THRIPS RESISTANCE IN CURRENT OBSOLETE AND FOREIGN COTTON VARIETIES

M. W. Fairbanks, D. R. Johnson and T. J. Kring
Department of Entomology
University of Arkansas
Fayetteville, AR

Abstract

Currently available, obsolete and foreign cotton cultivars were evaluated for resistance to thrips feeding. Each cultivar, replicated four times, was planted in 44 ft. plots that included two Gaucho-treated and two untreated rows. A whole plant sampling technique was used to collect adult and larval thrips from seedling cotton. Visual damage of each cultivar and treatment was rated on all sample dates. In the untreated plots, Asiatic 154 and Asiatic 49 had the lowest mean number of total thrips with 40 and 47 per five plants, respectively. Also, these two cultivars had the lowest average damage rating, indicating a high degree of resistance. Identifying thrips resistant cotton cultivars will lessen the impact on the environment and lower production cost by reducing insecticide application.

Introduction

Thrips (Thysanoptera) are considered important economic pests in seedling cotton, *Gossypium hirsutum* L., (Johnson et al. 1989) and are commonly found on cotton throughout the season (Leigh 1995). Early infestations of thrips can cause pre-bloom square loss (Johnson et al. 1996), reduce leaf area, root development (Roberts & Rechel 1996), and yield (Hawkins et al. 1996) and delay crop maturity (Carter et al. 1989).

Differences in the levels of cotton susceptibility to thrips feeding, caused by genotypic variations, have been known for many years (Bowman & McCarty 1997). Several morphological and physiological traits have been linked to tolerance of thrips feeding in cotton, but are not often incorporated into the most common cultivars (Jenkins 1994). The objective of this research was to evaluate the potential resistance of current, obsolete and foreign cotton cultivars to thrips feeding injury.

Methods and Materials

The study was conducted in Mississippi Co., AR in the summer of 1999. Seventeen cotton cultivars consisting of two currently available, nine obsolete, two Asiatic, and four Greek varieties were compared in four-row plots. Each plot, measuring 12.7 by 44 ft, included two rows that were treated with Gaucho (imidacloprid) and two rows that were untreated. Plots were replicated four times. Seeds were planted on 13 May, and plants emerged about a week later. Adult and immature thrips were collected then counted from five plants per plot using whole plant sampling techniques (Burris et al. 1990) on 1 June, 10 June, and 15 June. Visual damage ratings, on a scale of one to ten with one being the lowest damage, were taken on all sample dates. All data were analyzed by analysis of variance (ANOVA), and means were separated with least significant difference (LSD) when appropriate.

Results and Discussion

In this study, thrips resistance in obsolete and foreign cultivars was compared to susceptible (Delta Pine NuCotn 33 B) and resistant (Delta Pine 428 B) currently used cultivars. In the treated plots, the currently available cultivars (Table 1) had statistically higher seedcotton yield than all but two of the other cultivars. An indication of the level of resistance for each cultivar is the difference in yield between the treated and the untreated plots. Small differences would suggest some form of resistance in the particular cultivar. Delta Pine 15, Plains, Coker 100A, Auburn 56, DixieKing, and Empire WR 61 had yield differences of less than or equal to 10%, indicating some resistance. Those cultivars with Empire in their genetic background have shown resistance in the past (Tugwell & Waddell 1964). For a cultivar to be considered resistant, it must have a low number of thrips occurring on the plants and a low damage rating (Table 2). Empire WR 61 may be the only cultivar that is truly resistant with the others being more tolerant to thrips feeding.

None of the foreign cultivars yielded higher than 2612 lbs. of seedcotton/acre. This low yield was expected since these cultivars are grown in different production systems than the United States. Asiatic 154 and Sindos 80 had relatively low yield differences between the treated and untreated plots with 10.3% and 12.8%, respectively. The difference in yield in Asiatic 49 would have been less if not for poor stand establishment in one of the untreated plots. Both of the untreated Asiatic cultivars had the lowest number of thrips and damage ratings.

Resistant and tolerant traits are desirable characteristics in cotton cultivars, as long as the yield is maintained. If resistance characters can be identified and incorporated into high yielding cultivars, reducing insecticide use, cotton production costs could be reduced and would be less disruptive to other pest management systems and the environment.

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 2:1111-1112 (2000)
National Cotton Council, Memphis TN

Literature Cited

Bowman, D. T. & J. C. McCarty, Jr. 1997. Thrips (Thysanoptera: Thripidae) tolerance in cotton: sources and heritability. J. Entomol. Sci. 32: 460-471.

Burris, E., Pavloff, A. M., Leonard, B. R., Graves, J. B. and G. Chruch. 1990. Evaluation of two procedures for monitoring populations of early season insect pests (Thysanoptera: Thripidae and Homoptera: Aphididae) in cotton under selected management strategies. J. Econ. Entomol 83:3 1064-1068.

Carter, F. L., N. P. Tugwell & J. R. Phillips. 1989. Thrips control strategy effect on crop growth, yield maturity and quality. Proc. Beltwide Cotton Prod. Res. Conf. 295-297.

Hawkins, B. S., H. A. Peacock & T. E. Steele. 1996. Thrips injury to upland cotton (*Gossypium hirsutum* L.) varieties. Crop Sci. 6: 256-258.

Jenkins, J. N. 1994. Host plant resistance to insects in cotton. Proc. World Cotton Res. Conf. 359-372.

Johnson, D. R., J. J. Kimbrough & J. S. McConnell. 1989. The effect of variety on thrips control. Proc. Beltwide Cotton Prod. Res. Conf. 303-305.

Johnson, D. R., C. D. Klein, H. B. Myers & L. D. Page. 1996. Pre-bloom square loss, causes and diagnosis. Proc. Beltwide Cotton Prod. Res. Conf. 103-105.

Leigh, T. F. 1995. Bionomics of cotton thrips: a review, pp. 61-70. *In* B. L. Parker & M. Skinner [eds.], Thrips biology and management. Plenum Press, New York.

Roberts, B. A. & E. A. Rechel. 1996. Effects of early season thrips feeding on root development, leaf area and yield. Proc. Beltwide Cotton Prod. Res. Conf. 939-941.

Tugwell, N. P. & B. A. Waddle. 1964. Yield and lint quality of cotton as affected by varying production practices. Ark. Agri. Exp. Sta. Bull. 682.

Table 1. Mean seedcotton yield (lbs/acre) for Gaucho-treated and untreated plots for current, obsolete and foreign cotton varieties.

Variety	Untreated	Gaucho	Difference
Current	**lbs/a**	**lbs/a**	**% Change**
DP NuCotn 33B	2716	3954	+31.3
DP 428B	3281	4035	+18.6
Obsolete			
DP 15	2860	3143	+9.0
ST 7	2495	3033	+17.7
Plains	3049	2879	-5.9
Coker 100A	3107	3379	+8.0
Rex	3002	3420	+12.2
Auburn 56	2578	2772	+7.0
Dekalb 108	2569	3061	+16.1
DixieKing	1987	2168	+8.3
Empire WR61	2597	2606	+0.3
Foreign			
Asiatic 49	880	1386	+36.5
Asiatic 154	800	892	+10.3
Eya	2217	2612	+15.1
Zeta	1305	1792	+27.1
Christidis	1166	2063	+43.5
Sindos 80	2457	2819	+12.8
LSD (p=0.05)	525	718	

Table 2. Mean total thrips/five plants and visual damage ratings for Gaucho-treated and untreated plots for current, obsolete and foreign cotton varieties.

	Untreated		Gaucho	
Variety	Thrips	Damage	Thrips	Damage
Current				
NuCotn 33B	74	7.75	39	5.10
DP 428B	49	6.75	30	3.67
Obsolete				
DP 15	64	6.58	23	3.75
ST 7	54	6.50	26	3.33
Plains	59	6.50	49	3.50
Coker 100A	72	6.58	31	3.25
Rex	79	6.92	36	3.42
Auburn 56	76	6.67	28	3.67
Dekalb 108	93	5.92	33	2.33
DixieKing	69	7.17	47	3.75
Empire WR61	59	5.50	25	2.17
Foreign				
Asiatic 49	47	5.00	32	2.42
Asiatic 154	40	2.83	28	1.50
Eya	75	6.83	30	3.83
Zeta	79	6.92	46	4.08
Christidis	75	5.92	37	2.58
Sindos 80	67	6.58	35	3.50
LSD (p=0.05)	48	0.85	22	0.97