

## **New Research Suggests Predatory Mites May Provide Economical Control of Spider Mites in Corn**

Final Report  
December 16, 2016

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### **Introduction**

The most challenging pests to control in corn are spider mites. These infestations can be either the Banks grass mites, *Oligonychus pratensis* Banks, and/or Twospotted spider mites, *Tetranychus urtica* Koch. Management of spider mite infestations is primarily dependent on acaricide applications. However, when acaricides are applied their populations are building extremely fast during the grain filling growth stages when it is difficult to get good acaricide spray penetration to the spider mites in the corn canopy. Acaricides currently available for use in controlling spider mites are rather costly (minimum \$15 per acre) compared to previous products, like dimethoate and bifenthrin.

In the mid-1980s and mid-1990s studies were conducted to determine whether augmentative releases of predatory mites would suppress spider mite infestations. These studies were conducted when spider mite infestations were building at tassel and during the reproductive corn growth stages. These releases of predatory mites did suppress mite populations below economically damaging levels, but the cost of the predatory mite release rates was prohibitive compared to the inexpensive cost of spraying bifenthrin. Also, when these studies were conducted the primary objective was to make these predatory mite releases when corn was close to tasseling or after tasseling. Now that acaricides are more costly to use, releases of predatory mites may be cost effective.

What if predatory mite releases were made earlier in the growing season as spider mites are migrating from wheat and becoming established in corn fields? The augmentative releases would occur when spider mite infestations are more localized around the field edges and the number of predatory mites to release in those localized areas would be less than making releases across the entire field later in the growing season. An early release of predatory mites should allow predatory mite populations to establish, increase and distribute across the field with the spider mites and prevent damaging levels. We conducted a study this past growing season that was funded by the

Texas Corn Producers Board to evaluate the potential of making early releases of predatory mites for managing spider mite infestations. The purpose of the study was to make predatory mite releases as economically and as easily as possible for individual producers, crop consultants, or others to do themselves.

### Methods and Materials

The study was conducted in two corn fields between Dimmit and Hart, TX. Two predatory mites (*Neoseiulus fallacis* and *Galendromus occidentalis*) were selected for release based on their ability to establish in the Texas High Plains environmental conditions. Releases were made at two locations in each of the two corn fields.

At each location 4,000 predatory mites for each predatory mite species were released on June 21 (Figure 1). Predatory mites were supplied by Rincon-Vitova Insectaries from Ventura, CA and shipped in containers that held 2,000 predatory mites each. Each container cost \$26.00. Additional shipping expenses were \$6.50 for packing and \$87.03 for next day shipping. The total cost per field was \$254.77 and each field was ca. 120 acres.

Asana (8.7 floz/A) was sprayed June 22<sup>nd</sup> on the pyrethroid treated areas to create a zone free of predators as a controlled check to see how the spider mite populations would develop in the absence of early season predators. The Asana treated area was 8 rows (30 inch centers) by 45 ft long. The area was treated using a 5 nozzle-hand carried CO<sub>2</sub> spray boom with nozzles spaced every 20 inches apart. The boom had 8002VS flat

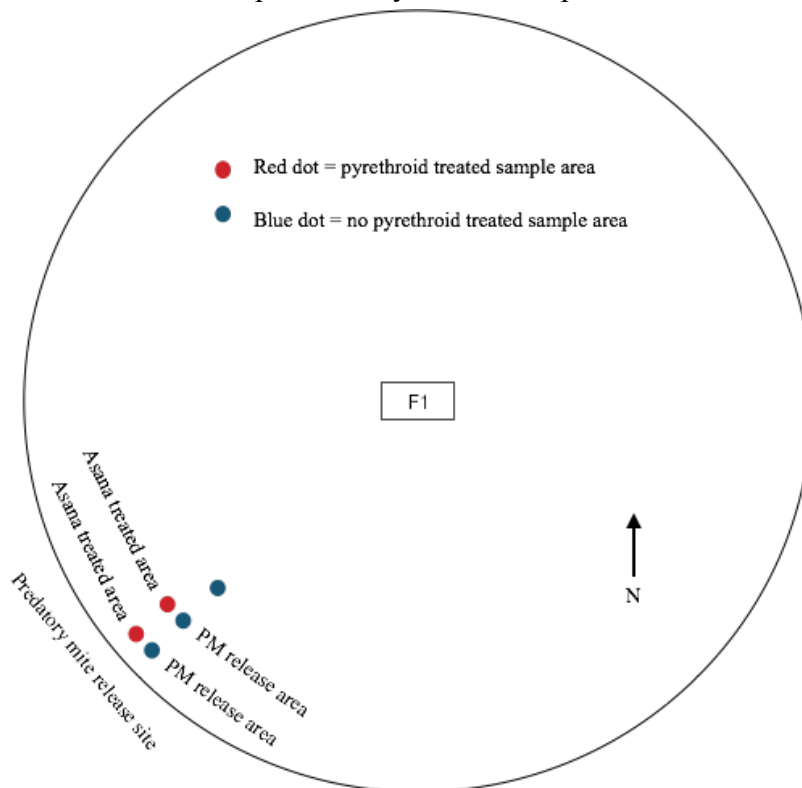


Figure 1. Schematic example of plot arrangements for a predatory mite release site.

fan tips that were calibrated to deliver 8.7 fl oz/A rate of Asana in 15 GPA at 25 psi.

After predatory mites were released, both spider mites and predators (predatory mites and other predators) were monitored weekly at each release site. Also, aerial images of the fields were taken July 16, August 1, August 17, and September 23 for detection of spider mite infestations, damage symptoms, and distribution across the fields. The images were taken with a multispectral image camera from an air plane at 13,000 ft @ 1.2 million pixel resolution on July 16 and August 1 and at 9,000 ft @ 0.8 million pixel resolution on August 17 and September 23. The multi-spectral image camera takes images using 12 different band wavelengths. Four bands are within the near-infrared wavelength between 750-900 nm, 4 bands are within the red wavelength between 600-690 nm, 3 bands are within the green wavelength between 515.2-600 nm, and 1 band at the blue wavelength between 450-515.2 nm. The combination of different bands produces photographs with different reference color images. A photograph taken with all of the 12 bands produces a gray scale image. A photograph taken with the near-infrared, red, and green bands produces a red image for green plant material. And, a photograph using the blue wavelength produces a NDVI image with a wide spectrum of red, yellow, and green colors. We are working with Dr. Jeffrey Willers, USDA-ARS, at Stoneville, MS to identify specific wavelengths, “signatures”, for detecting spider mite damage symptoms from areas where predatory mites were released to the areas where Asana was sprayed to remove spider mite predators. These images are currently being processed by Dr. Willers.

### **Results and Discussion**

Field plots were set up on June 7 and predatory mites were scheduled to be released the following week on June 14, but all fields were heavily infested with western flower thrips migrating from wheat fields. The decision was made to postpone the release until after the western flower thrips populations had declined. Therefore, predatory mites were released on June 21 in the designated release areas.

After our releases in June, predatory mites established in all of the release sites, even when the spider mite populations were very low early in the season. Also, the predatory mites could be found at the opposite side of the field from where they were released. During the weeks we were finding predatory mites in our release sites, area crop consultants were not finding predatory mites in other fields that they were scouting until the end of August. Spider mite populations did build up to damaging levels in some fields across the High Plains late in the season. However, in our release sites spider mites did not build to damaging levels, except in the pyrethroid treated areas where predatory mites would have been killed at the beginning of the study (Figure 2 and 3). These preliminary findings are very encouraging that early releases of predatory mites will contain spider mite infestations to non-economically damaging levels. Of course additional studies will need to be conducted to determine how effective predatory mites will be under different environmental conditions and different spider mite infestations.

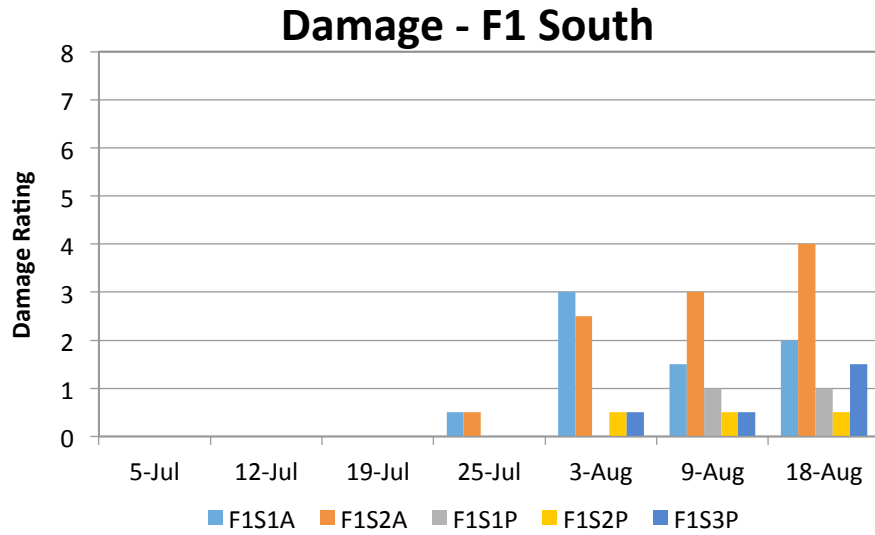


Figure 2. Damage levels from spider mite infestations in field 1, south site, in predatory mite release areas (P) and areas treated with a pyrethroid (A).

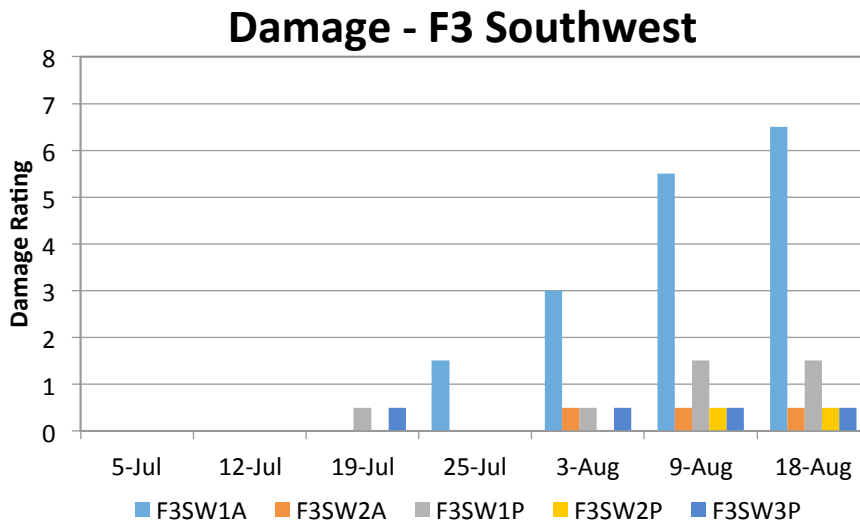
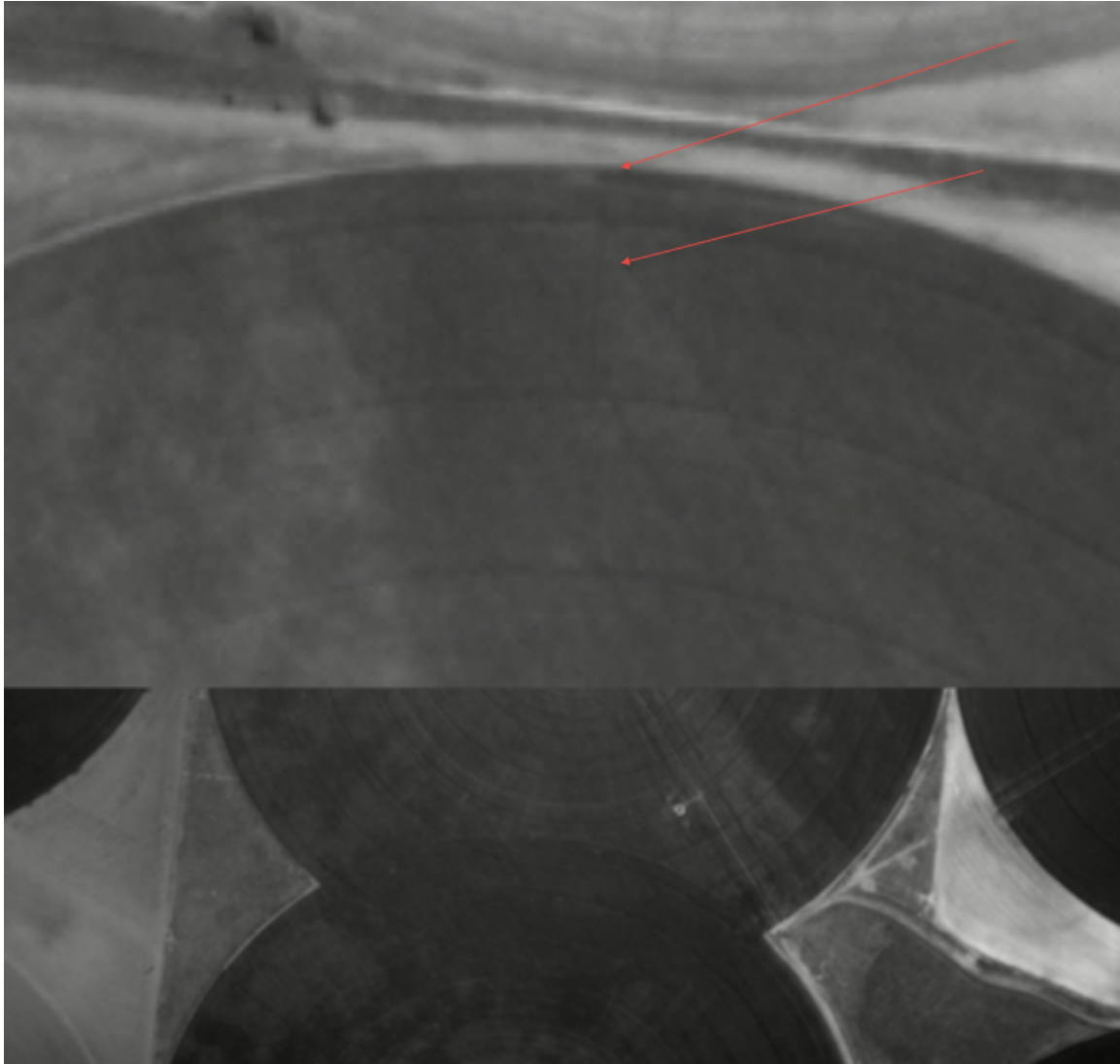


Figure 3. Damage levels from spider mite infestations in field 3, southwest site, in predatory mite release areas (P) and areas treated with a pyrethroid (A).

The photograph below shows a closeup of one of our predatory mite release sites in the NE field. The red arrows pin-points areas with spider mite damage for the plots where Asana was sprayed to kill spider mite predators. Although it may be difficult to see and distinguish for other areas, the image provides specific information from the 12 wavelength bands to help Dr. Willers identify spider mite damage signatures. Also, the photograph shows that killing the spider mite predators allowed spider mites to build to damaging infestations compared to the adjacent areas where predatory mite were released.



### **Acknowledgements**

We thank the Texas Corn Producers Board for funding this research study.