

Upland and Pima Cotton Demonstration Using IGR's Knack® & Applaud® to Control Silverleaf Whitefly at the Yuma Valley Ag Center in 1996

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ABSTRACT

The section 18 granted for the use of insect growth regulators in 1996 in Arizona provided an excellent opportunity to demonstrate the efficacy of the materials. Knack®(Pyriproxyfen) and Applaud®(Buprofezin) both demonstrated excellent control of whitefly in this demonstration. Efficacy of the insect growth regulators was monitored by using the "Ellsworth-Naranjo" methods of measuring adult and nymph whitefly numbers. This method provided good tracking of the populations throughout the period monitored. The areas treated were cotton variety trials both pima and upland. On the upland trial whitefly infestation data was collected on each variety. Hairy leaf varieties tended to have higher whitefly numbers of both adults and nymphs.

INTRODUCTION

The introduction of insect growth regulators for silverleaf whitefly control presented an opportunity to evaluate this new technology at the University of Arizona Yuma Valley Ag. Center. A upland cotton variety trial containing 10 varieties and a pima trial were planted in blocks that made them available for such a demonstration. The manufacturer of Knack®, Valent® and Applaud®, AgrEvo™ agreed to provide their materials for this purpose. Valley Ag Center personnel agreed to make the applications by ground when the trigger points were met for using the materials.

MATERIAL AND METHODS

The upland cotton was planted on March 23 in an area 274 feet long and 560 feet wide. The pima was planted on March 26 in a block 1/4 as wide and the same length. The whiteflies were monitored starting on June 12. Both adults and nymphs were counted in 2 of the 3 replications on the upland cotton. Counts on the pima cotton were not done by variety, but rather by random much as indicated in Arizona Cooperative Extension IPM Series # 2, revised May 1995. There were a total of 100 leaves examined on the upland cotton at each sampling date. Thirty were sampled on the pima cotton on the same day and in the same manner. Sampling was done on roughly a weekly basis until August 30.

The counts on adult whiteflies were made on the bottom of the 5th leaf from the top of the plant as prescribed in Arizona Cooperative Extension IPM Series # 2. In addition to the presence and absence indicated by this system when 3 adults were observed, all of the adult whiteflies present were counted for most of the observation period.

The counts on nymphs were made on the bottom of the same leaf as adults using a system described in the Arizona Cooperative Extension IPM Series # 6, April 1996. A quarter sized disc is the sampling area.

Round washer type disc's are placed in the crotch of the center vein and its left adjacent vein.

IGR applications were started on June 19 with Knack® applied as prescribed on the label to the entire area of both the pima and upland cotton blocks. The whitefly populations were not at trigger level on all of the varieties when this application was made. The lygus population warranted adding Orthene® for controlling that population. Other insecticide treatments are listed in TABLE 1. The Applaud® was applied on July 18, when populations began increasing. Once again lygus populations were high enough to warrant the addition of Vydate® to help in managing them. Lygus and pink bollworm counts are displayed in TABLE 2.

RESULTS AND DISCUSSION

Adult whitefly data for the entire sampling period are displayed in GRAPH 1. for both upland and pima cotton. The Knack® and Orthene® application on June 21 reduced whitefly adult populations for almost 1 week. Populations of adults increased for 2 weeks starting on the 3rd of July. Adult numbers finally started downward by July 11 and continued to decrease until about the 17 of July when numbers once again began increasing. Pima and upland reacted much the same except pima tended to have more adults during most of the sampling period. Since the 2 types of cotton were not in the same immediate areas (more than 600 feet separated them) differences could have been because of location. The pima was adjacent to a field of cantaloupes being used for a whitefly migration study. Adult populations of whiteflies increased for 2 weeks after the application of Applaud® and Vydate® on July 18 in pima cotton. On upland cotton populations of adults decreased after one week. There was finally a reduction of population after August 7 in both types of cotton. Several insecticide treatments subsequent to August 5 finally brought the adult population to near zero by August 30, when it was to be decided to terminate the crop.

Nymph counts for the entire sampling period are shown in GRAPH 2 for both pima and upland cotton. In the upland cotton the large number of nymphs on July 3 is probably because of the large number of adults the prior 2 weeks. A dramatic reduction occurred by July 8 to an average of .5 nymphs per leaf and .2 per leaf by July 11, 20 days after the Knack® application. On the pima cotton nymph populations were fairly low all during the sampling period until August 7 and continued to increase through August 20. Adult populations were quite high prior to this increase in nymphs on July 24 and August 7. The August 5 Bolstar® application reduced numbers of adult whiteflies in both pima and upland, however, it appeared to hold the adults in check more in the upland than the pima. The known excellent insecticide combinations of Capture® + Orthene® when applied twice finally brought the nymph populations to near zero by August 30.

Comparative adult whitefly data for the different upland cotton varieties are depicted in GRAPH 3. Variety DPL 5415, a smooth leaf variety, had the lowest number of adults during the sampling period. It should be noted that these observations were made in the areas treated by both IGR's and other insecticides during the sampling period. Varieties which have hairy leaves, such as Stoneville 887, had higher counts of adult whiteflies. The BT variety from Deltapine DPL 33B™ was similar to DPL 5415 in adult whitefly populations. The Paymaster BT cotton 1220BG™ averaged less adults than its comparative variety Paymaster H1560. All of the varieties were at almost zero adults when the crop was terminated. The data were not collected in a way which allowed statistical perusal.

Data for nymph populations are shown in GRAPH 4 for the variety trial. Hairy varieties favored higher whitefly nymph populations. In this demonstration nymph and adult populations were not necessarily the same by varieties. TABLE 3 shows the data for nymphs and adults on the respective varieties. The trial was not designed to allow statistical interpretation, however, the yields also shown in the table were statistically analyzed. The varieties with the lowest whitefly counts were not necessarily the best yielding. This came as no surprise since whitefly populations were maintained below economic thresholds currently accepted. The biggest limiting factor for yield appeared to be the pink bollworm infestation as shown in TABLE 2. The BT transgenic cottons responded very positively to this pressure as did the well adapted Stoneville 474. A more complete report on BT cottons in this trial can be found elsewhere in the cotton report.

TABLE 1. 1996 YUMA VALLEY AG CENTER COTTON VARIETY TRIAL
INSECT CONTROL AND DATES

DATE	INSECTICIDE TREATMENT	TARGET PEST**
6/21	KNACK + ORTHENE	WF, LY, PBW
7/18	APPLAUD + VYDATE	WF, LY, PBW
7/26	LORSBAN	PBW
8/5	BOLSTAR	PBW
8/12	CAPTURE + ORTHENE	WF, PBW, PER
8/28	CAPTURE + THIODAN	WF, PBW, PER

**=
WF-WHITEFLY
LY-LYGUS
PBW-PINK BOLLWORM
PER-COTTON LEAF PERFORATOR

TABLE 2. 1996 YUMA VALLEY AG CENTER COTTON VARIETY TRIAL
INSECT COUNTS

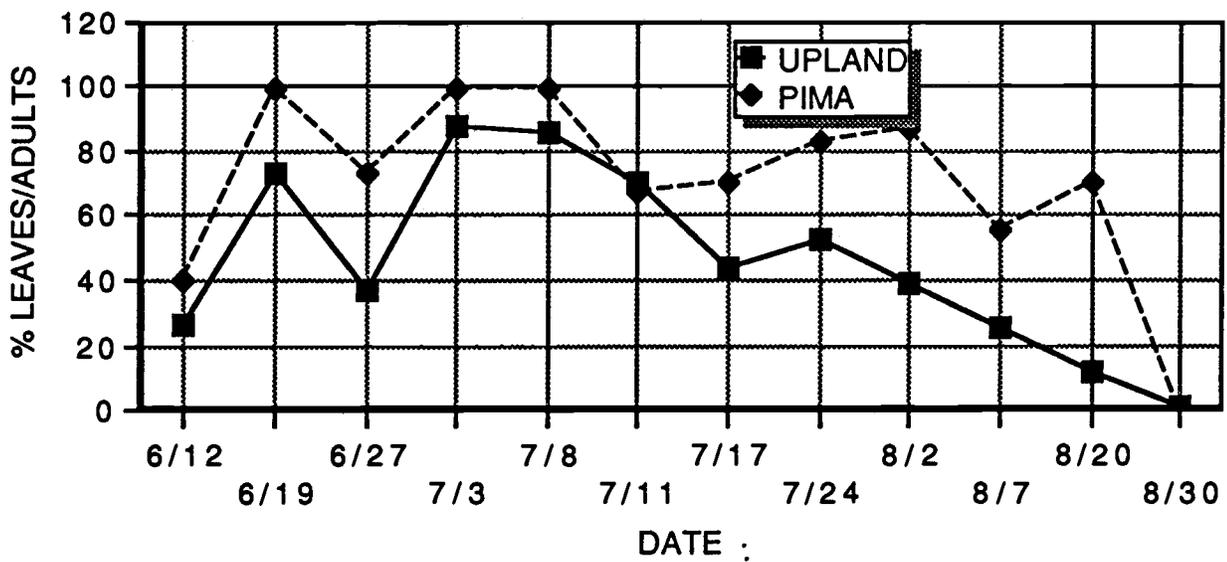
DATE	% PBW(BOLLS INFESTED)	LYGUS/100 SWEEPS
6/12	0	30
6/19	0	11
6/27	0	5
7/3	0	18
7/8	5	5
7/11	NOT COUNTED	12
7/17	25	34
7/24	35	10
8/2	55	NOT COUNTED
8/7	65	NOT COUNTED
8/20	65	NOT COUNTED
8/30	95	NOT COUNTED

**TABLE 3. 1996 YUMA VALLEY AG CENTER COTTON
VARIETY TRIAL YIELD AND AVERAGE
ASCENDING WHITEFLY COUNTS PER LEAF**

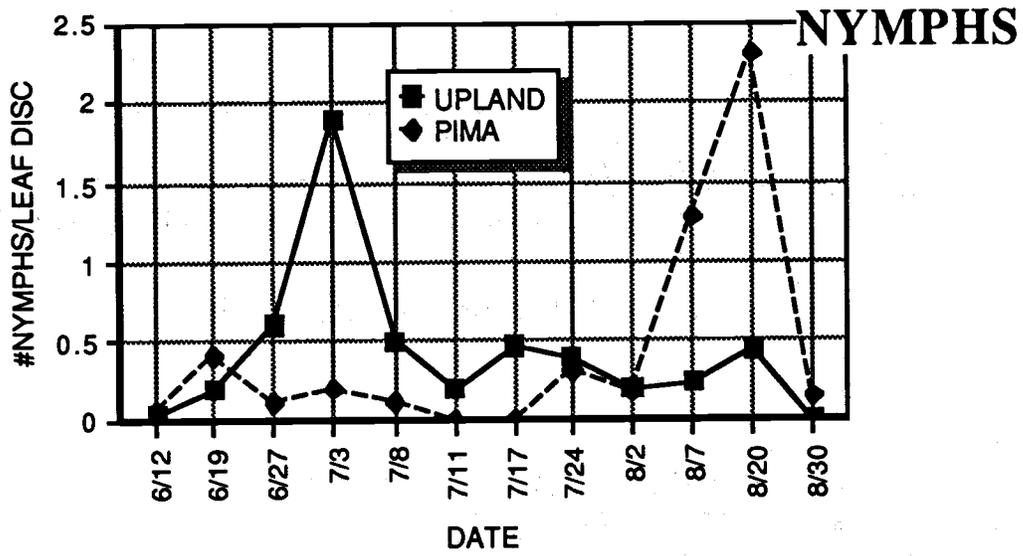
ADULTS		NYMPHS		YIELD/LBS
AVERAGE#	VARIETIES	AVERAGE#		LINT/ACRE
1.07	DPL5415	HS46	0.09	772 e*
1.14	DPL33B	DPL5415	0.20	1028 d
1.42	HS44	HS44	0.25	1157 cd
1.45	HS46	SG125	0.26	1375 b
1.54	PAY1220BG	DPL33B	0.32	1615a
1.55	SG125	SG501	0.38	1212 c
1.78	SG501	ST474	0.57	1511ab
2.18	PAY H1560	PAY H1560	0.70	1163 cd
2.21	ST887	PAY1220BG	0.89	1480ab
2.49	ST474	ST887	1.17	1009 d

**Means followed by the same letter are not significantly different according to a Duncan's Multiple Range Test*

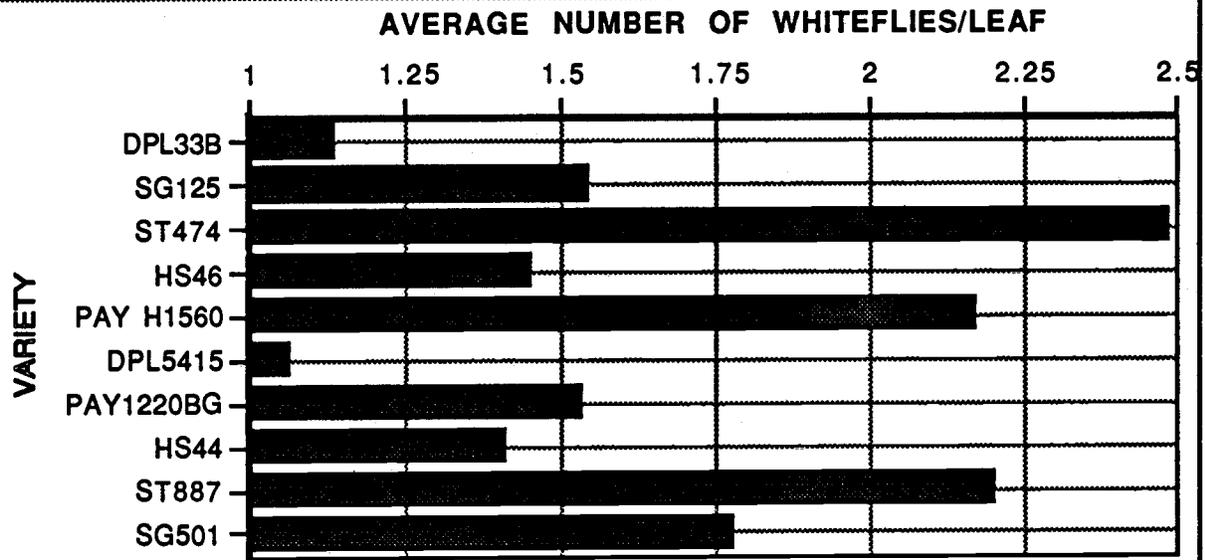
GRAPH 1. Adult whitefly leaves infested Yuma Ag Center
1996 Upland and Pima cotton



GRAPH 2. Nymph whitefly counts Yuma Ag Center
1996 Upland and Pima cotton



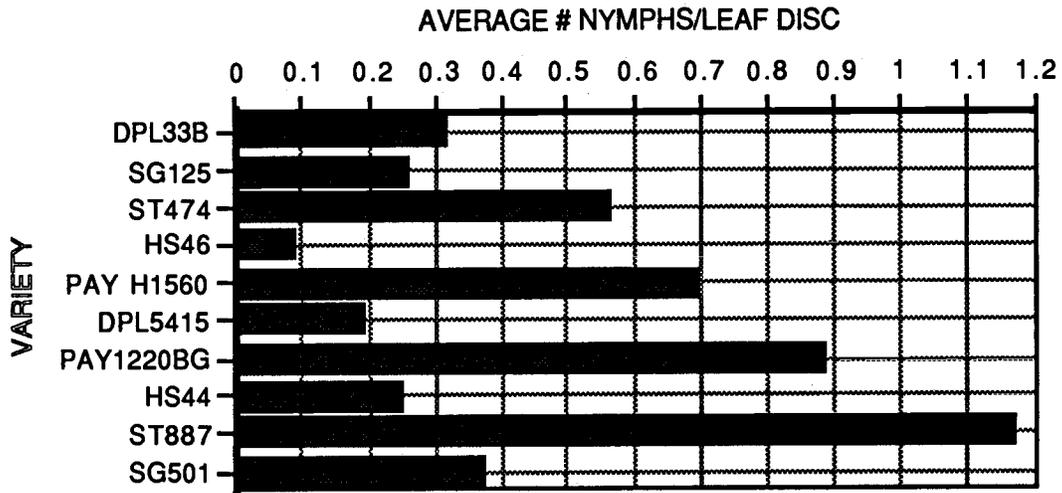
GRAPH 3: Adult whitefly Yuma Ag Center 1996 Upland cotton variety trial



DATA FOR 12 DATES (6/11-8/30) AND 106 LEAVES OBSERVED PER VARIETY

GRAPH 4: Nymph whitefly Yuma Ag Center

1996 Upland cotton variety trial



DATA FOR 12 DATES (6/11-8/30) AND 106 LEAVES OBSERVED PER VARIETY