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THRIPS
(Thysanoptera: Thripidae)
A MULTI-STATE SURVEY:
SUMMARY OF OBSERVATIONS FOR ARKANSAS, ALABAMA, GEORGIA, LOUISIANA, MISSISSIPPI, AND TENNESSEE

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Figure 1. 1997-99 Mississippi survey sites included Lee, Oktibbeha, and Washington counties.

Introduction

Entomologists in six mid-South and southeastern states recently conducted surveys to evaluate thrips on seedling cotton. Mississippi sites are shown in Figure 1. The multi-state surveys revealed changes in the thrips pest spectrum for soybean thrips, *Neohydatothrips variabilis* (Beach), and western flower thrips, *Frankliniella occidentalis* (Pergande). Trap captures indicated sporadic occurrence of selected species not reported as pests on seedling cotton. Therefore, since the last surveys were conducted in cotton (1, 3, 4, 7, 8) new thrips pests with varying susceptibility to pesticides have developed on seedling cotton.

Thrips are an annual problem on seedling cotton and are usually the first insect pest with which consultants and farmers must deal (1). In many of the multi-state survey regions, tobacco thrips, *Frankliniella fusca* (Hinds), continue to be the predominant species of occurrence. However, the western flower thrips (Figure 2) was consistently found in all states except Tennessee, and the soybean thrips was common to all the survey regions. Both species may be considered as new pests in comparison with tobacco thrips, flower thrips, *Frankliniella tritici* (Fitch), and other species reported in the older surveys. Endemic species may transfer to new hosts and exotic species are easily transported into new regions of the world.

Dispersal

Thrips dispersal across cotton fields occurs immediately after emergence. The type of flora adjacent to a field often can influence the degree of infestation and species present (Figure 3). After immigration into a cotton field, thrips feeding starts while cotton plants are in the cotyledon stage.

Figure 3. Weeds adjacent to cotton fields can serve as overwintering habitat for thrips.

Movement and Selection of Hosts

Like other insects, thrips locate hosts using color, shape, size, and volatiles associated with them. Cues for detection of hosts may be general for polyphagous species or very specific for more monophagous species. Mating, feeding, and oviposition may occur on the same host, so cues used for detection of feeding sites may also serve for detection of hosts for reproduction (5).

Distribution

In cotton, the distribution of thrips species over time indicates population densities generally peak during the last week of May and the first week of June. Occasionally, three distinct peaks occur during the seedling stage of cotton. The multiple cycles develop during dry seasons, and overlapping generations from several species probably account for the deviation in cyclic behavior.

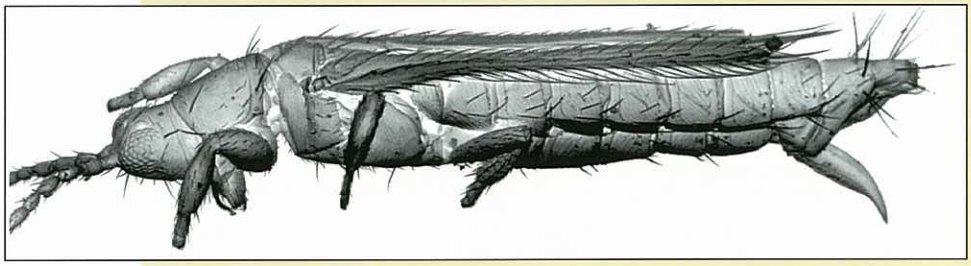
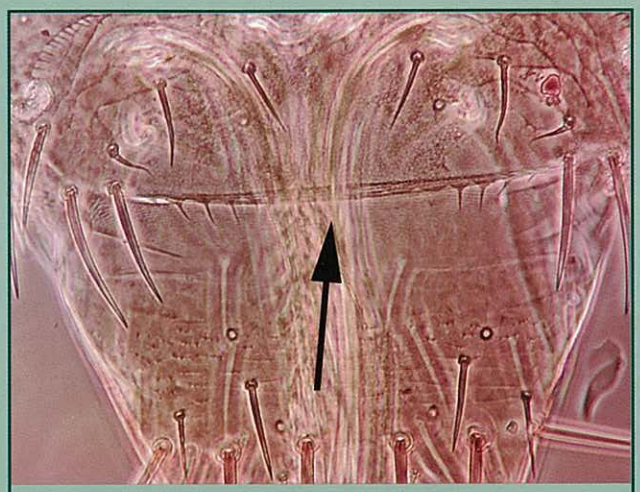


Figure 2. Western flower thrips, adult female viewed with a scanning electron microscope.

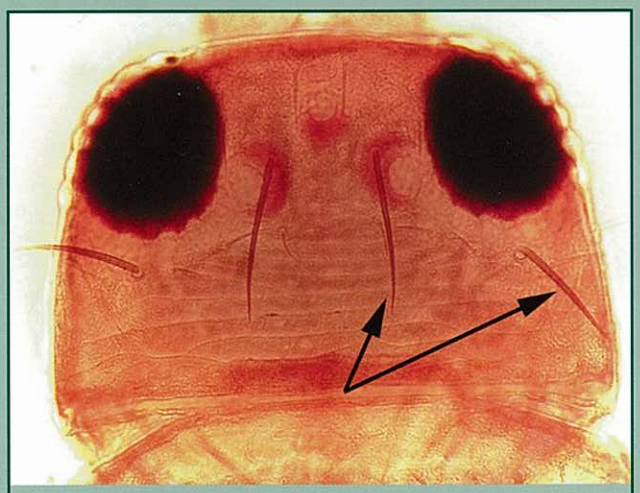
Thrips Species

Multi-state survey results indicate that the most common thrips species are tobacco thrips and flower thrips. A relatively new pest of cotton, soybean thrips, was probably introduced when soybean acreage rapidly increased during the 1970s. Western flower thrips, another recent addition to the thrips complex on cotton, is a devastating pest of several crops and may seriously impact pest management of cotton. Western flower thrips were present in the Southeast and mid-South by the early 1980s and have subsequently become established as a consistent pest of seedling and in-season cotton. Western flower thrips in some locations are tolerant to most standard insecticides and are associated with numerous incidents of virus transmission to peanut, soybean, tobacco, and tomato crops. Western flower thrips were reported in Mississippi cotton in 1986 and were present in every cotton-growing county of the Delta by late summer of 1987 (8). Characteristics that help distinguish flower thrips and western flower thrips are shown in Figures 4, 5, and 6. These characteristics can only be seen with the aid of a microscope at approximately 400X magnification. Tables 1 and 2 summarize findings for the Mississippi thrips samples from seedling cotton.



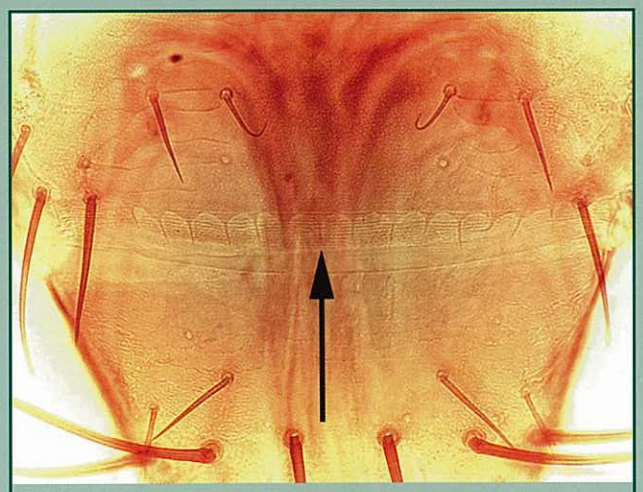
Flower thrips
- *(Frankliniella tritici)*
- Eighth abdominal segment = comb incomplete (spines absent in center)

Figure 4. Characteristics that help identify eastern flower thrips.



Western flower thrips
- *(Frankliniella occidentalis)*
- Interocellar and postocular seta = same length

Figure 5. Characteristics that help identify western flower thrips.



Western flower thrips
- *(Frankliniella occidentalis)*
- Comb = complete (spines present in center)

Figure 6. Characteristics that help identify western flower thrips.

Photos by Eugene (Gene) Burris, Don Cook, Barry Freeman, and Jack Reed.

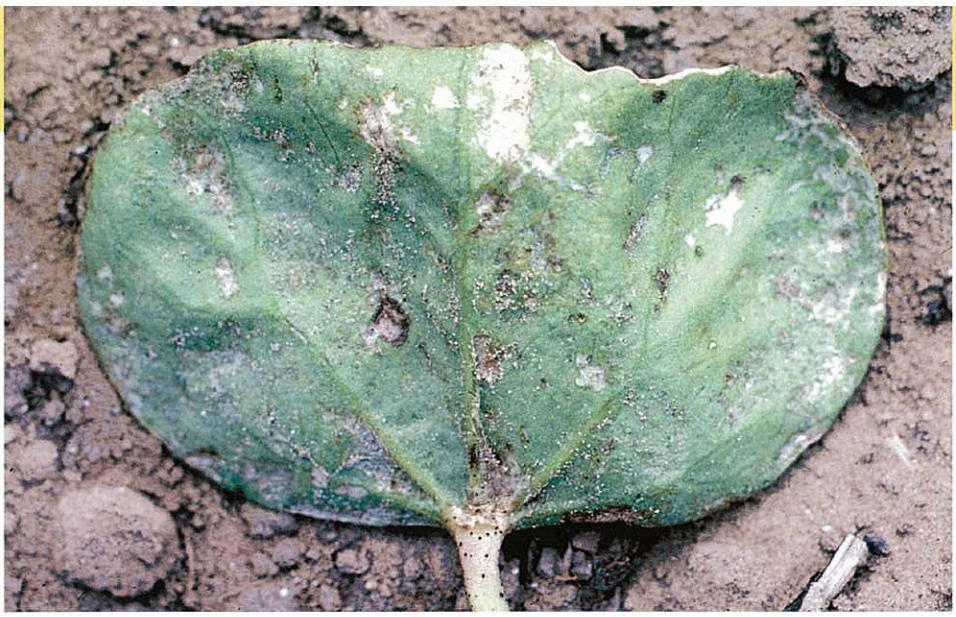


Figure 7. First symptoms of thrips feeding on a cotyledon cotton leaf.

Damage

The first symptoms of damage are small areas of feeding on the cotyledonary leaves that soon appear silver or whitish (Figure 7). Excessive thrips feeding causes delayed maturity and/or lost yield. In addition to feeding damage, thrips are an important pest because cotton management decisions for the entire season can be interrupted (2). Immatures and adults show preference for the small leaves and stipules in the bud, resulting in ragged and crinkled leaves as they expand and mature. Size of the first few true leaves is often greatly reduced by thrips feeding (Figure 8). If feeding damage is severe enough to kill buds in the terminal, apical dominance is lost, and plants become excessively branched or distorted in appearance as secondary terminals form in leaf axils (Figure 9).

Figure 9. Loss of apical dominance occurs as a result of severe thrips feeding.

Figure 8. Cotton plants recovering from moderate-heavy thrips damage.

Figure 10. Thrips feeding symptoms.

Similar thrips feeding symptoms were described as early as 1930 for the tobacco thrips, *Frankliniella fusca*, on cotton in South Carolina (3). This phenomenon was also described in Louisiana by researchers at the USDA Tallulah Laboratory (6) (Figure 10). Cotton exhibiting these symptoms, i.e. loss of apical dominance and excessive branching, has been described as "crazy cotton" and also may be caused by other insects, diseases, and mechanical damage (Figure 11). Other problems related to thrips damage are increased seedling mortality, reduced plant height, reduced leaf area, delayed crop maturity, and yield loss (1).

Insecticide Efficacy

Recommended thrips control practices for Mississippi cotton production include use of seed treatments, in-furrow spray treatments, granular in-furrow treatments, and application of foliar treatments "as needed" for serious outbreaks of thrips. Gaucho, Orthene, and Adage are available as seed treatments from seed distributors. When the on-farm seed treatment option is selected, farmers should apply either acephate or imidacloprid at the rate of 8 ounces per hundredweight of seed. If acephate is used as an in-furrow spray treatment, 1 pound of active ingredient per acre is recommended in Mississippi. If nematodes are a problem, aldicarb should be the product of choice. A use rate of 3.3 pounds of aldicarb per acre will be adequate in most instances. When Command herbicide is applied, Di-Syston insecticide should be used in-furrow. Di-Syston 8E (9 to 16 ounces of product per acre), Orthene 90S (1 to 1.1 pounds of product per acre), and Orthene 97 (1 pound of product per acre) are the recommended in-furrow spray insecticides.

Table 1. Number of thrips collected and the percent (%) of total population represented by that species in seedling cotton at the Delta Research and Extension Center in Stoneville, Mississippi.

Sample date	Tobacco thrips	Western flower thrips	Flower thrips	Soybean thrips
1998				
May 15	4 (80)	1 (20)	0 (0)	0 (0)
May 21	34 (94)	1 (3)	0 (0)	1 (3)
May 27	26 (65)	6 (15)	4 (10)	4 (10)
June 3	10 (83)	1 (8)	1 (8)	0 (0)
Total	**74 (80)**	**9 (10)**	**5 (5)**	**5 (5)**
1999				
May 19	57 (90)	6 (10)	0 (0)	0 (0)
May 24	47 (90)	1 (2)	4 (8)	8 (0)
June 1	75 (100)	0 (0)	0 (0)	0 (0)
June 7	28 (85)	5 (15)	0 (0)	0 (0)
Total	**207 (90)**	**12 (5)**	**4 (2)**	**8 (3)**

Randall Furr and Aubrey Harris of the Delta Research and Extension Center in Stoneville, Mississippi, collected thrips from this location for inclusion in the survey.

Figure 11. A developing cotton plant exhibiting symptoms of "crazy cotton."

Table 2. Number of thrips collected and the percent (%) of total population represented by each species in seedling cotton at the North Mississippi Research and Extension Center in Verona and the Plant Science Center at Mississippi State, Mississippi.

Sample date	Number of samples	Tobacco thrips		Western flower thrips		Flower thrips		Soybean thrips	
1997									
May 29	20	108	(98)	0	(0)	2	(2)	0	(0)
June 2	23	76	(94)	3	(4)	2	(2)	0	(0)
June 5	24	51	(94)	1	(2)	2	(4)	0	(0)
June 9	19	19	(100)	0	(0)	0	(0)	0	(0)
June 13	15	21	(91)	0	(0)	2	(9)	0	(0)
June 20	26	32	(84)	3	(8)	3	(8)	0	(0)
June 24	8	4	(100)	0	(0)	0	(0)	0	(0)
July 9	9	18	(95)	1	(5)	0	(0)	0	(0)
Total		**329**	**(95)**	**8**	**(2)**	**11**	**(3)**	**0**	**(0)**
1998									
May 25	12	78	(89)	1	(1)	7	(8)	2	(2)
June 2	16	470	(84)	41	(7)	21	(4)	27	(5)
June 8	23	121	(86)	7	(5)	6	(4)	6	(4)
June 11	15	39	(78)	0	(0)	1	(2)	10	(20)
Total		**708**	**(86)**	**49**	**(6)**	**35**	**(3)**	**45**	**(5)**
1999									
May 25	60	1,065	(91)	35	(3)	74	(6)	2	(0)
June 1	74	861	(89)	70	(7)	25	(3)	8	(1)
June 2	15	183	(91)	13	(6)	5	(2)	1	(0)
June 3	4	8	(73)	1	(9)	2	(18)	0	(0)
June 8	6	50	(86)	3	(5)	5	(9)	0	(0)
June 10	4	10	(83)	0	(0)	2	(17)	0	(0)
June 11	3	0	(0)	0	(0)	1	(50)	1	(50)
June 15	20	75	(59)	42	(33)	10	(8)	0	(0)
June 26	4	4	(50)	4	(50)	0	(0)	0	(0)
Total		**2,256**	**(88)**	**168**	**(6)**	**124**	**(5)**	**12**	**(1)**

References

1. **Burris, E., K.J. Ratchford, A.M. Pavloff, D.J. Boquet, B.R. Williams, and R.L. Rogers.** 1989. Thrips on seedling cotton: Related problems and control. La. Agric. Exp. Stn. Bull. 811.
2. **Burris, E., A.M. Pavloff, G.E. Church, and B.R. Leonard.** 1994. Analysis of cotton pest management strategies. La. Agric. Exp. Stn. Bull. 845.
3. **Eddy, C.O. and E.M. Livingstone.** 1931. (Hinds) thrips on seedling cotton. S.C. Agric. Exp. Stn. Bull. 271.
4. **Gaines, J.C.** 1965. Cotton insects. Tex. Agric. Ext. Serv. Bull. B-933.
5. **Lewis, T.** 1997. Thrips as crop pests. CAB International, New York, NY.
6. **Newsom, L.D., J.S. Roussel, and E.E. Smith.** 1953. The tobacco thrips. La. Agric. Exp. Stn. Bull. 474.
7. **Race, S.R.** 1961. Early-season thrips control on cotton in New Mexico. J. Econ. Entomol. 54:974-976.
8. **Reed, J.** 1988. Western Flower thrips in Mississippi cotton: Identification, damage, and control. Mississippi Agric. & Forestry Exp. Stn. Info. Sheet 1320.

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