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Genetic Variability and Correlation Studies in *Capsicum annuum* L.

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Variation, heritability in broad sense, genetic advance and inter-relationships of certain quantitative characters were studied in *Capsicum annuum* L. This study revealed the high variability in all the five characters studied. Heritability of number of branches and fruits per plant was found to be high and it was low in length of fruit and number of branches. The genetic advance was maximum for yield per plant followed by fruits per plant and seeds per fruit. The yield had significant association with number of fruits per plant and number of branches. But the number of fruits per plant and length of fruit had negative correlation with length of fruit and number of branches and seeds per plant respectively.

In any crop improvement programme, the basic study of genetic variability of genetic stock with regard to phenotypic and genotypic variability, heritability, genetic advance is a first step and also a pre-requisite. In *Capsicum annuum* L. Singh and Singh (1970) have reported correlation, heritability and genetic advance in 19 lines and have noted that yield is positively correlated with number of fruits, length of fruit and 1000-seed weight. Nandpuri *et al*., (1970) reported that yield per plant was positively correlated with the number of fruit, number of branches and 100 - seed weight. Kirti Singh *et al*., (1972) noted high phenotypic coefficient of variability for number of branches, number of fruits and yield per plant. Legg and Lippert (1966) reported positive correlation between yield and number of fruits and length of fruit. Number of fruits was positively corrolated with fruit length.

The present study was undertaken to investigate the magnitude of genetic variability for yield and its components and to estimate the nature and degree of association between these characters in red pepper varieties.

MATERIALS AND METHODS

Thirtysix cultures of chillies maintained in the Agricultural Botany Department, College of Agriculture, Dharwar were used for the present study. These cultures were grown in a randomised block design with three replications during 1975. Each culture was grown in one row plot of 9 meter length spaced 60 cm apart within the row and 75 cm between the rows. Observations in respect of yield per plant, number of fruits per plant, number of branches, length of fruit and seeds per fruit were recorded on five randomly selected plants in each row mean values were

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used for determining genetic parameters and correlations. The analysis of variance and covariance was done according to the conventional methods. Genetic parameters like genotypic and phenotypic variances, coefficient of varibility, heritability in broad sense and genetic advance were calculated, following the conventional method of estimation.

RESULTS

The coefficient of variation was quite large for all the characters studied (Table I). The genetic estimates have been summarised in Table I. All the five characters showed a wide range of variability. High phenotypic variances were observed for yield and number of fruits per plant. The ratio of the genotypic variance to the total phenotypic variance was of the order of 1 : 1 for length of fruit, 1 : 2 for yield and number of branches, 1 : 1.5 for the number of seeds per fruit and almost 1 : 3 for number of fruits per plant.

All the characters except number of branches and fruits per plant exhibited high percentage of heritability. Genetic advance was maximum for yield per plant, whereas it was fairly good for plant and seeds per fruit. It was very low for the length of the fruit and number of branches (Table I).

The expected genetic advance was ranging from 14.30 to 24.75 per cent for five characters. The high percentage of expected genetic advance recorded for all the five characters was encouraging.

A simple correlation coefficients between characters in all possible combinations have been presented in Table II. In most of the cases, the association between the characters are in positive direction. Yield per plant showed highly significant positive correlation with number of fruits per plant and is significant at five per cent level with number of branches. There was a positive correlation of yield per

TABLE I. Genetic parameters

Characters	Variance	C. V.	Mean	Range	Phenotypic variance	Genotypic variance	Heritability%	Genetic advance	Expected genetic advance as % on mean
Yield in (g)	2346.53*	23.10	121.1	50 – 189	782.17	407.17	52.05	29.98	24.75
Number of fruits	454.14	22.90	53.7	27 – 79	151.38	46.10	30.45	7.72	14.38
Length of fruits in(cm)	16.57	18.85	10.7	5.2 – 13.4	5.52	5.14	93.11	4.50	42.05
Number of Branches	3.02*	18.95	8.6	6 – 13	2.67	1.27	47.56	1.60	18.60
Number of seeds per fruit	181.31*	12.23	63.5	46 – 85	60.41	38.00	62.97	10.10	15.90

* Significant at 5 per cent level

plant with length of furit but with number of seeds per fruit was nonsignificant. Number of fruits per plant exhibited negative association with length of fruit and number of branches. Length of fruit also exhibited very low negative association with number of branches and number of seeds per fruit.

DISCUSSION

From Table I, it is understood that considerable variability existed in the material as the variance between cultures was highly significant for yield per plant, length of fruit and seeds per fruit and significant for number of branches. The character seeds per fruit had the lowest coefficient of variability (12.23) whereas the yield per plant had the highest (23.10) which indicated that the yield per plant showed wide diversity. The remaining characters had coefficient of variability ranging from 18.95 to 22.90 showing sufficient genetic diversity among the cultures.

Yield per plant, number of fruits per plant and number of seeds per fruit exhibited high genotypic variance, indicating the range of variability in the material for these characters. However, the genotypic variance alone is not helpful in determining the amount of heritable portion of variation for which estimates of heritability are needed.

Heritability values in respect of number of branches, yield per plant, number of seeds per fruit and length of fruit were high, ranging from 47.57 to 93.11 per cent which confirmed the results by Nandpuri *et al.*, (1971) and Kirti Singh *et al.*, (1972). It means these characters are less influenced by environmental factors. High heritability is an indication of presence of fixable more umber of a additive factors.

A low genetic advance was noticed for length of the fruir, number of branches and number of fruits in spite of the fact that the character exhibited comparatively high degree of heritability. Thus, a high heritability does not necessarily accompany a high genetic advance. Yield per plant and number of seeds per fruit exhibited high heritability as well as greater genetic advance which meant that these two characters were governed largely by a additive effects of gene (Johnson *et al.*, 1955). Similar results have also been reported by Nandpuri *et al.*, (1971) and Kirti Singh *et al.*, (1972). It might be

TABLE II. Correlation coefficient between different pairs of characters

Characters	Length of fruit	Number of branches	Number of seed/fruit	Yield per plant
Number of fruits per plant	−0.18	−0.34*	+0.17	0.82**
Length of fruits		−0.03	−0.01	−0.18
Number of branches			+0.31	+0.37*
Number of seeds per fruit				0.27

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

concluded that the yield per plant, length of fruit, number of branches and number of seeds per fruit may be improved by selection.

Table II revealed that yield per plant showed high significant positive correlation with number of fruits per plant with number of branches and nearly significant with number of seeds per fruit. It is clear that the yield components, number of fruits per plant, number of branches and number of seeds per fruits are main contributing components of yield confirming the reports of Singh and Singh (1970), Legg and Lippert (1966) and Kirti Singh *et al.*, (1972). Number of fruits per plant had significant negative correlation with number of branches.

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