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Jassid Resistant Variety CR1S-7A

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Abstract: CRIS-7A as jassid resistant variety requiring one or two less insecticide applications for control. However maximum population of whitefly was observed on this variety indicating the positive correlation of hairiness and whitefly attack. CRIS-7A recorded minimum bollworm damage percent as compared to commercial checks NIAB-78 and CRIS-9. CRIS-7A also has proved as boll rot disease resistant and seedling rot disease tolerant variety when compared with other advance strains and standards. This variety has proved itself among the high yielding varieties also.

Key words: Cotton, *Amrasca devastans*, leaf hairiness, host plant resistance

Introduction

Many cotton growers depend on chemical insecticides for controlling jassid. However, the use of pesticides has led to problems such as development of resistance and resurgence of secondary pests. Therefore there is need for exploring alternate methods to manage this pest. The cultivated cottons, *G. arboreum* and *G. tomentosum*, *G. armourianum* and *G. raimondii* are resistant to jassid (Narayanan and Singh, 1994). The hairiness in these wild species is attributed for the resistance of jassid (Santhanam, 1958). Development of varieties resistant to sucking pests especially jassid, remained the significant feature of the research conducted for cotton protection in India and Pakistan since long. Shah (1974) found M-4 slightly resistant, Qalandri (H-59-1) and S-61-30/8 resistant and M-100, Sarmast (S-59-1) and S-64-15 as the most susceptible to jassid. He also expressed that resistant varieties are more hairy than susceptible ones. Javed (1994) studied the resistance of upland cotton to jassid in selection to hairiness on cotton varieties of Sindh and concluded that all the varieties showing resistance were hairy. Hussain (1984) indicated that hair density and length of hair on abaxial surface of the leaf are the major factors, which contribute to jassid resistance. Agarwal *et al.* (1978) reported that leaf hairiness is the only recognizable morphological attribute, which is closely linked with resistance of jassid. They also explained various mechanisms of resistance to jassid in cotton by reviewing different morphological, anatomical and biochemical basis of resistance. Ahmed (1980) opined that hair density of mid rib, leaf lamina and length of hair on mid rib and lamina contribute towards resistance to jassid and susceptibility to whitefly. Referring the previous studies on jassid resistance, Central Cotton Research Institute, Sakrand exploited hairiness character extensively and developed a new densely hairy variety CRIS-7A through conventional breeding by crossing densely hairy variety Rajhans from India and local variety NIAB-78. These studies were under taken to assess CRIS-7A against insect pest resistance, yield and fiber quality characters.

Materials and Methods

CRIS-7A (densely hairy variety) which is cross between an exotic hairy variety Rajhans from India and NIAB-78 a local commercial variety. To confirm its resistance against sucking insects and bollworms, the host plant and disease resistance trials were conducted (without any pesticide application) at CCRI, Sakrand during 1997 and 1998 crop seasons. The seedcotton yield comparison trials like zonal varietal and demonstration trials were also conducted to assess the yield potential of CRIS-7A against other candidate strains and commercial varieties during 1997 and 1998 seasons. All the trials had randomized complete block design with four replications. Recommended agronomic practices (hoeing,

weeding, interculturing, plant to plant and row to row spacing) including fertilizer application were carried out during the experimentation period.

Results and discussion

Host plant resistance trial: Minimum population of trips and jassid was recorded from CRIS-7A (Table 1) that hairiness provides resistance against jassid.

The maximum population of these pests (trips and jassid) recorded was 4.52 and 2.0 from CRIS-105 and CRIS-5A respectively. The population of trips and jassid recorded from commercial varieties CRIS-9 and NIAB-78 was significantly higher than CRIS-7A. As regards whitefly, the hairy variety CRIS-7A recorded maximum population proving positive correlation of hairiness and whitefly attack. Non-significant results were observed when bollworm damage percent was recorded. This hairy variety CRIS-7A recorded minimum bollworm damage percent as compared to commercial varieties CRIS-9 and NIAB-78.

As regards seedcotton yield, non-significant differences were observed between the varieties. None of the compared varieties/strains surpassed commercial variety CRIS-9. However, CRIS-7A with 2196 kg ha⁻¹ surpassed other commercial variety NIAB-78 that produced 1435 kg ha⁻¹ seedcotton yield. It can safely be concluded from the data of Table 1 that CRIS-7A is complete jassid resistant strain and also tolerate trips and bollworm attack. Being densely hairy variety CRIS-7A is susceptible to whitefly but can be listed among the high yielding varieties because it has surpassed NIAB-78 the widely grown variety in Sindh.

Disease resistance trial: CRIS-7A was found tolerant variety against seedling rot disease after CRIS-19 and CRIS-121 during 1997 and after CRIS-121 during 1998. As regards boll rot disease, CRIS-7A recorded minimum percent of the disease during both the years. When number of bolls/plant was observed, CRIS-7A produced highest bolls/plant during 1997. In the year 1998 this variety was among the second best varieties and produced 23 bolls/plant, however CRIS-121 recorded 27 bolls and ranked first during 1998. As regards seedcotton yield, on an average of two years, CRIS-7A ranked third by producing 2605 kg ha⁻¹. The highest seedcotton yield was produced by CRIS-121 followed by CRIS-9 the standard. The second standard variety Tamcot gave 2246 kg ha⁻¹ seedcotton yield (Table 2).

Yield Trials

Zonal Varietal Trial: The average seed cotton yield data are presented in Table 3. During 1994 CRIS-7A yielded minimum but statistically the results were non-significant. CRIS-7A ranked second in the year 1995 and was statistically at par with CRIS-9 (check) and CRIS-107. The second check variety NIAB-78 yielded

Table 1: Natural resistance of CRIS-7A and other newly developed strains against insect pest complex during 1997-98 cotton season at CCRI, Sakrand

Varieties/ Strains	Per leaf population of sucking pests			Bollworm damage (%)	Live larvae (%)	Seedcotton Yield (kg ha ⁻¹)
	Trios	Jassid	Whitefly			
CRIS-7A	1.67 d	0.29 d	6.68 a	4.22 a	0.72 ab	2196 a
CRIS-134	1.94 cd	0.56 c	3.34 ab	4.94 a	0.81 ab	2010 a
CRIS-54	2.06 bc	1.60 bc	4.42 ab	4.35 a	0.59 abc	2009 a
CRIS-19	2.20 abc	1.68 bc	4.46 ab	4.69 a	0.71 ab	1722 a
CRIS-82	2.10 abc	1.83 ab	3.35 ab	4.49 a	0.78 ab	2011 a
CRIS-52	3.32 ab	1.88 a	6.55 ab	4.24 a	0.38 abc	1722 a
CRIS-56	2.35 abc	1.87 ab	5.47 ab	4.96 a	0.87 a	2290 a
CRIS-105	4.52 a	1.87 ab	5.48 ab	4.76 a	0.36 abc	2293 a
CRIS-5A	2.20 abc	2.00 a	2.29 ab	4.14 a	0.13 c	1722 a
CRIS-107	2.22 abc	1.64 bc	1.14 b	4.48 a	0.70 ab	2009 a
CRIS-83	3.40 ab	0.56 c	1.13 b	4.42 a	0.49 abc	2291 a
NIAB-78	3.41 ab	0.56 c	1.18 b	4.27 a	0.56 abc	1435 a
CRIS-9	3.37 ab	0.57 c	2.26 ab	4.45 a	0.57 abc	2296 a

Means followed by similar letters are not significantly different from each other according to DMR test

Table 2: Natural resistance of CRIS-7A and other newly developed strains against seedling rot and boll rot diseases during 1997 and 1998 cotton seasons at CCRI, Sakrand

Varieties/ Strains	Seedling rot (%)		Boll rot (%)		Bolls/plant		Seedcotton yield (kg ha ⁻¹)		
	1997	1998	1997	1998	1997	1998	1997	1998	Average
	CRIS-7A	1.57	4.3	8.7	3.2	35	23	3497	1712
CRIS-5A	2.74	5.9	8.8	4.1	31	23	2759	1651	2205
CRIS-19	0.94	6.0	11.1	3.9	28	20	2759	1558	2159
CRIS-83	1.51	7.7	10.8	3.1	30	22	3093	1741	2417
CRIS-107	3.34	7.2	9.4	3.6	24	21	2286	1374	1830
CRIS-121	1.93	4.1	10.4	3.5	30	27	3631	1834	2733
CRIS-127	2.44	8.3	9.4	3.4	32	21	3228	1558	2393
CRIS-129	1.98	8.1	9.8	3.3	30	23	2690	1651	2171
CRIS-9	2.34	4.3	7.8	3.4	33	23	3497	1773	2635
Tamcot	4.65	7.3	9.2	4.3	22	21	3362	1130	2246

Table 3: Performance of CRIS-7A and other advance strains in zonal varietal trials conducted during 1994 through 1996

Varieties/ Strains	Seedcotton yield (kg ha ⁻¹)			
	1994	1995	1996	Average
CRIS-7A	1555 a	2791 ab	2093 b	2146
CRIS-78	2153 a	3070 a	2392 a	2538
CRIS-107	2309 a	2791 ab	2392 a	2497
NIAB-78	1607 a	2551 b	2033 b	2064
CRIS-9	1950 a	2791 ab	2063 b	2268

Means followed by similar letters are not significantly different from each other according to DMR test

Table 4: Performance of CRIS-7A and other advance strains in demonstration trials during 1997 and 1998 cotton season at CCRI, Sakrand

Varieties/ Strains	Seedcotton yield (kg ha ⁻¹)			Seedcotton yield (mounds/acre)		
	1997	1998	Average	1997	1998	Average
CRIS-7A	2538	861	1700	27.5	9	18.3
CRIS-5A	2991	2239	2615	32.5	24	28.3
CRIS-19	4101	1981	3041	44.5	22	33.3
CRIS-52	3218	1894	2556	35.0	21	28.0
CRIS-54	3036	1636	2336	33.0	18	25.5
CRIS-56	3059	2411	2735	33.2	26	29.6
CRIS-78	2697	2067	2397	29.0	22	25.5
CRIS-79	2742	775	1759	29.7	8	18.9
CRIS-82	2833	2067	2450	30.8	22	26.4
CRIS-83	3127	2067	2597	34.0	22	28.0
CRIS-85	2923	1894	2409	31.7	21	26.4
CRIS-105	2470	2153	2312	26.8	23	24.9
CRIS-107	2130	1981	2056	23.0	22	22.5
CRIS-110	2289	1808	2049	24.8	20	22.4
CRIS-133	3059	2450	2755	33.2	27	30.1
CRIS-134	2379	2463	2421	25.8	27	26.4
N1AB-78	2289	1931	2110	24.8	21	22.9
CRIS-9	2379	2017	2198	25.8	22	23.9

lowest. During 1996, CRIS-7A out yielded both commercial varieties but statistically was of the same order. On an average of three years CRIS-7A defeated NIAB-78 (check) but was slightly behind the second check variety CRIS-9. Thus keeping in view the average performance of CRIS-7A in yield comparison tile's, this hairy variety can be listed among high yielding varieties with the extra benefit of one or two reduced sprays against jassid.

Demonstration Trials: Table 4 revealed that CRIS-7A during 1997 season out yielded six varieties including two standards CRIS-9 and NIAB-78. But in the year 1998 due to very poor plant population of CRIS-7A and CRIS-79 these varieties remained far behind other varieties and two commercial checks. However CRIS-7A has proved as jassid resistant variety and requires one or two less insecticide applications against this pest.

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