J. Cotton Res. Dev. **30** (1) 29-31 (January, 2016)

Correlation and path analysis between seed cotton yield and its attributing characters studies in *deshi* cotton

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ABSTRACT: This study was carried out to determine direct and indirect effects of some characters (Days to first flowering, days to 50 per cent flowering, days to maturity, plant height (cm), monopodia/plant, sympodia/ plant, boll weight (g),bolls/ plant, halo length (mm), ginning percentage, 100 seed weight (g)) on seed cotton yield. The experiment was carried out with 50 genotypes of *Gossypium arboreum* L. were evaluated to study the correlation and path effects. The correlation studies revealed that plant height, monopodia/plant, sympodia/ plant, boll weight, bolls/plant and halo length showed significant and positive correlation with seed cotton yield/plant. The associations of bolls/plant and days to 50 per cent flowering with seed cotton yield/plant were stronger than remaining yield traits. Path analysis revealed positive direct effect of days to 50 per cent flowering, sympodia/ plant, boll weight, bolls/plant and 100 seed weight on seed cotton yield. Bolls/plant and days to 50 per cent flowering had high positive direct effect on seed cotton yield/ plant and appeared to be the most important component of yield. Direct selection for these two traits could prove advantageous for improving seed cotton yield.

Key words: Correlation, cotton, path analysis

Cotton occupies a prime position as fibre crop of masses of the world in general and of India in particular. The sufficient production of cotton for meeting the fibre requirements of the world's exploding population is now universally realized. Keeping in view the future needs of the country, cotton research needs to be versatile and accelerated to develop more productive cotton genotypes. For this, it is desirable for plant breeder to know the extent of relationship between yield and its various components which will facilitate him in selecting plants of desirable characteristics. Correlation coefficient analysis measures the magnitude of relationship between various plant characters and determines the component character on which selection can be based for improvement of seed cotton yield. Further, the true picture of correlation between seed cotton yield and traits is reflected from direct and indirect effects in order to perceive the most influencing characters to be utilized as selection criteria in cotton breeding programme.

The present investigation was carried out in Research Area, Department of Genetics and Plant Breeding, College of Agriculture, Dhule during *kharif*, 2011. Fifty diverse cotton genotypes selected from the germplasm were raised in a randomized block design in 3 replications. Each genotype was grown in a row of 4.5 m length. Keeping a distance of 45 cm between rows and 22.5 cm between plants. The data were recorded on 5 competitive plants selected randomly from each replication. The mean of 5 plants was used for statistical analysis. The data on the 12 parameters were recorded *viz.*, days to first flower, days to 50 per cent flowering, days to maturity, plant height (cm), monopodia/plant, sympodia/ plant, boll weight (g),bolls/ plant, Halo length (mm), Ginning percentage, 100 seed weight (g) and seed cotton yield/ plant.

The data was statistically analyzed to estimate genotypic, phenotypic correlation coefficients and path analysis using genotypic correlation coefficients. Pesual of data in

Table 1. Phenotypic (above diagonal) and genotypic (below diagonal) correlations among various yield and its attributing traits

	Days to first flowering	Days to 50 per cent flowering	Days to maturity	Plant height (cm)	Mono-podia/ plant	Sym-podia/ plant	Boll weight (g)	Bolls/ plant	Halo length (mm)	Ginning percentage	100 seed weight (g)	Seed cotton yield/ plant (g)
Days to first flowering	1	0.49**	0.12	-0.05	-0.08	-0.12	-0.07	-0.02	-0.07	0.05	-0.24 **	-0.04
Days to 50 per cent flowering	0.65**	1	0.29 **	-0.17 *	-0.02	-0.24 **	-0.11	-0.10	-0.13	-0.02	-0.13	-0.08
Days to maturity	0.20	0.44**	1	0.01	-0.12	-0.03	0.01	0.03	0.36 **	-0.17 *	-0.02	0.02
Plant height (cm)	0.11**	-0.15	0.01*	1	0.16 *	0.67 **	-0.02	0.59 **	0.37**	-0.16 *	0.05	0.51**
Monopodia/plant	-0.01	0.10**	-0.26	0.24**	1	0.17 *	0.10	0.27 **	-0.14	-0.09	-0.09	0.23**
Sympodia/plant	-0.05	-0.36	-0.16	0.90**	0.23**	1	-0.01	0.49**	0.25 **	-0.06	0.08	0.42**
Boll weight (g)	-0.19	-0.17	0.07	-0.27	0.26	-0.18	1	0.06	0.05	-0.09	0.14	0.17*
Bolls/plant	0.15	0.00	0.01	0.69**	0.55	0.61	-0.06	1	0.20 *	-0.05	-0.13	0.86**
Halo length (mm)	-0.08	-0.25	0.43**	0.44**	-0.21	0.32**	0.07	0.31**	1	-0.34 ***	0.34 **	0.18*
Ginning percentage	0.28**	-0.04	-0.31	-0.35	-0.11	-0.19	-0.12	-0.17	-0.50	1	-0.27 **	-0.08
100 seed weight (g)	-0.39	-0.28	0.03	0.04	-0.13	-0.05	0.29**	-0.25	0.42**	-0.46	1	-0.05
Seed cotton yield/plant (g)	0.12*	0.11	-0.08	0.57**	0.49**	0.48**	0.09*	0.94**	0.28**	-0.33	-0.04	1

If correlation r 0.1603 0.2097 * Significant at 5 per cent ** Significant at 1 per cent

Table 2. Direct (diagonal) and indirect (off diagonal) effects of yield components on seed cotton yield at genotypic level

	Days to first flowering	Days to 50 percent flowering	Days to maturity	Plant height (cm)	Mono-podia/ plant	Sym-podia/ plant	Boll weight (g)	Bolls/ plant	Halo length (mm)	Ginning percentage	100 seed weight (g)	Seed cotton yield/ plant (g)
Days to first flowering	**-0.06**	-0.04	-0.01	-0.01	0.00	0.00	0.01	-0.01	0.01	-0.02	0.02	0.13
Days to 50 per cent flowering	0.35	**0.54**	0.24	-0.08	0.06	-0.19	-0.09	0.00	-0.14	-0.02	-0.15	0.11
Days to maturity	-0.10	-0.21	**-0.48**	0.00	0.12	0.08	-0.03	-0.01	-0.21	0.15	-0.01	-0.08
Plant height (cm)	-0.06	0.07	0.00	**-0.48**	-0.12	-0.43	0.13	-0.33	-0.21	0.17	-0.02	0.58
Monopodia/plant	0.00	-0.06	0.14	-0.13	**-0.54**	-0.13	-0.14	-0.30	0.12	0.06	0.07	0.50
Sympodia/plant	-0.02	-0.11	-0.05	0.28	0.07	**0.31**	-0.06	0.19	0.10	-0.06	-0.02	0.49
Boll weight (g)	-0.05	-0.05	0.02	-0.07	0.07	-0.05	**0.26**	-0.02	0.02	-0.03	0.08	0.10
Bolls/plant	0.23	0.00	0.02	1.02	0.82	0.90	-0.09	**1.48**	0.47	-0.25	-0.37	0.94
Halo length (mm)	0.01	0.03	-0.05	-0.05	0.03	-0.04	-0.01	-0.04	**-0.12**	0.06	-0.05	0.29
Ginning percentage	-0.07	0.01	0.08	0.09	0.03	0.05	0.03	0.04	0.13	**-0.25**	0.12	-0.33
100 seed weight (g)	-0.12	-0.08	0.01	0.01	-0.04	-0.02	0.09	-0.08	0.13	-0.14	**0.30**	-0.04

Phenotypical Correlation Ma C:Phenotypical Correlation Ma1.0000 0.4929 *** 0.1181 -0.0461 -0.0771 -0.1240 -0.0717 -0.0230 -0

Table 1 showed that generally the correlation coefficients among the various characters at the genotypic level were greater than their corresponding phenotypic ones indicating thereby that inspite of a strong inherent association between the various traits studied, the phenotypic expression of correlation was lessened under the influence of environment. Seed cotton yield/plant had highly significant and positive correlation with its component characters *viz.*, plant height, monopodia/plant, sympodia/ plant, boll weight, bolls/plant and halo length. Therefore, by improving these characters there are possibilities of improvement in yield.These results are in conformity with earlier works of Eswara Rao *et al.,* (2009) and Mahantesh *et al.,* (2010).These attributes were interelated with each other which indicated that improvement in these traits could bring about substantial increase in seed cotton yield.Significant and positive associations were also observed between component characters themselves like plant height with monopodia/ plant, sympodia/ plant, bolls/ plant, seed cotton yield/plant and halo length which was in conformation with the finding of Batool *et al.*, (2010). Bolls/plant had significantly positive association with plant height, monopodia/plant, sympodia/ plant, seed cotton yield/ plant and halo length. Similarly boll weight is significant and positive association with seed cotton yield/ plant.

Association of various characters is the consequence direct and indirect effects of different characters. It becomes imperative to partition such association into direct and indirect effects of component character through path analysis.Path analysis (Table 2) showed that the direct effects of number of bolls/plant was found to be highly positive (1.48) on seed cotton yield. These results confirm the earlier findings of Salahuddin *et al.,* (2010). The path analysis was carried out using genotypic correlation coefficients with seed cotton yield/ plant. The residual effect (0.47) indicates that the choice of characters for path analysis are appropriate. Among the characters number of bolls/ plant (1.48) and days to 50 percent flowering (0.53) recorded high positive direct effect and its indirect effect was through plant height (1.02),sympodia/ plant (0.90), monopodia/ plant (0.82) and days to first flowering (0.35), days to maturity (0.24) respectively. Selection for high seed cotton yield seems to be possible through number of bolls/plant and days to 50 percent flowering as they exerted high positive direct effect as well as had highly positive and significant association with seed cotton yield.

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Received for publication : July 31, 2014
Accepted for publication : April 6, 2015