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Path Co-efficient Analysis of Yield and Yield Components of Co 1 Tomato (*Lycopersicon esculentum*, Mill)

C. PAULRAJ[1], RANI PERUMAL[2] and K. K. KRISHNAMOORTHY[3]

A field trial was conducted on a sandy-clay loam soil of Agricultural College and Research Institute, Madurai with a test crop of tomato CO 1 to study the source of N and its frequency of application on the physical parameters such as weight of fruits, size of fruits, number of branches, number of fruits/plant and yield. The data scrutinised by path analysis indicated that the fruit weight, number of branches, size of fruits and number of fruits/plant exhibited highly significant correlation to the yield of plant.

The most economic sources of protein, vitamins and minerals are the legumes and vegetables. Among vegetables, there is a high demand for tomato in the market. Being adaptable to rainfed and irrigated cropping systems, it offers the small farmers a profitable cash crop. Tomato is an excellent source of vitamin A and C. Tomato as a crop for processing industry is very attractive.

So as to meet the demand by boosting up the production, appropriate fertilizer and its frequency of application are essential; and these aspects form a complex quantitative feature governed by a large number of factors and are mostly influenced by the physical parameters such as weight, size and number of fruits. Therefore, a knowledge of the nature and magnitude of relationship of the various features with yield is important in improving production capacity of the crop.

The present study of path analysis provided the information on the nature of association of several interrelated features contributing to yield, by way of the direct and indirect contribution to yield, by way of the direct and indirect contribution of various factors in building up a complex correlation (Wright, 1921, 1923; Lee, 1956).

MATERIAL AND METHODS

The experiment was conducted with Co 1 tomato during the period from December, 1977 to March, 1978. It was laid out in a randomised block design with three replications involving five treatments, viz., Calcium ammonium nitrate, urea, ammonium sulphate, ammonium chloride and control with two different split applications. The crop was raised in ridges and furrows with a spacing of 75 cm between ridges and 60 cm between plants. The field was divided

1 & 2 Assistant Professors of Soil Science & Agrl. Chemistry, Agrl. College & Res. Institute, Madurai, 625104.

3 Dean, Agricultural College & Research Institute, Madurai. 625104

into three blocks and each block was further divided into nine plots measuring 6.75 sq. metres each. Each plot had two rows of plants with a population of 25 plants.

Data were collected from all the 25 plants of each plot. Observations were recorded at weekly interval on the number of branches, height of plant, fruit number, size of the fruit and fruit weight (fresh weight) and correlations were worked out using the method adopted by Miller *et al.* (1958) (Table I). In addition multiple linear regressions were calculated for these phenotypic characters and presented below.

RESULTS AND DISCUSSION

Physical parameters : The relation ship of the traits viz, number of fruits per plant, number of branches per plant height of plant, size of fruits and individual fruit weight of fruit yield per plant were assessed by working out simple correlations. Besides, the correlation between the plant traits themselves computed.

The features such as fruit weight, number of branches, size of fruit and number of fruits per plant exhibited highly positive significant correlation with the yield of plants. However, the height of plant had a feeble association.

The interplay path co-efficient analysis was resorted to with yield into direct and indirect effects through the other characters and are presented in Table II.

The interrelation of all the features indicating the fact of expression for the correlation with the other genomic features (Dewey and Lu, 1959). The individual fruit weight per plant had highly significant direct effect on first weight per plant. Besides, it served as a vehicle for the expression of other characters such as number of branches and size of the fruits.

Next to fruit weight, number of fruits per plant exhibited a substantial direct effect. Number of branches and size of the fruit had very feeble direct effect on plant yield. However, they expressed their characters through individual fruit weight. The direct effect of height of plant was also feeble and negative. The bulk of its correlation was due to its indirect effect through the number of fruits per plant. Natarajan *et al.* (1978) also observed in proso millet that 1000 grain weight was the important contributing factor followed by the number of grains per branch.

The relationship between the various physical parameters and yield was worked out through multiple linear regression equation and is given below

$$Y = -0.905 + 0.054 X_1 + 0\ 009 X_2 - 0.0009 X_3 + 0.005 X_4 + 0.016 X_5$$

where, Y = Yield, X = Physical parameters employed

The multiple linear regression of the five traits was also significant

wit R^2 value of 0.952 which indicated that 95.2 per cent of yield could be explained by the physical parameters studied viz., number of fruits per plant (X_1), number of branches (X_2), height of the plant (X_3), size of the fruit in sq. cm (X_4) and fruit weight in g (X_5).

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TABLE I Correlation matrix of yield contributors in tomato.

Characters	No. of branches	Height of plant (cm)	Size of fruit (sq.cm)	Fruit weight (g)	Yield/plant (kg)
No.of fruits/plant	0.433**	0.296	0.205	0.180	0.560**
No. of branches	—	0.296	0.773**	0.795**	0.833**
Height of plant (cm)	—	—	0.045	0.033	0.101
Size of fruit (sq cm)	—	—	—	0.703**	0.685**
Fruit weight (g)	—	—	—	—	0.884**

** Significant at 1% level

TABLE II The interplay path co-efficient with yield into direct and indirect components through other features.

Characters	No. of fruits/ plant	No. of branches	Height of plant (cm)	Size of fruit (sq.cm)	Fruit weight (g)	Correlation with yield
No. of fruits/plant	(0.4147)	0.0222	— 0.0178	0.0065	0.135	0.5601**
No. of branches	0.1795	(0.0513)	— 0.0178	0.0245	0.5948	0.8332**
Height of plant (cm)	0.1228	0.0151	(— 0.0601)	— 0.0014	0.0244	0.1008
Size of fruit (sq. cm)	0.0849	0.0396	0.0272	(0.0317)	0.5258	0.6848**
Fruit weight (g)	0.0745	0.0407	— 0.0019	—0.0222	(0.7485)	0.8841**

Residual effect : 0.218 ** Significant at 1% level

Figures given in paranthesis denote the direct effect.