

## PERFORMANCE OF DIFFERENT COTTON VARIETIES UNDER THE CLIMATIC CONDITIONS OF JAMSHORO

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### Abstract

An experiment was laid out in complete block design with three replications at the department of Botany, University of Sindh, Jamshoro, Sindh, Pakistan during 2007 for assessing the performance of commercial cotton cultivars viz., CIM-707, CIM-443, CIM-506, CIM-446, TH-3/83, FH-901, Chnadi-95 and Reshmi. The data was recorded on plant height, sympodia/plant, bolls/plant, boll weight and seed cotton yield/plant. Significantly maximum plant height (127.5 cm) and sympodia/plant (23.0) were displayed by variety TH-3/83 while the maximum seed cotton yield per plant (48.5 g) was shown by CIM-446 followed by TH-3/83. Maximum number of bolls/plant (18.56) and boll weight (5.11) were recorded for varieties FH-901 and Reshmi respectively. Correlation studies revealed that seed cotton yield/plant was significantly associated with sympodia/plant (0.379\*\*), bolls/plant (0.509\*\*) and boll weight (0.329\*) which contributed 14.20%, 25.40% and 10.8% respectively toward seed cotton yield/plant. It is concluded that varieties CIM-446 and TH-3/83 showed overall better performance than other cultivars and may be recommended for commercial cultivation in the agro-climatic conditions of Jamshoro.

### Introduction

Our main objective of cotton improvement is the accumulation of positive variation associated with the advancement of seed cotton yield/plant and its effective components. In the present studies, phenotypically stable cotton cultivars were evaluated for different quantitative traits under climatic conditions of Jamshoro, Sindh. Such studies can be instrumental in producing genotypes with high genetic homeostatis (Lerner, 1954) and ultimately in enhancing seed cotton yield (Larik *et al.*, 2000). Mean performance and correlations among yield and yield components is reported.

### Material and Methods

An experiment was conducted in randomized complete block design at the Department of Botany, University of Sindh, Jamshoro, Sindh, Pakistan during 2007 using eight commercial cotton varieties (CIM-707, CIM-443, CIM-506, CIM-446, TH-3/83, FH-901, Chandi-95 and Reshmi) for assessing the yield potential in the agro-climatic conditions at Jamshoro region. Homogeneous delinted seeds were drilled in rows 75 cm apart by single coulter hand driven drill @ 35 Kg/ha. Before first irrigation the seedlings were thinned to maintain plant to plant distance of 30 cm. A 3.75 x 14.25 meter plot size was maintained.

Fertilizer @ 125-75 Kg/ha was applied in the form of urea and DAP. Full dose of phosphorus with 1/3 of nitrogen was applied at the time of land preparation, while remaining dose of nitrogen was splitted in three equal doses at first irrigation, flowering and boll setting respectively. All required cultural practices including spraying, weeding etc. were adopted uniformly in all the plots throughout the growing period. The data on five quantitative traits were recorded using ten randomly selected competitive plants from

each plot. The characters under studies are plant height, sympodia/plant, bolls/plant, boll weight and seed cotton yield/plant. The significance of the genotypes were tested after Steel & Torrie (1980) and the comparison of means was tested by Duncun's Multiple Range Test at 5% using MSTATC computer package. Correlations of yield and yield components were carried out as suggested by Snedecor & Cochran (1980).

### Results and Discussion

Mean varietal performance for seed cotton yield and its components tested through Duncun's Multiple Range Test and the consolidated ANOVA (mean squares) is presented in Table 1. Data reveals that variety TH-3/83 displayed highest significant plant height (127.5 cm) followed by Chandi-95 (94.42 cm). It was further noted that all the varieties responded differently in attaining plant height. This may be due to their genetic makeup which resulted in taller plants of these varieties. In case of sympodia/plant variety TH-3/83 produced maximum sympodia (23.0) per plant followed by Chandi-95. These significant differences might be due to high sink size and strength for withdrawing the food materials and accommodating capacity in more sympodia producing varieties. Environmental effects may also be one of the reasons, leading to produce more sympodia by varieties suitable to the prevailing climatic conditions (Khan *et al.*, 1993). Variety FH-901 produced maximum bolls (18.56) per plant followed by CIM-446. In case of boll weight variety Reshmi produced heavy bolls (5.11 g) followed by variety Chandi-95, which expressed 5.11 grams boll weight as compared to all other cultivars. Results revealed that cotton varieties have different potential for producing heavy or light bolls. Maximum significant seed cotton yield/plant (48.5 g) was displayed by variety CIM-446 followed by variety TH-3/83 (47.28 g) whereas, the lowest seed cotton yield/plant (35.45 g) was shown by variety CIM-506. These significant differences might be due to the compatibility of higher seed cotton yield producing varieties to the climatic conditions and the genetic potential of these varieties or might be due to subsequent more bolls/plant (Larik *et al.*, 1999; Khan *et al.*, 1993).

ANOVA for all the traits demonstrate that mean squares for genotypes were highly ( $p \leq 0.01$ ) significant. Highly significant mean squares (Table 1) attributable to genotypes suggest that significant genetic variability existed among the varieties for all the traits studied.

The data for association of different quantitative traits is depicted in Table 2. Results reveal that plant height was strongly associated (0.661\*\*) with sympodia/plant and was negatively (-0.016<sup>n.s</sup>) associated with seed cotton yield/plant. The low phenotypic correlation could result from the masking and modifying effect of environment on the association of these characters at genetic level (Soomro, 2000). The value of  $r^2$  suggest that 43.6% improvement in sympodia/plant was due to increase in plant height. Sympodia/plant were highly significantly correlated (0.378\*\*) with seed cotton yield/plant. Coefficient of determination ( $r^2$ ) values suggest that 14.2% increase in seed cotton yield/plant was due to increase in sympodia/plant. Bolls/plant were significantly but negatively (-0.582\*\*) associated with boll weight.  $r^2$  value suggest that 28.3% reduction occurred in boll weight due to increase in number of bolls/plant. Bolls/plant were significantly (0.509\*\*) associated with seed cotton yield/plant.  $r^2$  value suggest that 25.9% increase in seed cotton yield/plant was due to increase in bolls/plant. Similarly boll weight was significantly (0.327\*\*) associated with seed cotton yield/plant.  $r^2$  value suggest that 10.8% increase in seed cotton yield/plant was due to increase in boll weight. These results are in agreement with those obtained by Larik *et al.*, (1999), Asad *et al.*, (2002) and Dahar *et al.*, (2007). Correlation studies suggest that all the quantitative yield components are important in determining seed cotton yield.

**Table 1. Mean performance and mean squares (ANOVA) for yield and yield components of eight cotton genotypes.**

Genotypes	Plant height (cm)	Sympodia/plant	Bolls/plant	Boll weight (g)	Seed cotton yield/plant (g)	
CIM-707	76.66 f	18.0 e	14.46 f	3.1 c	44.83 d	
CIM-443	89.7 d	20.0 d	16.79 c	2.6 e	43.66 f	
CIM-506	90.66 c	20.0 d	15.41 e	2.3 g	35.45 h	
CIM-446	83.73 e	17.0 f	17.32 b	2.2 h	48.5 a	
TH-3/83	127.5 a	23.0 a	16.3 d	2.9 d	47.28 b	
FH-901	69.8 h	21.0 c	18.56 a	2.4 f	44.55 e	
Chandi-95	94.42 b	22.0 b	8.66 h	4.3 b	37.25 g	
Reshmi	74.46 g	16.0 g	9.09 g	5.11 a	46.59 c	
Source of variation	DF	Mean squares				
Replication	2	7.90	8.00	7.98	0.32	31.92
Genotypes	7	973.62**	17.946**	41.606**	3.298**	66.681**
Error	14	0.004	0.001	0.002	0.002	0.005

**Table 2. Correlation (r) and coefficient of determination (r<sup>2</sup>) for yield and yield components of cotton genotypes.**

Characters	Plant height	Sympodia/plant	Bolls/plant	Boll weight	Seed cotton yield/plant
Plant height	1.00				
Sympodia/plant	0.661** (r <sup>2</sup> =0.436)	1.00			
Bolls/plant	0.059n.s (r <sup>2</sup> =0.003)	0.177n.s (r <sup>2</sup> =0.0313)	1.00		
Boll weight	-0.104n.s (r <sup>2</sup> =0.0108)	-0.233* (r <sup>2</sup> =0.54)	-0.532** (r <sup>2</sup> =0.283)	1.00	
Seed cotton yield/plant	-0.016n.s (r <sup>2</sup> =0.0002)	0.370** (r <sup>2</sup> =0.142)	0.509** (r <sup>2</sup> =0.254)	0.329** (r <sup>2</sup> =0.108)	1.00

From the present studies it is concluded that variety TH-3/83 generally displayed better performance in all the quantitative traits among all the varieties under agro-climatic conditions of Jamshoro, Sindh.

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