The Pharma Innovation Journal 2018; 7(5): 33-38

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(5): 33-38

www.thepharmajournal.com
Received: 09-03-2018
Accepted: 10-04-2018

Amrita Kumari
Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Anand Kumar Singh
Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Durga Prasad Moharana
Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Anand Kumar
Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Niraj Kumar
Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Correspondence
Durga Prasad Moharana
Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Character relationship and path coefficient analysis for yield and yield components in diverse genotypes of cucumber (*Cucumis sativus* L.)

Amrita Kumari, Anand Kumar Singh, Durga Prasad Moharana, Anand Kumar and Niraj Kumar

Abstract
An investigation was carried out in order to study the interrelationship and path coefficient analysis for fruit yield and its contributing components. Nineteen genotypes were evaluated during *kharif* 2016 considering twenty two characters. Most of the traits have shown significant correlation as revealed by the association study. Correlation study measures the mutual relationship among various plant character pairs whereas path coefficient analysis provides information about direct and indirect effects of independent variables on dependent variables and thus helps in determining yield contributing characters and is useful in indirect selection. The fruit yield per plant had significant and positive correlations, viz., both genotypic and phenotypic with traits like average fruit weight (g), number of fruits per plant, number of pistillate flowers per plant, fruit width (cm), vine length (cm), and number of nodes per vine. Path coefficient analysis indicated that the traits like number of fruits per plant and average fruit weight (g) have positive and direct genotypic and phenotypic effects towards the fruit yield.

Keywords: Cucumber, character association, character contribution, yield, yield traits

Introduction
Among various cucurbitaceous vegetable crops, cucumber has got its own significance. It inhabits a prominent position in cucurbit cultivation after water melon. Cucumber, a crop of Indian origin, is known as *kheera* in Hindi. The tender and immature fruits are primarily consumed as salad. Cucumber fruit juice has got beneficial effect for diabetic and jaundice patients. Immature fruits have also got culinary properties and are used in preparation of *raita* and pickles. Cucumber is bestowed with various vitamins and minerals, viz., vitamin B and C; calcium, phosphorus, iron, and potassium. Dehusked cucumber seeds can be utilized for edible purpose and are used as nutritive additive in different sweets and confectionery items. Before embarking on fruit yield improvement it is necessary to understand the relationship existing between fruit yield and other quantitative traits of the crop. Studies on the correlation coefficients of various attributes are very useful in order to identify the desirable traits that contribute in fruit yield improvement and assist to ascertain the degree to which these traits are associated with the economic productivity. In order to consider the complex relationship among various dependent variables, path coefficient analysis provides an effective mean of chalking out the direct and indirect effects of yield contributing traits towards the fruit yield with a target to enhance the usefulness of selection for fruit yield improvement. Knowledge of genotypic and phenotypic correlations of yield and its components combined with the path coefficient analysis will be valuable in framing the breeding strategies targeted to develop elite genotypes through selection in advance generation.

Materials and Methods
The present investigation was carried out at the Vegetable Research Farm of Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, during *kharif* 2016. The materials used for the study includes nineteen genotypes which are procured from various authentic sources, i.e., ICAR-Indian Institute of Vegetable Research, Varanasi; Bihar Agricultural University, Bihar; and Department of Horticulture, Institute of Agricultural Sciences, B.H.U. The genotypes of cucumber evaluated in the study are Shiva, Moti, Prasad-100, PCUC-09, Kalyanpur Green, Pahari, Varsha Rani, Kheera No. 40, Anupriya, Gujarat Kheera-01, Pant Kheera-01, S-4, CS-1, Heera, Vinayak-512, Vinayak-100, VRCU-102-09-02,

Summer Express, and Messina Green Long. The experimental plot was well prepared by repeated ploughing followed by planking to obtain a fine tilth. The resulting correlation and path coefficient analysis were evaluated in Randomized Complete Block Design (RCBD) consisting of three replications. Observations were recorded on five randomly selected plants for twenty one traits, viz., days to 50 percent germination, vine length (cm), number of primary branches per vine, internodal length (cm), number of nodes per vine, number of node at which first staminate flower appears, number of node at which first pistillate flower appears, days to first staminate flower appearance, days to 50 percent staminate flower appearance, days to first pistillate flower appearance, days to 50 percent pistillate flower appearance, number of staminate flowers per plant, number of pistillate flowers per plant, sex ratio, days to first fruit picking, number of fruits per plant, fruit length (cm), fruit width (cm), average fruit weight (g), test weight (g), and fruit yield per plant (kg). The mean values were used for statistical analysis. The correlation coefficient for various traits was calculated by using the procedure given by Al-Jibouri *et al*. (1958) [1]. The path analysis was calculated by the procedure provided by Dewey and Lu (1959) [2].

Results and Discussion

Fruit yield is a complex character and is dependent on several contributing characters. Genotypic correlations reveal the existence of real association, while phenotypic correlation may occur by chance. Without significant genetic correlation, there is no use of phenotypic significant correlation. Non-significant phenotypic correlation along with significant genotypic correlation revealed that the existing real association is masked by the environmental effect. In the present study, the estimates of phenotypic and genotypic correlation coefficients revealed that the genotypic values were higher than the phenotypic values; this is in agreement with the findings of Prasad and Singh (1994) [3]; Afreen *et al*. (2017) [4] in garden pea; Moharana *et al*. (2017) [5] in bitter gourd; and Singh *et al*. (2016) [6] in pointed gourd. Traits like fruit weight (g), number of fruits per plant, number of pistillate flowers per plant, fruit width (cm), vine length (cm), and number of nodes per vine had positive and significant genotypic and phenotypic correlations with fruit yield per plant (kg).

The analysis of genotypic and phenotypic correlations studies (Table 1) showed that a positive and significant genotypic as well as phenotypic correlations were observed between days to 50 percent germination with days to first staminate flower appearance, Kumar *et al*. (2010) [7] also found similar result; vine length (cm) with the internodal length (cm); number of primary branches per vine with number of node at which first staminate flower appears; internodal length (cm) with number of nodes per vine; number of nodes per vine with fruit length (cm). Number of node at which first staminate flower appears with days to first flowering and number of node at which first pistillate flower appears with days to first pistillate flowering, this agreement was in accordance with the earlier work of Babu *et al*. (2013) [8] in oriental pickling melon and Kumar *et al*. (2010) [7]. Days to first staminate flower appearance with days to first fruit picking, fifty percent staminate flowering with days to first pistillate flowering, similar findings were found by Kumar *et al*. (2010) [7] and Babu *et al*. (2013) [8] in oriental pickling melon; days to first pistillate flower appearance with sex ratio; days to 50 percent pistillate flower appearance with the traits like sex ratio, similar results were recorded by Dhiman and Chander (2005) [9] and Das *et al*. (2003) [10]; number of staminate flowers per plant with number of pistillate flowers per plant; number of pistillate flowers per plant with number of fruits per plant; sex ratio with days to first fruit picking. Days to first fruit picking with fruit length (cm), this result is supported by the earlier findings of Kumar *et al*. (2010) [7], Dhiman and Chander (2005) [9] and Das *et al*. (2003) [10]. Number of fruits per plant with fruit width (cm), Kumar *et al*. (2011) [11] and Khan *et al*. (2009) [12] in pointed gourd also found similar results; fruit length (cm) with the average fruit weight (g); fruit width (cm) with fruit weight (g), and average fruit weight (g) with test weight (g).

Path coefficient analysis facilitates separating the direct and their indirect effects to various traits by portioning correlation. In table 2, path coefficient analysis considering both genotypic and phenotypic levels was depicted. Path coefficient analysis at genotypic level depicted that the traits like number of fruits per plant showed maximum direct positive effect towards number of fruit yield per plant (kg) followed by average fruit weight (g), and sex ratio. Similar results were found by Rao *et al*. (2004) [13] and Kumar *et al*. (2011) [11]. While, in case of phenotypic path coefficient analysis, the highest direct positive effect towards fruit yield per plant was seen in traits like average fruit weight (g) followed by number of fruits per plant, and number of pistillate flowers per plant. These results were supported by the works of Rao *et al*. (2004) [13]; and Hanchinamani and Patil (2008) [14].

In path coefficient analysis, residual effect is the measure of the effect of other possible independent variables that were not included in the study on the dependent variable. In the present study, the residual effect was only 0.0964 of genotypic analysis and 0.0683 of phenotypic analysis which indicated that most of the possible factors contributing towards the yield have been included in the study to justify the objective however some proportions are yet to be incorporated for getting the more concrete results.

Table 1: Estimates of genotypic (G) and phenotypic (P) correlation coefficients among 21 characters in cucumber

Character		DFPF	VL	NPBV	IL	NNV	NNFSFA	NNFPFA	DFSFA	DFPSFA	DFPFA	DFPPFA	NSFP	NPFP	SR	DFFP	NFP	FL	FW	AFW	TW	FYP
DFPF	G	1.0000	-0.0268	-0.6255**	0.2175	-0.1027	0.0111	0.3534**	0.5582**	0.5041**	0.5936**	0.4856**	0.6714**	0.1299	0.1843	0.4824**	0.2635	0.1601	0.6829**	0.5744**	0.5565**	0.4400**
	P	1.0000	-0.0294	-0.2139	0.0356	0.0098	-0.0433	0.2001	0.3480**	0.3056*	0.2831*	0.1800	0.3301*	-0.0131	0.1445	0.2492	0.1583	0.0836	0.2045	0.2988*	0.3071*	0.2525*
VL	G		1.0000	-0.0769	0.4821**	0.5587**	-0.0993	0.2159	-0.1693	-0.0302	0.0097	0.2418	-0.1191	0.3913**	-0.4804**	-0.0838	0.5041**	0.3711**	0.1444	0.5544**	-0.1491	0.5989**
	P		1.0000	-0.0535	0.4136**	0.5086**	-0.0897	0.2079	-0.1591	-0.0466	0.0236	0.2407	-0.1082	0.3738**	-0.4432	-0.0874	0.4828**	0.3480**	0.1295	0.5386**	-0.1491	0.5818**
NPBV	G			1.0000	0.0374	-0.2524*	0.1516	-0.1599	-0.3757**	-0.3503**	-0.1142	-0.4448**	-0.3101*	-0.3223*	0.2209	0.1321	-0.2379	-0.0223	-0.3814**	-0.2931*	-0.2899*	-0.3180*
	P			1.0000	-0.0537	-0.2307	0.0194	-0.1508	-0.3310*	-0.3293*	-0.0825	-0.3754**	-0.2624*	-0.3162*	0.2323	0.1041	-0.2189	-0.0401	-0.3369*	-0.2659*	-0.2539	-0.2888*
IL	G				1.0000	0.4618*	-0.6311**	0.5837**	-0.0834	0.0306*	0.1697	0.0913	-0.3508**	0.0468	-0.2921*	0.2599*	0.1517	0.7682**	-0.1707	0.1800	-0.3378*	0.1651
	P				1.0000	0.4083**	-0.2709*	0.5586**	-0.0860	0.0022	0.1137	0.0826	-0.3141*	0.0656	-0.2582	0.2226	0.1269	0.6931**	-0.1545	0.1559	-0.2980	0.1457
NNV	G					1.0000	-0.3395*	0.4067**	0.0217	0.1438	0.1953	0.3318*	-0.2821*	0.1107	-0.2479*	0.2304	0.0462	0.4394**	-0.0167	0.4641**	-0.1356	0.3292*
	P					1.0000	-0.2280	0.3941**	0.0327	0.1526	0.1709	0.2736*	-0.2819*	0.1288	-0.2601	0.2260	0.0423	0.4384**	-0.0122	0.4444**	-0.1268	0.3151*
NNFSFA	G						1.0000	-0.3529**	0.5449**	0.4471**	0.0789	0.1417	-0.1037	-0.3983**	0.3782**	0.2065	-0.0986	-0.2934*	-0.2725*	-0.3761**	0.2909*	-0.3190*
	P						1.0000	-0.2293	0.3721**	0.3148*	0.0036	0.0739	-0.0871	-0.2529	0.2233	0.1634	-0.0702	-0.1802	-0.1933	-0.2884*	0.2307	-0.2370
NNFPFA	G							1.0000	0.1746	0.1960	0.6682**	0.4759**	-0.1238	-0.2822*	0.2212	0.5713**	-0.1719	0.6629**	-0.1822	-0.0333	0.0736	-0.1212
	P							1.0000	0.1514	0.1535	0.6031**	0.4134**	-0.1183	-0.2573	0.2022	0.5523**	-0.1762	0.6372**	-0.1655	-0.0336	0.0737	-0.1219
DFSFA	G								1.0000	0.9263**	0.4753**	0.4757**	0.2512	-0.0791	0.2116	0.5085**	-0.0700	0.1924	-0.1776	-0.1580	0.3538**	-0.1587
	P								1.0000	0.8708**	0.4201**	0.4034**	0.2151	-0.0616	0.1634	0.4620**	-0.0507	0.1873	-0.1942	-0.1497	0.3217*	-0.1440
DFPSFA	G									1.0000	0.4573**	0.3567**	0.1669	0.0945	-0.0311	0.5389**	0.1184	0.2934*	-0.1383	0.0129	0.2433	0.0422
	P									1.0000	0.4168**	0.3164*	0.1282	0.0862	-0.0401	0.4810**	0.1252	0.2924*	-0.1404	-0.0001	0.2270	0.0415
DFPFA	G										1.0000	0.2112	0.2865*	-0.2114	0.3803**	0.5197**	-0.1404	0.3718**	-0.0507	0.0865	0.2953*	-0.0315
	P										1.0000	0.2586	0.2546	-0.2224	0.3637**	0.4787**	-0.1100	0.3459**	-0.0631	0.0782	0.2821	-0.0250
DFPPFA	G											1.0000	0.0462	-0.2990*	0.3700**	0.3744**	-0.3464**	0.2576*	-0.0696	0.1027	-0.0745	-0.0855
	P											1.0000	0.0197	-0.2953*	0.3473**	0.3314*	-0.2959*	0.2254	-0.0651	0.0915	-0.0694	-0.0750
NSFP	G												1.0000	0.4045**	0.1198	-0.2058	0.1744	-0.3054*	0.2970*	0.2006	0.4324**	0.2119
	P												1.0000	0.3840**	0.1190	-0.1959	0.1570	-0.3021*	0.2840*	0.1998	0.4185**	0.2041
NPFP	G													1.0000	-0.8512**	-0.4839**	0.8354*	-0.0123	0.4060**	0.5209**	0.2149	0.7537**
	P													1.0000	-0.8590**	-0.4367**	0.7573**	0.0014	0.3886*	0.4950**	0.1900	0.7011**
SR	G														1.0000	0.4002**	-0.8552*	-0.1624	-0.3357*	-0.4550**	-0.0196	-0.7153**
	P														1.0000	0.3553**	-0.7660**	-0.1660	-0.3209*	-0.4270**	-0.0098	-0.6560**
DFFP	G															1.0000	-0.2612*	0.6199**	-0.2291	-0.0760	0.0573	-0.1947
	P															1.0000	-0.2605	0.6043**	-0.2077	-0.0689	0.0548	-0.1931
NFP	G																1.0000	0.0739	0.6271**	0.5655**	0.3271*	0.8265**
	P																1.0000	0.0713	0.5403**	0.5491**	0.3202*	0.8209**
FL	G																	1.0000	-0.2386	0.1457	-0.2517*	0.1292
	P																	1.0000	-0.2150	0.1397	-0.2442	0.1264
FW	G																		1.0000	0.7383**	0.3428**	0.7708**
	P																		1.0000	0.6837**	0.3155*	0.6970**
AFW	G																			1.0000	0.0257	0.9260**
	P																			1.0000	0.0235	0.9211**
TW	G																				1.0000	0.1426
	P																				1.0000	0.1412

FYP	G																				1.0000
	P																				1.0000

*, ** Significant at 0.05 and 0.01 probability levels, respectively.

Where,

DFPF=Days to 50 percent germination, VL=Vine length (cm), NPBV=Number of primary branches per vine, IL=Internodal length (cm), NNV=Number of nodes per vine, NNFSFA=Number of node at which first staminate flower appears, NNFPFA=Number of node at which first pistillate flower appears, DFSFA=Days to first staminate flower appearance, DFPSFA=Days to 50 percent staminate flower appearance, DFPFA=Days to first pistillate flower appearance, DFPPFA=Days to 50 percent pistillate flower appearance, NSFP=Number of staminate flowers per plant, NPFP=Number of pistillate flowers per plant, SR=Sex ratio, DFFP=Days to first fruit picking, NFP=Number of fruits per plant, FL=Fruit length (cm), FW=Fruit width (cm), AFW=Average fruit weight (g), TW=Test weight (g), and FYP=Fruit yield per plant (kg).

Table 2: Genotypic (G) and phenotypic (P) path coefficient direct (diagonal) and indirect (off diagonal) effects of quantitative traits on fruit yield of cucumber

Character		DFPF	VL	NPBV	IL	NNV	NNFSFA	NNFPFA	DFSFA	DFPSFA	DFPFA	DFPPFA	NSFP	NPFP	SR	DFFP	NFP	FL	FW	AFW	TW
DFPF	G	0.0423	-0.0011	-0.0265	0.0092	-0.0043	0.0005	0.0150	0.0236	0.0213	0.0251	0.0206	0.0284	0.0055	0.0078	0.0204	0.0111	0.0068	0.0289	0.0243	0.0235
	P	0.0122	-0.0004	-0.0026	0.0004	0.0001	-0.0005	0.0024	0.0042	0.0037	0.0034	0.0022	0.0040	-0.0002	0.0018	0.0030	0.0019	0.0010	0.0025	0.0036	0.0037
VL	G	0.0096	-0.3573	0.0275	-0.1723	-0.1997	0.0355	-0.0771	0.0605	0.0108	-0.0035	-0.0864	0.0425	-0.1398	0.1717	0.0300	-0.1801	-0.1326	-0.0516	-0.1981	0.0533
	P	0.0001	-0.0028	0.0001	-0.0012	-0.0014	0.0002	-0.0006	0.0004	0.0001	-0.0001	-0.0007	0.0003	-0.0010	0.0012	0.0002	-0.0013	-0.0010	-0.0004	-0.0015	0.0004
NPBV	G	-0.0258	-0.0032	0.0412	0.0015	-0.0104	0.0062	-0.0066	-0.0155	-0.0144	-0.0047	-0.0183	-0.0128	-0.0133	0.0091	0.0054	-0.0098	-0.0009	-0.0157	-0.0121	-0.0119
	P	0.0051	0.0013	-0.0239	0.0013	0.0055	-0.0005	0.0036	0.0079	0.0079	0.0020	0.0090	0.0063	0.0076	-0.0055	-0.0025	0.0052	0.0010	0.0080	0.0064	0.0061
IL	G	-0.0065	-0.0144	-0.0011	-0.0298	-0.0138	0.0188	-0.0174	0.0025	-0.0009	-0.0051	-0.0027	0.0105	-0.0014	0.0087	-0.0077	-0.0045	-0.0229	0.0051	-0.0054	0.0101
	P	-0.0018	-0.0206	0.0027	-0.0498	-0.0203	0.0135	-0.0278	0.0043	-0.0001	-0.0057	-0.0041	0.0156	-0.0033	0.0129	-0.0111	-0.0063	-0.0345	0.0077	-0.0078	0.0148
NNV	G	-0.0197	0.1072	-0.0484	0.0886	0.1919	-0.0652	0.0780	0.0042	0.0276	0.0375	0.0637	-0.0541	0.0213	-0.0476	0.0442	0.0089	0.0843	-0.0032	0.0891	-0.0260
	P	-0.0002	-0.0117	0.0053	-0.0094	-0.0230	0.0052	-0.0091	-0.0008	-0.0035	-0.0039	-0.0063	0.0065	-0.0030	0.0060	-0.0052	-0.0010	-0.0101	0.0003	-0.0102	0.0029
NNFSFA	G	0.0018	-0.0161	0.0246	-0.1026	-0.0552	0.1626	-0.0574	0.0886	0.0727	0.0128	0.0230	-0.0169	-0.0647	0.0615	0.0336	-0.0160	-0.0477	-0.0443	-0.0611	0.0473
	P	-0.0001	-0.0003	0.0001	-0.0008	-0.0007	0.0031	-0.0007	0.0012	0.0010	0.0000	0.0002	-0.0003	-0.0008	0.0007	0.0005	-0.0002	-0.0006	-0.0006	-0.0009	0.0007
NNFPFA	G	0.0727	0.0444	-0.0329	0.1200	0.0836	-0.0726	0.2056	0.0359	0.0403	0.1374	0.0979	-0.0254	-0.0580	0.0455	0.1175	-0.0353	0.1363	-0.0375	-0.0068	0.0151
	P	-0.0005	-0.0005	0.0004	-0.0014	-0.0010	0.0006	-0.0024	-0.0004	-0.0004	-0.0015	-0.0010	0.0003	0.0006	-0.0005	-0.0013	0.0004	-0.0016	0.0004	0.0001	-0.0002
DFSFA	G	-0.0352	0.0107	0.0237	0.0053	-0.0014	-0.0343	-0.0110	-0.0630	-0.0583	-0.0299	-0.0300	-0.0158	0.0050	-0.0133	-0.0320	0.0044	-0.0121	0.0112	0.0100	-0.0223
	P	-0.0120	0.0055	0.0114	0.0030	-0.0011	-0.0128	-0.0052	-0.0345	-0.0300	-0.0145	-0.0139	-0.0074	0.0021	-0.0056	-0.0159	0.0017	-0.0065	0.0067	0.0052	-0.0111
DFPSFA	G	0.0050	-0.0003	-0.0034	0.0003	0.0014	0.0044	0.0019	0.0091	0.0098	0.0045	0.0035	0.0016	0.0009	-0.0003	0.0053	0.0012	0.0029	-0.0014	0.0001	0.0024
	P	0.0027	-0.0004	-0.0029	0.0000	0.0014	0.0028	0.0014	0.0078	0.0089	0.0037	0.0028	0.0011	0.0008	-0.0004	0.0043	0.0011	0.0026	-0.0013	0.0000	0.0020
DFPFA	G	-0.0933	-0.0015	0.0179	-0.0267	-0.0307	-0.0124	-0.1050	-0.0747	-0.0719	-0.1572	-0.0332	-0.0450	0.0332	-0.0598	-0.0817	0.0221	-0.0584	0.0080	-0.0136	-0.0464
	P	-0.0020	-0.0002	0.0006	-0.0008	-0.0012	0.0000	-0.0042	-0.0029	-0.0029	-0.0070	-0.0018	-0.0018	0.0015	-0.0025	-0.0033	0.0008	-0.0024	0.0004	-0.0005	-0.0020
DFPPFA	G	0.0185	0.0092	-0.0169	0.0035	0.0126	0.0054	0.0181	0.0181	0.0136	0.0080	0.0380	0.0018	-0.0114	0.0141	0.0142	-0.0132	0.0098	-0.0026	0.0039	-0.0028
	P	0.0012	0.0016	-0.0025	0.0005	0.0018	0.0005	0.0027	0.0027	0.0021	0.0017	0.0066	0.0001	-0.0019	0.0023	0.0022	-0.0020	0.0015	-0.0004	0.0006	-0.0005
NSFP	G	-0.1431	0.0254	0.0661	0.0748	0.0601	0.0221	0.0264	-0.0535	-0.0356	-0.0611	-0.0098	-0.2131	-0.0862	-0.0255	0.0439	-0.0372	0.0651	-0.0633	-0.0428	-0.0922
	P	-0.0344	0.0113	0.0273	0.0327	0.0294	0.0091	0.0123	-0.0224	-0.0134	-0.0265	-0.0020	-0.1042	-0.0400	-0.0124	0.0204	-0.0164	0.0315	-0.0296	-0.0208	-0.0436
NPFP	G	0.0606	0.1826	-0.1504	0.0218	0.0517	-0.1858	-0.1317	-0.0369	0.0441	-0.0987	-0.1395	0.1887	0.4666	-0.3972	-0.2258	0.3898	-0.0057	0.1895	0.2431	0.1003
	P	-0.0027	0.0783	-0.0662	0.0137	0.0270	-0.0530	-0.0539	-0.0129	0.0181	-0.0466	-0.0619	0.0805	0.2095	-0.1800	-0.0915	0.1587	0.0003	0.0814	0.1037	0.0398
SR	G	0.1324	-0.3451	0.1587	-0.2098	-0.1781	0.2717	0.1589	0.1520	-0.0223	0.2732	0.2658	0.0860	-0.6114	0.7183	0.2875	-0.6143	-0.1167	-0.2412	-0.3268	-0.0141
	P	0.0221	-0.0676	0.0354	-0.0394	-0.0397	0.0341	0.0309	0.0249	-0.0061	0.0555	0.0530	0.0182	-0.1311	0.1526	0.0542	-0.1169	-0.0253	-0.0490	-0.0652	-0.0015
DFFP	G	-0.1335	0.0232	-0.0366	-0.0719	-0.0638	-0.0572	-0.1581	-0.1407	-0.1492	-0.1439	-0.1036	0.0570	0.1340	-0.1108	-0.2768	0.0723	-0.1716	0.0634	0.0210	-0.0159
	P	-0.0085	0.0030	-0.0035	-0.0076	-0.0077	-0.0056	-0.0188	-0.0157	-0.0164	-0.0163	-0.0113	0.0067	0.0148	-0.0121	-0.0340	0.0089	-0.0205	0.0071	0.0023	-0.0019
NFP	G	0.2366	0.4527	-0.2136	0.1362	0.0415	-0.0885	-0.1543	-0.0629	0.1064	-0.1260	-0.3110	0.1566	0.7501	-0.7679	-0.2345	0.8979	0.0664	0.5631	0.5078	0.2937

	P	0.0657	0.2004	-0.0909	0.0527	0.0176	-0.0291	-0.0732	-0.0211	0.0520	-0.0457	-0.1228	0.0652	0.3144	-0.3180	-0.1082	0.4152	0.0296	0.2243	0.2280	0.1330
FL	G	0.0247	0.0573	-0.0034	0.1187	0.0679	-0.0453	0.1024	0.0297	0.0453	0.0574	0.0398	-0.0472	-0.0019	-0.0251	0.0958	0.0114	0.1545	-0.0369	0.0225	-0.0389
	P	0.0055	0.0229	-0.0026	0.0456	0.0289	-0.0119	0.0420	0.0123	0.0193	0.0228	0.0148	-0.0199	0.0001	-0.0109	0.0398	0.0047	0.0658	-0.0142	0.0092	-0.0161
FW	G	-0.0927	-0.0196	0.0517	0.0232	0.0023	0.0370	0.0247	0.0241	0.0188	0.0069	0.0094	-0.0403	-0.0551	0.0456	0.0311	-0.0851	0.0324	-0.1357	-0.1002	-0.0465
	P	-0.0016	-0.0010	0.0026	0.0012	0.0001	0.0015	0.0013	0.0015	0.0011	0.0005	0.0005	-0.0022	-0.0030	0.0025	0.0016	-0.0042	0.0017	-0.0078	-0.0053	-0.0025
AFW	G	0.4445	0.4291	-0.2269	0.1393	0.3592	-0.2910	-0.0257	-0.1223	0.0100	0.0669	0.0795	0.1553	0.4031	-0.3521	-0.0588	0.4376	0.1128	0.5713	0.7739	0.0199
	P	0.2015	0.3631	-0.1792	0.1051	0.2996	-0.1945	-0.0227	-0.1010	0.0000	0.0527	0.0617	0.1347	0.3337	-0.2879	-0.0465	0.3702	0.0942	0.4610	0.6742	0.0158
TW	G	-0.0590	0.0158	0.0307	0.0358	0.0144	-0.0308	-0.0078	-0.0375	-0.0258	-0.0313	0.0079	-0.0458	-0.0228	0.0021	-0.0061	-0.0347	0.0267	-0.0363	-0.0027	-0.1059
	P	0.0003	-0.0002	-0.0003	-0.0003	-0.0001	0.0002	0.0001	0.0003	0.0002	0.0003	-0.0001	0.0004	0.0002	0.0000	0.0001	0.0003	-0.0002	0.0003	0.0000	0.0010
CFYP	G	0.4400	0.5989	-0.3180	0.1651	0.3292	-0.3190	-0.1212	-0.1587	0.0422	-0.0315	-0.0855	0.2119	0.7537	-0.7153	-0.1947	0.8265	0.1292	0.7708	0.9260	0.1426
	P	0.2525	0.5818	-0.2888	0.1457	0.3151	-0.2370	-0.1219	-0.1440	0.0415	-0.0250	-0.0750	0.2041	0.7011	-0.6560	-0.1931	0.8209	0.1264	0.6970	0.9211	0.1412

Genotypic Residual Effect=0.0964, Phenotypic Residual Effect=0.0683

Where,

DFPF=Days to 50 percent germination, VL=Vine length (cm), NPBV=Number of primary branches per vine, IL=Internodal length (cm), NNV=Number of nodes per vine, NNFSFA=Number of node at which first staminate flower appears, NNFPFA=Number of node at which first pistillate flower appears, DFSFA=Days to first staminate flower appearance, DFPSFA=Days to 50 percent staminate flower appearance, DFPFA=Days to first pistillate flower appearance, DFPPFA=Days to 50 percent pistillate flower appearance, NSFP=Number of staminate flowers per plant, NPFP=Number of pistillate flowers per plant, SR=Sex ratio, DFFP=Days to first fruit picking, NFP=Number of fruits per plant, FL=Fruit length (cm), FW=Fruit width (cm), AFW=Average fruit weight (g), TW=Test weight (g), and CFYP=Correlation with fruit yield per plant (kg).

References

1. Al-Jibouri H, Millar PA, Robinson HF. Genotypic and environmental variances and covariances in an upland cotton cross of inter specific origin. Agronomy Journal. 1958; 50:633-636.
2. Dewey OR, Lu KH. A correlation and path analysis components of created wheat grass seed production. Agronomy Journal. 1959; 57:511-518.
3. Prasad VSRK, Singh DP. Genetic association and interrelationship between yield component in cucumber. Journal of Maharashtra Agricultural University. 1994; 19(1):147-148.
4. Afreen S, Singh AK, Moharana DP, Singh V, Singh P, Mohapatra AS *et al*. Character association for yield and yield attributing traits in diverse genotypes of garden pea (*Pisum sativum* var. *hortense* L.). Environment and Ecology. 2017; 35(2C):1400-1404.
5. Moharana DP, Syamal MM, Singh AK. Interrelationship studies for yield and yield attributing traits in elite genotypes of bitter gourd (*Momordica charantia* L.). Vegetos. 2017; 30(Special-2):392-396.
6. Singh P, Kurrey VK, Minz RR, Moharana, DP. Correlation coefficient analysis between fruit yield and qualitative traits of pointed gourd (*Trichosanthes dioica* Roxb.) in Chhattisgarh region. The Ecoscan. 2016; IX(Special):33-38.
7. Kumar KH, Patil MG, Hanchinamani CN. Variability and correlation studies in F_2 population of BGDL × White Long cucumber (*Cucumis sativus* L.). Journal of Environment and Ecology. 2010; 28(1):17-20.
8. Babu RR, Rao NH, Reddy RVSK. Correlation and path analysis in oriental pickling melon (*Cucumis melo* L. var. *conomon*) genotypes. Journal of Research PJTSAU. 2013; 42(3):62-66.
9. Dhiman MR, Chender P. Correlation and path coefficient analysis in cucumber. Haryana Journal of Horticultural Sciences. 2005; 34:111-112.
10. Das S, Maurya KR, Chaudhary DN. Heritability study in cucumber. Journal of Applied Biology. 2003; 13(1/2):54-57.
11. Kumar S, Kumar R, Gupta RK, Sephia R. Studies on correlation and path coefficient analysis for yield and its contributing traits in cucumber. Crop Improvement. 2011; 38(1):18-23.
12. Khan ASMMR, Kabir MY, Alam MM. Variability, correlation path analysis of yield and components of pointed gourd. Journal of Agriculture and Rural Development. 2009; 7(1-2):93-98.
13. Rao ES, Munshi AD, Verma VK. Genetic association and Interrelationship of yield and its components in cucumber (*Cucumis sativus* L.). Indian Journal of Horticulture. 2004; 61(4):315-318.
14. Hanchinamani CN, Patil MG. Path coefficient analysis in cucumber (*Cucumis melo* L.). Crop Research. 2008; 36(1-3):270-272.