# TEMPORAL AND SPATIAL DISTRIBUTION OF TWO-SPOTTED SPIDER MITE (*TETRANYCHUS URTICAE*) IN COTTON William Scott Fred Musser Mississippi State University Mississippi State, MS Angus Catchot Mississippi State University Extension Service Mississippi State, MS Jeff Gore

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#### **Abstract**

An experiment was conducted to quantify two-spotted spider mite temporal and spatial distribution based on their damage in cotton. Significant differences in mite injury were found between distances from the point of infestation at the 3 rating dates. Additionally, significant differences in mite injury ratings were found between rating dates at the 4 distances away from the initial infestation point. In general, as distance from the point of infestation increased, two-spotted spider mite injury decreased and as time after infestation increased, spider mite injury increased.

# **Introduction**

Early season spider mite infestations have become more prevalent in cotton fields since 2005 (Catchot 2010). Spider mites were the 3<sup>rd</sup> most damaging pest in cotton in 2005 (Williams 2005). It has been speculated that the use of neonicotinoid seed treatments in the absence of Temik has contributed to these infestations. Many biotic and abiotic factors such as chemicals, weather, and beneficial insects also can impact spider mite population densities. Significant reductions in yield, fiber quality, and seed viability in cotton are all related to two spotted spider mite time of infestation and rate of population development (Wilson 1993). Infestations of spider mites occurring during the Pre-flowering stages of cotton have a greater impact on yield than infestations at first boll (Wilson 1993). Crawling is the primary mechanism of dispersal for two spotted spiders early in the season when moving from border vegetation into neighboring corn fields (Brandenburg and Kennedy 1982). Wind served as the main agent of two spotted spider mite dispersal during the later part of the season when they move from desiccating hosts onto more succulent hosts (Wilson et al. 1983).

### **Materials and Methods**

An experiment was conducted at the Delta Research and Extension Center in Stoneville, MS to measure spider dispersal rates in cotton. Four blocks of Phytogen 375 WRF were planted May 16, 2011 into raised conventionally tilled beds on 1.02 m centers. Each block consisted of 16 rows that were 16.32 m in length creating a perfect square. Each plot was flagged in a 1.02 m grid pattern. There were 16 total flags down each row and 16 flags across each plot all spaced1.02 m apart creating 256 grids within each block. This type of grid setup allowed for systematic sampling of mites as they dispersed across individual grids. All blocks were infested on June 7, 2011. A flat of mite infested green beans from the MSU lab colony was placed in the center of each plot between the rows. The four grids in the center of each plot were considered the point of infestation. As mites dispersed away from the source of infestation into subsequent grids, degree of injury in each grid was documented weekly. Injury was rated on a scale of 0-5 where 0 = no damage and 5 = complete reddening or defoliation of leaves. Rating interpretations are described as follows: 1) light stippling occurring on sporadic leaves, 2) stippling and reddening occurring on 15-20% of leaves, 3) 50% of leaves have a definite reddening on basal portion of leaves, 4) >50% of leaves contain extensive reddening of entire leaves and area where leaves begin to excise and 5) complete reddening of plants. Each plot was subdivided into 5 categories based upon distance away from initial infestation point. Categories consisted of 0, 2, 4, 6, and 7 meters away from infestation point (Figure 1). Injury ratings within each category were averaged and mean injury ratings were analyzed with a mixed model analysis of variance (SAS Institute, Version 9.2). Data were analyzed by days after infestation and a separate analysis was done by distance from point of infestation. Letter groupings were assigned based upon least significant differences (LSD P<0.05). Spider mite injury ratings were measured 28, 33, and 44 days after infestation (DAI).

# **Results and Discussion**

At all rating dates, significant differences were observed for two-spotted spider mite injury among the 4 distances (Figures 2-4). At all distances, significant differences were observed for two-spotted spider mite injury among the 3 rating dates (Figure 5). Spider mite injury increased at later rating intervals for all of the distances from the point of infestation. Symptoms of spider mite injury were first detected at the farthest distance from the point of infestation (7m) within 28 days. At 6 and 7 m from the point of infestation, spider mite injury ratings averaged <1 at 28 DAI. Within an additional 10 days, spider mite injury increased to 2 at 6 m and 1.8 at 7 m. These data suggest that spider mites and their subsequent injury can spread fairly rapidly under certain environmental conditions. Environmental conditions were generally hot and dry at Stoneville, MS in 2011. These results may be significantly different with cooler temperatures or significant rainfall. Results from these experiments will be used to optimize two-spotted spider mite management in cotton.

# **References Cited**

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	C1	CZ	C3	C4	C5	C6	C7	C8	<b>C</b> 9	C10	C11	C12	C13	C14	C15	C16
R1	7															
R2		6														
R3																
R4				4												
R5																
R6						2										
R7																
R8								0								
R9																
R10																
R11																
R12																
R13																
R14																
R15																
R16																

Figure 1. Plot layout for categories based on distance in meters from the point of infestation (0=point of infestation).



Figure 2. Average Spider Mite Injury in plots 28 days after infestation



Figure 3. Average spider mite injury in plots 33 days after infestation



Figure 4. Average spider mite injury in plots 44 days after infestation



Figure 5: Pooled spider mite injury ratings within 4 categorical distances from initial infestation point. Categorical distances consisted of 2, 4, 6, and 7 meters which can be identified on the X axis. Each graph displays the 3 different rating dates 28, 38, and 44 days after infestation.