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Effect of Plant Density on Four Short Statured Cotton Varieties

[1]M. Akhtar, [1]M. S. Cheema, [2]Moazzam Jamil, [2]M. Rashad Farooq and [3]M. Aslam
[1]Agronomic Research Station, Bahawalpur, Punjab, Pakistan
[2]Soil and Water Testing Laboratory, Bahawalpur, Punjab, Pakistan
[3]Regional Agricultural Research Institute, Bahawalpur, Punjab, Pakistan

Abstract: The experiment was conducted to evaluate the maximum yield potential of cotton as effected by plant population for four short statured varieties viz., NIAB-Karishma, NIAB-78, CIM-443 and CIM-448 planted at spacings 10, 20, and 30 cm with rows at 75 cm apart. Maximum seed cotton yield 2657 kg ha^{-1} was recorded when plant spacing was 30 cm for all the varieties closely followed by 2640 kg ha^{-1} for the treatment, where plant spacing was 20 cm. The minimum values were obtained at plant spacing of 10 cm.

Key words: Plant density, short statured cotton varieties

Introduction

Cotton (*Gossypium hirsutum* L.) is an important cash crop of Pakistan. It covers an area of 2927.5 thousand hectares with annual production of 10731.9 thousand bales during the year 2000 (Anonymous, 2002). Cotton is not only a source of foreign exchange but it is also a source of income to farmer's and labourer's because local textile industry is based on the cotton production. Cotton seed is the major source of vegetable oil and oil seed cake for animal feed. Production of cotton use in textile industry.

Although Pakistan has been able to achieve breakthrough in production of cotton, yet there is vast gap between the potential and national average yield. Out of factors, limiting higher yield in cotton effective crop management practices particularly to maintain an appropriate plant population may help to get maximum seed cotton yield.

Cotton production plan pointed out that, plant population has been identified as one of the major factors responsible for low yield in the country (Anonymous, 1985). The PCCC recommended plant population of 60,000-75,000 plants ha^{-1} in Sindh and NWFP. Devi *et al.* (1995) stated that cotton cv. JKHY-1 was grown at densities of 55556, 74074 or 111 111 plants ha^{-1} and givan 0-160 N kg ha^{-1}. Seed cotton yield was highest with 160kg N and at a plant density of 111 111 plants ha^{-1}. Goudreddy *et al.* (1995) concluded that seed cotton yield was greater at the higher plant population and reduced by sowing in July compared with June. Jagannathan and Venkitaswamy (1996) reported that seed cotton yield decreased with increase in plant spacing and it was highest with 80 kg N + 40 kg P + 40 kg K ha^{-1} while, seed cotton yield was unaffected by cultivars.

El-Din (1997) concluded all combinations of 3 plant densities (target populations of 140,000, 70000 or 46,666 plants feddan^{-1}) and yield per feddan was highest at 70,000 plants feddan^{-1} in both years (1 feddan=0.42 ha). Esparza and Pedroza (1997) reported that cotton cv. laguna 89 grown at spacings of 10, 30 or 50 cm between plants. Plant density have no significant effect on seed cotton yield. Manjappa *et al.* (1997) concluded that cotton cv. RAMPBS 155 gave the highest yield of 3.11 t ha^{-1} when grown at 90 x 45 cm spacing. The lowest plant density of 4 spacing treatments tested. Shekar *et al.* (1999) grown cotton cv. DCH-32 at 9 different spacing. Seed cotton yield was highest (2881 kg ha^{-1}) from 60 X 30 cm, which was the highest plant density (55555 plants ha^{-1}) studied. Spacing at 90 X 30 cm^2 gave the yield of 2675 kg ha^{-1} and it is suggested that this spacing should be more convenient for cultural operations.

Materials and Methods

The study was carried out at Agronomic Research Station, Bahawalpur during the kharif 1999 and 2000 to find out the optimum plant population in exploring the maximum yield potential of cotton varieties. The experiment was laid out in split plot design with four replications, having a plot size of 3 X 6m^2. The experiment involved the following levels of the two factors

Factor 1
Varieties

V_1	NIAB-Karishma	V_2	NIAB-78
V_3	CIM-443	V_4	CIM-448

Factor 2
Plant spacings

S_1	10 cm	S_2	20 cm	S_3	30 cm

Row spacing was maintained at 75 cm

The observations for each entry were recorded on yield and yield components. Data were collected analyzed statistically using least significant difference test (Steel and Torrie, 1984).

Results and Discussion

The analysis of variance showed significant differences among plant spacings in cotton varieties. A thorough scrutiny of the data revealed a superiority of plant spacings of 30 cm over others.

The data (Table 1) depicts a detailed scenario of yield performance at different plant spacings of four cotton varieties. The highest mean seed cotton yield of 2657 kg ha^{-1} was obtained when plant and row spacings were 30 and 75 cm respectively, followed by (2640 kg ha^{-1}) for plant and row spacing 20 and 75 cm respectively. A significantly lowered weights were obtained when plant and row spacings were 10 and 75 cm respectively. The interaction between varieties and plant spacings was also significant, reflecting the optimum plant spacing for different cotton varieties under study. These results are in line with those reported by khan *et al.* (1975) and Goudreddy *et al.* (1995) and not in line with those reported by Devi *et al.* (1995), El-Din (1997) and Shekar (1999). As for as varieties were concerned V. NIAB-Karishma gave the highest yield (2702 kg ha^{-1}) with significantly lowered values for V. CIM-443, V. CIM-448 and NIAB-78 i.e., 2634, 2557 and 2509 kg ha^{-1} respectively.

Irrespective of varieties, maximum no of bolls plant^{-1} were attained by plant spacing 30 cm followed non significantly by plant spacing of 20 cm, while the significantly lowest values were recorded by plant spacing 10 cm (Table 2). These results are in line with those reported by Sinha (1974) and not in line with Katarki *et al.* (1970).

The data (Table 3) explains that boll size was maximum when plant spacings was 30 cm followed significantly by plant spacing 20 cm while, least value was obtained by plant spacing 10 cm with standard row spacing. The interaction between plant spacings and varieties were also significant reflecting the optimum plant spacing for different cotton varieties under study. Similar findings were reported by Emiroglu (1970). As for as varieties were concerned,

Table 1: Effect of plant spacing on seed cotton yield (Kg ha^{-1}) of different varieties of cotton

Plant spacing (cm)	NIAB-Karishma	NIAB-78	CIM-443	CIM-448	Means
S_1 (10)	2570b	2341b	2632b	2478c	1505b
S_2 (20)	2753a	2574b	2632b	2599b	2640a
S_3 (30)	2783a	2613b	2638b	2594b	2657a
Means	2702a	2509c	2634ab	2557bc	

Cd_1 for plant spacings = 73.37 Cd_1 for varieties = 84.47 Cd_1 for varieties X plant spacings = 83.45

Table 2: Effect of plant spacing on boll $plant^{-1}$ of different varieties of cotton

Plant spacing (cm)	NIAB-Karishma	NIAB-78	CIM-443	CIM-448	Means
S_1 (10)	37c	33d	37c	33d	34.83b
S_2 (20)	39bc	40ab	37c	38bc	38.75a
S_3 (30)	41ab	43a	42a	39bc	41.17a
Means	39	38.56	38.78	36.78	

Cd_1 for plant spacings = 2.715 Cd_1 for plant spacings X varieties = 2.675

Table 3: Effect of plant spacing (cm) on 100 bolls weight (g) of different varieties of cotton

Plant spacing(cm)	NIAB-Karishma	NIAB-78	CIM-443	CIM-448	Means
S_1-10	335ef	310g	330f	340e	38.20c
S_2-20	362abc	340e	350d	361bc	353.30b
S_3-30	370a	355cd	368ab	369ab	365.70a
Means	355.80a	335.20b	349.30a	356.70a	

Cd_1 for plant spacings = 8.608 Cd_1 for varieties = 10.22 Cd_1 for plant spacings X varieties = 8.482

Row spacing was maintained at 75 cm

Means sharing different letters differ significantly at $P \leq 0.05$

all the varieties were statistically same for this yield components. On the basis of two years results it was concluded that maximum seed cotton yield was obtained when plant and raw spacings were 30 and 75 cm respectively followed by plant and row spacing 20 and 75 cm respectively.

References

Anonymous, 2002. Statistical pocket book of Pakistan, Federal Bureau of Statistics, Statistical Division Govt. of Pakistan, Pakistan, pp: 83.

Anonymous, 1985. Cotton Production Plan Published by PCCC, pp: 14-20.

Devi, C.M., B.R. Reddy, P.M. Reddy and S.C.S Reddy, 1995. Effect of Nitrogen levels and plant density on yield and quality of JKHY-1 cotton. Current Agric. Res., 8: 144-146.

El-Din G.M.S., 1997. Effect of weed control and plant Density of cotton on yield, some of its components, fibre properties and associated weeds. Ann. Agric. Sci. Moshtohor., 35 699-714.

Emiroglu, S.H., 1970. Degisik Sulama, Gubreleme Ve Ekim Mesafesi Sartlari Altinda Koker Pamugunun Verimle Iiglil Bazi Vasiflarl Uzerinde Arastirmalar. Doktora Tezi, E.U.Z.F. Yayinlari No. 157.

Esparza, M.J.H. and A.S Pedroza, 1997. Effect of plant density and harvesting date on yield and quality of cotton. ITEA-production Vegetal, 93: 94-103.

Goudreddy, B.S., B.T. Pujari, Sathyanarayanarao, V.S. Veeranna, K. Manjappa and A.K. Gugari, 1995. In fluence of plant populations, sowing dates and moisture conservation methods on the yield of DCH-32 cotton. J. Moharashtara Agric. Univ., 20: 88-89.

Jagannathan. N.T. and R. Venkitaswamy, 1996. Effect of plant density and nutrient levels on new cotton varieties. Madras Agric. J., 83: 159-161.

Katarki, B.H., G., Hunsigi, N.S. Parameshwar and N.K.S. Prasad, 1970. A Note on the Varietal Response of *G. hirsutum* to Fertilizer and Plant population Level. Mysore J. Agric. Sci., 4: 205-207.

Khan, W.S., A. Latif, A.R. Khan and R.A. Saroya, 1975. B-557 A new high yield potential Punjab American (*G. hirsutum*) cotton. The Pak. Cottons, 20: 21-33.

Manjappa, K., A.K. Guggari, Y.B. Palled and V.S. Kubsad, 1997. Effect of spacing and fertilizers on yield of cotton *(G. hirsutum)* under irrigated conditions. Ind. J. Agron., 42: 184-187.

Shekar, B.G., K.T.R. Prasad, B. Mahanthesh and S. shivanna, 1999. Kapas yield and Economics of hybrid cotton (*G. hirsutum*) as influenced by inter and intra row spacings. Current Res. Univ. Agric. Sci. Banglore, 28: 41-42.

Sinha, M.N., 1974. Studies on Spacing with Cotton at two Nitrogen Levels. Ind. J. Agron., 19: 53-59.

Steel, R.G.D. and J.H. Torrie, 1980. Principals and Procedures of Statistics. McGraw Hill Book Company, New York, pp: 187-188.