Received: 03 Aug 2023 | Revised: 05 Sep 2023 | Accepted: 06 Sep 2023

Electronic Journal of Plant Breeding

Research Article

Decoding the genetic network of F_2 population in naturally coloured cotton: variability, correlation, and path analysis

R. Nivedha[1*], S. Rajeswari[1], N. Premalatha[2] and T. Nivethitha[1]

[1] Department of Genetics and Plant Breeding, Tamil Nadu Agricultural University, Coimbatore – 641 003
[2]Department of cotton, Centre for Plant Breeding and Genetics, Tamil Nadu Agricultural University, Coimbatore – 641 003
***E-Mail:** nivedharakkimuthu@gmail.com

Abstract
In recent past, dyeing in textile industry have attained massive growth, resulting in environmental pollution. It necessitates the need for the resurrection of research interest in naturally coloured cotton. In this view, the present study was conducted in two F_2 populations derived by crossing naturally brown coloured cotton Red 5-7 and white linted cotton MCU 5 and its reciprocal at the Department of Cotton, Tamil Nadu Agricultural University during *kharif,* 2019. The phenotypic variance was higher than the genotypic variance for all traits and the magnitude of difference between PCV and GCV for five fibre quality traits was less which pointed out less environmental influence. Heritability and GAM were high for yield-related traits, such as the number of bolls per plant and seed cotton yield/plant, making them suitable targets for selection. Association studies revealed that the number of bolls/plant and boll weight were positively correlated with the seed cotton yield/plant with positive direct effect. Thus, direct selection of these traits will assist in the yield improvement programme in coloured cotton.

Keywords: colour cotton, variability, correlation, heritability, F_2 population

INTRODUCTION

India is the second largest manufacturer and exporter of cotton next to China. It has an intrinsic linkage with agriculture involving cotton as the major raw material. The discovery and use of synthetic dyes have emerged into a massive industry in the present century. In recent times, concerns about pollution and toxicity caused by synthetic dyes and dyeing industries have resurrected the interest in naturally coloured cotton. The fibres of naturally coloured cotton are short, coarse and weak compared to white fibres. To re-establish the commercial cultivation of naturally coloured cotton, hybridization with superior white-linted cultivars followed by selection in the segregating generation and further stabilization would offer a better choice of breeding. The magnitude of genetic variability of the desirable trait governs the selection exercise in the population. Since yield depends on other characters, the knowledge of association among different traits aid in better selection. By comparing GCV and PCV, the cause of variation in the population under study could be understood to implement efficacious selection. Heritability corresponds to the breeding value of the particular phenotype. But it alone cannot provide information on genetic progress of selection (Ahmed *et al.,* 2006). The genetic advance is the response to selection which indicates the improvement in progeny compared to parent. High heritability coupled with high genetic advance indicates additive gene effect promoting selection. The association of colour and fibre quality along with seed cotton yield/plant traits help in understanding the relationship to improve the quality of naturally coloured cotton genotypes. The present study aimed to bring out the genetic parameters and association analysis of yield and fibre quality traits in

segregating populations of naturally coloured cotton to enable efficient identification of the traits to be considered for selection.

MATERIALS AND METHODS

The study was conducted during *kharif,* 2019 under irrigated condition at Department of Cotton, Tamil Nadu Agricultural University. The research material comprised of two F_2 populations of the cross between naturally coloured cotton Red 5-7 and white linted cotton MCU 5 and its reciprocal cross. The aim of crossing was to transfer the fibre quality from white cotton to naturally coloured cotton. Those plants which possessed coloured lint in the first generation (F_1) were forwarded to F_2 generation. In case of parents, observations were recorded in five randomly selected plants. The agronomical and plant protection measures were carried out from sowing to harvest as per the standard recommendation.

A total of 11 biometrical traits were recorded in all the plants of each cross in the segregating generation, while in parents, observations were recorded on five randomly selected plants . The lint sample obtained from individual plants of the segregating generation were tested for fibre quality in High Volume Instrument (User Model: HVC Classic 900) at Department of Cotton, Tamil Nadu Agricultural University, Coimbatore. In case of parents, the pooled lint from five randomly selected plants was used for the determination of quality.

Genotypic and phenotypic variances, genotypic and phenotypic co-efficient of variability, heritability and genetic advance were calculated for the observed characters as per the method suggested by Singh and Choudary (1985). The range of PCV and GCV were classified as suggested by Sivasubramanian and Madhavamenon (1973). The PCV and GCV were considered to be low if the values were less than 10%, moderate if 10-20% and high if more than 20%. Heritability and Genetic Advance as per cent of mean were classified as suggested by Johnson *et al.,* (1955). For heritability, less than 30% was considered as low, 30-60% was considered as moderate and more than 60% implied high heritability. Genetic advance as per cent of mean was classified as low, moderate and high if the values were, less than 10%, 10-20% and more than 20% respectively. The simple correlation coefficients were calculated based on the formula proposed by Falconer and Mackay (1996). The correlation and path analysis were done using the software SPSS 16.0.

RESULTS AND DISCUSSION

The mean values of yield and fibre quality traits of parents are furnished in **Table 1**. The *per se* performance of parents revealed that MCU 5 was observed to record the maximum value for plant height, number of sympodia/ plant, seed index, chlorophyll index and fibre quality traits like upper half mean length, uniformity ratio, bundle strength and elongation per cent. The highest average for the number of monopodia/plant and number of seeds/boll were recorded in the parent Red 5-7. Among the crosses, the cross MCU 5 x Red 5-7 produced the highest average for number of monopodia/plant, number of seeds/boll and also the finest fibres (2.98 µg/inch). The plants with the highest uniformity ratio were observed in the cross Red 5-7 x MCU 5. The study on genetic parameters revealed that the value of phenotypic variance was larger than genotypic variance for all the traits (Bhatti *et al*., 2020). But there existed a little difference between PCV and GCV for quality traits like upper half mean length, uniformity ratio, bundle strength, elongation per cent and fibre fineness indicating less environmental influence on the expression of these traits .

Table 1. Mean data of Parents for yield and fibre quality traits

Traits	Red 5-7	MCU 5
Plant height (cm)	91.4	103
Number of monopodia/plant	1.4	1
Number of sympodia/plant	12.4	18.6
Number of bolls/plant	19.2	14
Boll weight(g)	3.73	3.65
Number of seeds/boll	28	26.44
Seed cotton yield/plant (g)	45.04	44.34
Lint index (g)	3.15	3.94
Seed index (g)	8.59	9.37
Ginning outturn (%)	27	29.61
Upper Half Mean Length (mm)	28.38	31.54
Uniformity ratio (%)	80.94	83.04
Bundle strength (g/tex)	25.28	29.76
Elongation per cent	5.68	6
Fibre fineness (µg/inch)	2.84	3.2
Chlorophyll index	42.24	42.6

https://doi.org/10.37992/2023.1403.129

Table 2. Genetic parameters for yield and fibre quality traits in Red 5-7 x MCU 5 and its reciprocal cross

Traits	Mean		Range		PCV		GCV		Heritability (%)		Genetic Advance as per cent of mean	
	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2	C1	C2
Plant height (cm)	93.93	95.89	40 - 150	50 - 150	22.39	18.86	17.5	12.99	61.13	47.44	28.19	18.43
Number of monopodia/plant	0.75	0.77	0 - 3	0 - 4	116.98	113.69	47.67	44.17	16.61	15.09	40.02	35.35
Number of sympodia/plant	15.17	15.24	4 - 23	5 - 23	28.51	23.5	20.22	12.31	50.29	27.44	29.53	13.28
Number of bolls/plant	15.32	17.63	5.0 - 27	6.0 - 30	26.95	24.07	24.38	21.9	81.82	82.78	45.42	41.04
Boll weight(g)	3.35	3.99	2.35 - 5.17	2.85 - 5.91	16.54	16.04	12.13	12.96	53.79	65.31	18.33	21.58
Number of seeds/boll	25.47	27.77	17 - 31	20 - 31	10.8	7.01	9.11	4.57	71.15	42.44	15.83	6.13
Seed cotton yield/plant (g)	41.85	57.98	13.26 - 93	13.75 - 143	38.54	36.87	34.52	34.73	80.25	88.76	63.71	67.41
Lint index (g)	3.56	3.86	2.07 - 6.97	2.25 - 5.96	21.47	17.07	19.09	14.46	79.06	71.8	34.97	25.24
Seed index (g)	9.89	10.47	5.55 - 15.37	7.39 - 15.98	15.53	11.67	13.2	8.75	72.29	56.23	23.13	13.51
Ginning outturn (%)	26.54	26.95	14.61 - 38.66	19.38 - 35.87	16.11	13.69	14.65	12	82.73	76.82	27.45	21.67
Upper Half Mean Length (mm)	27.69	28.39	22.4 - 31.2	23.6 - 33.3	5.64	5.92	5.5	5.8	95.18	95.85	11.06	11.7
Uniformity ratio (%)	82.13	82.74	78.60 - 86.30	80.2 - 85.5	1.59	1.31	1.53	1.24	92.47	89.22	3.02	2.42
Bundle strength (g/tex)	26.72	27.77	23.90 - 31.40	24.00 - 33.30	5.45	6.6	4.66	6.01	73.33	83.16	8.23	11.3
Elongation per cent	5.82	5.87	5.00 - 6.00	5.60 - 6.10	2.48	2.2	1.91	1.55	59.33	49.23	3.04	2.23
Fibre fineness (µg/inch)	3.17	2.98	2.06 - 5.02	2.06 - 4.79	18.08	17.29	17.94	17.12	98.46	98.1	36.66	34.94
Chlorophyll index	36.84	39.84	30.10 – 49.5	30 – 49.8	12.74	11.94	3.91	6.25	9.4	27.35	2.47	6.37

C1 Red 5-7 x MCU5

C2 MCU5 x Red 5-7

Heritability and GAM: The yield traits *viz.,* number of bolls/plant (Abdelmoghny *et al*., 2021), seed cotton yield per plant, lint index, ginning outturn and the quality trait *viz*., fibre fineness showed high heritability coupled with high genetic advance as per cent of mean (**Table 2**) These were in agreement with the findings of Jogender *et al*. (2023), Gnanasekaran *et al.* (2018) and Nandhini *et al.* (2019). Among the traits with high heritability and high GAM, high PCV and GCV were recorded by number of bolls/plant and seed cotton yield per plant. Moderate PCV and GCV were recorded by lint index (Iqbal *et al*., 2023), ginning outturn and fibre fineness. Similar results of high variability for number of bolls/plant and seed cotton yield per plant were reported by Krishnan *et al*. (2023) and Hampannavar *et al*. (2020). This suggestes that these traits could be controlled by additive gene action and therefore they could produce high response to selection. Hence these crosses can be further exploited for selection of superior lines with coloured fibre.

Fibre quality traits *viz.,* upper half mean length showed moderate GAM coupled with high heritability implying the involvement of both additive and non-additive gene action whereas bundle strength, uniformity ratio and elongation per cent recorded low GAM coupled with high heritability indicating the presence of non-additive gene action and therefore selection is not useful for these traits.

Association analysis: Correlation : The simple correlation coefficients were calculated for all the observed traits including fibre quality parameters to identify the significant positively correlated traits with yield and the inter correlation among other components in order to choose the traits to be considered for selection in segregating populations (**Table 1 and Table 2**). There existed a highly significant positive correlation between number of bolls/ plant, number of seeds/boll and boll weight on one hand and seed cotton yield/plant on the other hand for both the crosses. This was in accordance with the results reported by Sahar *et al.,* 2021 and Manonmani *et al*., 2019. In Red 5-7 x MCU 5 cross, number of sympodia/plant had highly significant positive association with seed cotton yield. In the cross MCU 5 x Red 5-7, seed index (0.221) was observed to record significantly positive correlation while lint index (0.161) was observed to register positive correlation with seed cotton yield/plant. In Red 5-7 x MCU 5, the upper half mean length (0.147) and bundle strength (0.170) were significant and positively correlated with seed cotton yield/ plant and uniformity ratio (0.178) was highly significantly correlated in positive direction with seed cotton yield/plant in the same cross. The selection based on the above-mentioned traits could be taken into consideration for improving the yield of the population.

The study of inter correlation within the traits in both the crosses revealed that, plant height was highly significant

Table 3. Simple correlation coefficients for observed traits and quality parameters in Red 5-7 x MCU 5

Traits	PH	NMP	NSP	NBP	BW	NSB	LI	SI	GOT	CI	UHML	UR	BS	EP	FF	SCYP
PH	**1.00**	0.135*	0.860**	0.448**	0.056	-0.004	0.079	0.114	-0.026	0.293**	0.193**	0.046	0.193**	0.141*	-0.032	0.329**
NMP		**1.00**	0.139*	-0.002	-0.027	0.013	-0.060	-0.106	0.024	-0.067	0.035	0.070	-0.009	-0.034	0.033	-0.047
NSP			**1.00**	0.489**	0.071	0.016	0.131	0.200**	-0.039	0.332**	0.203**	0.061	0.222**	0.141*	-0.074	0.345**
NBP				**1.00**	0.194**	0.234**	0.142*	0.231**	-0.046	0.733**	0.145*	0.131	0.208**	0.132	-0.088	0.764**
BW					**1.00**	0.379**	0.363**	0.147*	0.209**	0.589**	0.073	0.161*	0.065	0.016	-0.089	0.619**
NSB						**1.00**	0.009	-0.169*	0.128	0.385**	0.024	0.016	0.047	0.017	-0.055	0.414**
LI							**1.00**	0.291**	0.701**	0.245**	0.095	0.199**	0.143*	0.011	0.185**	0.216**
SI								**1.00**	-0.467**	0.190**	0.102	0.034	0.108	0.058	-0.012	0.187**
GOT									**1.00**	0.076	-0.009	0.138*	0.041	-0.050	0.179**	0.048
CI										**1.00**	0.137*	0.158*	0.170*	0.139*	-0.112	0.929**
UHML											**1.00**	0.532**	0.829**	0.303**	-0.251**	0.147*
UR												**1.00**	0.563**	0.283**	-0.247**	0.178**
BS													**1.00**	0.391**	-0.303**	0.170*
EP														**1.00**	-0.109	0.112
FF															**1.00**	-0.128
SCYP																**1.00**

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

PH - Plant height
NMP - No of monopodia/plant
NSP - No of sympodia/plant
NBP - No of bolls/plant
BW - Boll weight
NSB - No of seeds/boll
SCYP - Seed cotton yield/plant
LI - Lint index
SI - Seed index
GOT - Ginning outturn
UHML - Upper Half Mean Length
UR - Uniformity ratio
BS - Bundle strength
EP - Elongation per cent
FF - Fibre fineness
CI - Chlorophyll index

and positively associated with number of monopodia/plant and number of sympodia/plant (Thiyagu *et al*., 2010). The intercorrelation between number of sympodia/plant and number of bolls/plant was positive and highly significant. The trait number of bolls/plant was positively correlated with boll weight and number of seeds/boll. There existed a highly significant negative association between seed index and ginning outturn in both direct and reciprocal crosses.

In the case of fibre quality, highly significant positive association was observed between upper half mean length and bundle strength (0.170), uniformity ratio (0.532) and elongation percent (0.303) in Red5-7 x MCU5. In the same cross, fibre fineness has highly significant negative association with Upper Half Mean Length (-0.251), uniformity ratio (-0.247) and bundle strength (-0.303). In both the crosses, bundle strength and elongation percent were positively correlated. Altogether on considering both the crosses, a significant positive correlation existed between number of bolls/ plant and number of seeds/bolls. Lint index was positively correlated with ginning outturn. The fibre quality trait upper half mean length showed a highly significant correlation in positive direction with bundle strength and uniformity ratio. Bundle strength exhibited a significant positive association with elongation per cent. Similar association of ginning outturn with lint index was reported by Kumar *et al.,* 2019.

Path analysis: In path analysis, the residual effect of 0.3018 indicates that the traits considered for the study contributed to the maximum variations (70%) in seed cotton yield/plant. Boll weight showed positive direct effect on seed cotton yield in both Red 5-7 x MCU 5 (0.2165) and MCU 5 x Red 5-7 (0.2369). The number of bolls/plant recorded positive direct effect in Red 5-7 x MCU 5 (0.2898) and low effect in the reciprocal cross. Similar findings for direct effect of number of bolls/plant on seed cotton yield was reported by Subalakhshmi *et al*., 2023 and Manonmani *et al*., 2019. In the cross Red 5-7 x MCU 5, the direct negative effect of the positively correlated trait, number of sympodia/plant is low and therefore the magnitude of its effect on yield is negligible. In MCU 5 x Red 5-7, the bundle strength showed low positive direct effect (0.1416) and lint index recorded high negative direct effect (-0.4970). Other fibre quality traits had negligible effects on seed cotton yield/plant in both the crosses. From path analysis, it is evident that selection based on number of bolls/plant and boll weight could be encouraged in segregating generations.

Based on the study of variability and genetic parameters, traits with maximum variability (high PCV and GCV) couple with maximum heritability and Genetic Advance as per cent of mean were number of bolls/plant and seed cotton yield per plant. Association study and path analysis revealed the existence of positive correlation and direct effect between number of bolls/plant, number

Table 4. Simple correlation coefficients for observed traits and quality parameters in MCU 5 x Red 5-7

Traits	PH	NMP	NSP	NBP	BW	NSB	LI	SI	GOT	CI	UHML	UR	BS	EP	FF	SCYP
PH	**1.00**	0.259**	0.758**	0.173*	0.019	-0.085	0.106	0.024	0.067	-0.041	-0.120	-0.015	-0.003	-0.019	-0.274**	0.050
NMP		**1.00**	0.180**	0.052	0.020	0.058	0.042	0.007	0.044	0.002	-0.040	0.023	-0.061	-0.020	-0.148*	0.051
NSP			**1.00**	0.188**	-0.098	-0.137	0.078	0.116	-0.003	-0.024	-0.113	-0.043	0.000	-0.045	-0.278**	0.021
NBP				**1.00**	0.254**	0.176*	0.105	0.101	0.007	0.599**	0.030	-0.030	0.049	0.074	-0.027	0.644**
BW					**1.00**	0.232**	0.355**	0.179*	0.184**	0.460**	0.128	0.163*	0.060	0.146*	0.072	0.578**
NSB						**1.00**	0.017	0.026	-0.005	0.224**	0.072	0.120	0.081	0.018	0.058	0.203**
LI							**1.00**	0.159*	0.791**	0.092	0.226**	0.264**	0.214**	0.204**	-0.020	0.161*
SI								**1.00**	-0.468**	0.227**	0.204**	0.166*	0.265**	-0.021	-0.069	0.221**
GOT									**1.00**	-0.073	0.068	0.126	0.005	0.188**	0.014	-0.009
CI										**1.00**	0.063	0.007	0.083	0.067	-0.037	0.897**
UHML											**1.00**	0.231**	0.814**	0.133	-0.043	0.078
UR												**1.00**	0.326**	0.115	0.023	0.027
BS													**1.00**	0.178*	-0.102	0.116
EP														**1.00**	0.135	0.141*
FF															**1.00**	-0.018
SCYP																**1.00**

**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

PH - Plant height
NMP - No of monopodia/plant
NSP - No of sympodia/plant
NBP - No of bolls/plant
BW - Boll weight
NSB - No of seeds/boll
SCYP - Seed cotton yield/plant
LI - Lint index
SI - Seed index
GOT - Ginning outturn
UHML - Upper Half Mean Length
UR - Uniformity ratio
BS - Bundle strength
EP - Elongation per cent
FF - Fibre fineness
CI - Chlorophyll index

https://doi.org/10.37992/2023.1403.129

Table 5. Path Coefficients displaying direct and indirect effects of yield and quality parameters on seed cotton yield in Red 5-7 x MCU 5

Traits	PH	NMP	NSP	NBP	BW	NSB	LI	SI	GOT	CI	UHML	UR	BS	EP	FF	SCYP
PH	**0.0784**	-0.0014	-0.0545	0.1297	0.0121	-0.0002	0.0024	-0.0068	0.0022	0.1692	0.0042	0.0014	-0.0058	-0.0026	0.0002	0.3286
NMP	0.0106	**-0.0101**	-0.0088	-0.0005	-0.0058	0.0006	-0.0018	0.0063	-0.0021	-0.0387	0.0008	0.0022	0.0003	0.0006	-0.0002	-0.0467
NSP	0.0674	-0.0014	**-0.0634**	0.1417	0.0154	0.0007	0.0040	-0.0119	0.0034	0.1917	0.0044	0.0019	-0.0067	-0.0026	0.0005	0.3452
NBP	0.0351	0.0000	-0.031	**0.2898**	0.0419	0.0104	0.0043	-0.0138	0.0039	0.4241	0.0032	0.0040	-0.0062	-0.0024	0.0006	0.7639
BW	0.0044	0.0003	-0.0045	0.0561	**0.2165**	0.0168	0.0111	-0.0088	-0.0179	0.3406	0.0016	0.0049	-0.0019	-0.0003	0.0006	0.6194
NSB	-0.0003	-0.0001	-0.001	0.0679	0.0821	**0.0444**	0.0003	0.0101	-0.0110	0.2224	0.0005	0.0005	-0.0014	-0.0003	0.0004	0.4145
LI	0.0062	0.0006	-0.0083	0.0411	0.0786	0.0004	**0.0305**	-0.0174	-0.0600	0.1417	0.0021	0.0061	-0.0043	-0.0002	-0.0013	0.2158
SI	0.0089	0.0011	-0.0126	0.0670	0.0319	-0.0075	0.0089	**-0.0597**	0.0400	0.1100	0.0022	0.0010	-0.0032	-0.0011	0.0001	0.1869
GOT	-0.0020	-0.0002	0.0025	-0.0133	0.0453	0.0057	0.0213	0.0279	**-0.0857**	0.0437	-0.0002	0.0042	-0.0012	0.0009	-0.0012	0.0477
CI	0.0229	0.0007	-0.0210	0.2125	0.1275	0.0171	0.0075	-0.0114	-0.0065	**0.5783**	0.0030	0.0049	-0.0051	-0.0025	0.0008	0.9286
UHML	0.0151	-0.0004	-0.0129	0.0420	0.0159	0.0011	0.0029	-0.0061	0.0008	0.0794	**0.0218**	0.0164	-0.0249	-0.0056	0.0017	0.1472
UR	0.0036	-0.0007	-0.0039	0.0378	0.0348	0.0007	0.0061	-0.0020	-0.0118	0.0915	0.0116	**0.0308**	-0.0169	-0.0052	0.0017	0.1780
BS	0.0151	0.0001	-0.0141	0.0604	0.0140	0.0021	0.0043	-0.0065	-0.0035	0.0981	0.0181	0.0173	**-0.0300**	-0.0072	0.0021	0.1705
EP	0.0111	0.0003	-0.0089	0.0384	0.0034	0.0008	0.0003	-0.0035	0.0043	0.0801	0.0066	0.0087	-0.0117	**-0.0184**	0.0008	0.1122
FF	-0.0025	-0.0003	0.0047	-0.0256	-0.0193	-0.0024	0.0056	0.0007	-0.0154	-0.0645	-0.0055	-0.0076	0.0091	0.0020	**-0.0069**	-0.1278

Residue = 0.3018

PH - Plant height
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NSP - No of sympodia/plant
NBP - No of bolls/plant
BW - Boll weight
NSB - No of seeds/boll
SCYP - Seed cotton yield/plant
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Table 6. Path Coefficients displaying direct and indirect effects of yield and quality parameters on seed cotton yield in MCU 5 x Red 5-7

Character	PH	NMP	NSP	NBP	BW	NSB	LI	SI	GOT	CI	UHML	UR	BS	EP	FF	SCYP
PH	**0.0593**	0.0083	-0.0236	0.0302	0.0046	0.0035	-0.0528	0.0079	0.0358	-0.0285	0.0119	0.0004	-0.0004	-0.0008	-0.0054	0.0504
NMP	0.0154	**0.0319**	-0.0056	0.0091	0.0047	-0.0024	-0.0207	0.0023	0.0237	0.0014	0.0040	-0.0006	-0.0086	-0.0008	-0.0029	0.0508
NSP	0.0449	0.0057	**-0.0312**	0.0330	-0.0232	0.0055	-0.0390	0.0379	-0.0017	-0.0165	0.0112	0.0012	0.0001	-0.0019	-0.0055	0.0207
NBP	0.0102	0.0017	-0.0059	**0.1751**	0.0602	-0.0071	-0.0521	0.0328	0.0035	0.4181	-0.0030	0.0008	0.0070	0.0032	-0.0005	0.6440
BW	0.0012	0.0006	0.0030	0.0445	**0.2369**	-0.0094	-0.1762	0.0583	0.0993	0.3208	-0.0127	-0.0044	0.0085	0.0063	0.0014	0.5782
NSB	-0.0051	0.0019	0.0043	0.0309	0.0550	**-0.0405**	-0.0085	0.0084	-0.0027	0.1562	-0.0072	-0.0032	0.0114	0.0008	0.0011	0.2028
LI	0.0063	0.0013	-0.0024	0.0184	0.0840	-0.0007	**-0.4970**	0.0519	0.4258	0.0641	-0.0224	-0.0071	0.0303	0.0088	-0.0004	0.1609
SI	0.0014	0.0002	-0.0036	0.0176	0.0424	-0.0010	-0.0791	**0.3262**	-0.2522	0.1582	-0.0202	-0.0045	0.0376	-0.0009	-0.0014	0.2208
GOT	0.0039	0.0014	0.0001	0.0012	0.0437	0.0002	-0.3931	-0.1528	**0.5384**	-0.0511	-0.0068	-0.0034	0.0007	0.0081	0.0003	-0.0092
CI	-0.0024	0.0001	0.0007	0.1050	0.1090	-0.0091	-0.0457	0.0740	-0.0395	**0.6975**	-0.0062	-0.0002	0.0118	0.0029	-0.0007	0.8971
UHML	-0.0071	-0.0013	0.0035	0.0053	0.0304	-0.0029	-0.1122	0.0664	0.0369	0.0439	**-0.0993**	-0.0062	0.1153	0.0058	-0.0009	0.0776
UR	-0.0009	0.0007	0.0014	-0.0052	0.0386	-0.0049	-0.1311	0.0543	0.0677	0.0046	-0.0229	**-0.0269**	0.0461	0.0049	0.0004	0.0270
BS	-0.0002	-0.0019	0.0000	0.0086	0.0142	-0.0033	-0.1063	0.0866	0.0026	0.0580	-0.0808	-0.0088	**0.1416**	0.0077	-0.002	0.1161
EP	-0.0011	-0.0006	0.0014	0.0129	0.0346	-0.0007	-0.1011	-0.0067	0.1013	0.0465	-0.0132	-0.0031	0.0252	**0.0432**	0.0027	0.1411
FF	-0.0162	-0.0047	0.0086	-0.0048	0.0171	-0.0024	0.0102	-0.0226	0.0075	-0.0257	0.0043	-0.0006	-0.0144	0.0058	**0.0197**	-0.0181

Residue = 0.3577

PH - Plant height
NMP - No of monopodia/plant
NSP - No of sympodia/plant
NBP - No of bolls/plant
BW - Boll weight
NSB - No of seeds/boll
SCYP - Seed cotton yield/plant
LI - Lint index
SI - Seed index
GOT - Ginning outturn
UHML - Upper Half Mean Length
UR - Uniformity ratio
BS - Bundle strength
EP - Elongation per cent
FF - Fibre fineness
CI - Chlorophyll index

of sympodia/plant and boll weight with the seed cotton yield/plant. Hence, selection can be effected based on these attributes for improving the yield and quality of the crop. Regarding fibre quality, although few traits showed significant positive corelation with seed cotton yield/ plant, their direct effect on the dependent trait is low. This emphasizes, that direct selection for fibre quality traits is not appreciable in yield improvement programme.

ACKNOWLEDGEMENT

The first author is thankful to the Department of Cotton, Tamil Nadu Agricultural University for lending all the facilities to carry out successful research.

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