Texas AgriLife Extension (Television, Radio, and Multi-media Interviews) - 2011

September 20, 2011, “2011 Panhandle Corn Moth Trapping Program”, KGNC – AM 710, http://www.kgnrcom.com/, listening audience of 12,500 is across a large portions of Texas, Oklahoma, Kansas and New Mexico, including such cities as Lubbock and Abilene, Texas; Clovis and Roswell, New Mexico and Garden City, Kansas. Under the right conditions, it can be heard in the suburbs of Dallas and Oklahoma City.


July 12, 2011, “Spider Mite Pest Status for the Texas High Plains”, KGNC – AM 710, http://www.kgnrcom.com/, listening audience of 12,500 is across a large portions of Texas, Oklahoma, Kansas and New Mexico, including such cities as Lubbock and Abilene, Texas; Clovis and Roswell, New Mexico and Garden City, Kansas. Under the right conditions, it can be heard in the suburbs of Dallas and Oklahoma City.

June 21, 2011, “Potato Psyllid Control Study”, youtube, http://www.youtube.com/user/kayledbetter#p/c/E7B5FE3093FF4F40/33/YCPbCr7QSCM.

February 24, 2011, “Wheat Greenbug Pest Status for the Texas High Plains”, KGNC – AM 710, http://www.kgnrcom.com/, listening audience of 12,500 is across a large portions of Texas, Oklahoma, Kansas and New Mexico, including such cities as Lubbock and Abilene, Texas; Clovis and Roswell, New Mexico and Garden City, Kansas. Under the right conditions, it can be heard in the suburbs of Dallas and Oklahoma City.

January 5, “Grain Elevator Workshop Conference”, KXIT Radio, Dalhart, TX, listening audience of 1,500 is across the NW Texas Panhandle and NW Oklahoma Panhandle and NE part of New Mexico.

Evaluation of Spider Mite Control Practices for Managing Spider Mite Infestations in Pre-Tassel and Post-Tassel Corn on the Texas High Plains

Ed Bynum, Pat Porter, and Monti Vandiver

- Relevance
  - Spider mite infestations are an annual and costly threat to corn production in the Texas High Plains. Producers have very few options for controlling mite infestations after populations reach damaging levels on tasseled corn. Miticides are the only control options available, but miticide products registered for use in corn are limited.
  - The miticide products are expensive ($20 to $30 / acre) and their effectiveness is adversely impacted by poor spray coverage in the lower portion of the canopy.
  - Comite® can be effective in controlling mites, but only when applied to pre-tassel corn while mite populations are just becoming established. The more recently registered Oberon® (2005) and Onager® (2007) miticides are products that corn producers have begun using to control mites. Oberon has been used for both pre-tassel and post-tassel mite control but there have been reports of control failures when applied to post-tasseled corn. Onager® is only currently registered for use on pre-tassel corn.
  - Therefore, control decisions have become more a matter of preventing significant mite infestations through prophylactic applications rather than determining when applications are
needed, most efficacious and most economical. Knowing which registered and new unregistered miticides provide effective control, and when it is the most economical time to use these miticides for maximum spider mite control has the potential to save producers money wasted on unnecessary and ineffective control applications.

Response

- Field studies were implemented with:
  - Special emphasis at evaluating new unregistered miticides for possible support in future registrations on corn.
  - Determining best control options for currently registered products when applied to pre-tassel and post-tassel spider mite infestations.

Results

- Field trials have shown promising results of spider mite control in corn with new unregistered miticides (Zeal, Portal, and AgriMek).
- Early season pre-tassel and post-tassel miticide trials in 2010 and 2011 are providing a clearer understanding as to when applications need to be made for effective control with each registered miticide product.
- These trials are providing a better understanding of the impact of spider mite predator levels to prevent or maintain spider mites below damaging infestations.
- These trials have shown that miticide applications may be reduced or eliminated depending on natural predator populations and that automatic preventive applications are often unnecessary.
- For a 640 acre corn field, managing spider mite infestations based on knowing when to treat could save corn growers as much as $30 per acre or a total of $19,000. Conservatively, if 10% of the 900,000 acres of corn grown on the Texas High Plains could eliminate one miticide application or not have to treat, producers would save $2.7 million.
Seasonal Moth Trapping for Detection of Adult Flights for Southwestern Corn Borer (SWCB), Western Bean Cutworm (WBC), and (FAW) in the Texas Panhandle

Dr. Ed Bynum, Extension Entomologist-Amarillo
Collaborators; Rick Auckerman, Mike Bragg, Brandon Boughen, Brad Easterling, Marcel Fischbacher, David Graf, Brandon McGinty, J. D. Ragland, J. R. Sprague, Scott Strawn, and Kristy Synatschk

Relevance
- There is approximately 1 million acres of corn grown in the Texas High Plains yearly.
- Fields and corn refuge areas planted to non-Bt corn hybrids are vulnerable to heavy damage from SWCB, WBC, and FAW infestations.
- Depending on the Bt-corn hybrid a producer plants, a certain percentage of the corn acreage has to be planted to non-Bt corn hybrids as a refuge to prevent these corn pests from developing resistance to the Bt corn. For corn grown in cotton producing areas (south of Amarillo, TX) the refuge acreage is 20% to 50% non-Bt corn. Fields in non-cotton areas (north of Amarillo, TX) refuge area is 5% to 20% non-Bt corn.
- Also, some of the Bt corn hybrids do not provide 100% protection against WBC and FAW infestations and corn ears can be damaged from larval feeding.
- Some food grade corn hybrids do not have the Bt technology and if a producer selects these hybrids to plant then 100% of the corn acreage is susceptible to damage from these pests.
- Therefore, if just 20% of all corn grown on the Texas High Plains there can be 200,000 acres of corn annually not protected from these corn pests.
- The activity of these three corn pests during the summer can occur at different times and at different magnitudes depending on seasonal weather conditions. This makes it difficult for producers, crop consultants, local ag suppliers, and ag-aviators to know when there will be damaging infestations and when to make timely insecticide applications for optimum control to minimize economic losses.

Response
- To assist producers, crop consultants, local ag suppliers, and ag-aviators with knowing when these pests were active a network of Texas AgriLife Extension County Extension Agents (CEA) across the Texas High Plains (Panhandle Region) was organized to monitor the moth flight activity of SWCB, WBC, and FAW.
- Eleven county extension agents used pheromone bucket style traps to monitor the abundance and duration of the moth flights in 12 Texas Panhandle counties. A total of 54 traps (one per pest species) were setup in 18 producers’ corn fields and were monitored weekly.
- Trap catches from each field in a county was summarized made available weekly to producers, crop consultants, local ag suppliers, and ag-aviators through phone calls and text messages from the local county extension agents, newspaper articles, county extension agent newsletters, the Texas AgriLife Extension Panhandle Pest Update newsletters, and postings on the Texas AgriLife Extension website Insect Surveys (http://amarillo.tamu.edu/facultystaff/ed-bynum/insects/).
- Also, weekly reports were provided to the Texas Corn Producers Board for their distribution to corn producers.

Results
- Moth trap catches during the 2011 corn growing season for SWCB, WBC, and FAW are shown in figures 1 to 3, respectively.
- Moth trapping showed SWCB moths increased to extremely high numbers in Deaf Smith County and continued for an extended period of time (July 18 to August 29) and in Dallam County from July 25 to August 15 (Fig. 1). Moderate moth activity was recorded in Sherman County while the remaining counties had relatively low levels of SWCB moth activity.
- WBC moth activity was predominately in high levels from June 27 to July 18 in Dallam and Hartley counties with slightly lower level in Sherman County (Fig. 2). The rest of the counties had nominal to no activity of WBC.
• Moth activity of FAW began with relatively high numbers as shown by trap numbers June 6 in several counties, but activity drop to low levels until moths became active again the last of August (particularly in Lipscomb County).
• These moth trapping data demonstrate the variability and differences of flight patterns of the three moth species.
• Monitoring moth activity revealed that counties like Gray, Hutchinson, Lipscomb, Ochiltree, Potter, Randall, and Swisher had little to no activity of these moths and posed no threat to corn.
• The different moth activity was reported to producers, crop consultants, local ag suppliers, and ag-aviators to keep them informed of potential damaging infestations and when activity was not a threat.
• A questionnaire was drafted to assess the value of the moth trapping project. The county extension agents distributed the questionnaire to individuals that had traps in their fields or that knew about the moth trapping project. If these individuals responded negatively to the project then we would know there would not be a need to continue monitoring moth activity.
• Results of the questionnaire were:
  - To date 11 individuals responded to the survey. Four were producers, two ag-aviators, one a crop supplier, one a crop consultant, one a crop consultant and ag-aviator, one a crop consultant and ag supplier, and one a crop consultant and producer.
  - One (9.1%) rated the value of the moth trapping data as somewhat important while 6 (54.5%) rated it important and 4 (36.4%) rated the data as very important. It was interesting that the individual rating the data as somewhat important was from Ochiltree County where there was very little moth activity for any of the moth species monitored.
  - One question asked if the moth trapping data helped in determining if moth activity was a threat or not a threat to pending infestations. Five of the 11 individuals checked that moth trapping helped them determine that moth activity was a threat. Five indicated it helped them determine the moth activity was not a threat while one indicated the data helped to determine when moth activity was both a threat and non a threat.
    ♦ A secondary question asked if moths were not a threat was a spray application prevented. Four checked yes, one checked no, and two were not sure. This indicates the data was important in preventing spray applications when moths were not a threat.
    ♦ Another secondary question asked if moths were a threat how did the information influence management decisions. Some individuals checked more than one answer. Six responded that they scouted fields more frequently. Three responded that the information helped in making better timing of spray applications. One checked that the information changed his spraying practices and one checked that it increased the number of spray applications to protect corn from damaging infestations.
  - One question asked how many acres were potentially at risk from each of the moths monitored. The number of acres given was dependent on whether they were a producer, crop consultant, etc.
    ♦ For SWCB, all 11 responders reported acres at risk were from 125 to 30,000 with 20% to 100% being non-Bt corn.
    ♦ For WBC, 6 responders reported acres at risk were from 125 to 10,000 with 20% to 60% being non-Bt corn.
    ♦ For FAW, 5 responders reported acres at risk were from 125 to 10,000 with 20% to 60% being non-Bt corn.
  - The last question asked how they got the moth trapping information during the season. Eleven got information from phone calls, text messages from local CEA. Three got information from CEA newsletters. Two responders each got information from news articles, the Texas AgriLife Extension Panhandle Pest Update Newsletter, or the Texas AgriLife Extension website where the Insect Surveys were posted weekly.
EVALUATION OF CONTROL STRATEGIES FOR DETERMINING WHEN TO APPLY INSECTICIDES FOR MANAGEMENT OF POTATO PSYLLID INFESTATIONS AND ZEBRA CHIP INCIDENCE

Bynum, E. D1,. Rush, C. M1. and Guenthner, J2

1 Texas AgriLife Research and Extension, Amarillo, TX 79109 and 2 University of Idaho

Summary

Psyllid populations were very low during the entire growing season in the experimental field at Texas AgriLife Research Station at Bushland, TX. These low infestation levels may have been a result of prolonged high temperatures and drought conditions from mid-June through August. Initially, a few potato psyllid eggs were counted on potato leaves on May 16 and May 23 and one psyllid nymph (May 31) was found on sampled leaves. After May 31, no eggs or immature psyllids were counted on leaf samples the rest of the growing season. Low numbers adult psyllids were trapped on yellow sticky traps, but none of the adults tested positive for the Liberibacter bacterium when analyzed with conventional PCR techniques. Therefore, none of the experimental ‘action threshold’ treatments were sprayed with insecticides when based on 1) \( \geq 3 \) psyllid trapped on sticky traps or an average of \( \geq 0.6 \) psyllid per trap, 2) \( \geq 6 \) adult psyllids caught in sweep net samples, 3) adult psyllids testing positive for Lso, and 4) \( \geq 2 \) nymphs counted per leaf were not treated during the growing season. The season long commercial foliar application and the season long non-commercial foliar application treatments were sprayed with insecticides weekly beginning June 1. The potato yield samples showed no differences among any of the treatments for tuber numbers, tuber weight, and yield per acre. Also, none of the randomly sampled tubers per treatment showed any evidence of Zebra Chip (ZC) symptoms. Comparing commercial and untreated fields from Olton and Dalhart to the experiment trial at Bushland showed psyllid infestations and ZC infected tubers were very low across the Texas High Plains in 2011. Also when season long insecticide applications were applied to the commercial spray treatment in the experiment at Bushland, the total insecticide cost was $312.00 per acre. This compares to insecticide costs from a low of $240.00 to a high of $516.00 for commercial fields surveyed by Dr. Goolsby at Olton and Dalhart. While producers use season long control strategies, the low levels of potato psyllid infestations, lack of Lso infected adult psyllids, and low levels of potato tubers infected with Lso experienced this growing season on the Texas High Plains indicate there are times when potato psyllid infestations never reach a threshold when spray applications are needed to protect potatoes. Although psyllid infestations never reached levels to evaluate differences among the experimental action thresholds, the experiment indicates an action threshold may be developed to save producers many needless applications. Further studies are still needed so the criteria used in this experiment or possible other criteria can be used as an action threshold for managing psyllid populations and the prevention of ZC infection.

Introduction

The potato psyllid, Bactericera cockerelli (Sulc.), has been a pest of economic importance for potato growers because of damages associated with psyllid yellows (Richards 1928 Wallis 1955). But, the recent association of potato psyllid as the vector of the Liberibacter pathogen (Munyaneza et al. 2007) has completely changed how commercial growers manage psyllid infestations in order to reduce the incidence of ZC symptomatic tubers. Producers have resorted to multiple insecticide applications for season long protection against possible ZC incidence. Spray programs by producers do rotate insecticides from different classification groupings (pyrethroid, neonicotinoid, spinosyns, avermectins, and feeding blockers) to reduce selection pressure for insecticide resistance management (IRM). Still, the numerous applications during a
season are exposing psyllid populations to heavy insecticide pressures and disrupting the impact of natural enemies.

Goolsby et al. (2007) reported that yellow sticky cards were especially an effective tool for detecting low densities of potato psyllids in both potato fields and stands of native host plants. They also stated the use of sticky cards could be used effectively for ‘IPM programs’ of season long multiple insecticide control. The extensive survey program from the Lower Rio Grande Valley to Nebraska from 2007 to 2010 has shown the incidence of ZC to be low when potato psyllids are at low densities for the entire season. The producers’ approach of applying multiple applications to maintain low psyllid densities is extremely costly, as producers can spend more than $300 per acre for insecticide costs alone.

Devising IPM strategies based on action thresholds could substantially reduce the number of insecticide applications while reducing the incidence of ZC disease. In the present study, we investigated the effectiveness of timing foliar applications based on 1) when 3 or more adult psyllids were caught weekly on yellow sticky traps, 2) when an average of 6 or more adult psyllids were collected per 10 sweep net sample, 3) when weekly trapped or sweep net collected adult psyllids tested positive for the Liberibacter disease, and 4) when psyllid nymphs average 2 or more per leaf. These treatments were compared to 1) season long commercial foliar applications for managing psyllid infestations, 2) season long non-commercial foliar applications, and 3) an untreated control.

Materials and Methods

The experiment was conducted at the Texas AgriLife Research Station at Bushland, TX. On April 5 the potato variety FL 1867 was planted on 30 inch row spacing with a commercial planter. The seed potatoes were spaced 9 inches apart. Irrigations of 0.5 inch to 2 inches were applied weekly with a LESA center pivot irrigation system. The field was treated with Platinum 75 SG (Syngenta) at 8 fl oz/ac on April 20 prior to establishing the experimental plots with a 6 row tractor mounted sprayer that delivered a total spray volume of 20 gpa. On July 26, the field was treated with a plant desiccant (Aim at 5.8 fl oz/ac + 1% v/v crop oil concentrate) to prepare potato vines for harvest.

On May 3, experimental plots were arranged in a randomized complete block design with 5 replications within the outside pivot span of the field. Plots were 12 (30 inch) rows wide by 50ft. long. The seven experimental treatments were 1) untreated control; 2) season long commercial foliar spray schedule (Commercial); 3) applications timed when ≥ 3 adult psyllids are trapped each week (Trap); 4) applications timed when an average of 6 or more adult psyllids were collected per 10 sweep net sample (Sweep Net); 5) applications timed when trapped or sweep net collected adult psyllids test positive for Liberibacter (Liberibacter); 6) applications timed when psyllid nymphs average 2 or more per leaf (Nymphs); and 7) season long non-commercial foliar applications (Season). Data were analyzed using SAS Proc GLM and means were separated using Duncan’s multiple range test (P=0.05).

Insecticide products used and application dates for each treatment are listed in table 1. All foliar applied insecticides were mixed with a 1% v/v rate of a crop oil concentrate. Insecticide used for the season long commercial foliar spray schedule treatment, in order of use, were Fulfill 50 WG (Syngenta) at 5.5 oz/ac, Movento (Bayer CropScience) at 5 fl oz/ac, Agri-Mek 0.15 EC (Syngenta) at 10 fl oz/ac, and Beleaf 50SG (FMC) at 2.8 oz/ac. Each of these products was applied twice 6-7 days apart before switching to another insecticide product. An insecticide mixture of Fulfill 50 WG (Syngenta) at 5.5 oz/ac, Movento (Bayer CropScience) at 5 fl oz/ac, and Agri-Mek 0.15 EC (Syngenta) at 10 fl oz/ac was used if foliar applications were applied to treatments 3 to 7. All foliar applications were applied with a International Harvester Cub tractor.
equipped with a CO\textsubscript{2} pressured spray boom that had five XR11002VS nozzles spaced 30 inches apart. The boom was calibrated to deliver 12 gpa spray volume using 30 psi at a speed of 3 mph.

Table 1. Insecticide products and date of application to each designated treatment.

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Five yellow sticky traps (Trécé Pherocon\textsuperscript{\textregistered} AM) were positioned around the outer perimeter of the east-northeast edge of the field beginning May 2. The perimeter of the field was 600 feet long. The first trap was positioned 50 feet from the south end of the field and each subsequent trap was 100 feet apart. These sticky traps were placed three feet above the ground on wooden stakes. Traps were replaced weekly until harvest. Adult psyllids captured on traps were counted under a dissecting stereomicroscope. When found they were removed with forceps and collectively placed in 70% ethyl alcohol (EtOH) until assayed for Liberibacter bacterium (Lso) using conventional PCR techniques. The assays were conducted by Dr. Charlie Rush’s lab at the Texas AgriLife Research Center, Bushland, TX. The results were available within 48 hrs from the time traps were collected. Also, in this field Dr. Jerry Michels setup and positioned 15 yellow sticky traps among experimental plots for a trial adjacent to our experimental plots. Since the experimental plan was to base one of the treatments when \( \geq 3 \) adult psyllids were captured weekly from the 5 sticky traps along the outer edge of the field, this plan was modified to base the treatment when there was an average of \( \geq 0.6 \) adults per trap for all traps within the field.

In each designated sweep net treatment plot adult psyllids were sampled weekly with a 15 inch sweep net by taken 10 sweeps across two rows in a plot. Collected adult psyllids were aspirated and combined with the adults removed from sticky traps for Lso detection.

The number of nymphs and eggs were counted and recorded weekly to monitor density differences among treatments and to determine when applications should be applied to the
Nymph treatment. Five potato leaves were collected from each plot, placed in a cooler, and returned to the lab. Each leaf was examined under a dissecting stereomicroscope at approximately 20X.

On August 3, potato tubers were hand harvested from 10 row feet from the two center rows per plot and taken to the lab for processing. Potatoes were counted and weighed (lbs). Ten tubers were randomly selected from a bag, sliced and visually inspected for Zebra Chip (ZC) disease symptoms. Any tuber exhibiting abnormal symptoms was then sliced (10 slices) and the slices were deep fried for detection of characteristic ZC disease discoloration.

**Results and Discussion**

Foliar applications were initiated in the commercial and non-commercial season long treatments on June 1 and continued weekly until July 19 (Table 1). These applications were made to insure season long protection from Liberibacter infection and yield losses from potato psyllid infestations. The other treatments that were to be sprayed with insecticides when based on 1) ≥3 psyllid trapped on sticky traps or an average of ≥0.6 psyllid per trap, 2) ≥6 adult psyllids caught in sweep net samples, 3) adult psyllids testing positive for Lso, and 4) ≥2 nymphs counted per leaf were not treated during the growing season. The psyllid densities never reached levels anytime during the growing season to warrant spraying based on these ‘action thresholds’ (Fig. 1). Also, none of the adult psyllids assayed with conventional PCR techniques tested positive for carrying the Liberibacter bacterium.

![Figure 1](image-url). Mean number of psyllid densities for adults captured on sticky traps (A) and eggs (B) and nymphs (C) on potato leaves sampled during the growing season at the Texas AgriLife Research Station at Bushland, TX.
Yellow sticky traps showed that adult psyllids were present during the growing season (Fig. 1). The number of psyllids trapped in a week was never higher than 0.4 adults per trap which was less than the number needed to spray based on trapped psyllids. Sweep net sampling did not capture any adult psyllids. A low number of psyllid eggs (< 0.15 per leaf) were found on potato leaves in May, even before adults were detected on sticky traps. Psyllid populations never developed from these early low egg infestations, as evident from virtually no nymphs or other egg infestations the rest of the growing season. These low infestations could be a result of extreme high temperatures and drought conditions from June through August (Fig. 2). Beginning from May 27 to August 31, extreme daytime temperatures and severe drought conditions existed across the Texas High Plains. During this 97 day period there were 94 days, 84 days and 36 days when temperatures were ≥90°F, ≥95°F and ≥100°F, respectively, at Bushland. There were comparable temperatures from Olton and Dalhart (Fig. 2). Also, during this period only 0.01 of an inch of rain was reported for Bushland while reported rainfall amounts for Olton and Dalhart were 0.0 and 4.57 inches, respectively.

Since potato psyllid infestations were low and none of the adult psyllids tested positive for Lso, there were no statistical differences among the different treatments for potato yields (lbs/ac), tuber numbers and tuber weight (Fig. 3). None of the tubers inspected showed any ZC symptoms. This indicates there was not an advantage to spraying insecticides in the commercial and non-commercial season long treatments when compared to the ‘action threshold’ treatments that did not require any insecticide sprays this year. The incidence of Lso infected psyllids and potato psyllid populations were too low to justify making insecticide applications based on the designated action thresholds for this experiment.

Comparisons were made between the potato psyllid infestations and ZC incidence at Bushland to locations used by Dr. John Goolsby to survey fields near Olton and Dalhart. There were two commercial fields and an untreated check field (Halfway) in the Olton area and three commercial fields and an untreated check field in the Dalhart area. Data used for fields at Olton and Dalhart were obtained from Dr. Goolsby’s 2011 weekly summary reports. All fields in the Olton area were planted between March 25 to March 28 and one field in Dalhart (LA82) was

![Figure 2. Maximum daily temperatures (°F) and precipitation (inches) for three locations (Bushland, Olton and Dalhart) across the Texas High Plains in 2011.](image-url)
planted March 16. The other fields near Dalhart were planted between May 8 to May 16. And, the field at Bushland was planted April 5. There were relatively high numbers of adult psyllids captured on yellow sticky traps prior to plant emergence at the Olton CSS16-A field. Then trap catches declined during the rest of the growing season. In general, all fields from Olton to Dalhart had relatively low numbers of adult psyllids trapped during the vegetative growth stages (Fig 4). The exception was for the Dalhart LA-82-A which had relatively high numbers on two sample dates. These comparisons showed adult trap catches at Bushland was comparable to both commercial and untreated fields at Olton and Dalhart. Of all the psyllids trapped only a small percentage in the pre-emergence traps at Olton tested positive for Lso, but none of the psyllids were ‘Hot’ at any other time during the season in any field at Olton and Dalhart (Goolsby’s 2011 weekly summary reports) (Fig. 5).

Immature potato psyllid nymph densities were very low and infrequently found on potato leaves at all of the locations, including the untreated check fields (Fig. 5). Subsequently, the percentage of tubers infected with Lso was very low for all of the fields from Olton to Dalhart. Based on Dr. Goolsby’s reported percentage of tubers infected with Lso, the fields in the Olton area was 0% to 2%. All fields at Dalhart had just 0% to 0.5% of tubers infected with Lso.

Commercial producers control strategy is to apply insecticides all season long because of the potential threat potato psyllids will infect potato tubers with Lso and psyllid infestations could substantially reduce yields. This causes insecticide costs alone to be extremely high during the

Figure 3. Comparison of mean number of tubers (A), mean tuber weight (B), and mean yield per acre (C) for the Commercial (Com), Liberibacter (Liber), Nymphs, Season, Sweep Net (Sweep), Trap and Untreated treatments.
growing season. As a comparison, the season long per acre insecticide cost for the commercial spray treatment at Bushland was $312.00 while the cost of insecticides for the commercial fields surveyed at Olton were $240.00 and $516.00 and at Dalhart were $252.00, $301.00 and $358.00. Differences in costs among fields were related to products selected and differences in applications applied to a field. While producers continue to use season long control strategies, the low levels of potato psyllid infestations, lack of Lso infected adult psyllids, and low levels of potato tubers infected with Lso experienced this growing season on the Texas High Plains indicate there are times when potato psyllid infestations never reach a threshold when spray applications are needed to protect potatoes.

Although psyllid infestations never reached levels to evaluate differences among the experimental action thresholds, the experiment indicates an ‘action threshold’ could be developed to save producers many needless applications. Further studies are still needed so the criteria used in this experiment or possible other criteria can be used as action thresholds for managing psyllid populations and the prevention of ZC infection.

References


Acknowledgements
Financial support was provided from SCRI matching funds.
Special thanks are extended to Li Paetzold and Angela Simmons for conducting the PCR analysis of potato psyllid adults.
Al Perez and Kelsea Porter served as summer field and lab technicians for data collection and we are grateful to Johnny Bible, Jimmy Gray, Erin Jones, Rachel Lange and Dr. Fedede Workneh for technical assistance.
Figure 4. Adult psyllid trap captures and immature nymph densities at different fields from Bushland, Olton and Dalhart. (Data for fields at Olton and Dalhart were taken from Dr. John Goolsby's weekly summary reports).
Figure 5. Percentage of adult psyllids testing positive from fields at Olton. (Data taken from Dr. John Goolsby's weekly summary reports).
Evaluation of Agri-Mek, Agri-Flex, and Zeal as Potential New Miticides for Spider Mite Control in Field Corn

Dr. Ed. Bynum and Mr. Monti Vandiver
Extension Entomologist (Amarillo) and Extension Agent – IPM (Bailey and Parmer Counties)

Cooperator
Mr. David Carthel

Summary
All of the miticide treatments were equally effective in reducing Banks grass mite infestations by 13 days after being applied. These miticide products also were relatively safe on mite predators, particularly a thrips complex. It is important to have miticides which conserve predators that naturally suppress mite infestations and other corn insect pests.

Objective
To evaluate the efficacy Agri-Mek at 2.0 and 2.5 fl oz/A, Agri-Flex at 8.5 fl oz/A, and Zeal at 2.0 oz/A for control of spider mites infesting tassel stage corn.

Methods & Materials

Agronomic Practices and Weather
A center pivot irrigated field near Friona, TX in Parmer County was planted to Pioneer P32B11 corn hybrid on April 27, 2011. Agronomic practices for irrigation, fertilizer, and herbicide were standard for corn production in the Texas High Plains. Climatic conditions were extremely hot and dry and the field was under severe drought stress even with being irrigated. No rainfall had been reported from January 2011 through the time the experiment was conducted.

Experimental Design
The experiment was arranged in a randomized complete block design having four (4) replications. Plots were four rows wide (38 inch center) by 40 ft. long.

Insecticide Application
Applications of Agri-Mek (2.0 and 2.5 fl oz/A), Agri-Flex (8.5 fl oz/A), Zeal (2.0 oz/A), Oberon 4SC® (4.25 fl. oz/A), and Onager 1E® (10 fl. oz/A) were made on July 16. Each of the AgriMek and AgriFlex application rates were mixed with a 0.25% v/v rate of a non-ionic surfactant (Activator 90). The application of Zeal was mixed with a 0.1% v/v rate of the non-ionic surfactant. Treatments were sprayed at 14.5 gpa with a CO₂ pressurized (30 psi) hand-carried backpack sprayer with the boom held at the base of corn tassels. The boom was equipped with 5 (T-jet® 8002VS) nozzles on 20 inch centers. At application the temperature was 65°F with a light wind of 2 mph from the south/southwest.

Insect Samples and Data Analysis.
Sample counts were taken the 1 day before the miticide applications and at 5 and 13 days following application. The number of visible mobile mites and predators were counted from 5 leaves per plot with the aid of an Optivisor® binocular magnifier, model DA10. The leaf sampled was the 4th leaf up the plant from the lowest leaf on the plant with at least 1/3 of the leaf green. Data were first corrected using the formula Log(x +
1.0) and then analyzed using PROC GLM analysis of variance (SAS 9.2 version). Treatment mean differences were separated with Duncan’s multiple range test (P=0.05).

**Results & Discussion**

The corn field was in the tassel growth stage with green silks beginning to become exposed from the corn ears. The corn plants were showing light mite feeding damage on the lower 1/3rd of the plant. And, Banks grass mite colonies were starting to become established as evident from densities at the pretreatment sample date (Table 1). Along with the mites becoming established, predatory thrips and a few western flower thrips were seen on the corn leaves (Table 2). The thrips accounted for 98.9% of all natural enemies found at the pretreatment sample count. By 5 days after treatment (DAT) mites in the untreated check plots were showing an increase in numbers. In general the activity of the miticide treatments was not evident at the 5 DAT count. Even when the mite numbers were statistically lower from the untreated in the Agri-Mek 2.0 fl oz/A and Onager treatments, it is unlikely that these two treatments were performing better than the miticides. We should not expect the low rate of Agi-Mek (2.0 fl oz/A) to be better than the higher rate of Agi-Mek (2.5 fl oz/A). The thrips, which were 99.1% of all natural mite enemies, did increase in numbers from the pretreatment levels. By 13 DAT, it was evident that all miticide treatments were reducing mite numbers below the untreated density levels. But, statistically there were no differences among the different miticides. Thrips were still present in relatively good numbers in all treatments at the 13 DAT sample date. This shows that all of these miticides are safe on mite predators, specifically the thrips complex. These thrips densities were beginning to have an impact on the mite numbers as evidenced by a reduction in mite numbers in the untreated check. It is important to have miticides which conserve predators that naturally suppress mite infestations and other corn insect pests.
Table 1. Mean Number of spider mites per sampled leaf 1 day before treatment (Pre-trt) and at 5 and 13 days after treatment (DAT).\(^a\)\(^b\)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate / A</th>
<th>Pre-trt</th>
<th>5 DAT</th>
<th>13 DAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agri-Mek + 0.25% NIS</td>
<td>2.0 fl oz</td>
<td>34.4 a</td>
<td>13.6 c</td>
<td>3.3 b</td>
</tr>
<tr>
<td>Agri-Mek + 0.25% NIS</td>
<td>2.5 fl oz</td>
<td>32.3 a</td>
<td>23.5 ab</td>
<td>5.1 bc</td>
</tr>
<tr>
<td>Agri-Flex + 0.25% NIS</td>
<td>8.5 fl oz</td>
<td>36.4 a</td>
<td>25.0 ab</td>
<td>4.4 b</td>
</tr>
<tr>
<td>Oberon</td>
<td>4.25 fl oz</td>
<td>32.1 a</td>
<td>23.2 ab</td>
<td>4.8 b</td>
</tr>
<tr>
<td>Onager</td>
<td>10 fl oz</td>
<td>21.1 a</td>
<td>19.6 bc</td>
<td>3.5 b</td>
</tr>
<tr>
<td>Zeal + 0.1% NIS</td>
<td>2 oz</td>
<td>20.9 a</td>
<td>26.8 ab</td>
<td>5.8 b</td>
</tr>
<tr>
<td>Untreated Check</td>
<td></td>
<td>20.4 a</td>
<td>35.7 a</td>
<td>18.0 a</td>
</tr>
</tbody>
</table>

CV: 32.3102 32.7058 48.3646
Rep(Prob F): 0.0009 <0.0001 0.0279
Trt(Prob F): 0.0734 0.0070 0.0002

\(^a\) Means in a column followed by the same letter are not significantly different according to Duncan’s multiple range test (P=0.05, SAS Institute 2009).
\(^b\) Data were corrected using the formula Log(x + 1.0) prior to conducting ANOVA.

Table 2. Mean number of predators per sampled leaf -1 day before treatment (Pre-trt) and at 5 and 13 days after treatment (DAT).\(^a\)\(^b\)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate / A</th>
<th>Pre-trt</th>
<th>5 DAT</th>
<th>13 DAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agri-Mek + 0.25% NIS</td>
<td>2.0 fl oz</td>
<td>0.7 a</td>
<td>3.3 a</td>
<td>2.4 a</td>
</tr>
<tr>
<td>Agri-Mek + 0.25% NIS</td>
<td>2.5 fl oz</td>
<td>0.7 a</td>
<td>1.8 ab</td>
<td>3.4 a</td>
</tr>
<tr>
<td>Agri-Flex + 0.25% NIS</td>
<td>8.5 fl oz</td>
<td>0.6 a</td>
<td>3.4 a</td>
<td>3.3 a</td>
</tr>
<tr>
<td>Oberon</td>
<td>4.25 fl oz</td>
<td>1.4 a</td>
<td>1.9 ab</td>
<td>3.0 a</td>
</tr>
<tr>
<td>Onager</td>
<td>10 fl oz</td>
<td>0.7 a</td>
<td>1.0 b</td>
<td>2.9 a</td>
</tr>
<tr>
<td>Zeal + 0.1% NIS</td>
<td>2 oz</td>
<td>0.4 a</td>
<td>2.0 ab</td>
<td>3.3 a</td>
</tr>
<tr>
<td>Untreated Check</td>
<td></td>
<td>0.4 a</td>
<td>3.4 a</td>
<td>2.7 a</td>
</tr>
</tbody>
</table>

CV: 144.2377 71.8047 59.5400
Rep(Prob F): 0.9031 0.0176 0.6004
Trt(Prob F): 0.1272 0.0248 0.7811

\(^a\) Means in a column followed by the same letter are not significantly different according to Duncan’s multiple range test (P=0.05, SAS Institute 2009).
\(^b\) Data were corrected using the formula Log(x + 1.0) prior to conducting ANOVA.
Acknowledgements

We would like to express our appreciation to Mr. David Carthel for allowing us to conduct this trial on his farm.

Also, thanks are extended to Syngenta and Valent for providing financial support and miticide products.

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