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Estimation of Response to Selection in Chilli (*Capsicum annuum L.*)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This experiment was conducted at Main Experiment Station of Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.) during *Rabi* 2019-20. The objective of the experiment was to estimate the correlation coefficient among yield and yield attributing traits in available genotypes of chilli. There were 35 genotypes and one check (KA-2) used in study as an experimental material.
The investigation was carried out in Randomized Completely Block Design with 3 replications. Observations were noted on 10 traits *viz*. days to 50% flowering, number of primary branches per

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plant, plant height (cm), and days to maturity (Red Ripe Stage), average fruit weight (g), fruit length (cm), days to maturity (Mature Green Stage), fruit diameter (mm), and fruit yield per plant. Fruit yield/plant was significantly and positively associated with average fruit weight and number of fruits per plant while primary branch per plant, fruit length and plant height showed negative and significant correlation with fruit yield per plant. Thus, selection for these parameters with positive correlation would be effective for yield improvement in chilli.

Keywords: Chilli; correlation; genotypes.

1. INTRODUCTION

One of the most valuable vegetable crops in India is chilli. Its contain chromosome 2n=24 and belongs to Solanaceae family. It is grown for both the domestic market and for export. One of the most prominent and widely grown spices in Asia is chilli [1,2]. Prominent country which grow chilli in the world are India, China, Ethiopia, Myanmar, Mexico, Peru, Vietnam, Pakistan, Ghana, and angladesh. In which our country is in tops among all of these in exporting chillies. It contributes over 33% of India's total spice exports and accounts for 16% of global spice commerce. 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. In order to make ginger beer and other drinks, chilli extracts are utilized. Poultry feeds contain cayenne pepper, and green chillies are abundant in rutin, which has medicinal uses. Capsaicin is what gives chillies their pungency. The color of the chilli is a result of capsanthin [3,4].

Chilli consist necessary nutrients and bioactive compounds which are act as an antioxidant, antiviral, antimicrobial, anti-inflammatory and anticancer properties in a wide range. It is a good source of Vitamin A, B, C, E and P [5]. It is also an excellent source of 'oleoresin', which allows better distribution of flavor and color in foods [6].

In India the productivity of chilli is less due to lack of superior genotypes or improved cultivars. The expression and combination of a number of plant growth factors results in yield. It is a must for any crop improvement effort to closely evaluate the relationships between yield and the factors that influence it. Studies of correlation help us understand how many characteristics are related to yield. Studies of correlation give us information on the type and strength of distinct relationships between attributes.

2. MATERIALS AND METHODS

The present experiment was conducted 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 for the study consisted of 36 genotypes including one checks (KA-2). Each entries were transplanted in the plot size of 1.2 m x 3 m. in Randomized Complete Block Design in 3 replications with distance of 60 X 50 cm. All the recommended agronomic package of practices and plant protection measures were followed to grow a better crop. Observations were noted on 10 traits *viz*. days to 50% flowering, number of primary branches per plant, plant height (cm), and days to maturity (Mature Green Stage), fruit length (cm), days to maturity (Red Ripe Stage), average fruit weight (g), fruit diameter (mm), 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 [7].

3. RESULTS AND DISCUSSION

For effective selection in earlier generations, it is vital to understand the type and strength of the link between yield and its component qualities. The type of population under consideration and the size of the correlation coefficient may frequently be affected by the selection of the subjects for the observations. Character correlations are caused by the pleiotropic or linkage of genes. As a result, choosing one feature has an impact on the related or pleiotropically affected traits. Correlation studies have been given a lot of emphasis in the field of plant development since they aid in wise 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 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 plant was also found to had significant and positive correlation with plant height (0.389). This showed that 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. [8], Vidya et al. [9], Srinivas et al. [10] and Chavan et al. [11].

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%

4. CONCLUSION

The results of the study showed a highly substantial and favorable correlation between fruit output per plant and average fruit weight and number of fruits per plant. Therefore, these traits can be recognized as significant factors affecting production, and selection may be successful in creating chilli varieties with large yields. Fruit yield per plant exhibited a negative and significant association with primary branch per plant, fruit length, and plant height.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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