Int.J.Curr.Microbiol.App.Sci (2017) *6*(7): 725-728

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 6 Number 7 (2017) pp. 725-728**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2017.607.090

Agronomic Evaluation of Promising Pre-Release Inter Specific Cotton Hybrids

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Keywords

Inter specific cotton, Plant geometry, Seed cotton yield and fertility levels.

Article Info

Accepted:
14 June 2017
Available Online:
10 July 2017

ABSTRACT

Field experiment was conducted at Agricultural Research Station, Borwat Farm, Banswara during *kharif* -2011 to find out the optimum plant geometry and fertility levels for inter specific cotton hybrids with three cotton hybrids (USHB-25,PSCHB-901 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 USHB-25 cotton hybrid gave significantly higher seed cotton yield (2354 kg ha^{-1}) over PSCHB-901. The maximum seed cotton yield (2208 kg ha^{-1}) was observed under plant geometry of 90 x 60 cm than wider plant geometry of 90 x 45 cm. Though, yield attributing parameters such as bolls $plan^{-1}$ 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 % RDF (2178 kg ha^{-1}) and 125 % RDF (2235 kg ha^{-1}) but both were significantly better than that of 75 % 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.

Introduction

Cotton, *Gossypium hirsutum* L., is one of the most important fibre crops playing a key role in economic and social affairs of the world. It is a soft fibre that grows around the seeds of the cotton plant *Gossypium spp*., a shrub native to tropical and subtropical regions around the world, including the Americas, India, and Africa. The fibre is most often spun into thread and used to make a soft, breathable textile, which is the most widely used natural-fibre cloth in clothing today. It is generally believed that the first cultivation of cotton was in India, though it grew wild in several locations around the world. People living in Egypt's Nile Valley and across the world in Peru were also familiar with cotton (Deng *et al.*, 2004). 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 (Sankaranarayanan *et al.*, 2004).

Nutrient management in cotton is complex due to simultaneous production of vegetative and reproductive structures during the active growth phase. The nutrient supplementation period can be increased, which provides long time from square formation to boll development. Hence, nutrient requirement during critical stages can be better met. Need for major nutrients especially nitrogen and potassium rises dramatically when bolls are set on the plants which are major sinks for potassium and high concentrations of potassium are required to maintain sufficient water pressure (water potential) for fibre elongation. Most of the cotton growing soils are losing their fertility level due to continuous mining of the nutrients from the soil (Blaise and Prasad, 2005). Thus an efficient nutrient management plan is the key in the light of the negative nutrient balances. Nutrient management in Bt-cotton is a better challenge to boost production and productivity.

Cultivar selection, a key management 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 fiber 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).

Materials and Methods

An experiment was conducted during *kharif* - 2011 at Agricultural Research Station, Borwat Farm, Banswara. The eighteen treatment combinations comprised of three cotton hybrids (USHB-25, PSCHB-901 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 leveling were performed for sowing of cotton. The soil was medium in available nitrogen (247 kg/ha), phosphorus (48.20 kg/ha) and high in available potassium (328 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 of the zone IV b of Rajasthan.

Growth

Data shows that the sowing of inter specific hybrid cotton, among the cotton hybrids the USHB-25 was proved superior over PSCHB-901. Cotton hybrid USHB-25 gave higher plant height (109.50 cm), monopodial branches plant^{-1} (1.28), sympodial branches plant^{-1} (20.06) as compared to PSCHB-901, but it was found at par with DCH-32 cotton hybrid plant height (108.60 cm), monopodial branches plant^{-1} (1.26), and sympodial branches plant^{-1} (19.85). The wider plant spacing 90 x 60 cm gave significantly higher plant height (113.09 cm), monopodial branches plant^{-1} (1.17) and sympodial branches plant^{-1} (19.20) over sowing at 90 x 45 cm plant spacing plant height (107.20 cm), monopodial branches plant^{-1} (1.08) and sympodial branches plant^{-1} (16.31). Significantly increase the growth of cotton with the increasing of fertility levels, application of 100 % RDF and 125 % RDF were found at par with each other. The maximum plant height (109.64 cm), monopodial branches plant^{-1} (1.17) and sympodial branches plant^{-1} (19.13) were observed under application of 100 % RDF over application of 75 % RDF plant height (103.98 cm), monopodial branches plant^{-1}(1.05) and sympodial branches plant^{-1} (16.12). Height increase could be due to competition for solar radiation, water and nutrient uptake among the plants. Besides leaf production was associated with plant height changes (Gao and Jein, 1989).

Yield attributes

Cotton hybrid USHB-25 gave higher bolls plant^{-1} (27.20), boll weight (4.35) over PSCHB-901 cotton hybrid bolls plant^{-1} (22.09), boll weight (3.86), but it was found at par with DCH-32 cotton hybrid. The wider plant spacing 90 x 60 cm gave significantly higher bolls plant^{-1} (25.23), boll weight (4.31) over sowing at 90 x 45 cm plant spacing bolls plant^{-1} (20.45), boll weight (3.98). Application of 100 % RDF and 125 % RDF were found at par with each other. The maximum bolls plant^{-1} (24.02), boll weight (4.00) were observed under application of 100 % RDF over application of 75 % RDF bolls plant^{-1} (19.16), boll weight (3.69). The difference between a narrow row and a wide row was not significant on yield but a wider row may facilitate intercultural and light interception but this advantage is seldom translated into improvements in yield Nehra and Kumawat, 2003 and Sharma *et al.*, 2001.

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

Treatment	Plant height (cm)	Monopodial branches / plant	Sympodial branches / plant	Bolls / plant	Boll weight (g)	Seed cotton yield (kg/ha)
Variety						
USHB-25	109.50	1.28	20.06	27.20	4.35	2354
PSCHB-901	102.23	1.10	15.89	22.09	3.86	2034
DCH-32	108.60	1.26	19.85	26.54	4.29	2298
SEm±	1.69	0.04	0.45	1.28	0.13	72
CD (p=0.05)	5.16	0.13	1.27	3.90	0.38	208
Plant geometry						
90 x 60 cm	113.09	1.17	19.20	25.23	4.31	2208
90 x 45 cm	107.20	1.08	16.31	20.45	3.98	1895
SEm±	1.71	0.03	0.32	1.10	0.07	69
CD (p=0.05)	5.29	0.08	1.02	3.41	0.24	212
Fertility levels						
75 % RDF	103.98	1.05	16.12	19.16	3.69	1904
100 % RDF	109.64	1.17	19.13	24.02	4.00	2178
125 % RDF	112.08	1.18	20.14	26.47	4.08	2235
SEm±	1.78	0.04	0.48	1.12	0.10	81
CD (p=0.05)	5.52	0.11	1.39	3.40	0.28	239

Seed cotton yield

Sowing of cotton hybrids USHB-25 and DCH-32 were found at par with each other in terms of seed cotton yield. The maximum seed cotton yield (2354 kg ha^{-1}) was observed by sowing of USHB-25 over sowing of PSCHB-901 seed cotton yield (2034 kg ha^{-1}). Significantly higher seed cotton yield (2208 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

(1895 kg ha^{-1}). Significantly increasing the seed cotton yield with the increasing of fertility levels, application of 100 % RDF and 125 % RDF were found at par with each other. The maximum seed cotton yield (2178 kg ha^{-1}) was found under application of 100 % RDF over application of 75 % RDF seed cotton yield (1904 kg ha^{-1}). The increase in seed cotton yield per plant was observed in plant geometries 90 cm x 60 cm than 90 cm x 45 cm. 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 Sankaranarayanan *et al.*, (2004) and Buttar and Singh (2007).

Based on the results it was concluded that variety USHB-25 over sowing of PSCHB-901. Significantly higher seed cotton yield recorded under sowing at 90 x 60 cm wider plant spacing over sowing at closer plant spacing at 90 x 45 cm.

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How to cite this article:

Harphool Meena, P.K.P. Meena and Bheru Lal Kumhar. 2017. Agronomic Evaluation of Promising Pre-Release Inter Specific Cotton Hybrids. *Int.J.Curr.Microbiol.App.Sci.* 6(7): 725-728. doi: https://doi.org/10.20546/ijcmas.2017.607.090