

Short Communication

Variability Parameters in American Cotton (*Gossypium hirsutum* L.)

P. Rokadia and B. Vaid

Agriculture Research Station, Banswara 327 001, India

Improvement in fiber yield is the ultimate aim of every cotton breeder. Since expression of most of the quantitative characters is greatly influenced by environmental fluctuations, it becomes necessary to determine the exact nature of variation in yield and its components. This will help the breeder in determining whether phenotypic selection would be effective or not, as well as gain in yield through selection. To work out such information in American cotton, this experiment was conducted and variability parameters were calculated.

The material consisted of 23 crosses developed by crossing promising lines from genetic stock of *hirsutum* cotton, along with two checks namely Bikaneri Narma and Ganganagar Agati. The material was planted in randomized block design with three replications at Agriculture Research Station, Banswara (Rajasthan), during kharif 1999- 2000. Each plot consisted of 4 rows of 6 m length with a row to row distance of 75 cm, and plant to plant distance of 30 cm. Observations were recorded on randomly selected 5 plants from each plotting, days to 50% flower on plant height, no. of bolls per plant and seed yield. The data were subjected to the analysis of variance following Panse and Sukhatme (1954). The various genetic parameters, viz.,

genotypic coefficient of variation, heritability estimates in broad sense and expected genetic advance, were estimated by the standard formulae (Burton, 1952; Johnson *et al.*, 1955; Hanson *et al.*, 1956).

The range, mean, F value and coefficient of variation for different characters under study are presented in Table 1. Plant height and bolls per plant, ranged widely among crosses. The crosses differed significantly for all the characters. The same results were obtained by Manivasakam and Kamalnathan (1987) and Khorgade and Ekbote (1981) in cotton.

Genotypic and phenotypic variances were higher for plant height and bolls per plant, indicating wide variability. The genotypic coefficient of variation indicated that bolls per plant and plant height had large variability due to genotype. Heritability in broad sense was higher for plant height (97.01%), bolls per plant (93.86%) and days to flower (84.02%). This indicated that these characters were less influenced by the environment. The low heritability estimates for seed cotton yield indicated larger influence of the environment. High heritability, combined with higher genetic advance for days to 50% flowering, indicated that this character was governed largely through the additive

Table 1. Variability parameters for various characters in cotton

Character	Days to flower	Plant height (cm)	Bolls per plant	Seed cotton yield (kg plot ⁻¹)
Range	69-88	62-160	20-107	1.1-2.8
Mean	76.89	109.73	53.60	1.864
F value	16.77	98.37	46.87	8.88
CV	12.62	8.46	8.34	13.46
Genetic variance (Vg)	21.40	468.39	306.27	0.016
Phenotypic variance (Vph)	25.47	482.82	326.30	0.046
Genotypic coefficient of variance	6.01	19.72	32.65	6.96
Phenotypic coefficient of variance	6.56	20.02	33.70	11.80
Heritability (h ²)	84.02	97.01	93.86	34.78
Genetic advance	86.93	43.70	34.76	0.15
Genetic gain	11.31	39.82	64.85	8.4

effect of genes and improvement in this trait may be achieved through phenotypic selection. Johnson *et al.* (1955) have also suggested that heritability estimates, along with genetic advance, shall be more helpful in predicting gain under phenotypic selection than heritability estimates alone. Plant height and bolls per plant showed high heritability with low genetic advance. Such a situation may be caused by non-additive gene action, i.e., dominance and epistasis. But seed cotton yield has low heritability as well as genetic advance, indicating that very little improvement can be achieved by phenotypic selection in this trait. The genetic advance as per cent of mean indicated that bolls per plant and plant height are more amenable to selection and these characters could be improved up to 65% and 40%, respectively. Khorgade and Ekbote (1981) also observed in cotton that number of bolls per plant and plant height can be improved by 55% and 47%, respectively, by applying selection pressure. Seed cotton yield *per se* cannot

be improved by applying selection pressure at 5% level since the genetic advance as percentage of mean was the lowest.

References

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