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Short Note

Evaluation of Combining Ability for the Expression of Traits of Tomato (*Lycopersicon Esculentum* Mill.) through the Line X Tester Analysis

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ABSTRACT

The present investigation entitled "Line X Tester analysis in Tomato (*Lycopersicon esculentum* Mill.)" was undertaken at Main Experiment Station, Department of Vegetable Science of Narendra Deva University of Agriculture & Technology, Narendra Nagar, Kumarganj, Faizabad (U.P.). Analysis of variance revealed significance differences among the genotype for all the characters indicating existence of wide variation in the experimental material evaluated. The analysis of variance of present investigation having 14 parents and 40 hybrids for 14 characters was carried out and mean squares obtained. The anylysis of variance for combining ability revealed significance difference due to lines, testers and line x tester interection for all the traits. The indicated that combining ability played vital role in the expression of the traits under study.

Kew word: Line x Tester, analysis in Tomato

INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill.) is one of the most important vegetable crops of India. It is used as a vegetable, soup, salad, pickle, ketch up, puree, sauce and many other ways. It is a good source of vitamin A, B and C. Tomato has acquired the status of world's most popular vegetable crop due to its wider adaptability to various agro climatic conditions (Gupta *et al.*, 2015).Good quality seed is a pre-requisite for higher productivity of any crop (Singh *et al.*, 2012). The losses in the seed viability and vigour depend on various factors, like genetic makeup of seed material, harvesting stage of the seed, fruit position on the mother plant, fruit size, fruit pickings, and prevailing environmental condition at harvesting time. The crop like tomato in which multiple fruit pickings are done over a long period, variation in seed quality may occur from one picking to the other (Kumar and Srivastava, 2015). At present, tomatoes rank second, next to potato, tomato belong to family solanaceae and chromosome number 2n=2x24. Toamto being self pollinated crop, hybridization followed by individual plant selection had primarily been used for improvement of yield and other economic characters (Bhutani and Kalloo, 1998). Heterosis has been exploited in F_1 tomato hybrids to a great extent in the last few decades in the developed countries (Sharma *et al.*, 1999).Though tomato is one of the crop where the genetic studies have been done very thoroughly, but it still lacks adequate genetic information for the very strong improvement programme (Dixit *et al.*, 1980). Among the several mating designs adopted for the study of genetic architecture in tomato, line x tester mating design has been widely used for evaluating more number of genotypes at a time for combining ability effects (Joshi and Thakur, 2005).

The present investigation entitled "Line X Tester analysis in Tomato (*Lycopersicon esculentum* Mill.)" was undertaken at Main Experiment Station, Department of Vegetable Science of Narendra Deva University of Agriculture & Technology, Narendra Nagar, Kumarganj, Faizabad (U.P.). Narendra Nagar is situated at 26.47^0 N latitude and 82.12^0 E longitudes at an altitude of 113 meters above the mean sea level. The soil type of experimental site was sandy-loam. The experiment on fourteen divers tomato variety/genotypes different in growth habit and fruit shape and size sleeted as parent from the genetic material in department of vegetable science. These strain were crossed in line x tester mating fashion during Rabi crop season 2005-06 and evaluation in Randomized Block Design during Rabi crop season 2006- 07. The soil fertility was homogenous in the field in which experiment was conducted. The field was ploughed twice with the soil tuning plough followed by four ploughing with the cultivator. Fertilizer @ 120 kg Nitrogen, 60 kg phosphorus and 60 kg potash per hectare in nutrients were given to the crop during the whole crop season. Half quantity of Nitrogen, whole of phosphorus and potash were applied through basal dressing in the form of fertilizers at the time of last ploughing. Rest of the Nitrogen was applied as top dressing in the form of urea after one month of transplanting. in each row. The rows distance of 60 x 45 cm row to row and the plant to plant spacing was maintained at 60 cm. Days to flowering: Height of plant (cm): Number of branches per plant: Length of Leaf (cm): Width of Leaf (cm): Length of fruit (cm): Width of fruit (cm): Number of fruit per plant: Weight of per fruit (g): Fruit Yield per plant (Kg).

The analysis of variance of present investigation having 14 parents and 40 hybrids for 14 characters was carried out and

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Table 1: Analysis of variance (ANOVA) for parents and crosses of line x tester set for 14 characters in tomato.

Source of variation	Degree of freedom	Days to 50 % flowering	Plant height	No. of branches per plant	No. of fruit/plant	Fruit weight	Length of fruit (cm)	Days to maturity	Pedicel length (cm)	Thickness of pericarp (cm)	No. of locules /fruits	T.S.S %	Acidity (%)	Ascorbic acid mg/100g	Yield (kg/plant)
Replications	2	189.40	43.15	0.07	7.95	1689.07	0.462	3.35	0.002	0.00	0.08	-0.00	0.00	14.03	0.03
Treatments	54	37.48**	359.20**	1.25*	16.74**	2980.24**	0.78**	50.10	0.07**	0.01**	2.01**	0.50**	0.02**	112.45**	0.28**
Parents	13	31.31**	532.37	1.74*	6.69**	432.02*	0.95	45.64	0.05**	0.01**	1.76*	0.21	0.04**	154.28*	0.11*
Crosses	39	38.79**	266.28**	1.10*	17.72**	3857.85*	0.73**	50.87**	0.08**	0.01*	2.10**	0.60*	0.01**	96.82**	0.29**
Parents vs Crosses	1	66.38	1733.92*	0.73**	109.20	1880.11*	0.36	78.46	0.00**	0.08*	1.63	0.35**	0.001	178.46	2.13*
Female	9	97.37**	642.62*	1.96**	34.13**	6084.85	2.06	69.29**	0.14**	0.01*	3.49**	1.107	0.04**	139.79**	0.27
Male	3	12.53	104.98	0.732	25.72	3933.78	0.252	28.76	0.137**	0.004	0.808	0.45**	0.011*	43.35**	0.53*
Female X Male	27	22.18	158.74**	0.866*	11.36**	3107.1**	0.33**	47.18*	0.066**	0.010**	1.782*	0.45**	0.007*	88.43*	0.27
Error	108	17.25	34.13	0.153	2.946	2217.5	0.116	7.589	0.010	0.001	0.078	0.061	0.004	10.797	0.024

***Significant at 5 per cent**
****Significant at 1 per cent**

mean squares obtained. The genotypes expressed highly significant differences for presence of substantial genetic diversity among the genotypes for the characters under study (Sherif and Husain, 1992). Mean squares due to parents vs. crosses were highly significant for all the traits. Analysis of variance revealed significance differences among the genotype for all the characters indicating existence of wide variation in the experimental material evaluated (Srivastava *et al*., 1995). The analysis of variance for combining ability revealed that there is significance difference due to lines, testers and line x tester interaction for all the traits under study (Sonone *et al*., 1986). This study indicated that combining ability played vital role in the expression of the traits under study. The analysis of variance for combining ability revealed existence of significance difference due to line x tester and their interaction for all the characters indicating wide genetic diversity among the lines and testers. It also showed that variance due to tester were comparatively higher for most of the characters towards combining ability than the lines and line x tester integration.

CONCLUSION

Present analysis of variance for combining ability revealed significance difference due to lines, testers and line x tester interaction for all the traits. This study indicated that the combining ability played vital role in the expression of the traits under study. The analysis of variance of present investigation having 14 parents and 40 hybrids for 14 characters was carried out and mean squares obtained.

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