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Inter Relationship between Seed Cotton Yield and Yield Contributing Characters in American Cotton (*Gossypium hirsutum* L.)

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A B S T R A C T

In any selection programme the association of the yield contributing characters plays a major role for increase of the yield. Eleven intra *hirsutum* F_4 populations were raised in winter rainfed condition in Cotton Research Station, Veppanthattai during the year 2017.Single plants were selected based on biometrical traits seed cotton yield (g/plat), plant height (cm), number of monopodial branches per plant, number of sympodial branches per plant, number of bolls per plant. Among the eleven crosses the two crosses *viz.*, F 2617 x Surabhi and African I -2 x TCH 1705 -250 in which number of plants selected were higher is used to study the interrelationship The results revealed that the positive significant correlation for the plant height with seed cotton yield per plant and number of sympodial branches per plant. Path analysis revealed the highest positive direct effects for plant height and number of bolls per plant in both the crosses. The positive indirect effect for seed cotton yield was observed for number of bolls per plant. Hence selection based on the above traits will be useful in selection programme in rainfed conditions.

Introduction

In India cotton is cultivated in area of 122.35 lakh hectares with a production of 377 lakh bales (170 kg).The cotton serve as raw material for textile industries hence it is called as "White Gold". Among the four cultivated species *viz.*, Karunganni cotton (*G.arboreum* L.), Uppam cotton (*G.herbaceum* L.), American cotton (*G.hirsutum* L.) and Egyptian cotton (*G.barbadense* L the species *G.hirsutum* L. covers major area of Cotton. In Tamil Nadu major area of cotton is under rainfed condition cultivated in area of 83 thousand hectares with a share of 56.6 per cent of total area of cotton with a production of 158520 bales (170 kg). Keeping this in objective the association analysis was carried out to study the interrelationship and between seed cotton yield and other yield contributing characters in the F_4 segregating population for selection of superior genotypes suited for

rainfed condition.

Materials and Methods

The Present investigation was carried out at Cotton Research Station, Veppanthattai, Tamil Nadu Agricultural University, Tamil Nadu, India during winter rainfed condition ,2017

Eleven F_4 segregating generations were studied under winter rainfed condition to select superior plant progenies suitable for rainfed conditions. Among the eleven cross combination studied the two crosses *viz.*, F 2617 x Surabhi and African I -2 x TCH 1705 - 250 were selected for study of association analysis since the number of single plant progenies is higher for studying association analysis. Biometrical characters seed cotton yield (g) and yield contributing characters Plant height (cm), number of monopodial branches per plant, number of sympodial branches per plant, number of bolls per plant and single plant yield (g) were recorded in each generation on single plant basis for advancement. The data from single plants were used to estimate correlation co-efficient as per the method suggested by Goulden (1959) to find out the relationship between yield and its components. The significance of correlation co- efficient was tested with reference to the 't' table given by Snedecor and Cochran (1967) at (n-2) degrees of freedom.

Results and Discussion

The range of seed cotton yield varies from 68.3 g to 316.6 g in the cross F 2617 x Surabhi with mean of 222.4 g. In the cross combination African I -2 x TCH 1705 -250 the range for seed cotton yield was from 70.6 g to 380.8 g with an average of 163.3 g.

The magnitude and amount of different quantitative traits contribute to the yield can be well studied from correlation analysis. Estimates of correlation coefficients for five quantitative traits in F_4 Generation of cotton are given in the table 1.

Significant positive association of the seed cotton yield was observed with plant height (r = 0.575) and plant height had significant positive correlation (r= 0.696) with number of sympodial branches per plant in cross F2617 x Surabhi. In the cross African I -2 x TCH 1705 -250 had significant positive correlation was observed for the character plant height with number of sympodial branches per plant (r = 0.555) and number of monopodial branches per plant (r = 0.455) (Ganesan and Raveendran, 2010, Santoshkumar Pujer *et al*., 2014, Sunayana *et al.,* 2017 and Khokhar *et al.,* 2017). Positive non significant correlation for number of bolls per plant (r=0.250 and r= 0.354) with seed cotton yield per plant was observed in both the cross. (Mohamed Iquabl, (2006), Ganesan and Raveendran, (2010), Tulasi *et al.,* 2012, Santoshkumar Pujer *et al*., 2014, Bayyapu Reddy *et al.,* 2015, Sunayana *et al.,* 2017 and Monisha *et al.,* 2018). The results revealed that there was strong association between plant height, number of sympodial branches per plant and number of bolls per plant with seed cotton yield.

Portioning of the total correlation coefficient into direct and indirect effects for seed cotton yield per plant showed number of bolls per plant (0.235 and 0.286).Highest Positive direct effect (0.980) was recorded for plant height in cross F 2617 x Surabhi (Santoshkumar Pujer *et al*., 2014). In indirect effects plant height showed positive indirect effect of plant height with number of bolls per plant (0.069 and 0.088).

Table.1 Range and mean performance of the plant progenies in F_4 Plant progenies in cotton

S.No.	Cross combination	Plant height (cm)	No of Monopodial branches per plant	No of Sympodial branches per plant	No of bolls per plant	Single plant yield (g)
1.	F 2617 x Surabhi	187.8 (105 – 251)	2.1 (1- 4)	23.4 (15 – 44)	79.8 (49 -111)	222.4 (68.3 -316.6)
2..	African -I-2 x TCH 1705-250	215.0 151-284	1.6 0 -3	28.8 17 -34	97.1 29 -176	163.3 70.6 -380.8

Table.2 Correlation coefficient for seed cotton yield and yield components in F4 generation in cotton

Character	Cross	PHT	MONO	Sym	Bolls	Yield
PHT	**Cross 1**	**1.000**	0.199	0.696*	0.293	0.575*
	Cross 2		-0.091	0.555*	0.307	-0.068
Mono	**Cross 1**		**1.000**	-0.121	0.411	0.090
	Cross 2			-0.137	0.455*	0.394
Sym	**Cross 1**			**1.000**	0.265	0.175
	Cross 2				-0.015	-0.083
Bolls	**Cross 1**				**1.000**	0.250
	Cross 2					0.354

Table.3 Direct and indirect effects of different characters on seed cotton yield in F_4 generation in cotton

Character	Cross	PHT	MONO	Sym	Bolls	Correlation Yield
PHT	**Cross 1**	**0.980**	-0.054	-0.420	0.069	0.575*
	Cross 2	**-0.156**	-0.023	0.024	0.088	-0.068
MONO	**Cross 1**	0.195	**-0.274**	0.073	0.097	0.090
	Cross 2	0.014	**0.256**	-0.006	0.130	0.394
Sym	**Cross 1**	0.682	0.033	**-0.603**	0.062	0.175
	Cross 2	-0.087	-0.035	**0.043**	-0.004	-0.083
Bolls	**Cross 1**	0.287	-0.113	-0.159	**0.235**	0.250
	Cross 2	-0.048	0.117	-0.001	**0.286**	0.354
Bold Values are Direct Effects **Residue value - F 2617 x Surabhi = 0.71**						
Residue value - African I-2 x TCH 1705-250 = 0.88						

Cross 1- F 2617 x Surabhi and Cross 2 - African -I-2 x TCH 1705-250
PHT-Plant height, Mono –No. of Monopodial branches per plant, Sym-No. of sympodial branches per plant, Bolls-No. of Bolls per plant and Yield-Seed cotton yield per plant

Number of monopodial branches per plant had positive indirect effect 0.195, 0.073 and 0.097 for the plant height, number of sympodial branches per plant and number of bolls per plant respectively in the cross F 2617 x Surabhi. Number of sympodial branches per plant and number of bolls per plant recorded indirect effects of 0.682 and 0.287 in the cross F 2617 x Surabhi. Hence selection by increasing the plant height will increase the number of sympodial branches per plant and number of bolls per plant (Tulasi et al., 2102 and Santoshkumar Pujer *et al*., 2014). The residual values were 0.71 and 0.88 indicating still characters other than recorded are also contributing to yield. Therefore, Plant height, number of sympodial branches per plant followed by number of monopodial branches per plant and number of bolls per plant should be given importance in the selection programme to get higher seed cotton yield.

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