SEASONAL OCCURRENCE AND DIVERSITY OF SPIDER MITES IN COTTON FIELDS FROM THE RIO GRANDE VALLEY TO THE COASTAL BEND

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Abstract

The incidence of spider mites was evaluated in seven locations of south Texas from the Rio Grande Valley to the Coastal Bend. This is an area with a south to north transect of 165 miles approximately. The cotton fields were located near the towns of Progreso and Weslaco (Hidalgo Co.), Harlingen (Cameron Co.), Raymondville (Willacy Co.), Bishop and Corpus Christi (Nueces Co.), and Sinton (San Patricio Co.). Spider mite surveys were conducted from 4 April to 24 July in 2012. In each location, the percentages of plants infested by spider mites were determined by sampling leaves in border and interior areas of each field. Spider mites appeared early in the season in Harlingen and Raymondville compared with Bishop, Corpus Christi and Sinton. In 2011 we reported the presence of *T. urticae* and *T. tumidus*. In addition to these species, *T. turkestani* and *T. ludeni* were identified in samples from the Rio Grande Valley in 2012.

Introduction

Leaf eating spider mites in the genus *Tetranychus* have become important pests in many crop systems lately, and many publications had evidence of their outbreaks due to the mismanagement of insecticides to control pest problems. In South Texas, there is not much information on the abundance of these spider mites in cotton fields, however these pests appear very early during the season, even before true leaves develop. Tetranychids that affect cotton plants are not a single species but a complex that includes several species that are easily misidentified due to similarities in color, shape, and size. Of all these species, most of the information refers to *Tetranychus urticae* which is the most abundant and polyphagous spider mite, and has a worldwide distribution. However, in South Texas many species are present and information about the effects of insecticides or miticides on these other species is unknown. In addition, current changes in the weather such as a severe drought or warmer temperatures during the winter might exacerbate the presence of these pests. Although, cotton acreage was reduced in 2012 compared to 2011, this crop is still important in Texas. Approximately 100,000 acres was planted in the Rio Grande Valley and near 350,000 acres in the Coastal Bend, the areas where this study was completed in 2012. In the Rio Grande Valley, spider mites species do not reduce their population completely due to the subtropical climate of the region and the presence of alternative hosts that can sustain lower level of population until cotton is planted the following season.

This is a second report on the abundance of spider in cotton fields in south Texas comprehending an area that goes from fields in the Rio Grande Valley near to the border with Mexico (Tamaulipas) to Sinton (San Patricio Co). Our objectives are to study the seasonal abundance of spider mites and identify the spider mite species present in these fields.

Materials and Methods

Spider mites were sampled from 04 April to 25 July, 2012 in fields located in Progreso and Weslaco (Hidalgo Co.), Harlingen (Cameron Co.), Raymondville (Willacy Co.), Bishop and Corpus Christi (Nueces Co.) and Sinton (San Patricio Co.) with a transect of 165 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. In addition, the numbers of spider mite numbers were tallied during some sampling dates in the laboratory. Also, 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.

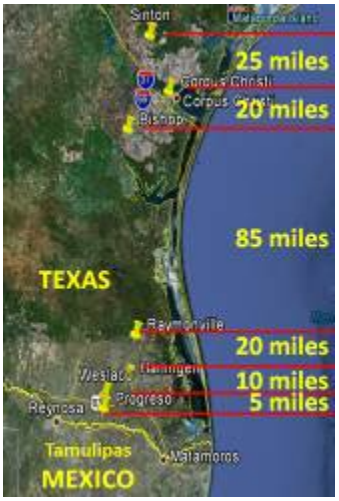

Figure 1. Map shows cotton sampling sites and distances between sites.

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 and Raymondville when plants were with the cotiledoneal leaves or just in the two-true leaves stage. Compared to 2011 (Villanueva et al. 2012) spider mites were present almost throughout the entire season; and significant differences between inner or outer plant in fields were not as clear. There were several instances where inner plants showed higher incidences of spider mites than outer plants. In Weslaco there were three dates were spider mite infestation were above 40% of plants sampled from mid-May to mid-June. These differences were probably due to the geographical location of fields and to the management of fields by the growers. Abundances of spider mites on leaves are shown in Figs. 3a and 3b. These graphs show that there were more mites per leaf in Raymondville and Sinton which coincides with the periods of high plant infestation by spider mites (Fig. 1) for the same locations.

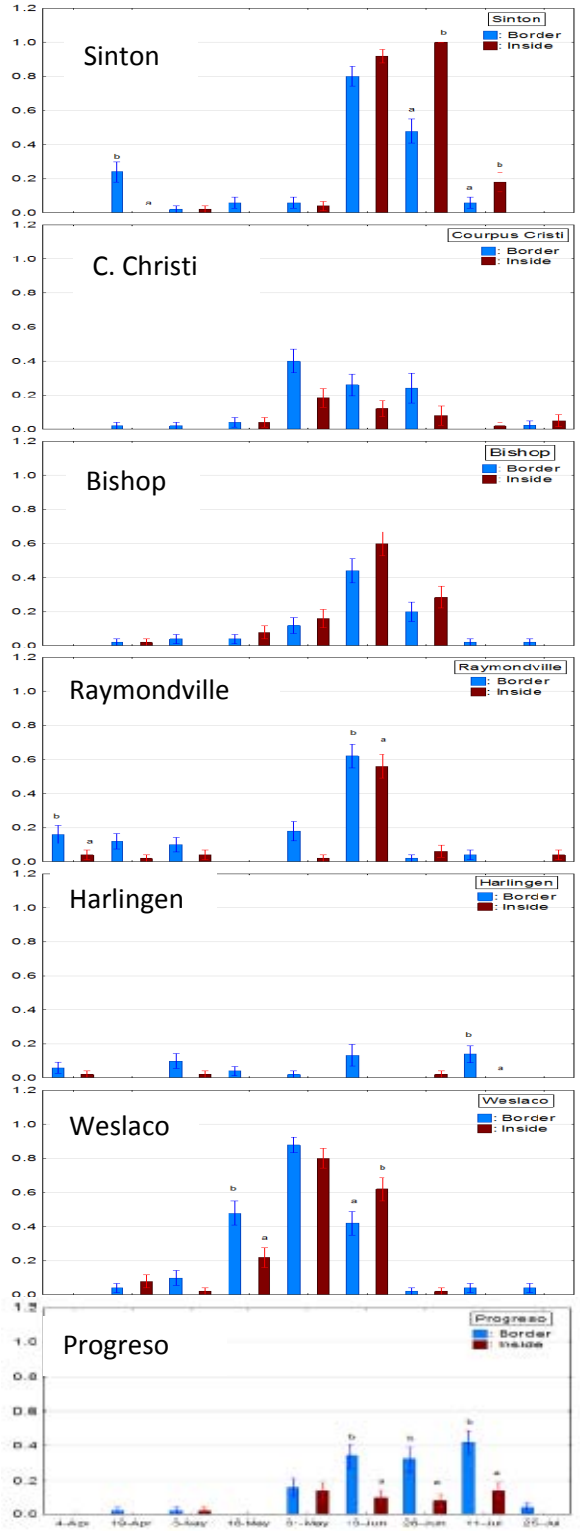

Figure 2. Ratios on presence of spider mites in inner and border plants sampled in seven different locations across Hidalgo (Progreso), Cameron (Harlingen), Willacy (Raymondville), Nueces (Bishop, and Corpus Christi), and San Patricio (Sinton) Counties. Asterisk indicates significant differences (p<0.05)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

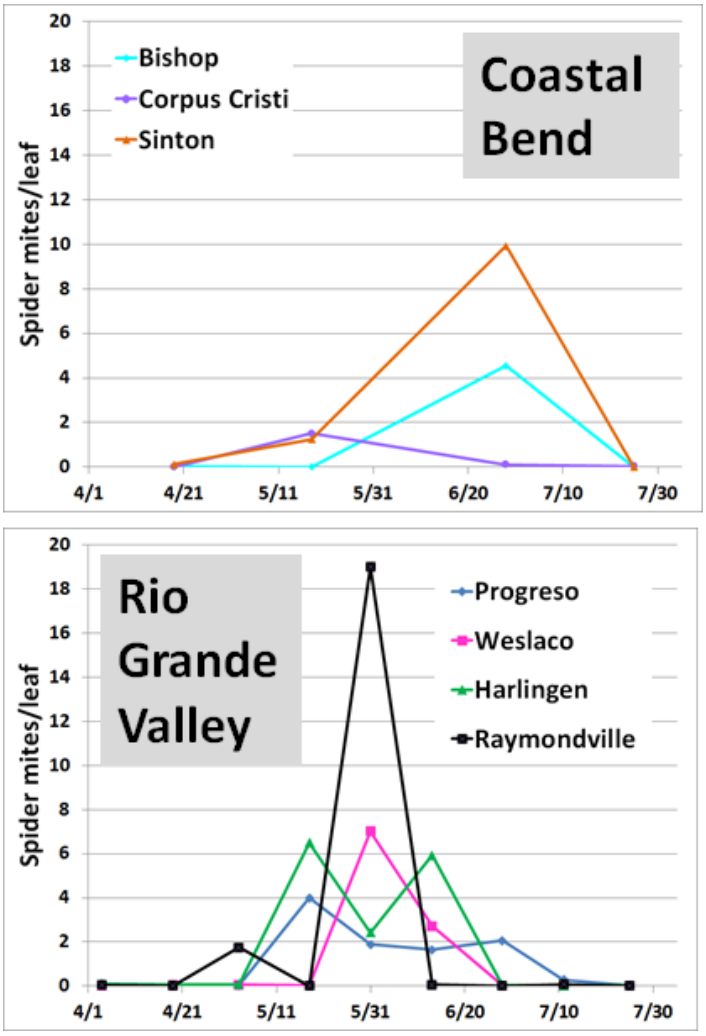

Figure 3. Numbers of motile spider mites/leaf in the Coastal Bend and the Rio Grande Valley from 4 April to 25 July, 2012 (above).

Although, not all specimens are prepared, preliminary mounted and cleared spider mites slides from the Rio Grande Valley shown that *Tetranychus urticae*, *T. tumidus*, *T. ludeni* and *T. turkestani* were identified in these samples. In 2011, we identify some of the samples as *T. cinnabarinus* (the carmine mite = red form); however this species is now identified as *T. urticae* (Sun et al. 2012). All these specimens were previously described in south Texas (Jeppson et al. 1975) and cotton was described as their host plant.

The presence of all these species in cotton field brings questions about the responses of these spider mites to insecticides and miticides. We do not know if all these species produce outbreaks with neonicotinoids or pyrethroid or if all acaricides affect these spider mites equally. Answers to these questions are difficult, due to the size of the spider mites for identification, and their multispecies presence in fields.

Summary

This is the second year report on the incidence of spider mites in the most southern cotton region of Texas. Spider mites occurred throughout the entire season compared with 2011. In spite of a short geographical distance between the locations sampled from the Rio Grande Valley to San Patricio Co., spider mites appeared earlier in Harlingen and Raymondville compared with other locations such as Corpus Christi and Sinton approximately 165 miles north. In 2011 we reported the presence of *T. urticae* and *T. tumidus*. In addition to these species *T. turkestani*, and *T.*

ludeni were identified in samples from the Rio Grande Valley in 2012.

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