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Approval and commercial release of conventional, yielding, early maturing and heat tolerant with desirable fiber traits variety CIM-554

Khan Idrees Muhammad, Shehzad Fazal, Husain Khadim
Head Plant Breeding Section, Central Cotton Research Institute, Multan

Authors' Contribution All the authors have contributed equally.

*Corresponding Author's Email Address peer6000@gmail.com

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ABSTRACT

Changes in the environment including heat and drought significantly declined the production of cotton. CCRI,. Multan developed a new variety CIM-554 through hybridization in this scenario. There is significantly higher yields recorded in advance varietal and agro-climatic Trials at farmers' fields and Govt. Farms in four consecutive years (2005-2008). In varietal trials, CIM-554 gave 20.2%, 14.5%, 12.6%, 12.8%, 22.7%, and 28.4%, increase- over commercial varieties MNH-786, CIM-534, CIM-496 NIAB-111, CIM-506 and CIM-499 respectively for seed cotton yield. In Zonal varietal trials (2007-08), CIM-554 gave a 4.9% higher yield of seed cotton over standard while in 2008-09, CIM-554 gave 21.8% higher seed cotton over the standard i.e CIM-496. CIM-554 exceeded commercial variety CIM-499 during 2004-05 in Punjab in National level Trial i.e. NCVT. CIM-554 had possessed desirable traits with high ginning GOT %age, better fiber qualities, and spinning qualities. Commercial cultivation of this variety significantly contributed to the overall cotton production as well as it can be used as valuable.

Keywords: Cotton, conventional, early maturing, yield, upland cotton.

INTRODUCTION: Cotton is a cash crop and is a vital source of raw material to the textile industry. The cotton production is declined to 1% in Gross Domestic Production and it contributed to 5.1 % in agriculture value addition. This year production of cotton massively declined, therefore, it maintained supply chain for cotton textile industry, the import of raw cotton during July has increased to 345.363 thousand tonnes compared to 97.354 thousand tones within same period last year showing a growth of 254.75 % while in value terms it reached to US$ 588.236 million against US$ 224.647 million witnessing the growth of 161.85%. 2015-16, the cotton crop was sown on an area of 2917 thousand hectares, showing a decrease of 1.5% over last year's area of 2961 thousand hectares. Cotton production for the year 2015 stood at 10.074 million bales against 13.960 million bales last year showing a decline of 27.8 %. The major reason for the low yield of seed cotton includes CLCuV and pink bollworm infestation as the major reasons in Pakistan. There are several varieties of cotton namely, CIM-448, CIM-1100, CIM-446, MNH-552, CIM-443, and MNH-554 was developed by various cotton breeding centers which have shown tolerance against CLCuV. Cotton varieties exhibit tolerance but it showed susceptibility in presence of high inoculum and pressure in the environment (Shah *et al.*, 2004) Besides, the Cotton (Gossypium) crop suffered multiple shocks during the 2020-21 growing season such as prolonged and frequent rains badly hit the standing cotton (Gossypium) crop, with additional crop losses coming from severe attacks of pink bollworm. While the crop generally becomes more pest attacks during the rainy season, the risks heightened further this year as the plant was still in the early stage of growth due to sowing delays. Simultaneously, nonexistence of support prices discouraged farmers from investing in fertilizer and pesticides. Highly significant variations among years, genotypes (varieties), and year × genotypes interaction for several bolls per plant, boll weight and seed cotton yield (Arshad *et al.*, 2005) particularly in case of American cotton.

OBJECTIVES: In this perspective, a strategy was developed to exploit exotic material employing a conventional breeding approach to develop a variety with wider adaptability to various types of stresses.

MATERIALS AND METHODS

The replicated varietal trials in CIM-554 is developed by hybridization of a local line 2579-4/97 and exotic variety W-1103 during 1997-98. W-1103 is short stature, early maturing variety having adequate resistance against CLCV and prevailing sucking insect pests. Further, it was highly heat and drought-tolerant. The local line 2579/97 was tall, early maturing, highly heat-tolerant in nature. It has a high staple length and had an oblong boll shape. The strain was bulked during 2003-2004 in F_6 generation. The ancestral selection procedure was used sorting of desirable genotypes from different populations and lines with similar morphology, fiber and seed characters were selected. This variety passed through a series of yield trials viz. multi-locational varietal trials, zonal varietal trials at farmers' fields and Govt. farms, Co-ordinated varietal trials i.e., NCVT of Pakistan Central Cotton Committee and Provincial Coordinated Cotton (PCC) Trials of the Punjab Government.

RESULTS

Varietal and zonal trials: A new strain CIM-554 was tested in Varietal Trials with replications at CCRI, Multan, and its testing centers to compare with the commercial varieties in last five years of data. The data presented in table 1 showed that CIM-554 is significantly higher yielding than other commercial varieties. CIM-554 gave 20.2% increase over MNH-786, 14.5% increase over CIM-534, 12.6% increase over CIM-496, 12.8% increase over NIAB111, 22.7% increase over and 28.4% increase over MNH-786, CIM-534, CIM-496, NIAB-111, CIM-506 and CIM-499 respectively. Variety CIM-554 was checked in

Year	Name of Trial	Location	Varieties / seed cotton (kg ha^{-1})							C.D 5 %
			CIM-554	CIM-786	CIM-534	CIM-496	NIAB-111	CIM-506	CIM-499	
2005-06	VT-3	Multan	4392	-	-	4153	3922	4005	-	-
		Khanewal	4361	-	-	4021	3842	3962		
		Average	4377	-	-	4087	3882	3984	-	83.47
2006-07	VT-2	Multan	4401	-	-	3815	-	3148	-	-
		Khanewal	4232	-	-	3640	-	3059	-	-
		Average	4317	-	-	3728	-	3104	-	87.64
	2 Years Average		4347	-	-	3907	-	3544	-	-
2007-08	VT-2	Multan	4424	3971	3987	4112	-	-	-	-
		Khanewal	4003	3429	3780	4046	-	-	-	-
		Average	4214	3700	3884	4079	-	-	-	206.47
2008-09	VT-2	Multan	4166	3182	3299	2593	-	-	-	-
		Khanewal	3156	2523	2682	3045	-	-	-	-
		Average	3661	2853	2991	2819	-	-	-	87.38
	2 Years Average		3937	3276	3437	3449	-	-	-	-
	% increase over		-	20.2	14.5	12.6	12.8	22.7	28.4	-

Table1: Yield performance of CIM-554 in varietal trials at Central Cotton Research Institute, Multan during 2002 to 2008

Zonal Varietal Trials at farms of government level in different progressive growers in different ecological zones during 2007-08 and 2008-09. The data in table 2 revealed that based on an average of 20 locations conducted during 2007-2008, CIM-554 yielded 3768 kgha^{-1} compared with 3591 kgha^{-1} of CIM-496.

Sr. No	Name of grower/location	Varieties/ seed cotton (kg ha^{-1})	
		CIM-554	CIM-496
1	Mr. Muhammad Saleem, Jalla Arian, Lodhran	3716	3500
2	Mr. Muhammad Tahir, Lodhran	4000	3750
3	Ch. Muhammad Akram, Lodhran	3360	3250
4	Haji Tariq Mahmood Bhutta, 6-Faiz, Multan	4225	4080
5	Ch. Ghohar Ali, Makhdum Rasheed	3965	3670
6	Ch. Muhammad Hanif 108/7R, Sahiwal	3300	3100
7	Ch. Muhammad Saddiq, 17/11R, Sahiwal	3210	3090
8	Mr. Khuda Bux, 19 Kasi, Multan	4160	3900
9	Mian Mehboob Qureshi, Kot Addu	3570	3600
10	Mian Abbas Qureshi, Kot Addu	3960	3810
11	Mr. Shahid Manzoor, Khanpur	3570	3610
12	Ch. Rehmat Ali, 88/10-R, KWL	3210	2950
13	Mr. Aleem Ahmad Khan, Tounsa	3810	3740
14	Sh. Abdul Rasheed, Burewala	3865	3500
15	Ch. Sher Bahdar 255/EB, Burewala	3240	3060
16	Haji Allah Ditta, Kukar Hatta	3290	3160
17	Ch. Ramzan Ahmad, Hasilpur	4050	3950
18	Mr. Ghulam Mustafa Chatta, Uch Sharif	4107	4000
19	Ch. Zia-ur-Rehman, Liaquat Pur	4360	4040
20	Ch. Hafeez, Rajanpur	4400	4060
	Average	**3768**	**3591**

Table 2: Yield performance of CIM-554 in Zonal Varietal Trial at farmers' fields during 2007-08.

During 2008-09, CIM-554 was tested in ZVT in different ecological zones. Data is presented in table 3, which showed that CIM-554 has the highest seed cotton yield 3465 kg ha^{-1} compared with 2844 kg ha^{-1} of CIM-496.

REGIONAL ADAPTABILITY TRIALS. National Coordinated Varietal Trials: The CIM-554 included in NCVT for two years.

Sr. No.	Name of grower/location	Varieties/ seed cotton (kg ha^{-1})	
		CIM-554	CIM-496
1	Ch. Hafeez, Rajanpur	3580	2817
2	Ch. Zia-ur-Rehman, Liaquat Pur	3512	2928
3	Mr. Ghulam Mustafa Chatta, Uch Sharif	3487	2880
4	Haji Tariq Mahmood Bhutta, 6-Faiz, Multan	2918	2188
5	Ch. Ghohar Ali, Makhdum Rasheed	3140	2455
6	Ch. Muhammad Hanif 108/7R, Sahiwal	3467	3051
7	Ch. Muhammad Saddiq, 17/11R, Sahiwal	3571	2995
8	Ch. Muhammad Akbar 70/5L, Sahiwal	3240	2529
9	Mr. Khuda Bux, 19 Kasi, Multan	3119	2527
10	Mian Mehboob Qureshi, Kot Addu	3490	2985
11	Mian Abbas Qureshi, Kot Addu	3570	2828
12	Mr. Shahid Manzoor, Khanpur	3511	2921
13	Ch. Rehmat Ali, 88/10-R, KWL	3860	3329
14	Mr. Aleem Ahmad Khan, Tounsa	3776	3112
15	Sh. Abdul Rasheed, Burewala	3560	3061
16	Haji Allah Ditta, Kukar Hatta	3281	2706
17	Ch. Ramzan Ahmad, Hasilpur	3800	3133
18	Mr. Muhammad Tahir, Lodhran	3460	2801
19	Ch. Muhammad Akram, Lodhran	3378	2920
20	Mr. Muhammad Saleem, Jalla Arian, Lodhran	3580	2715
	Average	**3465**	**2844**

Table 3: Yield performance of CIM-554 in Zonal Varietal Trial at farmers' fields during 2008-09

Yield data for 2007-08 are given in table 4 indicated that in Faisalabad Region CIM-554 gave high yield (3100 kg ha^{-1}) as compared to the standard variety CIM-496 (2780 kg ha^{-1}). CIM-554 again gave a higher yield compared with standard variety CIM-496 (2326 kg ha^{-1}) based on average of all the locations in Punjab (2517 kg ha^{-1}). CIM-554 was also included in NCVT during 2008-09. The yield data presented in table 4 revealed that based on an average of 20 locations of Punjab. The CIM-554 had presented a higher yield (3095 kg ha^{-1}) as compared with 2940

kg ha^{-1} of standard variety CIM-496. On average, during two consecutive years both CIM-554 and CIM-496 gave same yields but CIM-554 exceeded in both years.

Provincial Coordinated Trials: CIM-554 have been evaluated in PCC Trials for two consecutive years i.e. 2007-08 and 2008-09 by the Punjab Government. The yield data for the year 2007-2008 in table 5 revealed based on the average of all 16 locations CIM-554 gave 2279 kg ha^{-1} yield which is higher than CIM-496 (2256 kg ha^{-1}). The yield data for the year 2008-09 given in table 7 revealed that CIM-554 gave a higher yield (2551 kg ha^{-1}) compared with standard variety CIM-496 (2261 kg ha^{-1}).

Entomological studies: Entomology Section of CCRI conducted entomological studies in host plant resistant trial for assessing tolerance levels against jassids, whitefly, thrips, and bollworm damage as compared to commercial variety CIM-496. Pest population data is under the self-control of Aphids Jassids thrips un-sprayed conditions shown in table-5 indicated that CIM-554 has shown better tolerance against sucking pest and at part against bollworm compared with CIM-496.

Pathological studies: Pathological studies of CIM-554 relating to cotton leaf curl virus (CLCuV) were conducted by the Pathology Section of CCRI, Multan. Table 9 presented the results of field screening of CIM-554 in NCVT during 2008-2009. The data presented in table 5 showed that disease incidence (at 90 days after sowing) at CCRI Multan ranged from 41.2% to 100% recorded on 25.8.200.

Evaluation for morphological and fiber characteristics: Plant traits viz, plant height, number of monopodial and sympodial branches, maximum boll weight, average boll weight, and number of bolls per plant presented in Table 9 showed that on average of two years (2008 and 2009), CIM-554 had 178cm plant height, 1.8 and 27 monopodial and sympodial branches per plant respectively. It possessed 4g average boll weight and 29 bolls plant^{-1}. CIM-554 was developed by exploitation of local and exotic germplasm for expected outcome. Leaf shape is normal and nectaried. It has landed pubescence of stem and leaves. Pollen color is creamy, and the boll shape is oval. CIM-554 is adapted in many environments, it has wide adaptability for heat and other abiotic stresses in cotton (Gossypium).

DISCUSSION

Cotton is a sensitive crop that is significantly affected according to cultivars, location as well as environmental conditions. Therefore, genetic potential of cotton germplasm for various morphological parameters is highly desirable to sort out high potential strains to be used in future breeding (Khan *et al.*, 2010). Different breeding procedures are devised to obtain the desired genetic variability and/or parental combinations or selection of genotypes in diverse segregating populations (Esmail *et al.*, 2008). These procedures may include introduction of exotic germplasm (leaf or seed), hybridization, and polyploidy. Studies reported development of cotton genotypes by hybridizing the distant parents as a potential source for the development of new varieties (Punitha and Raveendran, 2004; Akter *et al.*, 2009). CIM-554 was developed by exploitation of local and exotic germplasm having promising outcomes based on agronomical, morphological, and physiological traits which is one of the established procedures for estimation of genetic diversity (Bajracharya *et al.*, 2006). Anjum *et al.* (2014) have confirmed results of CIM-554 observed during its development which have exhibited high genetic potential in all agronomic and fiber traits recorded and exceeded with standards used during trials.

Availability: Limited quantities of seed of CIM-554 for research purposes can be requested from author. Appropriate recognition of source should be given when it contributes to the development of new cultivars, breeding lines, or hybrids.

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YEAR	REGION	No of Trials	Seed Cotton Yield (Kgha^{-1})	
			CIM-554	CIM-496
2007-08	Multan	07	2182	2065
	Faisalabad	04	3100	2780
	Average		2641	2422
	% increase over			**9.04**
2008-09	Multan	06	3095	2940
	Faisalabad	03	2935	3090
	Average		3015	3015
	% increase over			**0**

Table. 4: Yield performance of CIM-554 and standards in National Coordinated Varietal Trial at different locations during 2007-08 and 2008-09.

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Sr. No.	Varieties	CRI FSD	CRS Multan	CRS Vehari	CRI RYK	CRS Sahiwal	CRS BWP	CRSS Jhang	A.A. MN	ARI FSD	ARS BWP	ARS KWL	ARS Kror	CCRI Multan	NIAB FSD	CRSS Piplan	PSC KWL	Average
1	VH-255	4121	3149	2852	1937	3712	1650	2517	2701	2166	2489	2197	3525	3748	4688	2956	3047	2966
2	FH-942	3636	3040	1722	1937	3027	1650	2652	2117	1074	2410	1950	4445	3389	4258	2292	3081	2667
3	NIAB-846	3062	2498	1238	2169	3505	1211	2282	1827	1204	2491	2074	2513	4035	5109	3095	3064	2586
4	MG-3	3143	3069	1650	2831	3314	2081	2434	2659	1870	2593	1728	1856	3228	3497	2535	2780	2579
5	FH-113	3114	2989	1812	2292	2485	2090	2117	2752	2481	2680	2170	1146	3443	3673	2808	2880	2558
6	CRSM-70	2710	3826	1758	1900	3410	1292	1717	2106	814	2708	1506	2971	3407	3617	3138	3131	2501
7	NIBGE-115	3229	2750	1722	1970	3426	1103	2305	1712	1148	2412	2543	1216	3910	4287	2890	3064	2480
8	NIAB-777	2643	2551	1381	2669	3744	1381	1808	1518	2000	2670	2123	1781	3228	3979	2918	2712	2444
9	FH-941	2535	2817	1094	2761	2581	1453	1924	2556	1278	2715	2247	2115	3300	4109	3320	2160	2435
10	NIAB-852	2332	2750	1094	2330	2677	1247	1934	1989	1018	2698	2247	2503	3461	3732	2253	2746	2313
11	SLH-284	2512	2578	1704	2239	3665	1458	2063	2000	1148	2621	1926	1001	3910	3120	2258	2579	2299
12	BH-168	2332	3202	1023	2061	2677	1688	1663	1511	1407	2682	1728	2675	3390	3481	2402	2646	2286
13	**CIM-554**	**2368**	**2910**	**1005**	**1830**	**2629**	**1381**	**1782**	**2077**	**1018**	**2708**	**2543**	**1954**	**3084**	**3694**	**2942**	**2546**	**2279**
14	CRSM-38	1954	4331	1453	1238	3107	1305	2595	2524	851	2712	1901	727	2995	2485	2727	3265	2261
15	**CIM-496**	**1794**	**2604**	**700**	**2099**	**2597**	**1758**	**1545**	**1932**	**1167**	**2698**	**2543**	**2583**	**3210**	**3288**	**2789**	**2796**	**2256**
16	GS-1	2349	2405	807	1754	3219	1426	1939	1930	1093	2701	1407	802	3676	4474	3267	2712	2248
17	RH-610	2813	2166	1381	2115	2549	1449	1474	1807	1111	2706	2519	1615	2833	4132	2473	2528	2229
18	RH-541	2356	2684	771	1431	3107	1327	1404	1564	1037	2492	2148	2298	2457	3929	3095	3014	2195
19	BH-167	1878	2671	466	1900	2358	1103	1552	1629	1852	2707	2419	2341	2744	3688	3277	2193	2174
20	ASR-1	1371	2285	700	1754	2756	1399	1452	2534	1407	2579	2321	2077	2600	3600	2076	2378	2081
21	VH-260	1363	2484	718	1883	1753	1386	1369	2196	1018	2705	1752	1162	3228	3240	3478	2361	2006
22	MG-2	478	1993	861	1092	2056	1372	2847	1855	1037	2695	1456	840	1901	2152	2043	3382	1754
23	CIM-541	1100	2192	359	1146	2023	996	1261	1573	589	2498	2148	1588	2367	2029	2976	2010	1678
24	MG-1	665	1594	448	447	2166	789	2106	1716	555	2468	1210	3213	-	1911	1483	2579	1557

Table 5: Yield performance of new strains (Kg ha^{-1}) in Provincial Coordinated Cotton Trials (PCCT) during 2007-2008.

Varieties	No. of insects/leaf			% bollworm damage	
	Jassid	Whitefly	Thrips	Spotted	Pink
CIM-554	0.83	12.97	0.52	11.0	4.0
CIM-496	1.00	16.60	0.26	11.4	3.30

Table 6: Reaction of CIM-554 to sucking pests and bollworm damage at Central Cotton Research Institute, Multan during 2008-2009.

Sr. No.	Varieties	CCRI Multan	CRS Multan	PSC KWL	ARS BWP	CRS BWP	CRS Sahiwal	RSS Jhang	CRI RYK	CRI FSD	NIAB FSD	CRS Vehari	Average
1	FH-942	2883	2028	3265	3166	3659	2747	4004	2282	1848	3624	3570	3007
2	RH-620	2511	1872	3856	3013	2762	2296	3108	2067	2534	4047	2063	2739
3	VH-255	3117	2574	3947	2523	2673	2296	3705	2024	3120	4311	2655	2995
4	CRSM-2007	2461	2730	4072	3133	3372	2405	3885	2024	3044	3111	3121	3033
5	MG-6	2708	2496	3588	3366	2619	2337	4004	2024	2669	3860	3175	2986
6	CIM-557	2340	1716	3318	3079	2062	2802	3168	1464	2282	3484	2368	2553
7	GS-1	2355	1466	3677	2756	1972	1859	3227	1292	1777	2519	2458	2305
8	VH-277	1953	1326	3641	2679	2116	2255	2510	1550	2328	2497	2117	2270
9	NIAB-852	3038	2106	3856	2979	3498	2897	3825	2024	2229	3972	2529	2996
10	CRSM-38	2242	3042	3354	2823	2152	2350	3425	1335	1894	2887	2363	2534
11	VH-207	2552	1872	3480	2899	2726	2897	2989	1981	2510	3870	3104	2807
12	SLH-317	2784	2028	3480	2746	2421	2405	4005	1679	1466	3198	2476	2608
13	**CIM-496**	**1350**	**780**	**3265**	**2946**	**2493**	**2173**	**2929**	**1378**	**2581**	**2985**	**1991**	**2261**
14	GS-14	2154	1794	3947	2713	2600	2255	3706	1292	2364	2871	2440	2558
15	**CIM-554**	**2905**	**1435**	**3820**	**2933**	**2636**	**2323**	**3766**	**1378**	**1689**	**2490**	**2691**	**2551**
16	PB-900	2037	1716	2726	2746	2062	1900	3048	1249	2023	2615	2099	2202
17	NIAB-777	2841	2262	3964	3056	2834	2214	3467	1636	2164	3601	2332	2761
18	SITARA-008	2420	1248	3462	2656	3426	1940	3228	1421	1724	3388	1955	2443
19	A-ONE	2592	1638	4126	2723	4484	2884	3347	1938	3137	4970	3875	3247
20	FH-941	3280	2964	4269	3233	3318	2679	3586	1722	3038	4586	3911	3326
21	BH-172	2870	2574	3641	2756	2367	2405	3945	1550	1496	2873	3121	2691
22	FH-2015	3249	2028	4485	3333	2924	2310	4184	1722	2492	3607	2368	2973
23	NIAB-2008	2704	2496	3497	2743	2385	2187	3825	1421	2199	3660	2171	2663
24	FH-113	2685	2964	4126	2923	3444	2542	3604	2067	2504	3567	3767	3108
25	NN-3	2912	1950	3533	3089	2780	2542	3527	1679	2170	3689	2458	2757
26	Alseemi-H	3566	3151	4126	3532	3336	2979	3825	1636	2499	3619	4413	3335

Table 7: Provincial Coordinated Cotton Trials in Punjab during 2008-09 (Yield kg ha^{-1})

NCVT	CLCuD (%)				
Strains	**30***	45	**60**	**75**	**90**
	(25.06.08)**	(08.07.08)	**(23.07.08)**	**(08.08.08)**	**(25.08.08)**
FH-942	12.38	**43.50**	79.75	90.47	90.47
PB-900	12.78	59.37	83.87	88.20	88.20
NIAB-777	3.26	39.65	76.36	96.34	96.34
CIM-496	7.14	43.85	83.23	95.58	100.00
GH-102	12.01	38.88	85.39	91.93	91.93
CRIS-129	36.50	51.29	80.27	80.67	80.67
CRSM-2007	5.93	21.16	63.64	80.90	80.90
GS-1	3.41	30.56	74.91	91.43	91.43
BH-172	2.16	17.79	61.27	83.27	83.27
VH-278	6.90	43.47	90.60	95.95	100.00
CRSM-38	2.40	27.62	56.73	65.92	65.92
NIAB-852	7.37	50.51	78.41	92.46	92.46
SLH-317	4.78	25.43	68.10	84.15	84.15
NN-3	2.67	13.25	29.07	41.20	**41.20**
FH-941	11.89	50.78	86.69	96.66	100.00
TH-06/2	21.92	72.50	83.41	90.42	90.42
CIM-557	2.90	17.26	50.72	67.84	67.84
NIA-78	16.79	52.34	91.31	95.88	95.88
GS-14	6.57	66.18	95.67	100.00	100.00
CIM-554	**8.50**	**49.36**	**81.31**	**85.98**	**85.98**

*= Days after planting ** = Observation Dates

Table 8: Provincial Coordinated Cotton Trials in Punjab during 2008-09 (Yield kg ha^{-1}).

Year	Trial	CIM-554	MNH-786	CIM-534	CIM-496
Plant height (cms)					
2007	VT-2	170	144	140	145
2008	VT-2	185	126	136	105
	Average	**178**	**135**	**138**	**125**
No. of monopodial branches plant^{-1}.					
2007	VT-2	1.4	3.6	2.3	2.3
2008	VT-2	2.1	2.5	1.8	1.1
	Average	**1.8**	**3.1**	**2.1**	**1.7**
No. of sympodial branches plant^{-1}.					
2007	VT-2	26	24	2.6	26
2008	VT-2	28	18	24	21
	Average	**27**	**21**	**25**	**24**
Average boll weight (g).					
2007	VT-2	4.0	4.2	3.5	3.5
2008	VT-2	3.9	4.0	2.9	3.2
Average		**4.0**	**4.1**	**3.1**	**3.4**
Number ob bolls plant^{-1}.					
2007	VT-2	30	32	40	31
2008	VT-2	27	20	30	20
	Average	**29**	**26**	**35**	**26**

Table 9: Incidence of cotton leaf curl virus on new strains in National Coordinated Varietal Trials at CCRI., Multan & CRS, Vehari during 2008-09.

Sr. No.	Characters	Varieties					
		CIM- 554	MNH- 786	CIM-534	CIM-496	NIAB-111	CIM-506
1.	Yield of seed cotton (kg ha^{-1})	4241	3276	3437	3449	3882	3344
2.	Ginning out turn (%)	41.5	37.4	40.8	41.3	36.5	38.7
3.	Staple length (mm)	28.5	27.4	28.8	29.1	29.3	28.5
4.	Micronaire value (µg inch^{-1})	4.7	5.2	4.6	4.8	4.3	4.7
5.	Fibre strength (tppsi)	96.8	100.9	97.6	91.7	90.8	101.1
6.	Maturity ratio	1.04	1.04	1.02	1.04	1.01	1.04
7.	Uniformity ratio (%)	48.3	47.6	48.1	48.1	47.9	48.0

Table 10: Summary of salient characteristics of CIM-554