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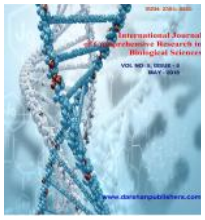

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Research Article

EFFICACY OF DIFFERENT HIGH YIELDING COTTON VARIETIES IN ECOLOGICAL ZONE BAHAWALNAGAR

Laila Khalid[1] and Mueen-u-Din[2]
[1]Research Officer of Adaptive Research Station Bahawalnagar
[2]Senior Subject Matter Specialist (Agronomy) of Adaptive Research Farm, Vehari
Department of Agriculture Punjab Pakistan

Abstract

To determine the efficacy of different high yielding cotton varieties this study was conducted at farmer's field of Bahawalnagar during the years 2015 and 2016. Cotton crop suffers from yield losses because of low yielding varieties, pure quality seed, attack of various insect pests, occurrence of cotton leaf curl virus and poor soil fertility. The experiment was laid out in RCBD design with three replications. Six different cotton varieties i.e FH-142, BS-70, MNH-886, FH-Lalazar, MNH-992 and IUB-13 was tested to check their yield potential in ecological zone of Bahawalnagar. The different cotton varieties was significantly affected almost all the characters related to growth and yield. The average of two years result revealed that significant maximum plant population/m^2 i.e 9.1, plant height (cm) i.e 155, number of bolls/plant i.e 52.1, boll weight (g) i.e 3.5 and maximum seed cotton yield i.e 2830.5 kg/ha was obtained by the cotton variety FH-142 in ecological zone of Bahawalnagar followed by MNH-886 and FH-Lalazar cotton varieties with yield i.e 2771.8 and 2601.2 kg/ha.

Keywords: cotton, yield, RCBD design, FH-142.

Introduction

Cotton is the most important crop of Pakistan, cultivated on 2917 thousands hectares and is the source of large amount of foreign exchange, contributing about 5.1% of value added in agriculture and about 1.0 percent of GDP and contributes about 66% share in national oil production (Anonymous, 2015). Cotton is the main cash crop of Pakistan and is grown primarily for fiber and oilseed. Being very sensitive to various climatic factors, its cultivation to produce lint and seed cotton yield, needs better understanding. Cotton crop suffers from yield losses because of low yielding varieties, pure quality seed, attack of various insect pests, occurrence of cotton leaf curl virus and poor soil fertility. The poor soil fertility is the most important of all these yield limiting factors. High land use intensity, introduction of modern crop cultivars, minimum and unbalanced fertilizer use in addition to organic matter in the soil, has further aggravated the nutrient deficiency (Siddiky et al., 2007). Afzal et al., (2002) reported significant differences in yield, boll weight, number of bolls per plant and plant height due to planting of various genotypes (varieties). In textile manufacturing, it produces seeds with a potential multi product base such as hulls, oil, lint and food for animals (Ozyigit . 2008). Hanif et al.,

(2001) also found significant variations in seed cotton yield due to varieties. Sezener et al., (2006) also found significant variation in seed cotton yield due to genotypes. Breeding efforts for improving *G.hirsutum* L. were initiated since its introduction in this region. Many high yielding and good quality varieties developed and successfully cultivated in this region. But cotton production in Pakistan faces the threats of both biotic and abiotic stresses (Saeed et al., 2015). In Pakistan, there is a focus on improving cotton germplasm and cultivars that can combat drought stress (Rahman et al., 2008; Ullah et al., 2008), exhibit resistance to the CLCuD (Rahman et al., 2002), and possess higher yield potential with improved fiber traits (Khan et al., 1989; Afzal et al., 2001; Hanif et al., 2001; Arshad et al., 2003). 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). Low yield of cotton in Pakistan is due to many crop husbandry problems such as low or more plant population, water shortage, low seed rate, improper fertilizer management, weed infestation, insect pest and disease problems (Ahmed et al., 2009). 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. 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). Keeping in view the importance of cotton crop and significant response of different cotton varieties, the present study was conducted to identify the most high yielding variety of cotton in ecological zone of Bahawalnagar.

Materials and Methods

The experiment was conducted at farmer's field of Adaptive Research station Bahawalnagar during 2015 and 2016 to determine the efficacy of different high yielding cotton varieties. The experiment was laidout in Randomized Complete Block Design (RCBD) with three treatments and repeated thrice. Experimental treatments comprised of Seed bed was prepared by cultivating the field for two times with tractor mounted cultivated each followed by planking. The cotton varieties i.e FH-142, BS-70, MNH-886, FH-Lalazar, MNH-992 and IUB-13 was sown on sandy loam soil. Sowing was done on well prepared seed bed 1st week of May in two years. With the help of manual labour by maintaining 2.5 feet row spacing and 12 inch plant to plant distance was maintained by thinning at 6 inch height of the cotton plant. Over all eight irrigation were applied and weeds were controlled through weedicides. Insecticides were applied to control the sucking insects (Whitefly, Thrips, Jassid, & Mites) and boll worms (Pink boll worm). All other agronomic practices were kept normal and uniform for all the treatments. Plant population/m^2 was counted after two weeks of sowing. Plant height (cm) of randomly selected plots from each plot was measured at the time of last picking and average height was calculated. The total number of bolls on the randomly selected plants picked at the time of each picking was counted. Thus total number of bolls on the plants was obtained by summing up the bolls picked during all pickings and average of number of bolls per plant was calculated. For boll weight (g), three samples each of 100 seeds from each plot were weighted and finally averaged. Average boll weight (g) was calculated by dividing the total plants seed cotton yield with respective number of bolls per plant. Seed cotton picked from selected plants during all the pickings was weighted in grams using electric balance. After that the yield of seed cotton per plant was calculated. Seed cotton yield kg ha^{-1} was computed from seed cotton yield per plot. Data collected on different parameters were analyzed statistically by using M STAT-C Programme

(Anonymous,1986) for analysis of variance and means were separated using Fisher's protected least significant difference (LSD) test at 5% probability level (steel et al., 1997).

Results and Discussion

Data pertaining to plant population/germination count m^{-2} was non significant during the year 2015 in all six treatments as mentioned in table-1.

Table.1 Efficacy of different high yielding cotton varieties in ecological zone of Bahawalnagar during 2015 and 2016.

Year	Treatments	Average germination counts (m^{-2})	Average plant height (cm)	No. of Bolls/plant	Boll weight (g)	Average seed cotton yield (kg/ ha)
2015	T_1	8.3	156a	54.3a	3.4	2427.1a
	T_2	7.6	141f	39.2f	2.8	2110.5f
	T_3	8.0	152b	51.3b	3.1	2363.7b
	T_4	7.8	149c	48.3c	3.2	2321.5c
	T_5	7.3	147d	44.0d	2.9	2216.0d
	T_6	8.3	144e	42.3e	3.0	2173.8e
LSD(0.05)		**Non-significant**	**4.86**	**2.03**	**Non-significant**	**68.50**
2016	T_1	10.0	154a	50a	3.7	3234a
	T_2	8.0	140f	38f	2.9	2582f
	T_3	9.0	151b	47b	3.3	3180b
	T_4	10.0	148c	46c	3.2	2881c
	T_5	9.0	143d	43d	3.0	2717d
	T_6	8.5	141e	41e	3.0	2660e
LSD(0.05)		**Non-significant**	**1.59**	**1.53**	**Non-significant**	**84.03**

Plant height per plant was affected in all cotton varieties. The plant height 156 (cm) maximum was observed for cotton variety FH-142 followed by 152 and 149 (cm) for cotton varieties MNH-886 and FH-Lalazar. The minimum plant height 141 (cm) was observed for cotton variety BS-70. Data presented in table-1 indicate that dry matter yield and plant height vary in different cotton varieties. Increase in main stem node numbers was mainly responsible for plant height (cm) is an important growth parameter of cotton plant with respect to seed cotton yield per plant, as plant height increases it produces more number of main stem node that allow to produce more number of bolls and boll weight that directly or indirectly can increase the seed cotton yield per plant Kaynak (1995). It is concluded by (Ahmed et al., 2009 and Sandhu et al., 1986) that number of fruiting branches per plant showed positive relationship with seed cotton yield per plant. The maximum number of bolls per plant was observed in treatment 1 i.e 54 for FH-142 cotton variety followed by 51.3 and 48.3 for cotton varieties MNH-886 and FH-Lalazar. The minimum number of bolls per plant was observed i.e 39.2 for cotton variety BS-70. Killy (1995) reported that seed cotton yield was highly affected by the numbers of bolls per plant. Boll weight is an important yield determining factor that varies among the different cotton varieties. The boll weight (g) data was observed as non significant among all the treatments. The maximum boll weight 3.4 (g) for FH-142 cotton variety followed by 3.1 and 3.2 (g) MNH-886 and FH-Lalazar.

Whereas minimum boll weight 2.8 (g) was observed for cotton variety BS-70. The B.T variety FH-142 produced maximum seed cotton yield i.e 2427.1 kg/ha i.e highest among all other cotton varieties followed by 2363.7 and 2321.5kg/ha for MNH-886 and FH-Lalazar cotton varieties. MNH-992 and IUB-13 was also performed better with a yield of i.e 2216 and 2173.8kg/ha. The minimum seed cotton yield was observed i.e 2110.5 kg/ha for BS-70 cotton variety. The results indicated that all the varieties performed in different manners in ecological zone of Bahawalnagar.

Data pertaining to plant population/germination count m^{-2} was non significant during the year 2016 in all six treatments as mentioned in table-1. Plant height per plant was affected in all cotton varieties. The plant height 154 (cm) maximum was observed for cotton variety FH-142 followed by 151 and 148 (cm) for cotton varieties MNH-886 and FH-Lalazar. The minimum plant height 140 (cm) was observed for cotton variety BS-70. It is concluded by (Ahmed et al., 2009 and Sandhu et al., 1986) that number of fruiting branches per plant showed positive relationship with seed cotton yield per plant. The maximum number of bolls per plant was observed in treatment 1 i.e 50 for FH-142 cotton variety followed by 47 and 46 for cotton varieties MNH-886 and FH-Lalazar. The minimum number of bolls per plant was observed i.e 38 for cotton variety BS-70. Boll weight is an important yield determining factor that varies among the different cotton varieties. The boll weight (g) data was observed as non significant among all the treatments. The maximum boll weight 3.7 (g) for FH-142 cotton variety followed by 3.3 and 3.2 (g) MNH-886 and FH-Lalazar. Whereas minimum boll weight 2.9 (g) was observed for cotton variety BS-70. The B.T variety FH-142 produced maximum seed cotton yield i.e 3234 kg/ha i.e highest among all other cotton varieties followed by 3180 and 2881 kg/ha for MNH-886 and FH-Lalazar cotton varieties. MNH-992 and IUB-13 was also performed better with a yield of i.e 2717 and 2660.8kg/ha. The minimum seed cotton yield was observed i.e 2582 kg/ha for BS-70 cotton variety. 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). The results indicated that all the varieties performed in different manners in ecological zone of Bahawalnagar during 2016 on the basis of varietal own characters, environmental factors and other soil factors.

Table.2 Efficacy of different high yielding cotton varieties in ecological zone of Bahawalnagar average of two years (2015-16).

Year	Treatments	Average germination counts (m^{-2})	Average plant height (cm)	No. of Bolls/plant	Boll weight (g)	Average seed cotton yield (kg/ ha)
2015-16	T_1	9.1	155	52.1	3.5	2830.5
	T_2	7.8	140.5	38.6	2.8	2346.2
	T_3	8.5	151.5	49.1	3.2	2771.8
	T_4	8.9	148.5	47.1	3.2	2601.2
	T_5	8.1	145	43.5	2.9	2466.5
	T_6	8.4	142.5	41.6	3.0	2416.9

Table 2 shows the average results of two years 2015-16 that indicated during two years the cotton variety FH-142 performed better produces highest germination count m^{-2} i.e 9.1, plant height (cm) 155, no. of bolls/plant 52.1, boll weight (g) 3.5 and yield kg/ha 2830.5 under the ecological zone of Bhawalnagar.

Table 3: Percentage increase in cotton yield (kg/ha) between different cotton varieties for the years 2015 and 2016.

Treatments	Combined Avg. yield of 2015 and 2016 (kg/ha)	Percentage increase in wheat yield (%)
T1	2830.5	20.6
T2	2346.2	-
T3	2771.8	18.1
T4	2601.2	10.8
T5	2466.5	5.1
T6	2416.9	3.01

Table 3 shows that the highest yield was produced in T_1 for cotton variety FH-142 with 20.6 % yield increase for both study years i.e.2015-16 followed by MNH-886 and FH- Lalazar i.e 18.1% and 10.8 % when compared with low yield variety i.e BS-70.

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