Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2582-2845.8295

ISSN: 2582 – 2845

Ind. J. Pure App. Biosci. (2020) *8*(4), 535-538

Indian Journal of Pure & Applied Biosciences

Peer-Reviewed, Refereed, Open Access Journal

Research Article

Determination of Genetic Variability, Correlation Coefficient, Heritability and Genetic Advance in Tomato (*Solanum lycopersicon* L.)

Vijay Kumar Pandey*, Sanjay Kumar and Rakesh Kumar Meena

Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University, Vidya-Vihar, Rae-Bareli Road, Lucknow-226025

*Corresponding Author E-mail: vkpandey0703@gmail.com

Received: 2.07.2020 | Revised: 13.08.2020 | Accepted: 19.08.2020

ABSTRACT

The present experiment "Determination of genetic variability, correlation coefficient, heritability and genetic advance in tomato (Solanum lycopersicon L.)" was carried out to study in 16 diverse genotypes of tomato during the year of 2013-14. The investigation was conducted at Horticulture Research Farm of Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University (A Central University), Vidya-Vihar, Rae Bareli Road, Lucknow-226025 (U.P.) India. The spacing was maintained at 60 x 45 cm with the plot size 2.4 x 1.8 m^2. The experiment was carried out under Randomized Block Design. The genotypes were used as experiment materials viz. Angoorlata, Arka Alok, Arka Abha, Arka Meghali, Arka Vikash, Azad Type-5, Kashi Amrit, Kashi Anupam, Kashi Hemant TKashi Vishesh, Pant Type-3, Pant Type-5, Pusa Gaurav, Pusa Hybrid-2, Pusa Upma and Pusa-120. The genotypes were collected from IIVR, Varanasi and GBPUA&T, Pantnagar. The twenty five characters of tomato ware observed viz. plant height, number of branches per plant (cm), plant spread (cm), number of leaves per plant, internodal length (cm), days to flower initiation, days to 50 % flowering, number of flowers per cluster, number of clusters per plant, number of flowers per plant, number of fruits per cluster, number of fruits per plant, 10 fruits weight (g), average fruit weight (g), number of harvest, total yield per plant (kg), fruit length (cm), fruit width (cm), polar diameter (mm), equatorial diameter (mm), pericarp thickness (mm), T.S.S. (^{0}B), number of locules, ascorbic acid (mg/100g) and acidity (%). Significant differences were recorded for all the traits. According to the present investigation, it may be concluded that wide range of variation ware found in tomato strain for all the traits studied. Among the all genotypes for most characters Kashi Amrit is highly significant viz. plant height, number of branches, plant spread, number of leaves, number of flower per cluster, number of fruit per cluster, number of fruits per plant, 10 fruit weight, average fruit weight, yield per plant, ascorbic acid and acidity.

Keywords: *Tomato, Yield, Horticulture, Ascorbic acid*

Cite this article: Pandey, V.K., Kumar, S., and Meena, R.K. (2020). Determination of Genetic Variability, Correlation Coefficient, Heritability and Genetic Advance in Tomato (*Solanum lycopersicon* L.), *Ind. J. Pure App. Biosci. 8*(4), 535-538. doi: http://dx.doi.org/10.18782/2582-2845.8295

INTRODUCTION

Tomato (*Solanum lycopersicon* L. / *Lycopersicon esculentum* Miller 1768) is one of the most popular and widely consumed vegetable crops throughout the world, both for the fresh fruit market and the processed food industry. It is cultivated worldwide in all kind of climate, like temperate sub-tropical and tropical. It is most economically important member of the family Solanaceae having chromosome No. 2n = 24 and originated from South America. Tomato is ranking second in importance only next to potato in many countries and ranked first in preserved and processed vegetable. Tomato is a typical day neutral plant and belongs to warm season crop reasonably resistant to hot and drought. It is also a popular vegetable around the world in respect of area, production and availability, almost round the year. Tomato is a versatile vegetable for culinary purpose. Ripe tomato fruit is consumed fresh as salad purpose and utilized in the preparation of range of processed products such as powder, puree, ketchup, sauce, soup, canned fruit pickles and chutney. Tomatoes are protective supplementary and important source of lycopene (Antioxidant), vitamin A, vitamin C either in outdoor or indoors. The genetic improvement of tomato depends upon the available genetic variability for important quantitative traits and its judicious exploitation through efficient breeding methods. Genetic advance denotes the improvement in the mean genotypic values of selected families over base population and thus helps the breeder to select the progenies in the earlier generation itself (Sidhya, 2014).

MATERIALS AND METHODS

Sixteen diverse genotypes of tomato were received from IIVR, Varanasi and GBPUA&T, Pantnagar were grown at Horticulture Research Farm of Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University, Lucknow during Rabi season of 2013-14. The experiment was laid out in the Randomized Block Design with three replications. The seeds of these genotypes was planted in the nursery and transplanted in the field on 27th November, 2013. The seedlings were planted in rows keeping row-to-row and plant-to-plant distances of 60 cm and 45 cm, respectively. The plot size was 2.4 x 1.8 m^2 and 16 plants were planted per plot. All recommended agronomic package of practices were followed to grow a healthy crop. The genotypes were used as experiment materials viz. Angoorlata, Arka Alok, Arka Abha, Arka Meghali, Arka Vikash, Azad Type-5, Kashi Amrit, Kashi Anupam, Kashi Hemant TKashi Vishesh, Pant Type-3, Pant Type-5, Pusa Gaurav, Pusa Hybrid-2, Pusa Upma and Pusa-120. Observation were recorded on various growth, yield and quality parameters from four randomly selected plants of each genotypes of each replication as per standard procedures for fourteen characters *viz.* plant height (cm), number of branches per plant, plant spread (cm), number of leaves per plant, internodal length (cm), days to flower initiation, days to 50 % flowering, number of flowers per cluster, number of clusters per plant, number of flowers per plant, number of fruits per cluster, number of fruits per plant, 10 fruits weight (g), average fruit weight (g), number of harvest, total yield per plant(kg), fruit length(cm), fruit width (cm), polar diameter (mm), equatorial diameter (mm), pericarp thickness (mm), T.S.S. (^{0}B), number of locules, ascorbic acid (mg/100g) and acidity (%).The phenotypic and genotypic coefficient of variance was estimated according Johnson et al. (1955).

RESULT AND DISCUSSION

The present research study was carried out with sixteen diverse genotype of tomato. The mean performance of all the 16 genotypes of the tomato were recorded. Genotypic and phenotypic correlation were worked out to know the degree of association of different components characters with yield and path coefficient analysis was done to provide information on the cause of this association (Dewey & La, 1969). A wide range of variation was recorded for all the characters suggesting presence of high genetic variability.

The phenotypic and genotypic coefficient at variation help to measure the range of variability in the characters to provide a tool to compare the variability present among various quantitative characters. Plant height assumes significance in the wake larger harvest duration. The present research study shows that strain Kashi Amrit recorded maximum plant height. High heritability with high genetic gain suggested that the trait was genetically controlled so selection can bring desired improvement. This result is according to Kale et al. (1998). Plant height had positive significant correlation with yield suggesting that genotypes with higher plant height would yield more. The result is in conformity with finding of the path coefficient analysis revealed with high positive direct effect of plant height this could be due to significant positive genotypic correlation between yield and plant height. Day to flower initiation is an important character of tomato for breeding for earliness. Highest number of branches are observed in the strain Kashi Amrit and found high heritability. High and positive significant correlation was found between fruit length. The highest numbers of fruits are to be recorded in the strain Kashi Amrit Followed by Azad Type- 5. The heritability percentage is (99.1). There is positive correlation coefficient is found in the characters. The mean value was recorded maximum in 10 fruit weight per plants (354.25) in Kashi Amrit. Highest value for fruit per cluster was recorded (267.5) in Arka Vikash. Mohanty (2003) found that the plant height manifested significant and negative relationship with fruit yield and its direct effect was but its indirect effect fruit girth was high and positive. Therefore, 10 fruit weight and number of locules / fruit contributing traits to the fruit yield in tomato. Among the genotypes studies, Kashi Anupam recorded the maximum pericarp thickness. A high heritability with the moderate genetic gain indicated that the selection of thicker pericarp could be useful to a responsible extent. This finding was reported by Rattan et al. (1983) and Mittal et al. (1986). The highest yield per plant was obtained Kashi Amrit. The height GCV &PCV were observed for plant height, fruit biomass, fruit yield, and average fruit weight , T.S.S., number of fruit per plant, number of locules/ fruit, vegetative biomass, pericarp thickness. Among the genotypes evaluated minimum value foe this trait was recorded in Kashi Amrit. High Total soluble solid contents is the desirable quality attributes in processing of tomato products in the present research studies, highest soluble solids was recorded in Arka Abha.

SUMMARY AND CONCLUSION

The analysis of variance of the design of experiment indicated that the mean sum of square due to genotypes were highly significant for all the characters. This revealed that treatments differed for all characters. The strain Pant Type-3 was significantly early (40 days), to each First flower initiation. The maximum height was recorded is 147.0 m for Kashi Amrit, and minimum is 56.66 for Pusa-120. The strain Arka Meghali was significantly early in days to 50% flowering. The number of flower per cluster was recorded maximum (9.6) for Kashi Amrit. In strain Arka Vikash the number of fruits per cluster was recorded maximum (9). The number of fruit per plant was recorded highest (267.5) in strain Kashi Amrit. The highest in 10 fruit weight was recorded 580 g for Kashi Amrit. The T.S.S. was recorded highest (5.2) for Arka Abha. The yield per plant (Kg) was recorded maximum (7.9) for Kashi Amrit. On the basis of overall findings of the present research trial, it was concluded that there are wide range of variation in tomato strain for all the characters studied. The strain Kashi Amrit is highly significant for plant height, number of branches, plant spread, number of leaves, number of flower per cluster, number of fruit per cluster, number of fruits per plant, 10 fruit weight, average fruit weight, yield per plant, ascorbic acid and acidity.

REFERENCES

Deway, D.R., & Lu, K.N. (1959). A correlation and path coefficient analysis of components of crested

wheat grass seed production. *Agron, J., 51*, 515-518.

Kale, R.D. (1998). Earthworm: Cinderella of Organic Farming. Prism Books. Bangalore.

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

Johnson, W. W., Robinson, H. F., & Comstock, R. E. (1955). Genotypic and phenotypic correlation in Soybeans and their implications in selection. *Agronomy Journal. 47*, 477-482.

Rattan, R.S., & Bindal, A. (1983). Reaction of tomato *(Lycopersicon esculentum* Mill.). Genotypes against leaf curl virus. *Veg. Sci., 10*(1), 22-29.

Sidhya, P., Koundinya, A. V. V., Pandit, M. K. (2014). Genetic variability, heritability and genetic advance in tomato. *Environment & Ecology. 32*(4B), 1737—1740.