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Studies on genetic parameters of seed cotton yield and fibre traits in upland cotton (*Gossypium hirsutum* L.)

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ABSTRACT : Exploitation of variability from various germplasm lines provides scope for sustainability in improvement. Studies were conducted in cotton with 41 diverse genotypes collected throughout India in a field trial at Regional Agricultural Research Station, Lam farm, Guntur with an objective to study generic variation, heritability and genetic advance for 14 characters *viz.,* plant height, days to 50 per cent flowering, monopodia, sympodia and bolls/plant, boll weight, seed index, lint index, ginning percentage, 2.5 per cent span length, bundle strength, micronaire, uniformity ratio and seed cotton yield. Boll weight, seed index, lint index had high heritability with high genetic advance indicating that these characters were governed by additive gene action and improvement of these characters were rewarding whereas characters 2.5 per cent span length, bundle strength and micronaire were exhibited high heritability and moderate genetic advance , these characters were also be taken into consideration for improvement.

Key words : Genetic advance, genetic parameters, genetic variation, germ plasm, fibre traits, heritability

Cotton is the prime fibre crop of India. The major objective of any crop improvement programme is aiming for yield improvement and it is complex character and polygenetically controlled. Information on genetic variability, heritability and genetic advance is helpful for planning and execution of breeding programme and selection of divers parents to achieve heterotic combinations and to generate segregating population with an objective of isolating superior geneotypes. The present investigation was carried out in 41cotton diverse genotypes to study genetic variability, heritability and expected genetic advance as per cent mean.

The present study consisted of 41diverse genotypes of cotton (*Gossypium hirsum* L.) grown in a randomized block design with 3 replications during *kharif,* 2010 at Regional Agricultural Research Station, Lam farm, Guntur. Each genotype was grown in 2 rows of 6 m length adopting a spacing of 105 cm between rows and 60 cm within a row. Five competitive plants were randomly selected for recording data on 14 characters *viz.*, plant height, days to 50 per cent flowering, monopodia, sympodia and bolls/plant, boll weight, seed index, lint index, ginning percentage, 2.5 per cent span length, bundle strength, micronaire, uniformity ratio and seed cotton yield. The mean data of 5 plants over 3 replications were used for statistical analysis.

Improvement through selection entirely depends on magnitude of genetic variability in the population. This information will be helpful in choosing the parents for crossing. Study on mean performance of seed cotton yield and yield attributing characters in addition to the fibre characters helps the breeder to select genotypes as parents to exploit heterotic combinations.

The range of characters among the genotypes was studied to know the amount of variation in the genotypes. Mean values for sympodia/plant ranged from 19.33 (TCH 1717) to 26.66 (SCS 793 and LRA 5166), for bolls/plant ranged from 30.00 (F 2337) to 54.00 (LRA 5166), for boll weight ranged from 2.33 (CSH 2810) to 5.10 (TCH 1728), for seed index ranged from 6.56 (HS 288) to 11.90 (CNH 1094), for lint index mean value ranged from 3.13 (HS 288) to 6.00 (P 2150) and for seed cotton yield/ha ranged from 693.33 (KH 1001) to 1864.33 (L 770). There was considerable level of genetic variability among the genotypes for most of the characters studied. The ANOVA revealed that all the characters were statistically significant indicating material choosen for the study is

highly significant.

The estimates of phenotypic coefficients of variation (PCV) ranged 4.01 for days to 50 per cent flowering 42.83 for monopodia/plant and the corresponding values for genotypic coefficients of variation (GCV) were 2.76 and 18.49 respectively. Monopodia/plant showed highest coefficients of both phenotypic and genotypic variation (Table 1). Similar results were reported by Verma *et al.,* (2006) and Neelima *et al.,* (2008). Seed cotton yield/plant also showed higher values of coefficients of variation. Bolls/plant, boll weight, seed index and lint index showed moderate estimates of phenotypic and genotypic coefficients of variation indicating variability among the material studied depicting the possibility of improvement in the yield by further selection in segregating generations. These results are in broad agreement with the findings of Verma *et al.*, (2006).

In general the differences between PCV and GCV were less for all the traits indicating that those were not much influenced by the environment, thus suggesting ample scope for improvement through selection as the characters are under genetic control. Low values of genotypic and phenotypic coefficients of variation were observed for days to 50 per cent flowering, plant height, sympodia/plant, ginning outturn, 2.5 per cent span length, bundle strength, micronaire and uniformity ratio indicating narrow range of variability for these traits, thereby restricting the scope for selection. These results are in broad agreement with the findings of Srinivasulu *et al.,* (2010). Plant height, boll weight, seed index, lint index, 2.5 per cent span length, bundle strength, micronaire and uniformity ratio showed higher estimates of heritability. Days to 50 per cent flowering, sympodia and bolls/plant ginning outturn and seed cotton yield/plant showed moderate estimates of heritability. The heritability estimates were low for monopodia/plant in accordance with Rao and Reddy (2001), Sakthi *et al.,* (2007).

Boll weight, seed index and lint index showed higher estimates of genetic advance as per cent of mean. Genetic advance as per cent mean estimates were moderate for plant height, monopodia and bolls/plant, 2.5 per cent span length, bundle strength, micronaire and seed cotton yield/plant. Days to 50 per cent flowering, sympodia/plant, ginning outturn and uniformity ration showed low estimates of genetic advance as percent of mean. Selection of characters like bolls/plant, boll weight, seed index, lint index, seed cotton yield/plant having high heritability

Table 1. Mean, range, variability, heritability and genetic advance as per cent of mean for seed cotton yield and yield components in cotton

Character	Mean	Range		PCV	GCV	Heritability (%)	Genetic advance as per cent of mean
		Minimum	Maximum				
Days to 50 per cent flowering	55.42	51.67	58.67	4.01	2.76 L	47.58 M	3.93 L
Plant height (cm)	135.46	108.33	159.67	9.71	7.93 L	66.73 M	13.34 M
Monopodia / plant	1.79	1.00	3.00	42.83	18.49 H	18.64 L	16.44 M
Sympodia / plant	22.59	19.33	26.67	9.58	6.50 L	45.97 M	9.07 L
Bolls / plant	41.46	30.00	54.00	17.66	12.54 M	50.47 M	18.36 M
Boll weight (g)	3.58	2.33	5.10	16.05	15.46 M	92.81 H	30.68 H
Seed index (g)	9.40	6.57	11.90	12.55	12.00 M	91.36 H	23.63 H
Lint index (g)	4.86	3.13	6.00	15.37	13.72 M	79.67 H	25.23 H
Ginning outturn (%)	33.92	30.37	36.60	5.37	4.17 L	60.38M	6.68 L
2.5 per cent span length (mm)	26.56	21.97	32.43	9.69	9.53 L	96.74 H	19.32 M
Bundle strength (g/tex)	22.82	19.93	29.43	8.20	7.90 L	92.89 H	15.67 M
Micronaire (10^{-6} g/in)	3.95	3.07	4.4.	9.94	8.62 L	75.11 H	15.39 M
Uniformity ratio (%)	53.99	43.67	53.33	5.15	4.63 L	80.70 M	8.57 L
Seed cotton yield / plant (g)	1306.26	693.33	1864.33	28.71	16.19 M	31.82 M	18.82 M

and high genetic advance indicative of additive gene effects (direct action) depicting the possibility of improvement in yield.

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