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Incidence of the Jassid, *Amrasca Biguttula Biguttula* Ishida in Relation to Plant Characters of Cotton Varieties*

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Studies on the correlation of plant characters of cotton with leafhopper (*Amrasca biguttula biguttula* Ishida) incidence revealed that it was positively correlated at a highly significant level with the plant height and negatively with number of leaves and internodal length. Correlations between the population and petiole length, area of leaf, number of nodes and yield were not significant. Population of leafhoppers and hopperburn were positively correlated while hopperburn and yield were negatively correlated indicating that population is not the sole factor contributing to the reduction in yield

Earlier scientists stressed the plant morphological characters to play a greater role in imparting resistance and many believed the hairiness of the cotton leaf to be associated with resistance to the leafhopper (Lal, 1937; Husain and Lal, 1940; Afzal, 1941; and Ghani, 1953; Sikka and Singh, 1953; Singh *et al.*, 1972 and Krishnananda, 1973). The toughness of vein, leathery nature of the leaf and lower moisture content of the leaf have been found to be associated with resistance in cotton to *Empoasca devastans* (Afzal and Abbas, 1943). The mean leaf area, width of pod, plant height, number of days to maturity and colour of the seed coat of *Phaseolus vulgaris* were significantly correlated with nymphal infestation of *E. fabae* (Wolfenbarger and Sleeman, 1961). In the light of the above findings, attempts were made to study further the direct and indirect relationships of the characters of cotton varieties with the leafhopper infestation and hopperburn injury and the results of the experiments are presented in this paper.

MATERIALS AND METHODS

Detailed studies were undertaken on the resistance mechanism of cotton varieties to the leafhopper by conducting field experiments with selected 32 varieties, replicated thrice. The leafhopper population was (both nymphs and adults) recorded at weekly intervals from five plants per variety under each replication and in each plant six leaves were chosen, viz., two from the top, two from the middle and two at the bottom. The observations commenced seven days after sowing till the plants died of age or due to pest incidence.

Morphological features such as plant height, petiole length, leaf area, number of leaves, internodal length and number of nodes of the varieties were recorded in the field from fifteen

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plants at the rate of five in each replication. The plant height was measured from the cotyledonary node to the terminal end. Similarly the number of nodes was counted from cotyledonary node to the top, while the distance between two nodes at the top, two in the middle and two at the bottom were measured for internodal length. For measuring the leaf area and petiole length, the two leaves at the top, two leaves from the middle and two at the bottom nodes were taken. Mean yield data per plant was also gathered. The hopperburn symptoms were expressed as percentage area of leaf affected (Jayaraj, 1966).

Correlation and regression coefficients were calculated to determine the degree of association between plant characters, leafhopper infestation and hopperburn according to the methods given by Panse and Sukhatme (1957).

RESULTS AND DISCUSSION

The data with regard to the mean plant height, total number of leaves, number of nodes, internodal length, petiole length, area of leaf and population of leafhoppers collected on the thirty two varieties of American cotton are presented in Table I. Correlation between the plant characters versus population of leafhoppers, population versus hopperburn, population versus yield and hopperburn versus yield were determined (Table II). The different varieties were classified based on the mean leafhopper population and percentage of hopperburn inflicted on the varieties (Balasubramanian *et al.*, 1977). The leafhopper incidence was found to be positively correlated with plant height and negatively with the number of leaves and internodal length. Correlation between the population and petiole length, area of leaf, number of nodes and yield was not significant. Population of leafhoppers and hopperburn were found to be positively correlated while hopperburn and yield were negatively correlated. Jayaraj (1968) and Uthamasamy *et al.* (1972) reported significant positive correlation of leafhopper population with the plant height of castor and bhendi varieties respectively. The plausible explanation offered by the former was that the tall varieties attracted more leafhoppers since the temperature at ground condition is higher than at upper level as they are very sensitive even to small fluctuations in temperature (Jayaraj, 1964) and hence preferred lower temperatures and consequently tall varieties. Jayaraj (1968) reported that leafhopper population was found to be positively correlated with leaf area, number of nodes, number of leaves, internodal length, petiole length and negatively with the number of seeds per 50 g on castor but in the present studies correlation between population of leafhoppers with number of leaves and internodal length were negatively correlated while not so significant with petiole length, area of leaf, number of nodes and yield. However, the relationship between population of leafhoppers and hopperburn was positive while hopperburn and yield were negatively correlated. This indicates that population of leafhoppers is not directly involved in reducing the yield but hopperburn has direct relationship with yield though

TABLE I. Morphological characters of cotton varieties in relation to jassid infestation

Variety	Mean values of fifteen plants per variety								
	Plant height (cm)	No. of leaves	No. of nodes	Internodal length (cm)**	Petiole length (cm)*	Area of leaf (Sq. cm)*	Population of leaf hopper*	Percentage of hopper-burn (TV)	Mean yielding
Resistant									
HB 69	91.3	36.0	14.2	7.6	6.4	109.5	2.1	0.00	19.9
Tolerant									
LL 43	75.9	30.0	15.3	4.7	8.6	37.1	2.8	21.80	42.0
D 2	84.8	33.6	19.4	4.6	6.6	65.2	2.8	24.00	20.9
Empire cotton	64.9	19.7	12.8	4.1	6.9	61.4	2.9	24.00	26.3
Mc Nair	64.1	27.7	12.6	3.7	5.1	41.6	3.0	28.00	32.5
AS 132	69.8	29.7	16.2	4.4	8.7	45.4	3.2	28.60	21.7
GS 23	73.3	36.3	16.4	4.7	6.0	54.8	3.3	29.70	30.5
Susceptible									
AC 124	67.3	33.0	14.6	4.4	5.7	61.9	3.4	29.80	21.4
CTI 3-14-15	39.6	29.3	12.3	5.6	4.8	44.2	3.4	30.10	36.6
Jai	59.4	24.0	16.5	4.0	7.7	52.1	3.5	30.80	27.5
Alabar	62.0	38.7	17.2	4.3	5.7	59.6	3.6	32.80	16.7
CTI 421-14-5	67.1	27.3	14.5	3.8	8.5	20.5	3.6	33.00	41.9
RS 267	70.9	28.7	14.4	3.9	10.8	60.0	3.7	37.20	25.7
AC 122/62	65.4	27.0	14.4	4.4	8.8	42.0	3.8	41.20	29.3
Parabhain	65.8	28.0	18.7	3.8	5.1	38.1	3.8	42.00	24.0
RA 35/6	66.6	20.3	14.9	4.3	10.5	39.4	3.9	42.70	37.1
54 (171)	66.7	21.7	16.7	4.4	7.8	58.9	4.1	43.00	13.5
MCU 5	74.8	21.7	16.4	4.4	8.7	35.6	4.1	43.20	17.5
Rs 267	79.6	18.3	14.0	5.0	10.5	62.2	4.2	46.20	25.7
Rs 212	60.1	28.0	13.6	3.6	6.3	22.4	4.2	47.00	18.0
Express	38.6	24.3	15.4	4.8	8.2	81.1	4.2	47.20	37.2
G III 33	64.2	17.0	15.5	4.3	10.5	46.5	4.4	48.20	30.3
147 F	61.1	17.0	13.2	3.6	5.2	46.4	4.5	48.40	18.5
K 3622	63.6	15.3	14.1	4.1	9.2	46.5	4.6	51.20	34.3
Nectariless	68.1	19.7	14.8	4.0	7.5	45.9	4.7	51.90	23.3
Stardel (42)	75.1	19.3	13.0	3.7	6.8	36.7	4.7	56.50	14.2
MCU 3	79.5	22.3	14.3	4.2	5.4	48.5	4.8	56.60	17.1
G III 323	60.9	26.3	12.7	4.3	10.0	35.4	4.9	58.20	19.3
Highly susceptible									
509 (PES)	56.4	18.3	12.7	3.5	6.3	34.8	5.2	60.90	12.3
RS 89	68.0	19.7	12.5	4.3	10.5	35.6	7.4	63.20	14.0
Reba B 50	58.4	20.7	16.0	4.1	9.0	46.7	8.5	63.20	29.0
PRS 72	55.9	22.7	10.5	3.9	8.5	70.0	9.4	73.90	19.0

* Mean of 6 observations in each plant

** Mean of 3 observations in each plant

TABLE II. Correlation of plant characters of 32 varieties of cotton with jassid incidence

Plant character	Jassid incidence r	Regression equation
1. Plant height	+ 0.540**	Y=0.09+0.06x
2. Number of leaves	− 0.350**	Y=6.57−0.09x
3. Internodal length	− 0.212*	Y=5.65−0.32x
4. Hopperburn	+ 0.206*	Y=17.2+5.73x
5. Petiole length	=0.151	Not significant at 5% levrl
6. Area of leaf	=0.129	
7. Number of nodes	=0.038	
8. Yield	=0.07	

Correlation of hopperburn of 32 varieties of cotton with yield
Yield r = −0.530** Y = 31.35−0.16x

** = Significant at 1% level
* = Significant at 5% level
N = 96 @ 3 plants per variety for all 'r' values

population and hopperburn are possessing positive association.

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