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GENETIC VARIABILITY FOR YIELD COMPONENTS AND FIBRE CHARACTERS IN COTTON (*GOSSYPIUM ARBOREUM* L.)

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Abstract

Among thirteen varieties of cotton maximum variability was observed for seed cotton yield per hectare followed by bolls per plant and boll weight during the seasons studied. High heritability coupled with high genetic advance was also observed for seed cotton yield per hectare, bolls per plant, ginning percentage, halo length and fibre strength which indicates additive gene action in these characters.

Key words : Seed cotton, halo length, fibre length, seed yield, micronaire, genotypic coefficient of variation, phenotypic coefficient of variation.

Introduction

India having the largest cotton growing area in the world and currently at second position in production with an average yield of 475 kg lint per hectare, which is far below the world average of 759 kg lint per hectare. Progress in breeding programme depends on the magnitude of variability presented in breeding material. The genetic variance is important, especially the additive genetic variance. The estimates of variability and its heritability component available in a material are pre requisite for any breeding programme. It is very difficult to judge whether any phenotypic variability is heritable or non heritable. Hence it becomes necessary to split overall variability into the heritable and non heritable components with the help of certain genetic parameters such as genetic coefficient of variation heritability and genetic advance. Ultimately the aim of plant breeder is to select a higher plant yield in selection on the basis of characters that have high heritable value. The present investigation was carried out as an assay with thirteen different varieties along with checks of cotton. These have been evaluated for genetic variability, heritability and genetic advance of yield, yield contributing and fibre quality characters.

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Materials and Methods

Thirteen different genotypes were grown in randomized block design with three replications for three years (*i.e.* during 2009, 2010 and 2011) at R.A.R.S, Nandyal, Kurnool, Andhra Pradesh. Each plot (Single row) was 6 meters length with 60 cm row to row and 30 cm plant to plant. Sowing was done by hand dibbling at the rate of 3-10 kg/ha.

The fertilizer dose, cultural procedure, plant protection and irrigation ware followed as per recommended package of practices. Observations were recorded on five randomly selected and tagged plants from the middle of the rows and average value of each character was determined from these plants. The observations were made on viz., seed cotton yield per hectare, bolls per plant, boll weight, ginning percentage, halo length, fibre strength and micronaire. The genetic parameters were studied by working out the genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability (broad sense) (Hansen *et al*., 1956) and genetic advance (Johnson *et al.,* 1955) for all the characters.

Results

Thirteen genotypes of *G. arboreum* were evaluated for yield, yield components and fibre characters for three

Table 1 : Estimates of variability, heritability and genetic advance for yield and yield components and fibre quality traits in cotton mean of different seasons.

Characters	Mean	Range		PCV	GCV	Heritability (%)	Genetic advance	Genetic advance as percentage of mean
		Minimum	Maximum					
Seed cotton yield /ha	2215.13	1977.3	2489.0	31.68	28.44	0.80	1162.82	52.49
Bolls per plant	31.21	23.56	37.0	21.46	17.15	0.64	8.81	28.23
Boll weight (g)	2.47	2.27	2.61	10.18	6.78	0.44	0.23	9.29
Ginning percentage	36.02	34.45	38.07	2.99	2.03	0.46	1.02	2.83
2.5% span length (mm)	21.09	18.61	23.44	7.31	3.57	0.24	0.76	3.59
Fibre strength (g/tex)	21.32	19.97	22.19	3.82	1.75	0.21	0.35	1.65
Micronaire (µg/inch)	4.65	4.23	4.99	8.20	4.15	0.26	0.20	4.32

consecutive years i.e., from 2009-10 to 2011-12 in Randomized Block Design with three replications. The pooled analysis of variance over years (table 1) revealed significant differences among the genotypes. But seasons and season x genotype interactions were non significant for all the characters except for boll weight studies.

The results pertaining to heritability and genetic advance of yield, yield components and fibre quality characters are presented in table 2. Genotypic coefficient of variation and phenotypic coefficient of variation were observed for all the characters. Phenotypic coefficient of variation was recorded higher than genotypic coefficient of variation in all the characters studied. Phenotypic coefficient of variation and genotypic coefficient of variation values recorded higher for seed cotton yield and yield components followed by fibre quality characters. However, low heritability was observed for all the characters studied in the present investigations. High heritability was observed for seed cotton yield and bolls per plant followed by ginning percentage, boll weight, micronaire, halo length and fibre strength.

Genetic advance and genetic advance on percentage of mean were observed to be higher for yield and yield components characters compared to fibre quality characters studied in the present investigation. Seed cotton yield per plant has recorded maximum genetic advance and genetic advance as percentage of mean followed by number of bolls per plant, boll weight, ginning percentage, halo length, micronaire and fibre strength. A comparison between genetic advance and genetic advance as percentage of mean recorded for the genotypes characters was studied. Genetic advance was recorded higher than genetic advance as percentage of mean in seed cotton yield per hectare. But, all other characters like bolls per plant, boll weight, ginning percentage, halo length, strength, and micronaire recorded genetic advance lower than genetic advance as percentage of mean.

Discussion

Cotton is an important fibre crop of world with highest acreage in India. India is also the first country to make pioneering effort to exploit the phenomenon of heterosis in the crop (Kategiri *et al.,* 1990). However, evaluation for further high yielding superior fibre quality varieties with higher ginning percentage is essential.

The pooled analysis of variance (table 1) revealed significant differences among the genotypes for all character studied during all the years, indicating the existence of different variations in the material for effective selection. The seasons and season × genotype interactions were also observed to be non- significant for all the characters studied except boll weight, which indicates variation in the performance of genotypes over the years. Higher seed cotton yield and the yield components *viz*. bolls per plant, boll weight and fibre character. Further, higher variation with the season was observed for seed cotton yield and the yield component characters like bolls per plant and boll weight, followed by fibre quality characters. Miller *et al*., (1962) and Abou - El- fittauh *et al.* (1969) also reported genotype × environment interactions are more important for seed cotton yield compared to fibre quality characters. Similar result was reported by Reddy (2001). Further, maximum variability was noticed for seed cotton yield followed by bolls per plant and boll weight. Murthy and Rao (1998) and Jagtap and Mehetre (1998) has also reported higher coefficient of variability for seed cotton yield and bolls per plant. Similarly, Satanga *et al.* (2000). Ahuja and Juteja (2000) and Sankara Pandian *et al.* (1998) also reported high levels of genetic variation for seed cotton yield and bolls per plant.

References

Abou - EI - Fittauh, H. A, J. O. Rawlings and P. A. Miller (1969). Genotypes by environment interactions in cotton their nature and related environment variables. *Crop Science*, **9** : 377-381.

Ahuja, S. L. and O. P. Tuteja (2000). Variability and association analysis for chemical components importing resistance to *(G.hirsutum L.)* cotton. *Journal of cotton research and development*, **14(1)** :19 - 22.

Jagtap, D. R. and S. S. Mehetre (1998). Genetic variability in inter varietal crosses of upland cotton (*G. hirsutum* L). *Annual Agricultural Research*, **19** : 130-132.

Johnson, H. W., H. F. Robbinson and R. E. Comstock (1955). Estimates of genetic and environmental variability in soya bean. *Agronomy Journal*, **47** : 314 - 318.

Miller, P. A., H. F. Robinson and O. A. Pope (1962). Cotton variety testing additional information on variety × environment interaction. *Crop Sciences,* **2** : 349-352.

Sankara Pandian, R. D., N. Krishnadoss, Muppidalthi and C. R. Ananda Kumar (1998). Genetic variability over environment and stability analysis of minfed cotton (*G. hirsutum* L). *Journal of Indian Society for Cotton Improvement*, **23(2)** : 144 - 146.

Satange, I. V., P. W. W. Khorgade and M. R. Hare, B. R. Patil and S. R. Golhar (2000). Studies on genetic variability and correlation coefficient in *American Cotton Journal of Soils and Crops*, **10(l)** : 94 - 97.

Reddy, N. A. (2001). Heterosis, combining ability and stability analysis for yield and yield components traits on cotton (*G. hirsutum* L). *Ph.D Thesis* submitted to *ANGRAU,* Hyderabad.