



# Asian Journal of Plant Sciences

ISSN 1682-3974

**science**  
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## Performance of Four Newly Developed Upland Cotton Strains Under Lower Sindh Conditions

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**Abstract:** Four newly developed strains; MPS-2, MPS-4, MPS-7, and MPS-11, were tested against two commercial, high yielding varieties CRIS-9 and NIAB-78, for two years (1996 and 1997) for seed cotton yield per hectare, ginning out turn percentage (Got), staple length and boll weight. The highest yield of 2209 kg/ha was obtained by MPS-2, followed by MPS-11 (2090 kg/ha). The increase of top yielding strain MPS-2 over commercial varieties CRIS-9 and NIAB-78 were 13.7 and 18.3%, respectively. The highest ginning out turn (38.3 %) was given by MPS-7 and highest staple length (27.0 mm) was measured in MPS-7.

**Key words:** Strains, varietal performance, environmental conditions

### Introduction

The climatic conditions of Pakistan differ from province to province and within province, as well. The cotton crop behaves differently under different environmental conditions. Some varieties adopt readily and perform well under the changed conditions, while the others fail to do so. In cotton, Singh *et al.* (1966) conducted a yield trial for three years and found that cotton variety Paramukh gave higher yield than 261 F and 320 F when grown in Uter Pradesh. Afzal (1971) found remarkable effects of sites on fiber properties. Singh *et al.* (1972) have reported significant differences in row cotton yields in American upland cotton due to varieties. Soomro and Memon (1979) studies the effect of site and season effect on yield and ginning out turn percentage in Desi cotton. They inferred highly significant differences in yield due to varieties and year components but found significant differences in ginning out turn due to varieties only. Ahmed *et al.* (1982) obtained highly significant differences in yield, and GOT due to varieties, locations, and year components. Soomro and Memon *et al.* (1979) reported significant differences in yield, ginning out turn percentage and staple length for varieties, location and years. Khan *et al.* (1989) observed significant difference in yield, ginning out turn percentage and staple length for varieties and years, while variety and year interaction remained non-significant in upland cotton experiments.

In view of differential behavior of cotton crop as referred above it was felt necessary to establish a Cotton Research Station at Mirpurkhas during the year 1989 to cater the need of South Eastern cotton region of Sindh province. The temperatures of this area as compared to Central and Northern Districts are lower and climate remains mild and humid round the year. Although this is a major cotton growing area of Sindh province yet, cotton yields per acre are low, due to cultivation of cultivars mainly developed elsewhere in the province or country. Central Cotton Research Station, Mirpurkhas was established with the objectives to evolve new high yielding and early maturing cultivars with high ginning out turn percentage, fiber strength and staple length to meet the requirements of the growers especially of this area. The present studies have been carried out on four new strains developed at this station and were compared for two years against commercial varieties (CRIS-9 and NIAB-78), in respect of boll weight, yield per hect., ginning out turn percentage and staple length.

### Materials and Methods

Four upland cotton strains, MPS-2, MPS-4, MPS-7 and MPS-11 evolved at Cotton Research Station, Mirpurkhas and two commercial varieties from Sindh and Punjab, CRIS-9 and NIAB-78, were tested for two years 1996 and 1997, to assess the best genotypes under Mirpurkhas conditions. The data were collected for boll weight, yield of seed cotton, ginning out turn, and staple length in Randomized Complete Block Design with four replications. The data thus collected were subjected to analysis of variance after Miller *et al.* (1959) to bring out the statistical differences among them. The data were further subjected to Duncan's Multiple Range Test (Duncan, 1970), to examine the mean differences in the varieties/strains.

### Results and Discussion

The data presented in Table 1 revealed that during 1996 MPS-2 was the top yielding variety with 2039 kg/ha followed by MPS-11, 1971 kg/ha and MPS-4, 1926 kg/ha seed cotton. During the year 1997, season, MPS-2 maintained its superiority and remains on the top with 2379 kg/ha followed by MPS-11, with 2209 kg/ha and MPS-4 with 2096/KGHA. The lowest yielding variety was NIAB-78, which produced 1929 kg/ha of seed cotton. The data presented in Table 2 indicated that on an average of two years, MPS-2 was still superior to all other strains and standards by producing 2209 kg/ha and gave 13.7 % increase over CRIS-9 and 18.3 % over NIAB-78 in seed cotton yield, followed by MPS-11, which produced 2090 kg/ha, thus gave 7.6 % increase over CRIS-9 and 11.9 % over NIAB-78, whereas MPS-4 with 2011 kg/ha gave 3.5 % increase over CRIS-9 and 7.7 % over NIAB-78. The highest ginning out turn of 37.8 % during 1996 was given by MPS-4, followed by MPS-2 and MPS-7, (37.3 %). During 1997 MPS-7 gave the highest ginning out turn of 39.4 % followed by MPS-2 and MPS-4, 36.0 and 35.5 %, respectively.

On an average of two years, MPS-7 was on the top by giving 38.3% and gave 5.8 % increase over CRIS-9 and 16.8 % over NIAB-78 followed by MPS-2 and MPS-4 (36.6 %) and gave 1.1 % increase over CRIS-9 and 11.6 % over NIAB-78. The lowest ginning out turn was however given by NIAB-78 (32.8 %). In case of staple length, significantly longest staple length of 28.5 mm for the year 1996 and 26.0 mm during 1997 was measured in MPS-7. On an average of two years, 27.2 mm staple length was measured in MPS-7, thus gave 8.4 % increase over CRIS-9 and 10.1 % over NIAB-78, followed by MPS-4 and MPS-11 having staple length of 26.4 mm and 26.0 mm respectively. From the present studies, it was observed that strain MPS-2 can be used in hybridization programme to improve the yield. However, for ginning out turn and staple length MPS-7 may be preferred. Regarding boll weight, standard variety i.e. CRIS-9 was found on better in

Table 1: Yield of seed cotton, ginning out turn, staple length and boll weight of four newly developed strains and two commercial varieties of Sindh and Punjab.

Year	Strain/ variety	Yield (Kg/ ha)	GOT (%)	Staple length (mm)	Boll weight (g)
1996	MPS-2	2039	37.3	26.5	2.6
	MPS-4	1926	37.8	27.9	2.3
	MPS-7	1586	37.3	28.5	2.7
	MPS-11	1971	35.0	27.0	3.2
	CRIS-9	1903	37.2	26.5	3.1
1997	NIAB-78	1805	32.6	24.8	2.9
	MPS-2	2379	36.0	25.0	2.6
	MPS-4	2096	35.5	25.0	2.5
	MPS-7	1983	39.4	26.0	2.7
	MPS-11	2209	35.2	25.0	2.4
	CRIS-9	1983	35.3	23.7	2.9
	NIAB-78	1929	33.0	24.6	2.8

Chang *et al.*: Performance of upland cotton strains

Table 2: Average yield of seed cotton and other characters of four newly developed strains and two commercial varieties of Sindh and Punjab

Varieties	Yield (Kg/ ha)	GOT (%)	Staple length (Mm)	Boll weight (g)
MPS-2	2209a	36.6b	25.7d	2.6c
MPS-4	2011c	36.6b	26.4b	2.4d
MPS-7	1784.5f	38.3a	27.2a	2.7bc
MPS-11	2090b	35.1d	26.0c	2.8ab
CRIS-9	1943d	36.2c	25.1e	3.0a
NIAB-78	1867e	32.8e	24.7f	2.8ab

  

%age increase (+) or decrease (-) of each variety over CRIS-9 and NIAB-78								
	CRIS-9		NIAB-78		CRIS-9		NIAB-78	
MPS-2	+13.7	+18.3	+1.1	+11.6	+2.4	+4.0	-13.3	-7.1
MPS-4	+3.5	+7.7	+1.1	+11.6	+5.2	+6.9	-2.0	-14.3
MPS-7	-8.6	+4.4	+5.8	+16.8	+8.4	+10.1	-10.0	-3.6
MPS-11	+7.6	+11.9	-3.0	+7.0	+3.6	+5.3	-6.6	-3.6

Means followed by same letter do not differ significantly from each other according to DMR test.

Table 3: Mean square and degree of freedom for the factorial analysis of variance for various characters of cotton

Source of variation	df	Mean squares			
		Yield	GOT	Staple length	Boll weight
Years	1	606600**	2.17**	47.20**	0.27*
Rep within years	6	220.44N.S	0.04N.S	0.03N.S	0.02N.S
Varieties	5	188416**	29.24**	6.77**	0.35**
Years x Varieties	5	30891**	5.75**	2.07**	0.23**
Pooled Error	30	323.31	0.06	0.03	0.02

\*, Significant; \*\* highly significant; N.S, non-significant

both the year of this study, and gave 3.0 g boll weight. Table 3 revealed that mean squares for yield, ginning out turn percentage and staple length are highly significant which indicates that varieties differ statistically from each other in these characters. The results are in conformity with those of Miller *et al.* (1962), Verhalen and Murray (1970), Afzal (1971), Singh *et al.* (1973), Soomro and Memon (1979), Gupta and Katiyar (1980) and Kalhoro *et al.* (2001). The mean squares for years are significant for all the four characters, which shows that this source of variation have substantial effect on these characters. This is further supported by the fact that, cotton season in Mirpurkhas is not similar from year to year. The results are in conformity with the findings of Ahmed *et al.* (1982). The mean squares for variety x year interactions are highly significant for all the four characters.

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