J. Cotton Res. Dev. **30** (1) 41-44 (January, 2016)

Study of genetic components on fiber and yield contributing parameters in upland cotton (*Gossypium hirsutum* L.)

H. V. PATIL*, D. B. DEOSARKAR AND S. K. ARBAD

Department of Agricultural Botany, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani.431 402

**E-mail: hanumantpatil16@gmail.com*

ABSTRACT: Twenty eight crosses were obtained by seven lines and four testers in L x T design to know the genetic variability, heritability and genetic advance for fibre quality, yield and component traits. Analysis of variance revealed significant differences among the genotype for various characters studied indicating the presence of ample variation for effective selection. The phenotypic coefficient of variation (PCV) was slightly higher in magnitude than genotypic coefficient of variation (GCV) for all characters indicating the influence of environment. High heritability estimates were observed for days to maturity, fiber length and seed cotton yield/plant.Whereas high heritability was observed for all other characters except monopodia/plant, sympodia/ plant, ginning percentage and uniformity ratio.The high heritability coupled with high genetic advance were observed for the traits like fibre length, micronaire value, bolls/plant, seed cotton yield/plant, seed cotton yield/plot and seed cotton yield kg/ ha.

Key words: Genetic advance, heritability, variability, yields.

Upland cotton (*G.hirsutum* L.) is a predominant species of cotton cultivated mainly for its lint in more than 80 countries of the world. Due to its wider adaptability, it is grown in irrigated as well as rainfed condition. In India, it occupies about 75 per cent of the total cotton area of the country with a contribution of 85 per cent to the national production. It is also one of the most important cash crop of India, which accounts for 60 per cent of total foreign exchange earnings through export of lint and value added cotton products. So varieties/hybrids of this species played a significant role in achieving self sufficiency in cotton production in country.

Knowledge on the nature and the extent of genetic variability, heritability and genetic advance is an important pre-quisite in framing of any crop improvement programme. Genetic variability along with heritability of a character indicates the possibility and extent to which improvement was feasible through selection on phenotypic basis. Further, high heritability coupled with high genetic advance would bring out the progress expected from selection.Therefore, the present study was undertaken to find out the genetic variability, heritability and genetic advance of various yield component and fiber properties to establish appropriate criterion for selection to improve the yield status of cotton.

In *kharif* 2013, experiment was conducted at Cotton Research Scheme, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani.The experiment material studies comprised of eleven (11) parents which included seven *Gossypium hirsutum* lines *viz.*, NH 545, NH 615, NH 630, NH 635, PH 1060, PH 1076, LRA 5166 and four testers out of which three were *Gossypium hirsutum viz.*, NH 452, NH 625, PKV Rajat and one was *barbadense* type Suvin. In experiment, 28 F_1s, 11 parents along with two checks (NHH 44 and DCH 32) were evaluated for studies the genetic variability, heritability and genetic advance for fibre quality, yield and component traits.The material was sown in randomized block design in three replications. Parents and hybrids were sown in two rows with spacing of 60 x 60 cm and all cultural package of practices were adopted. Data were recorded on average of five randomly

selected plant/genotype for days to 50 per cent flowering, monopodia/plant, sympodia/plant, plant height, days to maturity, boll weight, bolls/plant, ginning percentage, micronaire value, fibre length, uniformity ratio, fibre strength, seed cotton yield/ plant, seed cotton yield/plot and seed cotton yield kg/ha. The genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability (h^2) and genetic advance (GA) were estimated as per the standard procedure.

The analysis of variance showed significant difference among the treatments (parents and crosses) for all the characters under study indicating existence of sufficient amount of variability in the material. The value phenotypic coefficient of variation (PCV) was slightly higher in magnitude than genotypic coefficient of variation (GCV) for all the characters (Table.1).

Among the different yield attributing and quality traits the estimate of GCV and PCV were to be moderate for monopodia/plant (8.53 and 18.52 respectively), bolls/plant (10.96 and 12.01), micronaire value (14.31 and 15.04), fibre length (12.96 and 13.07), seed cotton yield/plant (14.45 and 14.63), seed cotton yield/plot (14.08 and 16.01) and seed cotton yield kg/ha (13.91 and 16.02) respectively.Value for GCV and PCV were found lowest for rest of characters like days to 50 per cent flowering (4.71 and 5.02, respectively), sympodia/plant (8.38 and 11.00), plant height (7.84 and 8.61), days to maturity (5.91 and 5.96), boll weight (8.70 and 9.23), ginning percentage (5.22 and 8.59), uniformity ratio (3.54 and 4.73) and fibre strength (7.72 and 8.41 respectively).This symbolizes considerable amount of variability in genotype studied.

The variation in the values GCV and PCV was narrow for all characters, which indicated that less influence of the environment in the expression of these traits. These observations showed ample scope for improvement for these characters through breeding. Phenotypic coefficient of variation was high for monopodia/ plant, micronaire value, fibre length, bolls/plant, seed cotton yield/plant and seed cotton yield kg/ ha. Similar result are in agreement with the finding Ahmed *et al.,*(2006) for monopodia/plant; Shakti *et al.,*(2007) for plant height, sympodia/ plant, bolls/plant, boll weight, ginning outturn, uniformity ratio and micronaire value; Bindupriya *et al.*,(2008) for days to 50 per cent flowering, monopodia/plant, sympodia/plant, plant height, boll weight, bolls/plant, ginning percentage, staple length and seed cotton yield/ plant; Sabir *et al.,*(2010) for number bolls/plant, microniare value and seed cotton yield/plant and Patnaik and Sial (2010) for seed cotton yield/ plant and seed cotton yield qt/ha.

The heritability estimates were better indicators of heritable portion of variation. The high heritability indicated the effectiveness of selection based on the phenotype.The estimate of heritability was highest for among the character.High heritability estimate were also observed for days to 50 per cent flowering (88.13%), plant height (83.32%), days to maturity (98.45%), boll weight (88.84%), bolls/plant (84.28%), micronaire value (90.50%), fiber length (98.27%), fiber strength (84.28%), seed cotton yield/plant (97.55%), seed cotton yield/plot (77.38%) and seed cotton yield kg/ha (75.42%)Table1.These findings are in accordance with the findings of Shakti *et al.*,(2007) for plant height, sympodia/plant, bolls/plant, boll weight, ginning outturn, uniformity ratio and micronaire value; Preetha and Raveendran (2007)for days to 50 per cent flowering, plant height ,bolls/plant and seed cotton yield/plant; Bindupriya *et al.*,(2008) for sympodia/plant, bolls/plant, ginning percentage, staple length and seed cotton yield/ plant; Khan *et al.*,(2009) for plant height, sympodia/ plant, bolls/plant, boll weight and seed cotton yield/plant; Patnaik and Sial (2009) for boll weight and seed cotton yield/plant; Kulkarni *et al.,*(2011) for days to maturity and Lal and Singh

Table 1. Mean, range, genotypic coefficient of variation, phenotypic coefficient of variation, heritability and genetic advance in cotton

Character	Mean	Range		GCV	PCV	h^2	GA (% over mean)
		Minimum	Maximum				
Days to 50 per cent flowering	75.65	67.00	84.66	4.71	5.02	88.13	9.12
Monopodia/plant	1.42	1.13	1.86	8.53	18.52	21.24	8.10
Sympodia/plant	23.47	19.33	28.26	8.38	11.00	58.99	16.87
Plant height (cm)	145.41	121.93	167.13	7.84	8.61	82.97	14.71
Day to maturity	163.17	146.66	184.66	5.91	5.96	98.45	12.09
Boll weight (g)	2.98	2.32	3.28	8.70	9.23	88.84	16.90
Bolls/plant	26.07	21.52	34.72	10.96	12.01	83.32	20.61
Ginning percentage (%)	38.54	32.96	42.05	5.22	8.59	36.92	6.53
Micronaire value (µg/ inch)	3.98	2.66	4.99	14.31	15.04	90.50	28.04
Fibre length (mm)	25.05	20.10	33.62	12.96	13.07	98.27	26.47
Uniformity ratio	45.93	40.50	49.36	3.54	4.73	55.93	5.45
Fibre strength (g/tex)	23.66	20.27	27.50	7.72	8.41	84.28	14.61
Seed cotton yield/plant (g)	75.61	57.79	109.79	14.45	14.63	97.55	29.40
Seed cotton yield/plot (g)	1364.52	1040.33	1968.00	14.08	16.01	77.38	25.53
Seed cotton yield kg/ha	1895.21	1450.02	2733.41	13.91	16.02	75.42	24.89

(2012) for boll weight and seed cotton yield/plant. These finding of high heritability indicated that environmental effect less influenced these characters and hence additive gene effects were substantially for these traits. Hence selection for these traits would be helpful for improvement in seed cotton yield.

High heritability coupled with high genetic advance may be useful for identifying character possessing additive or non additive gene effect.Genetic advance ranged from 5.45 (uniformity ratio) to 29.40 (seed cotton yield/ plant). It is evident from present finding that number of bolls/plant (83.32% and 20.61, respectively), micronaire value (90.50% and 28.04), fiber length (98.27% and 26.46), seed cotton yield/plant (97.55% and 29.40), seed cotton yield/plot (77.38% and 25.53) and seed cotton yield kg/ha (75.42% and 24.89). Most of the characters, except number of monopodia/ plant,ginningpercentage and uniformity ratio had high heritability but low expression of genetic advance indicating that the variability was partly due to additive gene effects. These result agreement with Shakti *et al.*, (2007), Bindupriya *et al.*, (2008), Preetha and Raveendran (2007), Khan *et al.*, (2009), Patnaik and Sial (2009), Patnaik and Sial (2010), Kulkarni *et al.*, (2011) and Lal and Singh(2012).

REFERANCES

Ahmed, H. M., Kandhro, M. M., Laghari, S. and Abro, S. 2006. Heritability and genetic advance as selection indicators for improvement in cotton *(Gossypium hirsutum* L.). *J. Biol. Sci.* **6:** 96-99.

Bindupriya, P., **Madrap, I. A. and Raut, P. N. 2008.** Genetic variability and inbreeding depression studies in cotton. *J.Maha.Agric.Univ*.**33**:170-173.

Khan, N. U., Gul, H., Marwat, K. B., Farhatullah., Sundus, B., Khadijah, M., Khan, I., Khan, I. A. and Ahmed, W. 2009. Genetic variability and heritability in upland cotton. *Pak.J.Bot.* **41 :** 1695-1705.

Kulkarni, A. A., Nanda, H. C. and Patil, S. G. 2011. Study the genetic parameters on yield, yield contributing and fibre quality

character in upland cotton *(G. hirsutum.* L.).*J. Cotton. Res. Dev.***25:** 22-24.

Lal, M. and Singh, D. P. 2012. Genetic variability, character association and component analysis in upland cotton (*Gossypium hirsutum* L.). *Annals agri, Bio. Res.***17**: 37-40.

Patnaik, R.S. and Sial, Parshuram 2010. Genetic variability, character association and component analysis in upland cotton under rainfed condition. *J. Cotton Res. Dev.***24:** 155-159.

Patnaik, R.S. and Sial, Parshuram. 2009. Genetic variability, character association and path coefficient analysis in upland cotton (*G.hirsutum* L.) under rainfed condition. *Environ. Ecology*. **27**: 989-93.

Preetha, S. and Raveendran, T. S. 2007. Genetic variability and association analysis in three different morphological groups of cotton *(Gossypium hirsutum* L.). *Asian J. Pl. Sci.***6** : 122-28.

Sabir, H., Nawab N.N., Ali , M.A., Aamir H., Nawaz ,M.A and Malik ,T.A 2010. Evaluation of performance, genetic divergence and character association of some polygenic traits in upland cotton.*J. Agric. Social Sci.***6**: 79-82.

Sakthi, A. R., Kumar, M. and Ravikesavan, R. 2007. Variability and association analysis using morphological and quality traits in cotton (*G. hirsutum* L.). *J. Cotton Res. Dev*. **21** : 148-52.

Received for publication : January 19, 2015
Accepted for publication : September 16, 2015