CORRELATION AND PATH COEFFICIENT ANALYSIS IN UPLAND COTTON (G*ossypium hirsutum* L.)

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ABSTRACT

Correlation and path coefficient analysis for yield and yield contributing characters in upland cotton were carried with 55 genotypes (45 F_1s and 10 parents) of cotton for seventeen characters in three locations *i.e.* Regional Agricultural Research Station, Lam, Guntur, Agricultural Research Station, Jangamaheswarapuram and Agricultural Research Station, Darsi, Andhra Pradesh. Analysis of pooled data from three locations showed the character association. The plant height, number of sympodia plant^{-1}, number of bolls plant^{-1}, boll weight, seed index, lint index, micronaire value (10^{-6}g/inch) and lint yield plant^{-1} were found to have significant positive association with seed cotton yield plant^{-1} at both phenotypic and genotypic levels. The path analysis indicated that the number of bolls plant^{-1}, boll weight (g), seed index and lint yield plant^{-1} (g) showed direct positive effects and significant positive correlation with seed cotton yield plant^{-1} (g) revealing that due weightage should be given in selection process with more number of bolls plant^{-1} and more boll weight and there should be economic balance among these traits to get higher seed cotton yield plant^{-1}.

Cotton (*Gossypium hirsutum* L.) is an important commercial crop of India, where it is being grown over an area of 126.55 lakh ha with an annual production of 400 lakh bales (1 bale=170 kgs of lint) with a productivity of 537 kg/ha (AICCIP Annual Report, 2015). Yield is a polygenically inherited character resulting from multiplicative interaction of its contributing characters. It is highly influenced by the environment, hence selection based on yield alone may limit the progress, where as the yield component characters are less complex in inheritance and are influenced by the environment to a lesser extent. Genetic correlation measures the magnitude of cause-effect relationship between various plant characters that determines the component characters on which selection can be made for improvement in yield. Further, path coefficient analysis, which splits the correlation coefficients, provides precise information on the direct and indirect effects in order to perceive the most influencing characters to be utilized as selection criteria in cotton breeding programme. Asha *et al.* (2015) reported that correlation studies indicated plant height, sympodia and bolls/plant, boll weight, bundle strength and fibre elongation recorded significant positive association with seed cotton yield/ plant. Path analysis revealed high positive direct effect of monopodia, sympodia, inter boll distance, boll and lint index on seed cotton yield (Chitti *et al.*, 2014). Both the correlation and path coefficient analysis form a basis for selection and also helps in understanding those yield components affecting yield improvement through the study of their direct and indirect effects.

MATERIAL AND METHODS

The present study was conducted during *kharif*, 2013-14 in randomized block design with 55 genotypes (45 F_1s and 10 parents) with three replications following 120 x 60 cm spacing in three locations *i.e.* Regional Agricultural Research Station, Lam, Guntur; Agricultural Research Station, Jangamaheswarapuram; and Agricultural Research Station, Darsi, Andhra Pradesh. Recommended doses of fertilizers 120 N, 60 P_2O_5 and 40 K_2O kg/ha were applied in split doses. Each plot consisted of three rows of 6 m length and observations were recorded on five randomly selected plants from each genotype per replication for 10 characters *viz.*, plant height (cm),

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Table 1. Analysis of variance over environments (pooled) in cotton during *kharif*, 2013-14

Source	d f	Days to 50% flowering	Plant height (cm)	No. of monopodia plant⁻¹	No. of sympodia plant⁻¹	No. of bolls plant⁻¹	Boll weight (g)	Relative chlorophyll content	Seed index (g)	Lint index (g)
Replications	2	5.39	159.89	0.07	0.97	16.24	0.03	0.05	0.33	0.00
Locations	2	58.44**	27224.59**	5.09**	261.14**	4534.32**	117.56**	0.15**	168.61**	86.68**
Interactions	4	1.28	52.32	0.15*	2.20	6.06	0.04	0.00	0.03	0.05
Overall Sum	8	16.60**	6872.28**	1.36**	66.63**	1140.67**	29.42**	0.05**	42.25**	21.70**
Treatments	54	78.73**	143.57**	0.05	5.50**	39.97**	0.86**	0.02**	12.43**	2.30**
Error	432	1.16	85.24	0.05	2.41	11.78	0.21	0.01	2.58	0.44

Source	d f	Ginning out turn (%)	2.5% span length (mm)	Micronaire value (10⁻⁶ g/inch)	Bundle strength (g/tex)	Uniformity ratio	Elongation (%)	Seed cotton yield plant⁻¹ (g)	Lint yield plant⁻¹ (g)
Replications	2	0.64	2.12	0.01	1.76	6.96	0.01	185.30	8.99
Locations	2	157.97**	62.47**	6.26**	0.19	119.09**	0.04	348887.50**	42201.89**
Interactions	4	0.57	2.40	0.06	2.17	0.71	0.02	175.92	30.93
Overall Sum	8	39.93**	17.34**	1.60**	1.57	31.87**	0.05	87356.16**	10568.18**
Treatments	54	23.57**	18.45**	0.93**	7.84**	14.35**	0.11**	2510.85**	331.03**
Error	432	8.25	4.10	0.20	1.70	3.07	0.03	631.96	81.06

** Significant at 1 % level   * Significant at 5 % level

Note :

Table 2. Phenotypic (above diagonal) and genotypic (below diagonal) correlation coefficients for seed yield and yield traits of cotton over three environments (pooled) during *kharif*, 2013-14

Character	Days to 50% flowering	Plant height	No. of monopodia a plant⁻¹	No. of sympodia plant⁻¹	No. of bolls plant⁻¹	Boll weight	Relative chlorophyll content	Seed index
Days to 50 % flowering	---	0.0156	0.0432	-0.0037	0.0845	-0.1028	0.0520	-0.0748
Plant height	0.1027*	---	0.1370**	0.3350**	0.1305**	0.0837	-0.0335	0.1263**
No. of monopodia plant⁻¹	-0.6991	-2.3733	---	0.0643	0.0288	-0.0559	-0.0370	-0.0435
No. of sympodia plant⁻¹	-0.0064	1.0346**	3.2397***	---	0.1620**	-0.0031	-0.0850	0.0631
No. of bolls plant⁻¹	0.1884**	0.5280**	1.8031**	0.6804**	---	0.0859	-0.0992	-0.0227
Boll weight	-0.2062	0.3690**	-4.2668	0.2370**	0.3802**	---	-0.0481	0.1766**
Relative chlorophyll content	0.1913**	-0.2866	-2.4301	-0.2935	-0.2698	-0.1654	---	-0.1199
Seed index	-0.1046	0.4821**	0.7074**	0.4296**	0.1310**	0.2714**	-0.3877	---
Lint index	-0.2344	0.4144**	-0.1932	0.3815**	0.1616**	0.1393**	-0.5175	0.8378**
Ginning out turn	-0.1154	-0.0451	-1.9335	-0.0249	0.0904*	-0.3170	-0.0374	-0.4593
2.5% span length	0.2160**	-0.2571	0.4757***	-0.1313	-0.1072	0.0434	0.2856**	-0.0660
Micronaire value	-0.1422	0.3202**	1.8363**	0.3648**	0.4445**	0.0166	-0.4931	0.2960**
Bundle strength	0.3815**	-0.0253	-1.4447	0.0119	0.1753**	0.2140**	0.1883**	0.0222
Uniformity ratio	0.1512**	0.2558**	-0.0639	0.0881*	0.4941**	-0.0263	-0.0946	-0.0689
Elongation	0.2742**	0.2232**	-0.1700	0.2058**	0.7601**	-0.0178	-0.0282	-0.0522
Lint yield plant⁻¹	-0.1265	0.4511**	-1.8649	0.5048**	0.7856**	0.7064**	-0.2509	0.0827
Seed cotton yield plant⁻¹ (P)	-0.0408	0.1365**	-0.0334	0.0924*	0.6508**	0.7359**	-0.0956	0.1009*
Seed cotton yield plant⁻¹ (G)	-0.0663	0.5526**	-1.7329	0.5456**	0.7995**	0.8844**	-0.2247	0.2706**

Character	Lint index	Ginning out turn	2.5% span length	Micronaire value	Bundle strength	Uniformity ratio	Elongation	Lint yield plant^{-1}
Days to 50 % flowering	-0.1414	-0.0461	0.1135*	-0.0676	0.1823**	0.0628	0.1338**	-0.0647
Plant height	0.0863	-0.0417	-0.1055	0.1493**	-0.0673	0.0800	0.0161	0.1024*
No. of monopodia plant^{-1}	-0.0434	-0.0018	-0.0420	0.0313	0.0429	0.0641	0.0584	-0.0352
No. of sympodia plant^{-1}	0.0575	-0.0256	-0.0572	0.2048**	-0.0878	0.1291**	0.0424	0.1071*
No. of bolls plant^{-1}	0.0531	0.0868	-0.1282	0.2404**	-0.0801	0.1280**	0.1370**	0.6484**
Boll weight	0.1269**	-0.0592	0.0340	0.0620	0.0367	-0.1361	-0.1016	0.6080**
Relative chlorophyll content	-0.1288	0.0173	0.1086*	-0.1103	0.1226**	-0.0121	-0.0197	-0.0621
Seed index	0.7235**	-0.4584	0.0446	0.2106**	0.0721	-0.0896	-0.0231	-0.1296
Lint index	---	0.2032**	-0.0735	0.2853**	-0.0596	-0.0111	0.0459	0.1934**
Ginning out turn	0.0370	---	-0.1303	-0.0213	-0.1441	0.0406	0.0702	0.4316**
2.5% span length	-0.2713	-0.2080	---	-0.4027	0.5865**	-0.3734	-0.1023	-0.1443
Micronaire value	0.3447**	-0.1033	-0.6894	---	-0.3188	0.3109**	0.2703**	0.1824**
Bundle strength	-0.1315	-0.1889	0.8655**	-0.5116	---	-0.2632	0.1165**	-0.1185
Uniformity ratio	0.1122*	0.2318**	-0.7888	0.6775**	-0.4296	---	0.2474**	0.0515
Elongation	0.0498	0.1042*	-0.2491	0.4693**	0.2590**	0.6555**	---	0.0397
Lint yield plant^{-1}	0.2443**	0.2091**	-0.2038	0.2481**	0.0559	0.3799**	0.4531**	---
Seed cotton yield plant^{-1} (P)	0.1104*	0.0094	-0.0258	0.1576**	0.0032	-0.0352	0.0080	0.8297**
Seed cotton yield plant^{-1} (G)	0.1785**	-0.1940	-0.0401	0.2473**	0.2351**	0.2465**	0.3992**	0.9096**

*significant at 5% level   **significant at 1% level

no. of monopodia plant[-1], no. of sympodia plant[-1], no. of bolls plant[-1], boll weight (g), relative chlorophyll content, seed index (g), lint index (g), seed cotton yield plant[-1] (g) and lint yield plant[-1] (g). The data on days to 50% flowering, ginning out turn (%), 2.5% span length (mm), micronaire value (10^{-6}g/inch), 0bundle strength (g/tex), uniformity ratio and elongation (%) were recorded on plot basis. The fibre quality parameters were studied at Central Institute for Research on Cotton Technology (CIRCOT), RARS, Lam, Guntur, Andhra Pradesh. The data was statistically analysed to estimate genotypic and phenotypic correlation coefficients (Falconer, 1964) and path coefficient analysis (Dewey and Lu, 1959).

RESULTS AND DISCUSSION

The analysis of variance indicated significant differences among the genotypes for all the characters (Table 1.). Genotypic correlation coefficients in general were higher than phenotypic correlation coefficients (Table 2.). Seed cotton yield per plant was significantly and positively correlated with plant height, no. of sympodia plant[-1], no. of bolls plant[-1], boll weight, seed index, lint index, micronaire value and lint yield plant[-1] at phenotypic level, where as with plant height, no. of sympodia plant[-1], no. of bolls plant[-1], boll weight, seed index, lint index, micronaire value, bundle strength, uniformity ratio, elongation and lint yield plant[-1] at genotypic level. Similar results were reported by Rajamani *et al.* (2013), Rumesh Ranjan *et al.* (2014) and Santosh Kumar *et al.* (2014).

Significant and positive correlations at both the levels were also observed between component characters themselves like that of days to 50% flowering with 2.5% span length, bundle strength, and elongation % (Muraleedhar, 2005); plant height with no. of sympodia plant[-1], no. of bolls plant[-1], seed index, micronaire value and lint yield plant[-1] (Kumari Vinodhana *et al.,* 2013 and Chitti *et al.,* 2014); number of sympodia plant[-1] with no. of bolls plant[-1], micronaire

value, uniformity ratio and lint yield plant[-1] (Rajamani *et al.,* 2013 and Krishna Mohan, 2011); number of bolls plant[-1] with micronaire value, uniformity ratio, elongation %, and lint yield plant[-1] (Eswar Rao, 2008); boll weight with seed index, lint index and lint yield plant[-1] (Kumari Vinodhana *et al.,* 2013 and Santosh Kumar Pujer *et al.*, 2014); seed index with lint index and micronaire value (Kumari Vinodhana *et al.,* 2013 and Santosh Kumar Pujar *et al.*, 2014); lint index with micronaire value and lint yield plant[-1] (Rajanna *et al.*, 2011 and Rajamani *et al.,* 2013); ginning out turn with lint yield plant[-1] (Krishna Mohan, 2011); 2.5% span length with bundle strength (Kumari Vinodhana *et al.,* 2013 and Santosh Kumar Pujer *et al.,* 2014); micronaire value with uniformity ratio, elongation %, and lint yield plant[-1] (Eswar Rao, 2008); bundle strength with elongation % (Rajanna *et al.*, 2011); and elongation %, uniformity ratio with elongation % (Krishna Mohan, 2011).

The correlation coefficient estimates mostly indicated inter-relationship of different characters but it did not furnish information on cause and effect. Under such situation path analysis helps the breeder to identify the index of selection. Path coefficient analysis was done in order to study the direct and indirect effects of individual component characters on the dependent variable *i.e.*, seed cotton yield plant[-1]. Study of path coefficients enable the breeders to concentrate on the variables which show high direct effect on seed cotton yield. The genotypic and phenotypic correlation coefficients of seed cotton yield with other yield and fibre quality traits was further partitioned into direct and indirect effects and the results were presented in Table 3 and 4.

The component of residual effect of path analysis in yield and fibre quality traits is 0.0450 at genotypic level and 0.3128 at phenotypic level. The lower residual effect indicated that the characters chosen for path analysis were adequate and

Table 3. Direct and indirect effects (phenotypic) of yield components on seed cotton yield of cotton over three environments (pooled) during *kharif*, 2013-14

Character	Days to 50% flowering	Plant height	No. of monopodia plant⁻¹	No. of sympodia plant⁻¹	No. of bolls plant⁻¹	Boll weight	Relative chlorophyll content	Seed index
Days to 50 % flowering	**-0.0197**	-0.0003	-0.0009	0.0001	-0.0017	0.0020	-0.0010	0.0015
Plant height	0.0002	**0.0112**	0.0015	0.0038	0.0015	0.0009	-0.0004	0.0014
No. of monopodia plant⁻¹	-0.0003	-0.0008	**-0.0061**	-0.0004	-0.0002	0.0003	0.0002	0.0003
No. of sympodia plant⁻¹	0.0000	-0.0033	-0.0006	**-0.0098**	-0.0016	0.0000	0.0008	-0.0006
No. of bolls plant⁻¹	0.0343	0.0529	0.0117	0.0657	**0.4056**	0.0348	-0.0403	-0.0092
Boll weight	-0.0485	0.0395	-0.0264	-0.0015	0.0405	**0.4720**	-0.0227	0.0834
Relative chlorophyll content	-0.0008	0.0005	0.0006	0.0013	0.0016	0.0008	**-0.0156**	0.0019
Seed index	-0.0068	0.0114	-0.0039	0.0057	-0.0021	0.0160	-0.0108	**0.0904**
Lint index	0.0121	-0.0074	0.0037	-0.0049	-0.0045	-0.0109	0.0110	-0.0619
Ginning out turn	0.0040	0.0036	0.0002	0.0022	-0.0074	0.0051	-0.0015	0.0393
2.5% span length	0.0025	-0.0024	-0.0009	-0.0013	-0.0029	0.0008	0.0024	0.0010
Micronaire value	0.0010	-0.0023	-0.0005	-0.0032	-0.0037	-0.0010	0.0017	-0.0033
Bundle strength	0.0035	-0.0013	0.0008	-0.0017	-0.0015	0.0007	0.0024	0.0014
Uniformity ratio	-0.0008	-0.0010	-0.0008	-0.0016	-0.0016	0.0017	0.0002	0.0011
Elongation	0.0012	0.0001	0.0005	0.0004	0.0012	-0.0009	-0.0002	-0.0002
Lint yield plant⁻¹	-0.0227	0.0360	-0.0124	0.0376	0.2277	0.2135	-0.0218	-0.0455
Seed cotton yield plant⁻¹	**-0.0408**	**0.1365**	**-0.0334**	**0.0924**	**0.6508**	**0.7359**	**-0.0956**	**0.1009**

Character	Days to 50% flowering	Plant height	No. of monopodia plant⁻¹	No. of sympodia plant⁻¹	No. of bolls plant⁻¹	Boll weight	Relative chlorophyll content	Seed index
Days to 50 % flowering	**-0.0704**	-0.0072	0.0492	0.0004	-0.0133	0.0145	-0.0135	0.0074
Plant height	0.0025	**0.0246**	-0.0584	0.0254	0.0130	0.0091	-0.0070	0.0119
No. of monopodia plant⁻¹	0.0002	0.0008	**-0.0003**	-0.0011	-0.0006	0.0014	0.0008	-0.0002
No. of sympodia plant⁻¹	0.0000	0.0029	0.0092	**0.0028**	0.0019	0.0007	-0.0008	0.0012
No. of bolls plant⁻¹	0.0236	0.0661	0.2259	0.0852	**0.1253**	0.0476	-0.0338	0.0164
Boll weight	-0.0678	0.1214	-1.4033	0.0780	0.1250	**0.3289**	-0.0544	0.0892
Relative chlorophyll content	-0.0106	0.0159	0.1346	0.0163	0.0149	0.0092	**-0.0554**	0.0215
Seed index	-0.0666	0.3071	0.4506	0.2736	0.0835	0.1728	-0.2469	**0.6370**
Lint index	0.1430	-0.2529	0.1179	-0.2328	-0.0986	-0.0850	0.3157	-0.5112
Ginning out turn	-0.0087	-0.0034	-0.1461	-0.0019	0.0068	-0.0240	-0.0028	-0.0347
2.5% span length	0.0136	-0.0161	0.0299	-0.0082	-0.0067	0.0027	0.0179	-0.0041
Micronaire value	0.0007	-0.0017	-0.0096	-0.0019	-0.0023	-0.0001	0.0026	-0.0015
Bundle strength	0.0140	-0.0009	-0.0532	0.0004	0.0065	0.0079	0.0069	0.0008
Uniformity ratio	0.0148	0.0250	-0.0063	0.0086	0.0484	-0.0026	-0.0093	-0.0067
Elongation	0.0174	0.0142	-0.0108	0.0131	0.0483	-0.0011	-0.0018	-0.0033
Lint yield plant⁻¹	-0.0720	0.2569	-1.0622	0.2875	0.4474	0.4024	-0.1429	0.0471
Seed cotton yield plant⁻¹	**-0.0663**	**0.5526**	**-1.7329**	**0.5456**	**0.7995**	**0.8844**	**-0.2247**	**0.2706**

Residual effect = 0.3128
Bold and diagonal values indicate direct effects

Table 4. Direct and indirect effects (Genotypic) of yield components on seed cotton yield of cotton over three environments (pooled) during *kharif*, 2013-14

Character	Lint index	Ginning out turn	2.5% span length	Micronaire value	Bundle strength	Uniformity ratio	Elongation	Lint yield plant^{-1}
Days to 50 % flowering	0.0028	0.0009	-0.0022	0.0013	-0.0036	-0.0012	-0.0026	0.0013
Plant height	0.0010	-0.0005	-0.0012	0.0017	-0.0008	0.0009	0.0002	0.0011
No. of monopodia plant^{-1}	0.0003	0.0000	0.0003	-0.0002	-0.0003	-0.0004	-0.0004	0.0002
No. of sympodia plant^{-1}	-0.0006	0.0003	0.0006	-0.0020	0.0009	-0.0013	-0.0004	-0.0011
No. of bolls plant^{-1}	0.0215	0.0352	-0.0520	0.0975	-0.0325	0.0519	0.0556	0.2630
Boll weight	0.0599	-0.0279	0.0160	0.0293	0.0173	-0.0642	-0.0480	0.2870
Relative chlorophyll content	0.0020	-0.0003	-0.0017	0.0017	-0.0019	0.0002	0.0003	0.0010
Seed index	0.0654	-0.0414	0.0040	0.0190	0.0065	-0.0081	-0.0021	-0.0117
Lint index	**-0.0856**	-0.0174	0.0063	-0.0244	0.0051	0.0010	-0.0039	-0.0166
Ginning out turn	-0.0174	**-0.0858**	0.0112	0.0018	0.0124	-0.0035	-0.0060	-0.0370
2.5% span length	-0.0016	-0.0029	**0.0223**	-0.0090	0.0131	-0.0083	-0.0023	-0.0032
Micronaire value	-0.0044	0.0003	0.0062	**-0.0155**	0.0049	-0.0048	-0.0042	-0.0028
Bundle strength	-0.0012	-0.0028	0.0113	-0.0062	**0.0193**	-0.0051	0.0022	-0.0023
Uniformity ratio	0.0001	-0.0005	0.0046	-0.0039	0.0033	**-0.0124**	-0.0031	-0.0006
Elongation	0.0004	0.0006	-0.0009	0.0024	0.0010	0.0022	**0.0088**	0.0003
Lint yield plant^{-1}	0.0679	0.1515	-0.0507	0.0640	-0.0416	0.0181	0.0139	**0.3511**
Seed cotton yield plant^{-1}	**0.1104**	**0.0094**	**-0.0258**	**0.1576**	**0.0032**	**-0.0352**	**0.0080**	**0.8297**

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Character	Lint index	Ginning out turn	2.5% span length	Micronaire value	Bundle strength	Uniformity ratio	Elongation	Lint yield plant^{-1}
Days to 50 % flowering	0.0165	0.0081	-0.0152	0.0100	-0.0269	-0.0106	-0.0193	0.0089
Plant height	0.0102	-0.0011	-0.0063	0.0079	-0.0006	0.0063	0.0055	0.0111
No. of monopodia plant^{-1}	0.0001	0.0006	-0.0002	-0.0006	0.0005	0.0000	0.0001	0.0006
No. of sympodia plant^{-1}	0.0011	-0.0001	-0.0004	0.0010	0.0000	0.0003	0.0006	0.0014
No. of bolls plant^{-1}	0.0202	0.0113	-0.0134	0.0557	0.0220	0.0619	0.0952	0.0984
Boll weight	0.0458	-0.1043	0.0143	0.0055	0.0704	-0.0087	-0.0058	0.2323
Relative chlorophyll content	0.0287	0.0021	-0.0158	0.0273	-0.0104	0.0052	0.0016	0.0139
Seed index	0.5337	-0.2926	-0.0421	0.1885	0.0141	-0.0439	-0.0332	0.0527
Lint index	**-0.6101**	-0.0226	0.1656	-0.2103	0.0802	-0.0685	-0.0304	-0.1491
Ginning out turn	0.0028	**0.0756**	-0.0157	-0.0078	-0.0143	0.0175	0.0079	0.0158
2.5% span length	-0.0170	-0.0131	**0.0628**	-0.0433	0.0543	-0.0495	-0.0156	-0.0128
Micronaire value	-0.0018	0.0005	0.0036	**-0.0052**	0.0027	-0.0035	-0.0025	-0.0013
Bundle strength	-0.0048	-0.0070	0.0319	-0.0188	**0.0368**	-0.0158	0.0095	0.0021
Uniformity ratio	0.0110	0.0227	-0.0772	0.0663	-0.0420	**0.0979**	0.0641	0.0372
Elongation	0.0032	0.0066	-0.0158	0.0298	0.0165	0.0416	**0.0635**	0.0288
Lint yield plant^{-1}	0.1391	0.1191	-0.1161	0.1413	0.0318	0.2164	0.2581	**0.5696**
Seed cotton yield plant^{-1}	**0.1785**	**-0.1940**	**-0.0401**	**0.2473**	**0.2351**	**0.2465**	**0.3992**	**0.9096**

Residual effect = 0.0450
Bold and diagonal values indicate direct effects

appropriate. Path coefficient analysis indicated that plant height, number of sympodia plant[-1], number of bolls plant[-1], boll weight, seed index and lint yield plant[-1] had shown direct positive effect on seed cotton yield plant[-1] at both phenotypic and genotypic levels. These results are in conformity with the findings of Kumari Vinodhana *et al.* (2013) and Rumesh Ranjan *et al.* (2014) and Santosh Kumar Pujer *et al.* (2014).

The indirect positive effect on seed cotton yield plant[-1] at both phenotypic and genotypic levels by days to 50% flowering with number of bolls plant[-1]; plant height with number of bolls plant[-1], boll weight and lint yield plant[-1]; number of sympodia plant[-1] with number of bolls plant[-1] and lint yield plant[-1]; number of bolls plant[-1] with boll weight and lint yield plant[-1]; boll weight with number of bolls plant[-1] and lint yield plant[-1]; seed index with boll weight; lint index with boll weight, seed index and lint yield plant[-1]; ginning out turn with lint yield plant[-1]; micronaire value with number of bolls plant[-1] and lint yield plant[-1]; uniformity ratio with number of bolls plant[-1]; elongation % with number of bolls plant[-1] and lint yield plant[-1]; lint yield plant[-1] with number of bolls plant[-1] and boll weight was observed.

CONCLUSION

Selection for high seed cotton yield seems to be possible through number of bolls plant[-1], boll weight and lint yield plant[-1] as they exerted high positive direct effect as well as had significant and positive association with seed cotton yield plant[-1].

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