Pak. j. life soc. sci. (2008), 6(1): 1-3

Pakistan Journal of
Life and Social Sciences

Comparative Yield Performance of New Cultivars of Cotton (*Gossypium Hirsutum* L.)

Fahad Ehsan, Asghar Ali, Muhammad Ather Nadeem, Muhammat Tahir and Atif Majeed
Department of Agronomy, University of Agriculture, Faisalabad-Pakistan

Abstract

A field experiment was conducted to asses the growth and yield performance of five cultivars of cotton i.e. FH-115, FH-207, FH-901, FH-113 and MNH-786, during spring 2006. Significant differences in plant height, number of sympodial branches per plant, number of bolls per plant, average boll weight, seed cotton yield, ginning out turn, fiber length and fiber fineness were recorded among the cultivars. The cultivar FH-115 statistically produced maximum yield due to more number of sympodial branches, number of bolls per plant and higher ginning out turn.

Key words: *Gossypium hirsutum* L., cotton, cultivars, yield

Introduction

Cotton is the most important fiber crop and second most important oilseed crop in the world (Chary and Leffler, 1984). Cotton is the main stay of Pakistan's economy as it contributes nearly 10% in agriculture GDP and a source of 60% foreign exchange earning. The value added through cotton is 8.6 % in agriculture and 1.8 % in total GDP. At present, cotton is grown on an area of 3075 thousand hectare and production stand as 13000 thousand bales (Anonymous, 2007).

Presently, there is acute need to further exploit the available agricultural and agronomic resources for greater benefits. Owing to increasing population growth rate, the demand for food and cloth has also increased. It indicates the tremendous scope for increasing the yield of seed cotton per hectare by overcoming yield constraints like improper sowing time, use of low yielding varieties, poor quality seed, low seed rate, low plant population, insect pest attack and weed infestation. Among these the varieties which are best suited to ago-climatic conditions and have high yield potential are of great importance. Although many high yielding cotton varieties have been developed and recommended for general cultivation in the past but their performance under farmer's conditions is not upto the mark. The reason being that either these have lost their adaptability to the changing edaphic and environment conditions or these have become susceptible to various pests and diseases.

Efforts, therefore, are needed to raise seed cotton yield through the continuous selection of high yielding cotton cultivars with wide range of adaptability to edaphic and climatic conditions to have site specific varietal selection. The varieties varied significantly for number of bolls per unit area, lint percentage (Wang *et al.*, 2004) seed index oil, protein contents (Rahman *et al.* (1993), ginning outturn (%), staple length (Khan *et al.*, 1989) bollworm resistance (Lisheng, 2005) and seed cotton yield (Ali *et al.*, 2005; Sezener *et al.* 2006; Rahman *et al.* 1993; Anwar *et al.*, 2002 Arshad *et al.*, 2003). One variety may perform better certain climatic condition but may not be a better performaer under different climatic conditions. Therefore the present study was designed to explore the yield potential of some new cotton cultivars under the prevailing conditions of Toba Tek Singh.

Materials and Methods

A field experiment was conducted to asses the growth and yield performance of five new cultivars of cotton (*Gossypium hirsutum* L.) at farmer field in Toba Tak Singh, under Adaptive Research Station, Faisalabad, during Khairf, 2006. The experiment was laid out in a randomized complete block design (RCBD) with four replications having a plot size of 15 m x 6 m. The experiment comprised five varieties i.e. FH-115, FH-207, FH-901, FH-113 and MNH-786. The crop was sown with single row hand drill using a seed rate of 20 kg ha^{-1} in 75 cm apart rows on 29^{th} May, 2006. The plant to plant distance of 22.5 cm was maintained by thinning at early growth stages. The fertilizer was applied at the rate of 90 kg N and 58 kg P_2O_5 ha^{-1} as urea and diammonium phosphate, respectively. Whole of the phosphorus and one third of nitrogen was applied at sowing while one third of nitrogen with first irrigation and remaining one third with second irrigation. All other agronomic practices were kept normal and

Corresponding author: Fahad Ehsan
Department of Agronomy,
University of Agriculture, Faisalabad-Pakistan

uniform for all the treatments. Ten plants were selected at random for recording plant height, number of sympodial branches, number of bolls per plant and average boll weight. Seed cotton yield was recoded on per plot basis and was converted to t ha^{-1}. Ginning out turn was recorded as ratio between weight of the lint and weight of the seed cotton in percentage. Fiber length was measured in millimeters after ginning from each plot and fiber fineness recoded by micronare meter from the lint after ginning. Data collected was analyzed statistically using Fisher's analysis of variance technique at 5 % probability level (Steel *et al*., 1997).

Results and Discussion

Various cotton cultivars differ significantly for plant height. The maximum plant height (104.8 cm) was observed in case of cultivar FH-113 which was statistically at par with cultivar MNH-786 (104.2 cm) and FH-115 (97.75 cm). The lowest plant height (91.15 cm) was observed in cultivar FH-207 and it was statistically at par with cultivar FH-901 (92.45 cm). Differences observed for plant height among cotton cultivars can be attributed to variation in genetic make up of crop plants. These results are supported by the findings of Anwar *et al.* (2002) and Copur (2006) who also reported significant differences among cultivars for plant height.

Data regarding to the number of sympodial branches per plant revealed a significant difference among cotton cultivars (Table-1). The cultivar MNH-786 produced the highest number of sympodial branches per plant (22.65). It was statistically at par with cultivars FH-115 (21.75) which was statitically at par with FH-113 (21.58). The lowest number of sympodial branches per plant was produced by FH-207 (19.40) but it was statistically at par with cultivar FH-901 (20.15). The difference in number of sympodial branches per plant can be attributed to differences in genetic makeup of the cultivars. The significant differences among varieties for number of sympodial branches per plant had also been reported by Copur (2006).

There was significant difference among the cultivars in case of number of bolls $plant^{-1}$. The ignificantly maximum number of bolls per plant was observed in case of cultivar FH-115 (31.60). The cultivars FH-901 (26.10) and FH-113 (25.90) produced statistically same number of bolls per plant. The minimum number of bolls per plant was found in cultivar FH-207 (21.60). The differences among cultivars for number of bolls per plant might have been due to the difference in genetic potential of the cultivars. The significant differences among varieties for number of bolls per plant had also been reported by Anwar *et al.* (2002) and Copur (2006).

Boll weight is directly related to the final seed cotton yield of cotton. A perusal of data indicated that maximum boll weight was recorded in cultivar MNH-786 (3.88 g) while the minimum boll weight was recorded in cultivar FH-113 (2.40 g). Significant differences were also found between FH-115 (3.48 g), FH-207 (3.40 g) and FH-901 (2.68 g). The higher boll weight (3.88 g) was in case of MNH-786 followed by FH-115 (3.48 g), FH-207 (3.40 g) and FH-901 (2.68 g). The significant differences among varieties for average boll weight had also been reported by Hofs *et al.* (2006),

All the cotton cultivars differed from each other for seed cotton yield. The cultivar FH-115 produced significantly maximum seed cotton yield (5.57 t ha^{-1}). The lowest yield was produced by the cultivar FH-113 (3.24 t ha^{-1}), but it was statistically at par with FH-207 (3.71 t ha^{-1}) and FH-901 (3.53 t ha^{-1}). The maximum seed cotton yield with FH-115 can be attributed to maximum number of sympodial branches, number of squares and number of bolls per plant. These results are supported by the findings made by Khan *et al.* (1989), Hofs *et al.* (2006) and Copur (2006).

Ginning out turn (GOT) was significantly influenced by the different cultivars. The highest value of ginning out turn was obtained in case of cultivar FH-115 (39.42), but it was statistically at par with cultivars FH-207 (39.08) and MNH-786 (38.92). There is a positive relationship between yield and ginning out turn percentage. The lowest value of GOT was observed in case of cultivar FH-113 (35.88). These findings are in agreement with those of Khan *et al.* (1989) and Wang *et al.* (2004) who reported that high lint yield was changed by the change of varieties.

The comparison of treatment means indicated that cultivars had significant effect on fiber length. The highest staple length was recorded in case of cultivar FH-113 (28.67 mm) and it was statistically at par with cultivar FH-207 (28.63 mm).The lowest staple length was found in cultivar FH-901 (26.77 mm) but it was statistically at par with cultivar MNH-786 (27.13 mm). Previous studies reported that fiber length could vary widely with plant variety and growing conditions. Copur (2006) and Khan *et al.* (1989) reported similar results for fiber length in cotton.

Fiber fineness is very important characteristic regarding the fiber quality of cotton and is very useful for textile industry. The comparison of treatment mean indicated that cultivars varied significantly for fiber fineness. The maximum thickness of fiber (minimum fineness) was recorded in case of cultivar FH-901 (4.95 µg $inch^{-1}$) and the minimum fiber thickness (maximum fineness) was found in cultivar FH-115 (4.31 µg inch^{-1}). Differences between the cultivars with respect to fiber fineness were also found significant by Copur, (2006).

Conclusion

On the basis of yield and yield components, the cultivar FH-115 performed the best. The use of cultivar FH-115 seems to be better to get maximum yield of cotton.

References

Ali, Y., Aslam, Z. and Hussain, F. Genotype and environment interaction effect on yield of cotton under naturally salt stress conditions. Int. J. of Environ. Sci. Tech. 2005, 2(2): 169-173.

Anonymous. Area and Production of Cotton in Pakistan. Ministry of Food, Agriculture and Livestock Federal Bureau of Statistics, 2007.

Anwar, A. M., Gill, M. I. , Muhammad, D. and Afzal, M. N. Evaluation of cotton varieties at different doses of nitrogen fertilizer. The Pak. Cottons, 2002, 46(1-4): 35-41.

Arshad, M., Afzal, M., Khan, M. I. and Mahmood, R. Performances of newly developed cotton strains for economic and fiber traits in national coordinated varietal trials. Pakistan. J. of Scientific and Ind. Res., 2003, 46(5): 373-375.

Boonrumpun, P., Kasemsap, P., Saimaneerat, A., Nawanich, S. and Tanasorn, C. Yield trial test of the 19 lines of brown fiber cotton. Proceeding of 43rd Kasetsart University Annual Conference, Thiland, 1-4 Feb., 2005, Subject: Plants; 188-196.

Chary, J. P., and Leffler, H. R. Seed in. Kohel R. J. cd. C. F. Lewis (eds) Cotton USA. Modison, Wiscoinsin, 1984, pp 511-569.

Copur, O. Determination of yield and yield components of some cotton cultivars in semi arid conditions. Pak. J Biol. Sci., 2006, 9(14) 2572-2578.

Hofs, J. L., Hau, B. and Marais, D. Boll distribution patterns in Bt and non-Bt cotton cultivars: I. Study on commercial irrigated farming systems in South Africa. Field Crops Res., 2006**,** 98(2 & 3): 203-209.

Khan, W. S., Khan, A. A., Naz, A. S. and Ali, S. Performance of six Punjab commercial varieties of *Gossypium hirsutum* L. under Faisalabad conditions. The Pak. Cottons, 1989, 33(2): 60-65.

Lisheng, B. Comprehensive evaluation of new varieties of insect resistant hybrid cotton by grey association degree. Acta Agriculture Shanghai, 2005, 21(1): 12-14.

Rahman, H., Rahman, A., Khan, W. S. and Murtaza, N. Genotype-environment interaction and stability of seed quality traits in *Gossypium hirsutum* L. cultivars. The Pak. Cottons, 1993, 37(1): 21-25.

Sezener, V., Bozbek, T., Unay, A. and Yavas, I. Evaluation of cotton yield trials under Mediterranean conditions in Turky. Asian J. of Plant Sci., 2006, 5(4): 686-689.

Steel, R.D.G., Torrie, J.H. and Dickey, D. Principles and procedures of statistic. A Biometrical Approach (3rd Edn.). MGraw Hill book co. Inc. New York. 1997, pp 172-177.

Wang, C., Isoda, A. and Wang, P. Growth and yield performance of some cotton cultivars in Xinjiang, China, an arid area with short growing period. J. Agron. Crop Sci., 2004, 190 (3): 177-183.

Table 1 Comparative yield performance of some new cultivars of cotton (*Gossypium hirsutum* L.)

Varieties	Plant height (cm)	Number of sympodial branches (Plant^{-1})	Number of bolls (Plant^{-1})	Average boll weight (g)	Seed cotton yield (t ha-1)	G.O.T (%)	Fibre length (mm)	Fibre fineness (µg inch^{-1})
FH-115	97.75 AB	21.75 AB	31.60 A	3.48 B	5.57 A	39.42 A	27.95 B	4.31 D
FH-207	91.15 B	19.40 C	21.60 C	3.40 C	3.71 C	39.08 A	28.63 A	4.51 C
FH-901	92.45 B	20.15 BC	26.10 B	2.68 D	3.53 C	37.05 B	26.77 C	4.95 A
FH-113	104.8 A	21.58 AB	25.90 B	2.40 E	3.24 C	35.88 C	28.67 A	4.57 BC
MNH-786	104.2 A	22.65 A	24.25 BC	3.88 A	4.79 B	38.92 A	27.13 C	4.70 B
LSD	7.185	1.691	3.358	0.06890	0.4848	0.5359	0.5806	0.1541

Any two means not sharing a letter with in a column differ statistically at 5% probability level