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Screening of cotton genotypes against leafhopper, *Amrasca biguttula biguttula* (Ishida) (Homoptera: Cicadellidae)

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Abstract
The study was conducted for preliminary screening trial of 350 cotton genotypes for relative susceptibility/resistance against leafhopper, *Amrasca biguttula biguttula* (Ishida) laid out in Department of Cotton, TNAU, Coimbatore during 2014-2015. Among the 350 genotypes screened, no genotypes were found to be resistant, 50 genotypes were categorized as tolerant, 158 genotypes moderately tolerant, 91 genotypes susceptible and 51 genotypes highly susceptible against leafhopper with a population ranged from 0.10 to 0.78, 0.79 to 1.57, 1.58 to 2.36 and 2.37 to 6.25 leafhopper/3 leaves/plant respectively based on the standard deviation value. The trichomes were compared against leafhoppers, incidence of leafhopper was less in high hairy varieties whereas high in less hairy varieties.

Keywords: Cotton, leafhopper, genotypes, screening, susceptibility, resistance

Introduction
Cotton is an important natural fibre crop cultivated in varying climatic conditions of tropics as well as sub-tropic regions of more than 110 countries all over the world. Cotton plays a key role in the national economy in terms of generation of direct and indirect employment in the Agricultural and Industrial sectors. Among the various causes of low productivity of cotton in India, insect pests are one of the major factors. During growth period, 148 insect pests have been recorded on cotton crop, of which only 17 species were recorded as major insect pests [1]. Cotton pests primarily are divided into sucking pests and bollworms. The pests of major significance in cotton are sucking pests like jassids (*Amrasca biguttula biguttula,* Ishida), aphids (*Aphis gossypii*, Glover), whiteflies (*Bemisia tabaci*, Gennadius) and thrips (*Thrips tabaci* Lindeman). Leafhopper undoubtedly is more severe among the many destructive pests of cotton. Cotton jassid is reported to cause 18.78 per cent decline in cotton yield [2]. The plant protection measures adopted to overcome the pest problem in general include the application of insecticides. Chemical control not only creates health hazards and ecological contamination but also induces the resistance in insects and disturbing the balance between the forces of destruction (predators, parasitoids and pathogens) and forces of creation (biotic potential of pests) in agro-ecosystem [3]. Considering the limitations of chemical control, use of natural plant resistance to their pest attack is one of the solutions to overcome the pest problem. A promising line for reducing the losses due to various insect pests therefore lies in the development of agronomically better suited strains or varieties of cotton which would resist the attack major insect pests. Host plant resistance is an important tool of integrated pest management. Host plant resistance depends upon mechanisms as well as components of resistance. Plant resistance affects the behaviour of herbivorous insect pest due to the pest makes decision to accept or reject the food. Due to these provisions plants exhibit immunity, resistance, susceptibility or tolerance against insect pest. Screening trial is used to determine plant resistance against insect pest under field condition. Therefore, the present study was conducted to identify resistant sources against leafhopper. An effort was made to unravel the trichome bases of this resistance.

Material and Methods
Field screening
The experiment to screen cotton germplasm against leafhopper was laid out at Department of

Cotton, Tamil Nadu Agricultural University Coimbatore. A total of 350 cotton genotypes were sown on 19, August, 2014. All the genotypes were screened under unprotected conditions following normal agronomic practices. Three leaves (top, middle and bottom) were selected randomly from 5 plants per plot at 30, 60, 90 and 120 DAS (Days after Sowing) [4]. The population of leafhopper during crop period was converted to mean population per 3 leaves per plant. These values were subjected to statistical scrutiny. Based on the standard deviation values, the germplasm lines were categorized as resistant, tolerant, moderately tolerant, susceptible and highly susceptible [5].

Trichomes bases of resistance

Trichome density was enumerated from the leaves of 20 cotton genotypes that showed low and high levels of incidence of leafhopper in the screening trial. Leaf samples were collected from different cotton germplasm and were cut into one or two square centimetre size. The leaf samples were heated in 20 ml of water in small glass vials for 15 minutes at 85 ºC. Water was decanted and 20 ml of 96% ethyl alcohol was added. The samples were boiled at 80 ºC for 20 minutes. The alcohol was drained and fresh alcohol was added till chlorophyll was removed completely. The leaf samples were then boiled at 85 ºC by adding 90 per cent concentrated lactic acid until the leaf segments were cleared. The vials were cooled and stored for observation. The number of trichomes was counted per cm^2 under the compound microscope at 45 x magnification [6].

Results and Discussion

Field Screening

The incidence of leafhopper in cotton genotypes were observed during *Kharif* season 2014-2015 as shown on Table 1. Based on the standard deviation values, the germplasm lines were categorized as resistant, tolerant, moderately tolerant, susceptible and highly susceptible are shown in (Table 2 and Fig.1). Results of the experiment revealed that, no genotype was found to be resistant. 50 genotypes, *viz*., Okra Leaf, SA 349, C-2682, RA-33-K, JR 23, EC 3, RL-Suseptible, EC-15736, JA1, M 60/A2, D4, 170Xco2M, k 2808, MW-3(P), T-176-6, 521, 530, GREGG, 479/25, 525, 14-2, RS 216, RS 94, Paula, HAR 92, TCH 1820, 547, 549, Halden-4, 561, ll 43, MU-8 X BP-52, 535, ll 56, Bambessssa-49, CO2, LH 95, F408, TCH 1764, TCH 1772, SA344, TCH 1813, EC 5, TCH 1815, Mecilla Acala, PK 1058, 528, 536, Hybea-200 and ll 57 were categorized as tolerant against leafhopper by recording a population ranged from 0.10 to 0.78 leafhoppers per 3 leaves per plant. 158 genotypes moderately tolerant and 91 susceptible genotypes against leafhopper by recording a population ranged from 0.79 to 1.57 and 1.58 to 2.36 leafhoppers per 3 leaves per plant respectively. [5]Screened 95 genotypes in similar manner and reported that none of the genotypes was found resistant, tolerant and moderately tolerant and most of the genotypes were highly susceptible.

The remaining 51 genotypes *viz*., Pelimond Cleveland, RS 4001, SA335,

137-CO-3M, 9(11), D16, I 41, 30-1, 418/49-45F X LSS6/63, LH33, SVPR 2, SA201,

G 4836, Dunn-56, Big Boll Trump, DPL 14, 418/49-45F X LSS4/63, H509, SH469(1-1), TCH 1806, TCH 1808, 134XCO2 Mead, 10(1), 531, 418/49-45F X LSS7/63, SH169, 467 MD, RS277,H386, SH469, RS 267, RS 235, Tzang PO, RS271, Coker, H392, H329, H492, Acala-1577-D, MU2, SA21, SAS15, SICIDS, PRS12, H487, PK 863, Alogodelgs Breans, Hybrid Surat Type, HB61, PR 22 and RS212 were categorized as highly susceptible [7] Reported that Parbhani Kranthi, line 199 and GOH 1 were most preferred by leafhopper. [8]Reported that the pooled nymphal population of the leafhopper was lower in Punjab Padmini (1.87) followed by DOV-91-4 (1.96) and Arka Anamika (1.98) and highest in Pusa Sawani (3.77) [5] Screened 95 genotypes in similar manner and reported that non of the genotypes was found resistant, tolerant and moderately tolerant and most of the genotypes were highly susceptible.

Table 1: Leafhopper incidence in cotton genotypes during *Kharif* 2014-2015

S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant	S. No	Geno types	No./3 leaves/ plant	S. No	Genoty pes	No./3 leaves/ plant
1	MU-8 X BP-52	0.73	19	Zululand Hybrid	2.28	37	537	1.10	55	561	0.68
2	MW-3(P)	0.60	20	47/10	1.10	38	536	0.78	56	563	1.43
3	MW-11	0.23	21	100FX Aelfos	1.15	39	538	1.00	57	564	0.98
4	MW-14	1.03	22	100FX G-ARM	1.58	40	539	0.85	58	589	1.48
5	Okara Trump	1.70	23	134XCO2 Mead	2.65	41	540	0.80	59	590	1.13
6	RA-33-K	0.38	24	170Xco2M	0.55	42	541	1.78	60	602	1.28
7	PAR-NO 20/3	1.40	25	479/25	0.63	43	542	1.53	61	610	0.83
8	RA-35-66	1.50	26	521	0.60	44	543	1.43	62	TCH17 16	2.00
9	RA-33-65	1.05	27	522	1.78	45	544	1.50	63	5143	1.38
10	Reax	0.80	28	523	0.85	46	545	1.33	64	7233	1.43
11	RL-Suseptible	0.40	29	525	0.63	47	547	0.65	65	Glacale	1.75
12	Stone Ville-SA	1.03	30	524	0.85	48	549	0.65	66	A9160/ 23	0.98
13	Stone Ville	1.15	31	527	1.43	49	550	1.40	67	Nectrile ss	1.98
14	SUS-27/2	1.55	32	528	0.78	50	551	1.30	68	Acala-1577-D	3.10
15	T-176-6	0.60	33	529	1.73	51	556	1.93	69	Alabar-7MB	1.28
16	UAMP-59/1	2.20	34	530	0.60	52	553	1.10	70	Alabar-333-55	1.95
17	Wilds-5	2.28	35	531	2.73	53	560	1.28	71	B50	1.25
18	0484-A	1.48	36	535	0.73	54	557	2.03	72	Bambes sssa-49	0.75

S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant
73	BJA-592	1.63	91	Stardel	1.90	109	AC132	1.35	127	Coker-Wilt	1.05
74	BAR-12/8	1.63	92	S-3F	1.13	110	AC133	1.60	128	CT130-10-16	1.93
75	Blight Master	1.45	93	S-450-555	1.58	111	AC136	2.08	129	CT-13-14-15	1.65
76	Bp.52-NC-62	1.98	94	S-622	0.95	112	Acala 3517	1.25	130	Delta Pine-16	1.43
77	Bra203	1.78	95	UPA-5-7-(17)	2.18	113	Acala 911/2	1.83	131	Dunn-56	2.53
78	Buri147	2.13	96	S-5501	1.35	114	AC 100	1.83	132	EC-15099	1.55
79	Cerra(P)	1.43	97	UPA-(62)31	1.55	115	AC 104	1.45	133	EC-15736	0.45
80	Corollina Queen	1.03	98	UPA(62)32	1.30	116	AC 128	1.25	134	Acala-W-29-1	1.00
81	Coker-100 AWR	1.65	99	5(44)	2.25	117	P57/42	2.18	135	C-2682	0.30
82	Coker-124-B	1.70	100	7(33)	1.60	118	546	1.45	136	Halden-4	0.65
83	Delta Pine-15	1.43	101	9(11)	2.40	119	BAR—84	1.03	137	Harts Ville-5	1.00
84	TCH M22	1.43	102	9(17)	1.78	120	TCH 1728	1.50	138	CT 130-10-Delta Extress	1.08
85	Empire-16WR	1.08	103	144F	1.78	121	C34	1.48	139	EC-35556	1.03
86	GREGG	0.60	104	182F	1.53	122	C124	1.75	140	G111-323	1.18
87	KK1543	1.90	105	A-101/63	1.83	123	C222/63	1.50	141	Hancock	0.85
88	Popt	1.50	106	A-678	1.85	124	CO-4B-40-21X	1.13	142	Hybea-200	0.78
89	Sanz Penna-M-58	0.88	107	AC114	1.33	125	Coker-201	1.65	143	Uganda-8-9	0.83
90	Samaru-26-T	1.03	108	AC122	1.83	126	Coker-413	1.10	144	Hybrid Surat Type	4.13

S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant
145	Indone-1	0.93	161	MC Nair-1032	1.53	177	Tzang PO	2.90	193	275/62	0.88
146	I 34	1.45	162	Big Boll Trump	2.53	178	Banda-1	1.98	194	10(1)	2.65
147	I102	0.95	163	Moors Special	0.85	179	CO2	0.75	195	PS-1	2.30
148	I 106	0.95	164	BP- 52-MB-2	0.93	180	Coker	3.03	196	9-68-5	1.60
149	I 41	2.50	165	K 3103	1.05	181	Fergoson	1.33	197	MCU5-2-1	1.63
150	j114	1.73	166	MUB-PUA7-1-4	1.00	182	HB61	4.13	198	D2	1.45
151	JR 23	0.38	167	Pelimond Cleveland	2.38	183	PK688	1.68	199	D4	0.53
152	k51	1.30	168	Alogodelgs Breans	3.75	184	14-2	0.63	200	D16	2.40
153	K 232	0.90	169	DPL 14	2.60	185	19-1	2.35	201	D20	1.15
154	k3216	1.03	170	DPL 15	2.28	186	30-1	2.50	202	PR 22	4.55
155	k 2808	0.55	171	Half and Half	1.75	187	35-4	2.23	203	PRS12	3.60
156	ll 43	0.70	172	Me X Acala	1.55	188	9030-LM	1.05	204	467 MD	2.78
157	ll54046/63	1.00	173	TCH M39	1.23	189	418/49-45F X LSS1/63	1.13	205	SH169	2.75
158	ll 56	0.73	174	PK 863	3.68	190	418/49-45F X LSS4/63	2.20	206	415/49-45F X LSS3/63	2.75
159	ll 57	0.78	175	Stone Ville	1.30	191	418/49-45F X LSS6/63	2.60	207	SH169 ND	0.95
160	M 60/A2	0.50	176	Stone Ville-5-A	1.38	192	418/49-45F X LSS7/63	2.50	208	SH264 ND	1.53

S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant
209	H297	2.33	229	RS265	1.65	249	ASB1	1.50	269	KC2	1.25
210	H420	1.65	230	RS277	2.78	250	J219	0.88	270	Anjali	1.75
211	H423	2.28	231	RS212	6.25	251	J205	1.63	271	RU4/4	0.88
212	H492	3.05	232	RS 267	2.88	252	J207	1.50	272	BSS-53	1.88
213	H334	2.20	233	RS271	3.00	253	F370	1.13	273	SA21	3.13
214	H392	3.03	234	RS 4001	2.38	254	TCH1741	1.88	274	SA205	1.38
215	H494	1.20	235	RS 253	1.13	255	F382	1.38	275	SA145	2.13
216	MU2	3.13	236	RS 225	1.38	256	F408	0.75	276	SA201	2.50
217	JA1	0.45	237	RS284	2.00	257	FSB 3	1.00	277	SA239	1.25

218	H386	2.80	238	RS 75	1.38	258	TCH1742	1.50	278	SA299	1.25
219	H487	3.60	239	RS 252	1.00	259	CRH 014	1.25	279	SA335	2.38
220	H490	1.05	240	RS 216	0.63	260	TCH 1764	0.75	280	SA383	1.38
221	H329	3.03	241	RS 235	2.88	261	NC 17	1.88	281	TCH 1806	2.63
222	H509	2.60	242	RS 94	0.63	262	Okra Leaf	0.25	282	TCH 1807	1.38
223	SH467	2.33	243	LH33	2.50	263	TCH 1772	0.75	283	TCH 1808	2.63
224	SH469(1-1)	2.60	244	LH 68	1.38	264	SVPR 1	2.25	284	SAS15	3.13
225	SH131	1.93	245	LH97	1.25	265	SVPR 2	2.50	285	SAS40	1.13
226	SS264-N	1.58	246	LH 48	2.00	266	TCH 1223	1.75	286	SAS 74	1.63
227	SH469	2.88	247	LH 62	1.13	267	TCH 1302	1.13	287	SA719	1.75
228	SH269	2.25	248	LH 95	0.75	268	TCH 1569	1.13	288	TCH 1809	1.75

S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant	S. No	Genotypes	No./3 leaves/ plant
289	SA 977	1.25	306	Stone Ville 7A	1.75	323	HAR 86	1.25	340	IC 1917SF	1.75
290	SA 1031	1.25	307	SE-42-1-1-47-7	1.38	324	EC 3	0.38	341	TCH 1816	1.13
291	DS 59	1.75	308	Stone Wlle 7A	2.13	325	R8/2	1.00	342	TCH 1818	1.88
292	Parbar American (Cotton)	1.38	309	T82-2 Wilds	2.25	326	HAR 92	0.63	343	Mecilla Acala	0.75
293	Paula	0.63	310	137-CO-3M	2.38	327	HAR 93	1.88	344	TCH 1819	1.25
294	TCH 1810	1.38	311	162/63	1.63	328	EC 2	2.25	345	TCH 1820	0.63
295	SA 972	0.88	312	167/62	1.00	329	HAR 841	1.25	346	PK 1058	0.75
296	SA344	0.75	313	275/62	1.13	330	EC 4	1.00	347	TCH 1821	2.13
297	TCH 1811	1.50	314	DS 28	1.00	331	Tamco+ SP37 H	2.13	348	PK1592	1.00
298	SA 349	0.25	315	TCH 1813	0.75	332	Tamco+SP215	2.00	349	GL5	1.00
299	SA443	1.88	316	SRT 1	1.38	333	TCH 1814	1.00	350	Stone Ville 20	1.50
300	TCH 181	1.38	317	EC 6	1.63	334	Tamco+Camde	1.88		Mean	1.55
301	SA 491	1.38	318	G 4836	2.50	335	1C 263 SF	1.25		SD	0.78
302	SA 578	1.13	319	HAR 82	1.25	336	TCH 1815	0.75			
303	SICIDS	3.13	320	EC 5	0.75	337	IC1 729SF	1.00			
304	Samarlex	1.63	321	HAR 84	0.88	338	IC1 893SF	1.50			
305	Stramp Roof	1.13	322	HAR 85	0.88	339	1903SF	1.13			

*Means of 30, 60, 90 and 120 DAS

Table 2: Reaction of cotton germplasm to leafhopper, *Amrasca biguttula biguttula*

S. No	Level of resistance	Leafhopper population No./3 leaves/plant	Genotypes
1	Resistant	0.01-0.10	Nil
2	Tolerant	0.10-0.78	Okra Leaf, SA 349, C-2682, RA-33-K, JR 23, EC 3, RL-Suseptible, EC-15736, JA1, M 60/A2, D4, 170Xco2M, k 2808, MW-3(P), T-176-6, 521, 530, GREGG, 479/25, 525, 14-2, RS 216, RS 94, Paula, HAR 92, TCH 1820, 547, 549, Halden-4, 561, ll 43, MU-8 X BP-52, 535, ll 56, Bambessssa-49, CO2, LH 95, F408, TCH 1764, TCH 1772, SA344, TCH 1813, EC 5, TCH 1815, Mecilla Acala, PK 1058, 528, 536, Hybea-200, ll 57
3	Moderately Tolerant	0.79-1.57	Reax, 540, 610, Uganda-8-9, 523, 524, 539, Hancock, Moors Special, Sanz Penna-M-58, 275/62, J219, RU4/4,SA 972, HAR 84, HAR 85, K 232, Indone-1, BP- 52-MB-2, S-622, I102, I 106, SH169 ND, 564, A9160/23, 538, Acala-W-29-1, Harts Ville-5, ll54046/63, MUB-PUA-7-1-4, RS 252, FSB 3, 167/62, DS 28, R8/2, EC 4, TCH 1814,IC1 729SF, PK1592, GL5, MW-14, Stone Ville-SA, Corollina Queen, Samaru-26, TBAR—84, EC-35556,k3216, RA-33-65, Coker-Wilt, K 3103, 9030-LM, H490, Empire-16WR, CT 130-10, Delta Extress, 47/10, 537, 553, Coker-413, 590, S-3F, CO-4B-40-21X, 415/49-45F X LSS3/63, RS 253, LH 62, F370, TCH 1302, TCH 1569, SAS40, SA 578, Stramp Roof, 275/62, 1903SF, TCH 1816, Stone Ville, 100FX Aelfos,D20,G111-323, H494, TCH M39, B50, Acala 3517, AC 128, LH97, CRH 014, KC2, SA239, SA299, SA 977, SA 1031, HAR 82, HAR 86, HAR 841, 1C 263 SF, TCH 1819,560, 602,Alabar-7MB, 551,, UPA(62)32, k51, Stone Ville, 545, AC114, Fergoson, S-5501, AC132, 5143, Stone Ville-5-A, RS 225, RS 75, LH 68, F382, SA205, SA383, TCH 1807,Parbar American (Cotton), TCH 1810,TCH 181, SA 491, SE-42-1-1-47-7, SRT 1, PAR-NO 20/3, 550, 527, 543, 563, 7233, Cerra(P),Delta Pine-15, TCH M22, Delta Pine-16, Blight Master, AC 104, 546, I 34, D2, 0484-A, 589, C34,RA-35-66, 544, Popt, TCH 1728, C222/63, ASB1, J207, TCH1742, TCH 1811, IC1 893SF, Stone Ville 20, 542, 182F, MC Nair-1032, SH264 ND, SUS-27/2, UPA-(62)31, EC-15099, Me X Acala

S. No	Level of resistance	Leafhopper population No./3 leaves/plant	Genotypes
4	Susceptible	1.58-2.36	100FX G-ARM, S-450-555, SS264-N, 7(33), AC133, 9-68-5, BJA-592, BAR-12/8, MCU5-2-1, J205, SAS 74, Samarlex, 162/63, EC 6, Coker-100 AWR, Coker-201, CT-13-14-15, H420, RS265, PK688,Okara Trump, Coker-124-B, 529, j114, Glacale, C124, Half and Half, TCH 1223, Anjali, SA719, TCH 1809, DS 59, Stone,Ville, 7A, IC 1917SF, 522, 541, Bra203, 9(17), 144F, A-101/63, AC122, Acala 911/2, AC 100, A-678, TCH1741, NC 17, BSS-53, SA443, HAR 93, Tamco+Camde, TCH 1818,KK1543, Stardel, 556, CT130-10-16,SH131, Alabar-333-55, Nectriless, Bp.52-NC-62, Banda-1,TCH1716, RS284, LH 48, Tamco+SP215, 557, AC136, Buri147, SA145, Stone Wlle 7A, Tamco+ SP37 H, TCH 1821, UPA-5-7-(17), P57/42, UAMP-59/1, 418/49-45F X LSS1/63, H334, 35-4, 5(44), SH269, SVPR 1, T82-2 Wilds, EC 2, Wilds-5, Zululand Hybrid,DPL 15, H423, PS-1, H297, SH467 and 19-1
5	Highly Susceptible	>2.37	Pelimond Cleveland, RS 4001, SA335, 137-CO-3M, 9(11), D16, I 41, 30-1,,418/49-45F X LSS6/63, LH33, SVPR 2, SA201, G 4836, Dunn-56, Big Boll Trump, DPL 14, 418/49-45F X LSS4/63, H509, SH469(1-1), TCH 1806, TCH 1808, 134XCO2 Mead, 10(1), 531, 418/49-45F X LSS7/63, SH169, 467 MD, RS277,H386, SH469,, RS 267, RS 235, Tzang PO, RS271, Coker, H392, H329, H492, Acala-1577-D, MU2, SA21, SAS15, SICIDS, PRS12, H487, PK 863,

Rohini *et al*. (2011), screened 16 genotypes and they identified that 4085 were resistance and LK-861 was susceptible to cotton leafhopper

Trichomes bases of resistance

The data on trichomes density of different cotton germplasm against leafhoppers, are presented in Table 3 and Plate 1. Results revealed the incidence of leafhopper was less in high hairy varieties whereas high in less hairy varieties. Less number of hairs were observed in germplasm RS212 (145 hairs per cm^2) followed by hybrid surat type (216 hairs per cm^2), 137-CO-3M (272 hairs per cm^2), acala-1577-D (309 hairs per cm^2) and MU2 (314 hairs per cm^2) with population of 6.25, 4.13, 2.38, 3.10 and 3.13 per 3 leaves per plant respectively. Highly dense hairs were observed in M 60/A2 (722 hairs per cm^2) followed by MW-11 (692 hairs per cm^2), Mecilla acala (691 hairs per cm^2), TCH1820 (689 hairs per cm^2) and PK 1058 (678 hairs per cm^2) with population of 0.50, 0.23, 0.75, 0.63 and 0.75 per 3 leaves per plant respectively. [9]Reported that the degree of jassid resistance, had definite correlation with the pilosity of the plant. The more tufted types were less prone to jassid attack.

Conclusion

I would like conclude that, I have screened 350 cotton germplasm based on the standard deviation values, the germplasm lines were categorized as resistant, tolerant, moderately tolerant, susceptible and highly susceptible against leafhopper. The populations of leafhopper were varied according to number of hairs on the leaves. The trichomes were compared against leafhoppers, incidence of leafhopper was less in high hairy varieties whereas high in less hairy varieties.

Table 3: Trichomes density in cotton genotypes and leafhopper incidence

Genotype	*No. of trichomes/cm^2	No. of leafhopper/3 leaves/plant
RS212	145.3	6.25
Hybrid surat type	216.1	4.13
137-CO-3M	272.7	2.38
Acala- 1577-D	309.3	3.10
MU2	314.1	3.13
Alogodelgs brean	408.2	3.75
HB 61	421.1	4.13
Zululand hybrid	508.7	4.13
PK863	518.3	3.68
Wilds 5	521.3	2.28
134 X CO2	542.4	2.38
J207	548.7	1.50
GL5	560.5	1.00
MW-3 (p)	617.3	0.60
BSS-53	645.1	1.88
PK 1058	678.4	0.75
TCH1820	689.3	0.63
Mecilla acala	691.4	0.75
MW-11	692.3	0.23
M 60/A2	722.4	0.50

*Mean of three replications

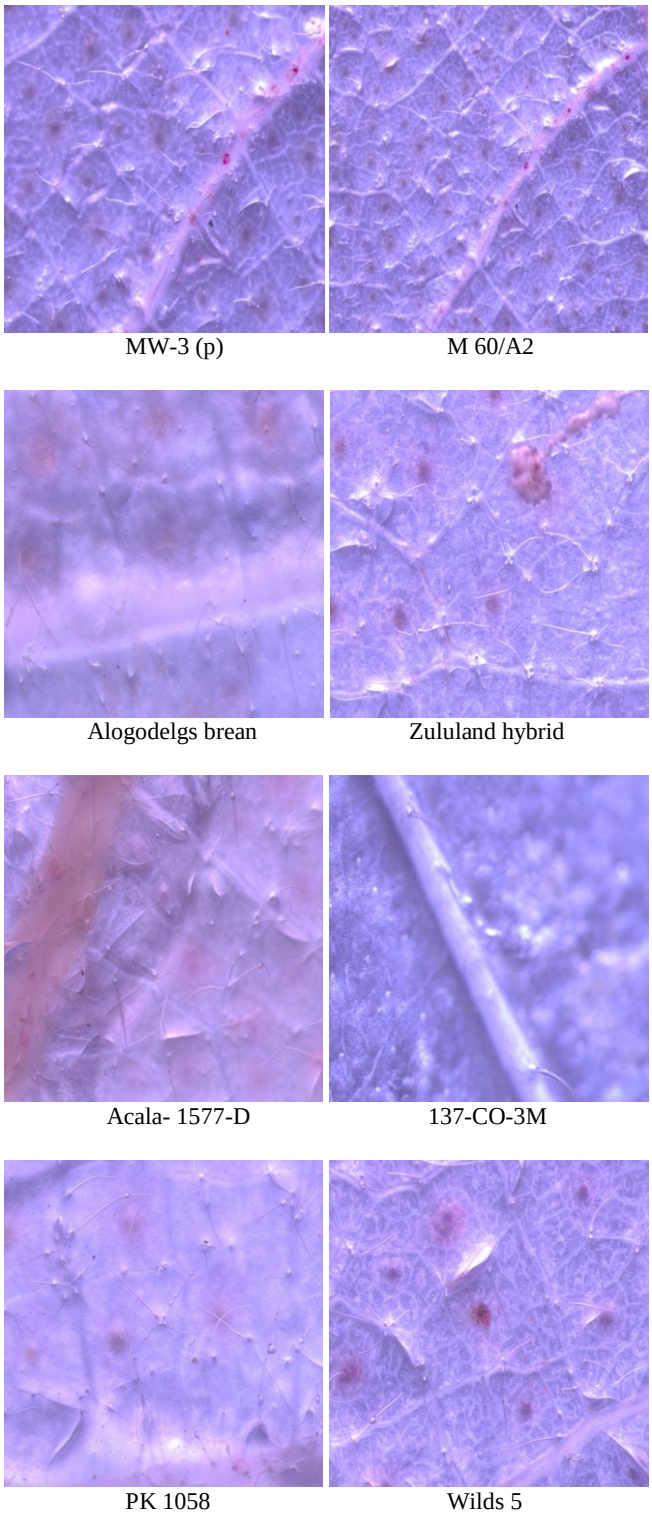

Plate 1: Trichomes observation on different cotton germplasm against leafhopper

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References

1. Abbas MA. General Agriculture. Publication Emporium 2nd edition Pakistan, 2001, 352.
2. Ali A. Physio-chemical factors affecting resistance in cotton against jassid, *Amrasca devastans (Dist.)* and thrips, *Thrips tabaci (Lind.)* in Punjab, Pakistan. Ph.D Thesis., Dept. Entomol., Univ Agric., Faisalabad. 1992, 430.
3. Sorejani M. Current trend in pesticide usage in some Asian countries. Rev. Appl. Entomo. 1998; **77**:219-234.
4. Rohini A, Prasad NV, Chalam MS, Veeraiah K. Identification of suitable resistant cotton genotypes against sucking pests. J. Ent. Res. 2011; 35(3):197-202.
5. Rajashekar K, Chiranjeevi CH, Ratnasudhakar T. Screening of germplasm against okra, *Abelmoschus esculentus* L. sucking pests. *Pestology*, 2010, 34.
6. Merdelyn CL, Emilian NB. Mechanism of resistance of eggplant (*Solanum melongena* Linn.) to the cotton leafhopper, *Amrasca biguttula biguttula* (Ishida) II, morphological and biochemical factors associated with resistance. Phillipp. J. Crop Sci. 1990; 15(2):79-84.
7. Srinivasa N, Sujeetha G. Field screening of certain okra varieties for resistance against major pests. Insect Environ. 2001; **7**(2):74-78
8. Manish Kumar, Singh AK, Kumar M. Varied resistaance of okra against cotton jassids, *A. biguttula biguttula* under field conditions. Annals of Plant Protection Sciences. 2002; 10(2):381-383.
9. Sikka SM, Sahni VM, Butani. Studies on jassid resistance in relation to hairiness of cotton leaves. *Euphytica*. 1966; 15:383-388