*Plant Archives* Vol. 25, Supplement 1, 2025 pp.831-837 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.supplement-1.111

# GENETIC ASSOCIATION AND CHARACTERIZATION OF CHILLI (*CAPSICUM ANNUUM L.*) GERMPLASM FOR YIELD AND ITS COMPONENT CHARACTERS

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(Date of Receiving : 16-08-2024; Date of Acceptance : 12-10-2024)

**ABSTRACT**

To characterize and select chilli genotypes for different qualitative and quantitative traits through determination of extent of genetic variability for those traits and interrelationship among the characters and their direct and indirect effects on yield for further breeding programme of improved chilli hybrids. To study the magnitude of variability for different morphological traits, of 75 chilli genotypes were evaluated at University Instructional Farm, School of Agriculture & Allied Sciences, The Neotia University, South 24 Parganas, West Bengal, India during autumn-winter season of 2023. Through analysis of variance, a wide significant difference was found for almost all characters indicating a greater opportunity of exploiting variability. High GCV and PCV values were recorded for plant height, fruit length, fruit shape index, fruit: stalk length, fruits per plant, fruit weight and fruit yield per plant. Phenotypic co-efficient of variation (PCV) and Genotypic co-efficient of variation (GCV) were recorded maximum for plant height, fruit length, fruit shape index, fruit: stalk length, fruits per plant, fruit weight and fruit yield per plant. In the present study all characters showed high heritability with high genetic advance. The character fruit yield per plant was significantly and positively correlated with fruit length, stalk length, fruits per plant, fruit weight, 1000-seed weight, fruit shape index and fruit: stalk length. Path analysis showed that fruits per plant exerted highest direct positive effect on fruit yield per plant; followed by fruit weight and fruit shape index in both the years. From the association studies, the characters, *viz*., days to 50% flowering, fruits per plant, fruit weight, fruit length, 1000-seed weight, stalk length, fruit shape index and fruit: stalk length, were established as the most important yield contributing characters of chilli.

***Keywords*** : Chilli, Correlation, Genetic variability, Heritability, Path coefficient

## Introduction

Chilli widely known as hot pepper belonging to the member of solanaceae originated in the new world (Bahurupe *et al*., 2013) is the second most important solanaceous vegetable after tomato and is widely grown as spice cum vegetable crops worldwide (Hasan *et al*., 2014). It is an important ingredient for spice, sauces and pickles for its pungency due to capsaicin, an alkaloid among a group of 15 different alkaloids (Bosland and Votava, 2000) present in the placenta of fruits and red color, due to the pigment known as capsanthin (Prasath and Ponnuswami, 2008) under tropical, sub-tropical and temperate climate (Hazra *et al*., 2011). Among the five cultivated species of the *Capsicum* genus which is originated from Mexico,

*Capsicum annuum* L. is the most widely cultivated species. Guatemala and Bulgaria are considered as its secondary centers of origins (Salvador, 2002). In India Chilli was introduced through the Portuguese in the 16$^{th}$ century (Singh *et al*., 2004). Chilli is grown in most countries of the world on an area of almost 1.5 million hectares with the annual production of almost 7.0 million tones and Asia is the largest producer of chilli. India is the major exporter and producer of chilli which is grown over an area of 7.92 lakh hectares with a production of 12.23 lakh tonnes and the productivity of 1.5 tonnes per hectare (Anonymous, 2011). Among the major chilli growing states, Andhra Pradesh has the highest area and production followed by Karnataka, Maharashtra, Punjab, Rajasthan and West Bengal. In West Bengal, it is mostly cultivated as autumn-spring (sowing in September) and also as summer-rainy crop (sowing in March-April). Though India ranks first in chilli production, its productivity is low (1 t/ha dry chilli) as compared to USA, South Korea, China etc. (3-4 t/ha, dry chilli) (Reddy *et al*., 2002) due to biotic and abiotic stresses, poor management practices, lower yield potential of the adopted varieties, large gap between potential and actual yield obtained in the field of the recommended varieties and use of open pollinated varieties with cultivation of hybrid varieties in only 2.6% of areas (Hundal, 2000).So, there is need of developing of new varieties and hybrids with high productivity and quality parameters. The selection, characterization and evaluation of germplasms and the critical assessment of the nature and magnitude of genetic variability, extent of heritability of economically important traits and gene actions in the germplasms and utilization of the available genetic diversity for improvement of chilli breeding programme is one of the important pre-requisites for effective breeding methods. Thus, the choice of desirable parental combination is sometimes done on the basis of selection of single trait that affects a number of associated traits which bring forth the necessity of finding out the inter relationship of various yield components both among themselves and with the yield. Keeping in view te above facts the present study was undertaken with the following objective: To characterize and select chilli genotypes for different qualitative and quantitative traits through determination of extent of genetic variability for those traits and interrelationship among the characters and their direct and indirect effects on yield for further breeding programme of improved chilli hybrids.

## Materials and Methods

The experiment was carried out at University Instructional Farm, School of Agriculture & Allied Sciences, The Neotia University, South 24 Parganas, West Bengal, India during autumn-winter season of 2023 with seventy-five genetically diversified chilli genotypes collected from West Bengal and all over India in randomized block design with two replications and spacing of 60cm x 45cm. Fifteen plants were planted per plot. The recommended agronomic practices were carried to raise the crop in the field. Observations were recorded from five randomly selected plants (excluding the border plants) per replication on the following twelve characters: plant height (cm), days to 50% flowering, fruit length (cm), fruit diameter (cm), stalk length (cm), fruit shape index, fruit to stalk length, fruits per plant, fruit weight (g), seeds per fruit, 1000 seed weight (g) and capsaicin content (%) and fruit yield per plant. The data generated in the experiments were subjected to following statistical analysis to draw valid conclusion from the experimental results: analysis of variance (Panse and Sukhatme, 1978), components of variance as the genotypic (G.C.V) and phenotypic (P.C.V) co-efficient of variation (Burton, 1952), genetic advance (Johnson *et al*., 1995 and Lush, 1949) and heritability; genotypic and phenotypic correlation coefficients (Al-Jibouri *et al*., 1958) and path co-efficient analysis (Dewey and Lu, 1959).

## Results and Discussion

The analysis of variance (ANOVA) is presented in Table 1. The results clearly revealed highly significant (at 1% level) differences for all the characters studied indicating the presence of sufficient genetic variability in the chilli genotypes. The findings were in close agreement of previous reports in chilli (Khurana *et al*., 2003; Singh *et al*., 2005 and Mishra *et al*., 2005). From the findings it can be inferred that the chilli genotypes may be selected on different genetic variability and be utilized in different combinations for breeding of variable hybrid chilli genotypes.

**Table 1 :** Analysis of Variance (ANOVA) for Twelve Different Characters of Chilli

| Source of Variation | d.f | Mean sum of square | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Plant Height | Days to 50% Flowering | Fruit Length | Fruit Diameter | Stalk Length | Fruit Shape Index | Fruit: Stalk Length | Fruits/ Plant | Fruit Weight | Seeds/ Fruit | 1000-Seed Weight | Fruit Yield/ Plant |
| **Replication** | 1 | 4.71 | 1.5 | 0.01 | 0.01** | 0.001 | 0.08 | 0.002 | 115.28 | 0.06** | 1.93 | 0.02** | 371.37 |
| **Genotype** | 74 | 334.31** | 188.99** | 4.00** | 0.05** | 0.25** | 5.62** | 0.31** | 2080.56** | 0.81** | 523.10** | 1.16** | 8245.24** |
| **Error** | 74 | 10.05 | 8.54 | 0.03 | 0.002 | 0.01 | 0.08 | 0.01 | 91.83 | 0.01 | 21.9 | 0.01 | 773.09 |
| **Total** | 149 | 171.07 | 98.11 | 2 | 0.03 | 0.13 | 2.83 | 0.16 | 1079.68 | 0.41 | 270.69 | 0.58 | 4481.39 |
| **$SE_d$** | | 3.17 | 2.92 | 0.17 | 0.05 | 0.11 | 0.28 | 0.07 | 9.58 | 0.12 | 4.68 | 0.1 | 27.81 |
| **CD (5%)** | | 6.32 | 5.82 | 0.34 | 0.09 | 0.22 | 0.56 | 0.14 | 19.09 | 0.24 | 9.33 | 0.21 | 55.4 |

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

Moderate to high range of variations were found for all the characters from Table 2; which might give scope for selection on the basis of phenotypic values of characters under study. But range was not able to reflect the actual variability present in the population for different characters, because it represents the extreme values only. The relative values for three types of coefficients of variation *viz*., phenotypic, genotypic and environmental, give an idea about the magnitude of genetic variability present in a population. There were narrow differences between corresponding PCV and GCV values for all the characters under study, with slightly higher values for the former. Hence, selection based on phenotypic values of these characters would be effective, as environment had little influence in expression of such characters. In earlier studies slightly high PCV values were found than GCV values, which indicated negligible effect of environment on the characters studied in chilli (Mishra *et al*., 2001). It was also indicated by the lower value of ECV. High GCV and PCV values were recorded for plant height, fruit length, fruit shape index, fruit: stalk length, fruits per plant, fruit weight and fruit yield per plant. All the other characters under study had moderate GCV and PCV values. These indicated that there were moderate to high genetic variability for all the characters under study. Hence, these characters might be improved through selection with greater scope for the former group of characters which have higher GCV and PCV values than the latter group of characters which have moderate GCV and PCV values. In a general sense, heritability specifies the proportion of the total variability that is due to genetic causes, or the ratio of genotypic variance to the total variance. It is a good index of the transmission of characters from parents to their offspring (Falconer, 1960). In the present investigation, heritability was high for all the characters under study (Table 2), indicating that these characters were less influenced by the environmental effects. Hence selection would be effective for improvement of these characters. High heritability for all the characters was noted in a previous study in chilli (Doshi, 2003). Heritability and genetic advance are important selection parameters. High heritability coupled with high genetic advance indicates the importance of additive gene effects in controlling such character (Panse, 1957). In the present investigation all the characters showed high heritability coupled with high genetic advance. This indicated that most likely the heritability is due to additive gene effect or additive gene action is predominant for controlling all the characters under study. Therefore, selection may be rewarding in improvement of these characters.

**Table 2 :** Genetic Variability Parameters for Twelve Different Characters of Chilli

| Character | Mean | Range | CV | Variance | | | ECV | GCV | PCV | $h^2_{(BS)}$ | GA | GA as % of mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Pheno. | Geno. | Envt. | | | | | | |
| Plant Height | 54.26 | 29.92-99.78 | 5.84 | 172.2 | 162.15 | 10.05 | 5.84 | 23.47 | 24.18 | 0.94 | 25.45 | 46.9 |
| Days to 50% Flowering | 53.98 | 38.00-77.50 | 5.41 | 98.77 | 90.23 | 8.54 | 5.41 | 17.6 | 18.41 | 0.91 | 18.7 | 34.64 |
| Fruit Length | 5.5 | 2.72-8.02 | 3.1 | 2.01 | 1.98 | 0.03 | 3.09 | 25.6 | 25.78 | 0.99 | 2.88 | 52.34 |
| Fruit Diameter | 1.07 | 0.77-1.32 | 4.34 | 0.03 | 0.03 | 0 | 4.2 | 14.72 | 15.35 | 0.92 | 0.31 | 29.11 |
| Stalk Length | 2.88 | 1.93-3.52 | 3.76 | 0.13 | 0.12 | 0.01 | 3.8 | 11.87 | 12.45 | 0.91 | 0.67 | 23.24 |
| Fruit Shape Index | 5.32 | 1.85-9.17 | 5.24 | 2.85 | 2.77 | 0.08 | 5.25 | 31.32 | 31.75 | 0.97 | 3.38 | 63.59 |
| Fruit: Stalk Length | 1.89 | 1.02-2.71 | 3.69 | 0.16 | 0.15 | 0.01 | 3.73 | 20.54 | 20.87 | 0.97 | 0.79 | 41.71 |
| Fruits/Plant | 88.56 | 40.50-193.60 | 11.47 | 1086.19 | 994.37 | 91.83 | 10.82 | 37.74 | 39.44 | 0.92 | 62.15 | 70.18 |
| Fruit Weight | 2.54 | 0.91-4.10 | 4.68 | 0.41 | 0.4 | 0.01 | 4.66 | 24.76 | 25.2 | 0.97 | 1.27 | 50 |
| Seeds/Fruit | 70.9 | 35.31-107.85 | 6.6 | 272.5 | 250.6 | 21.9 | 6.6 | 22.33 | 23.28 | 0.92 | 31.27 | 44.11 |
| 1000-Seed Weight | 4.97 | 3.09-6.33 | 2.08 | 0.59 | 0.58 | 0.01 | 2.11 | 15.29 | 15.43 | 0.98 | 1.55 | 31.21 |
| Fruit Yield/Plant | 181.85 | 86.62-369.32 | 15.29 | 4509.16 | 3736.07 | 773.09 | 15.29 | 33.61 | 36.93 | 0.83 | 114.61 | 63.03 |

Phenotypic and genotypic correlations were computed for all possible paired combinations among the twelve different characters including yield are presented in the Table 3. In the present study, generally genotypic correlation coefficients ($r_g$) were higher than the corresponding phenotypic correlation coefficients ($r_p$) indicating the true genetic association between the characters and the differences between these two types of correlations were also small. Similar results were also recorded earlier in chilli (Kumar *et al*., 2003 and Rathod *et al*., 2002). Plant height showed significantly positive correlation with days to 50% flowering and significantly negative correlation with seeds per fruit. Days to 50% flowering showed significantly negative correlation with seeds per fruit. Fruit length showed significantly positive correlation with stalk length, fruit shape index and fruit: stalk length. It also had significantly positive correlation with fruit weight, seeds per fruit, 1000-seed weight and fruit yield per plant. It showed significantly negative correlation with fruit diameter and fruits per plant. Fruit diameter showed significantly positive correlation with fruit weight, seeds per fruit and 1000-seed weight and significantly negative correlation with fruits per plant, fruit shape index and fruit: stalk length. Stalk length showed significantly positive correlation with fruit weight, fruit shape index, fruit : stalk length and fruit yield per plant Fruits per plant an important yield attributing character, showed significantly positive correlation with fruit yield per plant but had significantly negative correlation with fruit weight, seeds per fruit and fruit : stalk length. Significantly negative correlation between fruits per plant and fruit weight of chilli, were also recorded earlier (Das and Choudhary, 1999 and Munshi *et al*., 2000). Fruit weight, another important yield attributing character, showed significantly positive correlation with seeds per fruit, 1000-seed weight, fruit shape index, fruit: stalk length and fruit yield per plant. Fruit shape index showed significantly positive correlation with fruit: stalk length and fruit yield per plant. Seeds per fruit and fruit: stalk length also had significantly positive correlation with fruit yield per plant. From the experimental results, it was evident that fruit yield per plant was significantly and positively correlated with fruit length, stalk length, fruits per plant, fruit weight, 1000-seed weight, fruit shape index and fruit: stalk length. Among these characters, fruits per plant had strongest correlation with fruit yield per plant followed by 1000-seed weight and fruit weight. Previously the strongest correlation between fruits per plant and fruit yield per plant, was also found among the characters studied in chilli (Pawade *et al*., 1995). On the other hand, fruits per plant showed undesirable, negative correlation with some other characters, which showed significantly positive correlation with yield. Fruits per plant showed significantly negative correlation with fruit weight, which indicating that these two characters might have an allometric relationship. The negative genotypic correlation between fruit number and fruit weight in tomato was explained earlier (Griffing, 1953). All the other characters i.e., fruit length, stalk length, fruit weight, 1000-seed weight, fruit shape index and fruit: stalk length, showed significantly positive correlation among themselves except, correlation of 1000-seed weight with stalk length and fruit shape index, which were positive but non-significant. Similar results on character association, were also obtained (Gogoi and Gautam, 2003; Sreelathakumary and Rajamony, 2004; Sujata *et al*., 2003) in chilli.

Knowledge of correlation alone is often misleading because two characters may show correlation just because they are correlated with a common third one (Jaiswal and Gupta, 1967). In such cases, it becomes necessary to study a method, which takes into account the causal relationship between the characters in addition to the degree of relationship. In the present investigations fruit yield per plant was taken as a dependent or resultant variable and all the others characters, under study as independent or causal variables.

The path analysis is presented in the Table 4. Path coefficient analysis suggested that fruits per plant had highest positive direct effect on fruit yield per plant and followed by fruit weight, fruit shape index and fruit: stalk length. In some studiesit was also found that the characters, fruits per plant and fruit weight had highest direct effect on yield of chilli (Das and Choudhary, 1999: Sreelathakumary and Rajamony, 2004). Fruit diameter and stalk length also showed considerable positive direct effect on fruit yield per plant. On the other hand, fruit length had strong direct negative effect on fruit yield per plant. The results were in close agreement with the results obtained earlier (Kumar *et al*., 2003; Sreelathakumary and Rajamony, 2004). Strong positive indirect effect on fruit yield per plant were shown by fruit length via fruit weight, fruit shape index and fruit: stalk length; fruit diameter via fruit weight; stalk length via fruit weight and fruit shape index; 1000 - seed weight via fruit weight; fruit shape index via fruit: stalk length; fruit : stalk length via fruit weight and fruit shape index. Strong negative indirect effect on fruit yield per plant were shown by fruit diameter via fruits per plant and

fruit shape index; fruits per plant via fruit weight; fruit weight via fruit length and fruits per plant; seeds per fruit via fruits per plant; fruit shape index via fruit length and fruit stalk length; 1000 - seed weight via fruit length.

**Table 3 :** Genotypic (G) and Phenotypic (P) Correlation Coefficients between Different Characters of Chilli

| Characters | | P.H. | D.T.F. | F.L. | F.D. | S.L. | F/P | F.Wt. | S/F | S.Wt. | F.S.I. | F. L:S.L | FY/P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Plant Height** | G | **1** | 0.668** | 0.004 | 0.048 | -0.098 | 0.046 | 0.053 | -0.264* | 0.062 | -0.006 | 0.048 | 0.148 |
| | P | **1** | 0.617** | 0.008 | 0.039 | -0.074 | 0.039 | 0.054 | -0.249* | 0.058 | 0 | 0.039 | 0.126 |
| **Days to 50% Flowering** | G | | **1** | -0.061 | 0.063 | 0.033 | -0.031 | 0.071 | -0.240* | 0.038 | -0.064 | -0.112 | 0.033 |
| | P | | **1** | -0.056 | 0.048 | 0.041 | -0.024 | 0.071 | -0.217* | 0.03 | -0.053 | -0.11 | 0.034 |
| **Fruit Length** | G | | | **1** | -0.215* | 0.705** | -0.280** | 0.575** | 0.209* | 0.343** | 0.904** | 0.907** | 0.265* |
| | P | | | **1** | -0.204* | 0.685** | -0.264* | 0.558** | 0.197* | 0.339** | 0.895** | 0.893** | 0.241* |
| **Fruit Diameter** | G | | | | **1** | -0.051 | -0.349** | 0.520** | 0.307** | 0.319** | -0.577** | -0.239* | 0.105 |
| | P | | | | **1** | -0.042 | -0.347** | 0.493** | 0.280** | 0.299** | -0.583** | -0.229* | 0.052 |
| **Stalk Length** | G | | | | | **1** | -0.202* | 0.497** | 0.197* | 0.165 | 0.615** | 0.354** | 0.222* |
| | P | | | | | **1** | -0.169 | 0.466** | 0.163 | 0.154 | 0.589** | 0.297** | 0.223* |
| **Fruits/Plant** | G | | | | | | **1** | -0.468** | -0.335** | -0.154 | -0.082 | -0.275** | 0.572** |
| | P | | | | | | **1** | -0.440** | -0.310** | -0.139 | -0.064 | -0.265* | 0.568** |
| **Fruit Weight** | G | | | | | | | **1** | 0.282** | 0.624** | 0.280** | 0.476** | 0.407** |
| | P | | | | | | | **1** | 0.272** | 0.602** | 0.269* | 0.455** | 0.380** |
| **Seeds/Fruit** | G | | | | | | | | **1** | 0.136 | 0.048 | 0.176 | -0.018 |
| | P | | | | | | | | **1** | 0.12 | 0.048 | 0.174 | -0.022 |
| **Seed Weight** | G | | | | | | | | | **1** | 0.181 | 0.361** | 0.427** |
| | P | | | | | | | | | **1** | 0.18 | 0.356** | 0.395** |
| **Fruit Shape Index** | G | | | | | | | | | | **1** | 0.882** | 0.210* |
| | P | | | | | | | | | | **1** | 0.806** | 0.209* |
| **Fruit:Stalk Length** | G | | | | | | | | | | | **1** | 0.207* |
| | P | | | | | | | | | | | **1** | 0.168 |
| **Fruit Yield/Plant** | G | | | | | | | | | | | | **1** |
| | P | | | | | | | | | | | | **1** |

**Table 4 :** Direct (Diagonal Bold) and Indirect Effects of Different Characters on Fruit Yield per Plant

| Characters | P.H | D.T. F | F. L | F. D | S. L | F/P | F.Wt | S/F | S.Wt | F.S. I | F. L:S.L |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Plant Height** | **0.08** | -0.01 | 0.00 | 0.01 | -0.02 | 0.05 | 0.04 | -0.02 | 0.00 | 0.00 | 0.02 |
| **Days to 50% Flowering** | 0.05 | **-0.02** | 0.05 | 0.02 | 0.01 | -0.03 | 0.05 | -0.02 | 0.00 | -0.04 | -0.05 |
| **Fruit Length** | 0.00 | 0.00 | **-0.87** | -0.06 | 0.12 | -0.28 | 0.42 | 0.02 | 0.01 | 0.52 | 0.40 |
| **Fruit Diameter** | 0.00 | 0.00 | 0.19 | **0.30** | -0.01 | -0.35 | 0.38 | 0.02 | 0.01 | -0.33 | -0.10 |
| **Stalk Length** | -0.01 | 0.00 | -0.61 | -0.02 | **0.17** | -0.20 | 0.36 | 0.02 | 0.01 | 0.35 | 0.15 |
| **Fruit Shape Index** | 0.00 | 0.00 | 0.24 | -0.10 | -0.04 | **1.00** | -0.34 | -0.03 | 0.00 | -0.05 | -0.12 |
| **Fruit: Stalk Length** | 0.00 | 0.00 | -0.50 | 0.16 | 0.09 | -0.47 | **0.72** | 0.02 | 0.02 | 0.16 | 0.21 |
| **Fruits/Plant** | -0.02 | 0.00 | -0.18 | 0.09 | 0.03 | -0.33 | 0.20 | **0.08** | 0.00 | 0.03 | 0.08 |
| **Fruit Weight** | 0.01 | 0.00 | -0.30 | 0.10 | 0.03 | -0.15 | 0.45 | 0.01 | **0.03** | 0.10 | 0.16 |
| **Seeds/Fruit** | 0.00 | 0.00 | -0.79 | -0.17 | 0.11 | -0.08 | 0.20 | 0.00 | 0.01 | **0.57** | 0.36 |
| **Fruit Yield/Plant** | 0.00 | 0.00 | -0.79 | -0.07 | 0.06 | -0.27 | 0.34 | 0.01 | 0.01 | 0.47 | **0.44** |

In the present study on path coefficient analysis, the residual effect (0.0632) was low, indicating the adequacy and appropriateness of the characters chosen for this experiment and also revealed that twelve characters, chosen in the experiment, adequately explained the variation at genotypic level for fruit yield per plant in path analysis study. A valid conclusion from correlation and path analysis only be drawn when we consider their results jointly. Fruit length had strong negative direct effect on fruit yield per plant but its correlation with yield was significantly positive due to good positive indirect effect through fruit shape index, fruit: stalk length, fruit weight and stalk length. These indirect effects supplemented strong direct effect and leads to its positively significant correlation with fruit yield per plant. All the other important characters, *viz.*, stalk length, 1000-seed weight, fruit shape index, fruit: stalk length, fruits per plant and fruit weight, except 1000 - seed weight showed both significantly positive correlation and strong positive direct effects on fruits yield per plant. Moderate to strong negative indirect effect of fruits per plant via fruit weight, fruit: stalk

length and fruit diameter were mainly nullified by very strong direct effect and leads to positively significant correlation with fruit yield per plant. From the correlation studies the characters like stalk length, fruit shape index and fruit: stalk length seems to be reliable indicator of high fruit yield per plant, were also supported by strong positive direct effect on fruit yield per plant. Though in the present investigation days to 50% flowering showed little effect on fruit yield per plant but early flowering is always desirable, especially to suit in the present-day tight crop schedule in multi cropped area. Days to 50% flowering showed moderately negative indirect effect on fruit yield per plant via fruits per plant. Hence, selection for early flowering may increase fruits per plant and thereby indirectly affect fruit yield per plant in favorable direction. The above discussion on correlation coefficient and path coefficient analysis in chilli revealed that fruits per plant, fruit weight, fruit length, 1000 - seed weight, stalk length, fruit shape index and fruit: stalk length are important characters in controlling fruit yield per plant; as these characters had both significant positive correlation and strong direct positive effect on fruit yield per plant. Direct selection for these characters would result simultaneous selection for high fruit yield per plant.

## Conclusion

From the above study it may be concluded that there was a wide variability among the chilli genotypes for the yield and yield attributing traits. There were narrow differences between PCV and corresponding GCV values, for all the characters studied, indicating little influence of environment in expression of these characters. In the present investigation, all the characters showed high heritability (broad sense) coupled with high genetic advance, indicating the importance of additive gene action in controlling these characters. Hence, selection might be rewarding in improving these characters. From the experimental results it was evident that fruit yield per plant was significantly and positively correlated with fruit length, stalk length, fruits per plant, fruit weight, 1000-seed weight, fruit shape index and fruit: stalk length. Path analysis showed that fruits per plant exerted highest direct positive effect on fruit yield per plant; followed by fruit weight and fruit shape index in both the years. From the association studies, the characters, *viz*., days to 50% flowering, fruits per plant, fruit weight, fruit length, 1000-seed weight, stalk length, fruit shape index and fruit: stalk length, were established as the most important yield contributing characters of chilli. Hence, emphasis should be given on these characters in selection of parents for hybridization programme.

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