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Performance of long linted desi cotton (*Gossypium arboreum*) genotypes for yield and fibre quality parameters under rainfed condition

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Abstract

Cotton is an important agriculture commodity for export in the form of raw cotton, cotton yarn and other value added textile goods. The textile industry demands long staple cotton genotypes for better clothes. Therefore in the present investigation, long staple *Gossypium arboreum* genotypes were evaluated to study their superiority for yield and quality parameters. Newly developed genotypes evaluated in the present study showed high yield potential on par with the check varieties but superior in respect of many fibre quality traits. These genotypes had high boll weight as compared to check varieties. Among the fourteen genotypes of *G. arboreum* cotton, the genotype PAIG 380, PA 808, PA 809 and PA 810 were the best genotypes for seed cotton yield as well as fibre properties like fibre length, fibre strength, uniformity ratio and fibre fineness.

Keywords: Fibre quality, *G. arboreum*, long linted, Rainfed

Introduction

Cotton is one of the most important cash crops in India. On account of its agricultural as well as industrial importance, it is called as White Gold. Millions of people depend on cotton cultivation, trade, transportation, ginning and processing for their livelihood. Of the four spinnable lint bearing species grown in India, *G. arboreum* cultivars have inherent ability of resistance against insect pests and diseases and withstand moisture stress. At the same time they have short and coarse fibre. Till now efforts were made mainly to breed *arboreum* strains for high seed cotton yield but they are short in fibre length and are not suited for high speed spinning in modern textile industry. The creation and quantification of genetic variability is of vital importance (Hussain *et al.*, 2010) [4]. This information could direct the breeders for genetic upgrading of cotton genotypes with improved fiber quality characteristics in addition to high seed cotton yield. At Cotton Research Station, Mahboob Baugh Farm, VNMKV, Parbhani efforts were made to develop high yielding arboretum genotypes having high quality lint. In the present investigation new genotypes have been evaluated for yield and fibre quality traits in comparison to cultivated varieties.

Materials and Methods

In the present investigation Fourteen newly developed genotypes of *arboreum* cotton were evaluated for yield and fibre quality traits along with four checks viz. *arboreum* varietal checks PA 08, PA 402, *hirsutum* varietal check NH 615 and *hirsutum* hybrid check NHH 206. Trial was conducted in Randomized Block Design with two replications. Each genotype was planted in 5.85 meter length with a spacing of 45 × 22.5 cm. Sowing was done by dibbling method using 2-3 seeds per hill. Optimum plant stand was maintained by thinning of extra plants. Normal recommended agronomical package of practices were followed to raise the crop. Observations were recorded on seed cotton yield (on plot basis) and yield contributing traits (on five competitive plants taken randomly). Lint samples were sent to CIRCOT, Nagpur for evaluation of fibre quality traits.

Results and Discussion

Fourteen genotypes along with four checks viz., PA 08, PA 402, NH 615 and NHH 206 were evaluated under rainfed condition. To give more emphasis on quality aspects, results on seed cotton yield, boll weight, ginning percent, lint yield in addition to quality parameters have been discussed. Data on seed cotton yield were statistically significant with a coefficient of variation 8.05 percent (Table 1).

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Out of fourteen developed long linted genotypes evaluated in this investigation, the genotype PA 812 recorded highest seed cotton yield (1495 kg/ha) over the checks PA 08 (1267 kg/ha), PA 402 (1172 kg/ha), NH 615 (1310 kg/ha) and NHH 206 (1222 kg/ha). It is followed by PA 835 (1478 kg/ha) and PA 810 (1441 kg/ha). As many as one, four and two genotypes each recorded significant superiority over the checks PA 08, PA 402 and NHH 206, respectively. Where as for lint yield, the genotype PA 835 recorded highest lint yield (559 kg/ha) followed by PA 841 (546 kg/ha) and PA 812 (534 kg/ha).

In *arboreum* (*desi*) cotton, boll weight is generally low as compared to *hirsutum* genotypes and is an important factor responsible for low yields in *desi* cotton. In this study it is observed that most of the new genotypes were having higher boll weight as compared to the checks. The genotype PA 835 was having maximum boll weight (2.92 g) followed by PA 810 and PA 837 (2.88 g). Therefore these genotypes can be used in breeding programme for the improvement of boll size in agronomically superior genotypes. The ginning outturn ranged from 34.21 (PAIG 378) to 38.27 percent (PA 841) amongst the genotypes under testing. The genotype PA 841 recorded highest ginning outturn (38.27%) followed by PA 835 (37.83%) and PAIG 380 (37.51%). The results are in agreement with the reports of Deshpande *et al.* (2003) [2] Dheva *et al.* (2009) [3], Kumari Basamma *et al.* (2009) [5],

Laxman (2010) [6], Patel *et al.* (2010) [7], Patel and Choudhari (2015) [8] and Patil *et al.* (2015) [9].

In quality parameters, most of the newly developed genotypes were superior than the checks. All the genotypes under testing recorded upper half mean length and fibre strength above 29 mm and 27 g/tex, respectively. In respect of fibre length measured as Upper Half Mean Length, all the Genotypes were superior to PA 402, NH 615 and NHH 206. Upper Half Mean Length ranged from 27.2 (check PA 402) to 33.7 mm (PA 809). The genotype PA 809 recorded highest upper half mean length (33.7 mm) followed by PAIG 380 (33.1 mm) and PA 810 (32.7 mm). Micronaire value ranged from 4.1 to 5.1. The genotypes PA 809 and PA 810 recorded superior micronaire value of 4.1. All the genotypes were superior to the check PA 08 and PA 402 in respect of fibre fineness. Fibre strength ranged from 27.0 g/tex to 34.1 g/tex. The genotype PA 808 recorded highest fibre strength (34.1 g/tex) followed by PAIG 380 (31.6 g/tex) and PA 825 (31.2 g/tex). The results are in agreement with the reports of Deshpande *et al.* (2003) [2], Sakhare *et al.* (2005) [10], Bolek *et al.* (2010) [11] and Patil *et al.* (2015) [9].

Considering overall fibre quality parameters, genotypes PAIG 380, PA 809, PA 808 and PA 810 were found superior to local *arboreun* as well as *hirsutum* checks. The study emphasized the necessity to develop genotypes with superior fibre qualities to meet the requirements of textile industry.

Table 1: *Per se* performance of *G. arboreum* genotypes for different characters

Sr. No.	Genotype	Seed cotton yield (kg/ha)	Lint yield (kg/ha)	G.O.T. (%)	Boll wt. (g)	Lint index	Seed index
1	PA 801	1386	516	37.29	2.85	5.35	7.64
2	PA 808	1223	445	36.42	2.78	3.76	6.55
3	PA 809	1357	493	36.37	2.84	3.99	6.54
4	PA 810	1441	520	36.09	2.88	3.38	6.69
5	PA 812	1495	534	35.73	2.82	3.56	6.36
6	PA 825	1241	455	36.74	2.80	3.63	6.55
7	PA 828	1356	500	36.93	2.80	3.69	6.58
8	PA 835	1478	559	37.83	2.92	3.88	6.96
9	PA 837	1337	498	37.29	2.88	3.42	6.47
10	PA 841	1429	546	38.27	2.84	3.15	6.15
11	PA 847	1184	425	35.92	2.76	3.21	6.48
12	PAIG 377	1156	409	35.39	2.78	3.90	8.10
13	PAIG 378	1046	357	34.21	2.84	3.57	7.41
14	PAIG 380	1300	487	37.51	2.80	3.68	6.71
Checks							
15	PA 08 (c)	1267	460	36.36	2.78	3.47	6.08
16	PA 402 (c)	1172	434	37.06	2.86	3.85	6.96
17	NH 615 (c)	1310	498	38.02	2.90	4.02	6.45
18	NHH 206 (c)	1222	464	37.99	2.78	3.55	6.41
	SE ±	74.07					
	CD at 5%	220.68					
	CV (%)	8.05					

Table 2: performance of *G. arboreum* genotypes for fibre quality characters

Sr. No.	Genotype	Upper Half Mean Length (mm)	Uniformity ratio (%)	Micronaire value (mv)	Fibre strength (g/tex)	Elongation (%)
1	PA 801	30.7	85	5.0	29.6	5.9
2	PA 808	32.0	87	4.7	34.1	5.7
3	PA 809	33.7	88	4.1	29.6	5.6
4	PA 810	32.7	87	4.1	29.4	5.6
5	PA 812	32.2	86	4.8	29.7	5.7
6	PA 825	30.0	84	4.8	31.2	6.0
7	PA 828	29.8	83	5.1	31.1	6.4
8	PA 835	32.5	86	4.9	27.8	4.9
9	PA 837	30.7	85	4.8	29.3	5.8
10	PA 841	30.2	83	4.6	27.6	6.3
11	PA 847	31.3	84	4.6	28.8	5.8
12	PAIG 377	32.1	87	4.3	28.2	5.4

13	PAIG 378	29.4	85	4.3	26.7	5.9
14	PAIG 380	33.1	87	4.3	31.6	6.0
Checks						
15	PA 08 (c)	30.5	85	4.9	28.6	6.0
16	PA 402 (c)	27.2	83	5.1	28.5	5.7
17	NH 615 (c)	29.5	86	4.1	27.0	5.7
18	NHH 206 (c)	29.1	85	4.1	27.2	5.9

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