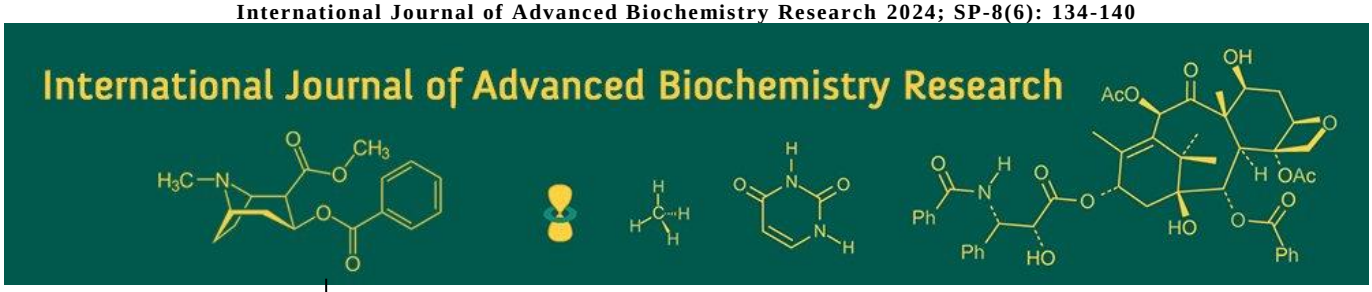

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; SP-8(6): 134-140
www.biochemjournal.com
Received: 28-04-2024
Accepted: 03-06-2024

Shubham Kumar
Rama University, Mandhana, Kanpur, Uttar Pradesh, India

Jitendra
Assistant Professor, Rama University, Mandhana, Kanpur, Uttar Pradesh, India

Corresponding Author:
Shubham Kumar
Rama University, Mandhana, Kanpur, Uttar Pradesh, India

A study on the genetic diversity in tomato (*Solanum lycopersicum* L.) under Agro-climatic condition of Kanpur

Shubham Kumar and Jitendra

DOI: https://doi.org/10.33545/26174693.2024.v8.i6Sb.1277

Abstract
The selection of the best cultivars can be helped by the significant positive relationship between crop path correlation and phenotypic and genotypic performance. It was used in our study due to the significant importance of these factors. For this an experiment was conducted on different genotypes of tomato during 2022-23, with the aim ofestimate phenotypic and genotypic correlation between fruit yield and its contributing traits and to estimate direct and indirect effects of yield components on fruit yield. The experimental material for the study consisted of 18 genotypes including one check (Kashi Aman), laid in Randomized Complete Block Design with three replications. Observations were recorded on thirteen quantitative characters. The most important trait fruit yield per plant had exhibited highly significant and positive phenotypic correlation with marketable fruit yield per plant (0.934), followed by average fruit weight (0.786), equatorial diameter (0.528). Marketable fruit yield per plant, average fruit weight and equatorial diameter were found significantly a positively correlated among themselves. The higher magnitude of positive direct effect on fruit yield per plant was exerted by marketable fruit yield per plant (0.635) followed by average fruit weight (0.348). The higher magnitude of negative direct effect on fruit yield per plant was exerted by equatorial diameter (-0.011). While maximum positive indirect effect on total fruit yield per plant shown by marketable fruit yield per plant (0.378), followed by equatorial diameter (0.329). while negative indirect effect shown by polar diameter (-0.148) followed by number of fruits per cluster (-0.127).Thus, it can be inferred from the data above that selecting for these qualities will effectively enhance the crop for increased production and contributing traits.

Keywords: Tomato (*Solanum lycopersicum* L.**)** correlation genotypic, phenotypic, path coefficient, quantitative trait

Introduction
Tomato (*Solanum lycoperscum* L.) is one of the most important vegetable crop, widely grown all over the world. It is a member of the family Solanaceae and the genus Solanum, is an herbaceous, annual and sometimes perennial in nature, prostrate and sexually propagated crop plant with bisexual flowers. Tomato is a typical day neutral plant that is primarily self-pollinated, but some cross-pollination does occur. It is a warm-season crop that tolerates heat and drought and grows in a variety of soil and climatic situations. Tomato is a good appetiser, and its soup is said to be an effective cure for patients suffering from constipation. It contains vitamin C and adds a variety of colours and flavours to the food. Tomatoes are noted for their high nutritional content, with 100g of edible tomato fruits containing 93.10g moisture, 3.60g carbs, 1.90g protein, 0.10g fat, 0.60g minerals, 0.70g fibres, and 320 I.U. vitamin C (ascorbic acid). Lycopene is a straight chain of hydrocarbon having 12 conjugated and 2 non-conjugated double bonds. It is a potent naturally occurring antioxidant that inhibits provitamin A activity and eliminates or quenches free radicals, which are involved in the breakdown of healthy body cells and have been associated with nearly every degenerative illness known to man, including cancer, arthritis, and heart disease. It is one of the best vegetables for retaining our stomach and intestine in good working order. Yield is a complex character controlled by many contributing characters and their interaction. An analysis of correlation between different quantitative characters provides an understanding of association that could be effectively exploited to work out selection strategies for improving yield components.

For any successful selection procedure, it would be beneficial to assess the relative significance of the link between different characteristics and yield. With an increasing need for tomatoes, it has become critical to develop high-yielding and suitable types for growth under various agro-climatic conditions. The primary goal of every crop development effort is to create productive and potentially optimal varieties. However, present trend exists in the development of hybrid cultivars to boost up the productivity and profitability of farmers. To meet out all the requirements of successful hybrids. It is necessary to be familiar with the detailed genetic structure of germplasm used for hybrid breeding. Path Coefficient analysis examines the direct impact of one variable on another and allows the division of the correlation coefficient into components of direct and indirect effects. The current research effort has been undertaken to explore the correlation and path coefficient analysis to estimate correlations among desirable features and their direct and indirect contributions toward yield. Thus, with the mentioned aspects in view, the current research was done to examine the correlation and path coefficient analysis in 18 genotypes on 13 tomato traits.

Material and Methods

The present investigation "To studies on genetic diversity in tomato (*Solanum lycopersicum* L.) under the agro-climatic condition of Kanpur" was conducted in the Agriculture Research Farm of Rama University, Mandhana, Kanpur during 2022-2023. The experimental material for the study consisted of 18 genotypes including one checks (Kashi Aman), laid in Randomized Complete Block Design with three replications. Each treatment consisted of 12 plants in one genotype, havingspacing of 60x50cm with net plot size of 3.0x1.8 m^2. Observations were recorded on thirteen quantitative characters *viz*., Daysto50percent flowering**,** Plantheight, Loculesperfruit, Pericarpthickness, Polardia meter of fruit, Equatorialdiameteroffruit, Number offruits per cluster, Average fruit weight, Number offruits perplant, Marketablefruityieldperplant, Unmarketable fruit yield per plant, Totalfruityieldperplant, TSS (°Brix).

The correlations between different characters at genotypic (g) and phenotypic (p) levels were worked out as suggested by Searle (1961) [6].

i) Phenotypic correlation coefficient between characters X and Y

$$r_{xy(p)} = \frac{Cov._{xy(p)}}{\sqrt{Var.\,X\,(p).\,Var.\,Y\,(p)}}$$

ii) Genotypic correlation between characters X and Y

$$r_{xy(g)} = \frac{Cov._{xy(g)}}{\sqrt{Var.\,X\,(g).\,Var.\,Y\,(g)}}$$

Where,

r_{xy} =Correlation coefficients between X and Y.

Covariance XY=Co-variance between characters X andY

Var.X=Variance for X character

Var.Y=Variance for Y character

The significance of phenotypic correlation coefficients was tested against (n-2) degrees of freedom at 5% and 1% probability level. Where, n is the number of germplasms on which the observations were recorded.

According to Singh and Chaudhary (1985) [9], statistical analysis was performed on the data to determine the genotypic and phenotypic correlation coefficient. Following Dewey and Lu's advice, the route analysis approach was used to quantify the direct and indirect impacts of component characteristics on yield (1959).

Result and Discussion

The type and degree of the relationship between yield and its constituent features is required for successful selection in future generations. The nature of the population under consideration, as well as the amount of the correlation coefficient, are frequently impacted by the people observed. Correlations between character pairs are caused by gene linkage or pleiotropy. As a result, choosing one attribute influences the other related or pleiotropically impacted qualities. Correlation studies have received a lot of attention in plant improvement since they aid with successful selection.

The phenotypic and genotypic correlation coefficient computed among the thirteen characters under study had been presented in table 1 and 2 In general, genotypic correlation coefficients were higher than the corresponding phenotypic correlation coefficients, suggesting therefore, a strong inherent relationship in different pairs of characters in tomato genotypes. The most important trait fruit yield per plant had exhibited highly significant and positive phenotypic correlation with marketable fruit yield per plant (0.934), followed by average fruit weight (0.786), equatorial diameter (0.528). Marketable fruit yield per plant, average fruit weight and equatorial diameter were found significantly a positively correlated among themselves. Thus, the selection for Marketable fruit yield per plant, average fruit weight and equatorial diameter or either of it may automatically improve the total fruit yield per plant. Many earlier research workers have also reported significant and positive association of total fruit yield plant with Marketable fruit yield per plant, average fruit weight and equatorial diameter. Similar association of traits in tomato had also been reported Jogi *et al.* (2018) [3], Maurya *et al.* (2020) [4], Sharma *et al.* (2021) [7].

Path Coefficient Analysis

The path coefficient is simply a standardized partial regression coefficient that splits the correlation coefficient into direct and indirect effects of a set of independent factors on the dependent variable. This study created a mechanism for identifying the direct and indirect impacts of various variables on fruit yield per plant at the phenotypic and genotypic levels.

Using phenotypic and genotypic correlation coefficients, path coefficient analysis was used to estimate the direct and indirect effect of thirteen characteristics on fruit yield per plant. Tables 3 and 4 indicate the direct and indirect effects of different traits on fruit yield per plant at the phenotypic and genotypic levels.

The higher magnitude of positive direct effect on fruit yield per plant was exerted by marketable fruit yield per plant (0.635) followed by average fruit weight (0.348). The higher magnitude of negative direct effect on fruit yield per plant was exerted by equatorial diameter (-0.011). While maximum positive indirect effect on total fruit yield per plant shown by marketable fruit yield per plant (0.378), followed by equatorial diameter (0.329). while negative

indirect effect shown by polar diameter (-0.148) followed by number of fruits per cluster (-0.127).

The higher magnitude of positive direct effect on fruit yield at genotypic level was exerted by marketable fruit yield per plant (0.658) and number of fruits per cluster (0.3867), average weight (0.0279). The higher magnitude of negative direct effect on fruit yield per plant was exerted by equatorial diameter (-0.0409) and pericarp thickness (-0.0183). while maximum positive indirect effect shown by marketable fruit yield per plant (0.4975) and polar diameter (0.329). This indicated that direct selection based on marketable fruit yield per plant and average fruit weight would result in an appreciable improvement of fruit yield per plant in tomato. Similar results were also reported by Rawat *et al.* (2017) [5], Sharma *et al.* (2019) [8], Doddamani *et. al.* (2019) [2] and Maurya *et al.* (2020) [4].

Tomato (*Solanum lycoperscum* L.) is one of the most important vegetable crop, widely grown all over the world. It is a member of the family Solanaceae and the genus Solanum, is an herbaceous, annual and sometimes perennial in nature, prostrate and sexually propagated crop plant with bisexual flowers.Tomato is a typical day neutral plant that is primarily self-pollinated, but some cross-pollination does occur. It is a warm-season crop that tolerates heat and drought and grows in a variety of soil and climatic situations. Tomato is a good appetiser, and its soup is said to be an effective cure for patients suffering from constipation. It contains vitamin C and adds a variety of colours and flavours to the food. Tomatoes are noted for their high nutritional content, with 100g of edible tomato fruits containing 93.10g moisture, 3.60g carbs, 1.90g protein, 0.10g fat, 0.60g minerals, 0.70g fibres, and 320 I.U. vitamin C (ascorbic acid). Lycopene is a straight chain of hydrocarbon having 12 conjugated and 2 non-conjugated double bonds.It is a potent naturally occurring antioxidant that inhibits provitamin A activity and eliminates or quenches free radicals, which are involved in the breakdown of healthy body cells and have been associated with nearly every degenerative illness known to man, including cancer, arthritis, and heart disease. It is one of the best vegetables for retaining our stomach and intestine in good working order. Yield is a complex character controlled by many contributing characters and their interaction. An analysis of correlation between different quantitative characters provides an understanding of association that could be effectively exploited to work out selection strategies for improving yield components. For any successful selection procedure, it would be beneficial to assess the relative significance of the link between different characteristics and yield. With an increasing need for tomatoes, it has become critical to develop high-yielding and suitable types for growth under various agro-climatic conditions. The primary goal of every crop development effort is to create productive and potentially optimal varieties. However, present trend exists in the development of hybrid cultivars to boost up the productivity and profitability of farmers. To meet out all the requirements of successful hybrids. It is necessary to be familiar with the detailed genetic structure of germplasm used for hybrid breeding. Path Coefficient analysis examines the direct impact of one variable on another and allows the division of the correlation coefficient into components of direct and indirect effects. The current research effort has been undertaken to explore the correlation and path coefficient analysis to estimate correlations among desirable features and their direct and indirect contributions toward yield. Thus, with the mentioned aspects in view, the current research was done to examine the correlation and path coefficient analysis in 18 genotypes on 13 tomato traits.

Material and Methods

The present investigation "To studies on genetic diversity in tomato (*Solanum lycopersicum* L.) under the agro-climatic condition of Kanpur" was conducted in the Agriculture Research Farm of Rama University, Mandhana, Kanpur during 2022-2023. The experimental material for the study consisted of 18 genotypes including one checks (Kashi Aman), laid in Randomized Complete BlockDesign with three replications. Each treatment consisted of 12 plants in one genotype, having spacing of 60x50cm with net plot size of 3.0x1.8 m2. Observations were recorded on thirteen quantitative characters *viz*., Daysto50percent flowering, Plant height, Locules per fruit, Pericarp thickness, Polardiameter of fruit, Equatorial diameter of fruit, Number offruits per cluster, Average fruit weight, Number of fruits per plant, Marketable fruit yield per plant, Unmarketable fruit yield per plant, Total fruit yield per plant, TSS (°Brix).

The correlations between different characters at genotypic (g) and phenotypic (p) levels were worked out as suggested by Searle (1961) [6].

i) Phenotypic correlation coefficient between characters X and Y

ii) Genotypic correlation between characters X and Y

Where,

rxy =Correlation coefficients between X and Y.

Covariance XY=Co-variance between characters X andY

Var.X=Variance for X character

Var.Y=Variance for Y character

The significance of phenotypic correlation coefficients was tested against (n-2) degrees of freedom at 5% and 1% probability level. Where, n is the number of germplasms on which the observations were recorded.

According to Singh and Chaudhary (1985) [9], statistical analysis was performed on the data to determine the genotypic and phenotypic correlation coefficient. Following Dewey and Lu's advice, the route analysis approach was used to quantify the direct and indirect impacts of component characteristics on yield (1959).

Result and Discussion

The type and degree of the relationship between yield and its constituent features is required for successful selection in future generations. The nature of the population under consideration, as well as the amount of the correlation coefficient, are frequently impacted by the people observed. Correlations between character pairs are caused by gene linkage or pleiotropy. As a result, choosing one attribute influences the other related or pleiotropically impacted qualities. Correlation studies have received a lot of attention in plant improvement since they aid with successful selection.

The phenotypic and genotypic correlation coefficient computed among the thirteen characters under study had been presented in table 1 and 2 In general, genotypic correlation coefficients were higher than the corresponding phenotypic correlation coefficients, suggesting therefore, a strong inherent relationship in different pairs of characters in

tomato genotypes. The most important trait fruit yield per plant had exhibited highly significant and positive phenotypic correlation with marketable fruit yield per plant (0.934), followed by average fruit weight (0.786), equatorial diameter (0.528). Marketable fruit yield per plant, average fruit weight and equatorial diameter were found significantly a positively correlated among themselves. Thus, the selection for Marketable fruit yield per plant, average fruit weight and equatorial diameter or either of it may automatically improve the total fruit yield per plant. Many earlier research workers have also reported significant and positive association of total fruit yield plant with Marketable fruit yield per plant, average fruit weight and equatorial diameter. Similar association of traits in tomato had also been reported Jogi *et al*. (2018) [3], Maurya *et al*. (2020) [4], Sharma *et al*. (2021) [7].

Path Coefficient Analysis:

The path coefficient is simply a standardized partial regression coefficient that splits the correlation coefficient into direct and indirect effects of a set of independent factors on the dependent variable. This study created a mechanism for identifying the direct and indirect impacts of various variables on fruit yield per plant at the phenotypic and genotypic levels.

Using phenotypic and genotypic correlation coefficients, path coefficient analysis was used to estimate the direct and indirect effect of thirteen characteristics on fruit yield per plant. Tables 3 and 4 indicate the direct and indirect effects of different traits on fruit yield per plant at the phenotypic and genotypic levels.

The higher magnitude of positive direct effect on fruit yield per plant was exerted by marketable fruit yield per plant (0.635) followed by average fruit weight (0.348). The higher magnitude of negative direct effect on fruit yield per plant was exerted by equatorial diameter (-0.011). While maximum positive indirect effect on total fruit yield per plant shown by marketable fruit yield per plant (0.378), followed by equatorial diameter (0.329). while negative indirect effect shown by polar diameter (-0.148) followed by number of fruits per cluster (-0.127).

The higher magnitude of positive direct effect on fruit yield at genotypic level was exerted by marketable fruit yield per plant (0.658) and number of fruits per cluster (0.3867), average weight (0.0279). The higher magnitude of negative direct effect on fruit yield per plant was exerted by equatorial diameter (-0.0409) and pericarp thickness (-0.0183). while maximum positive indirect effect shown by marketable fruit yield per plant (0.4975) and polar diameter (0.329). This indicated that direct selection based on marketable fruit yield per plant and average fruit weight would result in an appreciable improvement of fruit yield per plant in tomato. Similar results were also reported by Rawat *et al*. (2017) [5], Sharma *et al*. (2019) [8], Doddamani et. al. (2019) [2] and Maurya *et al*. (2020) [4].

Table 1: Estimates of phenotypic correlation coefficients among thirteen characters in tomato

Traits	Days to 50% Flowering	Plant Height	Locules Per Fruit	Pericarp Thickness	Polar Diameter	Equatorial Diameter	Number of Fruits Per Cluster	Average fruit weight	Number of fruits per plant	Marketable Fruit Yield Per Plant	Unmarketable Fruits Yield Per Plant	TSS	Total Fruit Yield Per Plant
Days to 50% Flowering	1.000	0.431**	0.218*	0.071	-0.095	0.053	0.09	0.335*	-0.512**	0.099	-0.339*	0.140	-0.071
Plant Height		1.000	0.537**	0.014	-0.113	-0.011	0.093	0.304	-0.122	0.008	0.156	0.211*	0.15
Locules Per Fruit			1.000	0.084	0.004	0.048	0.245	0.072	0.141	-0.044	0.480**	0.160	0.177
Pericarp Thickness				1.000	0.257**	0.239**	0.073	0.094	-0.126	-0.167	-0.149	-0.088	-0.012
Polar Diameter					1.000	0.213*	0.018	0.810**	-0.498**	0.007	-0.129	-0.186	0.381*
Equatorial Diameter						1.000	0.003	0.105	0.047	-0.199	0.049	-0.128	0.528**
Number of Fruits Per Cluster							1.000	0.132	-0.011	0.080	0.359*	-0.173	0.382
Average Fruit Weight								1.000	0.349**	-0.065	0.185	-0.216*	0.786**
Number of Fruits Per Plant									1.000	0.113	0.542**	-0.020	0.382*
Marketable Fruit yield Per Plant										1.000	0.474**	0.137	0.934**
Unmarketable Fruit yield Per Plant											1.000	-0.105	0.164
TSS												1.000	-0.019

Significant at 5%and1%,respectively

Table 2: Estimates of genotypic correlation coefficient among thirteen characters in tomato

Traits	Days to 50% Flowering	Plant Height	Locules Per Fruit	Pericarp Thickness	Polar Diameter	Equatorial Diameter	Number of Fruits Per Cluster	Average fruit weight	Number of fruits per plant	Marketable Fruit Yield Per Plant	Unmarketable Fruits Yield Per Plant	TSS	Total Fruit Yield Per Plant
Daysto 50% Flowering	1.000	0.429**	0.287**	0.081	-0.113	0.012	0.103	0.372*	-0.632**	0.094	-0.383*	0.178	-0.103
Plant Height		1.000	1.100**	0.031	-0.361	-0.018	0.1	0.302	-0.139	-0.233**	0.153	0.401**	0.164
Locules Per Fruit			1.000	0.112	-0.054	0.080	0.284	0.078	0.142	-0.296**	0.505**	0.307**	0.171
Pericarp Thickness				1.000	0.458**	0.417**	0.081	0.097	-0.136	-0.215*	-0.155	-0.097	-0.014
Polar Diameter					1.000	0.518**	-0.056	0.806**	-0.566**	-0.190*	-0.161	-0.278**	0.482*
Equatorial Diameter						1.000	0.115	0.179	0.248**	-0.523**	0.025	-0.234**	0.526**
Number of Fruits Per Cluster							1.000	0.143	-0.052	0.068	0.347*	-0.188*	0.286
Average Fruit Weight								1.000	0.445**	-0.149	0.163	-0.241**	0.727**
Number of Fruits Per Plant									1.000	0.082	0.555**	-0.041	0.376*
Marketable Fruit yield Per Plant										1.000	0.478**	0.171	0.986**
Unmarketable Fruit yield Per Plant											1.000	-0.112	0.156**
TSS												1.000	-0.044

Significant at 5%& 1%

Table 3: Direct and indirect effect of twelve characters on fruit yield per plant at phenotypic level in tomato

Traits	Days to 50% Flowering	Plant Height	Locules Per Fruit	Pericarp Thickness	Polar Diameter	Equatorial Diameter	Number of Fruits Per Cluster	Average fruit weight	Number of fruits per plant	Marketable Fruit Yield Per Plant	Unmarketable Fruits Yield Per Plant	TSS	Total Fruit Yield Per Plant
Daysto 50% Flowering	-0.003	0.002	0.002	0.000	-0.002	-0.001	0.006	-0.003	0.002	-0.002	0.093	-0.001	-0.071
Plant Height	-0.029	0.006	0.005	0.000	-0.003	0.000	-0.010	0.000	0.000	-0.034	0.128	-0.001	0.15
Locules Per Fruit	-0.006	0.003	0.010	0.000	0.000	-0.001	-0.078	0.001	0.000	0.039	0.110	-0.001	0.177
Pericarp Thickness	0.000	0.000	0.001	0.000	0.006	-0.003	-0.053	0.000	0.001	-0.035	0.046	0.000	-0.012
Polar Diameter	0.011	-0.001	0.000	0.000	0.026	-0.002	-0.024	0.001	-0.003	-0.148	0.245	0.001	0.381*
Equatorial Diameter	0.012	0.000	0.001	0.000	0.005	-0.011	0.001	-0.001	0.001	-0.077	0.329	0.001	0.558**
Number of Fruits Per Cluster	-0.018	0.005	0.000	-0.005	0.005	0.000	0.019	-0.001	0.000	-0.034	-0.127	0.001	0.382
Average Fruit Weight	-0.027	0.007	0.000	-0.006	0.007	-0.001	0.051	0.348	0.006	0.001	0.036	0.001	0.786**
Number of Fruits Per Plant	0.041	0.002	0.001	-0.005	0.002	-0.007	-0.004	-0.003	0.017	-0.002	0.056	0.000	0.382*
Marketable Fruit yield	0.000	0.007	0.000	-0.007	0.007	0.002	0.031	0.001	0.002	0.635	0.378	-0.00	0.934**

Per Plant												1	
Unmarketable Fruit yield Per Plant	-0.021	-0.003	0.001	0.009	-0.003	0.001	0.079	0.000	0.001	-0.010	0.009	0.001	0.564**
TSS	-0.005	0.006	0.001	-0.006	0.006	0.001	-0.066	0.002	0.000	-0.003	-0.087	-0.005	-0.019

R^2= 0.8624, RESIDUAL EFFECT = 0.0753

Table 4: Direct and indirect effect soft welve characters on fruit yield per plant at genotypic Evelin tomato

Traits	Days to 50% Flowering	Plant Height	Locules Per Fruit	Pericarp Thickness	Polar Diameter	Equatorial Diameter	Number of Fruits Per Cluster	Average fruit weight	Number of fruits per plant	Marketable Fruit Yield Per Plant	Unmarketable Fruits Yield Per Plant	TSS	Total Fruit Yield Per Plant
Days to 50% Flowering	-0.0333	0.0089	0.0058	-0.0015	-0.0106	-0.0007	0.0523	0.0138	0.0041	-0.0042	0.1049	0.0026	-0.103
Plant Height	-0.0135	0.0206	0.0221	-0.0006	-0.0342	0.0011	-0.0152	-0.0020	0.0017	0.0104	-0.1380	0.0058	0.164
Locules Per Fruit	-0.0090	0.0227	0.0221	-0.0021	-0.0051	-0.0049	-0.1861	-0.0035	0.0032	0.0133	-0.2393	0.0044	0.171
Pericarp Thickness	-0.0026	0.0006	0.0023	-0.0183	0.0433	-0.0254	-0.0662	0.055	-0.035	0.046	-0.1285	-0.0014	-0.014
Polar Diameter	0.0035	-0.0075	-0.0011	-0.0084	0.0151	-0.0316	-0.0694	0.477	-0.138	0.245	-0.0778	-0.0040	0.482*
Equatorial Diameter	-0.0004	-0.0004	0.0016	-0.0076	0.0490	-0.0409	0.0443	0.501	-0.077	0.329	-0.2443	-0.0034	0.556**
Number of Fruits Per Cluster	-0.0042	0.002	0.001	-0.005	-0.001	-0.015	0.3867	0.0039	-0.0015	-0.0030	0.2462	-0.0027	0.286
Average Fruit Weight	-0.0160	0.007	0.000	-0.007	-0.053	-0.109	0.0552	0.0266	0.0128	0.0067	0.0644	-0.0035	0.727**
Number of Fruits Per Plant	-0.0045	-0.003	0.001	0.009	0.033	0.035	-0.0201	0.0120	0.0179	-0.0037	0.0321	-0.0006	0.376*
Marketable Fruit yield Per Plant	-0.0029	0.006	0.001	-0.006	-0.030	-0.079	0.0263	-0.0040	0.0024	0.6587	0.4975	0.0025	0.986**
Unmarketable Fruit yield Per Plant	-0.0038	0.004	0.003	0.011	0.008	-0.006	0.1109	0.0020	0.0011	-0.0311	0.007	-0.0016	0.656**
TSS	-0.0056	-0.008	-0.001	-0.007	-0.003	-0.004	-0.0728	-0.0065	-0.0012	-0.0076	-0.0961	0.0145	-0.044

R^2=0.8595,RESIDUALEFFECT=0.0163

Conclusion

Based on the above result of correlation studies it could be concluded that characters like Marketable fruit yield per plant, average fruit weight and equatorial diametershowed highly positive significant correlation with the yield. Thus, this finding indicated that these traits could utilize in various breeding as well as improvement programmes. The information may further help the breeders in formulating appropriate strategy aimed at getting higher yield and character improvement in tomato.

Acknowledgement

The first author is thankful to the whole Department of Vegetable Science for providing necessary facilities to conduct an experiment and specially my Advisor Dr. Jitendra Kumar for their kind suggestions and inspirations during research work.

Competing interests

Author have declared that no competing interests exist.

References

1. Dewey DR, Lu KH. A correlation and path coefficient analysis of components of crested wheat grass seed production. Agron J. 1959;51:515-8.
2. Doddamani MB, RCJ, Baby R, GP. Correlation and path analysis for growth, yield and quality traits in F3 population of Cherry tomato (*Solanum lycopersicum* L. var. cerasiforme). Int J Chem Stud. 2019;7(3):3712-6.
3. Jogi M, Lingaiah HB, Indiresh KM, Singh TH, Samuel DK, Ramachandra RK. Studies on correlation and path coefficient analysis in tomato (*Solanum lycopersicum* L.). Int J Chem Stud. 2018;6(5):1499-502.
4. Maurya RK, Singh AK, Sai A. Correlation and path analysis in tomato (*Solanum lycopersicum* L.) for yield and yield contributing traits. J Pharmacogn Phytochem. 2020;9(3):1684-7.

5. Rawat M, Singh D, Singh N, Kathayat K. Character association and path coefficient analysis in tomato (*Solanum lycopersicum* L.). Int J Curr Microbiol Appl Sci. 2017;6(8):1966-72.
6. Searle SR. The value of endive of selection I. Mass selection. Biometrika. 1961;21:682-709.
7. Sharma A, Pandey SK, Nair R. Correlation and path co-efficient analysis for yield and its contributing traits in Tomato (*Solanum lycopersicum* L.). Pharma Innov J. 2021;10(3):616-22.
8. Sharma P, Dhillon NS, Kumar V, Kumar P. Correlation and path analysis for yield and its contributing traits in tomato (*Solanum lycopersicum* L.) under the protected environment. J Pharmacogn Phytochem. 2019;SP1:447-50.
9. Singh RK, Chaudhary BD. Biometric methods in quantitative genetic analysis. New Delhi: Kalyani Publishers; c1985. p. 303-18.