remained low in pre-bloom cotton as well with few preferred host plant species actively growing during in the severe drought situations. Only about 5% of the area's fields required treatment, which is well below the normal 15-30%. Likewise, most pre-boot grain crop pests were light with some fall armyworm populations causing minor damage and some pockets of Banks grass mites building.

The drought and heat intensified through summer and early fall placing heavy pressure on already overtaxed irrigation systems. The relatively large amount of corn suffered during the key production stages of pollination and grain fill capping and then sapping yield potential. These drought stressed fields soon began to experience issues with spidermites with about 80% of the area's corn and 5% of the area's sorghum requiring treatment. Fungal issues were greatly reduced during the hot, dry summer and fall with very few fields having any notable issues, including the late planted corn. Improved sugarcane aphid management from across the State and a more naturally expected beneficial reaction to the aphid seemed to lessen this pest's impact. The aphid arrived in Hale and Swisher later than usual, developed populations slower than usual, and was easier to control once ET was reached. For the first time locally since the arrival of the invasive aphid, several area sorghum fields did not require treatment at all for the aphid while failures were very few.

Late season cotton pests were also largely absent. The cotton bollworm (corn earworm, sorghum headworm) populations had the lowest recorded adult moth trappings for the season with very few migratory populations moving into the region. Less than 1% of area non-Bt cotton or sorghum required treatment with most of the present bollworm populations sinking into the late corn acres where they are of no immediate economic threat.

A largely clear fall combined with early maturing or limited yielding crops lead to a good harvest aid season for area cotton and a prompt harvest for area grain crops. Corn yields were well below normal with some of the best grain yields coming in only around 6,000 pounds per acre. Sorghum yields were variable depending upon irrigation investments or capacities. Fields yielded either better than average at 5 to 6,000 pounds per acre or better or were far below average at 3,000 pounds or less with little middle performing fields. A moisture event finally occurred in late October in conjunction with the first freeze of the year. This manifested as a week-long freezing fog that caught most cotton fields before harvest could occur but with most bolls open and nearing harvest readiness. The cotton strung out from the bolls terribly and storm proof ratings for varieties became a very notable factor. Many of the worst fields dropped 20-40% of lint before harvest could occur. Cotton yields both due to the drought and strung cotton, was generally light while quality was only minorly impacted.

Winter wheat plantings were again high with a sustained wheat price and lower production costs interests, but the drought situation has persisted and establishment without irrigation has been delayed.

2020 Applied Research and Demonstration Projects

2020 Population Monitoring of Adult Bollworms in Hale & Swisher County

2020 Bollworm, *Helicoverpa zea*, - Pyrethroid Resistance Survey in Hale & Swisher County

Sentinel Plot Monitoring of Bollworm, Helicoverpa zea, Resistance to Bt Technologies in Cotton 2020

2020 Auxin Spray Tip Impact on Early Season Thrips Control in West Texas Cotton

2020 Hale County Phytogen Limited Irrigation Cotton Variety Trail

2020 Swisher County Phytogen Limited Irrigation Cotton Variety Trail

Evaluating Sivanto In-Furrow at Planting for Control of the Sugarcane Aphid, *Melanaphis sacchari*, in Texas High Plains Sorghum

Evaluating Surfactant Impact on Sugarcane Aphid Control in West Texas Grain Sorghum

2020 Army Cutworm in Wheat Efficacy Trial

2020 Product Efficacy for Banks Grass Mite Control in West Texas Corn

2020 Onager and Experimental Gowan Tank Mix Partner Mite Efficacy Trial in West Texas Corn

2020 Albaugh Experimental Miticide Efficacy for Banks Grass Mite Control in Corn

2020 Population Monitoring of Adult Bollworms in Hale & Swisher County

Texas A&M AgriLife Extension Service
Hale & Swisher County
Cooperators: Mike Goss, Shane Berry
Blayne Reed EA-IPM Hale & Swisher and Dr. David Kerns

Summary

The data generated from this effort indicated that the 2020 bollworm population in all three counties was far below what average season's pressure, much like 2019 was. This marks two consecutive seasons of light bollworm pressure. It was suspected that a lack of migratory worms to the region was due to weather patterns and possibly better management of the bollworms by producers in other regions. Our field data generated by the Plains Pest Management scouting program confirmed this light population for 2019 and 2020 with a nearly complete lack of economic problems caused by the bollworm during the growing season.

Adult Lepidopteron pest monitoring is not a guarantee of pest presence or economic problem predictability, trends can be noted and timely alerts for potential egg lay and volume of the area bollworm pest populations can be extrapolated. Assumptions based upon known pest biology combined with this effort can infer aspects about general adult bollworm movement, immigration, and emergence. In an effort to help monitor for this major pest of multiple crops, the information generated from this effort was shared with district and regional researchers, crop consultants, agribusiness professionals, and area producers through the Plains Pest Management Newsletter, the High Plains 'Radio' Podcast, discussions on radio programs, and freely shared independently as requested. If compiled with similar efforts completed in the past, historical trends for the bollworm might be established. Two trapping sites were utilized, one for each county served. The Swisher trap was in central Swisher along the Middle Tule Draw and the Hale trap was in southwestern Hale near Cotton Center. Traps were counted weekly and species-specific pheromone lures changed bi-weekly.

Objective

This effort was made to monitor the adult bollworm (corn earworm, sorghum headworm) population trends throughout the summer growing season in Hale & Swisher County both for immediate and historical use.

Materials and Methods

Standard wire-framed Lepidopteran cone traps and *Helicoverpa zea* specific pheromone lures were utilized in this effort. Traps were suspended upon rebar posts at a height of roughly 4 ½ feet to the top of the trap. Traps were checked, moths counted, recorded, and traps emptied weekly, and pheromone was changed bi-weekly.

Figure 1. Standard moth trap used in monitoring.

Two trapping sites were utilized, one for each county served. The Swisher trap was in central Swisher along the Middle Tule Draw on the Mike Goss Farm (34 26 29.65N -101 44 27.33W) to capture overwintering moths and moths migrating from the east up the Caprock escarpment. The Hale trap was in southwestern Hale near Cotton Center on Shane Berry Farm (33 59 43.59N -101 58 31.39W) to capture overwintering moths and immigrant moths moving from the south. Traps were counted weekly and species-specific pheromone lures changed bi-weekly. All traps were set during the first week of June centering on 3 June and concluded the first week of October centering on 7 October.

Results and Discussion

The population for all two counties started lighter than an average year and remained low for the second consecutive year. Hale County did experience a few high peaks while Swisher remained low throughout the season. All peaks remained well below the economic concern for bollworms in West Texas with one peak well after any local crops would have been threatened.

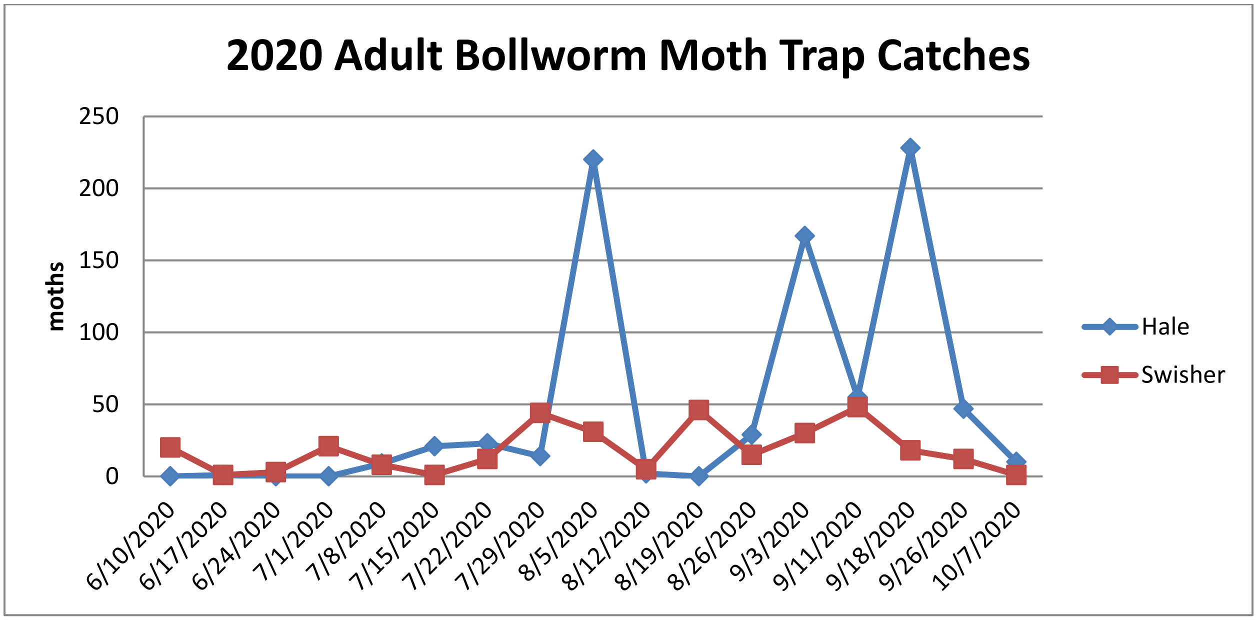


Figure 2. Bollworm moth catches by county per week over time.

The Hale trap peaked last and highest with 228 moths the week of 18 September. Swisher's highest date occurred on the week of 11 September with only 48-moths.

Conclusions

For the second straight season, the bollworm population was well below an average or economic concern for the region. An average bollworm population for the Texas High Plains should yield about 450 moths per week during July and August. This historically includes healthy migratory populations of bollworms moving into the area from other crop producing areas to the south and east. The 2020 peak moth capture was only 228 for one week and no major populations found in any adjoining week. This trend likely represents the 'native' or successfully overwintered population of bollworms from the previous season and very few traditionally present migratory bollworm populations.

The majority of the Cotton Belt the past few seasons have dealt with economic populations of Bt and Pyrethroid resistant bollworms very effectively, likely limiting the number of bollworms migrating to the Texas High Plains. It is not known if this trend of light populations will continue for the region. If bollworms return in at least average numbers or higher, it is very likely they will be very hard to control through locally preferred means.

Acknowledgements

This work is supported by Crops Protection and Pest Management Competitive Grants Program [grant no. 2017-70006-27188 /project accession no. 1013905] from the USDA National Institute of Food and Agriculture. I would like to extend thanks to our cooperating producers Mike Goss and Shane Berry for working with us to gather this data. I would like to thank the 2020 Plains Pest Management Interns for data collection and labor associated with this trial: Lauryn Carroll and Jerik Reed. Thank you all.

2020 Bollworm, *Helicoverpa zea*, - Pyrethroid Resistance Survey in Hale & Swisher County

Texas A&M AgriLife Extension Service / Cotton Incorporated

Hale & Swisher County

Cooperators: Mike Goss, Wayne Johnson, Shane Berry

Blayne Reed, EA-IPM Hale & Swisher and Dr. David Kerns, State IPM Coordinator

Summary

This study is one location of several *Helicoverpa zea* pyrethroid resistance study sites across Texas sponsored by Cotton Incorporated. Traps from the 2020 Hale & Swisher bollworm adult population study were utilized in catching live male moths for this study. Three trapping sites were utilized, one for each county served. Moth exposure vials utilized were 20 mL Scintillation Vials for the product exposure or moth survival test. All moth testing vials were prepared by Dr. David Kern's lab in College Station in groups of 99. All test vials were pre-treated with one of three treatment levels, an untreated check, 5 ug cypermethrin, or 10 ug cypermethrin. All vials were color coded according to treatment levels for ease of trial procedural routine. Due to a light bollworm population during the 2020 growing season, only one check date yielded enough moths for a trial.

The moth population that survived 24-hour vial-treatment exposure was adjusted using Abbotts Formula to adjust for the health of the moth population and calculate true resistance and dominant resistance levels.

These results indicate that we should only expect at best about **42.31% control from any pyrethroid** application to this population of bollworms on the Texas High Plains. They also show that 7.69% of the bollworm population present in 2020 will pass dominant resistance genetic traits on to the next generation of bollworms. This is a considerable drop from the previous year indicating a possible dip in resistance trait dominance being passed to the next generation but is far too high to offer hope for a return to susceptibility. In conclusion, a pyrethroid should not be considered the best option for a first choice economically triggered bollworm treatment on the Texas High Plains in 2020 or the near future.

Objective

Evaluate the level of pyrethroid resistance present within a typical bollworm population prevailing in Hale, & Swisher as a portion of a larger, State-wide survey to reassess the value and level of control offered by this class of insecticides in pest control.

Materials and Methods

This study is one location of several *Helicoverpa zea* pyrethroid resistance study sites across Texas sponsored by Cotton Incorporated. Traps from the 2020 Hale & Swisher bollworm adult population study were utilized in catching live male moths for this study. The traps were standard wire-framed Lepidopteran cone traps and *Helicoverpa zea* specific pheromone lures were utilized in this effort. Traps were suspended upon rebar posts at a height of roughly 4 ½ feet to the top of the trap. Traps were checked, moths counted, recorded, traps emptied weekly, and pheromone was changed bi-weekly.

Two trapping sites were utilized, one for each county served. The Swisher trap was in central Swisher along the Middle Tule Draw on the Mike Goss Farm (34 26 29.65N -101 44 27.33W) to capture overwintering moths and moths migrating from the east up the Caprock escarpment. The Hale trap was in southwestern Hale near Cotton Center on Shane Berry Farm (33 59 43.59N -101 58 31.39W) to capture overwintering moths and immigrant moths moving from the south. Traps were counted weekly and species-specific pheromone lures changed bi-weekly. No kill strips were used to maintain optimum moth health.

Figure 3. Example of adult bollworm moth trap used.

Due to a light bollworm population during the 2020 growing season, only 1 date yielded enough moths to test. On 4 September, only 21 moths were collected from the Hale County site in the 24-hour period and 8 from the Swisher County Site. Both sites were combined for an overall area assessment, but data was analyzed separately for site specific data.

Moth exposure vials utilized were 20 mL Scintillation Vials for the product exposure or moth survival test. All moth testing vials were prepared by Dr. David Kern's lab in College Station in groups of 99 and shipped across the State to cooperating agents and specialists including this site. This location received 2 groups of treated vials for the completion of this survey, but only 28 vials were used. All test vials were pre-treated with one of three levels of cypermethrin, an untreated check, 5 ug cypermethrin, or 10 ug cypermethrin. All vials were color coded according to treatment levels for ease of trial procedural routine. Untreated vials remained clear, 5 ug vials were tainted white across the bottom of the vial and 10 ug vials were tainted red across the bottom. Untreated vials were used to test the overall health of the moth population while the 5 ug rate represented a maximum field rate of cypermethrin and survivors would represent a resistant population that would survive a labeled field treatment. The 10 ug rate would represent a 2X rate of cypermethrin and survivors should represent a dominant resistant trait within the moth population. All vials following moth transfer were left slightly loose to ensure air transfer for the moths.

The moth population that survived 24-hour vial-treatment exposure was adjusted using Abbotts Formula to adjust for the health of the moth population and calculate true resistance and dominant resistance levels.

Results and Discussion

The survivorship for both counties were very similar in every aspect in 2020. The overall health of the tested bollworm population was moderate with an average UTC survivorship of 88.6% (87.5% Swisher and Hale 89.7%) moths surviving 24-hours in untreated vials. The percentage of bollworms surviving the 5-µg treatment, with the Abbott's Adjustment for population health, for both counties becomes 42.31% (42.11% Swisher and 42.86% Hale). The number of bollworms surviving the 10 µg and thus likely to pass the resistant trait to the next generation becomes 7.69% for both counties (0% Swisher and 10.53% Hale).

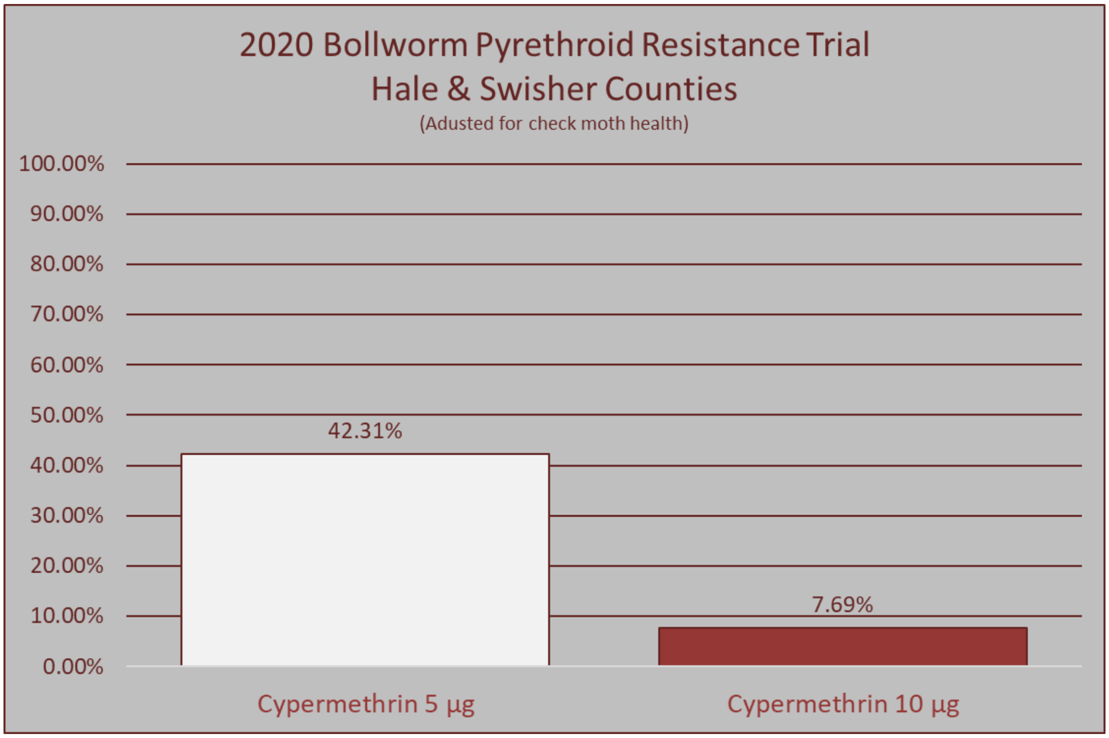


Figure 4. Adult bollworm survivorship by treatment following Abbot's Adjustment calculations.

This season's percent survivorship data is a decrease from the 2019 data. The 42.31% surviving the 5 µg is down from the 2019's 50% but remains higher than the 2018 results of 26%. The reduction in 10 µg survivorship is more drastic at 7.62% down from 40% in 2019 and 22% in 2018.

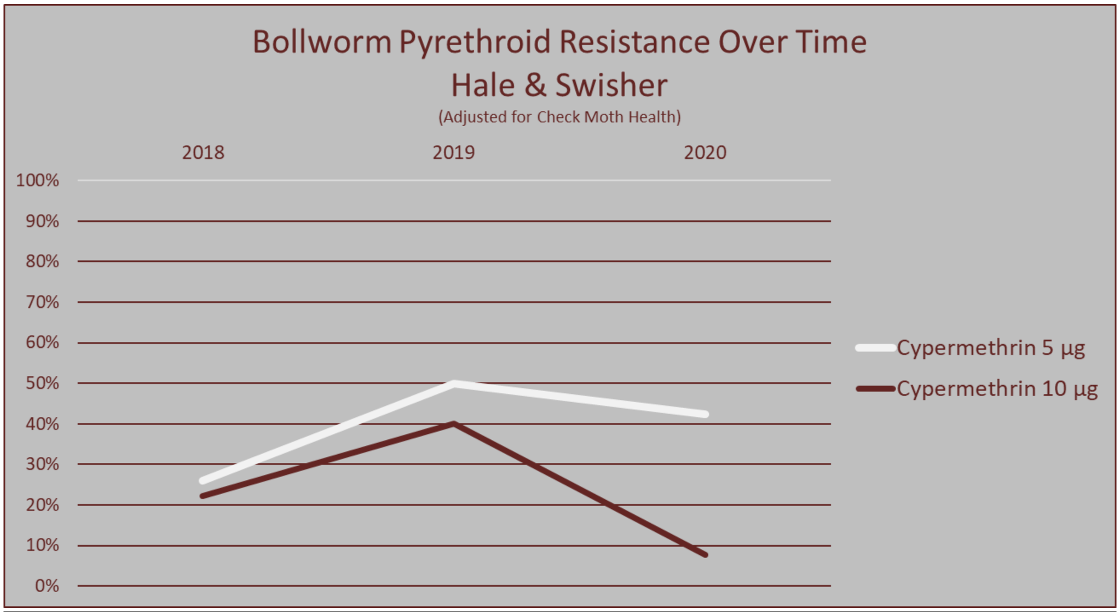


Figure 5. Percent moth survivorship over the past three years by treatment.

Conclusions

While the population available for testing in 2020 was light, the results are startling and similar to previous years. The moderate health of the population indicates that these moths likely migrated a great distance, experienced hardships and limited food along the way, were exhausted upon arrival, and had little food available this late in the growing season. The results show that during 2020, only **42.31% control would result from any pyrethroid application to this population of bollworms**. They also show that 7.69% of this bollworm population will pass dominant resistance genetic traits on to the next generation of bollworms. These results fall within the norm of other areas of the State tested. The survivorship of the 5 µg typically ranges between 10% and 60%. The best optimistic point comes from the steep drop in the 10 µg survivorship numbers this year for Hale & Swisher County. This could indicate that a return to susceptibility might be possible in future years if selection for pyrethroid resistance can be avoided across the Cotton Belt. However, the results from other areas are not nearly as drastic, but rather resemble the slight decline of the 5 µg survivorship percentages.

In conclusion, a pyrethroid should not be considered the best option for a first choice economically triggered bollworm treatment on the Texas High Plains in 2020 or the near future. It also indicates that pyrethroids should not be removed as a control option and need to retain usable labels for control. If large scale use across the Cotton Belt can be avoided, likely for several more growing seasons, the economic use pyrethroids could return. This might be of paramount importance with fewer and fewer insecticides being labeled.

Acknowledgements

This work is supported by Crops Protection and Pest Management Competitive Grants Program [grant no. 2017-70006-27188 /project accession no. 1013905] from the USDA National Institute of Food and Agriculture. I would like to extend thanks to Mike Goss, Shane Berry, and Wayne Johnson for cooperating with us to gather this data. I would like to thank Cotton Incorporated for sponsorship of this work, Dr. David Kerns and the Texas A&M Department of Entomology for moth trapping supplies and the 2018 Plains Pest Management Field Scouts and Lab Technicians for data collection and labor associated with this trial: Jerik Reed and Lauryn Carrol. Thank you all.

Sentinel Plot Monitoring of Bollworm, *Helicoverpa zea*, Resistance to Bt Technologies in Cotton 2020

Texas A&M AgriLife Extension Service
Floyd, Crosby, Hale & Swisher County
Cooperator: Clay Golden
Dagan Teague, EA-IPM Floyd & Crosby, Blayne Reed, EA-IPM Hale & Swisher, and Tim Culpepper, BASF

Summary

With confirmed Bt technology resistance confirmed, each year the need for monitoring resistance in Bt cotton at the local level increases. A Fibermax large plot cotton variety trial near Aiken, Texas, in northwestern Floyd was utilized for Sentinel Purposes. A non-Bt line, , a TwinLink (Cry1AB+Cry2Ae) line, , a TwinLink Plus (Cry1AB+Cry2Ae+Vip3A) line, and a Bollguard III (Cry1Ac+Cry2Ab+Vip3A), , were chosen for resistance screening. Data collection began with weekly counts of 50 whole plant inspections, 100 boll inspections, 100 square inspections, and 50 white flower inspections per technology beginning at first bloom and continuing weekly until absolute cut-out stage of 3.5 NAWF.

Resulting bollworm pressure was unusually light in the High Plains during 2020 with few regional fields ever reaching ET. Only 1,203 bollworms per acre were found in the non-Bt line only some light bollworm damage was found in the TwinLink technology line. All treatments were well below the ET of 8,000 to 10,000 or the 6% harvestable fruit ET. Due to the lack of pressure, we are left to assume that the field efficacy of the varying Bt traits are similar to lab results for 2020 and past area Sentinel Plot results locally. This assumption is not blind however. The light amount of pressure experienced in 2020 does fall within the parameters of the lab results with all Bt technologies being at ET risk from the bollworms causing the utmost need for scouting, but not without some control benefits from the technologies in worm suppression.

Objective

Evaluate efficacy and level of economic return of non-Bt and all Bt trait technologies on bollworms in West Texas commercial cotton and compare these results to other Bt/bollworm resistance studies across the US Cotton Belt for any clues regarding potential regional differences and resistance hotspots.

Materials and Methods

A Fibermax large plot cotton variety trial near Aiken, Texas, in a northwestern Floyd drip irrigated field was utilized for these Sentinel Plot Trial Purposes in 2020. All planting, agronomic and IPM inputs were managed by the producer and Clay Golden Consulting. From this trial A non-Bt line, FM 2322 GL, a TwinLink (Cry1AB+Cry2Ae) line, FM 1911 GLT, a TwinLink Plus (Cry1AB+Cry2Ae+Vip3A) line, FM 2398 GLTP, and a Bollguard III (Cry1Ac+Cry2Ab+Vip3A), NBX 2191 B3XF, were chosen for resistance screening.

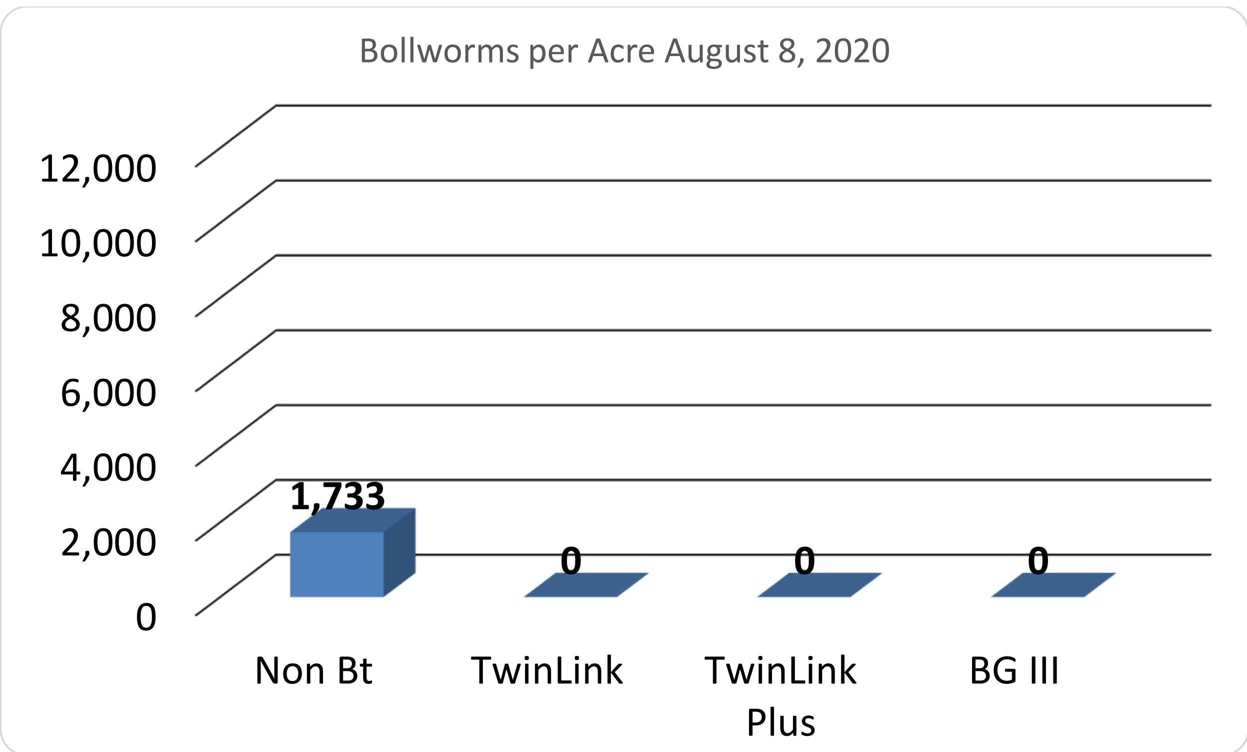
Data collection began with weekly counts of 50 whole plant inspections, 100 boll inspections, 100 square inspections, and 50 white flower inspections per technology beginning at first bloom and continuing weekly until absolute cut-out stage of 3.5 NAWF for a total of seven weeks of data collection. The first count date occurred on July 21st and the last on September 1st.

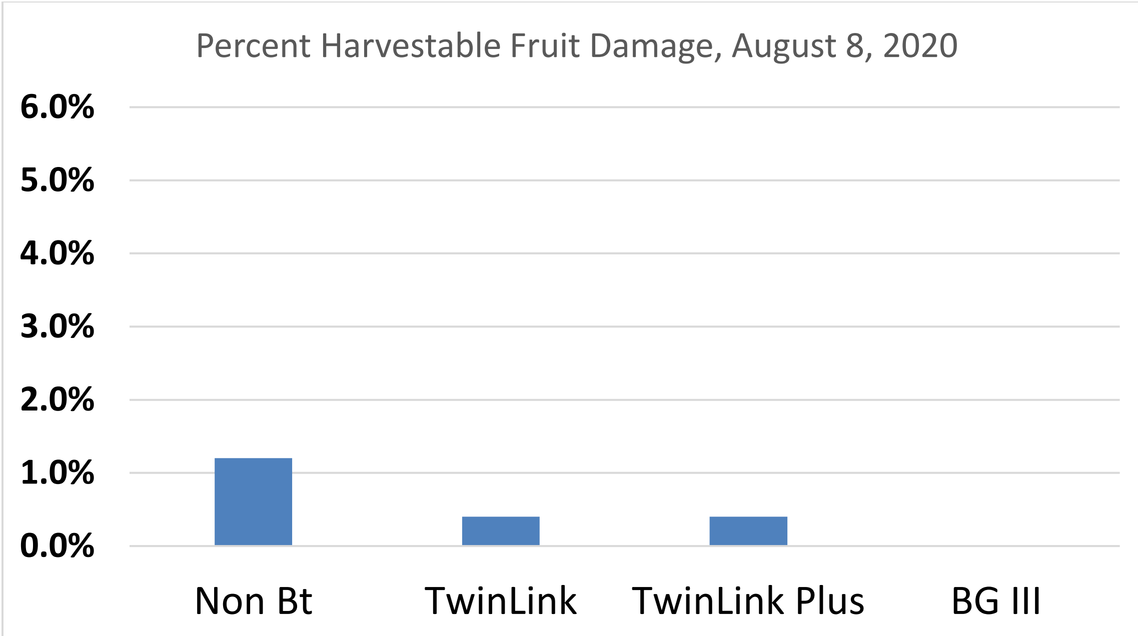
Figure 6. Members of the High Plains IPM Team gather data from the Sentinel plots in 2020.

Field stand counts in terms of plants per acre were taken from 1/1000th of an acre from all lines utilized were taken on the first check date. For commonality with local bollworm ET standards and in sharing resulting data with producers regionally, all resulting bollworm whole plant inspection data was converted calculated with the plants per acre data and converted into bollworms per acre. All resulting damaged fruit data was converted into percent damaged fruit for commonality with the new Cotton Beltwide ET of 6% harvestable fruit damage.

Results and Discussion

From the 21 July check date through the 4 August check date, no bollworm eggs, larva, or resulting damage were found in any plot. On the 11 August check date in the non-Bt line there were found 4 larvae per 50 inspected plants in the 1 damaged boll per 100 harvestable bolls, 1 damaged square per 100 havestable squares, and 1 damaged white flower per 50 harvestable white flowers. Meanwhile, no live worms were found from any of the Bt technologies and only the TwinLink and TwinLink Plus technologies shown 1 damaged square per 100 harvestable squares. No other damage was noted from any Bt technollogy for any category. This resulted in the nonBt line exhibiting 1,733 bollworms per acre, and 1.2% harvestable fruit damage, TwinLink, TwinLink Plus, and Bollguard III with 0 bollworms per acre and with TwinLink and TwinLink Plus with 0.4% harvestable fruit damage.





For the 8 August and 24 August check dates, no worms, eggs or damage were found in any treatment. On the final check date of 1 September, 2 freshly harched worms per 50 plant inspections were found in the non-Bt line, but no damage was found in any treatment. Converted into the common ET standars, the non-Bt line shown 867 bollworms per acre, but all treatments exhibited 0% harvestable fruit damage.

Conclusions

This year for the first several weeks of data collection there was very little for us to report on. There were no eggs, no larvae, and very little damage until the 8 August collection date. Even then the amount of bollworm pressure was far below ET and no action for additonal control was needed. This agrees with our field scouting in the region and with our adult bollworm moth traps for several counties. Unfortunately, we cannot guarantee this light control in the future. These results also at least hint that the bollworm pressure that did arrive on the High Plains in 2020 fall in line with the existing lab results.

There are indications from the data presented here that all of the Bt toxins are still exhibiting some level of control, but that control might not be complete. We can also infer from these results that bollworms will not be an annual economic cotton pest on the Texas High Plains. Most areas of the cotton belt have adopted new economic thresholds for bollworms in response to Bt resistance, which include chemical preventative treatments triggered simply by egg lay for all Bt except lines with the Vip 3A trait. These results show that the High Plains does not consistently have enough bollworm pressure to adopt these extreme measures of prophylactic chemical treatments. Instead, the High Plains likely should extend the existing economic threshold of 8,000 to 10,000 bollworms per acre or 6% harvestable fruit damage to all Bt lines due to the likelihood of some level of resistance.

Acknowledgements

This work is supported by Crops Protection and Pest Management Competitive Grants Program [grant no. 2017-70006-27188 /project accession no. 1013905] from the USDA National Institute of Food and Agriculture. I would like to extend thanks to, Clay Golden Consulting for cooperating with us to complete this trial, Fibermax and Tim Culpepper for sponsoring and partnership of this trial, the 2020 Plains Pest Management Field Scouts and Lab Technicians for data collection and labor associated with this trial: Jerik Reed, Lauryn Carrol. Thank you all.

2020 Auxin Spray Tip Impact on Early Season Thrips Control in West Texas Cotton

Texas A&M AgriLife Extension Service / Cotton Incorporated
Swisher County
Mike Goss, Cooperator
Blayne Reed, EA-IPM Hale & Swisher and Dr. Suhas Vyavhare, District 2 Cotton Entomologist

Summary

Five treatments involving the auxin herbicide Enlist, the insecticide Orthene, and the insecticide Bidrin were organized into a small plot completely randomized block design (CRBD) with four replications. These treatments were grouped into an application A and application B. Application A consisted of all treatments made with auxin approved spray tips. Application B consisted of a second treatment with medium flat fan spray tips. Treatment 1 was made with application A and Enlist alone. Treatment 2 and 4 were made of application A with a mixed treatment of Enlist and a select insecticide for thrips control. Treatment 3 and treatment 5 were made with application A with Enlist alone, followed by treatment B with select insecticides alone. Orthene was utilized in treatment 2 and 3 while Bidrin was utilized in treatment 4 and 5. 0-5 thrips damage ratings were taken preharvest, 3 DAT, 7 DAT, and 10 DAT.

By the 7 DAT date, all treatments that included an insecticide treatment were performing better than the auxin alone treatment 1 and treatment 3 was significantly out performing all other threatments. By 10 DAT, treatment 3 remained significantly superior to all treatments except treatment 2, while treatment 5 was only numerically superior to treatment 4. These results hint that thrips control is hindered by the mandatory use of auxin spray tips if thrips control is needed while herbicide applications are being made and the treatments are mixed into one application. If thrips control is needed for early season West Texas cotton production, it should be made as a separate treatment from the auxin herbicides with tips designed for better coverage.

Objective

Evaluate the impact, if any, of the use of auxin herbicide recommended large droplet spray nozzle tips on thrips efficacy from joint broadcast herbicide with insecticide early season treatments in West Texas Cotton. This will determine if auxin herbicide and thrips insecticide treatments need to be made in one mixed treatment or will two separate treatments with two differing and specialized spray tips be needed.

Materials and Methods

A commercial cotton field intended to be planted in Enlist cotton in central Swisher County belonging to Mike Goss Farms was selected to house this trial. The field selected for this trial had a reliable source for migrating thrips to emerge from drying wheat to the cotton on several sides. On 6 May the field was planted with Mr. Goss' field planter with the Enlist variety PHY 490 W3FE without any insecticidal seed treatments at 52,000 seeds per acre. On 2 June the plots were lain out and alleys cut into Mike Goss' established field. All plots were 4 30-inch rows wide and 36 feet long.

Trial Map Treatment Description

Trt	Code	Description
1	CHK	Auxin A;Roundup Power Max 32 FL OZ/A A;residual A
2		Auxin A;Roundup Power Max 32 FL OZ/A A;Residual A;Orthene 2.5 OZ WT/A A
3		Auxin A;Roundup Power Max 32 FL OZ/A A;Residual A;Orthene 2.5 OZ WT/A B
4		Auxin A;Roundup Power Max 32 FL OZ/A A;Residual A;Bidrin 1.6 FL OZ/A A
5		Auxin A;Roundup Power Max 32 FL OZ/A A;Residual A;Bidrin 1.6 FL OZ/A B

Figure 7. Plot map and treatment list for the trial.

Five treatments involving the auxin herbicide Enlist, the insecticide Orthene, and the insecticide Bidrin were organized into a small plot CRBD with four replications. These treatments were grouped into an application A and application B. Application A consisted of all treatments made with auxin approved spray tips. Application B consisted of a second treatment with medium flat fan spray tips. Application A was applied to all plots (1-5) with treatment 1, 3, and 5 being made with Enlist alone. Application A for treatment 2 and 4 was a mix of Enlist and a selected insecticide for weed and thrips control. Application B was made with medium flat fan nozzles and represented a second application of insecticide alone following application A and was applied to treatment 3 and 5. Orthene at 2.5 oz./ac. was mixed with Enlist for treatment 2 and in treatment 3 was applied alone in application B. Bidrin at 1.6 oz./ac. was mixed with Enlist for treatment 4 and in treatment 5 was applied alone in application B.

All sprays were made with a CO2 backpack sprayer at 16.2 GPA with a walking groundspeed of 2.5 MPH. All application A treatments were made with Enlist at 32 oz./ac. with the Enlist label approved TeeJet TTI, 02, H spray tips. All application B treatments were made with TeeJet 8002V (medium flat fan) spray tips. NIS at 1% V/V was added as a surfactant to all A and B applications. Treatments were made on 8 June with 8.4 MPH SW winds, clear skies, and an 84°F temperature as sprays began. Between all treatments, the backpack spray system was cleansed and made ready for the next application regime. Sprays began with application A for treatments 1, 3, and 5 (Enlist alone) at about 10:45 AM. Application A for treatments 2 and 4 (Enlist mixed with insecticides) began shortly following at 11:50 AM. Following the conclusion of all application A treatments, the spray system was cleansed, and spray tips were changed for application B. At 12:55 PM application B for treatment 3 was made (Orthene alone). At 1:24 PM, application B was made for treatment 5 (Bidrin alone).

Figure 8. CO2 backpack sprayer with auxin labeled tips making an application in cotton.

Thrips numbers were collected on these dates by harvesting 10 randomly selected plants from the middle 2 rows of each plot, by cutting them at the soil level, and directly placing them into labeled and individual plot mason jars containing 75% alcohol. These jars were transported to Dr. Megah Parjulee's Cotton Insect Lab at the Texas A&M AgriLife Center in Lubbock where any thrips captured in the jars would be filtered out of the solution, cleaned, counted, and species identified under microscope at leisure. Unfortunately, there were issues at the Insect Lab in filter screen size utilized for separating the thrips from the solution and the numbers of thrips from each plot were not valid or usable for this trial.

Thrips damage ratings were also taken from the plots pretreatment on 8 June, and at the 3, 7, and 10 DAT dates. Due to the loss of the thrips numbers, this damage rating is the only measurable result from the trial and will be the only result discussed in the Results and Discussion section here. This approved damage rating system utilizes a 0-5 numeric assignment given each plot by the on-site researcher who can make use of visual thrips damage differences down to a 0.5 increment level.

Figure 9. The 0-5 thrips damage rating scale visualized with examples of damage at these levels.

Notes were taken on weed control differences within the plots on a percent control basis for all check dates.

Results and Discussion

All plots rated a 3 damage level on the 0-5 damage rating system pretreatment on 8 June when the plant stages were just above the 1st true leaf stage. By the 3 DAT date, there still were no significant differences between treatments (*P*=0.5539). All treatments had dropped in damage rating, but all treatments including an insecticide were dropping numerically faster than the treatment with Enlist alone. In addition, the treatments made via application B (second treatment with insecticide alone) were numercally lower than those of application A that included an insecticide with Enlist.

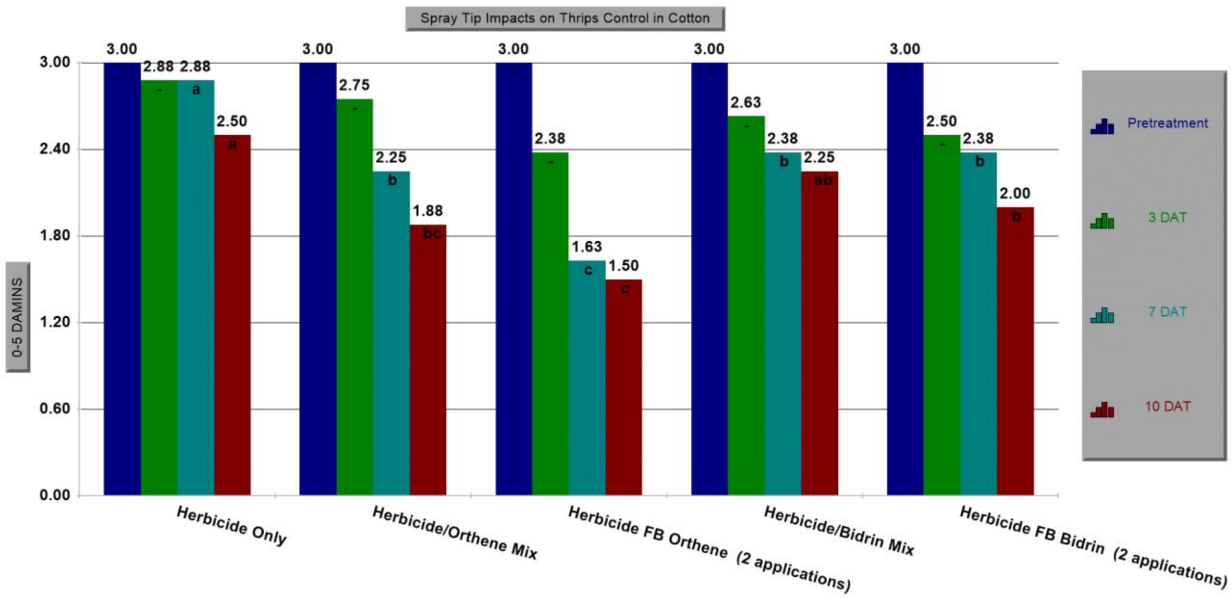


Figure 10. Damage ratings by treatment over time.

By the 7 DAT date, all treatments that included an insecticide treatment were performing better than the auxin alone or UTC treatment. In addition, treatment 3, with Orthene made as application B alone, was significantly superior to all other treatments (*P*=0.0006). By the 10 DAT date, treatment 4, the treatment that included a mix of Enlist and Bidrin mixed for application A, was no longer significantly different from treatment 1, Enlist alone. Treatment 3, Orthene alone as a second application B, was still numerically lower than all other treatments and was significantly lower in damage rating to all treatments except treatment 2, which mixed Orthene with Enlist for application A. Meanwhile, Treatment 5, Bidrin alone in application B, was numerically superior to treatment 4, Enlist and Bidrin mixed in application A.

In terms of weed control, there were no differences between treatments. On the pretreatment data collection date, only 0.8 weeds were found per plot. By the 7 DAT date, all plots and treatments equaled 100% control.

Conclusions

These results are not conclusive and additional research, complete with thrips numbers by treatment over time, is needed. These results do strongly hint that thrips control is hindered by the mandatory use of auxin spray tips if thrips control is needed while herbicide applications are being made and the treatments are mixed into one application. While West Texas auxin herbicide applications must be made with the use of these approved tips, thrips control should be improved by making a second application with tips that offer better coverage that should offer better thrips control.

Acknowledgements

This work is supported by Crops Protection and Pest Management Competitive Grants Program [grant no. 2017-70006-27188 /project accession no. 1013905] from the USDA National Institute of Food and Agriculture. I would like to extend thanks to Mike Goss for cooperating with us to complete this trial, Cotton Incorporated for sponsoring and partnership of this trial, the Cotton Insect Lab for thrips counting and species analysis, the 2020 Plains Pest Management Interns and Lab Technicians for data collection and labor associated with this trial: Jerik Reed and Lauryn Carrol. Thank you all.

2020 Hale County Phytogen Limited Irrigation Cotton Variety Trail

Texas A&M AgriLife Extension Service / Corteva Agriscience

Hale County

Cooperator: Wayne Johnson

Blayne Reed, EA-IPM Hale & Swisher and Dr. Ken Lege, PhytoGen Seed

Summary

Eight Phytogen Cotton varieties, PHY 250 W3FE, PHY 350 W3FE, PHY 394 W3FE, PHY 400 W3FE, PHY 320 W3FE, and the experimental lines PX2C14 W3FE, PX3D32 W3FE, PX3D43 W3FE were planted on 5 May 2020 in a large plot trial with 3 replications in a section of a pivot irrigated field at Wayne Johnson's NE Hale Farm. Plots were 8-rows wide with a row width of 40-inches and a variable plot length. Data on stand counts and vigor ratings were taken on 9 June and end of season agronomic data was collected on 23 September. Harvest occurred on 6 November via Wayne Johnson's harvest equipment, Texas A&M AgriLife Extension cotton weight trailer. Burr weights for each plot were recorded and grab samples from each plot were taken. Samples were subsequently ginned at the Texas A&M Cotton Research sample gin in Lubbock and all percent turnout, lint data, and fiber quality measurements were recorded.

With all factors considered, including the tough 2020 growing season, the cotton variety PHY 394 W3FE is the top performer of this trial. The line was the top performer the all-important category of lint yield and the resulting lint per acre value. The line also performed superior, or among the top performers in enough of the agronomic and fiber quality categories, to be noteworthy for any of these desired traits the categories represent. The varieties PHY 400 W3FE, PHY 443 W3FE, and PHY 250 W3FE were among the rest of the top overall performers.

Objective

Determine the value of selected Phytogen Cotton Seed varieties in Hale County in an area typical agronomic situation.

Materials and Methods

Eight Phytogen Cotton varieties, PHY 250 W3FE, PHY 350 W3FE, PHY 394 W3FE, PHY 400 W3FE, PHY 320 W3FE, and the experimental lines PX2C14 W3FE , PX3D32 W3FE (released as PHY 332 W3FE), PX3D43 W3FE (released as PHY 443 W3FE) were planted on 5 May 2020 in a large plot trial with 3 randomized replications in a section of a pivot irrigated field in Northwestern Hale County belonging to Wayne Johnson. Plots were 8-rows wide with a row width of 40-inches and a variable plot length around the pivot arch.

Figure 11. Rep 1 of the Trial in early September.

All agronomic production and harvest inputs were made by Wayne Johnson with entomological and agronomic scouting and solution recommendations from the Plains Pest Management field scouting program.

On 9 June, data on early season agronomic values and ratings were taken. Five randomly selected 1/1000-acre areas per plot were counted for stand count values and averaged together for a representative stand count value while whole plots were rated on a 1-5 seedling vigor rating scale. On 23 September all late season agronomic data were collected. 5 randomly selected plants per plot were measured for plant height, 1st fruiting branch, total number of fruiting branches, node of the uppermost harvestable boll, and uppermost open boll.

Figure 12. Taking grab samples during cotton harvest 2020.

Prior to harvest in October, an unusually heavy ice storm impacted the trial. This gave the researchers the opportunity to evaluate the varieties for storm tolerance on the 1-5 scale on 5 November. Harvest occurred on 6 November via Wayne Johnson's harvest equipment, Texas A&M

AgriLife experimental cotton weight trailer, and module builder. Burr weights for each plot were recorded and grab samples from each plot were taken following burr weight recording. Samples were subsequently ginned at the Texas A&M Cotton Research sample gin in Lubbock and all percent turnout, lint data, and fiber quality measurements were recorded. All results, both agronomic, yield, and fiber, were statistically compared utilizing ANOVA and LSD = 0.05.

Results and Discussion

All resulting trial data is listed in table 1. The trial lint yielded from 1,286-pounds lint per acre down to 1,033-pounds lint per acre with significant differences in lint yield between varieties. The variety PHY 394 W3FE had the highest lint yield and highest dollar per acre return of the cotton lines tested while PHY 350 W3FE had the lowest lint yield and lowest dollar per acre return. There significant fiber differences between varieties in percent lint turnout with PHY 400 W3FE being superior with 34.1% turnout, Mic with PHY 443 W3FE having the highest at 4.69 and PX2C14 W3FE the lowest at 3.94, length with PHY 394 W3FE, PHY 400 W3FE, and PHY 332 W3FE all exhibiting lengths of 1.18 with the lines PHY 320 W3FE and PX2C14 W3FE exhibiting the lowest with 1.12, in Uniformity the line PHY 443 W3FE exhibited the highest percent at 83.6% and PHY 350 W3FE exhibited the lowest at 82.0%. There were no significant differences in fiber strength, color grade, leaf grade, or loan value.

There were significant differences in the agronomic traits for node of 1st fruiting branch with PHY 400 W3FE averaging the earliest at 6.2 while PX2C14 W3FE averaged the latest at 7.1, in plant height PHY 394 W3FE averaged the shortest at 20.2-inches and PHY 350 W3FE averaged the tallest at 26.0-inches, in total notes PX2C14 W3FE averaged the most with 18.9 and PHY 250 W3FE averaged the least at 17.2, in established plant population per acre PHY 394 W3FE averaged the most with 44,667 and PHY 350 W3FE averaged the least with 33,533, and PHY 394 W3FE and PXC14 W3FE averaged the best storm tolerance with 2.5 and 2.6 respectively. There were no significant differences in nodes above cracked boll, height to node ratio, or seedling vigor rating.

Table 1. Trial data with significance by category.

PhytoGen COTTONSEED **Innovation Trial**

TEXAS A&M AGRILIFE EXTENSION

Grower Cooperator:	Wayne Johnson	Planting Date:	5/5/2020
Trial Cooperator:	Blayne Reed, TAMU	Seed Treatments:	TRiO
PhytoGen CDS:	Ken Legé, Ph.D.	Moist. @ planting:	Good
Location:	Claytonville, TX (Hale Co.)	Soil Temp @ planting:	
Replicates:	3	Seed/Acre:	56,000
Plot Size:	8 rows x half circle	GPS Lat:	34.253948
Row Spacing:	40"	GPS Long:	-101.576224
Beds:	No	Elevation:	3339
Previous crop(s):	Sorghum	Harvest Date:	11/5/2020
Soil type:	Pullman Clay Loam		
Irrigation:	LEPA		

Variety	Lint Yield *(lbs/A)*	Turnout *(%)*	Mic	Length *(in)*	Strength (g/tex)	Uniformity *(%)*	Color Grade	Leaf Grade	Loan Value ($/lb)	Lint Value ($/A)
PHY394W3FE	1286	31.8	4.03	1.18	31.1	80.4	21, 21, 31	3.0	0.5690	732
PHY400W3FE	1234	34.1	4.23	1.15	31.3	82.2	21, 31, 31	2.7	0.5655	698
PHY443W3FE	1199	33.7	4.69	1.14	32.2	83.6	21, 21, 21	1.7	0.5685	682
PHY250W3FE	1182	31.7	4.23	1.18	31.6	82.6	21, 21, 21	2.0	0.5740	678
PHY332W3FE	1156	32.7	4.46	1.18	31.0	83.0	21, 21, 21	1.7	0.5745	664
PHY320W3FE	1163	31.8	4.43	1.12	30.1	83.0	31, 31, 31	1.7	0.5610	652
PX2C14W3FE	1095	30.4	3.94	1.12	29.9	82.3	31, 21, 21	2.0	0.5640	618
PHY350W3FE	1033	31.0	4.25	1.15	29.7	82.0	21, 21, 21	1.7	0.5685	587
Mean	*1138*	*31.9*	*4.28*	*1.15*	*30.9*	*82.4*		*2.1*		
LSD	*90*	*1.2*	*0.25*	*0.03*	*ns*	*1.1*		*ns*		
CV (%)	*4.38*	*2.1*	*3.4*	*1.6*	*3.9*	*0.8*		*36.4*		
Prob>F, variety	*0.0010*	*0.0001*	*0.0004*	*0.0028*	*0.2260*	*0.0014*		*0.2614*		

Variety	Node of 1st Fruiting Branch	Final Plant Height *(in)*	Final Total Nodes	Nodes Above Cracked Boll	Height-to-Node Ratio *(in/internode)*	Plant Population *(#/A)*	Vigor Rating *(1=excellent; 5=very poor)*	Storm Tolerance *(1=very tight; 5=very loose)*	
PHY394W3FE	7.9	20.2	18.7	4.2	1.08	44667	1.3	2.6	
PHY400W3FE	6.2	22.8	18.4	3.4	1.24	42000	1.5	3.5	
PHY443W3FE	7.9	25.6	18.4	3.7	1.39	39467	1.3	3.9	*Previously PX3D43W3FE*
PHY250W3FE	6.9	22.5	17.6	3.4	1.28	36867	2.0	3.3	
PHY332W3FE	7.0	23.1	17.2	2.0	1.35	44200	1.3	3.6	*Previously PX3D32W3FE*
PHY320W3FE	6.5	22.5	17.3	3.4	1.30	34867	2.2	3.8	
PX2C14W3FE	7.1	23.6	18.9	2.2	1.25	39800	1.7	2.5	
PHY350W3FE	6.3	26.0	17.9	4.2	1.45	33533	2.0	3.6	
Mean	*6.7*	*24.8*	*18.4*	*3.2*	*1.35*	*36667*	*1.8*	*3.0*	
LSD	*0.9*	*1.9*	*1.2*	*n/a*	*n/a*	*5579*	*ns*	*0.7*	
CV (%)	*7.6*	*4.7*	*3.6*	*n/a*	*n/a*	*8.1*	*28.1*	*11.3*	
Prob>F, variety	*0.0070*	*0.0004*	*0.0411*	*n/a*	*n/a*	*0.0050*	*0.2059*	*0.0022*	

Values in bold are best within each column; values in green-shaded cells are not significantly different from the best value

Conclusions

With all factors considered, the cotton variety PHY 394 W3FE is the top performer of the trial. The line was the top performer the all-important category of lint yield and the resulting lint per acre value. The line also performed superior, or among the top performers in enough of the agronomic and fiber quality categories, to be noteworthy for any of these desired traits the categories represent. For the 2020 season and its tough establishment environment, droughty summer, topped with the late season ice storm that tested storm proofness, all varieties performed admirably, within their given strengths. The 2020 season highlighted the need for stand establishment, agronomic efficiency, and storm proof readiness. PHY 394 W3FE were strong if not the top performer in these important areas. PHY 394 W3FE being the top performer in most notably the plant per acre establishment of 44,667 of 56,000 seed planted and having one of the best storm tolerance ratings undoubtedly aided in its best all-around top performing status.

However, there are other strong performing varieties in this trial worth consideration. PHY 400 W3FE exhibited good seeding vigor also at 42,000 plants established of 56,000 seed planted, exhibited superior ling percentage turnout, and was the earliest to start setting fruit. The new variety PHY 443 W3FE performed among the leaders in several categories offering a solid result, and PHY 250 W3FE still performed well despite its determinant nature in drought situations. This line could be of particular interest and often outperforms its contemporaries in the area if drought could be mitigated by increased irrigation if possible or higher rainfall amounts.

Acknowledgements

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2020 Swisher County Phytogen Limited Irrigation Cotton Variety Trail

Texas A&M AgriLife Extension Service / Corteva Agriscience

Swisher County

Cooperator: Mike Goss

Blayne Reed, EA-IPM Hale & Swisher and Dr. Ken Lege, PhytoGen Seed

Summary

Eight Phytogen Cotton varieties, PHY 250 W3FE, PHY 350 W3FE, PHY 394 W3FE, PHY 400 W3FE, PHY 320 W3FE, and the experimental lines PX2C14 W3FE, PX3D32 W3FE, PX3D43 W3FE were planted on 6 May 2020 in a large plot trial with 3 replications in a section of a pivot irrigated field at Mike Goss central Swisher Farm. Pivot and irrigation system breakdown at key developmental stages combined with severe drought situations limited critical inputs in this trial while ice storms in October caused boll stringing. Both were viewed as opportunities to better evaluate these varieties in harsh situations. Plots were 8-rows wide with a row width of 30-inches and a variable plot length. Data on stand counts and vigor ratings were taken on 8 June and end of season agronomic data was collected on 23 September. Harvest occurred on 12 November via Mike Goss' harvest equipment and the Texas A&M AgriLife Extension cotton weight trailer. Burr weights for each plot were recorded and grab samples from each plot were taken. Samples were subsequently ginned at the Texas A&M Cotton Research sample gin in Lubbock and all percent turnout, lint data, and fiber quality measurements were recorded.

With all factors considered, including the tough 2020 growing season, the cotton variety PHY 332 W3FE won this trial by being among the better yielders, but exhibited many superior fiber quality traits that led to a superior loan value. The line 400 W3FE exhibited the best lint yield while PHY 394 exhibited the best stand establishment and seedling vigor, factors that might have actually hurt its value performance given the unique and unexpected extreme drought situation of the trial by having too many plants per acre developing too quickly.

Objective

Determine the value of selected Phytogen Cotton Seed varieties in Swisher County in an area typical agronomic situation.

Materials and Methods

Eight Phytogen Cotton varieties, PHY 250 W3FE, PHY 350 W3FE, PHY 394 W3FE, PHY 400 W3FE, PHY 320 W3FE, and the experimental lines PX2C14 W3FE , PX3D32 W3FE (released as PHY 332 W3FE), PX3D43 W3FE (released as PHY 443 W3FE) were planted on 6 May 2020 in a large plot trial with 3 randomized replications in a section of a pivot irrigated field in Central Swisher County belonging to

Mike Goss. Plots were 8-rows wide with a row width of 30-inches and a variable plot length around the pivot arch. Seed for all plots were planted at 52,000 seed per acre.

All agronomic production and harvest inputs were made by Mike Goss with IPM and agronomic scouting and solution recommendations from the Plains Pest Management field scouting program.

On 8 June, data on early season agronomic values and ratings were taken. Five randomly selected 1/1000-acre areas per plot were counted for stand count values and averaged together for a representative stand count value while whole plots were rated on a 1-5 seedling vigor rating scale. During late July and early August, the field experienced severe drought conditions combined with well and irrigation breakdowns resulting in serious agronomic conditions offering insight into real-world, worst-case scenarios that can add value to the evaluation of this trial. On 23 September all late season agronomic data were collected. 5 randomly selected plants per plot were measured for plant height, 1st fruiting branch, total number of fruiting branches, node of the uppermost harvestable boll, and uppermost open boll.

Figure 13. Taking grab samples during cotton harvest 2020.

Prior to harvest in October, an unusually heavy ice storm impacted the trial. This gave the researchers the opportunity to evaluate the varieties for storm tolerance on the 1-5 scale on 11 November. Harvest occurred on 12 November via Wayne Johnson's harvest equipment, Texas A&M AgriLife experimental cotton weight trailer, and module builder. Burr weights for each plot were recorded and grab samples from each plot were taken following burr weight recording. Samples were subsequently ginned at the Texas A&M Cotton Research sample gin in Lubbock and all percent turnout, lint data, and fiber quality measurements were recorded. All results, both agronomic, yield, and fiber, were statistically compared utilizing ANOVA and LSD = 0.05.

Results and Discussion

All resulting trial data is listed in table 1. The experimental line PX3D32 W3FE, later released as PHY 332 W3FE, shown the highest lint value per acre at $320 while PHY 394 W3FE shown the lowest lint value per acre at $198. The lint yield per acre held significant differences between varieties and ranged from 628 pounds down to 435 pounds with the line PHY 400 W3FE actually taking the top lint yield and PHY 394 W3FE taking the low spot.

Figure 14. The Swisher Phytogen Trial played host to a field day highlighting situations and variety responses.

In terms of fiber quality, there were significant differences in percent lint turnout with the line PHY 443 W3FE taking top billing at 33.8% and PX2C14 W3FE taking the low with 27.8%, in mic with PHY 443 W3FE exhibiting the highest mic at 4.49 and PHY 250 W3FE taking the low at 3.75, in strength with PHY 400 being the strongest at 27.1 and PHY 394 W3FE the lowest at 25.1, and in leaf grade with PHY 332 W3FE and PHY 443 W3FE sharing the low at 1.7 while PHY 394 W3FE held the high at 4.0. There were no significant differences in length, uniformity, or color grade. The fiber quality differences led to the line PHY 332 W3FE holding a loan value of $0.5240 per pound lint. this was a full $0.02 per pound higher than its nearest loan value performer and nearly $0.07 above the trial average of $0.4593.

In agronomic traits there were significant differences in node of 1st fruiting branch with PHY 400 W3FE fruiting earliest at an average 6.5 and PHY 394 W3FE starting latest at 8.7, plant height with PHY 394 W3FE being the shortest at an average 21.0-inches up to PHY 350 W3FE at 26.6-inches, in final plant population with PHY 394 W3FE establishing 43,867 plants per acre down to PHY 350 W3FE establishing only 31,467, and in seedling vigor ratings with PHY 394 W3FE being rated at a 1.0 down to PHY 350 W3FE which was rated at 2.3. There were no significant differences in total nodes, nodes above cracked boll, or height to node ratio. There were significant differences in the storm proof ratings. PX2C14 W3FE had the tightest boll with an average rating of 2.0 while PHY 343 had the loosest at 4.0.

Table 2. All Data from the 2020 trial by category.

Innovation Trial

Grower Cooperator:	Mike Goss	Planting Date:	5/6/2020
Trial Cooperator:	Blayne Reed, TAMU	Seed Treatments:	TRiO
PhytoGen CDS:	Ken Legé, Ph.D.	Moist. @ planting:	Good
Location:	Kress, TX (Swisher Co.)	Soil Temp @ planting:	
Replicates:	3	Seed/Acre:	53,000
Plot Size:	8 rows x half circle	GPS Lat:	34.436111
Row Spacing:	30"	GPS Long:	-101.738206
Beds:	No	Elevation:	3476
Previous crop(s):	Wheat fallow	Harvest Date:	11/12/2020
Soil type:	Pullman Clay Loam		
Irrigation:	LEPA (2 gpma)		

Variety	Lint Yield *(lbs/A)*	Turnout *(%)*	Mic	Length (in)	Strength (g/tex)	Uniformity (%)	Color Grade	Leaf Grade	Loan Value ($/lb)	Lint Value ($/A)
PHY332W3FE	611	32.5	4.12	**1.05**	26.7	77.7	11,11, 11	1.7	0.5240	320
PHY400W3FE	628	33.6	4.22	1.02	27.1	77.2	21, 11, 21	2.0	0.5045	317
PHY350W3FE	540	33.4	4.31	1.01	25.5	77.6	11, 11, 21	2.0	0.4595	248
PHY443W3FE	509	33.8	4.49	1.00	26.7	77.5	11, 21, 11	1.7	0.4865	248
PX2C14W3FE	506	30.9	3.82	1.01	27.0	77.7	21, 11, 11	2.0	0.4870	246
PHY250W3FE	488	31.3	3.75	1.01	26.3	78.4	11, 21, 11	2.3	0.4920	240
PHY320W3FE	518	31.4	4.07	0.99	25.7	78.2	11, 21, 21	2.7	0.4630	240
PHY394W3FE	435	27.8	3.76	1.01	25.1	76.6	21, 21, 21	4.0	0.4555	198
Mean	*477*	*29.6*	*3.92*	*1.00*	*25.4*	*77.4*		*3.4*	*0.4593*	*219*
LSD	*98*	*1.9*	*0.4*	*ns*	*1.1*	*ns*		*1.2*		
CV (%)	*10.6*	*3.4*	*5.7*	*2.0*	*2.5*	*1.0*		*29.9*		
Prob>F, variety	*0.0157*	*0.0001*	*0.0107*	*0.0809*	*0.0112*	*0.2378*		*0.0172*		

Variety	Node of 1st Fruiting Branch	Final Plant Height *(in)*	Final Total Nodes	Nodes Above Cracked Boll	Height-to-Node Ratio *(in/internode)*	Plant Population *(#/A)*	Vigor Rating *(1=excellent; 5=very poor)*	
PHY332W3FE	7.6	26.3	19.0	0.7	1.38	36800	1.2	*Previously PX3D32W3FE*
PHY400W3FE	6.5	22.9	19.3	0.6	1.19	32933	1.7	
PHY350W3FE	6.7	26.6	19.1	0.6	1.39	31467	2.3	
PHY443W3FE	8.0	24.0	18.4	0.2	1.30	38467	1.5	*Previously PX3D43W3FE*
PX2C14W3FE	6.9	23.8	19.6	0.2	1.21	36867	1.5	
PHY250W3FE	7.7	22.3	18.9	0.4	1.18	32267	2.0	
PHY320W3FE	7.2	24.1	18.9	0.3	1.27	36667	1.8	
PHY394W3FE	8.7	21.0	20.7	0.6	1.01	43867	1.0	
Mean	*7.5*	*23.6*	*19.3*	*0.4*	*1.23*	*36667*	*1.7*	
LSD	*0.9*	*3.2*	*ns*			*5967*	*0.6*	
CV (%)	*7.0*	*7.6*	*4.2*			*9.4*	*20.8*	
Prob>F, variety	*0.0021*	*0.0299*	*0.1058*			*0.0121*	*0.0054*	

Values in bold are best within each column; values in green-shaded cells are not significantly different from the best value

Conclusions

When reviewing these results, it is important to note the pivot and irrigation system breakdown during an extreme drought situation at key developmental stages and the impacts upon this trial. This is notable in the results with all varieties yielding low in terms of lint per acre and fiber quality generally being poor. There are also opposing results from some categories that should be desirable in a variety that actually hindered final yield and fiber results here. The variety PHY 394 W3FE established the best plant population per acre with the 43,867 plants resulting from the 52,000 seeds planted. This variety also had the best seedling vigor rating. These are characteristics are usually desirable and often do result in varieties winning trials of this nature. However, given the drought situation and extenuating circumstances, this higher plant population and faster plant development led to too many plants per acre given the sudden and extreme change in field situation. The plants were not able to mature bolls with the competition of too many plants per acre. Fruit drop was excessively high and fiber quality was adversely affected. Meanwhile, varieties without such high plant establishment traits, but other desirable characteristics, fared better. If the extreme drought and irrigation situation had been predicted the inputs for the field would have been different. The seeding rate would have been adjusted to the situation. A lower seeding rate then could have dropped some of the well performing lines below a profitable plant per acre level unless taken into account. Conversely, if the irrigation system had not experienced difficulties higher plant populations, that were planted, would have been warranted, if not needed to make the original desired yields. While this situation was not predictable, these diametrically opposing characteristics should be noted in modern irrigation cotton production on the Texas High Plains.

With all factors considered today, the variety PHY 332 W3FE ultimately led this trial in lint value per acre, thus winning this trial proving serious value in this worse case situation. It did so by being among the leaders in fiber quality traits that resulted in a higher loan value but remained among the leaders in yield. It also exhibited a light enough plant population, through a poor showing in resulting established plants per acre, so as to not to be as impacted by over competition.

The variety PHY 400 W3FE was a very close second in terms of value per acre by leading in lint yield but sustaining a good loan value also. Both of these varieties should certainly be considered as good fits for the area, particularly when environmental situations cannot be guaranteed. These lines have proven to be better at retaining some return on investment in unpredictable, worse case situations.

All other varieties from this trial remain worthy of consideration for characteristics offered. PHY 394 W3FE is a prime example. With its superior seeding rate to plant per acre rate and seedling vigor may very well have performed, as it has in other similar trials in the region, much better with either a lower seeding rate or a reversal of either the drought situation or irrigation system breakage.

Acknowledgements

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Evaluating Sivanto In-Furrow at Planting for Control of the Sugarcane Aphid, *Melanaphis sacchari*, in Texas High Plains Sorghum

Blayne Reed [1], Suhas Vyavhare [2], Russ Perkins [3], Patrick Porter [4], John Thobe [5], Dagan Teague [6], 1)Texas A&M University, Plainview, TX, 2)Texas A&M AgriLife Research and Extension Center, Lubbock, TX, 3)Bayer Crop Science, Idalou, TX, 4)Texas A&M AgriLife Extension, Lubbock TX, 5)Texas A&M AgriLife, Muleshoe, TX, 6)Texas A&M AgriLife, Floydada, TX

Summary

In 2017, 2019, and 2020 Sivanto was evaluated as applied in-furrow, at planting for sugarcane aphid control efficacy. All trials were conducted as a RCBD with 4 replications. In 2017 a 4 oz./acre rate was compared to an untreated check (UTC) and 5 seed treatments. In 2019 and 2020, two rates of Sivanto, 4 oz./ac. and 5 oz./ac., were compared to an UTC and a standard foliar Sivanto at 7 oz./ac. over the top (OVT) at threshold treatment. The 2017 in-furrow treatment outperformed all seed treatments but lost economic control at 81 DAP and required a foliar treatment to maintain season long control. In 2019 the Sivanto in-furrow treatments seemed to experience a rate response just before the SCA population crashed at about the 85 days after planting (DAP) mark. The 4 oz./ac. rate lost control at about the 80 DAP mark, while the 5 oz./ac. rate maintained control through 85 DAP when populations crashed. In 2020, both rates of Sivanto lost control at about the 80 DAP date. In all trial years, the OVT treatment provided adequate economic control in grain sorghum.

The in-furrow at planting treatments have consistently offered at least a remarkable 80 days of SCA control regardless of environmental situations. However, these results suggest that in-furrow at planting treatments of Sivanto do not offer season long SCA control in grain sorghum consistently, and that the OVT treatments, when made in good order and at established ET timing, are sufficient for SCA control in grain sorghum. If harvest can be expected to occur for any sorghum type hay crop within or around this 80 – 85 day time frame, the in-furrow treatments should provide adequate control of SCA, particularly in high or dense foliage cover hay and silage situations where OVT treatments prove lacking for coverage.

Objective

To evaluate Sivanto for sugarcane aphid efficacy in grain sorghum and sorghum type hay crops when applied at planting, in-furrow.

Materials and Methods

Field experiments were conducted during the 2017, 2019, and 2020 growing seasons at the Texas A&M research farm in Halfway, TX, as in a Randomized Complete Block Design with 4 replications. The 2017 trial compared a UTC and Sivanto in-furrow at 4 oz. per acre to existing and experimental seed treatments. An OVT (over-the-top) treatment of Sivanto at 6 oz. per acre was applied at 88 DAP once treatments lost efficacy in order to guarantee yield for all treatments in the trial.

The 2019 and 2020 trials compared Sivanto in-furrow at 4 oz/ac and 5 oz/ac with standard over-the-top (OVT) Sivanto at 7 oz. per acre applied at threshold, and an UTC. The in-furrow treatments were made via CO_2 sprayer rigged with flow nozzles attached to the Halfway Research Farm planter units.

Seed was planted at 27,000 seeds per acre across the trial with the Sivanto in-furrow treatments going out at 20.6 GPA and a tractor speed of roughly 3.9 MPH.

Table 3. Important Agronomic and Timing information and differences in the trial years.

Trial Year	2017	2019 & 2020
Replications	4	4
Treatments	7 (1 UTC, 5 seed treatments, 1 in-furrow)	4 (1 UTC, 2 in-furrow rates, 1 OVT at threshold)
Plot Size	4-40" Rows X 35'	4-40" Rows X 38'
Sorghum Variety	DK37-07 (SCA Tolerant)	KS 585 (SCA Susceptible)
Planting Date	19-Jun	21-Jun/4-Jun
OVT Made	All Treatments at 88 DAP	52 DAT/70 DAP
SCA Detection Date	27-July (38 DAP)	25-July (33DAP)/29-July (55 DAP)
Harvest Date	15-Nov	17-Oct/5-Oct

The 2019 and 2020 trials compared Sivanto in-furrow at 4 oz/ac and 5 oz/ac with standard over-the-top (OVT) foliar Sivanto at 7 oz. per acre rate applied at threshold.


Figure 1. Making the OVT treatment in 2020.

All agronomic needs of the field were managed by the Halfway Experiment Station Personnel, with weed and other management inputs provided by the IPM Agent. The field was monitored for insect, weed, and disease pests by the Plains Pest Management field scouting program weekly. The 2019 growing season was hot and dry during key summer growth stages, but an average amount of rainfall (18.2”) occured over the year to supplement the set pivot irrigation amounts in the spring and fall. The 2020 growing season saw intensified drought conditions with little rainfall (3.4”) to supplement the set irrigation amounts.

Once SCA were detected in the field, weekly per-leaf SCA counts began in all trials. Sugarcane aphid counts were taken from ten upper leaves (1-2nd leaf below flag) and lower leaves (1-2nd leaves above desiccated leaf) per plot on each sampling date.

Figure 2. 2019 Calibrating and preparing to make the in-furrow treatments at planting with the nozzle-hose boom, later to be attached to the planter units.

Once the OVT and UTC plots reached Economic Threshold (ET) for the SCA, the OVT treatment (Sivanto at 7 oz./ac.) was then made. OVT Treatments were made via CO2 backpack sprayer with overhead boom attachment set 1-foot above crop heads, at 16.2 GPM with a walking groundspeed of 2.5 MPH. For all trials, ten row-feet were randomly selected for harvest. Harvest was completed by hand by cutting heads form the plants within the ten-foot area and placing them in plot unique sample bags. Samples were promptly threshed via trailer mounted Haldrup research grain thresher on site. Grain moisture and bushel weight measurements were collected on a Dickey-john Mini GAC Plus grain moisture analyzer. Grain samples were weighed in terms of grams per 10 row feet and converted to grain yield in pounds per acre. All data were analyzed via ARM ANOVA with a P<0.05 or less. For ease of discussion and graphing in the following figures, per leaf SCA counts were merged for a total per leaf average.

Results and Discussion

2017

In-furrow application of Sivanto at 4 oz/a resulted in significantly fewer sugarcane aphids per leaf than all other treatments from 45 to 88 DAP (Fig. 1) ($P<0.05$). By 80 DAP the Sivanto in-furrow treatment lost economic control of the aphids and had to be treated OVT at 88 DAP to maintain control.

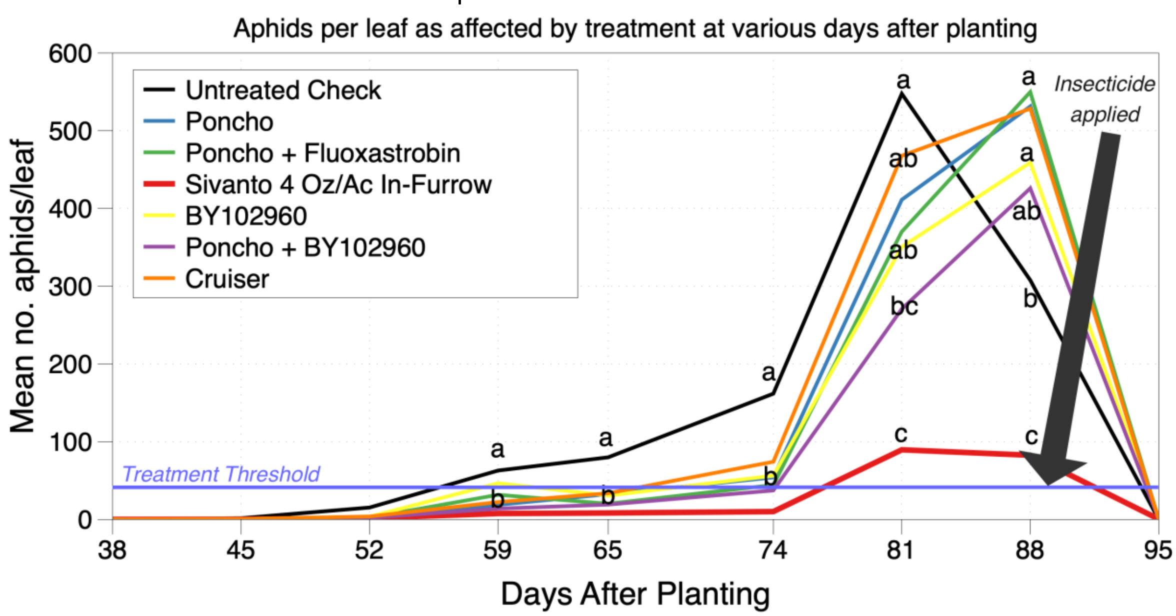

Fig. 1. Impact of insecticide seed treatments and at-plant in-furrow application of Sivanto on sugarcane aphid infestation levels in sorghum, 2017.

2019

At 48 DAP, both Sivanto in-furrow treatments had significantly fewer aphids than the untreated control plots. Following the OVT treatment at 52 DAP, the OVT treatment separated from the UTC and became similar to the lower 4 oz. in-furrow rate treatment while the higher 5 oz. in-furrow rate remained superior to all treatments.

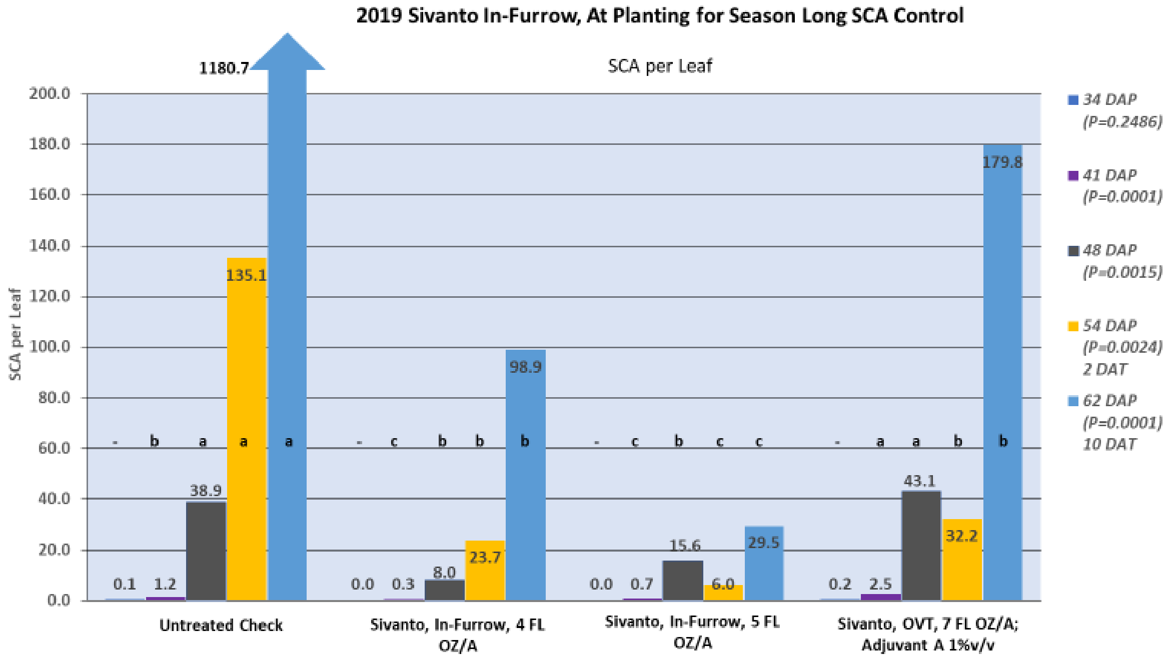

Fig. 2. 2019 SCA per leaf data, detection through 62 DAP.

This trend continued with the leaf damage ratings until the final 83 DAP (31 DAT after the OVT treatment) rating date when the 7 oz. OVT treatment became similar to both in-furrow treatments. The 4 oz/ac in-furrow treatment began losing control at 76 DAP while the 5 oz/ac treatment remained steady in control. By the 83 DAP / 31 DAT date, all aphid populations crashed and any further differentiation between treatments became impossible.

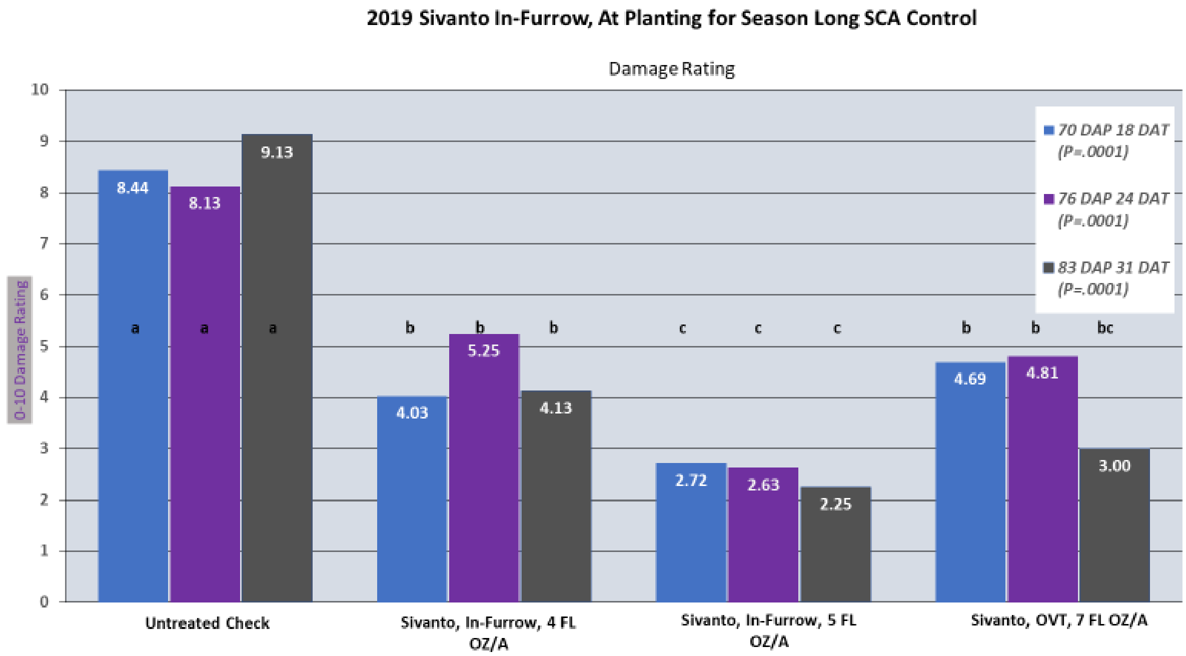

Fig. 3. Sugarcane aphid leaf damage rating across treatments, 2019

Grain yield was significantly higher in insecticide treated plots compared to the untreated check in 2019 (Fig. 4) (*P*=0.003). Yield did not differ significantly among insecticide treatments.

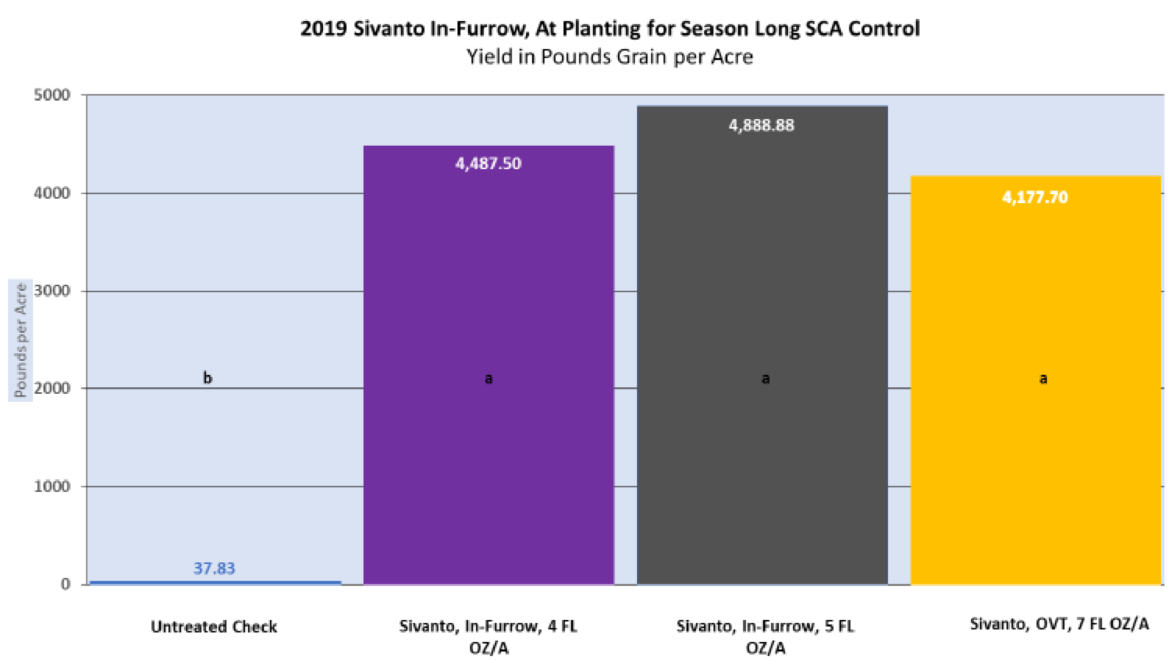

Fig. 4. Treatment impact on grain yield, 2019 (*P*=0.0003).

2020

For the 2020 growing season, SCA did not arrive to infest the trial plots until about the 55 DAP date. The population growth and intensity of the SCA population also was not as severe as previous seasons. Statistical separations in any aphids per leaf counts did not occur until the 70 DAP count date and only for the upper leaf counts. On this date, all SCA numbers were increasing for all plots, and ET was reached for the OVT plots. All treatments separated from the UTC at the 77 DAP and 7 DAT (OVT) count date, but the OVT treatment had significantly fewer aphids than the in-furrow treatments. The OVT treatment continued to have fewer aphids than the UTC and in-furrow treatments for the remainder of the trial, while the in-furrow treatments were not different from the UTC by the 91 DAP/21 DAT (OVT) date.

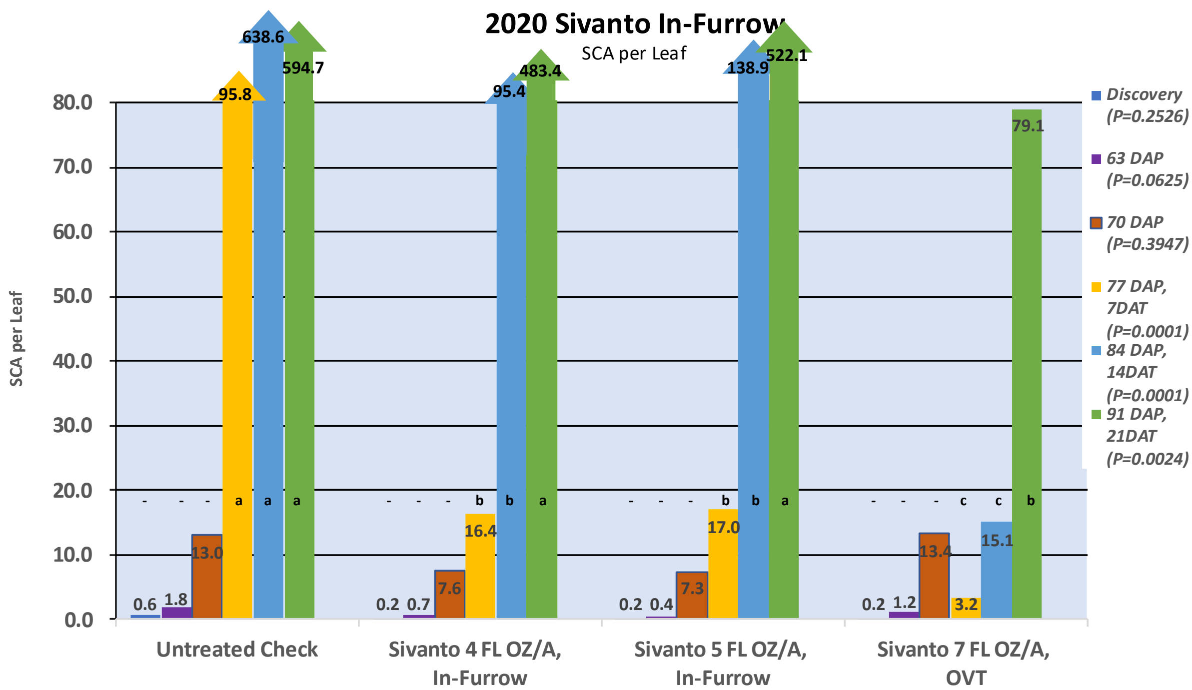

Figure 15. 2020 SCA per leaf counts by treatment by date.

In terms of the 0-10 damage ratings, all treatments separated from the UTC from the 84 DAP/14 DAT date, and at this time the OVT treatment was significantly superior to the in-furrow treatments. This trend continued for the duration of the trial. The in-furrow treatments average rating were both over a 2nd SCA treatment threshold of 5 on the 0-10 damage rating scale at the 91 DAP/21 DAT date while the OVT treatment remained below this 2nd treatment threshold until 123 DAP/53 DAT preharvest rating.

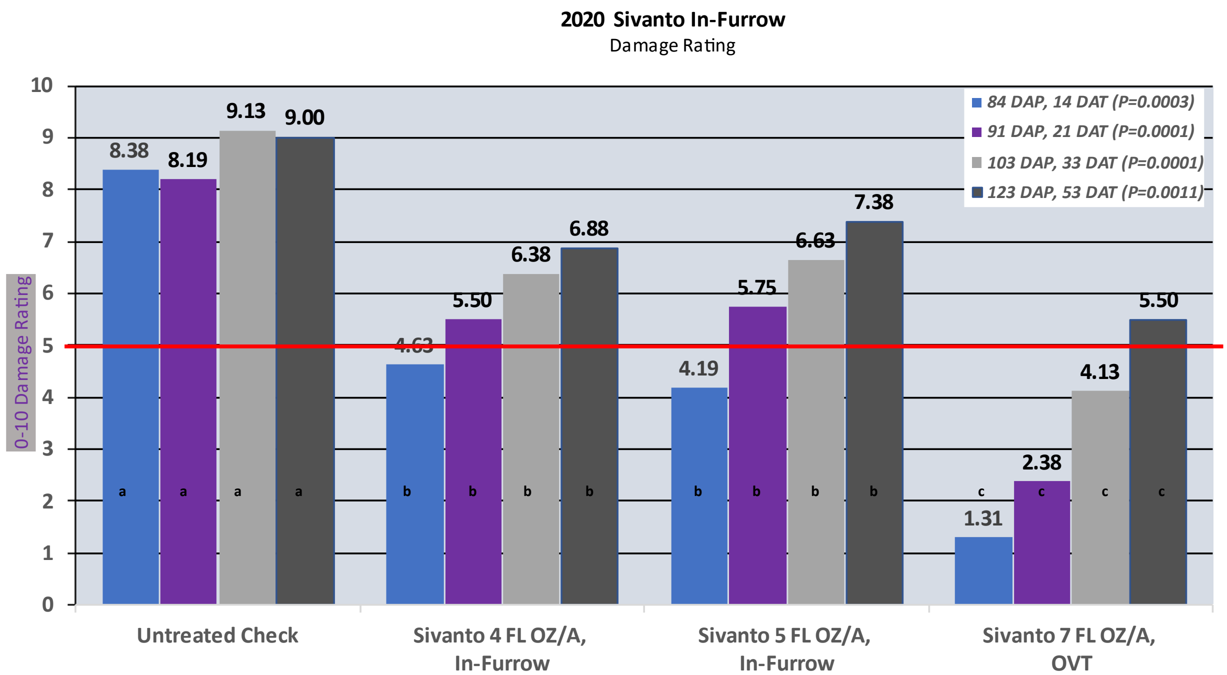

Figure 16. 2020 SCA damage ratings by treatment over time with a red line indicating proven 2nd SCA treatment threshold ET.

In terms of grain yield per acre, the SCA numbers and damage resulted in significant differences. The 4 oz. in-furrow Sivanto treatment and the OVT treatment yielded significantly more than the UTC, but the 5 oz. Sivanto in-furrow did not. None of the chemical treatments were statistically significant from each other at alpha 0.05 level despite a very large numeric advantage for the OVT treatment.

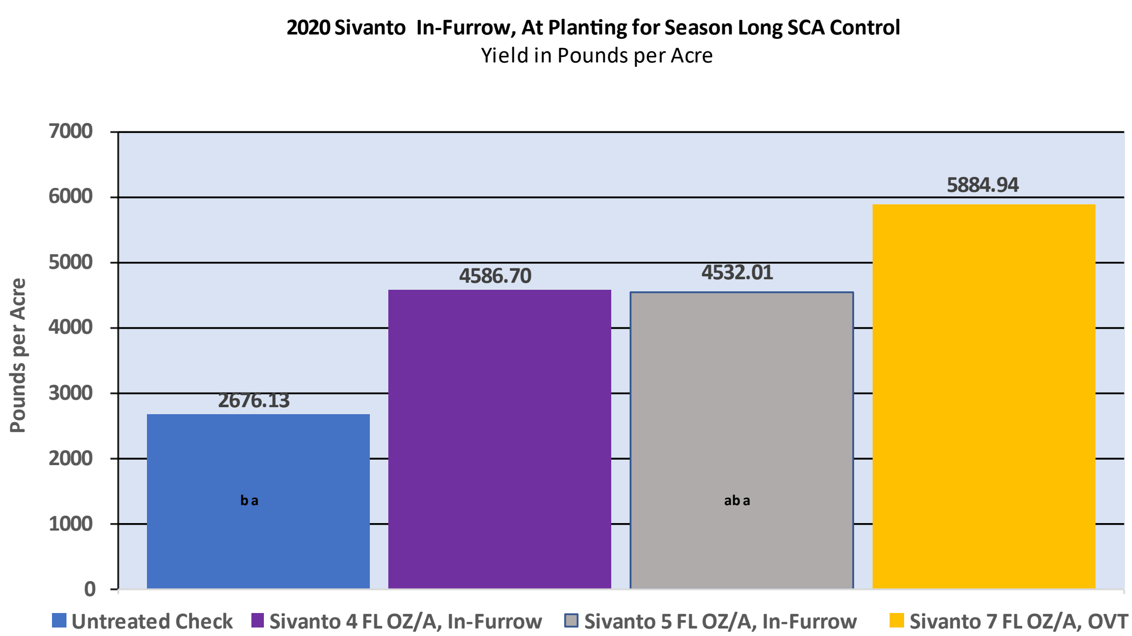

Figure 17. 2020 Grain yield in terms of pounds grain per acre by treatment.

Conclusions

Undoubtedly, Sivanto in-furrow at planting offers benefits in SCA control. The question about whether or not the at planting-time treatment can offer season long control in grain sorghum without the need for a second, uneconomical treatment remains doubtful after review of three years of research. The 2019 results offered inconclusive hope that a higher rate might give an associated control level response. For whatever reason, environmental drought conditions of 2020 are a possibility, there were no rate responses in 2020 from the in-furrow treatments with SCA populations active well passed the 100 DAP timeframe wanted for proper evaluations. Upon these findings, it should be suggested that in-furrow at planting treatments of Sivanto do not offer season long SCA control in grain sorghum and that the OVT treatment, made in good order and at established ET timing, is sufficient for SCA control.

However, the in-furrow at planting treatments have consistently offered a minimum of 80 days of SCA control regardless of environmental situations. If harvest can be expected to occur for any sorghum type hay crop within or around this time frame, the in-furrow treatments should provide adequate control of SCA, particularly in high or dense foliage cover hay and silage situations where OVT treatments prove lacking in coverage.

Acknowledgements

This work is supported by Crops Protection and Pest Management Competitive Grants Program [grant no. 2017-70006-27188 /project accession no. 1013905] from the USDA National Institute of Food and Agriculture. I would like to extend thanks to the staff at the Halfway Experiment Station and the Farm Manager Casey Hardin for cooperating with us to complete this trial, Bayer Crop Science and Russ Perkins for sponsoring and partnership of this trial, the Plains Pest Management Field Scouts, interns, and Lab Technicians for data collection and labor associated with this trial: Jim Graham, Lauryn Carrol, Nicole Kiem, Denise Reed, Jerik Reed, and Madeline Stanfield. Thank you all.

Evaluating Surfactant Impact on Sugarcane Aphid Control in West Texas Grain Sorghum

Texas A&M AgriLife Extension Service
Hale, & Swisher County
Texas A&M AgriLife Experiment Station - Halfway
Blayne Reed, EA-IPM Hale & Swisher, Neil McIver, Grower Source, Pat Porter, District 2 Entomologist, Suhas Vyavhare, District 2 Cotton Entomologist, John Thobe, EA-IPM Parmer, Bailey, & Castro, Dagan Teague, EA-IPM Floyd & Castro

Summary

Five treatments, including an UTC, were arranged into a CRBD with 4 replications in sorghum plots at the Halfway Experiment Station. Treatments 2 through 5 utilized Sivanto at 5 ounces per acre as the chemical treatment for the sugarcane aphids with a variation of surfactant used for each treatment. In treatment 2, no surfactant was used with the Sivanto, treatment 3 used the Grower Source Products *Wildfire* at 0.04 ounces per gallon plus *Insect-X-Citer* at 0.16 ounces per gallon, treatment 4 used COC (Crop Oil Concentrate) at 1 % V/V, and treatment 5 used MSO (Methylated Seed Oil) at 1 % V/V. Ten upper leaves and lower leaves sugarcane aphid per leaf counts were taken pretreatment, 4 DAT, 11 DAT, and 18 DAT. Damage ratings using the Texas High Plains 0-10 SCA damage rating system were taken at 18 DAT and 26 DAT of the treated area. On 5 October, ten row-feet were randomly selected from the treated area, and hand harvested into sample bags. On 6 October, samples were promptly threshed via trailer mounted Haldrup research grain thresher on site. All data was analyzed via ARM ANOVA with a $P<0.05$ or less. Data was re-analyzed at the $P=0.25$ level to detect subtle differences in the resulting data.

All surfactant treatments hinted at an overall improvement in Sivanto's performance in SCA control. Some of these hints occurred inconsistently in the per leaf aphid counts, some in damage ratings, but show in the yield and grain quality data consistently. These hints were significant at the $P=0.25$ level, but not at a true significant level of $P<0.05$, indicating a need for additional research on this subject.

Objective

Evaluate the impact on chemical control measures for sugarcane aphid efficacy in grain sorghum by various surfactant products available to West Texas Agricultural Producers.

Materials and Methods

This field experiment was conducted at the Texas A&M Research Farm in Halfway, TX. In the research pivot at Halfway, the sorghum variety KS 585 was bulk planted on 4 June 2020. All agronomic needs of the field were managed by the Halfway Experiment Station Personnel with weed and input management inputs from the IPM Agent The field was monitored for insect, weed, and disease pests by the Plains Pest Management Field Scouting Program weekly.

Trial Map Treatment Description

Trt	Code	Description
1	CHK	Untreated Check
2		Sivanto 5 FL OZ/A
3		WILDFIRE .04 FL OZ/GAL;INSECT-X-CITER .16 FL OZ/GAL;Sivanto 5 FL OZ/A
4		Sivanto 5 FL OZ/A;COC 1 % V/V
5		Sivanto 5 FL OZ/A;MSO 1 % V/V

Figure 18. Treatments and plot layout of the trial.

Five treatments, including an untreated check (UTC), were arranged into a CRBD with four replications for the trial. The treatments 2 through 5 utilized Sivanto at 5 ounces per acre as the chemical treatment for the sugarcane aphids with a variation of surfactant used for each treatment. In treatment 2, no surfactant was used with the Sivanto, treatment 3 used the Grower Source Products *Wildfire* at 0.04 ounces per gallon plus *Insect-X-Citer* at 0.16 ounces per gallon, treatment 4 used COC (Crop Oil Concentrate) at 1 % V/V, and treatment 5 used MSO (Methylated Seed Oil) at 1 % V/V.

All plots were lain out and alleys cut on 3 July. Plot sizes were 6, 40-inch rows wide by 36 feet long with 4-foot alleys. The middle two rows were utilized at treated rows with all rows in-between acting as a drift buffer and a source of re-infestation for optimum residual measurement. On about 29 July a population of sugarcane aphids were found in the area of the trial which developed into an economic population by 11 August. On 13 August all treatments were placed, and pretreatment counts were taken. The sorghum averaged 70% bloom-stage. Treatments were made via CO2 backpack sprayer with overhead boom attachment set 1-foot above crop heads, at 16.2 GPM with a walking groundspeed of 2.5 MPH. Ten upper leaf (1-2nd leaf

Figure 19. PPM Intern, Lauryn Carrol, connects a treatment bottle for application during trial treatment to the CO2 backpack sprayer.

Figure 20. Treating the plots.

below flag) and lower leaf (1-2 leaves above desiccated leaf) sugarcane aphid per leaf counts were taken pretreatment, 4 DAT, 11 DAT, and 18 DAT. All counts were taken from western row of treated two row centers. Damage ratings using the Texas High Plains 0-10 SCA damage rating system were taken at 18 DAT and 26 DAT of the treated area. On 5 October, ten row-feet were randomly selected from the uncounted east row from the treated area, and hand harvested into sample bags. On 6 October, samples were promptly threshed via trailer mounted Haldrup research grain thresher on site. Grain moisture and bushel weight measurements were collected on a Dickey-john Mini GAC Plus grain moisture analyzer. Grain samples were weighed in terms of grams per 10 row feet and converted to grain yield in pounds per acre. All data was analyzed via ARM ANOVA with a $P<0.05$ or less. For ease of discussion and graphing here, per leaf SCA counts were merged for a total per leaf average.

Figure 21. Counting the per leaf SCA counts.

Results and Discussion

At 4 DAT the upper leaf counts shown significant differences from the UTC (P=0.0327) but he lower leaf treatment 2, Sivanto without surfactant, was not significantly different from either the UTC or the other treatments (*P*=0.0474). By the 11 DAT all treatments were strongly significantly different from the UTC (*P*=0.0001) with treatment 3, the Grower Source product treatment, having a notable numeric advantage compared to the other treatments. By the 18 DAT date, the UTC treatment per leaf numbers had started dropping due to plot desiccation from aphid damage. All treatments remained significantly superior to the UTC but treatment 3 with the Grower Source product was significantly superior to treatment 5 the MSO treatment (*P*=0.0001).

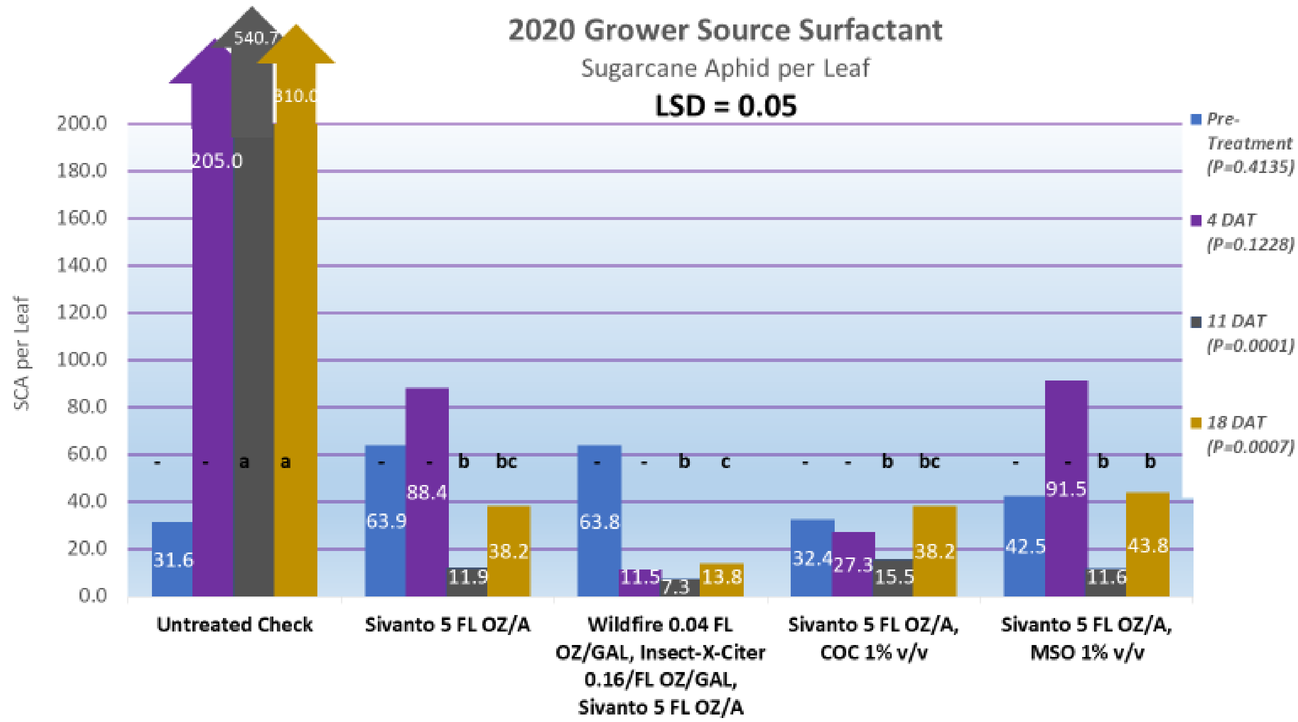

Figure 22. SCA per leaf counts by treatment, by date.

The 18 DAT damage rating shown all treatments again superior to the UTC, buy treatment 5 now shown superior to treatment 2, the Sivanto alone treatment (*P*=0.0001). The 26 DAT damage ratings show all treatments similar but still significantly much better than the UTC (*P*=0.0302).

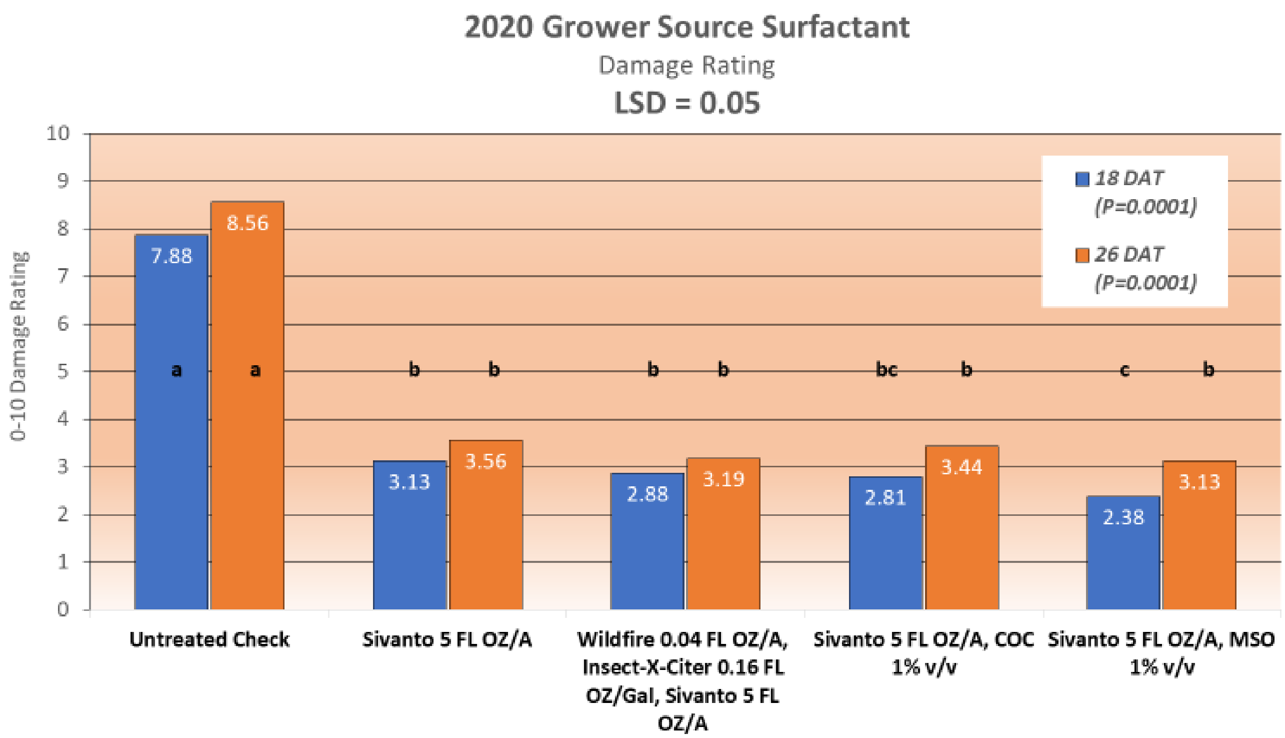

Figure 23. 0-10 SCA damage ratings by treatment, by date.

In terms of grain yield per acre, all treatments were significantly better than the UTC with treatments 3, 4, and 5 having distinct numeric advantages over the Sivanto alone treatment 2. In terms of grain quality, all treatments also had significantly more moisture content than the UTC but also had a significantly higher bushel weight.

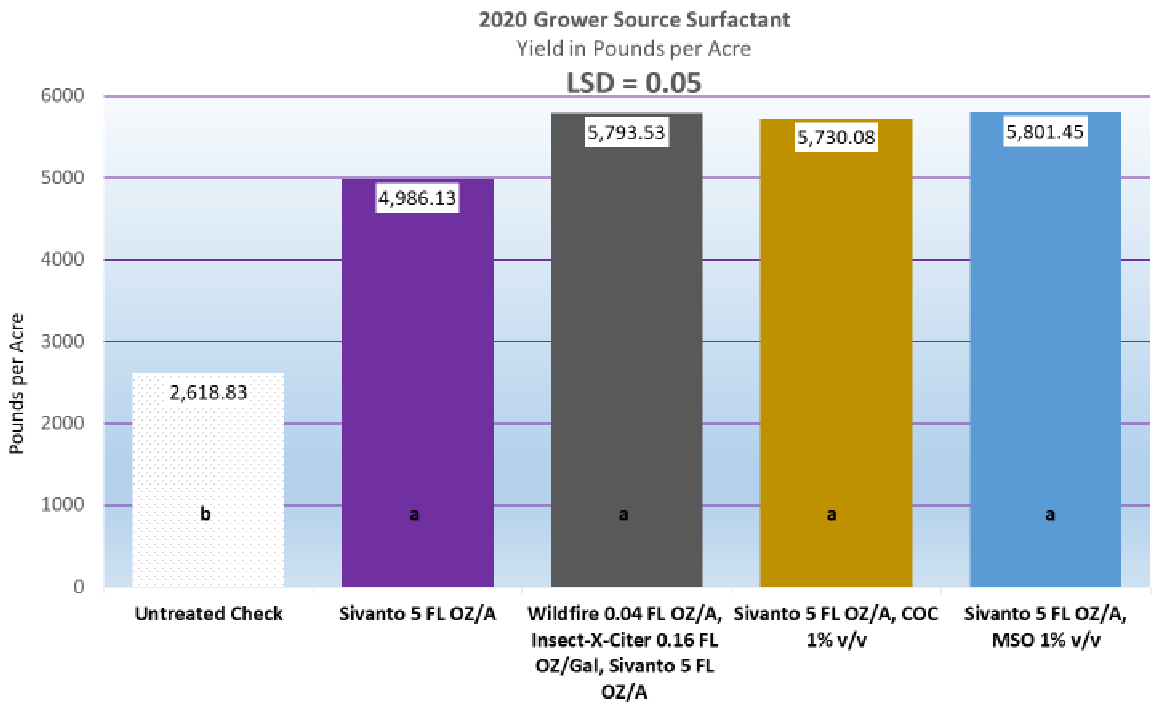

Figure 24. Grain yield in terms of pounds per acre by treatment.

Conclusions

This data hints that surfactants benefit chemical treatments for SCA in grain sorghum, but not at a strongly significant level. These results were analyzed at a lower significance level of P=0.25. This change highlighted the numeric differences mentioned. Treatment 3, the Grower Source product treatment, did show to work better on lower leaves than treatment 2, Sivanto alone, at the 4, 11, and 18 DAT count date indicating possible better coverage. At the P=0.25 level, treatment 3 outperformed all other treatments at 18 DAT total aphid per leaf counts as well. But the MSO treatment, treatment 5 outperformed treatment 2, the Sivanto alone treatment also at the 18 DAT damage rating. In terms of yield, the numeric differences of treatment 2, Sivanto alone was separated from the other treatments as inferior. However, P=0.25 levels are not significant enough to pronounce proven differences.

We are left to assume from this data that any advantages in surfactant use or type as likely but not proven with defined benefits unspecified. Additional research of this exact protocol is needed in this matter. Perhaps multiple years-worth of data can find differences that likely exist. For now, we can only suggest a surfactant is worth any extra investment for chemical treatments in grain sorghum but cannot recommend its absolute value.

Acknowledgements

This work is supported by Crops Protection and Pest Management Competitive Grants Program [grant no. 2017-70006-27188 /project accession no. 1013905] from the USDA National Institute of Food and Agriculture. I would like to extend thanks to the staff at the Halfway Experiment Station and the Farm Manager Casey Hardin for cooperating with us to complete this trial, Grower Source and Neil McIver for sponsoring and partnership of this trial, the 2020 Plains Pest Management Interns, Field Scouts and Lab Technicians for data collection and labor associated with this trial: Jerik Reed, Lauryn Carrol, and Denise Reed. Thank you all.

2020 Army Cutworm in Wheat Efficacy Trial

Texas A&M AgriLife Extension Service

Hale & Swisher County

Cooperator: Scott Irlbeck

Blayne Reed, EA-IPM Hale & Swisher, Dr. Pat Porter, D2 Entomologist, John Thobe, EA-IPM Parmer, Bailey, & Castro, Dagan Teague, EA-IPM Floyd & Crosby, Dr. Suhas Vyavhare, D2 Entomologist

Summary

With a spring 2020 economic outbreak of army cutworms in many regional wheat fields for grain, the IPM Team on the High Plains, took the opportunity to place an efficacy trial in a particularly heavy infestation in northwestern Swisher County. In this research trial, we placed three insecticides that were the most likely to offer control for the pest. A small pot field trial was arranged a as a CRBD with five treatments. The treatments included untreated check, Prevathon at 10 oz./ac., Prevathon at 14 oz./ac., Blackhawk at 2.2 oz./ac., and Baythroid XL at 1.8 oz./ac. A pretreatment count of larvae per square foot was made to ensure a stable pest population, and treatments were applied on 9 March. Four one-square-foot counts were taken per plot and averaged by treatment at 3 and 10 days after treatment (DAT). Heavy pest pressure from the surrounding field, movement of the larvae between plots, bad weather conditions, and the difficulty of scouting for the nocturnally active army cutworm made the sampling difficult and muddied results. It was determined the best representation of this data is the percent average mortality of each treatment, calculated by the replications. From this adjusted perspective, the Baythroid XL, both Prevathon treatments, and Blackhawk were superior to the UTC at the 3 DAT count date. The Baythroid XL treatment separated from all other treatments as superior at the 10 DAT date, while both Prevathon treatments only remained separate from the UTC. For army cutworm control in Texas High Plains wheat Baythroid XL is suggested as most efficacious, and Prevathon as acceptable.

Objective

To evaluate chemical control products for efficacy against the army cutworm in Texas High Plains Wheat.

Materials and Methods

With the outbreak of army cutworms in many of our local wheat fields for grain, we, the IPM Team on the High Plains (Dr. Pat Porter, Dr. Suhas Vyavhare, Blayne Reed, John Thobe, and Dagan Teague), took the opportunity to place an efficacy trial in a particularly heavy infestation in northwestern Swisher County. We placed this trial in an edge of a failed field where there would be no chance of overspray, but where the population was more than enough to guarantee a good trial.


Figure 1. Readying the CO2 backpack sprayer to make the treatments.

We tested the three insecticides which are the most likely to offer the best control for the pest. These products were arranged into a Completely Randomized Block Design (CRBD) small plot trial with five treatments. The treatments included and UTC, Prevathon at 10 oz./ac., Prevathon at 14 oz./ac., Blackhoawk at 2.2 oz./ac., and Baythroid XL at 1.8 oz./ac. All treatments were made on 9 March. All treatments were made with a backpack CO2 sprayer at 16.2 GPA and a walking groundspeed of 2.5 MPH. Plots were Y feet long and X feet wide. Four one square foot counts were randomly made per plot and averaged by treatment for pretreatment, 3 and 10 DAT.

Heavy pest pressure from the surrounding field, movement of the larvae between plots, bad weather conditions, and the difficulty of scouting for the nocturnally active army cutworm made the sampling difficult and muddied results. Both dead and live larvae per square foot were recorded with puzzling results. Our scouting became better for this sporadic pest with experience, but we think some of our pre-treatment counts were inaccurate. The area of the field where placed the trial had shown in our pre-treatment and early scouting to exhibit 5.08 larvae per square foot. We learned that either


Figure 2. Rinsing the boom clean between treatments.

Figure 3. John Thobe and Dagan Teague scouting for army cutworms and taking a larvae per square foot count data.

the larva moved into this area from the remainder of the now failed field and/or we had missed many of the larvae by not 'digging' deep enough or thoroughly enough. After attempting several methods and calculating adjustments to correct for this confusing result, it was determined by the team that the best representation of the data was the percent average mortality of each treatment, calculated by the replications. All resulting data were analyzed by ARM ANOVA, LSD with P=0.05.

Results and Discussion

While data were collected for live and dead worms per square foot, only the percent mortality from within each plot will be presented due to the difficulties in quantifying the data under the situations of the trial.

On the pretreatment count date, all larvae were alive, and percent mortality was 0% for all plots. At the 3 DAT date, the UTC mortality was 31.3%(b), the Prevathon at 10 oz./ac. was 78.9%(a), Prevathon at 14 oz./ac. was 71.2%(a), Blackhawk was 57.3%(a), and Baythroid XL was 73.0%(a) (*P*=0.0078). By the 10 DAT counts, and following 3-inches of rain, the UTC mortality was at 15.0%(c), the Prevathon at 10 oz./ac. was 36.4%(b), Prevathon at 14 oz./ac. was 35.1%(b), Blackhawk was 31.5%(bc), and Baythroid XL was 59.6%(a) (*P*=0.0023).

Figure 4. Live larvae found on 1 square foot from an UTC plot at 10 DAT.

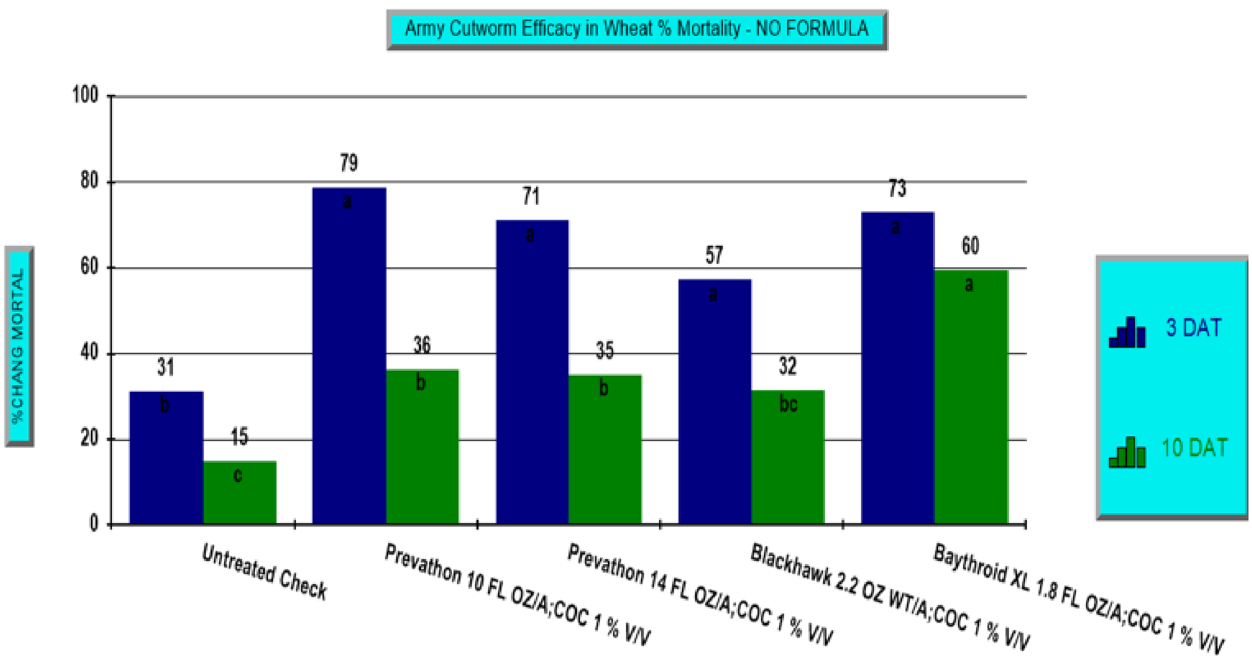

Figure 5. Percent mortality of the army cutworm by treatment over time. (*P*<0.05).

Conclusions

The impacts of from the nature of this nocturnally active pest, heaviness of the pest pressure, location with movement from the surrounding failed field, pest movement between plots, weather, and the increasing experience in scouting for army cutworms on this trial cannot be understated. In our pretreatment and pest pressure confirmation count, we found 5.08 larvae per square foot. By the 3 and

10 DAT counts, we were finding about 20 per square foot in the UTC. This coincided with an increase in live larvae in all treated plots, which were beside a very large number of dead worms. These dead worms had also been physically moved by flowing water resulting from a significant rain event occurring post treatment. Beside both the dead and healthy worms, were numerous sick worms obviously impacted by the treatments, some of which were even in the UTC. Impacts from all treatments were clear compared to each other and the UTC, just not quantifiable compared to our pretreatment counts. There was ample evidence that the larvae were moving between test plots and from outside the test plot area into our trial.

It was disappointing to not have any treatment nearing what most would consider good control, or something nearing 100% mortality. Yet, the treatments seemed to have good impacts, given the influx of a massive number of worms from outside the trial area with some level of residual having impacts on a mobile population that continued to move through all treatments. Maintaining control under these circumstances would have been difficult at best and almost impossible to fully quantify given the insect movement issue. All results should be viewed with caution.

The bottom line is that we are comfortable recommending either Prevathon or Baythriod for army cutworm control in wheat in West Texas. At both the 3 and 10 DAT counts, while counting blind (not knowing which plot we are in to ensure fairness) we could clearly tell when we were in the UTC, Prevathon, and Baythriod plots. The number of dead worms versus live would give the plot away every time. With treatment coverage to control entire fields, Prevathon should offer outstanding control at light rates that still offer the added benefit of saving predators for other pests and possibly other crops later this year. With the same amount of field coverage, Baythriod, a first line pyrethroid, still offers outstanding control of the army cutworm with a touch more residual in harsh conditions such as heavy rains following treatment. More research is needed before these conclusions can be fully confirmed.

Acknowledgements

This work is supported by Crops Protection and Pest Management Competitive Grants Program [grant no. 2017-70006-27188 /project accession no. 1013905] from the USDA National Institute of Food and Agriculture. I would like to extend thanks to our cooperating producer Scott Irlbeck for working with us to gather this data. I would like to thank the 2020 Plains Pest Management Intern for data collection and labor associated with this trial, Jerik Reed. I would also like to thank the representative product companies for supplying product for this trial. Thank you all.

2020 Product Efficacy for Banks Grass Mite Control in West Texas Corn

Texas A&M AgriLife Extension Service / Bayer

Cooperator: Tim Black

John Thobe, EA-IPM Bailey, Castro, & Parmer, Blayne Reed EA-IPM Hale & Swisher, Pat Porter Extension Entomologist Lubbock, Russ Perkins Bayer Crop Science, Idalou

Summary

Five different labeled miticide treatments including an untreated check (UTC) were applied to an over ET population of Banks Grass Mites (BGM) in a commercial corn field in a small plot CRBD with four replications. Applications were applied at 16.2 GPA to BGM populations that were past recommended thresholds offered by Texas A&M AgriLife in an attempt to simulate a rescue treatment situation. Per leaf BGM data was captured at pre, 3, and 10 days after treatment (DAT) as well as 0-10 damage ratings taken at 10 and 17 DAT. Data collection was not possible past the 17 DAT date due to field desiccation and environmental conditions. All Data was compared using ANOVA and LSD of *P*=.05

BGM populations in all treatments began well past the suggested threshold both in damage rating as well as sheer number of pests in question. At the 3 DAT all treatments along with the UTC saw an increase in BGM population, yet at the 10 DAT all miticide applied plots saw a decrease in population across the field. Results suggest that, no miticide product available on the market, while having impact on the BGM, can act as a rescue treatment in any field corn once BGM populations move past the ET.

Objective

Evaluate Oberon and other labeled miticide products for efficacy against and over ET population of Banks Grass Mite.

Materials and Methods

A commercial corn field belonging to Tim Black in northern Bailey County was selected with the help of an independent crop consultant as the candidate for this trial, the field. The population of BGM found in field were found to already be well above economic threshold (ET). Plots were lain out on 1 August in a suitable pocket of BGM in the field.

Five labeled miticide products at local use rates, one experimentation of a combination of two products, and an untreated check was organized for this trial. All treatments were assimilated into a

Figure 25. Mixing treatments for a 2020 trial application.

small plot CRBD with four replications. Plot sizes consisted of 6 30-inch rows per plot and 43 feet in length. These plots used the middle two rows as the treated area of the plot, the remaining rows acted as a buffer to prevent chemical drift and acted as a source for re-infestation both from beneficials as well as additional mite populations to ensure residual measurement of the miticidal products tested.

All treatments were made to the plots on 1 August with a standard CO2 backpack sprayer with boom attachment at 16.2 GPA at a walking groundspeed of 2.5 MPH. The boom extension was placed 1 foot above the corn canopy of the two treated rows of each plot.

On the 1 August establishment date, pretreatment, per leaf BGM counts were taken. In all, BGM per leaf counts were taken pretreatment, 3 DAT, and 10 DAT. Counts were made by harvesting five randomly selected ear leaves from each plot's treated area were transported for immediate count of mites per leaf under magnification at the Muleshoe Extension office. No distinction was made in mite life stages.

Figure 2. Making applications to trial North of Muleshoe with the CO2

The treated plot areas were rating on the 0-10 Texas A&M AgriLife Extension's mite damage in corn rating system at the 10 and 17 DAT dates. All data was recorded in ARM and following trial completion using ANOVA and LSD with alpha 0.05 confidence level.

Results and Discussion

It should be noted that BGM populations within all plots were already well above any established ET for mites in corn. The BGM populations in all treatments were very high at the pre-treatment count date and increased drastically by the 3 DAT counts. By the 10 DAT all treatments began a lowering of the population of BGM.

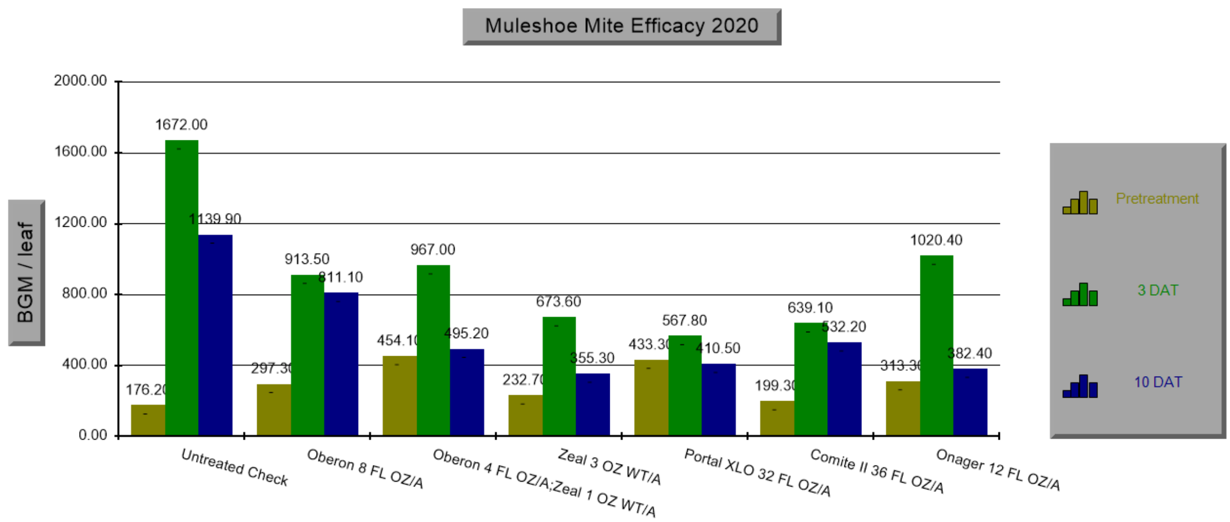

Figure 3.. BGM per leaf counts by treatment over time.

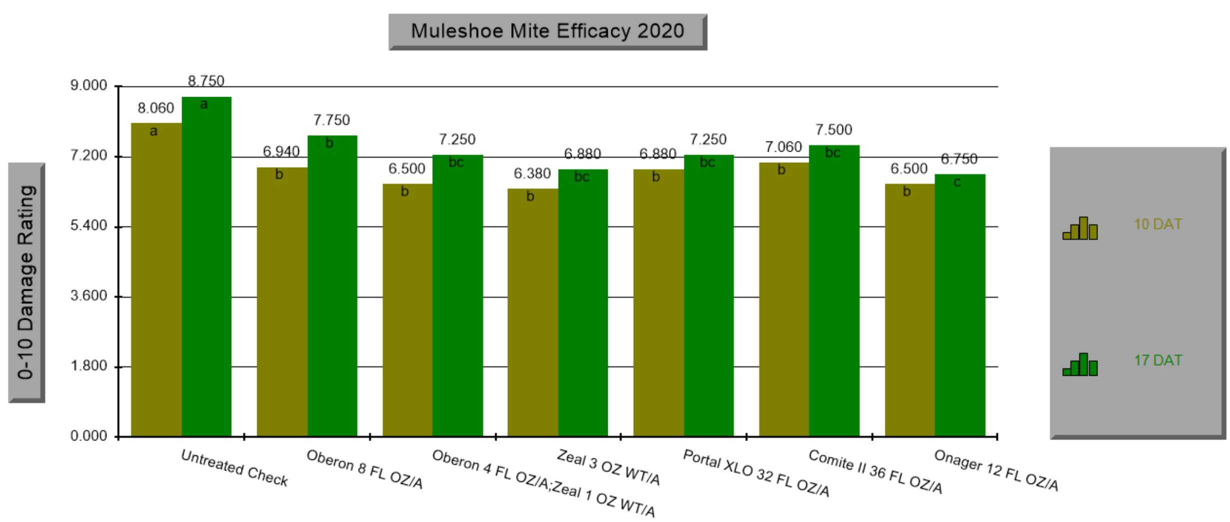

*Figure 4. BGM 0-10 damage ratings by treatment (*P=*0.0034,* P=*0.0070)*

Conclusion

The BGM per leaf population, figure 1, shows the dramatic increase BGM already above ET can have in only three days. This also highlights that all available products take time to be effective by a commercial rescue standard. It should be noted that all miticide treatments did hold BGM populations comparatively lower than the UTC. However, without the UTC as a standard, most producers would consider these treatments as failures. These results do show positive results of the treatments, but also the need to make treatments before the ET is reached.

By the 10 DAT the BGM population across the trial begins to decrease in all plots, including the UTC. While the product treatments had started showing efficacy results, the UTC plots' drop in numbers was solely a result of desiccation of the plants due to mite damage. Due to the drop in BGM numbers in the UTC, significant differences were not found in the trial.

Figure 2 shows the damage rating from the untreated check does indeed show a difference statistically from all the treatments put out along the same lines as the per leaf counts. Though the difference is not great it does show the effectiveness of the products being tested and reasserts the need to make treatments at the proven ET and that no product available on the market can be utilized as a rescue treatment.

All BGM modern mite treatments in corn must be made before the mite population increases to an uncontrollable level in both damage indicated as well as overall population of the pest. All treatments, when used correctly and following the label, can be effective in the reduction of the target pest while not elimination the beneficial population. At this time is can be indicated that application of miticide at suggested rates cannot be substituted for accurate scouting and timely application when treating for BGM in a commercial corn situation. It is safe to say that none of these commercial labeled treatments can be used as a “rescue treatment” once BGM surpass an economic threshold as indicated earlier.

Acknowledgements
This work is supported by Crops Protection and Pest Management Competitive Grants Program [grant no. 2017-70006-27188 /project accession no. 1013905] from the USDA National Institute of Food and Agriculture. I would like to extend thanks to Bayer Crop Science and Russ Perkins for sponsoring and partnership of this trial, Tim Black for cooperating and hosting this trial, and the 2020 interns and lab techs Jerik Reed, Denise Reed and Lauren Carrol for all their help in this trial!

2020 Onager and Experimental Gowan Tank Mix Partner Mite Efficacy Trial in West Texas Corn

Texas A&M AgriLife Extension Service / Gowan

Cooperator: Reed Farms

Blayne Reed, EA-IPM Hale, Swisher, & Floyd, Dr. Craig Sandoski, Gowan, John Thobe, EA-IPM Parmer, Bailey, Castro

Summary

Ten numbered compounds of miticides, experimental chemistries, and mixes of labeled compounds from GOWAN along with an untreated check were organized for this trial. All treatments were organized into a small plot CRBD with four replications in a commercial corn field in southern Swisher County. Plots were lain out on 4 August in one of the stronger pockets of BGM available in the field. This population was augmented with additional mites harvested from a heavily infested BGM field in northern Bailey County belonging to the West Plains Pest Management scouting program. The treated rows of each plot were then flared with a treatment of Karate at 2.4 oz. / acre via CO2 backpack sprayer with overhead boom attachment at 16.2 GPA. All treatments were applied on 15 August with the CO2 backpack sprayer with the overhead boom attachment. Data on mites per leaf were recorded pre-treatment, 3, 10, and 17 DAT with a mite damage rating taken at 24 DAT with the 0-10 Texas A&M AgriLife Mite Damage Rating Scale. All data was then analyzed via ARM utilizing ANOVA and LSD of *P*=0.05 or less as a significance level.

At the 17 DAT date, all treatments except treatment 6 were significantly better than the UTC, but treatment 6 was not significantly different from the other treatments and numerically lower than the UTC. In terms of the 0-10 damage ratings from the 24 DAT date, more significant differences appeared in the data. Treatments 5, 6, and 7 were not significantly different from the UTC. Treatments 8 and 10 showed the lowest damage rating, but were statistically similar to treatments 2, 3, and 4. These results indicate that the labeled products tested, Onager and Oberon, are providing economic control of the BGM in West Texas Corn. No significant benefit in BGM control by the addition of the experimental compounds when mixed with the labeled products was seen at this time.

Objective

Evaluate numbered and experimental Gowan miticides when tank mixed with and without Onager for Banks Grass Mite efficacy in West Texas Field Corn under field conditions.

Materials and Methods

Ten numbered compounds of miticides, experimental chemistries, and mixes of labeled compounds from GOWAN along with an untreated check were organized for this trial. All treatments were organized into a small plot CRBD with four replications. Plot sizes were 6-40-inch rows wide by 43-feet long with the first two rows of each plot being the treated area of the plot and the remaining rows being a buffer to prevent chemical drift between plots and to provide a source for re-infestation both from beneficials and additional mites for superior residual measurement of the products.

Figure 26. The CO2 backpack sprayer between treatments for the 2020 trial.

A commercial corn field enrolled with the Plains Pest Management field scouting program in southern Swisher County belonging to Reed Farms was selected for the trial. Some light pockets of Banks Grass Mites (BGM) were noted by the Plains Pest Management field scouts on 3 August. Plots were lain out on 4 August in one of the stronger pockets of BGM available in the field. This population was augmented with additional mites harvested from a heavily infested BGM field in northern Bailey County belonging to the West Plains Pest Management scouting program. Within each plot's two treated rows, 3 additional BGM infested leaves were evenly placed around the treated rows at the zero leaf. Shortly following artificial BGM infestation on 5 August, the treated areas of all plots were sprayed with Karate at 2.4 oz. / acre via CO2 backpack sprayer with overhead boom attachment at 16.2 GPA. This was done in an effort to temporarily remove all mite predators so that economic populations of BGM would develop in the plot treated areas.

On 14 August the treated areas of the plots were deemed economic and treatable for BGM and pretreatment counts were made. All treatments were applied on 15 August with the CO2 backpack sprayer with

Image 2. Harvesting ear leaves from corn plots to be taken to lab and counted for BGM/leaf counts.

the overhead boom attachment. Data on mites per leaf were recorded pre-treatment, 3, 10, and 17 DAT with a mite damage rating taken at 24 DAT with the 0-10 Texas A&M AgriLife Mite Damage Rating Scale.

For the mite per leaf counts, five randomly selected ear leaves were harvested from each plot on count dates and taken to the Plains Pest Management Insect Lab in Plainview where mites per leaf were counted under magnification. No differentiation was made about mite life stage as all living mites were counted. All data were recorded in ARM and following trial completion compared using ANOVA and LSD.

Results and Discussion

No significant differences were found in the number of BGM per leaf pretreatment, 3 DAT, or 10 DAT although numeric differences between all treatments and the UTC were forming by the 10 DAT date. At the 17 DAT date, all treatments except treatment 6 were significantly better than the UTC, but treatment 6 was not significantly different from the other treatments and numerically lower than the UTC.

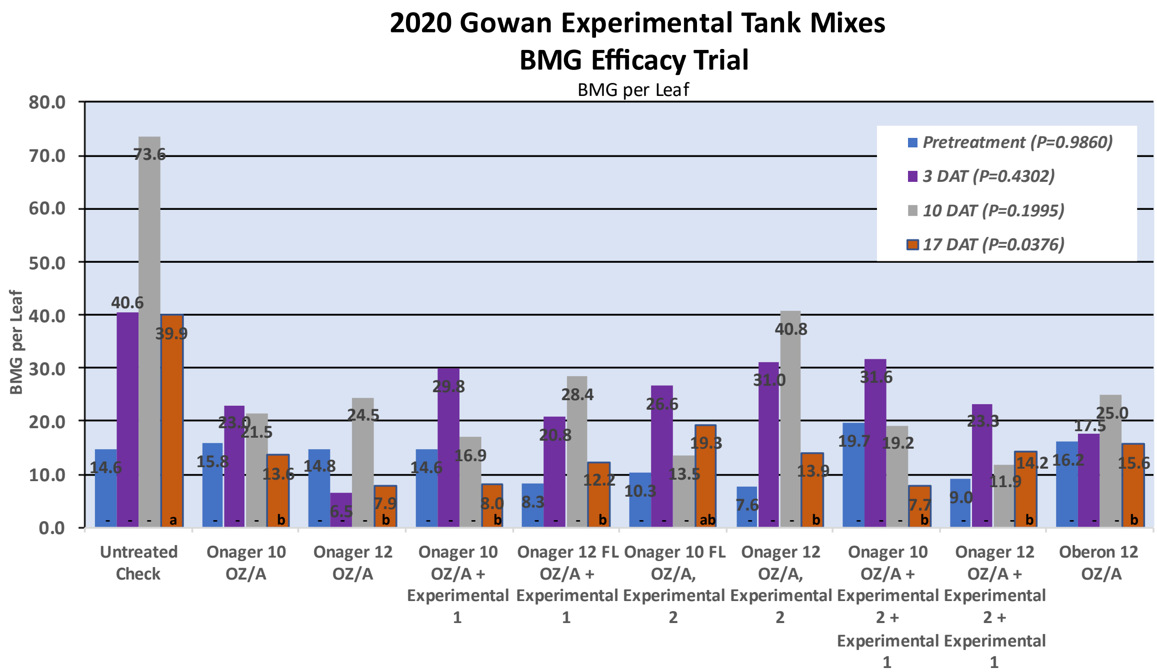

Figure 3. Treatments in terms of mites per zero leaf by date.

In terms of the 0-10 damage ratings from the 24 DAT date, more significant differences appeared in the data. Treatments 5, 6, and 7 were not significantly different from the UTC. Treatments 8 and 10 shown the lowest damage rating, but were statistically similar to treatment 2, 3, and 4.

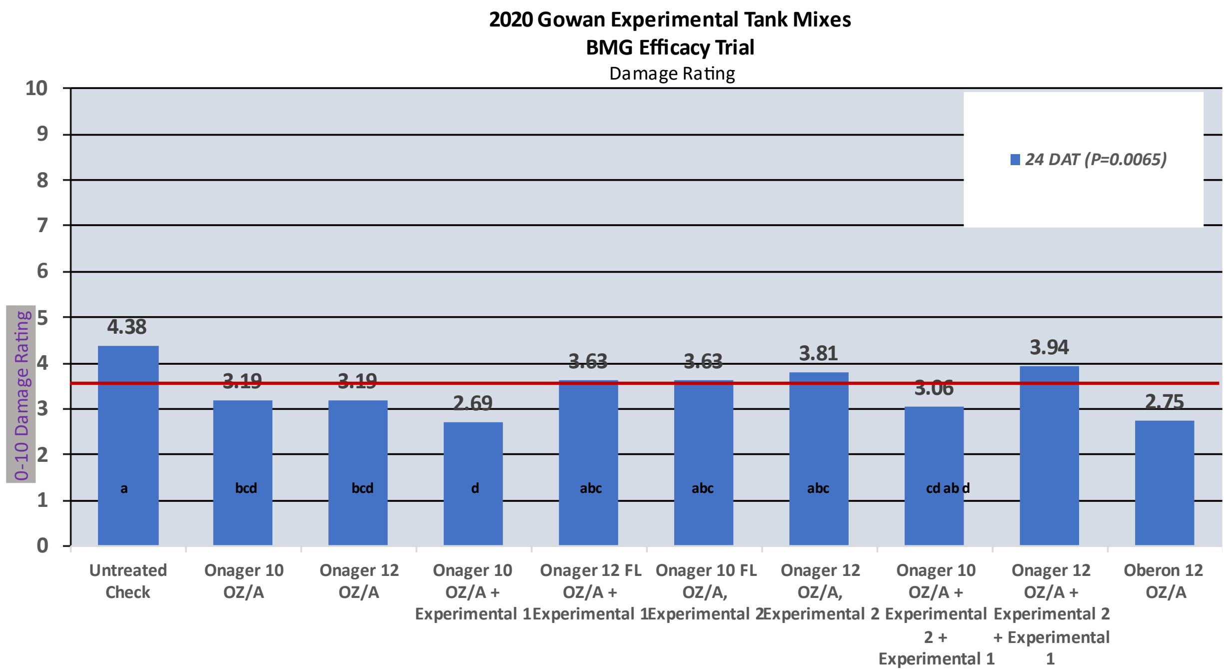

Figure 4. Damage ratings by treatment at 24 DAT with mite damage economic threshold shown.

Conclusions

Treatments 2 and 3, the Onager treatments, were nearly identical in every way. Both proved they remain highly effective in economically controlling West Texas BGM populations in corn. Today, there seems no reason to increase the rate of Onager to increase control in the Hale and Swisher area as both treatments performed so similar. Treatment 10, the Oberon treatment, performed amongst the best treatments, but the trial also shows a valid statistical concern between replicates (*P*=0.0001) where in 2 of the Oberon plots were notably lower in mites and damage for the duration of the trial indicating an uneven distribution of the pest for the trial. Still, Oberon has had concerns surrounding resistance from the BGM in control due to its length of use as the only effective miticide for many years following Oberon's release. These results hint that this is possibly loosening or is not a local issue in Hale &

Swisher BGM populations. These results indicate no significant benefit in BGM control offered by the experimental compounds in being mixed with the labeled products at this time.

Acknowledgements

This work is supported by Crops Protection and Pest Management Competitive Grants Program [grant no. 2017-70006-27188 /project accession no. 1013905] from the USDA National Institute of Food and Agriculture. I would like to extend thanks to Gowan and Craig Sandoski for sponsoring and partnership of this trial, Jeremy, Joe, Jimie, Johnie, and Jeff Reed for Cooperating and hosting this trial, and the 2020 Plains Pest Management Interns and lab techs for data collection and labor associated with this trial: Jerik Reed, Lauryn Carrol, and Denise Reed. Thank you all.

2020 Albaugh Experimental Miticide Efficacy for Banks Grass Mite Control in Corn

Texas A&M AgriLife Extension Service / Albaugh

Cooperator: Drew Higgins

Blayne Reed, EA-IPM Hale, & Swisher, Dr. Jaime Yanes, Albaugh, John Thobe, EA-IPM, Parmer, Bailey, & Castro

Summary

Six numbered compounds of miticides and experimental chemistries, along with an untreated check were organized for this small plot efficacy trial with 4 replications. The chemical treatments included Hexamite EC at 12 oz./ac., ALB 7000, ALB 7001, ALB 7002, and Onager EC at 12 oz./ac. All applications were made with the CO2 backpack sprayer with the overhead boom attachment. Data on mites per leaf were recorded pre-treatment, 7, 14, and 21 DAT with a mite damage rating taken at 21 DAT.

All miticides outperformed the UTC by the 14 DAT date indicating that all are acceptable forms of chemical control based upon this trial. Additional locations and trials might be needed before advancing experimental products to market. Onager EC and Hexamite EC, a generic version of Onager EC, behaved similarly and in a typical fashion for the chemistry. The three experimental compounds acted within these same parameters but offered no improvement or advantage in terms of mite control. If any of the three are novel compounds or new modes of action they could prove to then have an advantage to the market as a form of resistance management. If any of these experimental mite products move to market, it is recommended that the same 3.5 damage rating on the 0-10 Texas A&M AgriLife mite damage scale be utilized for ET field treatment decision making tool.

Objective

Evaluate numbered and experimental Albaugh miticides compared to commercial standards for Banks Grass Mite Efficacy in West Texas Field Corn.

Materials and Methods

Plot sizes consisted of 6 rows at 30-inch rows wide by 43-feet long with the middle two rows of each plot being the treated area of the plot and the remaining rows being a buffer to prevent chemical drift between plots and to provide a source for re-infestation both from beneficials and additional mites for superior residual measurement of the products.

Figure 27. The CO2 backpack sprayer with boom attachment at work during the 2020 season.

A commercial corn field enrolled with the West Plains Pest Management field scouting program in southeastern Castro County belonging to Drew Higgins was selected for the trial. Some light pockets of Banks Grass Mites (BGM) were noted by the scouting program in early-July. Plots were lain out on 16 July in one of the stronger pockets of BGM available in the field. All plots were sprayed with Karate at 2.4 oz. / acre and Headline at 14 oz. / acre via CO_2 backpack sprayer with overhead boom attachment at 16.2 GPA. This was done in an effort to temporarily remove all mite predators and mite fungal pathogens so that economic populations of BGM would develop in the plot treated areas.

On 24 July the treated areas of the plots were deemed economic and treatable for BGM and all treatments were applied. All treatments were made with the CO_2 backpack sprayer with the overhead boom attachment. Data on mites per leaf were recorded pre-treatment, 7, 14, and 21 DAT with a mite damage rating taken at 21 DAT.

For the mite per leaf counts, five randomly selected ear leaves were harvested from each plot on count dates and taken to the Plains Pest Management Insect Lab in Plainview where mites per leaf were counted under magnification. No differentiation was made about mite life stage as all living mites were counted. The damage ratings were conducted by the EA-IPM Agents utilizing the 0-10 Texas A&M AgriLife spider mite damage rating scale. All data were recorded in ARM and following trial completion compared using ANOVA and LSD.

Image 2. Harvesting ear leaves from corn plots to be taken to lab and counted for BGM/leaf counts.

Results and Discussion

At the 7 DAT count date, all per leaf BGM counts for all treatments had increased from the pretreatment count. There were no significant differences in BGM per leaf at the 0.05 level. However, the UTC and treatment ALB 7002 were numerically higher than all other treatments. By the 14 DAT date mite numbers had dropped in all treatments, yet all treatments had significantly separated from the UTC (*P*=.0.0001) while the ALB 7001, ALB 7002, and Onager treatments performed superior to the other chemical treatments. At the 21 DAT count date, all treatments remained significantly superior to the UTC despite a solid reinfestation level from the surrounding, untreated areas (*P*=0.0033), but no treatment separated from another.

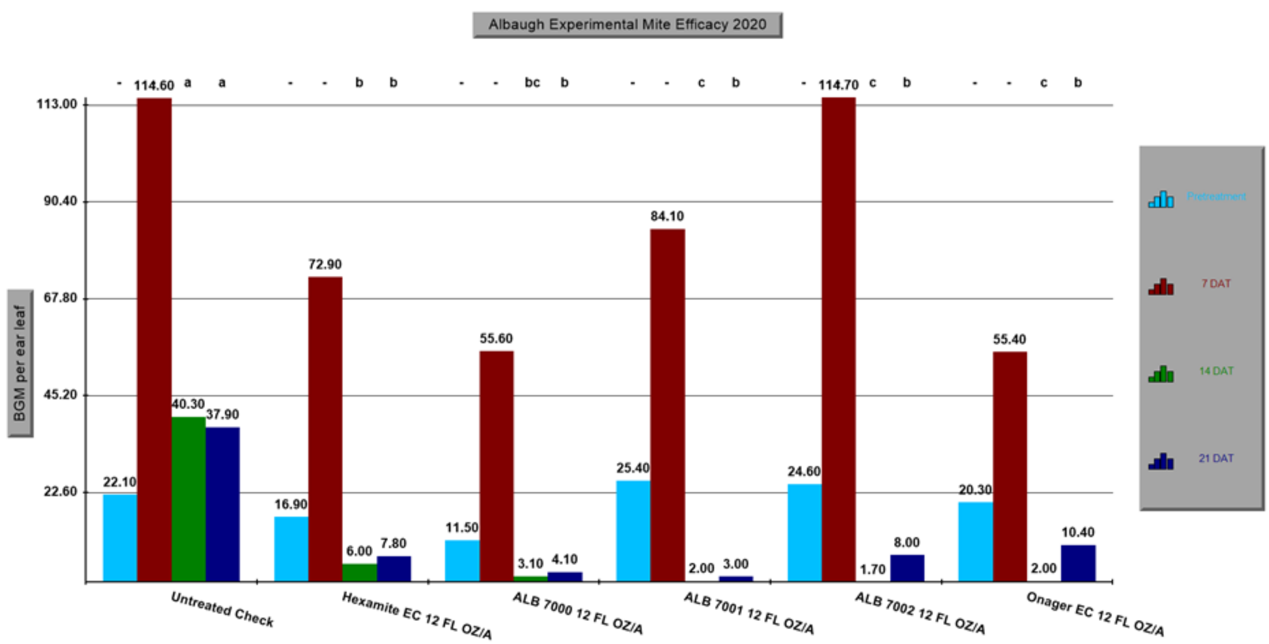

Figure 28. Banks Grass Mites per leaf by treatment over time.

In terms of the 21 DAT 0-10 damage rating, all treatments separated from the UTC while the Hexamite EC treatment separated from the ALB 7002, and Onager EC treatment.

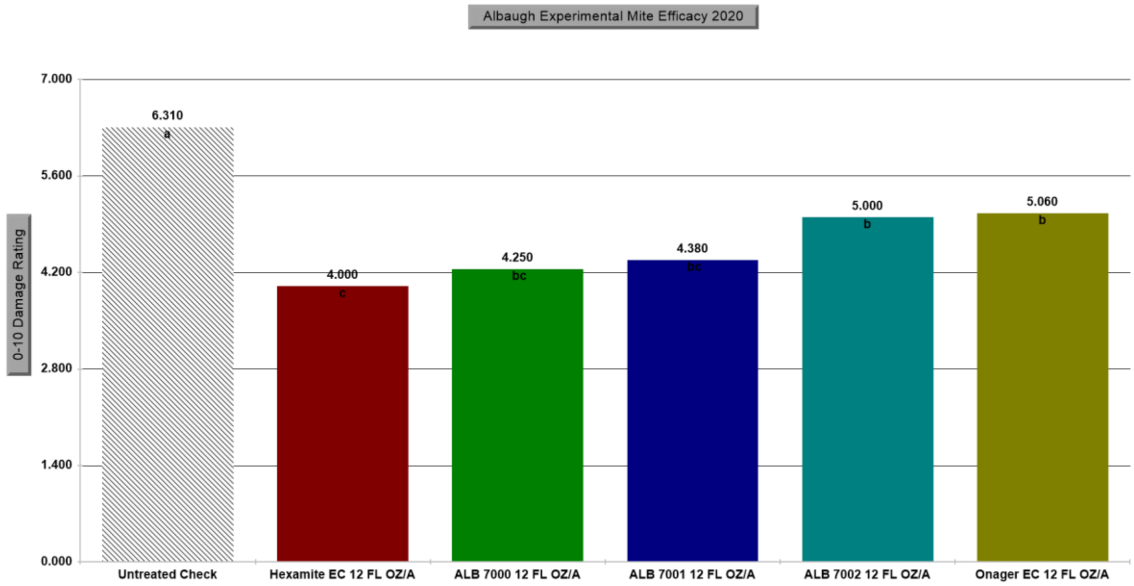

Figure 29. Texas A&M AgriLife 0-10 BGM damage ratings by treatment.

Conclusions

All miticides outperformed the UTC indicating that all are acceptable forms of chemical control based upon this trial. Additional locations and trials might be needed before advancing experimental products to market. Onager EC and Hexamite EC, a generic version of Onager EC, behaved similarly and in a typical fashion for the chemistry. The three experimental compounds acted within these same parameters but offered no improvement or advantage in terms of mite control. If any of the three are novel compounds or new modes of action they could prove to then have an advantage to the market as a form of resistance management.

None of the treatments shown any true knockdown activity as none of the treatments separated from the UTC at the 7 DAT date. All did show good activity at the 14 DAT date and onward with differences showing in the damage rating as well. This is typical of all miticide products on the market today, but especially true with the Onager type of chemistry. It is standard for miticide products to not show activity until about the 10 DAT date. If any of these experimental mite products move to market, it is recommended that the same 3.5 damage rating on the 0-10 Texas A&M AgriLife mite damage scale be utilized for ET field treatment decision making tool. The need for this treatment level was again confirmed for the commercial products Hexamite and Onager.

Acknowledgements

This work is supported by Crops Protection and Pest Management Competitive Grants Program [grant no. 2017-70006-27188 /project accession no. 1013905] from the USDA National Institute of Food and Agriculture. I would like to extend thanks to Albaugh and Dr. Jamie Yanes for sponsoring and partnership of this trial Drew Higgins for Cooperating and hosting this trial, and the 2020 Plains Pest Management Interns and Lab Technicians for data collection and labor associated with this trial: Jerik Reed, Lauryn Carrol, and Denise Reed. Thank you all.