

# Silverleaf Whitefly Studies: Effects of Trichome Density and Leaf Shape

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## **Abstract**

*We examined nine upland cotton cultivars in 2000 to determine silverleaf whitefly (SLW)-cotton leaf trichome relationships. The hairy leaf cultivar Stoneville 474 had significantly higher numbers of SLW eggs, nymphs and adults compared to eight other smooth leaf cotton cultivars. The top young leaves on main stem terminals had fewer SLW eggs, nymphs and adults, but higher numbers of trichomes compared with older leaves. Among the eight smooth leaf cultivars, the four okra leaf cultivars as a group had fewer SLW eggs, nymphs and adults compared with the four normal leaf cultivars.*

## **Introduction**

The silverleaf whitefly (SLW) *Bemisia argentifolii* Bellows and Perring remains an economic pest that affecting cotton production in the southwest. Smooth leaf cotton cultivars have fewer whiteflies compared with hairy leaf cultivars (Norman and Sparks 1997), however, the mechanism(s) involved remain unexplained. This report presents results of the studies in 2000 comparing SLW colonization on nine upland cotton cultivars at Maricopa, AZ.

## **Materials and Methods**

The study was conducted in a randomized complete block design with four replicates. Each plot was eight rows wide and 12.2 m long with rows spaced 1 m apart. There were four unplanted rows between plots and 3 m wide alleys between blocks. Treatments were the hairy leaf cultivar Stoneville (ST) 474, and eight smooth leaf cultivars: Deltapine [DPL] 20B, DPL 50 B, DPL 90B, and NuCOTN 33B (all normal-leaf shape) and Siokra L-23, E0223, E0798 and E1028 (all okra-leaf shape). Seeds were pre-treated with a mixture of insecticides and fungicides by seed companies and were planted on 10 April 2000 and watered three days later for germination. Irrigation was at 10-20 day intervals and no pesticides were applied during the growing season.

Silverleaf whitefly populations were determined on 8 dates from 10 July to 5 September. On each date, leaves were picked from six main stem leaf nodes #1, #2, #3, #4, #5, and #7 below apical terminals of each of five plants from each plot. A 1.43 cm<sup>2</sup> of leaf disk was taken from the second leaf sector of each leaf and numbers of silverleaf whitefly eggs and nymphs (Naranjo and Flint 1994) and trichomes were counted on abaxial leaf surfaces with the aid of a stereoscope. Leaves picked at node #1 were  $\geq 2.5$  cm measured between the two largest leaf lobes. Adults were counted on leaves from each of the six node positions (Naranjo and Flint 1995). Data were analyzed using ANOVA (Anonymous 1989) for a randomized complete block design.

## Results and Discussion

Mean numbers of SLW adults were significantly higher on hairy-leaf ST 474 compared with the eight smooth-leaf cotton cultivars (Table 1). These results confirmed our earlier reports (Chu et al. 1998) and that of Norman and Sparks (1997) that hairy leaf cotton cultivars were more susceptible to silverleaf whitefly colonization compared with smooth leaf cultivars. Stonville 474 also had higher numbers of SLW eggs and nymphs compared to the other cultivars and the highest number of trichomes per cm<sup>2</sup> of leaf disk

Mean numbers of trichomes were higher on the top young leaves, but whitefly densities were lower (Table 2). The results were confirmed in greenhouse cage studies by exposing leaves on different main stem nodes to whiteflies for the same amount of time. Trichome-whitefly density relationships appear more complex than previously suggested.

Whitefly densities among the eight smooth leaf cultivars were varied but the differences were small. The four normal-leaf cultivars as a group had significantly higher whitefly densities compared with the four okra-leaf cultivars (Table 3). The results suggest that leaf shape among other morphological characters may play a role in the whitefly colonization.

## References

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Table 1. Mean numbers of silverleaf whiteflies on hairy leaf Stonville 474 and eight smooth leaf cotton cultivars, Maricopa, AZ, 2000.

Hairiness	Numbers/cm <sup>2</sup> leaf disk			
	Trichomes	Eggs	Nymphs	Adults/leaf
Yes	14.5a <sup>a</sup>	17.6a	6.5a	7.2a
No	0.3b	5.7b	2.5b	3.8b

<sup>a</sup>Means in a column not follow by the same letters are significantly different (*F*-test, *P* =0.05).

Table 2. Mean numbers of silverleaf whiteflies on leaves of different main stem leaf nodes below the terminals of main stems of eight smooth leaf cotton cultivars of, Maricopa, AZ, 2000.

Leaf node	Numbers/cm <sup>2</sup> leaf disk			
	Trichomes	Eggs	Nymphs	Adults/leaf
1	1.1a	7.2b	0.8e	3.2d
2	0.3b	9.2a	2.0d	3.2d
3	0.1b	10.7a	3.7c	4.5c
4	0.1b	11.2a	4.7b	6.1a
5	0.0b	10.6a	5.7a	6.6a
7	0.0b	7.1b	5.1ab	5.3b

<sup>a</sup>Means in a column not follow by the same letters are significantly different (Student-Neuman-Keul's MRT, *P* =0.05).

Table 3. Mean numbers of silverleaf whiteflies on normal and okra-leaf shapes of eight smooth leaf cotton cultivars, Maricopa, AZ, 2000.

Normal/okra	Numbers/cm <sup>2</sup> leaf disk			
	Trichomes	Eggs	Nymphs	Adults/leaf
Normal	0.3a	12.9a	4.8a	5.7a
Okra	0.3a	5.7b	2.5b	3.8b

<sup>a</sup>Means in a column not follow by the same letters are significantly different (*F*-test, *P* =0.05).