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PATH COEFFICIENT ANALYSIS FOR YIELD AND QUALITY COMPONETS IN CHERRY TOMATO (*SOLANUM LYCOPERSICUM var. CERASIFORME*)

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Abstract

The path coefficient study was conducted for 22 genotypes of tomato at Experimental plot (Block-8), Division of Vegetable Crops, Indian Institute of Horticultural Research (IIHR), Hessaraghatta, Bangalore - 560 089 (Karnataka), India, during *kharif* and *rabi* season in the year 2011-2012. Fruit yield per plant was positively and significantly associated with number of fruits per plant and yield per plot. Genotypic path coefficient analysis for fruit yield per plant was directly and positively influenced by number of fruits per plant, locules per fruit, pericarp thickness, number of primary branches, indicating that these are the real independent characters and have maximum contribution towards increase in fruit yield, Hence this character may be simultaneously selected to develop the high yielding varieties.

Key words : Cherry tomato, yield and quality components, tomato germplasm, genetic improvement.

Introduction

Cherry tomato, *Solanum lycopersicum* var. *cerasiforme* is a botanical variety of the cultivated tomato or a smaller garden variety of tomato, having chromosome number 2n = 24. It is thought to be the ancestor of all cultivated tomatoes. It is marketed at a premium to ordinary tomatoes. Cherry tomatoes are generally considered to be simillar but not identical to the wild relative of the domestic tomato. It is widely cultivated in Central America when the Conquistadores arrived and is distributed in California, Korea, Germany, Mexico and Florida (Anonymous, 2009).

Tomato is self-pollinated solanaceous vegetable crop, which is originated from Peru Ecuador region (Rick, 1969). It is widely consumed vegetable crop throughout the world both for fresh fruit market and the processed food industry. Tomato is one of the most nutritive vegetable which is rich in vitamin A, vitamin C, proteins, fats, carbohydrates, food energy calories as well as other essential minerals and also having medicinal value (Nagariya *et al*., 2015). In India, tomato is grown in an area of about 0.82 mha with a production of 18.73 MT and productivity being 21.2 tonnes per ha. In Karnataka, it occupies an area of 0.61 lakh hectares with a production of 20.68 lakh tonnes and productivity being 33.90 tonnes per hectare (Anonymous, 2014).

Systematic study and evaluation of tomato germplasm is of great importance for current and future agronomic and genetic improvement of the crop. Furthermore, if an improvement programme is to be carried out, evaluation of germplasm is imperative, in order to understand the genetic background and the breeding value of the available germplasm (Agong *et al*., 2000). Singh *et al.* (2002) observed high genetic variation for plant height, number of fruit clusters plant^{-1}, number of fruits plant^{-1}, fruit weight plant^{-1}and fruit yield plant^{-1}. Yield being a complex trait, it is difficult to exploit various yield contributing characters through the knowledge of correlation, therefore it is important to carry out other analysis including path coefficient that provides a clear indication for selection criterion (Mc Giffens *et al*., 1994). The coefficients generated by path analysis measure the direct and the indirect influence of a variable upon another. Thus, the present investigation was initiated to study path coefficient

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analysis in different tomato genotypes, thereby; it is possible to recognize the relationship among various characters of tomato (Hidayatullah *et al*., 2008).

Materials and Methods

The experiment was conducted at the research farm of Experimental Plot (Block-8), Division of Vegetable Crops, Indian Institute of Horticultural Research (IIHR), Hessaraghatta, Bangalore - 560 089 (Karnataka), India. Twenty two genotypes of tomato were grown in randomized block design in three replications during *kharif* and *rabi* season in the year 2011-2012. Each treatment or varieties in each replication was represented by a plot size of 4m × 4m with four rows and each row consisting of 10 plants, for each genotype were planted with 75 cm inter row spacing, whereas plant distance were kept at 40 cm. All cultural practices were done according to Chaudhary and Shahid (2000). The observations were recorded on five randomly selected plants in each genotype per replication for various characters using standard procedures. The path coefficient analysis was carried out using phenotypic correlation values of yield components on yield as suggested by Wright (1921) and illustrated by Dewey and Lu (1959).

Results and Discussion

Path analysis helps in partitioning of correlation coefficients into direct and indirect effects, permitting a critical examination of the relative importance of each trait. Partitioning of total correlation into direct and indirect effects would be worthwhile for an effective selection programme. Path coefficient analysis was carried out using genotypic and phenotypic correlation coefficient for fruit yield per plant and are presented in tables 1 and 2, respectively. Genotypic path coefficient analysis for fruit yield per plant was directly and positively influenced by number of fruits per plant, locules per fruit, pericarp thickness, number of primary branches, indicating that these are the real independent characters and have

Table 1 : Genotypic path coefficient analysis of different characters on fruit yield per plant in cherry tomato through direct and indirect effects.

Characters	Plant height(cm)	No. of branches	T.clusters/plant	Locule no.	T.S.S.	Fless Thickness
Plant height(cm)	**-0.1956**	-0.1253	-0.0507	0.0294	-0.0358	0.0521
No. of branches	-0.0981	**-0.1531**	-0.0970	0.0351	-0.0220	0.0470
T. clusters/plant	-0.0047	-0.0114	**-0.0180**	0.0054	-0.0004	0.0083
Locule no.	-0.0146	-0.0222	-0.0291	**0.0969**	-0.0345	0.0121
T.S.S.	-0.0519	-0.0407	-0.0065	0.1010	**-0.2836**	0.0688
Fless Thickness	-0.0368	-0.0424	-0.0638	0.0172	-0.0335	**0.1382**
Yield / plant (kg)	-0.4016	-0.3951	-0.2650	0.2849	-0.4099	0.3265
Partial R^2	0.0786	0.0605	0.0048	0.0276	0.1162	0.0451

R sqare = 0.3328, Residual effect = **0.8168**
Bold : Direct effect Above and below diagonal: Indirect effect.
*Significant at 0.05 probability level **Significant at 0.01 probability level.

Table 2 : Phenotypic path coefficient analysis of different characters on fruit yield per plant in cherry tomato through direct and indirect effects.

Characters	Plant height(cm)	No. of branches	T.clusters/plant	Locule no.	T.S.S.	Fless Thickness
Plant height(cm)	**-0.1973**	-0.1301	-0.0551	0.0475	-0.0421	0.0713
No. of branches	-0.0352	**-0.0533**	-0.0385	0.0208	-0.0088	0.0232
T. clusters/plant	0.0174	0.0450	**0.0623**	-0.0250	0.0044	-0.0358
Locule no.	-0.0614	-0.0994	-0.1021	**0.2550**	-0.1254	0.0289
T.S.S.	-0.0551	-0.0424	-0.0181	0.1269	**-0.2581**	0.0682
Fless Thickness	-0.0922	-0.1111	-0.1464	0.0289	-0.0674	**0.2550**
Yield / plant (kg)	-0.4238	-0.3914	-0.2979	0.4542	-0.4974	0.4109
Partial R^2	0.0836	0.0209	-0.0186	0.1158	0.1284	0.1048

R sqare = 0.4349, Residual effect = **0.7517**
Bold : Direct effect Above and below diagonal: Indirect effect
* Significant at 0.05 probability level **Significant at 0.01 probability level.

maximum contribution towards increase in fruit yield. Harer *et al*. (2002), Mohanty (2003), *Rani et al*. (2010) reported the same effects of component traits on yield in different genotypes and environments. High negative direct effects on fruit yield per plant had been observed for number of fruits per clusters, total inflorescence, average fruit weight, no of fruits, fruit firmness, secondary branches, plant height. The results are in accordance with the findings of Asati *et al*. (2008).

Phenotypic path coefficient analysis for fruit yield per plant was directly and positively influenced by number of fruits per plant, locules per fruit, plant height, pericarp thickness, number of primary branches, average fruit weight, indicating that these are the real independent characters and have maximum contribution towards increase in fruit yield. Harer *et al.* (2002), Mohanty (2003), Rani *et al.* (2010) reported the same effects of component traits on yield in different genotypes and environments. It was concluded that number of fruits per plant exhibited the highest direct effect could be the selection criteria for improving fruit yield plant. High negative direct effects on fruit yield per plant had been observed for number of fruits per clusters, fruit firmness, total inflorescence, no of fruits, secondary branches. Similar findings were also obtained by Prashanth *et al.* (2008) and Asati *et al.* (2008). The study indicates that direct selection of number of fruits per plant, locules per fruit, plant height, pericarp thickness and number of primary branches, can be used as selection criteria for improvement and future breeding programme in tomato. Residual effect was low, indicating negligible contribution of the characters not included in the study.

References

Agong, S. G., S. Schittenhelm and W. Friedt (2000). Genotypic variation of Kenyan tomato (*Lycopersicon esculentum* L.) germplasm. *Plant Genetic Resources Newsletter*, **123** : 61-67.

Anonymous (2009). *Botanical classification of cherry tomato*.

Anonymous (2014). *Indian Horticulture Database*. National Horticulture Board. pp. 177-257.

Asati, B. S., N. Rai and A. K. Singh (2008). Geetic parameters study for yield and quality traits in tomato. *The Asian J. Hort*., **3(2)** : 222-225.

Chaudhary, M. F. and R. Shahid (2000). *Cultivation of Tomato* (Urdu). Vegetable Crops Research Programme, Horticulture Research institute, National Agricultural Research Centre, Islamabad, Pakistan, pp. 2-3.

Dewey, D. R. and K. H. Lu (1959). A correlation and path coefficient analysis of components of crested wheat grass seed production. *Agron. J.,* **51** : 515-528.

Harer, P. N., D. B. Lad and T. J. Bhor (2002). Correlation and path analysis studies in tomato. *J. Maharashtra Agr. Univ.,* **27(3)** : 302–303.

Hidayatullah, Shakeel A. J., G. Abdul and M. Tariq (2008). Path coefficient analysis of yield component in Tomato (*Lycopersicon esculentum*). *Pak. J. Bot*., **40(2)** : 627-635.

Mc Giffen, M. E., D. J. Pantone and J. B. Masiunas (1994). Path analysis of tomato yield components in relation to competition with black and eastern black nightshade. *J. Amer. Soci. Hort. Sci*., **119** : 6-11.

Mohanty, B. K. (2003). Genetic variability, correlation and path coefficient studies in tomato. *Indian J. Agr. Res*., **37(1)** : 68–71.

Nagariya, N. K., B. Rahul, S. Nemichand, S. Mukherjee and Umesh (2015). Correlation and path analysis in tomato, (*Solanum lycopersicon* L.). *Intl. J. Farm Sci*., **5(4)** : 111-117.

Prashanth, S. J., R. P. Jaiprakashan, R. Mulge and M. B. Madalageri (2008). Correlation and path analysis in tomato (*Lycopersicon esculentum* Mill.). *Asian J. Horti.*, **3** : 403-408.

Rani, C. I., I. Muthuvel and D. Veeraragavathatham (2010). Correlation and path coefficient for yield components and quality traits in tomato (*Lycopersicon esculentum* Mill.). *Agr. Sci. Dig.,* **30(1)** : 11–14.

Rick, C. M. (1969). *Origin of cultivated tomato, current status of the problem*. Abstr, XI International Botanical Congress, pp. 180.

Singh, J. K., J. P. Singh, S. K. Jain, J. Aradhana and A. Joshi (2002). Studies on genetic variability and its importance in tomato (*Lycopersicon esculentum* Mill.). *Prog. Hort*., **34** : 77-79.

Wright, S. (1921). Correletion and causation. *J. Agric. Res*., **20** : 557-587.