SILVERLEAF WHITEFLIES AND COTTON LEAF HAIRS, LOWER RIO GRANDE VALLEY, 1994-1995.

John W. Norman, Jr. & Alton N. Sparks, Jr.
Texas Agricultural Extension Service
Texas Agricultural Research and Extension Center
Weslaco, Texas

Abstract

Silverleaf whiteflies were found to have lower infestations in cotton varieties with lower leaf hair counts in 1994 and 1995. Varieties with lower leaf hair counts also had numerically higher yields than those varieties with higher leaf hair counts.

Introduction

Silverleaf whiteflies in cotton have been observed to have larger populations in hairy leafed cotton than in smooth leafed cotton varieties since whiteflies first became a pest in cotton in 1991 in the LRGV. Growers have made changes to smoother leafed varieties since the 1992 season in the LRGV. However, growers and others have had no real knowledge about which varieties have a specific number of leaf hairs and what actual number of leaf hairs will lead to higher infestations of whiteflies.

Materials and Methods

Two cotton variety tests (early and later maturity variety tests) which were grown on the Texas A&M Experiment Station Annex Farm at Mercedes, were selected to be evaluated for leaf hair-whitefly interactions in 1994 and 1995. Each 24 variety test was approximately 1 acre in size and each variety was planted on four rows, 30 feet long and replicated 4 times in a randomized complete block. A 3.5 foot unplanted alley was left between plots. Insect control was applied equally to all plots when treatments were deemed necessary.

Adult whitefly counts (1995 only) were made using the third leaf from the top. The leaf was turned slowly upside down and all adult whiteflies present were counted on 10 leaves per plot.

Silverleaf whitefly immatures were evaluated by counting all nymphs inside a 2.25 square centimeter lens field on the bottom side of the 5th fully expanded leaf from the top of the plant. Ten (10) leaves from each plot for each variety was sampled once per week for nymphsand adults starting on May 12 and ending on July 7, 1994.

Leaf hairs (trichomes) were counted using a binocular dissecting microscope set at 15 power. All leaf hairswere counted in a one (1) square centimeter area on the underside of each leaf at the juncture of the main and first lateral vein closest to the leaf base. Trichomes on the veins were not counted. Twenty (20) 6th node leaves from each plot were collected one time during the season for trichome enumeration. All varieties were divided into five (5) groups using 20 trichomes/cm^2 increments in 1994. Only three groups were made in 1995 since the highest f leaf hair count was less than 60. PC SAS statistical computer program was used to analyze all data.

Results and Discussion

In 1994, there was a statistical separation of yields based on leaf hair numerical groupings. In 1995, no statistical separation was found. Both 1994 and 1995 test results showed a numerical yield advantage and a reduced whitefly count for those groupings with the lower leaf hair counts (Tables 1,2,3,4,5 and 6).

Average yields in these two tests were higher when leaf hairs were lower. An exception was Stoneville 132, in 1995, which had the highest yield in the later maturity test. However, statistically, yields did not separate in this test. Stoneville 132 yielded 10th out of 24 in the early maturity test in 1995.

Several factors were possibly involved in keeping varieties with the lowest leaf-hair groupings from having the highest yieldsin 1995 compared to 1994. One of those was that beet armyworms severely damaged yields in both tests in 1995. Beet armyworms caused significant damage to cotton all across the LRGV in 1995. Thus, yields were adversely effected by insects other than whiteflies in 1995, which may have masked any effect of whitefly damaage to yields compared to 1994 when whiteflies were the only insect influencing yields.

Another factor was variety earliness. Varieties which were truly early maturing types had more, larger bolls which were less susceptible to beet armyworm damage than varieties that matured later.

Leaf hair counts dramatiacally changed for some of the varieties in the 1995 tests compared to 1994 tests with the same varieties (Table 7). If it holds that the lower the leaf hairs the lower the whiteflies and the higher the yield, a reduction of leaf hairs would raise the yield potential of smoother leafed varieties. The only factorsdifferent between 1994 and 1995 leaf hair counts were the seed lots and years.

Finally, both tests were sprayed to keep the potential for complete loss of yields by beet armyworms and whiteflies from occurring. Whiteflies were extremely heavy in many area fields in 1995. The potential for severe damage was

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estimated to be high at the time decisions to treat for the pests were made. Two applications of Danitol + Orthene at 9 day intervals were applied at the same time insecticide for beet armyworms was applied.

Thus, given the insect conditions of this season, the results for whitefly influence on the yields was reduced and yet, the trend continued for lower whiteflies and higher yields when leaf hairs were lower.

Table 1. Sweetpotato whiteflies and cotton leaf trichome interactions on yields from early maturity cotton variety test, Texas A&M Experiment Station Annex Farm, Mercedes, Texas 1994.

Leaf Hairs /cm²	Sample Date & WF Immatures/2.25 cm² 5/26	6/02	6/17	6/23	6/30	7/07	Avg. WF	Lint #/Ac
0-20	1.6C	2.7B	1.5B	0.7B	1.5A	2.8A	1.8	863A
21-40	2.2BC	2.9B	1.6AB	1.0B	1.4A	1.9A	1.8	740B
41-60	2.9AB	4.4B	2.1AB	1.4AB	1.5A	3.0A	2.6	721B
61-80	3.8A	4.6B	2.3AB	2.2A	1.8A	2.3A	2.8	717B
81+	3.0AB	6.5A	2.4A	1.1AB	1.3A	2.1A	2.7	697B

Numbers followed by the same letter are not statistically different. P= 0.05

Table 2. Sweetpotato whiteflies and cotton leaf trichome interactions on yields from later maturity cotton variety test, Texas A&M Experiment Station Annex Farm, Mercedes, Texas 1994.

Leaf Hairs/ cm²	Sample Date & WF Immatures/2.25 cm² 5/26	6/02	6/17	6/23	6/30	7/07	Avg. WF	Lint #/Ac
0-20	2.6B	2.0B	2.3B	1.9C	2.9B	3.5B	2.5	682AB
21-40	3.9A	4.1A	3.1B	3.6BC	3.7AB	4.6B	3.8	725A
41-60	4.3A	4.1A	3.3AB	4.2B	4.1AB	4.8AB	4.1	588BC
61-80	4.6A	4.1A	3.5AB	3.7B	4.5A	7.9A	4.7	599ABC
81+	4.8A	5.9A	4.5A	6.2A	4.1AB	4.9AB	5.1	525C

Numbers followed by the same letter are not statistically different. P= 0.05

Table 3. Silverleaf whitefly adults and cotton leaf trichome interactions on yields from early maturity cotton variety test, Texas A&M Experiment Station Annex Farm, Mercedes, Texas 1995.

Tri-chomes/ cm²	Sample Date & WF Adults/2.25 cm2 5/30	6/5	6/15	7/5	7/13	Avg. WF	Lint #/Acre
0-20	5.02A	2.80A	0.72A	1.97A	14.42A	5.0	463 A
21-40	5.96A	3.46A	0.84A	2.32A	14.22A	5.4	444 A
41-60	5.65A	3.59A	0.77A	2.29A	13.71A	5.2	420 A

Numbers followed by the same letter are not statistically different. P=0.05

Table 4. Silverleaf whitefly immatures and cotton leaf trichome interactions on yields from early maturity cotton variety test, Texas A&M Experiment Station Annex Farm, Mercedes, Texas 1995.

Leaf Hairs/ cm²	Sample Date & WF Immatures/2.25 cm² 5/30	6/5	6/15	7/05	7/13	Avg. WF	Lint #/Acre
0-20	1.5A	1.6A	1.6B	0.9A	2.6A	1.6	463 A
21-40	1.7B	2.1A	1.9AB	0.9A	2.7A	1.9	444 A
41-60	2.5B	2.1A	2.6A	0.9A	2.8A	2.2	420 A

Numbers followed by the same letter are not statistically different. P=0.05

Table 5. Silverleaf Sweet potato whitefly adults and cotton leaf trichome interactions on yields from later maturity cotton variety test, Texas A&M Experiment Station Annex Farm, Mercedes, Texas 1995.

Leaf Hairs/ cm²	Sample Date & WF Adults/2.25 cm² 5/30	6/5	6/15	7/5	7/13	Avg. WF	Lint #/Acre
0-20	3.7A	3.0B	0.6A	1.3B	14.5B	4.6	610A
21-40	4.0A	4.0AB	0.6A	1.4B	15.3AB	5.0	609A
41-60	3.9A	4.5A	0.4A	2.3A	17.1A	5.6	531A

Numbers followed by the same letter are not statistically different. P=0.05

Table 6. Silverleaf Sweet potato whitefly immatures and cotton leaf trichome interactions on yields from later maturity cotton variety test, Texas A&M Experiment Station Annex Farm, Mercedes, Texas 1995.

Leaf Hairs/ cm²	Sample Date & WF Immatures/2.25 cm² 5/30	6/5	6/15	7/5	7/13	Avg. WF	Lint #/Acre
0-20	1.4A	1.7B	1.5A	0.5B	2.7B	1.6	610A
21-40	1.4A	2.1AB	2.2A	0.9A	3.1AB	1.9	609A
41-60	1.4A	2.6A	1.6A	0.7AB	3.3A	2.0	531A

Numbers followed by the same letter are not statistically different. P=0.05

Table 7. Examples of cotton leaf hair changes among selected varieties, LRGV, Texas 1994-95.

VARIETY	1994[1]	1995[1]
HARTZ H-1244	41.9	5.9
TEXAS 121	12.2	5.9
DPL 50	7.3	6.1
DPL-51	4.4	6.9
STPSA MD 51ne	7.0	7.6
DPL 5409	4.4	10.7
DPL 5415	7.3	10.0
SUREGROW 404	8.0	10.1
CHEMBRED 232	27.3	12.0
CHEMBRED 1233	16.6	12.9
HARTZ H-1220	36.7	15.5
HARTZ H-1215	30.7	15.9
SUREGROW 501	6.7	25.1
HARTZ H-1330	30.5	27.1
STONEVILLE 132	47.3	27.9
GPX-106889	48.6	27.9
GPX-78589	44.0	29.5
HARTZ 1380	41.3	37.6
STONEVILLE LA-887	58.0	42.7
STONEVILLE 474	102.7	50.3
Average # of Leaf Hairs	29.2	19.4