Original Research Article

Estimation of response to selection in chilli (*Capsicum annuum L.*)

Comment [M1]: Consider revising the title. May be Estimation of genetic variability in Chilli...

ABSTRACT

The present investigation was executed at Main Experiment Station of Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj), Ayodhya (U.P.) during Rabi 2019-20., The ~~with~~ objectives of the study~~to~~was to estimate the genetic variability among the available germplasm of chilli. Experimental material for the study consisted of 36 genotypes including one check~~s~~ (KA-2). The experiment was conducted in Randomized Completely Block Design with three replications. Observations were recorded on 10 quantitative traits *viz*. days to 50% flowering, plant height (cm), number of primary branches per plant, days to maturity (Mature Green Stage), days to maturity (Red Ripe Stage), fruit length (cm), fruit diameter (mm), average fruit weight (g) and fruit yield per plant. Fruit yield per plant was positively and significantly associated withaverage fruit weight and number of fruits per plant while primary branch per plant, fruit lengthand plant height showed negative and significant correlation with fruit yield per plant. Thus, ~~and~~ selection for these traits with positive correlation would be effective for yield improvement in chilli.

Comment [M2]: A brief introduction to your research will help.

Key word- Genetic variability. Germplasm, ~~Chilli~~Genotypes,, ~~and~~ correlation

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1. INTRODUCTION

Comment [M3]: A brief description of the genotypes used will be helpful
Indicate clearly your study objectives.
Also include in your introduction expanded literature on (heritability, genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV) Genetic Advance and Genetic advance as percent of mean (GAM). which you did not present in your results) and their implications with references which will help you in the discussions. Briefly state how these parameters were calculated and how the traits were measured

Chilli is one of the most important vegetable crop grown throughout India. It belongs to the family *Solanaceae* with chromosome number 2n=24. It is grown for exports as well as for domestic market. Chilli is one of the most important and the largest produced spice crop in Asia. Major chilli growing countries in the world are India, China, Ethiopia, Myanmar, Mexico, Peru, Vietnam, Pakistan, Ghana, and Bangladesh. India tops among all of these in exporting chillies. It contributes about 33% of the total spice export from India and share about 16% of the world spice trade. The major chilli growing states of India are Andhra Pradesh, Karnataka, Maharashtra, Orissa, Tamil Nadu, Madhya Pradesh, West Bengal and Rajasthan.

Chilli pulp is pickled in strong vinegar or brine. Extracts of chilli are used in the production of ginger beer and other beverages. Cayenne pepper is incorporated in poultry feeds;a green chilli are rich in Rutin which has pharmaceutical use. Pungency of chilli is due to capsaicin. The pigment (colour) in chilli is due to capsanthin and also contains many other oleoresins.

Chilli contains a range of essential nutrients and bioactive compounds which are known to exhibit antioxidant, antimicrobial, antiviral, anti-inflammatory and anticancer properties. It is an excellent source of Vitamin A, B, C, E and P **(Quresh *et al.,* 2015**). It is also a good source of 'oleoresin', which permits better distribution of colour and flavour in foods (**Chattopadhyay *et al.,* 2011).**

The productivity of chilli in India is low due to lack of superior genotypes or improvedcultivars.

Yield is the result of the expression and association of several plant growth components. In any crop improvement programme, it is a prerequisite to critically assess the interrelationship for yield and its contributing characters. Correlation studies providea better understanding of the association of different characters with yield. Correlation studies provide information about the nature and magnitude of various associations among the traits.

2. MATERIAL AND METHODS

The present investigation was executed at Main Experiment Station of Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj), Ayodhya (U.P.) during Rabi 2019-20. Experimental material forthe study consisted of 36 genotypes including one checks (KA-2). Each entries were transplanted in the plot size of and 1.2 m x 3 m. in Randomized Complete Block Design in three replications with spacing of 60 X 50 cm. All the recommended agronomic package of practicesand plant protection measures were followed to raise a good crop. Observations were recordedon 10 quantitative traits *viz*. days to 50% flowering, plant height (cm), number of primary branches per plant, days to maturity (Mature Green Stage), days to maturity (Red Ripe Stage), fruit length (cm), fruit diameter (mm), average fruit weight (g) and fruit yield per plant.

The simple correlation between different characters t genotypic and phenotypic level were looked out between character as suggested by Searle (1965).

3. RESULT AND DISCUSSION

The nature and magnitude of association between yield and its components traits is necessary for effective selection in advance generations. Nature of population under considerationand the magnitude of correlation coefficient could often be influenced by the choice of the

individuals upon which the observations are made. Correlations between character pairs are due to linkage of genes or pleiotropy of genes. Therefore, selection of one trait influence the other linked or pleiotropically affected traits. Considerable importance has been attached to correlation studies in the plant improvement because they are helpful in making effective selection.

The phenotypic and genotypic correlation coefficient computed among the ten 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

Comment [M4]: You can add the rainfall data during the trial period if available. Describe briefly the location since different environments could produce different results.

Comment [M5]: Please your results and discussions are wholefully inadequate. You should have presented an ANOVA, (Heritability, GCV, PCV, GA,GAM). You only showed correlations results which are not enough for genetic variability studies.

strong inherent relationship in different pairs of characters in chilli genotypes. The most important trait fruit yield per plant had exhibited highly significant and positive phenotypic correlation with average fruit weight (0.539) and number of fruits per plant (0.331) while highly significant and negative correlation with primary branches per plant (-0.340) followed by fruit length (-0.321) and plant height (-0.277). Primary branches per plant had exhibited highly significant and positive correlation with plant height (0.389) while highly significant and negative correlation with number of fruits per plant (-0.352). Numbers of fruits per plant showed highly significant and negative correlation with fruit length (-0.334) and plant height (-0.323). Fruit diameter exhibited highly significant and negative correlation with fruit length (-0.338), days to maturity (RRS) (-0.323) and days to maturity (MGS) (-0.277). Fruit length showed highly significant and positive correlation with days to maturity (RRS) (0.493). Most important positive and significant association was estimated between fruit yield per plant and average fruit weight (0.539). Primary branch per plantwas also found to had significant and positive correlation with plant height (0.389). This showedthat traits having significant positive correlation with fruit yield per plant also showed significant and positive correlations with some other traits as well as. Similar association of traits in chilli had also been reported by **Pujar et al. (2017), Vidya *et al.* (2018), Srinivas *et al.* (2020) and Chavan *et al.* (2021).**

Comment [M6]: No conclusions were drawn???

Table 1: Estimates of phenotypic correlation coefficients among ten characters in chilli

Traits	Days to 50% Flowering	Days to maturity (MGS)	Days to maturity (RRS)	Plant height	Fruit Length	Fruit Diameter	Number of fruits per plant	Average fruit weight	Primary branches per plant	Fruit yield per plant
Days to 50% Flowering	1	0.123	0.125	0.099	0.158	-0.028	-0.09	-0.268	0.079	-0.209
Days to Maturity (MGS)		1	0.299*	-0.029	0.095	-0.277*	0.027	-0.176	-0.225	-0.2
Days to Maturity (RRS)			1	0.04	0.493**	-0.323*	-0.186	0.056	0.228	-0.125
Plant Height (cm)				1	0.103	0.051	-0.323*	-0.091	0.389**	-0.277*
Fruit length (cm)					1	-0.338*	-0.334*	-0.188	0.257	-0.321*
Fruit Diameter						1	-0.003	0.045	0.048	0.058
Number of fruits per plant							1	-0.127	-0.352*	0.331*
Average fruit weight								1	-0.046	0.539**
Primary branches per plant									1	-0.340*
Fruit yield per plant										1

Table- 2: Estimates of genotypic correlation coefficient among ten characters in chilli

Traits	Days to 50% Flowering	Days to Maturity (MGS)	Days to Maturity (RRS)	Plant height	Fruit length	Fruit diameter	Number of fruits per plant	Average fruit weight	Primary branches per plant	Fruit yield per plant
Days to 50% Flowering	1	0.244	0.227	0.138	0.151	-0.001	-0.079	-0.305*	0.086	-0.213
Days to maturity (MGS)		1	0.336*	-0.014	0.206	-0.657**	0.045	-0.277*	-0.315*	-0.294*
Days to maturity (RRS)			1	0.085	0.722**	-0.614**	-0.24	0.098	0.293*	-0.179
Plant height (cm)				1	0.103	0.104	-0.351*	-0.095	0.411**	-0.293*
Fruit length (cm)					1	-0.473**	-0.375*	-0.202	0.288*	-0.348*
Fruit diameter						1	-0.046	0.056	0.081	0.06
Number of fruits per plant							1	-0.132	-0.378*	0.339*
Average fruit weight								1	-0.051	0.554**
Primary branches per plant									1	-0.349*
Fruit yield per plant										**1**

Significant at 5% & 1%

References

Chattopadhyay, A.; Sharangi, A.B.; Dai, N. and Dutta, S. 2011. Diversity of genetic resources and genetic association analysis of green and dry chillies of eastern India .*Chilean J. Agric. Res.* 71:350-356.

Chavan, D.L.; Waskar, D.P.; Khandare, V.S. and Mehtre, S.P. 2021. Correlation andcoefficient analysis in chilli (*Capsicum annum* L.). *Int. J. Curr. Microbiol. App. Sci.* 10(2): 1848-1851.

Pujar, U.U.; Tirakannanavar, S.; Jagadeesha, R.C.; Gasti, V.D. and Sandhyarani, N. 2017. Genetic variability, heritability, correlation and path analysis in chilli (*Capsicum annuum* L.). *Int. J. Pure App. Biosci.* 5:579-586.

Quresh, W.; Alam, M.; Ullah, H.; Jatoi, S.A. and Khan, W.U. 2015. Evaluation and characterization of Chilli (*Capsicum annuum* L.) germplasm for some morphological and yield characters. *Int. J. Pure and App. Bio.* 4:628-635.

Searle, S. R. 1965. The value of endive of selection I. Mass selection. *Biomet.* 21: 682-709.

Srinivas, J.; Reddy, K.R.; Saidaiah, P.; Anitha, K.; Pandravada, S.R. and Balram, M. 2020. Correlation and path analysis study in chilli (C*apsicum annuum* L.) genotypes. *Int. Res. J. Pure App. Chem.* 21(21): 1-11.

Vidya, C.; Jagtap, V.S. and Santhosh, N. 2018. Correlation and path coefficient analysis foryield and yield attributing characters in chilli (*Capsicum annuum* L.) genotypes. *Int.*
J. Current Microbio. App. Sci. 7:3265-3268.