

## Evaluation of Miticides and Factors Associated with Chemical Performance When Products are Applied for Control of the Banks Grass Mite and Twospotted Spider Mite

Ed Bynum<sup>1</sup>, Pat Porter<sup>1</sup>, Monti Vandiver<sup>1</sup>, Emilio Nino<sup>1</sup>, G. J. Michels, Jr.<sup>2</sup>, and J. B. Bible<sup>2</sup>  
<sup>1</sup>Texas AgriLife Extension Service, <sup>2</sup>Texas AgriLife Research

### Relavance:

The Banks grass mite (BGM), *Oligonychus pratensis*, and Twospotted spider mite (TSSM), *Tetranychus urtica*, are serious corn pests in the Texas High Plains. The BGM is the predominate mite species infesting corn, but severe infestations of TSSM often occur each year in the Texas High Plains. Damage is caused by mites removing chlorophyll from host tissue resulting in decreased photosynthesis and transpiration. Heavy infestations can cause severe leaf death resulting in significant yield reduction. Mite suppression is in many cases dependent on miticides because control by predators and diseases alone may be delayed thus allowing unacceptable amounts of damage before suppression is achieved. Both spider mite species on the Texas High Plains have a history of developing resistance to miticides and there is the potential for mites to develop resistance to currently available miticides quickly. Since the removal of Azodrin<sup>®</sup> by EPA in the early 1980's, bifenthrin and dimethoate have been the primary miticides used to control mite infestations on tasseled corn. Within the past eight to ten years, BGM control failures with bifenthrin and dimethoate became common and widespread across the area. Products such as Comite<sup>®</sup> 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<sup>®</sup> (2005) and Onager<sup>®</sup> (2007) miticides are products that corn producers in the Texas High Plains 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<sup>®</sup> is primarily used to control mites on pre-tassel corn, but it shows promise as a post-tassel application product and will be investigated further in 2010. The early pre-tassel miticide applications are not always the best management practice because populations often never reach damaging levels due to environmental conditions and natural predation. Producers have very few options for controlling mite infestations after populations reach damaging levels on tasseled corn. It is imperative that producers have information about the most current practices and strategies for managing spider mite infestations.

### Response:

Individuals from Texas AgriLife Extension Service and the Texas AgriLife Research have developed a collaborative project to address issues related to control and management of spider mites in corn. Special emphasis is directed to evaluating new unregistered miticides for possible support in future registrations on corn, determining best control methods for currently registered products, and developing base-line susceptible levels for detecting possible changes in miticide resistance.

### Target Audience

The target audience includes producers, crop consultants, chemical representatives, and extension agents in the corn production areas for the Texas High Plains and the Texas Panhandle.

### *Resource Acquisition*

Several resources were required for this project. Human resources were needed to conduct field and laboratory trials. Producer fields and Texas AgriLife Research facilities were used when conducting field and laboratory trials. Extension Entomology Specialists and IPM extension agents are needed as presenters at educational events. Financial resources were provided from the Texas Corn Producers Board, Gowan Inc., FMC Inc., Bayer CropScience and Valent Inc. for the trials and educational events. A total of \$15,000 was secured for this program. Additionally, New Mexico State University participated in this project by providing an additional experimental location on the NMSU Research Center at Clovis.

### *Education Events and Media Efforts*

Since field trials were conducted during the 2009 growing season and the laboratory studies were conducted from October through November of 2009, only one educational event has been conducted to date. This educational event was in November at the Entomology Science Conference in College Station, TX for entomologists with the Texas A&M University Entomology Department, Texas AgriLife Extension Service, and Texas AgriLife Research. Further educational events will be conducted at extension meetings for producers in 2010. There are currently five meetings scheduled in District 1. Also, information will be provided to extension agents at a corn training workshop in June 2010.

Information from the field and laboratory studies will be used in the Panhandle Pest Update, Focus on High Plains Agriculture, and county IPM newsletters to help producers and crop consultants manage mite infestations during the 2010 growing season.

### *Result Demonstrations or Research Studies*

There were a total of seven miticide field studies conducted across the Texas High Plains during the 2009 growing season. Two field trials were conducted at the Texas AgriLife Research Station at Etter, TX. These trials were conducted in an area that had been infested with mites that were collected from a producer's field located north of Sunray, TX and from a laboratory mite colony at the Texas AgriLife Research Station at Bushland, TX. Two trials were conducted on producer fields near Muleshoe, TX and Farwell, TX. These trials were treated with a hand-carried CO<sub>2</sub> spray boom held over the top of tasseled corn to simulated control by aerial applications. One trial near Clovis, NM and another at the Texas AgriLife Research station at Lubbock, TX was conducted using a hand-carried CO<sub>2</sub> spray boom held vertically within the corn canopy to provide good spray coverage. The last trial was conducted at the Texas AgriLife Research station at Halfway, TX using a tractor mounted spray boom designed to simulate chemigation with Low Energy Precision Application (LEPA) commercial drop nozzles. A complete summary of the results is available upon request. Additional research will be conducted in 2010 to continue evaluation of miticide products and application methods for effective spider mite control.

Laboratory studies were conducted at the Texas AgriLife Research Station at Bushland, TX using mite colonies from mites collected from field populations at Etter, TX. The objectives of these

trials were to 1) Determine baseline toxicity data of spider mites to Oberon® (spiromesifen) and 2) evaluate possible susceptibility changes by spider mites following an exposure to Oberon®.

*Summary of Study Results* - Field control of spider mites on tasseled corn, late in the season when populations are increasing is influenced by environmental conditions, susceptibility of mites to a chemical, the complex of mite species present, the chemical mode of action, and application spray coverage. The comprehensive field trials this past season showed that all miticides evaluated, including Oberon® (spiromesifen), were affected by some, if not all, of these factors. Poor coverage of over the top applications probably had the greatest influence on mite control. Coverage is critical because miticides are not systemic within the plant and their activity is primarily against mite eggs and the immature stages. The incidence of twospotted spider mites in the field could contribute to control failures, particularly if twospotted spider mites are less susceptible to the currently registered miticides. This can be important because field identification of mites are not easy and can be miss-identified.

Laboratory studies provided interesting insights into Oberon's mechanism for control of spider mites infesting corn. The studies confirmed that Oberon® is not a good adulticide and control is associated with mortality of eggs and immature mites. The studies provided baseline data that can be used to evaluate possible changes in twospotted spider mite susceptibility as Oberon® continues to be used by producers. The studies showed that the susceptibility of the tested mite population did not change after being treated with Oberon®. This would indicate the population was not mixed with susceptible and resistant mites. Further studies are needed to determine if there are differences in susceptibility by Banks grass mites and twospotted spider mites.

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