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Studies of genetic parameters for seed cotton yield and its contributing characters in *Gossypium arboreum* L

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ABSTARCT: Sixty *Gossypium arboreum* L. genotypes were studied to observe genetic variability, heritability and genetic advance for seed cotton yield and its contributing characters. The analysis of variance revealed that the sufficient variability was present in the material for all the characters. The value of phenotypic coefficient of variation (PCV) is greater than genotypic coefficient of variation (GCV); it means that the apparent variation is not only due to genotypes but also due to influence of environment. Seed cotton yield/ plant provided high estimates of genotypic and phenotypic coefficients of variation coupled with high heritability and high expected genetic gain as a per cent of mean, which provides better scope for advancement through direct selection. Similar results were also observed for number of monopods.

Key words: Genetic advance, *Gossypium arboreum,* heritability, seed cotton yield, variability

Cotton is one of the most important cash crops in India. On account of its agricultural, as well as industrial importance, it is also called as 'White Gold'. In India, cotton is grown on about 12.19 million ha which represents 30 per cent of the world cotton area. The average cotton productivity of cotton in India is about 481 kg/ ha which is about 70 per cent of world average of 740 kg/ha. Millions of people depend on cotton cultivation, trade, transportation, ginning and processing for their livelihood. The productivity of cotton has not made headway particularly in *Gossypium arboreum*. Therefore, there is a need to break plateau of yield potential by developing a high yielding cotton varieties or hybrids.

Information on the nature and the extent of genetic variability, heritability and genetic advance is an important prequisite in framing any crop improvement programme. Genetic variability alongwith heritability of a character indicated the possibility and extent to which improvement was feasibile through selection on phenotypic basis. Furthermore, high heritability coupled with high genetic advance would bring out the progress expected from selection. Therefore, the present study was under taken to find out the genetic variability, heritability and genetic advance of various yield and its components traits in *G. arboreum.*

The present investigation was carried out at Research Area of Cotton Section, Department of Genetics and Plant Breeding, CCS Haryana Agricultural University, Hisar during *kharif,* 2011. Sixty diverse cotton genotypes from different cotton growing states were raised in a randomized block design (RBD) in 3 replications. There were two rows of each genotype of 3 m length. Rows were spaced 67.5 cm apart and plant to plant distance with in a row was 30 cm. The data were recorded on 5 competitive plants selected randomly from each replication. The mean of 5 plants was used for statistical analysis. Recommended package of practices were followed for raising healthy the healthy crop. The data on the 9 parameters were recorded *viz*, days to first flower, plant height (cm), monopods, bolls/ plant, boll weight (g), seed cotton yield/plant (g), ginning outturn (%), seed index (g) and lint index (g). The genotypic coefficient of variability (GCV), phenotypic coefficient of variability (PCV), heritability in broad sense and genetic advance were estimated as/the standard procedure.

Analysis of variance indicated highly significant differences among the genotypes for all the characters studied indicated existence of sufficient amount of variability in the material. Genetic variability was assessed among all the genotypes for the purpose of comparison across different traits. Comparison of variability parameters are presented in Table 1. Perusal of data in Table 1 showed that values of PCV were greater than GCV; it means that the apparent variation was not only due to genotypes but also due to influence of enviroment. Selection of such plants on phenotypic basis might not be fruitful. The result of the present study revealed

maximum phenotypic (30.80) and genotypic (28.28) coefficient of variation were observed for monopods/plant. Different workers like Reddy and Pradeep (2001), Kale and Annapurve (2007), Do Thi *et al.*, (2008), Patnaik and Sial (2010) and Kulkarni *et al.,* (2011) also observed wider genetic variability for this trait in cotton. High GCV and PCV were also observed for seed cotton yield / plant with phenotypic (20.85) and genotypic (20.01) coefficient of variation. Similar result has been reported by Gitte *et al.*, (2006), Do Thi *et al.*, (2008), Khan *et al.*, (2009), Patnaik and Sial (2010) and Kulkarni *et al.* (2011). Values for GCV and PCV were found moderate for rest of the characters except seed index (7.50 and 9.954%) and ginning outturn (5.70 and 8.09 %), respectively.

Heritability estimates in broad sense were relatively higher for almost all the characters under investigation (Table 1). Among the characters studied the highest estimate of heritability was recorded for days to first flower (95.500 %). Similar trend of heritability was reported by Reddy (2001) and Neelam and Potdukhe (2002). High heritability was also observed for seed cotton yield/plant (92.1%), monopods (84.3 %), plant height (84.2%), boll weight (80.3%), bolls (79.0%) whereas, seed index (56.9%), ginning outturn (49.8%) and lint index (41.4%) exhibited moderate estimate of heritability (30-60%). These finding are in accordance with the findings of Patnaik and Sial (2010) for seed cotton yield/ plant, number of monopods and boll weight and Kale and Annapurve (2007) for plant height and number of bolls. Similar result for seed index, ginning outturn and lint index were also reported by Reddy and Pradeep (2001) and Sambamurthy *et al.,* (2006). These findings of high heritability indicated that enviromental effects less influenced these characters and hence additive gene effects were substantially contributing for these traits. Hence, selection for these traits would be helpful for improvement in seed cotton yield.

In the present investigation, high heritabilitry estimates coupled with high genetic advance were recorded for the traits like seed cotton yield/plant and plant height. These findings were in agreement with the findings of Do Thi *et al.,* (2008), Patnaik and Sial (2010) and Kulkarni *et al.*, (2011) for both traits. Thus, it can be concluded from above findings that the selection for these traits may accumulate more additive genes leading to further improvement of the characters. Genetic advance percentage of mean (GAM), together with high heritability estimates indicated that there would be a close correspondance between the genotype and the phenotype due to a relatively smaller contribution of the enviroment to the phenotype and hence selection for the character is easy. Such situation, genetic improvement in different traits should be made considering heritability and GCV values higher. That effectiveness of selection depend upon heritability but heritability itself was not a true measure of genetic advance.

Thus, in present investigation when variability, heritability and genetic advance considered together, seed cotton yield/plant,

Table 1. Variability parameters for different characters in *Gossypium arboreum*

Variability parameters	Days to first flower	Plant height	Bolls	Monopods	Boll weight	Seed cotton yield/ plant	Ginning outturn	Seed index	Lint index
Grand mean	**56.28**	**172.14**	**34.14**	**4.53**	**2.32**	**72.26**	**38.22**	**5.14**	**3.20**
Range	44.67-68.33	133.67-211.33	21.33-50.33	2.33-7.33	1.77-3.00	44.00-115.33	34.03-43.47	4.23-7.07	2.23-4.27
Genotypic variance	30.30	486.65	26.55	1.64	0.07	208.99	4.76	0.15	0.10
Phenotypic variance	31.73	577.94	33.62	1.95	0.09	226.96	9.55	0.26	0.25
GCV (%)	9.78	12.81	15.10	28.28	11.85	20.01	5.71	7.50	10.00
PCV (%)	10.01	13.96	16.98	30.80	13.22	20.85	8.09	9.95	15.55
h^2_{bs} (%)	95.50	84.20	79.00	84.30	80.30	92.10	49.80	56.90	41.40
GA	11.08	41.70	9.43	2.42	0.51	28.58	3.17	0.60	0.42
GAM (%)	19.69	24.22	27.63	53.48	21.87	39.55	8.30	11.66	13.25

number of monopods and to some extent plant height may be the best reliable traits that would be exploited through hybridization and selection, since these chaarcters recorded high magnitude for two or three variability parameters.

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