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Progress with Varietal Development at CCRI, Sakrand Sindh

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Abstract: Four promising strains viz. CRIS-19, CRIS-82, CRIS-133 and CRIS-134 developed by CCRI, Sakrand along with 12 other strains of Punjab were included in this trial for their yield and insect resistance performance. In Sindh Region first three positions out of sixteen were secured by Sakrand varieties having 36 percent advantage of seed cotton yield over NIAB-78, the check variety. In Multan Region Sakrand variety CRIS-134 securing fourth position yielded 5.8 percent more seed cotton, whereas in Faisalabad Region Sakrand variety CRIS-19 with second position produced 31.9 percent more yield than NIAB-78 the check variety. On an average of 16 locations the three top yielding Sakrand varieties CRIS-134, CRIS-19 and CRIS-82 produced 18.9, 17.4 and 16.3 percent more seed cotton yield respectively than NIAB-78, the check variety. Minimum whitefly attack was observed on Sakrand varieties CRIS-82 and CRIS-19, whereas minimum bollworm damage percent was recorded in CRIS-82 at Multan. At Sakrand minimum jassid attack was observed on CRIS-82.

Key words: Adaptability, Genotype \times Environment interaction, Host plant resistance

Introduction

Evolution of high yielding varieties with desirable fiber properties and resistance to prevailing insect pests and diseases plays very important role in boosting up cotton production. Cotton genotypes behave differently under different environmental conditions. Some adapt readily and perform well under the changed conditions, while the others fail to do so. When varieties are compared under series of environments, the relative ranking usually differ which result difficulty in demonstrating the significant superiority of any variety. The breeders look forward to such varieties, which respond well under varied conditions and preferably under the adverse conditions.

Sharif and Ahmad (1978) stated that there are two major factors for determining the yield of any crop species (a) genetic make-up (b) environmental factors and their interaction. Soomro and Memon (1979) recorded highly significant differences in yield due to varieties and year components but found significant differences in ginning outturn due to varieties only. Gupta and Katiyar (1980) reported highly significant seasonal effects on seed cotton yield, number of bolls per plant, boll size and staple length due to significant genotype \times environment interaction component.

Ahmad *et al.* (1982) obtained highly significant differences in yield of upland cotton due to variety, location and year components. Meredith (1984) reported highly significant seasonal effects on seed cotton yield, number of bolls per plant, boll size and staple length due to significant genotype \times environment interaction component. Soomro *et al.* (1986) reported significant differences in yield, ginning outturn percentage and staple length for varieties, locations and years. Khan *et al.* (1989) observed significant differences in yield, ginning outturn percentage and staple length for varieties and years, while variety and year interaction remained non-significant in upland cotton experiments. These studies were conducted to assess the performance/adaptability of the advance strains developed by different breeders in different zones/locations of the country.

Materials and Methods

Pakistan Central Cotton Committee lays out National Coordinated Varietal Trials (final stage of variety test) at 20 to 22 locations of the country every year. The objective of conducting these trials is to test the promising strains developed by the breeders and to screen the most promising strains under various ecological conditions of cotton growing tracts of the Punjab, Sindh and

NWFP. Every year sixteen most promising strains are coded (V1 to V16) by Director of Research, PCCC and sent to various Research Institutes and Stations for laying out the yield and insect resistance trials.

Central Cotton Research Institute, Sakrand situated in Central Sindh is engaged in varietal evolution process considering the various needs of growers, gingers and spinners. Consequently the Institute has evolved a high yielding variety CRIS-9, which was released in 1992 for commercial cultivation in whole of Sindh Province. In present studies during 1997-98 cotton season four promising strains developed by CCRI, Sakrand were also included in National Coordinated Varietal Trials (NCVT) to assess their per hectare yield and insect resistance against check variety NIAB-78. Although the trial was conducted at 21 locations of Sindh, Punjab and NWFP but the yield results were received from 16 locations i.e. six locations of Sindh, seven of Multan and three of Faisalabad Regions. The trial at other five locations was vitiated due to rain or other reasons. The insect resistance trial was conducted only on two locations viz. CCRI, Sakrand and Multan. The data were subjected to Duncan's Multiple Range Test to compare the statistical differences between the strains.

Results and Discussions

Yield trials: All the four strains developed by CCRI, Sakrand were among the five top yielding varieties when the data of six locations of Sindh were averaged. CRIS-19 ranked first by producing 2578 kg/ha seed cotton followed by CRIS-134 (2543 kg/ha), CRIS-82 (2386 kg/ha). A new strain from Sahiwal, SLH-171 ranked fourth with 2204 kg/ha and again Sakrand variety CRIS-133 ranked fifth with 2190 kg/ha. The highest yielding Sakrand variety CRIS-19 yielded 36.7 percent more seed cotton than NIAB-78, the check variety (Table 1).

In Multan Region, on an average of seven locations, Sakrand varieties were among the top six strains. Highest yield of 2786 kg/ha was obtained from Bahawalpur strain 8H-95, followed by CIM-435 (2572 kg/ha) and FS-643 (2543 kg/ha). Sakrand variety CRIS-134 produced 2449 kg/ha seed cotton yield and ranked fourth, this variety secured second position in Sindh Region also. Again Sakrand variety CRIS-19 ranked sixth and produced 2400 kg/ha, this variety secured first position in Sindh Region also. The fourth highest yielding Sakrand variety CRIS-134 produced 5.8 percent more seed cotton yield than NIAB-78, the check variety (Table 2).

The results of Faisalabad Region (Table 3) revealed that on an average of three locations, Sakrand varieties secured second,

Table 1: Seed cotton yield (kg/ha) of NCVT conducted in Sindh Region during 1997-98

Code No.	Name of Strain	ARI, Tandojam	AEARC, Tandojam	CRSS, Kotdiji	CRS, M. Khas	CRI, Sakrand	CRS, Ghotki	Average of six locations
V1	CR1S-82	2063	2191	1929	1570	4545	2017	2386 ab
V2	CRIS-19	2745	2386	2467	1615	4704	1549	2578 a
V3	CIM-435	1444	2198	1256	1121	2201	1823	1674c
V4	CIM-443	637	1794	556	1076	2488	1753	1384 d
V5	CRIS-133	1911	1891	1659	1435	4449	1794	2190 b
V6	NIAB-78	1740	2038	1516	1255	3061	1707	1886 c
V7	BH-95	2440	1911	2108	1570	2583	1920	2089 bc
V8	VH-53	2224	2350	1902	1255	2631	1,689	2008 bc
V9	CR1S-134	2781	1758	2377	1660	4832	1847	2543 a
V10	RH-308	2323	1794	2045	1390	2822	1893	2045 bc
V11	MNH-427	1381	1776	1273	987	3396	1670	1747c
V12	B-630	2269	1830	2072	1390	2727	2044	2055 bc
V13	DNH-40	2206	1973	1973	1524	3540	1883	2183 b
V14	FS-643	2332	1749	2090	1435	2440	1963	2002 bc
V15	MNH-465	1687	2045	1507	1300	2201	1640	1730 c
V16	SLH-171	2457	2135	2260	1345	3253	1775	2204b

Table 2: Seed cotton yield (kg/ha) of NCVT conducted in Multan Region during 1997-98

Code No.	Name of Strain	CCRI, Multan	Jhandir farm Mailsi	PSC, farm Khanewal	CRS, Baha-walpur	CRS, R.Y. Khan	CRSS, Haroon abad	Thatta Gurmani farm	Average of seven locations
V1	CRIS-82	2039	2199	1788	2843	2726	2321	2192	2301c
V2	CRIS-19	2505	2257	2022	2232	3037	2346	2403	2400 ab
V3	CIM-435	2532	2793	2138	2682	2732	2879	2560	2572 bc
V4	CIM-443	2929	3013	2731	2251	2155	1903	1932	2416 b
V5	CMS-133	884	1463	1769	1166	3113	1597	1603	1656 a
V6	NIAB-78	1852	2458	2075	2305	2840	2349	2328	2315c
V7	BH-95	2703	2793	1722	3516	3367	2855	2543	2786 a
V8	VH-53	1530	2075	1664	2697	2503	2226	2226	2132 d
V9	CR1S-134	2084	2726	2425	2870	2445	2303	2290	2449 b
V10	RH-308	1512	2429	1549	1812	2602	2861	2523	2183.d
V11	MNH-427	1592	2372	1626	1740	2721	2830	2546	2204 d
V12	B-630	2361	2625	1598	2816	3024	2118	2120	2379 bc
V13	DNH-40	2442	2482	1913	2108	2916	2125	2321	2372 bc
V14	FS-643	2438	2740	1769	3381	3008	2364	2102	2543 ab
V15	MNH-465	1728	2224	1578	1964	3134	2149	2124	2129 d
V16	SLH-171	2349	2611	1750	2566	3008	2272	2229	2398 b

Table 3: Seed cotton yield (kg/ha) of NCVT conducted in Faisalabad Region during 1997-98

Code No.	Name of Strain	ARSS, Jhang	Risalewala Farm	CRS, Sahiwal	Average of three location	Overall average sixteen location
V1	CRIS-82	592	1649	2014	1397 ab	2028
V2	CRIS-19	929	1421	1238	1196 bc	2058
V3	CIM-435	835	1134	1187	1052 bc	1766
V4	CIM-443	371	1285	1420	1025 bc	1608
V5	CRIS-133	287	1470	362	706 c	1517
V6	NIAB-78	647	1402	1127	1059 bc	1753
V7	BH-95	795	1149	1160	1035 bc	1970
V8	VH-53	736	1081	2159	1325 ab	1822
V9	CRIS-134	899	1267	1618	1261 ab	2084
V10	RH-308	489	1263	513	755c	1661
V11	MNH-427	489	1072	537	699 c	1550
V12	B-630	1003	1143	1159	1102 bc	1845
V13	DNH-40	653	1158	933	915 bc	1823
V14	FS-643	1181	1276	1957	1471 a	2005
V15	MNH-465	450	1075	588	704 c	1521
V16	SLH-171.	914	1143	1440	1166 bc	1923

Means in columns having similar letters do not statistically differ from each other according to DMR test

Table 4: Host plant resistance studies of NCVT at CCRI, Sakrand and Multan during 1997-98

Code No.	Name of Strain	No. of sucking pests/leaf			No. of sucking pests/leaf			Bollworm damage (%)	
		Sakrand			Multan			Sakrand	Multan
		Thrips	Jassid	Whitefly	Thrips	Jassid	Whitefly		
V1	CRIS-82	2.82	0.35	0.48	1.6	3.0	4.1	3.17	5.2
V2	CRIS-19	2.47	0.46	0.57	2.2	3.0	4.6	2.73	8.0
V3	CIM-435	2.55	0.53	0.40	3.6	3.9	7.4	4.05	13.8
V4	CIM-443	2.48	0.52	0.44	2.9	2.7	6.2	3.53	10.9
V5	CRIS-133	2.96	0.93	0.38	1.9	4.1	5.7	2.57	7.6
V6	NIAB-78	2.63	0.65	0.30	2.1	3.8	4.9	4.70	9.5
V7	BH-95	2.83	0.54	0.43	2.7	3.8	4.8	4.47	8.5
V8	VH-53	2.54	0.63	0.26	3.6	5.2	6.2	5.01	9.6
V9	CRIS-134	2.73	0.42	0.69	2.1	4.2	5.2	4.23	6.4
V10	RH-308	3.19	1.04	0.68	3.5	3.7	9.6	4.47	9.3
V11	MNH-427	2.55	1.17	0.78	2.0	2.1	7.8	3.70	8.9
V12	B-630	2.63	0.81	0.59	2.7	3.9	5.2	4.63	10.1
V13	DNH-40	3.03	0.47	0.61	2.2	2.5	7.5	4.80	9.4
V14	FS-643	2.39	0.47	0.46	3.2	3.2	5.6	2.67	6.5
V15	MNH-465	2.92	0.60	0.65	2.0	3.6	6.3	5.73	11.6
V16	SLH-171	2.86	0.49	0.51	2.9	3.4	7.0	5.37	6.6

fourth and fifth positions maintaining their superiority in seed cotton yield and adaptability in whole of Sindh and Punjab provinces. Highest seed cotton yield of 1471 kg/ha was produced by Faisalabad variety FS-643 in Faisalabad Region followed by CRIS-82 (1397 kg/ha), VH-53 (1325 kg/ha), CRIS-134 (1261 kg/ha) and CRIS-19 (1196 kg/ha). The second best yielding Sakrand variety CRIS-19 produced 31.9 percent more seed cotton than NIAB-78, the check variety.

When data of all the 16 locations were overall averaged (Table 3), Sakrand varieties CRIS-134, CRIS-19 and CRIS-82 secured first three positions by producing 2084, 2058 and 2028 kg/ha seed cotton yield respectively. Faisalabad variety FS-643 ranked fourth (2005 kg/ha) and Bahawalpur variety BH-95 ranked fifth (1970 kg/ha). The three top yielding CRIS varieties CRIS-134, CRIS-19 and CRIS-82 produced 18.9, 17.4 and 16.3 percent more seed cotton yield respectively than NIAB-78.

Host plant resistance trials: Sixteen most promising strains of Sindh and Punjab were evaluated for their tolerance/susceptibility against thrips, jassid, whitefly and bollworm damage under unsprayed block at CCRI, Sakrand and Multan. The data presented in Table 4 revealed that at Sakrand, minimum population of thrips (2.39) was recorded on FS-643 followed by Sakrand variety CRIS-19 (2.47). Minimum population of jassid (0.35) was also recorded on Sakrand variety CRIS-82, whereas minimum population of whitefly (0.26) was recorded on VH-53 followed by NIAB-78 and Sakrand variety CRIS-133. Minimum bollworm damage (2.57%) was observed on CRIS-133 followed by FS-643 and again Sakrand variety CRIS-19.

The host plant resistance data of CCRI, Multan (Table 4) revealed that Sakrand varieties CRIS-82 and CRIS-133 encountered minimum attack of thrips, whereas jassid attack was also on lower level on Sakrand varieties CRIS-82 and CRIS-19. Minimum

whitefly population 4.1 and 4.6 was also observed on Sakrand varieties CRIS-82 and CRIS-19 respectively. Similarly minimum bollworm damage of 5.2 and 6.4 percent was also recorded on Sakrand varieties CRIS-82 and CRIS-134 respectively. Now it can safely be concluded that Sakrand varieties have shown marvelous yield as well as insect resistance performance against NIAB-78 the check variety and also against other promising varieties of Punjab.

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