Evaluation of Banks Grass Mite Response to Propargite, Spiromesifen and Hexythiazox

Objectives:

1) Determine if the three commonly used miticides provide acceptable Banks grass mite suppression in large field situations.
2) Establish baseline data for Banks grass mites using methods agreed upon through consultation with the respective chemical company personnel.
3) Determine if shifts in Banks grass mite susceptibility to these miticides is occurring.

Procedures:

1) Banks grass mites will be collected from corn fields prior to miticide applications and mite susceptibility to the three miticides will be measured. Probit analysis will be conducted to establish base line data and to determine if shifts are occurring in populations surviving the two miticide treatments. A comparison of the probit analyses will be made to determine if a shift in susceptibility has occurred in Banks grass mites surviving a miticide application.

2) Six commercial production corn fields will be chosen to study efficacy of the three miticides propargite, spiromesifen and hexythiazox. Two fields will be treated as follows: half of each field will be treated with propargite while the remaining half will be treated with spiromesifen. Two additional fields will be treated similarly with propargite and hexythiazox and another two fields will be treated with spiromesifen and hexythiazox. Prior to miticide applications ten locations in each half of the field will be evaluated as such. Two sites within the outside tower of the center pivot irrigation will be marked with flagging tape. Mites will be counted in a 2cm square area with a hand lens on the ear leaf and on the next leaf above of five consecutive plants at each site. This procedure will be continued in marked locations within the next two center pivot towers. Counts will continue every seven days for 28 days. The respective chemical companies have agreed to supply the chemical necessary to complete this project. Data will be analyzed using analysis of variance to determine if the three miticides are performing equally well in suppressing mite populations. This project's duration is three years. Year One was funded in 2006. This proposal is for Year Two funding only.

Project Locations: The greenhouse portion of this project will be carried out at the Texas Agricultural Experiment Station (TAES) at Bushland, TX. The commercial corn production portion of this project will be carried out on corn producer fields with Dallam, Hartley, Moore and/or Sherman counties. Specific fields will be selected when mite infestations reach a treatable level.

Evaluation of Ensilage Yield, Quality and Harvest Timing from Spider Mite Damaged Corn

Objectives:

1. Determine if spider mite damaged corn significantly affects ensilage yield, quality and harvest timing

2. Determine if chemigated hexythiazox is effective in minimizing spider mite affects on ensilage yield, quality and harvest timing and on final grain yield

Procedures: We will engage the assistance of as many crop consultants and corn producers as possible across the northwest Texas Panhandle to provide us with the necessary research sites. We will choose at least 5 fields to intensively monitor. This area has grown over 20% of the corn grown in the state of Texas and probably is the most management intensively grown corn in the state. We will ask that at least one aerial application pass be left untreated to allow for the necessary comparisons. This area is strongly supportive of the IPM program and has been willing to assist in any research. It has been reported that when leaves at or above the ear leaf are damaged yields are severely affected (Wright et al. 2006). Spider mite numbers on the ear leaf will be estimated, beginning at miticide treatment and continuing weekly in the treated and untreated areas until the corn maturity signals time to harvest for silage. Even if the producer decides to take the field through to mature grain rather than chopped for ensilage, we will take ensilage samples following standard procedures suggested by silage experts Joe Lauer at the University of Wisconsin and Bill Seglar, Pioneer Hi-Bred International Forage Specialist. Samples will be sent to Dairyland Laboratories, Inc. for Near Infrared Spectral (NIR) Nutrition and Neutral Detergent Fiber (NDF) analysis as suggested by Dr. (Pioneer). Accelerated plant dry down in the spider mite untreated areas may result in earlier sampling in those areas. This will be an important aspect of the research as it is unknown what effect spider mite damage has on timing for chopping ensilage. Special attention will be given to the starch content of the sample analysis results as it has been reported that drought stressed corn has lower starch content than fully irrigated corn.

To determine if chemigated hexythiazox is effective in minimizing spider mite affects on ensilage yield, quality and harvest timing and on final grain yield we will be employing the assistance of a local producer who has agreed to assist with this portion of the research. Mr. Brent Spurlock from the Stratford, TX area typically uses chemigation to treat his fields and cooperated on a chemigation trial during 2007. Gowan Company has agreed provide the hexythiazox miticide gratis to perform this portion of the project for two fields. Each field will be split into 6 different sections. Two of the sections will remain untreated. Two sections will be treated with an 8 ounce per acre rate of hexythiazox and the remaining two sections will be treated with a 10 ounce per acre rate of hexythiazox. Spider mite counts on the ear leaf will be made on 6 plants in each of the 6 sections for a total of 36 samples from each field. Subsequently, six ensilage samples from each section when the crop maturity reaches one-third milk line. Samples will be processed similar to the first objective. Hand harvested grain samples also will be taken at full crop maturity to assess spider mite affect on final grain yield. We will compare ensilage nutrition component analyses between treated and untreated areas and between different hexythiazox rates. We also will compare final grain yields between treated and

untreated areas and between different hexythiazox rates

Flight Patterns and Management Options for Western Bean Cutworm and Southwestern Corn Borer on the Texas High Plains

Objectives:

1. Determine the flight patterns of western bean cutworm and southwestern corn borer moths in the Texas Panhandle
2. Compare the effectiveness of the new insecticide Belt (Bayer CropSciences) and Intrepid (Dow AgroSciences) or bifenthrin, depending on what the producer chooses to use to control western bean cutworm and southwestern corn borer

Procedures: Sixty bucket-style traps will be provided by Dow AgroSciences and will be spread across the Texas Panhandle from Bushland to Dalhart, TX, to determine the flight patterns of western bean cutworm and southwestern corn borer moths. We will work closely with the local crop consultants to place most of the traps next to non-Herculex corn fields. After the first adults are caught in the traps, we will make weekly visual inspections of each field for eggs and larvae of both species of moths.

One field in the Dalhart area will be included as an experimental site for comparison of Belt and Intrepid or bifenthrin. The producer has agreed to participate in this project. This field will be part of the first objective and when the crop consultant and producer determine they would like to spray, we will provide Belt insecticide for half of the field and the producer will be responsible for the chemical selection and cost on the remaining half of the field. Weekly counts of moths and immatures will continue in this field to determine how effective each chemical is in suppressing western bean cutworm and southwestern corn borer. A weigh wagon will be used for estimating yield from each half of the field.

Research results will be published on the Moore County Extension Internet site, reported to local media, presented at growers' meetings throughout the year and to other university and Extension professionals during the yearly Science Conference held in College Station. Results will be sent each week via e-mail to a list of interested recipients.

This is Camilo's MS project.

Management Options and Economic Thresholds for Control of Gray Leaf Spot on the Texas High Plains

Objectives:
1. Hybrid resistance and its effect on GLS damage rating, including aerial imagery, and yield
2. Economic threshold of GLS based on fungicide-treated and nontreated plots

Procedures: One field each in the Dumas, Dalhart and Dimmitt areas of Texas will be used as experimental sites. We have confirmation from producers in all three areas to participate in this project. Pioneer Hi-Bred International, Inc. has agreed to provide seed to plant all three sites. We will use hybrids of similar maturities that rate a 4, 5, 6 and 7 for resistance to GLS. Each set of these four hybrids will be repeated within a field. When possible the producer will plant each hybrid the entire length of the field. Exact plot size will depend on the producer's planting and harvesting equipment. One set of the four hybrids will be aerially treated with Quilt® fungicide (provided gratis by Syngenta Crop Protection, Inc. for all three fields) and the remaining set of four will remain untreated. The experimental design will allow the producer to apply fungicide to the remainder of the field if deemed necessary by the producer and his crop consultant. Buffer strips of nontreated corn will be used to insure that drift does not compromise the experiment. An aerial photograph of each field will be taken just prior to treating with fungicide and again 28 days later. Leaf damage, including the highest leaf showing GLS lesions, will be scored from each plot before treating and 7, 14 and 21 days after application of fungicide. Yield will be assessed by using weigh wagons provided by Pioneer Hi-Bred International for each of the eight plots in a field. Economic threshold of GLS-infested plots will be determined based on yield differences between treated and nontreated plots.

Research results will be published on the Moore County Extension Internet site, reported to local media, presented at growers' meetings throughout the year and to other university and Extension professionals during the yearly Science Conference held in College Station. Knowledge gained from this research will be used to update the current GLS extension publication written by Dr. Bowling.

Evaluation of Traps to Predict Western Bean Cutworm Egg Deposition and to Assist with Timing Insecticide Applications for Control

Objectives:

1) Use plastic funnel universal bucket traps to monitor adult moth flight and correlate with infield egg lay.

2) Determine if shifts in moth flight are occurring and if insecticide applications can be better timed.

3) Develop a preliminary predictive model for Western bean cutworm adult moth flights.

Procedures:

1) WBCW will be trapped from edges of 10 corn fields planted to non-Herculex corn with four traps per field. Traps will not be placed within the field due to the potential of damaging overhead pivot irrigation equipment and the potential for the irrigation water to enter the trap. One hundred plants near each trap within the field will be sampled to determine the number of plants with an egg mass. The number of eggs in each mass will be recorded. Fourteen days after the first egg mass is located in each field, and every 7 days after until no adults are captured in the traps, we will survey 10 ears near each trap for caterpillars. The caterpillars will be identified and counted.

We will remain in contact with the crop consultants and producers involved with each field to collect information regarding their insect management tactics used. Because we will be working in commercial production fields we will not ask the producers to adjust their management tactics for our research.

2) Trap and egg data from each field will be used to determine if changes are occurring in the length of time that moths are active. Comparisons of the management tactics used in each field will be made to determine what tactic was the most effective. Where possible we will ask the producer to leave a portion of the field untreated to allow us the opportunity to treat a portion of the area in the following manner: one strip treated within 7 days of the first egg mass sighting, one strip treated 14 days after first egg mass sighting, one strip treated 21 days after first egg mass sighting and one strip treated 28 days after the first egg mass sighting. Then 10 ears per strip will be sampled 14 post insecticide application to determine insecticide efficacy.

3) After three years of flight data are collected; these data will be used to develop a preliminary predictive model for Western bean cutworm adult moth flights. The model will be developed with the assistance of Dr. Marvin Harris, Texas AgriLife Research at College Station. We have a number of years of experience in developing these types of models, including the Western corn rootworm adult flight model that was developed with the support of the Texas Corn Producers Board and is currently in use in the Texas High Plains.

This will be a PhD project. We're expecting Bryan Fontes to be the student.