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Yield and fibre quality parameter studies in upland cotton under rainfed condition

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Abstract

Initial evaluation of twenty two *G. hirsutum* genotypes with three checks were screened for yield, and fibre quality in randomized block design under rainfed condition at Cotton Research Station, Nanded during 2015-16. The entries were sown in three replications with two rows having spacing 60 x 30 cm and 6 metres each row. Results were statistically significant for seed cotton yield. As many as four entries viz. BGDS 1033 (1478 kg/ha), ARBH 1551 (1369 kg/ha), NDLH 2028-2 (1370 kg/ha) and NDLH 2005-4 (1529 kg/ha) recorded significant superiority for seed cotton yield over higher yielding check, NH 545 (1044 kg/ha). Lowest yield was recorded by strain H 1464 (581 kg/ha). Ginning outturn was ranged from 29.78 (ARBH 1551) to 41.19 (CCH 15-3). Only three strains viz., CNH 07-16 (38.23 %), CCH 15-3 (41.19 %) and BGDS 1055 (38.52 %) recorded ginning outturn above 38 per cent. The higher yielding strain NDLH 2005-4 recorded medium ginning outturn (35.18 %). Upper half mean length (UHML) of the genotypes under testing was ranged from 24.4 mm (GBHV 198) to 29.2 (NDLD 2005-4), Micronaire (*ug/inch*) was ranged from 3.3 *ug/inch* (NH 615) to 4.9 *ug/inch* (RAH 1271). None of the strains recorded better bundle strength (*g/tex*) than quality check, Suraj (32.6 *g/tex*). However, three strains viz., CCH 15-3 (30.8 *g/tex*), CNH 1122 (31.3 *g/tex*) and CCH 15-4 (32.2 *g/tex*) recorded fibre strength above 30 *g/tex*.

In general, performance of strain NDLH 2005-4 was found excellent for seed cotton yield (1529 kg/ha), lint yield (535 kg/ha) with medium ginning outturn (35.18 %) and better fibre properties (29.2 UHML (mm), 4.1 micronaire (*ug/inch*) and acceptable bundle strength (26.2 *g/tex*).

Keywords: Fibre qualities, *G. hirsutum*, seed cotton yield, rainfed screening, cotton

Introduction

In cotton, yield and quality of lint are equally important in developing varieties and hybrids. Cotton, being often cross pollinated crop, is highly amenable to both heterosis and recombination breeding. Commercial exploitation of heterosis in cotton got a momentum with the releases of first cotton hybrid in the world H-4. Cotton is the most challenging crop to the breeders as it is a crop with instances of negative genetic linkages and correlation between important characters numerous essential parameters of fibre quality. The negative genetic linkages between yield components can be broken by intermating of selected lines. Cotton is a long duration crop, which is greatly influenced by seasonal and environmental fluctuations over different locations. High yielding varieties/hybrids with stable performance over different agro climatic conditions had great significance towards sustainable production and productivity. The irrigated area under cotton in the country is 40%, while it is only 3% in Maharashtra (Thakare, 2001). Most of the cotton cultivation (97%) grown under rainfed condition results in low productivity (336 kg/ha) of the state against the productivity (526 kg/ha) of the country (Anonymous, 2009). A number of studies carried out on Bt cotton have clearly shown benefits like higher cotton yield ranging from 30.9 to 63.0 % owing to effective control of bollworm, drastic reduction in the application of chemical insecticides from 39 to 55 %, per higher profit of biological agents and other beneficial organisms (Manjunath, 2007). Keeping in view the above facts, an experiment was conducted at Cotton Research Station, Nanded to pool the genetic variability for yield coupled with fibre parameters during *kharif* 2015-16.

Materials and Methods

The present experiment was carried out at Cotton Research Station, Nanded for screening twenty two *G. hirsutum* genotypes with three checks viz., NH 615, NH 545 and Suraj. The screening was done for yield and fibre qualities. The experiment was laid in randomized block design with three replications under rainfed during 2015-16. The test entries were sown on 19.06.2015 keeping row to row distance of 60 cm and plants to plants 30 cm apart. For each

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entry two rows of six meters length were sown. The intercultural operations were done as per Agronomic requirement and plant protection measures as per recommendation.

Two pickings were made as per crop maturity and seed cotton samples were collected from each entry in each replication. The seed cotton yield was recorded/plot of both the pickings and total seed cotton yield/plot was converted into yield kg/ha. The samples were ginned on hand ginning machine at laboratory of cotton research station, Nanded and prepared lint samples were then sent for testing fiber quality parameters at Central Institute for Research on Cotton Technology, Matunga, New Mumbai. Boll weight of each entry was calculated by taking ten well opened boll weight in gram and it was averaged. The ginning percentage were also obtained as per standard methods. The statistical analysis of the data was done as per the standard method suggested by Panse and Sukhatme (1985) [3].

Results and Discussion

Seed cotton yield (kg/ha)

Results were statistically significant for seed cotton yield. As many as four entries *viz.* BGDS 1033 (1478 kg/ha), ARBH 1551 (1369 kg/ha), NDLH 2028-2 (1370 kg/ha) and NDLH 2005-4 (1529 kg/ha) recorded significant superiority for seed cotton yield over higher yielding check, NH 545 (1044 kg/ha). Lowest yield was recorded by strain H 1464 (581 kg/ha) (table 01).

Lint yield (kg/ha)

The highest lint yield kg/ha was recorded by strains BDGS 1033 (561 kg/ha) followed by NDLH 2005-4 (535 kg/ha) and BDGS 1055 (490) and were found statistically superior for lint yield kg/ha over all the three checks *viz.*, zonal check, NH 615 (334 kg/ha), local check NH 545 (383 kg/ha) and quality check Suraj (340). The range of lint yield per hectare was found from 177 kg/ha to 561 kg/ha.

Ginning Out Turn (%)

Ginning outturn was ranged from 29.78 (ARBH 1551) to 41.19 (CCH 15-3). Only three strains *viz.*, CNH 07-16 (38.23 %), CCH 15-3 (41.19 %) and BGDS 1055 (38.52 %) recorded ginning outturn above 38 per cent. The higher yielding strain NDLH 2005-4 recorded medium ginning outturn (35.18 %).

Boll weight (g)

The boll weight range recorded from 2.23 g (RAH 1271) to 3.78 g (RAH 1069), whereas highest seed cotton yielding genotype NDLH 2005-4 (1529 kg/ha) recorded 3.40 g boll weight and second highest seed cotton yielding genotype BGDS 1033 (1478 kg/ha) had 2.98 g boll weight. The strain RAH 1069 recorded highest boll wt 3.78 g followed by PH 1070 (3.63 g)

Number of bolls per plant

The number of bolls per plant were ranged from 9.00 bolls per plant (GBHV 198) to 14.80 bolls per plant (PH 1070). In general maximum number of the stains ranged from 10 to 12 bolls per plant. No strain was found statistically superior over check NH 545 (13.13 bolls per plant).

Fibre Properties

Upper half mean length (UHML) of the genotypes under testing was ranged from 24.4 mm (GBHV 198) to 29.2 (NDLH 2005-4), Micronaire (*ug/inch*) was ranged from 3.3 *ug /inch* (NH 615) to 4.9 *ug/inch* (RAH 1271). None of the strains recorded better bundle strength (*g/tex*) than quality check, Suraj (32.6 *g/tex*). However, three strains *viz.*, CCH 15-3 (30.8 *g/tex*), CNH 1122 (31.3 *g/tex*) and CCH 15-4 (32.2 *g/tex*) recorded fibre strength above 30 *g/tex*.

Over all, out of twenty two strains tested, some strains were superior for one character, while other emerged superior for other characters. The similar pattern of expression for seed cotton yield and fibre parameters were observed by several workers (Siwach *et al.*, 2016; Hussain *et al.*, 2010; Ali *et al.*, 2008; Yuan *et al.*, 2005 and Rao and Reddy 2001) [5, 2, 6, 4].

In general, performance of strain NDLH 2005-4 was found excellent for seed cotton yield (1529 kg/ha), lint yield (535 kg/ha) with medium ginning outturn (35.18 %) and better fibre properties (29.2 UHML (mm), 4.1 micronaire (*ug/inch*) and acceptable bundle strength (26.2 *g/tex*). The response of strais BGDS 1033 was also found better for seed cotton yield (1478 kg/ha), lint yield (490 kg/ha) with ginning outturn (37.92 %) and good fibre properties (26.0 UHML (mm), 4.6 micronaire (*ug/inch*) and acceptable bundle strength (28.3 *g/tex*).

Table 1: Initial evaluation trial of *G. hirsutum* during 2015-16 at Nanded.

S: No	Entry name	Seed Cotton Yield (kg /ha)	Lint Yield (kg / ha)	GOT (%)	Boll number/ Plant	Boll wt. (g)	UHML (mm)	Micronaire ($\mu\text{g}/\text{inch}$)	Bundle strength (g/tex)
1	RAH 1271	716	259	36.12	10.87	2.23	25	4.9	28.7
2	CNH07-16	867	331	38.23	10.00	2.88	25.9	3.7	26.2
3	AKH-09-5	1074	362	33.7	13.07	3.40	27.4	4.1	25.5
4	BGDS 1033	1478*	561*	37.92	13.00	2.98	26	4.6	28.3
5	CCH 15-3	692	287	41.19	11.33	2.90	25.3	4.1	30.8
6	CNH 1123	1306	464	35.61	12.00	3.53	25.8	3.9	25.3
7	CPD-1551	756	254	33.66	09.53	3.23	27.0	3.8	28.7
8	ARBH-1551	1369*	407	29.78	11.67	2.88	24.6	3.6	24.4
9	NDLH – 2028-2	1370*	463	33.78	13.93	3.17	28.3	4.1	29.3
10	CNH 1122	665	224	33.59	12.27	3.2	27.6	3.9	31.3
11	BGDS 1055	1275	490*	38.52	13.87	3.17	25.8	4.3	27.4
12	RAH 1069	1175	427	36.35	10.33	3.78	26.0	4.3	25.2
13	CPD-1552	1075	358	33.4	09.80	3.15	25.3	3.8	25.7
14	NDLH – 2005-4	1529*	535*	35.18	12.07	3.40	29.2	4.1	26.2
15	GBHV-198	975	335	34.29	09.00	3.52	24.4	4.3	26.1
16	ARBH-1552	1275	420	32.95	12.00	3.05	28.2	4	28.9
17	H 1464	581	177	30.42	13.53	3.32	24.8	4	24.5
18	PH 1070	1220	414	34	14.80	3.63	27.2	3.9	28.5

19	CNH 09-9	700	246	35.15	10.60	3.38	27.2	3.7	27.8
20	IH 11-10	1009	355	35.11	10.07	2.9	25.5	3.9	28.3
21	GBHV-195	1047	367	34.97	12.33	2.7	24.8	4.2	26.6
22	CCH 15-4	963	336	34.92	12.20	2.92	29.0	3.4	32.2
	Checks								
23	NH 615 (ZC)	918	334	36.54	12.07	2.77	26.6	3.3	28.1
24	NH 545 (LC)	1044	383	36.78	13.13	2.65	25.3	4	25.7
25	Suraj (QC)	874	340	39.04	9.60	3	29.3	3.7	32.6
	S.E.+	92	32.59	1.16	0.908	0.234			
	C. D. @ 5 %	255	90	3.22	2.514	0.648			
	C.V.%	15.32	15.46	5.72	13.42	13.03			

* Significantly superior over Local check, NH 545

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