Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.5053

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **5 (3):** 403-406 (2017)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Genetic Variability and Character Association in Intra-Hirsutum Hybrids

P. K. Prem Meena* and Harphool Meena

Agriculture Research Station, Kota (Agriculture University Kota, Rajasthan-324 001)

*Corresponding Author E-mail: pkp_meena@rediffmail.com

Received: 12.06.2017 | Revised: 21.06.2017 | Accepted: 22.06.2017

ABSTRACT

Variability and correlations were studied in 24 cotton hybrids of Gossypium hirsutum of diverse origin. Significant difference among the hybrids for all the seven characters was revealed. The components viz., phenotypic (σ^2p), genotypic (σ^2g) and environmental (σ^2e) variances were used for estimation of phenotypic and genotypic coefficient of variations. The phenotypic coefficient of variation (PCV), which measures the total variation, was found to be greater than genotypic coefficient of variation (GCV). Moderate to high estimates of heritability along with high genetic advance were noticed for lint index, seed index, number of bolls/ plant, seed cotton yield/plot and lint yield, indicating the presence of additive gene action in the expression of these traits. Genotypic and phenotypic correlation showed that seed cotton yield/plot had significant positive association with ginning outturn (%) at genotypic level, while lint index, seed index and number of bolls/plant showed significant positive association with seed cotton yield at genotypic and phenotypic levels. The positive significant correlation was observed for both the characters viz., seed index (g) and lint index (g) with number of bolls/plant at genotypic and phenotypic levels. Thus, for increasing seed cotton yield in cotton, due emphasis should be given to ginning outturn (%), lint index (g), seed index (g) and number of bolls/plant. All the characters which had high heritability and highly significant positive association with seed cotton yield can be increased through selection in cotton.

Key words: *Cotton, variability, PCV and GCV, Genetic advance, heritability, correlation.*

INTRODUCTION

Cotton (*G. hirsutum*) is an important fiber crop grown in India. It is often cross pollinated crop in which large amount of variation is observed for many important traits. The success of any breeding programme depends on the spectrum of genetic variability present in the population. In addition to genetic variability, knowledge on heritability and genetic advance helps the breeder to employ a suitable breeding strategy to achieve the objective. Burton[3] and Swarup and Chaugle[9] indicated that genetic variability together with the heritability estimates would give on the amount of genetic advance expected out of selection. Yield is a complex character which depends upon several component characters. Therefore, direct selection for yield is often not effective.

Cite this article: Meena, P.K.P. and Meena, H., Genetic Variability and Character Association in Intra-Hirsutum Hybrids, *Int. J. Pure App. Biosci.* **5(3):** 403-406 (2017). doi: http://dx.doi.org/10.18782/2320-7051.5053

Thus, it is essential to study the association of yield components with yield which is less influenced by environmental factors. Hence, the present investigation was carried out to access the quantum of variability, heritability, genetic advance and association of certain characters with yield in upland cotton (*G. hirsutum* L.).

MATERIALS AND METHODS

The study was carried out with 24 phenotypically diverse genotypes of upland cotton (*Gossypium hirsutum* L.) obtained from different sources. The experiment was conducted at Agricultural Research Station, Banswara (Maharana Pratap University of Agriculture & Technology, Udaipur) in randomized block design with three replications. Each plot consisted of two rows of 6.0 m in length with row to row and plant to plant spacing of 90 and 45 cm, respectively. Normal agronomic practices recommended to the zone were followed timely. Data on five randomly selected plants in each plot were collected for ginning outturn (%), lint index (g), seed index (g), number of bolls/ plant, boll weight (g/ boll). The seed cotton yield and lint yield were taken on plot basis.

The GCV and PCV were estimated as pre Burton and De Vane[4]. The heritability in broad sense and expected genetic advance were estimated following Johnson *et al*[6]. The phenotypic and genotypic correlations were computed according to Al-Jibouri *et al*[2].

RESULTS AND DISCUSSION

The analysis of variance showed highly significant differences between genotypes for the characters studied indicated the presence of considerable genetic variation in the experimental material. The means, phenotypic and genotypic coefficients of variation and heritability estimates are presented in Table 1. A wide range of variability was observed for all the traits. Phenotypic coefficient of variation (PCV) were higher than those of genotypic coefficient of variation (GCV) for all the traits studied, indicating that they all interacted with the environment with the same degree. Similar findings were reported by Santoshkumar *et al.*[8]

Table 1: Mean, range, phenotypic (PCV) and genotypic coefficient of variation (GCV), heritabilit and genetic advance for various characters in cotton hybrids

Characters	Range	Mean	GCV (%)	PCV (%)	Heritability (%)	GA (% of mean)
Ginning outturn (%)	30.71-36.55	32.88	4.34	5.65	59.01	6.87
Lint Index (g)	4.07-7.19	5.14	14.96	16.82	79.15	27.42
Seed Index (g)	8.80-12.67	10.45	11.69	12.54	86.94	22.46
Number of Bolls/ plant	14.43-36.37	27.46	21.09	27.82	57.46	32.93
Boll weight (g/boll)	3.85-4.80	4.38	4.53	9.63	22.16	4.39
Seed Cotton Yield/ plot (kg)	2.93-6.74	5.09	15.68	24.40	41.32	20.77
Lint yield/ plot (kg)	0.91-2.45	1.68	18.80	26.41	50.68	27.57

Table 2: Genotypic (r_g) and phenotypic (r_p) correlation coefficients among seven characters in cotton

Characters		Lint Index (g)	Seed Index (g)	No. of Bolls/ plant	Boll weight (g/boll)	Seed Cotton Yield/ plot (kg)	Lint yield/ plot (kg)
Ginning outturn (%)	r_g	0.636 **	0.243	0.482 *	-0.224	0.646 **	0.756 **
	r_p	0.673 **	0.228	0.305	0.093	0.242	0.424 *
Lint Index (g)	r_g		0.901 **	0.703 **	-0.074	0.879 **	0.882 **
	r_p		0.870 **	0.451 *	0.041	0.477 *	0.588 **
Seed Index (g)	r_g			0.639 **	-0.016	0.746 **	0.686 **
	r_p			0.408 *	-0.024	0.464 *	0.487 *
Number of Bolls/ plant	r_g				-0.517 **	0.986 **	0.921 **
	r_p				-0.140	0.641 **	0.652 **
Boll weight (g/boll)	r_g					-0.233	-0.216
	r_p					-0.218	-0.180
Seed Cotton Yield/ plot (kg)	r_g						0.987 **
	r_p						0.979 **

*, **: Significant at 5 percent and 1 percent probability level, respectively

GCV values ranged from 4.53 (boll weight/ g boll) to 21.09 (Number of bolls/ plant). Moderate to high GCV and PCV values recorded for the traits viz., lint index (g), seed index (g), number of bolls/ plant, seed cotton yield/plot and lint yield/ plot indicating the presence of high level of genetic variability for these characters and good scope for yield improvement through phenotypic selection. Santoshkumar *et al.*[8] were also reported moderate to high GCV and PCV values for most of the yield contributing traits. Low values for ginning outturn (%) and boll weight (g) were obtained which indicated that one has to either create or locate source of high variability of wider spectrum for effective selection and improvement of these traits. indicating

GCV values only are not enough to determine the genetic variability, this could be done with the help of heritability and genetic advance estimates to assess the heritable portion of total variation and extent of genetic expected gain for selection. The estimates of broad sense heritability were ranged from 22.16 percent for boll weight (g) to 86.94 Per cent for seed index (g). Moderate to high heritability exhibited for all the characters studied, except boll weight (g) suggest that high component of heritable portion of variation that can be exploited by breeders in the selection of superior genotypes on the basis of phenotypic performance.

Since high heritability does not always indicate high genetic gain, heritability with genetic advance should be used in predicting selection of superior genotypes Ali *et al*[1]. In this study high to medium genetic advance as % mean estimates were obtained for all the traits ranged from 4.39 to 27.57. High heritability coupled with high genetic advance % mean obtained for the most of yield contributing traits except ginning outturn (%) and boll weight (g). These traits could be considered as favourable attributes and as an indication of additive gene action and the consequent high extended genetic gain from selection of superior genotypes. Elango Dinakaran *et al.*[5] and Santoshkumar *et al.*[8] opined additive genetic effects for these traits. Therefore, simple selection method will be effective for the improvement of these traits. High heritability coupled with low genetic advance was observed for ginning outturn (%) this suggest that this character were under the control of non additive gene action and

heterosis breeding can be resorted for improving the character. Elango Dinakaran *et al.*[5] and Santoshkumar *et al.*[8] reported high heritability coupled with low genetic advance was observed for day to 50 % flowering revealing the preponderance of non-additive gene action governing the inheritance of this trait.

The genotypic and phenotypic correlation coefficients between yield and yield components are presented in Table 2. The present study indicates that seed cotton yield/ plot was significant and positively associated with ginning outturn (%) at genotypic level. This was in accordance with the results obtained by Murthy[7]. Lint index, seed index and number of bolls/plant showed significant positive association with seed cotton yield at genotypic and phenotypic levels. The positive significant correlation was observed for both the characters viz., seed index (g) and lint index (g) with number of bolls/plant at genotypic and phenotypic levels. Thus, for increasing seed cotton yield in cotton, due emphasis should be given to ginning outturn (%), lint index (g), seed index (g) and number of bolls/plant.

In the present investigation, it may be conclude that the analysis of variance highly significant differences between genotypes for the characters studied indicated the presence of considerable genetic variation in the experimental material. Moderate to high GCV and PCV values recorded for the traits viz., lint index (g), seed index (g), number of bolls/ plant, seed cotton yield/plot and lint yield/ plot, indicating the presence of high level of genetic variability for these characters. High heritability coupled with high genetic advance % mean obtained for the most of yield contributing traits and except ginning outturn (%) and boll weight (g). These traits could be considered as favourable attributes and as an indication of additive gene action and the consequent high extended genetic gain from selection of superior genotypes.

REFERENCES

1. Ali, A., Khan, S. and Asad, M.A., Drought tolerance in wheat: Genetic variation and heritability for growth ion relations. *Asian J. Plant Sci*, **1:** 420-422 ((2002)).
2. Al-Jibouri, H. A., Miller and Robinson, H. F., Genotypic and environmental variation and correlation in upland cotton cross of interspecies origin. *Agron, J*., **50:** 633-637 (1958).
3. Burton, G.W., Quantitative inheritance in grasses. Proceeding of sixth International Congress pp.277-283 (1952).
4. Burton, G.W. and Devane, E.M., Estimating heritability in tall fescue (Festuca arundinacea) from replicated clonal material. *Agron, J.,* **45:** 478-481 (1953).
5. Elango Dinakaran, Thirumani, S. and Paramasivam, K., Yield and fibre quality components analysis in upland cotton (*Gossypium hirsutam*) under salinity. *Annals of Biological Research,* **3(8):** 3910-3915 (2012).
6. Johnson, H. W., Robinson, H. F. and Comstock, R. E., Estimation of genetic and environmental variability in soybean. *Agron. J*., **47:** 314-318 (1955).
7. Murthy, J.S.V., Variability and association analysis using morphological and quality traits in cotton (*Gossypium hirsutum* L.). *Madras Agric. J*., **86:** 39-42 (1999).
8. Santhoshkumar Magadum, Urbi Banerjee, R. Ravikesavan, Doddabhimappa Ganapur and N. Manikanda Boopathi, Variability and heritability analysis for yield and quality traits in *Interspecific* population of Cotton (*GOSSYPIUM SPP*). *Bioinfolt* **9(4A):** 484-487 (2012).
9. Swarup, V. and Chaugle, B. S., Studies on genetic variability in sorghum. Phenotypic variation and heritable component in some quantitative characters contributing towards yield. *Indian Journal of Genetics and Plant Breeding* **22:** 31-36 (1962).