SHORT COMMUNICATION

CORRELATION AND PATH COEFFICIENT ANALYSIS IN CHILLI (*CAPSICUM ANNUM* L.) FOR FRUIT YIELD AND ITS ATTRIBUTING TRAITS

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Received-04.03.2018, Revised-23.03.2018

Abstract: The present investigation is carried out to study the correlation and path analysis for fruit yield and its attributing traits in 18 genotypes of chilli. Correlation and path coefficient analyses have been successfully used for plant selection for increasing yields of different crops. Association analysis studies indicated that fruit yield plant^{-1} had significant positive correlation with fruiting span, number of fruit plant^{-1}, fruit length indicating that these characters are the primary yield determinant in Chilli. To measure the direct as well as indirect association of one variable through another on the end product, path coefficients were calculated for all the yield attributing traits. Path coefficient analysis revealed that plant height at 150 DAT, number of branches plant^{-1}, days to first flowering, days to 50% flowering, days to first picking, fruiting span, number of fruit plant^{-1}, fruit length, fruit width, average fruit weight were the most important characters contributing towards fruit yield plant^{-1} and hence purposeful and balanced selection based on these characters would be made rewarding for improvement of chilli.

Keywords: Chilli, Correlation, Path coefficient analysis, Fruit

INTRODUCTION

Chilli *(Capsicum annuum* L.) is one of the most important vegetable as well as condiment and cash crop of India having immense commercial and therapeutic value. Chilli is very rich source of vitamin A and C. Green fruit of chilli is one of the richest sources of anti-oxidant. The pungency is due to alkaloid capsaicin. It has very high export potential as a spices crop. Five species of capsicum are under cultivation, *Capsicum annuum, Capsicum frutescens, Capsicum pubescens, Capsicum baccatum, and Capsicum chinensis.* Chilli belongs to the family solanaceae and is cultivated throughout the country. Chilli has been classified under often cross pollinated crops and the extent of natural out crossing has also reported up to 66.4 per cent (Singh *et al.*, 1994).

Genotypic and phenotypic correlations are important in determining the degree to which various yield contributing characters are associated. However, under complex situation, correlation alone become insufficient to explain relationships among characters. In such situation, the correlation coefficient may be confounded with indirect effect due to common association inherent in trait interrelationships. Path coefficient analysis has proven useful in providing additional information that describes a priori cause-and-effect relationships, such as yield and yield components. Thus path analysis of economic yield components with yield is important However in green chilli is meager to the study on correlation and path analysis in chilli for green vegetable yield. Therefore, field investigation was carried out with a view to study the character association and direct and indirect effect of independent characters on dependent green chillli yield by assessing the chilli genotype.

MATERIAL AND METHOD

The experiment was conducted with eighteen genotypes of chilli at Horticulture complex, Maharajpur, Department of Horticulture. J.N.K.V.V. Jabalpur (M.P.) during *Rabi* season of 2015- 2016. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. The nursery was raised during first week of September and the seedlings were transplanted at a spacing of 60 cm × 50 cm in a row during last week of October. Data were recorded on ten different traits viz**.** Plant height (cm) 150 DAT, No. of primary branches / plant at harvest, Days to 1st flowering, Days to 50% flowering, Days to 1st picking, Fruiting span, No. of fruit /plant, Fruit length (cm), Fruit width (cm) and Average fruit weight (g). The data recorded were analyzed statistically as per the original concept of correlation was presented by Galton (1888), which was elaborated later by Fisher (1918) and formula proposed by Miller *et al.* (1958). Path coefficient analysis was carried out as per the procedure given by Wright (1921) and illustrated by Dewey and Lu (1959).

RESULT AND DISCUSSION

Correlation coefficient was estimated between yield and its attributing traits at genotypic and phenotypic levels to know the interrelationship among the characters. The study of correlations among different traits revealed that in general the genotypic

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correlation coefficients were higher than phenotypic correlation coefficient. In the present findings significant positive phenotypic correlation of fruit yield plant^{-1} was observed with fruiting span, number of fruit plant^{-1}, fruit length indicating strong association of these traits with fruit yield plant^{-1}and selection for these traits will be useful in improving fruit yield (Table1). These findings corroborated the earlier findings of Pandit and Ahikary (2014) for number of fruit plant^{-1} and fruit length and Yatung et al. (2014) for number of fruit plant^{-1}. Number of branches plant^{-1} showed significant positive correlation with days to first flowering and fruit length. These results are in accordance with the findings of Patel et al. (2015). Highly significant and positive correlation of days to first flowering was observed with days to first picking. It indicates simultaneous improvement of both the characters. However, negative and significant association of fruit yield plant^{-1} with days to first flowering, days to 50% flowering and days to first picking was also observed are in agreement with the findings of Rajya and Vijaya (2011) and Sharma et al.(2010). Positive correlation between desirable traits is favourable because it helps in simultaneous improvement of both the characters. On the other hand, negative correlation will hinder the simultaneous expression of both characters with high values. In such situation some economic compromise has to be made.

To measure the direct as well as indirect association of one variable through another on the end product path coefficients were calculated at genotypic and phenotypic levels for all the yield attributing traits. The genotypic correlations were partitioned into direct and indirect effects to know the relative importance for all the yield attributing traits. The results of path analysis revealed that day to first picking followed by number of fruit plant^{-1}, average fruit weight, plant height at 150 DAT and number of branches plant^{-1} showed high positive direct effect on fruit yield plant^{-1}(Table2). Positive direct effect of these traits on fruit yield plant^{-1} indicated their importance in determining this complex character and therefore should be given high weightage during selection. These results are supported by earlier findings of Patel et al. (2015) for number of fruit plant^{-1} and average fruit weight, Farhad et al. (2008) for number of fruit plant^{-1}. Days to first flowering, fruiting span, fruit length, fruit width, days to 50% flowering had (Table2) high negative direct effect on fruit yield plant^{1}. The results are supported by the findings of Datta and Jana (2010) for width of fruit. Plant height at 150 DAT imparted highest positive indirect effect on average fruit weight, days to first flowering and days to 50% flowering and therefore these traits should be given due importance while practicing selection, aimed for improvement of fruit yield. Fruit length, fruit width, average fruit weight shows higher positive indirect effect on fruit yield plant^{-1}.

Thus in the present study correlation and path analysis collectively revealed the importance of plant height at 150 DAT, number of branches plant^{-1}, days to first flowering, days to 50% flowering, days to first picking, fruiting span, number of fruit plant^{-1}, fruit length, fruit width, average fruit weight were the most important characters contributing towards fruit yield plant^{-1} should be given more emphasis in the selection aimed at improving yieldinchilli.

Table 1. Estimates of genotypic and phenotypic correlation coefficients among fruit yield and its attributing traits in chilli

Characters		No. of primary branches / plant at harvest	Days to 1st flowering	Days to 50% flowering	Days to 1st picking	Fruiting span	No. of fruits /plant	Fruit length (cm)	Fruit width (cm)	Average fruit weight (g)	Fruit yield /plant (g)
Plant height (cm) 150 DAT	G	-0.137	-0.223	-0.561	-0.244	0.244	-0.491	0.581	0.223	0.723	0.090
	P	-0.101	-0.136	-0.403**	-0.224	0.224	-0.465**	0.490**	0.151	0.642**	0.081
No. of primary branches / plant at harvest	G		0.314	-0.190	0.307	-0.307	-0.293	0.215	0.061	0.099	-0.246
	P		0.296*	-0.082	0.235	-0.235	-0.215	0.269*	0.002	0.139	-0.176
Days to 1st flowering	G			0.392	0.849	-0.849	-0.578	-0.422	0.057	0.038	-0.703
	P			0.193	0.514**	-0.514**	-0.376**	-0.297*	0.108	0.097	-0.540**
Days to 50% flowering	G				0.483	-0.483	-0.058	-0.705	0.008	-0.376	-0.619
	P				0.441**	-0.441**	0.005	-0.367**	-0.088	-0.282*	-0.326*
Days to 1st picking	G					-0.684	-0.477	-0.211	0.219	0.025	-0.630
	P					-0.621**	-0.413**	-0.143	0.058	0.013	-0.519**
Fruiting span	G						0.477	0.211	-0.219	-0.025	0.630
	P						0.413**	0.143	-0.058	-0.013	0.519**
No. of fruit /plant	G							-0.130	-0.219	-0.777	0.650
	P							-0.075	-0.216	-0.643**	0.597**

Fruit length (cm)	G								0.272	0.401	0.243
	P								0.146	0.321*	0.269*
Fruit width (cm)	G									0.523	0.009
	P									0.394**	-0.046
Average fruit weight (g)	G										0.004
	P										0.010

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

Table 2. Genotypic path coefficients showing direct and indirect effects of different characters on fruit yield per plant (g) in Chilli

Characters	**Plant height (cm) 150 DAT**	**No. of primary branches / plant at harvest**	**Days to 1st flowering**	**Days to 50% flowering**	**Days to 1st picking**	**Fruiting span**	**No. of fruits / plant**	**Fruit length (cm)**	**Fruit width (cm)**	**Average fruit weight (g)**	**"r" value Fruit yield/ plant (g)**
Plant height (cm) 150 DAT	**1.6261**	-0.0772	1.5124	1.0899	-1.1765	-1.1766	-2.0660	-1.9651	-0.5250	2.8386	0.090
No. of primary branches / plant at harvest	-0.2220	**0.5657**	-2.1264	0.3692	1.4774	1.4776	-1.2361	-0.7256	-0.1428	0.3866	-0.246
Days to 1st flowering	-0.3632	0.1776	**-6.7709**	-0.7606	4.0860	4.0865	-2.4358	1.4264	-0.1342	0.1482	-0.703
Days to 50% flowering	-0.9127	-0.1076	-2.6542	**-1.9417**	2.3227	2.3230	-0.2454	2.3836	-0.0186	-1.4751	-0.619
Days to 1st picking	-0.3976	0.1737	-5.7485	-0.9378	**4.8120**	3.2918	-2.0074	0.7127	-0.5163	0.0984	-0.630
Fruiting span	0.3976	-0.1737	5.7493	0.9372	-3.2914	**-4.8126**	2.0074	-0.7127	0.5163	-0.0984	0.630
No. of fruit /plant	-0.7977	-0.1660	3.9160	0.1132	-2.2935	-2.2956	**4.2117**	0.4403	0.5165	-3.0477	0.650
Fruit length (cm)	0.9452	0.1216	2.8570	1.3691	-1.0145	-1.0146	-0.5485	**-3.3806**	-0.6419	1.5747	0.243
Fruit width (cm)	0.3620	0.0345	-0.3859	-0.0155	1.0538	1.0538	-0.9225	-0.9195	**-2.3581**	2.0515	0.009
Average fruit weight (g)	1.1763	0.0560	-0.2573	0.7299	0.1203	0.1206	-3.2711	-1.3556	-1.2333	**3.9241**	0.0040

Residual effect at Genotypic level = -0.903

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