SHORT COMMUNICATION

CORRELATION AND PATH ANALYSIS IN CHILLI (*CAPSICUM ANNUUM* L.)

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Abstract: Correlation and path coefficient analysis for nine genotypes of chilli were evaluated during *rabi*season of 2011-12. The studies revealed that green fruit yield per plant had highly significant and positive association with days to 50% flowering at phenotypic and genotypic level, number of primary branches at genotypic level, fruit length at phenotypic level, fruit bearing period and plant height at environmental level. Whereas, path coefficient analysis revealed that among the developmental characters *viz*., days to 50% flowering, plant height (cm), number of primary branches, secondary branches, fruit bearing period, fruit width (cm), fruit weight (g), stalk/pedicel length (cm), number of seeds per fruitand number of fruits per plant showed high positive direct effect on green fruit yield per plant (g).

Keywords: Correlation, Path anlysis, *Capsicum annuum* L.

INTRODUCTION

Chilli (*Capsicum annuum* L.) is mainly used in culinary to add aroma, colour and taste. In India no dish is complete without chillies. It is belongs to family solanaceae. A few varieties are still recommended for commercial cultivation, there is a need for genetic evaluation of the available chilligermplasm for increasing the productivity considering the preference of the consumer's demand. Correlation studies of yield and its components characters are useful in developing an effective basis of phenotypic selection and path analysis further helps to elucidate the intrinsic nature of the observed association and impact confidence in the selection of breeding programme. As more variables are included in the correlation study, the association becomes more complex. In such situation, path coefficient analysis devised by Wright (1921) provides effective means of finding out direct and indirect causes of association and permits a critical examination of the specific forces acting to produce a given correlation and measures the relative importance of each casual factor. Considering these points a study was undertaken at Department of Horticulture, I.G.K.V. Raipur (C.G.), to studied about relationship among green fruit yield and its components and determines the correlation and path analysis in chilli.

MATERIAL AND METHOD

The experimental material comprised of nine diverse genotypes of Chilli (6 line and 3 testers) which were received from All India Coordinate Research Project on Vegetable Crops, Indira Gandhi KrishiVishwavidyalaya, Raipur (C.G.).The trials were evaluated during *Rabi* season of 2011-12 at the Horticulture Farm, Department of Horticulture. The soil of the experimental field was sandy loam in texture which is locally known as "*Matasi*" and is neutral in reaction with the pH 7.5. The experiment was conducted in a Randomized Block Design (RBD) with three replications.

The six week old seedlings of nine parents (6 line and 3 testers) were transplanted in a randomized block design with three replications. Each plot consisted of 4.2 x 3.5 m^2 areas and a gap was kept in 60 cm between rows and 30 cm between plants and only one seedling sown per hill.All the standard agronomical practices and plant protection measures were followed timely to raise a crop successfully. Five plants were selected randomly for recording different yield related traits. However green fruit yield, days to first and 50% flowering and days to first picking were recorded on plot basis. After recording data phenotypic correlation coefficient and genotypic correlation coefficient and direct and indirect effects were computed by using procedure given by Deway and Lu (1957).

RESULT AND DISCUSSION

The correlation coefficient at phenotypic, genotypic and environmental levels for green fruit yield and developmental characters are presented in (Table-1). Characters like days to 50% flowering showed significant and positive correlation with green fruit yield per plant (g) at phenotypic and genotypic levels, number of primary branches at genotypic level, fruit length at phenotypic level, fruit bearing period and plant height at environmental level. Whereas, among the component traits positive correlation was observed the pair of traits*viz.*, days to first flowering at phenotypic level,fruit width, fruit weight and number of secondary branches at genotypic level, days to 1st picking, number of seeds/fruit, duration of crop(sowing to last harvest days) atphenotypic and genotypic levels. While, number of fruits/plant and plant height at phenotypic and environmental levels.The above results supported the revelations of Reddy (2006) who reported that fruit yield had positive and highly significant association with number of fruits per

Table 1: Genotypic (G), phenotypic (P) and environmental (E) correlation coefficient for fruit yield and its component characters in nine genotypes

Characters.			DFF	D50%	PH	NPB	SB	DF	D1st	FBP	FL	FWi	FWe	S/PL	NS/F	NF/F	DC	GFY/P
DFF	Days to first flowering	G	1.000	0.992**	0.148	-0.289	0.284	0.999**	0.903**	0.023	0.403	0.212	0.353	0.247	0.423	-0.544	-0.309	-0.010
		P	1.000	0.990**	0.116	-0.248	0.315	0.996**	0.873**	-0.024	0.447	0.265	0.403	0.288	0.425	-0.589	-0.316	0.023
		E	1.000	0.717*	0.132	-0.394	-0.503	0.169	0.230	-0.189	-0.062	-0.406	-0.186	0.397	0.276	-0.175	-0.012	-0.457
D50%	Days to 50% flowering	G		1.000	0.091	-0.188	1.047	-0.331	-0.321	-0.390	0.608	0.722*	0.480	0.211	0.205	0.000	-0.472	0.765**
		P		1.000	-0.219	-0.173	0.180	0.237	0.249	-0.061	0.612	0.885**	0.667	0.085	0.239	-0.314	-0.414	0.800**
		E		1.000	-0.455	-0.279	0.200	0.994**	0.888**	-0.001	0.402	0.199	0.338	0.254	0.462	-0.553	-0.337	-0.041
PH	Plant height (cm)	G			1.000	0.201	-0.373	0.985**	0.874**	0.209	0.090	0.008	0.133	-0.016	0.138	-0.277	-0.123	-0.108
		P			1.000	0.078	0.550	0.153	0.845**	-0.013	-0.290	-0.084	-0.047	-0.477	-0.466	0.154	0.579	0.189
		E			1.000	0.053	-0.219	-0.233	0.214	-0.025	0.383	0.653	0.912**	0.769**	0.765**	-0.802**	-0.580	0.715*
NPB	Number of primary branches	G				1.000	-0.253	0.132	-0.220	-0.093	0.423	0.154	0.739	0.216	0.271	-0.774**	-0.114	0.602
		P				1.000	-0.061	0.871**	0.196	-0.090	-0.056	0.205	0.343	0.690*	0.493	-0.840**	-0.262	0.845**
		E				1.000	-0.077	0.722*	0.848**	-0.150	0.376	-0.281	0.385	0.238	0.589	-0.754**	-0.335	0.359
SB	Number Secondary branches	G					1.000	-0.162	-0.074	-0.013	0.541	0.245	-0.173	0.277	0.411	-0.533	-0.879**	0.258
		P					1.000	0.073	-0.103	0.155	0.380	0.510	0.360	0.372	0.414	-0.487	0.095	-0.433
		E					1.000	-0.289	-0.175	-0.236	0.083	0.143	0.498	0.179	0.256	-0.538	-0.278	-0.212
DF	Days to fruiting	G						1.000	0.171	-0.063	-0.280	0.006	0.329	0.099	0.139	-0.153	-0.255	-0.010
		P						1.000	0.127	0.271	-0.115	-0.101	0.116	0.235	0.180	-0.097	0.010	0.016
		E						1.000	-0.300	0.281	-0.190	0.561	-0.057	-0.002	0.442	-0.234	-0.249	-0.440
D1st	Days to 1st picking	G							1.000	-0.258	0.070	-0.172	0.875**	-0.365	0.141	-0.492	-0.328	0.561
		P							1.000	-0.089	-0.517	-0.100	0.553	0.740**	-0.361	-0.223	-0.279	0.578
		E							1.000	0.021	0.695	0.343	0.114	0.150	0.750*	0.143	-0.113	-0.040

		G	1.000	-0.116	-0.543*	-0.010	0.679	0.227*	-0.708	0.658	-0.104
		P	1.000	-0.116	-0.089	0.065	-0.035	0.472	-0.475	-0.515	0.156
FBP	**Fruit bearing period**	E	1.000	-0.511	-0.152	0.062	-0.043	0.578	-0.792**	-0.055	0.688*
		G		1.000	-0.008	0.103	-0.189	-0.162	-0.682*	-0.226	0.488
		P		1.000	-0.131	0.141	0.198	-0.100	-0.465	-0.277	0.818**
FL	**Fruit length (cm)**	E		1.000	0.283	-0.342	0.315	-0.470	-0.089	-0.729**	0.355
		G			1.000	-0.155	-0.254	-0.216	-0.240	0.092	0.256
FW_i	**Fruit width (cm)**	P			1.000	0.098	0.461	0.052	-0.003	-0.296	-0.344
		E			1.000	-0.335	-0.151	-0.427	-0.332	-0.034	-0.170
		G				1.000	-0.029	0.352	-0.083	0.141	0.003
FWe	**Fruit weight (g)**	P				1.000	-0.263	-0.284	-0.075	0.095	-0.240
		E				1.000	0.440	0.196	0.321	-0.201	-0.006
		G					1.000	0.079	0.138	-0.101	-0.059
S/PL	**Stalk/pedicel length (cm)**	P					1.000	-0.317	-0.045	-0.165	-0.109
		E					1.000	0.067	0.393	0.789**	-0.003
		G						1.000	-0.590	-0.460	0.094
NS/F	**Number of seeds per fruit**	P						1.000	-0.214	0.064	0.180
		E						1.000	0.268	-0.149	-0.131
		G							1.000	-0.097	-0.047
NF/F	**Number of fruits per plant**	P							1.000	-0.387	0.119
		E							1.000	0.090	0.196
		G								1.000	0.142
		P								1.000	0.594
DC	**Duration of crop (sowing to last harvest)**	E								1.000	-0.004
		G									1.000
GFY/P	**Green fruit yield /plant (g)**	P									1.000
		E									1.000

* Significant at P=0.05 level;** Significant at P=0.01 level

Table 2: Genotypic path coefficient analysis (direct and indirect effect) of different characters on green fruit yield in nine genotypes

Characters	DFF	D50%	PH	NPB	SB	DF	D1st	FBP	FL	FWi	FWe	S/PL	NS/F	NF/F	DC	Genotypic correlation coefficient
DFF	**-0.03702**	0.09779	0.07213	-0.16118	-0.05565	-0.34285	-0.17377	0.00693	-0.10975	0.01903	0.14934	0.06927	0.16242	-0.05721	0.11623	-0.0103
D50%	-0.03700	**0.09783**	0.05644	-0.13813	0.06070	-0.34188	-0.16798	-0.00711	-0.12177	0.02381	0.17014	0.08071	0.16287	-0.06191	0.11867	0.02341
PH	-0.00548	0.01132	**0.48765**	-0.21990	-0.09689	-0.05801	-0.04420	-0.05618	0.01700	-0.03646	-0.07869	0.11150	0.10572	-0.01837	0.00443	-0.457
NPB	0.01069	-0.02421	-0.19213	**0.55812**	0.20184	0.11352	0.06170	-0.11610	-0.16547	0.06486	0.20299	0.05917	0.07863	0.00003	0.17724	0.76475
SB	0.01069	0.03082	-0.24519	0.58457	**0.19270**	-0.08136	-0.04781	-0.01825	-0.16674	0.07951	0.28169	0.02386	0.09177	-0.03297	0.15541	0.8004
DF	-0.03697	0.09744	0.08241	-0.18457	0.04567	**-0.34328**	-0.17075	-0.00033	-0.10937	0.01789	0.14289	0.07125	0.17725	-0.05818	0.12649	-0.041
D1st	-0.03345	0.08545	0.11208	-0.17904	0.04791	-0.30476	**-0.19233**	0.06236	-0.02446	0.00076	0.05629	-0.00435	0.05311	-0.02910	0.04606	-0.1084
FBP	-0.00086	-0.00234	-0.09202	-0.21767	-0.01181	0.00038	-0.04029	**0.29770**	0.07888	-0.00753	-0.01986	-0.13388	-0.17866	0.01618	-0.21736	0.18868
FL	-0.01492	0.04374	-0.03043	0.33908	0.11797	-0.13785	-0.01728	-0.08621	**-0.27236**	0.05868	0.38562	0.21575	0.29364	-0.08432	0.21785	0.7147
FWi	-0.00784	0.02594	-0.19799	0.40307	0.17061	-0.06837	-0.00163	-0.02495	-0.17795	**0.08981**	0.31245	0.06074	0.10390	-0.08135	0.04294	0.60167
FWe	-0.01308	0.03939	-0.09080	0.26806	0.12844	-0.11606	-0.02562	-0.01399	-0.24851	0.06640	**0.42263**	0.19362	0.18928	-0.08828	0.09850	0.84515
S/PL	-0.00914	0.02814	0.19375	0.11769	0.01639	-0.08715	0.00298	-0.14203	-0.20940	0.01944	0.29161	**0.28062**	0.22587	-0.07932	0.12588	0.35941
NS/F	-0.01567	0.04153	0.13438	0.11439	0.04610	-0.15860	-0.02662	-0.13864	-0.20847	0.02432	0.20852	0.16522	**0.38364**	-0.05608	0.33013	0.25846
NF/F	0.02014	-0.05760	-0.08519	0.00016	-0.06043	0.18997	0.05324	0.04581	0.21844	-0.06949	-0.35484	-0.21170	-0.20463	**0.10514**	-0.03573	-0.4327
DC	0.01145	-0.03091	-0.00575	-0.00008	-0.07972	0.11558	0.02358	0.17225	0.15794	-0.01027	-0.11081	-0.09404	-0.33714	0.01000	**-0.37566**	-0.2118

Residual effect: 0.04707 **Diagonal bold value show direct effects**

*Significant atP=0.05 level; ** Significant at P=0.01 level

DFF Days to first flowering
D50% Days to 50% flowering
PH Plant height (cm)
NPB Number of primary branches
SB Secondary branches
DF Days to fruiting
D1st Days to 1st picking
FBP Fruit bearing period
FL Fruit length (cm)
FWi Fruit width (cm)
FWe Fruit weight (g)
S/PL Stalk/pedicel length (cm)
NS/F Number of seeds /fruit
NF/F Number of fruits/ plant
DC Duration of crop (sowing to last harvest days)
GFY/P Green fruit yield /plant (g)

plant, number of primary branches, number of secondary branches and average fruit weight. Patil (2007)reported that fruit yield per plant was highly and positively correlated with average fruit weight and pericarp thickness and plant spread at the genotypic level.Kulkarni (2006) found that plant height, fruit diameter, fruit surface area, pericarp weight showed negative direct effect while all other characters showed positive and high direct effect.

Path coefficient analysis at genotypic level (Table-2) reveled thatnumber of primary branches (0.558) showed the highest positive direct effect on green fruit yield per plant (g) though it had negative indirect contribution of fruit length and fruit bearing period respectively.Plant height (0.487) showed the second highest positive direct effect on green fruit yield per plant (g) followed by fruit weight (0.422),number of fruits/plant (0.383), Fruit bearing period (0.297), stalk/pedicel length (0.280), number of secondary branches (0.192) etc. The character days to fruiting had highly significant correlation with green fruit yield per plant (g), although it showed negative direct effect (- 0.343) due to higher positive indirect effect of fruit width, fruit weight, stalk/pedicel length, number of seeds/fruit and duration of crop (sowing to last harvest days).The above results agree with Dipendra and Gautam (2003)&Bhojaraja (2009) who reported that the developmental characters *viz*.,fruit weight, fruit length, fruit diameter, fruit surface area, number of fruit per plant had showed positive significant association with fruit yield per plant.

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