INCIDENCE OF SPIDER MITES IN SOUTH TEXAS COTTON FIELDS

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Abstract

The incidence of spider mites was evaluated in four locations of south Texas between Progreso (Hidalgo Co.) to Bishop (Nueces Co.). This is an area with a south to north transect of 125 miles from Progreso to Bishop (respectively). The other two intermediate sampled locations were Harlingen (Cameron Co,), and Raymondville (Willacy Co.). Spider mite surveys were conducted from 12 April to 25 July, 2011. In each location, the percentages of plants infested by spider mites were determined by sampling 50 leaves in each border and interior of 10 plants (10 leaves/plant). Spider mites appeared early in the season in Progreso, Harlingen and Raymondville compared with Bishop. Similar trends were found in the percentages of plants infested by spider mites for Harlingen and Raymondville. The Progreso cotton field was isolated and surrounded by the Rio Grande River and onion fields; whereas the remainder of surveyed fields were associated with large acreages of sorghum or corn which may have contributed to early season spider mite populations within the cotton. A mixed population of *Tetranychus urticae,* and unidentified 'reddish' spider mite species were found in Bishop. It is also possible, but yet to be confirmed by further taxanomic support, that the reddish spider mite species might be more than one species (i.e. *T. cinnabarinus*, *T. tumidus* or *T. urticae*). From Progreso one of the reddish spider mite species was confirmed as *T. tumidus*.

Introduction

The cotton growing regions between the Lower Rio Grande Valley and Corpus Christi in South Texas had roughly 200,000 and 400,000 acres of cotton, respectively, which is near 10% of all cotton planted in Texas in 2011. These are areas of importance in the U.S. agriculture due to its geographical position, subtropical climate, and they represent the southernmost region of Texas cotton production, and where "new" invasive pest species can be introduced from Mexico. Cotton in the Rio Grande Valley is of singular importance because it provides income to many growers and the production here deals with problems such as the mandatory application of malathion to follow the guidelines of the Cotton boll weevil eradication program.

Historically, spider mites infesting cotton have been considered a secondary pest (Stevenson and Matocha 2005) however; their increasing presence and a limited number of control options had moved them up in pest status. The indiscriminate use and secondary effects of insecticides produced spider mite outbreaks (i.e. pyrethroids, dimethoate, neonicotinoids) (Penman and Chapman 1988, James and Price 2002). Cotton growers use miticides that are expensive, thus increasing costs and reducing profits. Spider mites in south Texas start to appear on the first true leaves of cotton by mid April (personal experience) and they can reach large populations by mid May, through July when they may cause leaf discoloration and leaf drop when damage is heavy. Cotton fruit development and yield can be negatively affected under high spider mite infestations, especially under droughty growing conditions. Our objectives were to make an evaluation of the spider mite phenology and identify the species in cotton fields of the area comprehended from the Lower Rio Grande Valley to Nueces County (Corpus Christi) Texas.

Figure 1. Map showing the sampling sites (★) and distances between sites.

Materials and Methods

Spider mites were surveyed from 12 April to 25 July, 2011 in fields located in Progreso (Hidalgo Co.) and Harlingen (Cameron Co.), Raymondville (Hidalgo Co.), and Bishop (Nueces Co.) with a transect of 125 miles from north to south (Fig 1.). In each location, the percentages of plants infested by spider mites were determined by sampling 50 leaves from plants on the from the border region and within the interior of each field. Mite sampling was conducting removing ten leaves per plant from five exterior and five interior plants selected randomly each sampling date. Presence or absence of spider mites was determined using 10X binocular magnifying visor headsets. The number of spider mite numbers were tallied during some sampling dates, however these data is not presented here. In addition, female and male spider mites were stored in alcohol for identification. Preliminary identification was conducted using male spider mites and characterizing the aedagus shape for this purpose. Percentages of spider mites were arcsine-transformed and an analysis of variance was conducted using Statistica©, StatSoft Inc., Tulsa, OK.

Results and Discussion

The ratios of cotton plants infested by at least one spider mite are presented in Fig. 2. Spider mites appeared early in Harlingen when plants were in the two-true leaves stage, and were in higher densities in Harlingen and Raymondville compared to Bishop and Progreso. The remainder of cotton fields sampled for spider mites were surrounded or nearby sorghum or corn fields. Also, spider mites were present across most of the sample dates in Harlingen (>80%) and Raymondville (~40%). Significant differences in the ratios of mites from the border zones compared to inner plants were not obtained for most of the sample dates across all location with the exception of two dates: on 26 April in Progreso there were significantly more spider mites in the border compared to the inner plants (p <0.05, F = 6.0); and on 27 May in Raymondville there were significantly more spider mites in the inner compared to the border plants ($p = 2.3\text{x}10^{-7}$, F = 256.0).

In this study we found that most of the spider mites found in Progreso, Harlingen and Raymondville were of reddish coloration giving the appearance of the carmine mite, *Tetranychus cinnabarinus*, whereas the spider mites found in Bishop showed a mixed population of the two spotted-spider-mite, *Tetranychus urticae*- and carmine-like mites. After checking the aedagi of the male spider mites we confirmed that the aedagus of one species resembled the form of the two-spotted spider mite (Jeppson et al. 1975) whereas, one of the reddish spider mite species was confirmed as *T. tumidus* from Progreso however, other samples still need confirmation or are inconclusive; further taxonomic analysis will be necessary.

The early appearance of spider mites in Harlingen, and their higher abundance throughout the growing season compared with the rest of the sites may be due to warmer temperatures during winter; and the presence of a diversity of host plants where spider mites can feed when cotton is not present. The abundance of spider mites in Progreso might be similar to Harlingen, however, the results obtained for Progreso could be misleading because this cotton field was isolated, and surrounded by onion fields; the latter site was located between the Rio Grande River (border with Mexico) and the "fence". The mixed presence of the two-spotted spider mite and the 'reddish' spider mite in Bishop, as well as the abundance of reddish spider mites in the southern sites are interesting. The reddish spider mite species might be more than one species (i.e. *T. cinnabarinus*, *T. tumidus* or *T. urticae*). Cleared and mounted specimens from this survey are currently under further investigation and confirmation from other acaraologist. In addition, the drought that affected Texas in 2011 may be a factor to consider, as well as the competition or displacement of spider mite species on any of the field sites surveyed.

Summary

In this study we report differences on the incidence of spider mites in the most southern cotton region of Texas. In spite of a short geographical distance between the locations sampled from the Rio Grande Valley to Kleberg Co., spider mites appeared earlier in Harlingen and Raymondville (when the first true leaves were expanding on cotton plants) compared to Bishop approximately 110 miles north. The species composition of spider mite may also be different between locations, the two spotted spider mite was frequently observed in Bishop, whereas the reddish form of spider mites were most common in the Rio Grande valley, among them we identified *T. tumidus*. Identification of these reddish species still need confirmation and this may help with its management.

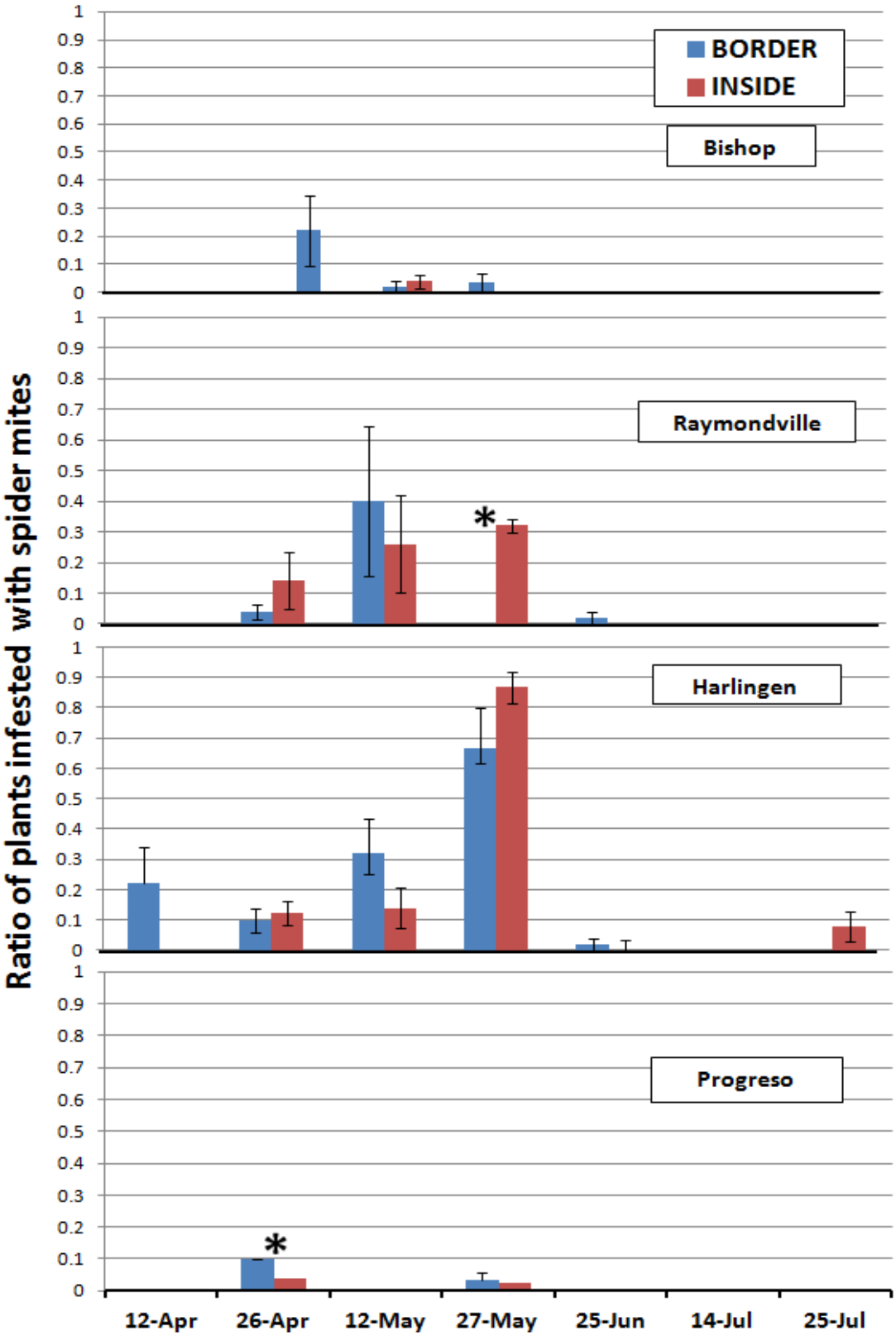

Figure 2. Ratios on presence of spider mites in inner and border plants sampled in four different locations across Hidalgo (Progreso), Cameron (Harlingen), Willacy (Raymondville) and Nueces (Bishop) Counties. Asterisk indicates significant differences ($p<0.05$) on respective dates after ANOVA.

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