

Correlation and Path Coefficient Analysis in Upland Cotton (*Gossypium hirsutum* L.)

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ABSTRACT

An experiment was conducted on correlation and path coefficient analysis for yield and yield contributing characters in upland cotton with 63 genotypes of cotton for seventeen characters at Regional Agricultural Research Station, Lam Farm, Guntur, Andhra Pradesh. The character association analysis revealed that number of monopodia plant⁻¹, number of bolls plant⁻¹, boll weight, relative chlorophyll content, 2.5% span length, bundle strength 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, 2.5% span length (mm) 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.

Key words: Correlation, cotton, path analysis, seed cotton yield.

INTRODUCTION

Upland Cotton (*Gossypium hirsutum* L.), is a predominant species of cotton cultivated mainly for its lint in more than 80 countries of world. Yield is a polygenically inherited character resulting from multiplicative interaction of its contributing characters. Yield 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. 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.

MATERIALS AND METHODS

The present study was conducted during *kharif*, 2012-13 in randomized block design with 63 genotypes obtained from all over India with three replications following 120 x 60 cm spacing at Regional Agricultural Research Station, Lam Farm, Andhra Pradesh. The soils are black cotton type. Recommended doses of fertilizers 120 N, 60 P₂O₅ and 40 K₂O 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 17 characters Viz., 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), 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 (10⁻⁶g/inch), bundle 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 coefficients⁴ and path coefficient analysis².

RESULTS AND DISCUSSION

The analysis of variance indicated significant differences among the genotypes for all the characters. Genotypic correlation coefficients in general were higher than phenotypic correlation coefficients (Table 1.). Seed cotton yield per plant was significantly and positively correlated with number of monopodia plant⁻¹, number of bolls plant⁻¹, boll weight, 2.5% span length and lint yield plant⁻¹ at phenotypic level, where as with number of monopodia plant⁻¹, number of bolls plant⁻¹, boll weight, 2.5% span length and lint yield plant⁻¹ at genotypic level. Similar results were reported by Krishna Mohan⁷, Rumesh Ranjan *et al.*,¹³ and Santosh Kumar Pujer *et al.*,¹⁵.

Significant and positive correlations at both the levels were also observed between component characters themselves like that of days to 50% flowering with lint index, ginning out turn and lint yield plant⁻¹ Karunakar Raju⁶ plant height with micronaire value, uniformity ratio and elongation % Eswar Rao³ number of monopodia plant⁻¹ with number of bolls plant⁻¹, boll weight, 2.5% span length and lint yield plant⁻¹ Krishna Mohan⁷ and Hafiz *et al.*,⁵ number of sympodia plant⁻¹ with seed index, lint index, 2.5% span length and bundle strength Neelima *et al.*,¹⁰ and Mahantesh⁹, number of bolls plant⁻¹ with boll weight and lint yield plant⁻¹ Rumesh Ranjan *et al.*,¹³ boll weight with lint yield plant⁻¹ Rajanna *et al.*,¹¹ seed index with lint index, 2.5% span length and bundle strength Krishna Mohan⁷; Kumari Vinodhana *et al.*,⁸ and Santosh Kumar Pujer *et al.*,¹⁵ lint index with ginning out turn, 2.5% span length, bundle strength and lint yield plant⁻¹ Sakthi *et al.*,¹⁴ Vijayalaxmi *et al.*,¹⁶ and Santosh Kumar Pujer *et al.*,¹⁵ ginning out turn with lint yield plant⁻¹ Krishna Mohan⁷ 2.5% span length with bundle strength⁸ and Santosh Kumar Pujer *et al.*,¹⁵ micronaire value with uniformity ratio¹² and elongation %, uniformity ratio with elongation % Krishna Mohan⁷.

The estimates of correlation coefficient mostly indicated inter-relationship of different characters but it did not furnish information on cause and effect. Under such situation path analysis helped 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 2 and 3, fig 1 and 2.

The component of residual effect of path analysis in yield and fibre quality traits is 0.0406 at genotypic level and 0.11191 at phenotypic level. The lower residual effect indicated that the characters chosen for path analysis were adequate and appropriate.

Path coefficient analysis indicated that 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 Chitti *et al.*,¹ Krishna Mohan⁷, Rajanna *et al.*,¹² Kumari Vinodhana *et al.*,⁸ and Rumesh Ranjan *et al.*,¹³.

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, boll weight and lint yield plant⁻¹, number of monopodia plant⁻¹ with number of bolls plant⁻¹, boll weight and lint yield plant⁻¹, number of sympodia plant⁻¹ with number of bolls 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 number of bolls plant⁻¹, lint index and ginning out turn with lint yield plant⁻¹, 2.5% span length with number of bolls plant⁻¹, bundle strength with number of bolls plant⁻¹, elongation with number of bolls plant⁻¹, lint yield plant⁻¹ with number of bolls plant⁻¹ and boll weight was observed.

Hence, from the correlation and path coefficient analysis study it was inferred that, number of bolls plant⁻¹, boll weight and lint yield plant⁻¹ had significant association and also showed high positive direct effects on seed cotton yield plant⁻¹. Hence in the improvement programmes due importance may be given for this traits to improve genetic yield potential in cotton.

Table 1. Phenotypic (above diagonal) and genotypic (below diagonal) correlations of 17 characters in 63 cotton (*Gossypium hirsutum* L.) genotypes

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	---	-0.0154	-0.0489	-0.1504*	0.0951	0.1182	-0.0338	0.0022
Plant height	-0.0091	---	0.0510	0.1127	-0.0034	-0.0138	0.0561	-0.0663
No. of monopodia plant ⁻¹	-0.0377	0.0591	---	0.1014	0.1691*	0.1544*	0.1011	0.1366
No. of sympodia plant ⁻¹	-0.1896**	0.1576*	0.2381**	---	0.0885	-0.0527	-0.0253	0.2163**
No. of bolls plant ⁻¹	0.1064	-0.0035	0.3005**	0.0777	---	0.1898**	0.1037	0.1125
Boll weight	0.1711*	-0.0015	0.2319**	-0.0876	0.2733**	---	0.0944	0.0715
Relative chlorophyll content	-0.0446	0.0520	0.1035	-0.0698	0.1576*	0.2085**	---	-0.0159
Seed index	-0.0056	-0.0701	0.1814*	0.2911**	0.1244	0.0675	-0.0153	---
Lint index	0.2273**	0.0117	0.1420	0.2279**	0.0500	0.0835	0.1002	0.6714**
Ginning out turn	0.2801**	0.0921	0.0310	-0.0056	0.0335	0.0623	0.1086	-0.3568**
2.5% span length	0.0058	-0.2873**	0.2883**	0.3109**	0.1375	0.1516*	0.2040**	0.4539**
Micronaire value	0.0632	0.2031**	-0.2018**	-0.1297	-0.0652	-0.2800**	-0.3332**	-0.0645
Budnle strength	0.0081	-0.2241**	0.2419**	0.3107**	0.0863	0.2215**	0.2390**	0.4652**
Uniformity ratio	0.0143	0.3719**	-0.0975	-0.0484	0.0308	-0.0696	-0.1918**	-0.2194**
Elongation	-0.0760	0.2983**	-0.1519*	-0.0420	0.0858	-0.2306**	-0.1850*	0.1529*
Lint yield plant ⁻¹	0.2173**	0.0011	0.3139**	0.0715	0.8769**	0.5190**	0.2203**	-0.0262
Seed cotton yield plant ⁻¹ (P)	0.1033	-0.0266	0.2003**	0.0454	0.9149**	0.5430**	0.1412	0.1247
Seed cotton yield plant ⁻¹ (G)	0.1153	-0.0253	0.3154**	0.0362	0.9407**	0.5776**	0.2124**	0.1286

Table 1(cont...)

Character	Lint index	Ginning out turn	2.5% span length	Micronaire value	Budnle strength	Uniformity ratio	Elongation	Lint yield plant ⁻¹
Days to 50 % Flowering	0.2190**	0.2636**	-0.0056	0.0620	0.0019	0.0198	-0.0669	0.2039**
Plant height	0.0195	0.0749	-0.2636**	0.1786*	-0.1633*	0.2460**	0.1602*	0.0000
No. of monopodia plant ⁻¹	0.1160	-0.0280	0.2190**	-0.1710*	0.0890	-0.0391	-0.0712	0.1875**
No. of sympodia plant ⁻¹	0.1835*	0.0239	0.2544**	-0.0904	0.2360**	-0.0461	0.0062	0.0685
No. of bolls plant ⁻¹	0.0441	0.0326	0.1169	-0.0533	0.0757	0.0097	0.0730	0.8475**
Boll weight	0.0673	0.0075	0.0996	-0.1863*	0.1290	-0.0978	-0.1484*	0.4647**
Relative chlorophyll content	0.0972	0.0948	0.1296	-0.2253**	0.1260	-0.0144	-0.1426	0.1735*
Seed index	0.6474**	-0.3328**	0.4303**	-0.0630	0.3724**	-0.1431*	0.0970	-0.0226
Lint index	---	0.3775**	0.2795**	0.0031	0.2575**	-0.1270	0.0071	0.2118**
Ginning out turn	0.4042**	---	-0.1539*	0.0244	-0.1362	0.0459**	-0.0750	0.4105**
2.5% span length	0.3005**	-0.1742*	---	-0.4047	0.7915**	-0.4799**	-0.1626*	0.0790
Micronaire value	0.0004	0.0270	-0.4439**	---	-0.3559**	0.2693**	0.3892**	-0.1161
Budnle strength	0.3041**	-0.1729*	0.9724**	-0.4616**	---	-0.3695**	0.0303	0.0675
Uniformity ratio	-0.2261**	0.0664	-0.7445**	0.4049**	-0.5393**	---	0.3131**	-0.0033
Elongation	-0.0057	-0.1235	-0.2490**	0.5644**	0.0000	0.5559**	---	-0.0400
Lint yield plant ⁻¹	0.2226**	0.4246**	0.0972	-0.1352	0.0745	0.0014	-0.0644	---
Seed cotton yield plant ⁻¹ (P)	0.0605	0.0230	0.1538*	-0.1227	0.1309	-0.0374	-0.0207	0.9034**
Seed cotton yield plant ⁻¹ (G)	0.0662	0.0384	0.1822*	-0.1494*	0.1610*	-0.0284	-0.0170	0.9178**

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

Table 2. Direct and indirect effects (phenotypic) of yield components on seed cotton yield in 63 genotypes of cotton (*Gossypium hirsutum* L.)

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	-0.0249	0.0004	0.0012	0.0038	-0.0024	-0.0029	0.0008	-0.0001
Plant height	0.0000	-0.0030	-0.0002	-0.0003	0.0000	0.0000	-0.0002	0.0002
No. of monopodia plant ⁻¹	0.0004	-0.0005	-0.0089	-0.0009	-0.0015	-0.0014	-0.0009	-0.0012
No. of sympodia plant ⁻¹	0.0030	-0.0022	-0.0020	-0.0197	-0.0017	0.0010	0.0005	-0.0043
No. of bolls plant ⁻¹	0.0534	-0.0019	0.0950	0.0497	0.5617	0.1066	0.0583	0.0632
Boll weight	0.0316	-0.0037	0.0412	-0.0141	0.0507	0.2671	0.0252	0.0191
Relative chlorophyll content	-0.0002	0.0004	0.0007	-0.0002	0.0008	0.0007	0.0073	-0.0001
Seed index	0.0001	-0.0026	0.0053	0.0084	0.0044	0.0028	-0.0006	0.0390
Lint index	-0.0085	-0.0008	-0.0045	-0.0072	-0.0017	-0.0026	-0.0038	-0.0253
Ginning out turn	-0.0298	-0.0085	0.0032	-0.0027	-0.0037	-0.0008	-0.0107	0.0376
2.5% span length	0.0000	-0.0013	0.0011	0.0012	0.0006	0.0005	0.0006	0.0021
Micronaire value	0.0016	0.0046	-0.0044	-0.0023	-0.0014	-0.0048	-0.0058	-0.0016
Budnle strength	0.0000	-0.0034	0.0018	0.0049	0.0016	0.0027	0.0026	0.0077
Uniformity ratio	0.0001	0.0008	-0.0001	-0.0001	0.0000	-0.0003	0.0000	-0.0004
Elongation	0.0021	-0.0049	0.0022	-0.0002	-0.0022	0.0046	0.0044	-0.0030
Lint yield plant ⁻¹	0.0745	0.0000	0.0685	0.0250	0.3098	0.1699	0.0634	-0.0083
Seed cotton yield plant ⁻¹	0.1033	-0.0266	0.2003**	0.0454	0.9149**	0.5430**	0.1412	0.1247

Table 2 (cont...)

Character	Lint index	Ginning out turn	2.5% span length	Micronaire value	Budnle strength	Uniformity ratio	Elongation	Lint yield plant ⁻¹
Days to 50 % flowering	-0.0055	-0.0066	0.0001	-0.0015	0.0000	-0.0005	0.0017	-0.0051
Plant height	-0.0001	-0.0002	0.0008	-0.0005	0.0005	-0.0007	-0.0005	0.0000
No. of monopodia plant ⁻¹	-0.0010	0.0002	-0.0019	0.0015	-0.0008	0.0003	0.0006	-0.0017
No. of sympodia plant ⁻¹	-0.0036	-0.0005	-0.0050	0.0018	-0.0046	0.0009	-0.0001	-0.0013
No. of bolls plant ⁻¹	0.0247	0.0183	0.0657	-0.0299	0.0425	0.0055	0.0410	0.4760
Boll weight	0.0180	0.0020	0.0266	-0.0498	0.0345	-0.0261	-0.0396	0.1241
Relative chlorophyll content	0.0007	0.0007	0.0010	-0.0017	0.0009	-0.0001	-0.0010	0.0013
Seed index	0.0253	-0.0130	0.0168	-0.0025	0.0145	-0.0056	0.0038	-0.0009
Lint index	-0.0390	-0.0147	-0.0109	-0.0001	-0.0101	0.0050	-0.0003	-0.0083
Ginning out turn	-0.0426	-0.1129	0.0174	-0.0028	0.0154	-0.0052	0.0085	-0.0463
2.5% span length	0.0014	-0.0008	0.0049	-0.0020	0.0039	-0.0023	-0.0008	0.0004
Micronaire value	0.0001	0.0006	-0.0104	0.0257	-0.0091	0.0069	0.0100	-0.0030
Budnle strength	0.0053	-0.0028	0.0164	-0.0074	0.0208	-0.0077	0.0006	0.0014
Uniformity ratio	-0.0004	0.0001	-0.0015	0.0008	-0.0011	0.0031	0.0010	0.0000
Elongation	-0.0002	0.0023	0.0050	-0.0120	-0.0009	-0.0096	-0.0308	0.0012
Lint yield plant ⁻¹	0.0774	0.1501	0.0289	-0.0425	0.0247	-0.0012	-0.0146	0.3656
Seed cotton yield plant ⁻¹	0.0605	0.0230	0.1538*	-0.1227	0.1309	-0.0374	-0.0207	0.9034**

Residual effect = 0.11191

*Significant at 5% level **Significant at 1%level Bold and diagonal values indicate direct effects

Table 3. Direct and indirect effects (genotypic) of yield components on seed cotton yield in 63 genotypes of cotton (*Gossypium hirsutum* L.)

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	-0.0329	0.0003	0.0012	0.0062	-0.0035	-0.0056	0.0015	0.0002
Plant height	0.0000	-0.0024	-0.0001	-0.0004	0.0000	0.0000	-0.0001	0.0002
No. of monopodia plant ⁻¹	0.0011	-0.0017	-0.0281	-0.0067	-0.0084	-0.0065	-0.0029	-0.0051
No. of sympodia plant ⁻¹	0.0026	-0.0021	-0.0032	-0.0135	-0.0011	0.0012	0.0009	-0.0039
No. of bolls plant ⁻¹	0.0635	-0.0021	0.1794	0.0464	0.5970	0.1631	0.0941	0.0743
Boll weight	0.0468	-0.0004	0.0635	-0.0240	0.0748	0.2737	0.0571	0.0185
Relative chlorophyll content	-0.0005	0.0006	0.0012	-0.0008	0.0018	0.0024	0.0113	-0.0002
Seed index	-0.0002	-0.0030	0.0076	0.0123	0.0052	0.0028	-0.0006	0.0421
Lint index	-0.0100	-0.0005	-0.0062	-0.0100	-0.0022	-0.0037	-0.0044	-0.0294
Ginning out turn	-0.0241	-0.0079	-0.0027	0.0005	-0.0029	-0.0054	-0.0094	0.0308
2.5% span length	0.0005	-0.0222	0.0223	0.0240	0.0106	0.0117	0.0158	0.0351
Micronaire value	0.0013	0.0042	-0.0041	-0.0027	-0.0013	-0.0057	-0.0068	-0.0013
Budnle strength	-0.0005	0.0129	-0.0139	-0.0179	-0.0050	-0.0128	-0.0138	-0.0268
Uniformity ratio	-0.0001	-0.0029	0.0007	0.0004	-0.0002	0.0005	0.0015	0.0017
Elongation	-0.0004	0.0015	-0.0008	-0.0002	0.0004	-0.0012	-0.0010	0.0008
Lint yield plant ⁻¹	0.0682	0.0003	0.0986	0.0225	0.2754	0.1630	0.0692	-0.0082
Seed cotton yield plant ⁻¹	0.1153	-0.0253	0.3154**	0.0362	0.9407**	0.5776**	0.2124**	0.1286

Table 3 (cont...)

Character	Lint index	Ginning out turn	2.5% span length	Micronaire value	Budnle strength	Uniformity satio	Elongation	Lint yield plant ⁻¹
Days to 50 % flowering	-0.0075	-0.0092	-0.0002	-0.0021	-0.0003	-0.0005	0.0025	-0.0072
Plant height	0.0000	-0.0002	0.0007	-0.0005	0.0005	-0.0009	-0.0007	0.0000
No. of monopodia plant ⁻¹	-0.0040	-0.0009	-0.0081	0.0057	-0.0068	0.0027	0.0043	-0.0088
No. of sympodia plant ⁻¹	-0.0031	0.0001	-0.0042	0.0018	-0.0042	0.0007	0.0006	-0.0010
No. of bolls plant ⁻¹	0.0299	0.0200	0.0821	-0.0389	0.0515	0.0184	0.0512	0.5235
Boll weight	0.0228	0.0170	0.0415	-0.0766	0.0606	-0.0190	-0.0631	0.1420
Relative chlorophyll content	0.0011	0.0012	0.0023	-0.0038	0.0027	-0.0022	-0.0021	0.0025
Seed index	0.0283	-0.0150	0.0191	-0.0027	0.0196	-0.0092	0.0064	-0.0011
Lint index	-0.0438	-0.0177	-0.0132	0.0000	-0.0133	0.0099	0.0002	-0.0097
Ginning out turn	-0.0349	-0.0862	0.0150	-0.0023	0.0149	-0.0057	0.0106	-0.0366
2.5% span length	0.0232	-0.0135	0.0773	-0.0343	0.0752	-0.0576	-0.0193	0.0075
Micronaire value	0.0000	0.0006	-0.0091	0.0205	-0.0094	0.0083	0.0115	-0.0028
Budnle strength	-0.0175	0.0100	-0.0560	0.0266	-0.0576	0.0311	0.0000	-0.0043
Uniformity ratio	0.0017	-0.0005	0.0057	-0.0031	0.0041	-0.0077	-0.0043	0.0000
Elongation	0.0000	-0.0006	-0.0013	0.0029	0.0000	0.0029	0.0052	-0.0003
Lint yield plant ⁻¹	0.0699	0.1334	0.0305	-0.0425	0.0234	0.0005	-0.0202	0.3141
Seed cotton yield plant ⁻¹	0.0662	0.0384	0.1822*	-0.1494*	0.1610*	-0.0284	-0.0170	0.9178**

RESIDUAL EFFECT = 0.0406

* Significant at 5%level **Significant at 1%level, Bold and diagonal values indicate direct effects

Phenotypal Path Diagram for Seed Cotton Yield/ Plant

Residual effect 0.119

Days to 50% Flowering 0.015

Plant Height cm 0.051

Monopodial Plant 0.101

Sympodial Plant 0.089

Bolls Plant 0.19

Boll Weight gm 0.094

Chlorophyll Content 0.016

Seed Index 0.647

Lint Index 0.378

Ginning Out % 0.154

2.5% Staple Length 0.405

Micronaire 0.356

Budline Strength 0.337

Uniformity Ratio 0.313

Fineness % 0.004

Lint Yield/ Plant 0.003

0.067 0

0.02 0.16 0.187

0.002 0.246 -0.071 0.068

0.062 -0.163 -0.039 0.006 0.847

-0.006 0.179 0.089 -0.046 0.073 0.465

0.264 -0.264 -0.171 0.236 0.01 -0.148 0.173

0.219 0.075 0.219 -0.09 0.076 -0.098 -0.143 -0.023

0.002 0.019 -0.028 0.254 -0.053 0.129 -0.014 0.097 0.212

-0.034 -0.066 0.116 0.024 0.117 -0.186 0.126 -0.143 0.007 0.411

0.118 0.056 0.137 0.183 0.033 0.1 -0.225 0.372 0.127 -0.075 0.079

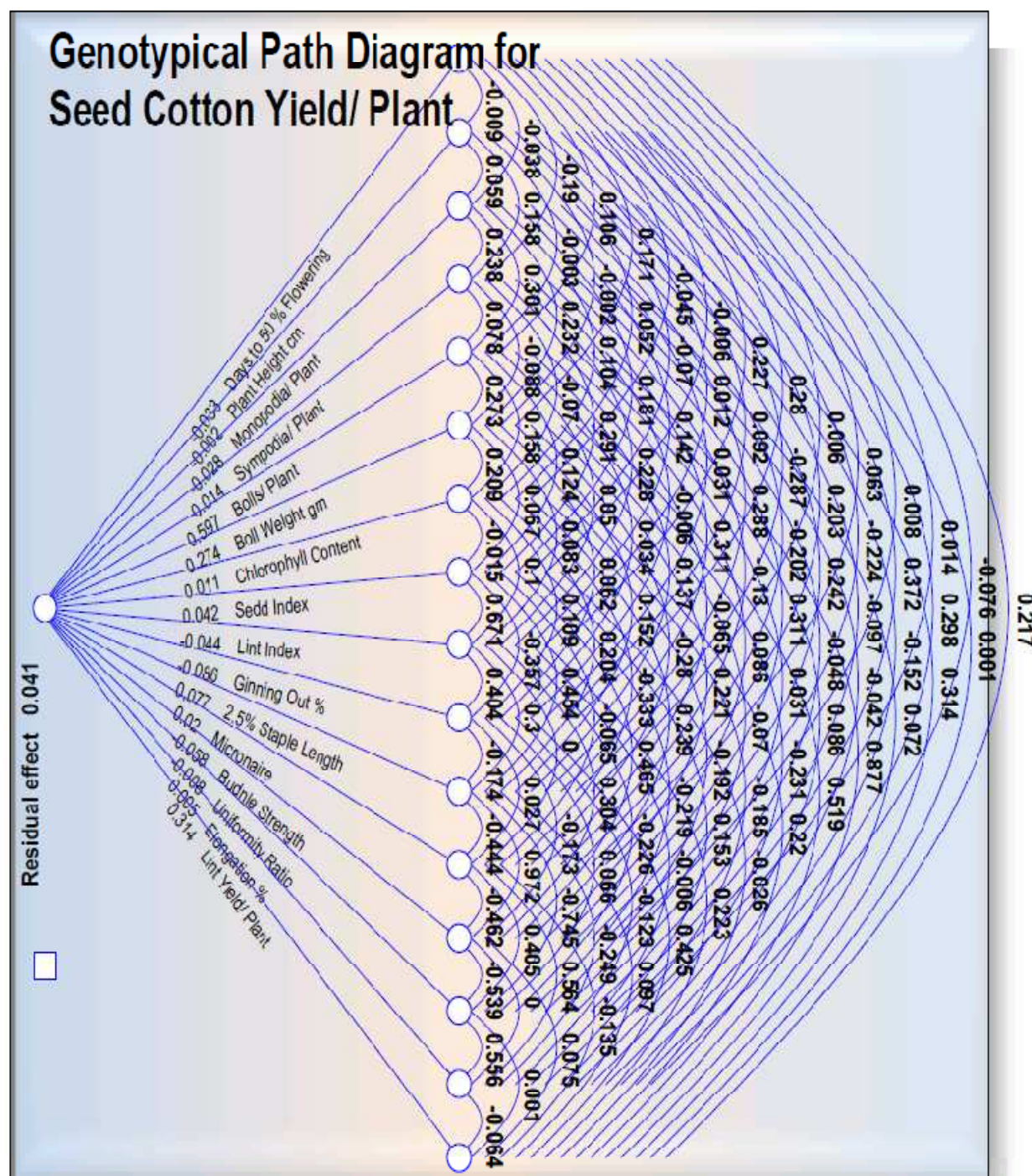
0.095 -0.014 0.101 0.216 0.044 0.808 0.13 -0.063 0.258 0.046 -0.163 -0.116

-0.15 -0.003 0.154 -0.025 0.112 0.067 0.095 0.43 0.003 -0.136 -0.48 0.389 0.008

-0.049 0.113 0.169 -0.053 0.104 0.072 0.097 -0.333 0.28 0.024 0.792 0.269 0.03 -0.003

-0.015 0.051 0.101 0.089 0.19 0.094 -0.016 0.647 0.378 -0.154 0.405 -0.356 -0.337 0.313 -0.004

Fig. 2: Genotypic path diagram showing cause-effect relationship of yield components with seed cotton yield plant⁻¹ in cotton (*Gossypium hirsutum* L.).



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