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RESEARCH ARTICLE

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Performance of inter specific cotton hybrids under various plant geometries and nutrient levels

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ABSTRACT : Field experiment was conducted at Agricultural Research Station, Borwat Farm, Banswara during *Kharif* -2010 to find out the optimum plant geometry and fertility levels for inter specific cotton hybrids with three cotton hybrids (JKCHB-214,RAHB-170 and DCH-32), two plant geometries (90 x 60 and 90 x 45 cm) and three fertility levels (75,100 and 125 % RDF). Sowing of JKCHB-214 cotton hybrid gave significantly higher seed cotton yield (1558 kg ha^{-1}) over DCH-32 cotton hybrid. The maximum seed cotton yield (1754 kg ha^{-1}) was observed under wider plant geometry of 90 x 60 cm than closer plant geometry of 90 x 45 cm. Though, yield attributing parameters such as bolls $plant^{-1}$ and boll weight were statically improved in wider as compared to closer spacing it could be increase the seed cotton yield. Among fertility levels, similar seed cotton yield was recorded with the application of 100 per cent RDF (1555 kg ha^{-1}) and 125 per cent RDF (1602 kg ha^{-1}) but both were significantly better than that of 75 per cent RDF and plant geometry 90 x 60 cm seemed to be ideal for inter specific hybrid cotton for realizing higher productivity under the specific agro climatic zone IV b of Rajasthan.

KEY WORDS : JKCHB-214, Inter specific cotton, Plant geometry, Fertility levels

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INTRODUCTION

Cotton is known as white gold and queen of fibres. It is an important cash crop of global significance which plays a dominant role in world agriculture and industrial economy. India is important grower of cotton on a global scale. The cotton productivity in 2016-17 has 568 kg/ha with an area of 105 lakh ha and production 351 lakh bales each 170 kg (CCI, 2017). Plant geometry having greater importance in cotton cultivation. Bt cotton crop may be producing excessive vegetative growth at wider plant geometry and excessive reproductive growth at close plant geometry. However, numerically lower monopodial with closer plant geometry and lower sympodial with wider plant geometry were observed indicating more period under vegetative growth with wider spacing (Buttar and Singh, 2006). Closer plant geometry also recorded higher seed cotton yields (Sankarnarayanan *et al.*, 2004). Cultivar selection, a key management

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component in any cropping system, is even more critical in various crop geometry of cotton production. While high yield potential is a predominant consideration, maturity, plant size, the transgenic present, and fibre properties are also major factors to consider (Jones, 2001). The maximum exploitation of these genotypes can be achieved only after determining their optimum planting densities in comparison to recommended cotton varieties. In general, it was observed that lower plant densities produces high values of growth and yield attributes per plant, but yield per unit area was higher with higher plant densities (Sharma *et al*., 2001). The reasons for decreasing productivity are due to decreasing soil fertility especially micronutrients, imbalanced use of fertilizer and occurrences of physiological disorders like square dropping, square drying, leaf reddening etc. Among these, imbalanced use of major and micro nutrients is the major problem (Hebbar *et al*., 2007). To overcome these constraints, additional nutrition through foliar feeding is required over and above the normal fertilizer recommendation. This is one of the most efficient ways of supplying essential nutrients to a growing crop. Newly released, high yielding transgenic cotton cultivars are said to have a higher nutrient demand during the boll development period (between flowering and maturity) due to their higher boll retention rate and larger boll load than conventional cultivars (Sawan *et al*., 2008).

EXPERIMENTAL METHODS

An experiment was conducted during *Kharif* -2010 at Agricultural Research Station, Borwat Farm, Banswara. The eighteen treatment combinations comprised of three cotton hybrids (JKCHB-214, RAHB-170 and DCH-32) in main plot, two plant geometries (90 x 60 and 90 x 45 cm) in sub plot and three fertility levels (75, 100 and 125 % RDF) in sub-sub plot under split plot design with four replications. Experimental field was well prepared by two ploughing followed by harrowing and cultivator and one planking for uniform levelling were performed for sowing of cotton. The soil was medium in available nitrogen (250 kg/ha), phosphorus (49 kg/ha) and high in available potassium (330 kg/ha) during the crop season. The crop was sown in last week of May by dibbling 2-3 seeds per hills and full dose of phosphorus and potash were applied before sowing, while nitrogen dose was given in two splits *i.e.* first half at the time of thinning and remaining half at flowering stage. All production and protection measures were applied as per package and practices of Humid Southern Plain Zone of Rajasthan.

EXPERIMENTAL RESULTS AND ANALYSIS

The results obtained from the present investigation as well as relevant discussion have been summarized under the following heads :

Growth:

Data shows that the sowing of inter specific hybrid cotton, among the cotton hybrids the JKCHB-214 was proved superior over DCH-32. Cotton hybrid JKCHB-214 gave higher plant height (163.83 cm), monopodial branches plant^{-1}(1.67), sympodial branches plant^{-1}(16.78) as compared to DCH-32, but it was found at par with RAHB-170 cotton hybrid plant height (162.60 cm), monopodial branches plant^{-1}(1.63), and sympodial branches plant^{-1} (15.60).The wider plant spacing 90 x 60 cm gave significantly higher plant height (163.67 cm), monopodial branches plant^{-1}(1.74) and sympodial branches plant^{-1} (15.08) over sowing at 90 x 45 cm plant spacing plant height (157.89 cm), monopodial branches plant^{-1}(1.52) and sympodial branches plant^{-1} (13.00). Significantly increase the growth of cotton with the increasing of fertility levels, application of 100 per cent RDF and 125 per cent RDF were found at par with each other. The maximum plant height (163.50 cm), monopodial branches plant^{-1} (1.70) and sympodial branches plant^{-1} (16.39) were observed under application of 100 % RDF over application of 75 per cent RDF plant height (148.17 cm), monopodial branches plant^{-1} (1.45) and sympodial branches plant^{-1} (12.61) (Table 1). Plant height and seed cotton yield was positively correlated with the plant spacing (Ganvir *et al.*, 2013).

Yield attributes:

Cotton hybrid JKCHB-214 gave higher bolls plant^{-1} (27.04), boll weight (3.20) over DCH-32 cotton hybrid bolls plant^{-1} (23.11), boll weight (2.89), but it was found at par with RAHB-170 cotton hybrid. The wider plant spacing 90 x 60 cm gave significantly higher bolls plant^{-1} (24.59), boll weight (3.18) over sowing at 90 x 45 cm plant spacing bolls plant^{-1} (22.58), boll weight (2.99). Application of 100 per cent RDF and 125 per cent RDF

Table 1 : Effect of plant geometry and fertility levels on growth, yield attributes and seed cotton yield of inter specific hybrid cotton

Treatments	Plant height (cm)	Monopodial branches / plant	Sympodial branches / plant	Bolls / plant	Boll weight (g)	Seed cotton yield (kg/ha)
Variety						
JKCHB-214	163.83	1.67	16.78	27.04	3.20	1558
RAHB-170	162.60	1.63	15.60	26.21	3.17	1486
DCH-32	153.39	1.46	12.61	23.11	2.89	1244
S.E.±	1.82	0.04	0.77	0.38	0.06	79
C.D. (P=0.05)	5.32	0.13	2.24	1.10	0.17	230
Plant geometry						
90 x 60 cm	163.67	1.74	15.08	24.59	3.18	1754
90 x 45 cm	157.89	1.52	13.00	22.58	2.99	1526
S.E.±	1.39	0.06	0.61	0.24	0.05	67
C.D. (P=0.05)	4.38	0.17	1.93	0.77	0.16	208
Fertility levels						
75 % RDF	148.17	1.45	12.61	20.15	2.86	1309
100 % RDF	163.50	1.70	16.39	23.28	3.02	1555
125 % RDF	164.17	1.72	17.00	23.83	3.05	1602
S.E.±	2.08	0.05	0.92	0.37	0.04	74
C.D. (P=0.05)	6.57	0.18	2.89	1.15	0.13	234

were found at par with each other. The maximum bolls plant^{-1} (23.28), boll weight (3.02) were observed under application of 100 per cent RDF over application of 75 per cent RDF bolls plant^{-1} (20.15), boll weight (2.86). Application of NPK leads to increase bolls/plant, boll weight due to accelerated mobility of photosynthates from source to sink Similar observations were also made by Siddiqui *et al*. (2009) and Sashtri *et al*. (2000).

Seed cotton yield:

Sowing of cotton hybrids JKCHB-214 and RAHB-170 were found at par with each other in terms of seed cotton yield. The maximum seed cotton yield (1558 kg ha^{-1}) was observed by sowing of JKCHB-214 over sowing of DCH-32 seed cotton yield (1244 kg ha^{-1}). Significantly higher seed cotton yield (1754 kg ha^{-1}) was recorded under sowing at 90 x 60 cm wider plant spacing over sowing at closer plant spacing at 90 x 45 cm seed cotton yield (1526 kg ha^{-1}). Significantly increasing the seed cotton yield with the increasing of fertility levels, application of 100 per cent RDF and 125 per cent RDF were found at par with each other. The maximum seed cotton yield (1555 kg ha^{-1}) was found under application of 100 per cent RDF over application of 75 per cent RDF seed cotton yield (1309 kg ha^{-1}). This might be due to better aeration, adequate interception of light and lesser competition for available nutrient and moisture, which have resulted in synthesis of higher photosynthates and in turn helped to produce higher seed cotton yield per plant under wider intra row spacing. Similar results were reported by Sankarnarayanan *et al*. (2004) and Buttar and Singh (2007).

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