TEXAS A&M AGRILIFE EXTENSION

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

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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.

2016 Trial

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 22nd 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

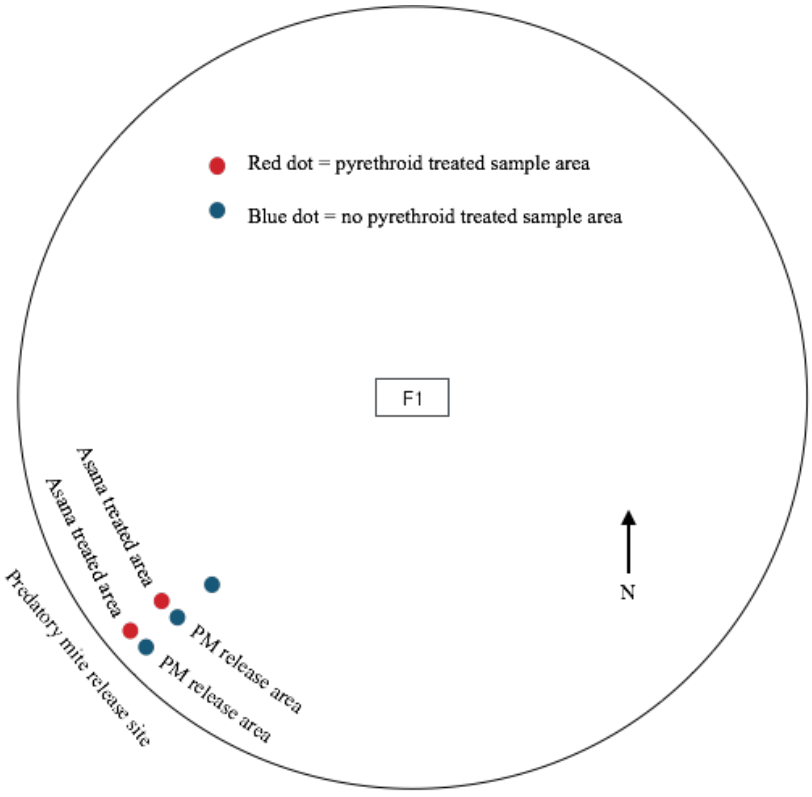

Figure 1. Schematic example of plot arrangements for a predatory mite release site.

CO_2 spray boom with nozzles spaced every 20 inches apart. The boom had 8002VS flat fan tips that were calibrated to deliver 8.7 fl oz/A rate of Asana in 15 GPA at 25 psi.

2017 Trial

As in 2016, 4,000 predatory mites for each species were released in the designated areas in the southwest field on June 20 at the 8 leaf growth stage . In the southeast field (designated as F1) 4,000 predatory mites were released on June 22. Predatory mites were supplied by Rincon-Vitova Insectaries, Ventura, CA and shipped in containers with 2,000 predatory mites per container. Each container cost $26.00. Additional shipping expenses were $6.60 for packing and $90.00 for next day shipping. Due to low establishment of predatory mites in the southeast field (designated as F4) another shipment of predatory mites was ordered for this field. At total of 2,000 predatory mites for each species were released on July 12. The cost for this shipment was $33.00 per container, $6.50 packing charge, and $90.00 for shipping. The total cost for the southwest field was $256.25 or $2.14 per acre. Due to the extra shipment of predatory mites for the southeast field the total cost was $484.75 or $4.04 per acre.

The test areas designated as the control with no predators initially were treated with Asana (8.7 fl oz/A) on June 28. The treatment area and the spray equipment was the same as in 2016.

Results and Discussion

2016 Trial

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 when 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 were very encouraging that early releases of predatory mites will contain spider mite infestations to non-economically damaging levels.

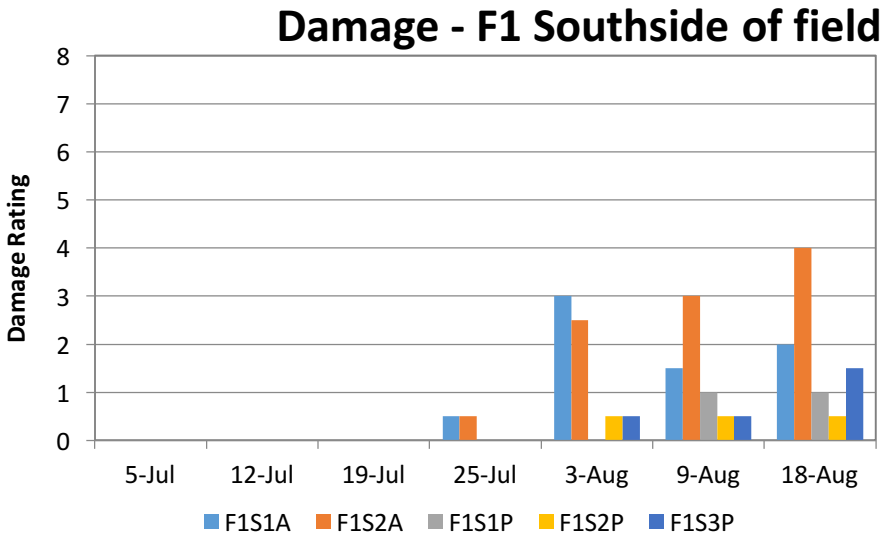

Figure 2. Damage levels from spider mite infestations in field 1, south site, in predatory mite release areas (P) and areas treated with a pyrethroid (A).

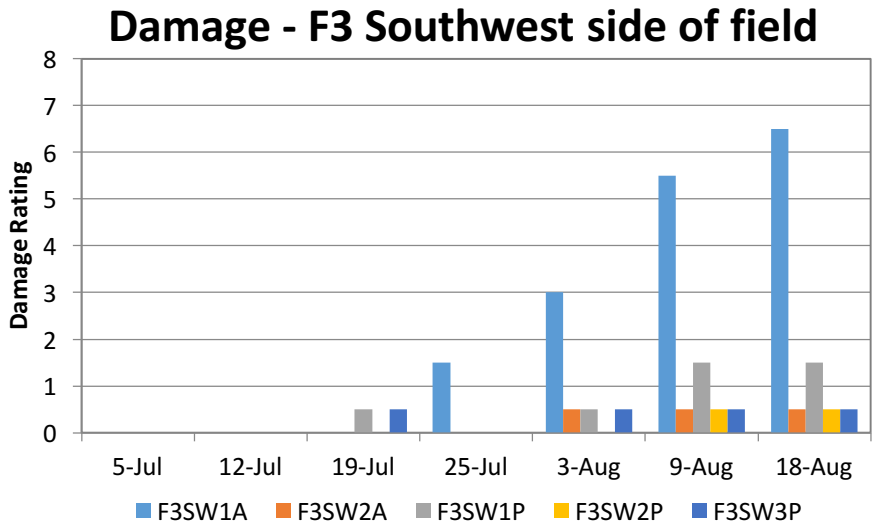

Figure 3. Damage levels from spider mite infestations in field 3, southwest site, in predatory mite release areas (P) and areas treated with a pyrethroid (A).

2017 Trial

Fields were checked for May 24 to June 6 for any establishment of spider mites along the field edges. On May 30, a hot spot of spider mites was found on the west side of the southwest field (F1), which was the same area where spider mites were found in 2016. On June 6, a hot spot of spider mites was found on the south edge of the southeast field (F4). Field plots were then set up in each of these two fields and data collection began on June 14 at the 7 leaf growth stage. When counts were taken on June 14 there were high number of western flower thrips had migrated into the corn fields (Fig. 4). Spider mites were just beginning to establish in each field. The average number of spider mites on the sample leaves were just 1.6 mites. The western flower thrips numbers

declined to very low levels by June 27, but they had a detrimental impact on spider mite populations particularly along the outer edge of the field. Overall, spider mites continued to increase each week and peaked on Aug. 2. The predator populations were relatively low all season. These are general observations, but they do not represent what occurred in the predatory release sites and the insecticide treated areas.

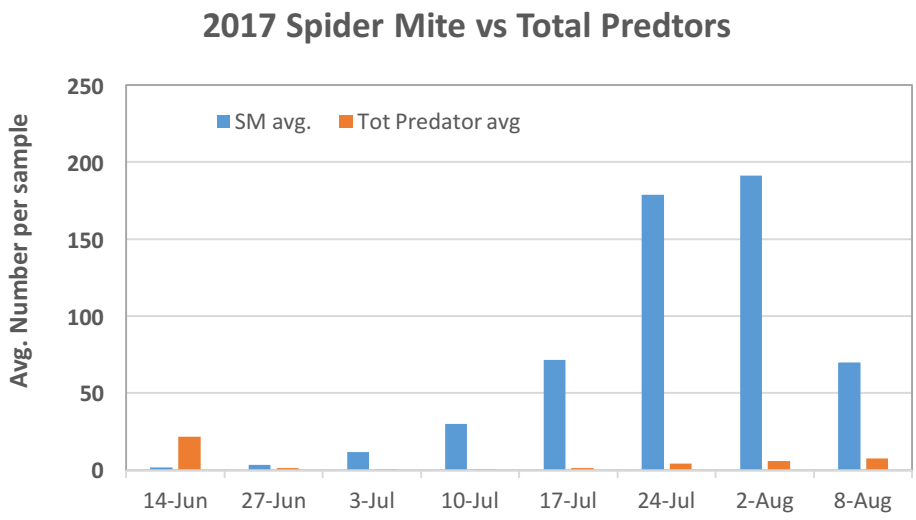

Figure 4. General population increase of both spider mites and predators during the 2017 growing season.

Locations P1 and P2 are the locations where predatory mites were released and locations A1 and A2 are where Asana was sprayed to initially kill predators. No predatory mites were released in location P3 to determine if predatory mites would disperse through the field. Locations P1 and A1 were adjacent to each other and located along the outer edge of the field; locations P2 and A2 were adjacent to each other but were located in the middle of the second pivot span from the outer edge of the field. And, location P3 was located in the middle of the third pivot span from the edge of the field.

For field 1, spider mite infestations did not develop into damaging infestation in any of the locations (Fig. 5). Spider mites never built up in locations P1 and P2 where predatory mites were released. Spider mites did increase in the P3 and both of the Asana treated locations until July 24 and began to decline to low number by Aug. 8. Predatory mites were found in on July 3 and could be found in low densities in all of the locations (both release sites and Asana treated site) by July 17. The predatory mites were more prevalent in locations that had higher levels of spider mites. Predator mites continued to increase in number to levels that caused spider mite numbers to decline from July 24 to Aug. 8. The percentage of predatory mites to the total number of predators shows that from July 24 to Aug. 8 predatory mite were from 34.7% to 43.9% of all predators.

For field 4, spider mites infestations increased in all locations, except in the P1 location (Fig.6). Spider mites never developed as high in P2, predatory mite release site, as the P3 and both of the Asana treated locations. This is probably because predatory mites became established in the P2 location as early as June 27 and increased to the highest numbers throughout the season. Predatory mites began to increase in the P3 location on July 24, which was the same date when predatory mites were increasing in

the P3 location in field 1. This indicates that it took a few weeks for when predatory mites were released for populations to build up and distribute across the field, but predatory mites did distribute across the field. After predatory mites moved into P3 their populations increased each week and were probably responsible for the decline in spider mite from Aug. 2 to Aug. 8. Overall, the average percentage of predatory mites to the total number of predators each week was lower (< 20%) than the percentage in field 1, but the percentage of predatory mites was between 30% to 55% in the P2 location after July 10 and increased to 10% to 35% in the P3 location from July 24 to Aug. 8.

Summary

This two-year study shows that when predatory mites are released early in the growing season will become established and spread throughout the field to where spider mites infestations have established. The predatory mites became established in situations when spider mite densities were very low after the migration of western flower thrips form wheat. This is a concern so purchases and releases of predatory mites should be after western flower thrips numbers have declined. Predator mites can be released where hot spots of spider mites are beginning to occur around the outer edge of the field. Releasing predatory mites in June allowed predatory mites to become established before natural populations of predatory mites begin to be present in fields. The two predatory mites selected for release in this study provided at least one or both of the species to survive under either hot and dry or cool and wet conditions. The cost of purchasing predatory mites is relatively inexpensive at $2.00 to $4.00 per acre.

Acknowledgements

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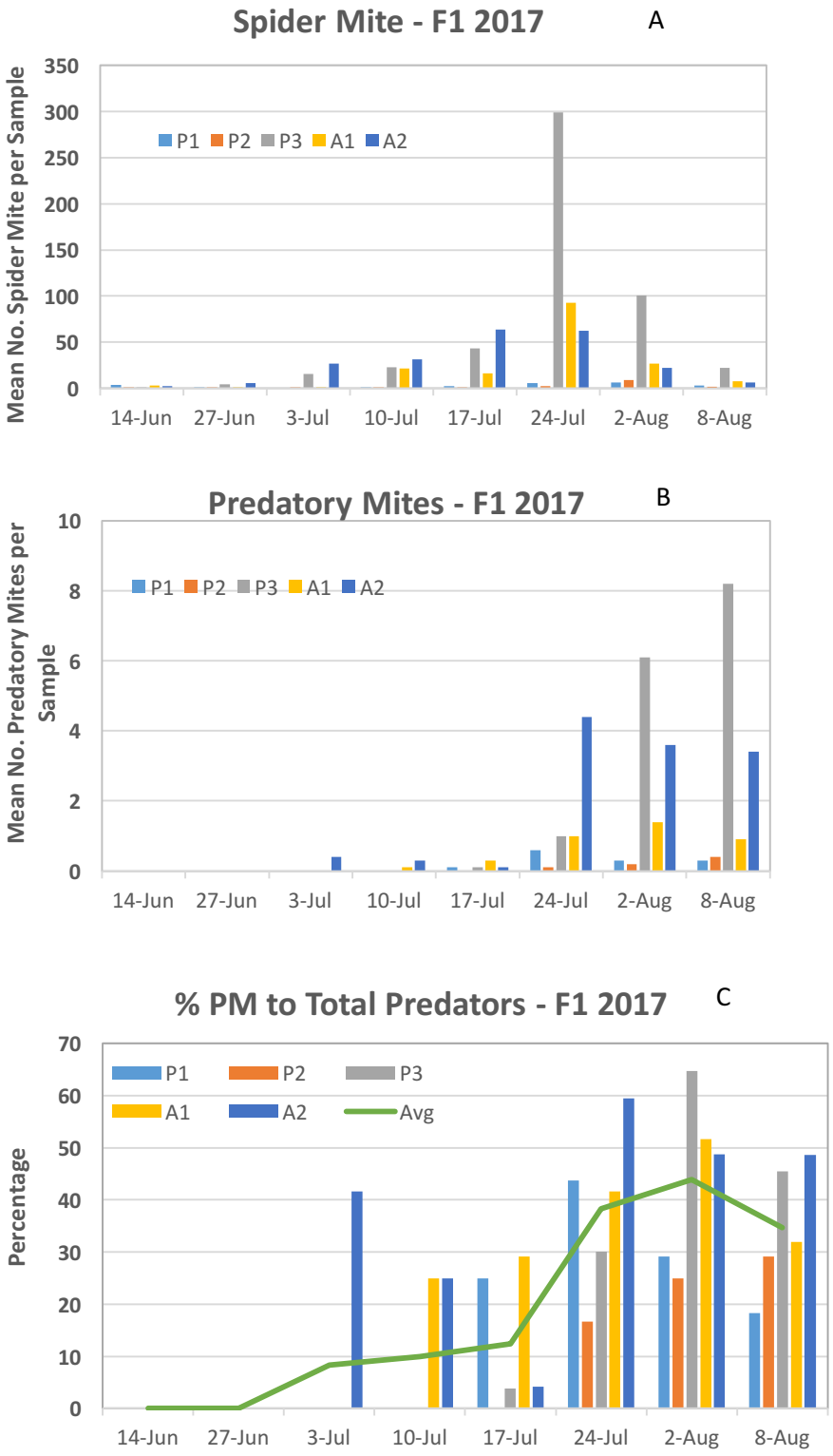

Figure 5. Mean no. of spider mites (A), predatory mites (B), and percentage of predatory mite to total predators (C) at each locations (P1 = Predatrory mite release along field edge, P2 = Predatory mite release in second pivot tower, P3 = no predatory mite release in third pivot tower, A1 = Asana treated along field edge, and A2 = Asana treated second pivot tower) of field 1, southwest field.

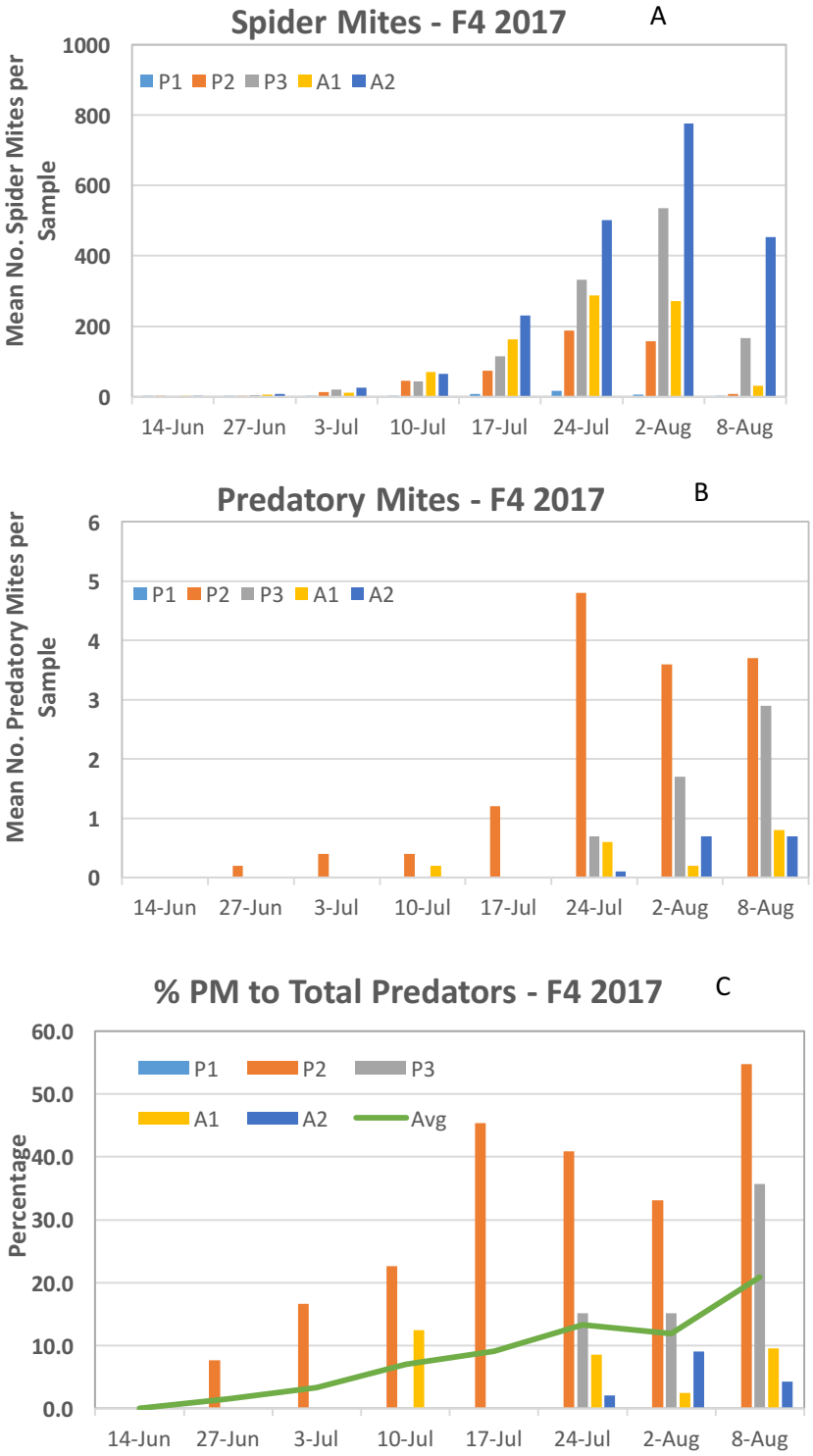

Figure 6. Mean no. of spider mites (A), predatory mites (B), and percentage of predatory mite to total predators (C) at each locations (P1 = Predatrory mite release along field edge, P2 = Predatory mite release in second pivot tower, P3 = no predatory mite release in third pivot tower, A1 = Asana treated along field edge, and A2 = Asana treated second pivot tower) of field 4, southeast field.