

Original Research Article

Performance of *Arboreum* Cotton Genotypes as Influenced by High Density Planting System and Different Nutrient Levels

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ABSTRACT

A field experiment entitled, "Response of *arboreum* cotton genotypes to high density planting system and different nutrient levels" was conducted at Cotton Research Station, M.B. Farm, VNMKV, Parbhani during *Kharif*, 2015-16 on clayey soil, alkaline in nature with low available nitrogen, medium phosphorus, rich in potassium. The climatic condition during experimental period was favorable. The experiment was laid out in Split plot design with three levels of fertilizer (nutrient) dose, three high density plant system and three *arboeum* cotton (*desi*) variety with three replication. *arboreum* cotton (*desi*) variety was sown on 7th Aug, 2015 by dibbling two seeds per hill as per given density planting system. The growth and yield parameters were improved with differences in seed cotton yield due to plant densities were evident. Among the different densities the plant density (S_2 -148,148 pl /ha, 45 x15 cm) recorded significantly superior higher seed cotton yield (1085kg /ha) over rest of plant density. Fertilizer levels significantly affected the seed cotton yield per ha. Increase in fertilizer levels resulted to increase in seed cotton yield per ha. Among different fertilizer levels, 150 % RDF (75:37.5:37.5 NPK kg/ha) was found significantly superior higher seed cotton yield (1060 kg/ha) over fertilizer levels 100% RDF (50; 25:25 NPK kg/ha) but at par with the fertilizer level 125% RDF (62.5:31.5:31.5 NPK kg/ha). Fertilizer level 100% RDF (50; 25:25 NPK kg/ha) recorded lowest seed cotton yield but was found at par with the fertilizer level 125% RDF (62.5:31.5:31.5 NPK kg/ha). In case of the different *arboreum* cotton genotype V_2 - PA 528 recorded significantly higher seed cotton yield (1050.1 kg /ha) and was found at par with V_1 - PA- 08 (1015 kg /ha). The lowest value recorded in *arboetum* cotton genotype V_3 - PA 255(963.1 kg/ha). From the present investigation it can be inferred that an application of 125 % RDF (75:37.5:37.5 NPK kg/ha) in high density planting system S_2 -148,148 pl /ha, 45 x15 cm and *arboreum* cotton varieties V_2 - PA 528 observed to be beneficial in increasing growth and yield of *arboetum* cotton. Interaction effect were found non-significant.

Keywords

High Density
Planting
System and
Different
Nutrient
Levels

Introduction

High density planting system (HDPS) are commonly followed to obtain high yields with straight varieties across the world, especially in the major cotton growing countries such as USA, Australia, China, Brazil and Uzbekistan the planting geometry is 8-10 cm distance between plants in row with row to row distance at 18, 30, 45, 60,

75, 90 and 100 cm. Generally wider row to row spacing is followed in deep soils and irrigated farms and ultra – narrow row spacing in rainfed conditions.

American cotton belongs to the species *Gossypium hirsutum* and *desi* cotton or Asiatic cotton belongs to *Gossypium*

arboreum. Cultivating *desi* cotton varieties is easy with low production cost. These are highly tolerant to drought, insect and pest, diseases and give high yields with low inputs. Among the different agronomic manipulation selection of potential geometry along with high density and fertilization plays a crucial role in increasing the productivity of arboretum cotton and

Therefore, the present investigation was undertaken to find out the suitable genotype of arboretum cotton and their nutrient requirement under HDPS with view to achieve high yield levels in the specific agro – climatic condition of Marathawada region

Materials and Methods

A field experiment entitled, "Response of *arboreum* cotton genotypes to high density planting system and different nutrient levels" was conducted at Cotton Research Station, M.B. Farm, VNMKV, Parbhani during *Kharif*, 2015-16 on clayey soil, alkaline in nature with low available nitrogen, medium phosphorus, rich in potassium. The climatic condition during experimental period was favorable.

The experiment was laid out in Split plot design with three levels of fertilizer (nutrient) dose, three high density plant system and three *arboreum* cotton (*desi*) variety with three replication. *arboreum* cotton (*desi*) variety was sown on 7th Aug, 2015 by dibbling two seeds per hill as per given density planting system.

Results and Discussion

Arboreum Varieties

Among the different arboreum cotton varieties, V₂- PA 528 recorded significantly higher seed cotton yield (1050 kg /ha) than

arboreum varieties V₃- PA 255 (963 kg/ha) and it was found at par with V₁- PA- 08 (1012 kg /ha).

Plant density

Differences in seed cotton yield due to plant densities were evident. Among the different densities the plant density S₂- 45 x15cm (148,148 pl /ha) recorded significantly superior higher seed cotton yield (1085kg /ha) over rest of plant densities. The plant densities of S₃-45x10 cm (2,22,222. pl /ha) recorded lowest seed cotton yield,(959 kg/ha) but it was found at par with plant density S₁- 45 x 22.5 cm (98,765 pl/ha) (984 kg/ha). Similar result was found by Butter, *et al.*, (2007) and Butter *et al.*, (2004)

Fertilizer levels

Fertilizer levels significantly affected the seed cotton yield per hectare. Increase in fertilizer levels resulted increase in seed cotton yield per hectare. Among different fertilizer level the fertilizer level F₃-150 % RDF (75:37.5:37.5 NPK kg/ha) was recorded significantly higher seed cotton yield (1060 kg/ ha) over the rest of fertilizer level. Fertilizer level F₁-100% RDF (50;25:25 NPK kg/ha) recorded lowest seed cotton yield (953.76kg/ha) similar result was found by Butter, *et al.*, (2007) Butter *et al.*, (2004) and Sharma *et al.*, (2004)

Interaction effect

Interaction effect on seed cotton yield were found non-significant

Economics

In *arboreum* varieties, higher GMR (Rs 43.052).NMR (1920.08) & B: C ratio (1.80) recorded in *arboreum* V₂- PA 528 and it was found at par with PA 08.

Table.1 Plant Growth and yield contributing characters of arboreum varieties as influenced by plant densities and fertilizer levels

Treatment	Plant Height (cm)	Monopodia/ plant	Sympodia/ plant	Yield / Plant (gm)	No Bolls / Plant	Boll wt (gm)
I) Main Plot: Arborium varieties						
V1-PA 08	88.25	0.91	12.11	15.23	6.05	2.24
V2-PA 528	91.27	1.11	13.69	15.87	7.10	2.40
V3-PA 255	85.25	0.91	12.33	14.70	5.89	2.09
SE ±	1.08	0.04	0.30	0.27	0.23	0.053
CD at 5%	4.25	0.15	1.20	1.08	0.93	0.21
II) Sub Plot : Plant density (plants/ha)						
S1- (45 x22.5cm) - 98,765 pl/ ha	87.09	0.99	11.80	15.53	6.22	2.21
S2- (45 x 15 cm) - 1,48,148 pl/ ha	91.74	1.10	14.07	16.62	7.12	2.44
S3- (45 x 10 cm) - 2,22,222 pl/ ha	85.94	0.85	12.22	13.75	5.75	2.26
SE ±	1.21	0.020	0.25	0.65	0.24	0.053
CD at 5%	3.73	0.062	0.77	2.00	0.74	0.16
Sub –sub plot : Nutrient Levels (NPK kg / ha)						
F1 -100% RDF (50:25:25)	84.37	0.94	12.10	14.02	5.81	2.17
F2-125% RDF (62:5:31.25:31.25)	87.05	0.97	12.25	15.20	6.16	2.20
F3-150% RDF (75:37.50:37.50)	93.35	1.03	13.77	16.57	7.14	2.35
SE ±	1.32	0.034	0.36	0.39	0.18	0.050
CD at 5%	3.79	NS	NS	1.08	0.50	0.13
Interaction						
Interaction V x S						
SE ±	2.0	0.035	0.43	1.12	0.41	0.09
CD at 5%	NS	NS	NS	NS	NS	NS
Interaction Vx F						
SE ±	2.29	0.058	0.63	0.67	0.31	0.08
CD at 5%	NS	NS	NS	NS	NS	NS
Interaction S x F						
SE ±	2.29	0.058	0.63	0.67	0.31	0.08
CD at 5%	NS	NS	NS	NS	NS	NS
Interaction V x Sx F						
SE ±	3.96	0.10	1.10	1.17	0.55	0.15
CD at 5%	NS	NS	NS	NS	NS	NS
Grand mean	88.26	0.98	12.71	15.26	6.37	2.24

Table.2 Seed cotton yield and economics of arboreum varieties as influenced by plant densities and fertilizer levels

Treatment	Seed cotton Yield (kg /ha)	GMR	NMR	B: C ratio
I) Main Plot: Arborium varieties				
V1-PA 08	1015.7	41644	17972	1.75
V2-PA 528	1050.1	43052	19208	1.80
V3-PA 255	963.1	39490	16080	1.68
SE ±	12.63	518	454	0.018
CD at 5%	49.52	2030	1782	0.070
II) Sub Plot : Plant density (plants/ha)				
S1- (45 x 22.5cm) - 98,765 plants ha	984	40345	17231	1.74
S2- (45 x 15 cm) - 1,48,148 plants ha	1085	44523	20599	1.85
S3- (45 x 10 cm) - 2,22,222 plants ha	959	39320	15431	1.64
SE ±	13.49	557	489.4	0.018
CD at 5%	41.82	1714	1505.8	0.057
Sub –sub plot : Nutrient Levels (NPK kg / ha)				
F1 -100% RDF (50:25:25)	953.76	39104	16310	1.71
F2-125% RDF (62.5:31.25:31.25)	1014	41603	17955	1.75
F3-150% RDF (75:37.50:37.50)	1060	43480	18995	1.77
SE ±	16.19	663	582	0.017
CD at 5%	44.80	1837	1613	0.050
Interaction				
Interaction V x S				
SE ±	23.54	965	847	0.032
CD at 5%	NS	NS	NS	NS
Interaction V x F				
SE ±	28.04	1149	1009	0.030
CD at 5%	NS	NS	NS	NS
Interaction S x F				
SE ±	28.04	1149	1009	0.030
CD at 5%	NS	NS	NS	NS
Interaction V x S x F				
SE ±	48.57	1991	1748.5	0.052
CD at 5%	NS	NS	NS	NS
Grand mean	1009.7	41396	17753	1.74

The lowest value of GMR, NMR and B: C ratio recorded in *arboreum* V₃- PA 255 significantly Higher GMR (Rs 44523), NMR (Rs 20599) and B: C ratio (1.85) was found in S₂- 45 x 15 cm-(148,148, pl/ha) over the rest of plant. The plant density S₃- 45 X10 cm (2,22,222 pl/ha) recorded lowest GMR (Rs.39320), NMR (Rs15431) & B:C ratio(1.64) but it was found at par with plant density S₁-45 x 22.5 cm-(98,765 pl/ha.).In Fertilizer level F1150% RDF (75:37.5:37.5 NPK kg/ha) recorded higher value of GMR (Rs.43480), NMR (Rs18995) & B:C ratio than fertilizer level fertilizer level F1- 100%

RDF (50:25:25 NPK kg/ha) and it was found at par with fertilizer level F2125% RDF. (63.5:31.5:31.5 NPK kg/ha).

The lowest value of GMR (Rs.39104), NMR (Rs16310) & B: C ratio (1.71) was recorded in 100 % RDF (50:25:25 NPK kg/ha) similar result was found by Butter, *et al.*, (2007)

Interaction effect

Interaction effect on GMR, NMR and B: C ratio were found non-significant

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