I J T A
© Serials Publications
National Academy of Agricultural Science (NAAS) Rating : 3.03

Resistance Levels of Different Cotton Genotypes Against Sucking Pests

V. Ravi Kumar[1], N.V.V.S. Durga Prasad[2], T. Madhumathi[3]

ABSTRACT: *The resistance levels of fourteen cotton genotypes to sucking pest complex* i.e *leafhoppers, aphids, thrips and whiteflies were evaluated in the experimental field at Regional Agricultural Research Station, Lam, Guntur district during* kharif *2013-2014. It was observed that the genotypes NDLH-1938 and L-603 had shown comparatively greater resistance against leafhoppers with the population of 6.03 and 6.30 per 3 leaves per plant where as the genotypes LK-861 and L-389 were highly susceptible (20.10 and 20.73 per 3 leaves per plant). Incidence of thrips population was maximum at 30 days after sowing, where the genotypes LRA-5166 showed more susceptibility (32.30 per 3 leaves per plant) and LK-861 found to be resistant (8.20 per 3 leaves per plant) against thrips. L-389 harboured very less aphid population (7.50 per 3 leaves per plant) where RCH-2 was reported to be a susceptible genotype (32.40 per 3 leaves per plant).*

Key words:- Cotton, resistance, sucking pest, genotype, screening

INTRODUCTION

Cotton, the most important fibre crop of India and it has been reported that about 162 insect pests attack on cotton in India (Anonymous. 1999 [1]; Lingappa, 2001 [6]), only few of them are key production constraints which cause losses to the tune of 30-80%. Leaf hopper *Amarasca devastans*; Thrips,*Thrips tabaci*; Aphids, *Aphis gossypi* and whiteflies are the important sucking pests which inflict the crop at seedling and cause phenomenal losses. Cotton is ravaged by an array of insect pests comprising of bollworms and sap sucking pests. These sucking pests cause 22.85% reduction in cotton yield (Satpute *et al.,* 1990) [11]. Severe infestation of leafhopper causes yield reduction up to 35% (Atwal, 1996) [3]. Keeping in view, this experiment was conducted to find out the resistant levels of different cotton genotypes.

MATERIALS AND METHODS

The experiment to screen cotton genotypes against sucking pest complex was laid out at Regional Agricultural Research Station, Lam farm, Guntur. A total of 14 genotypes L-770, L-761, L-804, LK-861, NA-1325, L-389, L-604, NDLH-1938, Suraj, MCU-5, LRA-5166, RCH-2, Sivanandi, L-603 were sown in Randomized Block Design with each genotype in 3 lines and replicated twice with a plot size of 3.15× 4.8 m^2. One row of okra was grown as infester row for every eight rows of cotton. All the genotypes were screened under unprotected conditions and under normal agronomic practices. Incidence of sucking pests per three leaves was recorded on 5 randomly selected plants per plot at 30, 60, 90 and 120 DAS. A jassid resistance index (Hopper burn index) was calculated as proposed by Nageswara Rao, 1973 [7]. Grouping of injury index into categories of resistance is as follows.

Resistance/Injury Index	*Category*
1.0 - 1.5	Highly resistant
1.5 - 2.0	Resistant
2.0 - 2.5	Intermediate
>2.5	susceptible

$$\text{Resistance Index} = \frac{G_1 \times P_1 + G_2 \times P_2 + G_3 \times P_3 + G_4 \times P_4}{P_1 + P_2 + P_3 + P_4}$$

* Department of Entomology, Agricultural College, Bapatla 522101, Andhra Pradesh
[1] Student M.Sc. (Ag.) Entomology,
[2] Senior Scientist (Entomology),
[3] Associate Professor (Entomology)

P_1, P_2, P_3 and P_4 are the no. of plants with G_1, G_2, G_3 and G_4 grades respectively.

The kapas yield from each plot was recorded separately in kg/plot from two pickings and converted into q/ha. The data pertaining to population of pests were subjected to square root transformation from respective treatments and analyzed using AGRISTAT statistical package.

RESULTS AND DISCUSSIONS

Thrips

The population of thrips was maximum in the first month of the crop season, and the data recorded at 30 days after sowing (Table.1) showed that LRA-5166 was more susceptible (32.30 per 3 leaves per plant) where as LK-861 found to be resistant (8.20 per 3 leaves per plant). The pest population was reduced gradually from 30 days after sowing. The data at 60,90 and 120 days after sowing revealed that LK-861 showed resistance against thrips throughout the crop season, where as the genotype LRA-5166 found to be susceptible. The data on overall mean population of thrips showed that the genotype LK-861 recorded the lowest population of thrips *i.e.* 4.35/3 leaves/plant followed by L-389 (3.70/3 leaves/plant) which were on par with each other. The highest population of thrips was observed in LRA-5166 (13.45/3 leaves/plant) and RCH-2 (12.60/3 leaves/plant) which were on par with each other. These results were in agreement with Rohini (2010) [10] who reported that LK-861 was resistant against thrips. Arif *et al.* (2004) [2] results showed that CIM-109 was susceptible to thrips, while Cyto 9/19 was resistant as the plant characters like hair density, hair length and gossypol glands on vein, midrib and lamina showed a contribution of 75.6 % to the resistance against thrips.

Table 1
Incidence of thrips on different cotton genotypes during *kharif*, 2013-14.

Treatment no.	*Genotype*	*Thrips no./3 leaves/plant*				
		30 DAS	*60 DAS*	*90 DAS*	*120 DAS*	*Overall mean*
T1	L-770	19.10 (4.37)^{c}	16.20 (4.02)^{def}	5.90 (2.43)^{efg}	2.40 (1.55)	10.90 (3.30)^{def}
T2	L-761	18.30 (4.28)^{c}	12.90 (3.59)^{cde}	5.60 (2.37)^{ef}	1.70 (1.30)	9.63 (3.10)^{cde}
T3	L-804	19.80 (4.45)^{cd}	16.90 (4.11)^{def}	6.50 (2.55)^{fg}	2.70 (1.64)	11.48 (3.39)^{ef}
T4	LK-861	8.20 (2.86)^{a}	5.00 (2.24)^{a}	2.30 (1.52)^{a}	1.90 (1.38)	4.35 (2.09)^{a}
T5	NA-1325	10.40 (3.22)^{ab}	7.30 (2.70)^{ab}	3.90 (1.97)^{bcd}	2.00 (1.41)	5.90 (2.43)^{b}
T6	L-389	8.50 (2.92)^{a}	5.90 (2.43)^{a}	2.90 (1.70)^{ab}	1.80 (1.34)	4.78 (2.19)^{ab}
T7	L-604	20.90 (4.57)^{cd}	17.50 (4.18)^{ef}	7.20 (2.68)^{fgh}	3.00 (1.73)	12.15 (3.49)^{fg}
T8	NDLH- 1938	8.90 (2.98)^{a}	6.60 (2.57)^{a}	3.10 (1.76)^{ab}	1.90 (1.38)	5.13 (2.26)^{ab}
T9	Suraj	15.40 (3.92)^{bc}	10.80 (3.29)^{bc}	4.20 (2.05)^{bcd}	1.70 (1.30)	8.03 (2.83)^{c}
T10	MCU-5	16.70 (4.09)^{c}	11.60 (3.41)^{c}	4.90 (2.21)^{cde}	1.70 (1.30)	8.73 (2.95)^{c}
T11	LRA-5166	32.30 (4.87)^{e}	18.60 (4.31)^{f}	8.70 (2.95)^{h}	2.80 (1.67)	13.45 (3.67)^{g}
T12	RCH-2	26.70 (4.65)^{d}	17.90 (4.23)^{f}	7.70 (2.77)^{gh}	3.20 (1.79)	12.60 (3.55)^{fg}
T13	Sivanandi	17.20 (4.15)^{c}	12.40 (3.52)^{cd}	5.30 (2.30)^{def}	2.20 (1.48)	9.28 (3.05)^{cd}
T14	L-603	9.10 (3.02)^{a}	6.90 (2.63)^{a}	3.40 (1.84)^{abc}	2.00 (1.41)	5.35 (2.31)^{ab}
F-test		Sig	Sig	Sig	NS	Sig
SEm±		0.25	0.20	0.13	0.11	0.10
CD (P=0.05)		0.75	0.60	0.39	NS	0.31
CV (%)		8.99	8.53	8.39	10.26	5.09

Figures in parentheses are square root transformed values.
Sig: Significant. NS: Non Significant

Aphids

The incidence of aphids was low at initial stage of the crop and the population started increasing from 30 days after sowing and reached to maximum at 90 days after sowing (Table.2). The data on overall mean population of aphids showed that the genotype L-389 recorded the lowest population of aphids *i.e.* 4.80/3 leaves/plant which was on par with L-604 (5.43/3 leaves/plant). The next least affected genotypes were LK-861 (6.28/3 leaves/plant), and Sivanandi (7.80/3 leaves/plant). Among all the genotypes, RCH-2 recorded the highest population of aphids (24.70/3 leaves/plant). The present findings were in agreement with Rohini (2010) who reported that LK-861 was resistant against aphids. Studies conducted by Khan and Agarwal (1990) [4] revealed that moderately hairy varieties were more preferred as compared to the varieties with glabrous or dense pubescent leaf surface.

Table 2
Incidence of thrips on different cotton genotypes during *kharif*, 2013-14.

Treatment no.	*Genotype*	*Aphids no./3 leaves/plant*				
		30 DAS	*60 DAS*	*90 DAS*	*120 DAS*	*Overall mean*
T1	L-770	9.40 (3.07)^{fg}	17.80 (4.22)^{de}	23.50 (4.85)^{cde}	15.40 (3.92)^{d}	16.53 (4.07)^{f}
T2	L-761	7.60 (2.76)^{de}	15.40 (3.92)^{cde}	19.50 (4.42)^{bcd}	11.50 (3.39)^{c}	13.50 (3.67)^{e}
T3	L-804	8.80 (2.97)^{ef}	14.60 (3.82)^{cd}	19.00 (4.36)^{bcd}	10.60 (3.26)^{c}	13.25 (3.64)^{de}
T4	LK-861	3.80 (1.95)^{ab}	6.20 (2.49)^{a}	9.50 (3.08)^{a}	5.60 (2.37)^{ab}	6.28 (2.50)^{b}
T5	NA-1325	6.30 (2.51)^{cd}	12.80 (3.58)^{c}	16.80 (4.10)^{b}	9.80 (3.13)^{c}	11.43 (3.38)^{d}
T6	L-389	2.70 (1.64)^{a}	4.50 (2.12)^{a}	7.50 (2.74)^{a}	4.50 (2.12)^{a}	4.80 (2.19)^{a}
T7	L-604	2.90 (1.70)^{a}	5.70 (2.39)^{a}	8.20 (2.86)^{a}	4.90 (2.21)^{ab}	5.43 (2.33)^{ab}
T8	NDLH- 1938	8.30 (2.88)^{ef}	18.20 (4.27)^{de}	24.50 (4.95)^{de}	17.80 (4.22)^{d}	17.20 (4.15)^{f}
T9	Suraj	6.90 (2.63)^{de}	13.00 (3.61)^{c}	17.10 (4.14)^{b}	11.20 (3.35)^{c}	12.05 (3.47)^{de}
T10	MCU-5	6.20 (2.49)^{cd}	13.90 (3.73)^{c}	17.90 (4.23)^{bc}	11.60 (3.41)^{c}	12.40 (3.52)^{de}
T11	LRA-5166	11.50 (3.39)^{g}	18.60 (4.31)^{e}	25.60 (5.06)^{ef}	18.30 (4.28)^{d}	18.50 (4.30)^{f}
T12	RCH-2	14.30 (3.78)^{h}	26.40 (5.14)^{f}	32.40 (5.69)^{f}	25.70 (5.07)^{e}	24.70 (4.97)^{g}
T13	Sivanandi	4.70 (2.17)^{bc}	8.90 (2.98)^{b}	10.50 (3.24)^{a}	7.10 (2.66)^{b}	7.80 (2.79)^{c}
T14	L-603	7.60 (2.76)^{de}	12.10 (3.48)^{c}	15.40 (3.92)^{b}	10.10 (3.18)^{c}	11.30 (3.36)^{d}
F-test		Sig	Sig	Sig	Sig	Sig
SEm±		0.11	0.15	0.21	0.16	0.10
CD (P=0.05)		0.34	0.46	0.63	0.46	0.28
CV (%)		6.17	6.10	7.34	6.68	3.92

Figures in parentheses are square root transformed values. Sig: Significant

Whiteflies

The whitefly population was low during cropping season (Table.3). However, based on overall mean whitefly population, the least population of whiteflies was observed in L-389 *i.e.* 0.90 whiteflies/3 leaves/plant followed by LK-861 (1.03/3 leaves/plant) which were on par with each other. The next best genotypes were L-804 (1.30/3 leaves/plant) and L-761 (1.38/3 leaves/plant). The highest population was observed in NDLH-1938, LRA-5166 and RCH-2 with population of 4.08, 3.90 and 3.68/3 leaves/plant, respectively, which were on par with each other. Rohini (2010) reported LK-861 was the best resistant genotype where DHY-286 was highly susceptible. Syed *et al.* (2003) [2013] reported that the highest and lowest population of *Bemicia tabaci* (Gennadius) were found on Rehmani and Greg-25 V as 1.99 and 1.73 insects/leaf respectively.

Table 3
Incidence of whiteflies on different cotton genotypes during *kharif*, 2013-14

Treatment no.	*Genotype*	*Whiteflies no./3 leaves/plant*				
		30 DAS	*60 DAS*	*90 DAS*	*120 DAS*	*Overall mean*
T1	L-770	0.00	0.70 (1.30)	2.20 (1.48)^{c}	4.20 (2.05)^{cd}	1.78 (1.33)^{c}
T2	L-761	0.00	0.70 (1.30)	1.30 (1.14)^{ab}	3.50 (1.87)^{c}	1.38 (1.17)^{b}
T3	L-804	0.00	0.70 (1.30)	1.30 (1.14)^{ab}	3.20 (1.79)^{bc}	1.30 (1.14)^{b}
T4	LK-861	0.00	0.60 (1.26)	1.10 (1.05)^{ab}	2.40 (1.55)^{ab}	1.03 (1.01)^{a}
T5	NA-1325	0.00	0.80 (1.34)	3.30 (1.82)^{d}	6.50 (2.55)^{fg}	2.65 (1.63)^{d}
T6	L-389	0.00	0.50 (1.22)	1.00 (1.00)^{a}	2.10 (1.45)^{a}	0.90 (0.95)^{a}
T7	L-604	0.00	1.10 (1.45)	4.20 (2.05)^{de}	7.10 (2.66)^{fgh}	3.10 (1.76)^{e}
T8	NDLH- 1938	0.00	0.90 (1.38)	6.50 (2.55)^{g}	8.90 (2.98)^{i}	4.08 (2.02)^{g}
T9	Suraj	0.00	1.00 (1.41)	1.50 (1.22)^{ab}	3.70 (1.92)^{cd}	1.55 (1.24)^{bc}
T10	MCU-5	0.00	0.60 (1.26)	1.70 (1.30)^{bc}	4.90 (2.21)^{de}	1.80 (1.34)^{c}
T11	LRA-5166	0.00	0.90 (1.38)	5.60 (2.37)^{fg}	8.20 (2.86)^{ghi}	3.68 (1.92)^{fg}
T12	RCH-2	0.00	1.00 (1.41)	6.00 (2.45)^{fg}	8.60 (2.93)^{hi}	3.90 (1.97)^{fg}
T13	Sivanandi	0.00	0.70 (1.30)	2.40 (1.55)^{c}	6.20 (2.49)^{ef}	2.33 (1.52)^{d}
T14	L-603	0.00	1.00 (1.41)	5.10 (2.26)^{ef}	7.60 (2.76)^{fgh}	3.43 (1.85)^{ef}
F-test		-	NS	Sig	Sig	Sig
SEm±		-	0.05	0.08	0.11	0.04
CD (P=0.05)		-	NS	0.25	0.31	0.12
CV (%)		-	6.31	7.12	6.57	3.97

Figures in parentheses are square root transformed values Sig: Significant. NS: Non Significant

Leafhopper

Leafhopper population was observed early in the cropping season, gradually increased and reached to maximum between 90 to 120 days after sowing (Table.4). The overall mean population showed that the population range varied between 6.03-20.73/3 leaves/plant. L-389 and LK-861 had shown very high population number of 20.73 and 20.10/3 leaves/plant respectively. NDLH-1938 and L-603 were found to be the resistant genotypes with lowest population of 6.03 and 6.30/3 leaves/plant respectively. The next best treatment was NA-1325 with the population of 8.03/3 leaves/plant. The present findings were in agreement with Rohini (2010) who reported that LK-861 was more susceptible to leafhoppers with the population of 13.00/3 leaves/plant. Khan *et al*. (2003) [5] studied 17 cotton cultivars and reported that the variety Ravi was the most resistant with lowest average population of leafhoppers (1.27/leaf).

Table 4
Incidence of leafhoppers on different cotton genotypes during *kharif*, 2013-14

Treatment no.	*Genotype*	*Leafhoppers no./3 leaves/plant*				
		30 DAS	*60 DAS*	*90 DAS*	*120 DAS*	*Overall mean*
T1	L-770	9.40 (3.07)^{c}	12.90 (3.59)^{cd}	18.60 (4.31)^{def}	16.60 (4.07)^{def}	14.38 (3.79)^{ef}
T2	L-761	15.30 (3.91)^{ef}	16.50 (4.06)^{def}	22.40 (4.73)^{ef}	21.20 (4.60)^{f}	18.85 (4.34)^{hi}
T3	L-804	13.50 (3.67)^{de}	14.60 (3.82)^{cde}	19.90 (4.46)^{ef}	17.50 (4.18)^{def}	16.38 (4.05)^{fgh}
T4	LK-861	17.20 (4.15)^{ef}	17.70 (4.21)^{ef}	23.60 (4.86)^{f}	21.90 (4.68)^{f}	20.10 (4.48)^{i}
T5	NA-1325	3.80 (1.95)^{a}	6.50 (2.55)^{ab}	11.20 (3.35)^{ab}	10.60 (3.26)^{bc}	8.03 (2.83)^{b}
T6	L-389	17.60 (4.20)^{f}	20.20 (4.49)^{f}	24.20 (4.92)^{f}	20.90 (4.57)^{f}	20.73 (4.55)^{i}
T7	L-604	10.50 (3.24)^{cd}	14.00 (3.74)^{cde}	19.30 (4.39)^{def}	16.30 (4.04)^{def}	15.03 (3.88)^{ef}
T8	NDLH- 1938	3.10 (1.76)^{a}	6.00 (2.45)^{a}	8.60 (2.93)^{a}	6.40 (2.53)^{a}	6.03 (2.45)^{a}
T9	Suraj	8.60 (2.93)^{bc}	11.80 (3.44)^{bc}	17.10 (4.14)^{de}	15.70 (3.96)^{de}	13.30 (3.65)^{d}
T10	MCU-5	6.20 (2.49)^{b}	8.50 (2.92)^{ab}	13.70 (3.70)^{bcd}	12.50 (3.54)^{cd}	10.23 (3.20)^{c}
T11	LRA-5166	8.80 (2.97)^{bc}	12.60 (3.55)^{cd}	17.80 (4.22)^{de}	15.40 (3.92)^{cde}	13.65 (3.69)^{de}
T12	RCH-2	15.40 (3.92)^{ef}	14.70 (3.83)^{cde}	20.50 (4.53)^{ef}	18.10 (4.25)^{ef}	17.18 (4.14)^{gh}
T13	Sivanandi	7.40 (2.72)^{bc}	10.90 (3.30)^{bc}	15.80 (3.97)^{cd}	13.60 (3.69)^{cde}	11.93 (3.45)^{c}
T14	L-603	3.40 (1.84)^{a}	5.80 (2.41)^{a}	9.20 (3.03)^{ab}	6.80 (2.61)^{ab}	6.30 (2.51)^{a}
F-test		Sig	Sig	Sig	Sig	Sig
SEm±		0.18	0.19	0.24	0.23	0.10
CD (P=0.05)		0.52	0.56	0.71	0.69	0.29
CV (%)		8.22	7.82	8.23	8.62	3.82

Figures in parentheses are square root transformed values. Sig: Significant.

Leafhopper Injury Index

Based on leafhopper injury grade, all the sixteen cotton genotypes were categorized into four groups. The genotypes which recorded leafhopper injury grade of 1-1.5 were categorized as highly resistant, between 1.5 and 2 as resistant, 2 and 2.5 as intermediately resistant and above 2.5 were categorized as susceptible.

Resistance/ Injury Index	*Category*	*Name of the genotype*
1.0 - 1.5	Highly resistant	NDLH-1938, L-603
1.5 - 2.0	Resistant	NA-1325,MCU-5,Sivanandi
2.0 - 2.5	Intermediate	Suraj, LRA-5166, L-770, L-604
>2.5	susceptible	L-804, RCH-2, L-761, LK-861, L-389

The genotypes NDLH-1938 and L-603 which were showing very less leafhopper population during screening were proven to be the highly resistant genotypes based on leafhopper injury index *i.e* 1.25 and 1.37 respectively (Table. 5). The present findings were in agreement with Rohini (2010) where LK-861 was reported as susceptible genotype based on injury index. Pushpam and Raveendran (2005) [8] screened 13 genotypes and reported that KC-2 was resistant with the lowest injury index value of 1.00. Radhika *et al*. (2006) [9] reported that NHH-44 and NDLH-1588 were found to be resistant against leafhoppers with the lowest injury index value (0.1-1.0).

Table 5
Seed cotton yield in different cotton genotypes during *kharif*, 2013-14.

Treatment No.	*Genotype*	*Injury index*	*Seed cotton yield Q ha^{-1}*
T1	L-770	2.40	16.52^{cde}
T2	L-761	2.92	13.82^{ef}
T3	L-804	2.62	15.23^{de}
T4	LK-861	3.14	12.02^{f}
T5	NA-1325	1.85	18.87^{abc}
T6	L-389	3.22	11.64^{f}
T7	L-604	2.48	16.34^{cde}
T8	NDLH- 1938	1.25	20.28^{a}
T9	Suraj	2.14	17.58^{abc}
T10	MCU-5	1.88	18.52^{abc}
T11	LRA-5166	2.22	17.11^{bcd}
T12	RCH-2	2.77	14.17^{def}
T13	Sivanandi	1.96	18.28^{abc}
T14	L-603	1.37	19.75^{ab}
F-test			Sig
SEm±			1.00
CD (P=0.05)			2.95
CV (%)			8.60

Seed cotton yield

The kapas yield from each plot was recorded separately in kg/plot from two pickings and converted into q/ha. The results (Table.5) showed that NDLH-1938, L-603, NA-1325, MCU-5 and Sivanandi produced more seed cotton yield of 20.28, 19.75, 18.87 and 18.52 q/ha respectively. These all genotypes mentioned above were showing less jassid resistant index. The genotypes L-389 and LK-861 showed very less yield of 11.64 and 12.02 q/ha respectively which were categorised as susceptible genotypes based on jassid resistant index.

CONCLUSIONS

The genotypes NDLH-1935, L-603 were showing resistance against sucking pests and also produced high yield. Hence these genotypes can be recommended to overcome sucking pest problem. One of the safe measures to avoid pest problem is to grow resistant varieties *i.e.*, finding out comparative resistance in conventional cotton genotypes, is a pre-requisite for the success of an Integrated Pest Management (IPM) approach for sustainable cotton production. It is therefore inferred that host plant resistance provides an effective management of insect pests as an economical and environmentally safe strategy.

REFERENCES

Anonymous (1999), Insecticide resistance management strategies for cotton pests, Directorate of cotton development, Mumbai, pp.7-12.

Arif M J, Sial I A, Saif Ullah, Gogi M D and Sial M A (2004), Some morphological plant factors effecting resistance in cotton against thrips (*Thrips tabaci* L.). International Journal of Agriculture and Biology 6(3):544-546.

Atwal A S (1996), Agricultural Pests of India and South East Asia. Kalyani Publishers, New Delhi. 279-280.

Khan Z R and Agarwal R A (1990), Mechanism of resistance to aphid (*Aphis gossypii)* in cotton. Indian Journal of Entomology 52(2):236-240.

Khan M T, Nameem M and Akram M (2003), Studies on varietal resistance of cotton against insect pest complex. Sarhad Journal of Agriculture. 19 (1):93-96.

Lingappa S (2001), Tools for management of *Helicoverpa* in cotton. In:National seminar on sustainable cotton production to meet the future requirement of industry, Directorate of cotton development, Mumbai from oct 3-4,2001:75-85.

Nageswara Rao (1973), An index for jassid resistance in cotton. Madras Agricultural Journal 60(4): 264-266.

Pushpam S and Raveendran T S (2005), Inheritence studies on resistance to jassid (*Amrasca devastans*) in *Gossypium hirsutum* L. Indian Journal of Genetics and Plant Breeding 65(3): 199-201

Radhika P, Sudhakar K, Sahadeva Reddy B and Basha M S (2006), Field evaluation of cotton genotypes against *Amrasca biguttula biguttula* Ishida. Journal of Cotton Research and Development 20(1):134-136.

Rohini A (2010), Screening of germplasm and evaluation of insecticides for the management of major sucking pests on cotton (*Gossypium hirsutum* L.). Thesis submitted to Acharya N.G.Ranga Agricultural University, Rajendranagar, Hyderabad. pp 52-67.

Satpute U S, Patil V N, Katole S R, Men V B, Bhagwat V R and Thakare A V (1990), Avoidable field losses due to sucking pests and bollworms in cotton. Journal of Applied Zoological Researches 1: 67-72.

Syed T S, Abro G H, Khuhro R D and Dhauroo M H (2003), Relative resistance of cotton varieties against sucking pests. Pakistan Journal of Biological Sciences 6(14):1232-1233.