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Genetic Variability, Heritability and Genetic Advance of Growth and Yield Components of Chilli (*Capsicum annuum* L.) Genotypes

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Abstract: ***Genetic variability, heritability, genetic advance and genetic advance as a percent of mean for fifteen characters were assessed by field evaluation of sixteen chilli genotypes at Vegetable Research Block of Veer Chandra Singh Garhwali Uttarakhand University of Horticulture and Forestry, Ranichauri Campus, Tehri-Garhwal during Kharif 2014. The phenotypic coefficient of variation was higher than genotypic coefficient of variation for all the characters indicating the influence of environment on these characters. High GCV and PCV, heritability and genetic advance as percentage of mean were noted for fruit weight at edible maturity (61.04% & 61.37%, 99.02% and 125.09%), fruit yield per plant (47.67% & 48.24%, 97.63% and 97.03%) and number of fruits per plant (39.77% & 40.11%, 98.31% and 81.24%). Therefore, selection should be imposed considering these traits for improvement of population in chilli in temperate hills of Uttarakhand.***

Keywords: *Capsicum annuum* L., variability, heritability, genetic advance

1. Introduction

Chilli pepper (*Capsicum annuum* L.) is one of the most important spice crop of India and finds a variety of uses. Chilli, also known as hot pepper, was introduced into India from Brazil during 1584 by the Portuguese [1]. The word „Chilli" is of Mexican origin and is still under use in India [2]. India is the world leader in chilli production with total area of 7.75 lakh hectare and production of 14.92 lakh tones next only to China and Pakistan [3]. Importance of genetic variability in any breeding material is a pre-requisite as it provides not only a basis for selection but also some valuable information regarding selection of diverse parents for use in hybridization programme. The plant breeder has to identify the sources of favourable genes, incorporate them in breeding populations and aim for isolation of productive genotypes and cultivars. Thus, improvement in any crop is based on the extent of genetic variation and the degree of improvement depends upon the magnitude of available beneficial genetic variability. Hence, the present study was undertaken to analyse the extent of variability present in sixteen genotypes of chilli in respect of traits contributing to yield and quality of chilli fruits.

2. Materials and Methods

Sixteen genotypes of green chilli (*Capsicum annuum* L.) collected from different sources were evaluated at Vegetable Research Block of Veer Chandra Singh Garhwali Uttarakhand University of Horticulture and Forestry, Ranichauri Campus, Tehri-Garhwal during *Kharif* 2014. The genotypes were raised in randomized block design with three replications. Ten plants were randomly selected per accession and observations recorded on plant height at 50% flowering (cm), days to 50% flowering, days to first picking, leaf area (cm^2), number of branches per plant, fruit length (cm), fruit diameter (cm), pedicel length (cm), pericarp thickness (mm), dry matter content (%), ascorbic acid content (mg/100 g fruit), plant height at last picking (cm), number of fruits per plant, fruit weight at edible maturity (g) and fruit yield per plant (g). Analysis of variance in respect of various characters was done [4]. Genetic variability for the different characters was estimated as suggested by Singh and Choudhary (1985) [5]. Heritability (broad sense) and genetic advance as percentage of mean were calculated as per Hanson *et al*. (1956) [6] and Johnson *et al*. (1955) [7].

3. Results and Discussions

Analysis of variance showed significant differences among the genotypes for all the characters studied. The extent of variability in respect of range, mean, phenotypic and genotypic variance, phenotypic and genotypic coefficients of variation, heritability and genetic advance as percentage of mean is given in Table 1.

The present investigation revealed considerable amount of variation for all the characters studied. Such wide variation indicated the scope for improving the population for these characters as suggested earlier by Cherian (2000) [8].

Table 1: Range, mean, coefficients of variation, heritability, genetic advance and genetic gain for different characters in *Capsicum annuum* L.

SI. No.	Characters	Range	Mean ± SEm	PCV %	GCV %	Heritability %	Genetic advance %	Genetic Gain
1	Plant height at 50% flowering (cm)	34.0-45.7	39.76 ± 0.31	9.25	9.15	97.85	7.42	18.66
2	Days to 50% flowering	70.3-102.0	81.64 ± 0.48	16.18	16.15	99.59	27.11	33.20
3	Days to first picking	106.0-119.3	110.75 ± 0.38	3.87	3.83	97.61	8.63	7.79
4	Leaf area (cm^2)	17.5-40.3	32.20 ± 0.28	16.78	16.72	99.17	11.04	34.30
5	Number of branches per plant	5.50-9.56	7.38 ± 0.12	19.49	19.28	97.58	2.90	39.30
6	Fruit length (cm)	5.47-10.71	8.76 ± 0.05	16.29	16.26	99.50	2.93	33.42
7	Fruit diameter (cm)	0.88-2.03	1.44 ± 0.03	21.12	20.80	96.77	0.60	42.21
8	Pedicel length (cm)	3.91-6.44	4.82 ± 0.09	16.72	16.39	95.38	1.59	33.10
9	Pericarp thickness (mm)	0.67-1.84	1.35 ± 0.02	24.03	23.81	98.20	0.65	48.63
10	Dry matter content (%)	8.66-14.87	11.51 ± 0.07	13.08	13.04	99.11	3.08	26.77
11	Ascorbic acid content (mg/100 g fruit)	120.3-269.8	162.49 ± 0.98	22.26	22.24	99.78	74.37	45.76
12	Plant height at last picking (cm)	56.76-89.6	68.36 ± 1.47	12.82	12.27	91.54	16.53	24.18
13	Number of fruits per plant	36.86-140.2	68.26 ± 2.04	40.11	39.77	98.31	55.46	81.24
14	Fruit weight at edible maturity (g)	1.81-10.21	3.30 ± 0.12	61.37	61.04	99.02	4.12	125.09
15	Fruit yield per plant (g)	59.28-414.65	207.61 ± 8.88	48.24	47.67	97.63	201.46	97.03

High coefficients of phenotypic (PCV) and genotypic (GCV) variation were observed for fruit weight at edible maturity, fruit yield per plant and number of fruits per plant. Similar results were also reported by Kumar *et al.* (2012) [9]. The high PCV and GCV observed are evident from their high variability that in turn offers good scope for selection. The lowest PCV and GCV were for dry matter content, plant height at last picking, plant height at 50% flowering and days to first picking. In present study, all the characters exhibited high estimates of heritability. The high estimates of heritability for ascorbic acid content, days to 50% flowering, fruit length, leaf area, dry matter content, fruit weight at edible maturity, number of fruits per plant, pericarp thickness, plant height at 50% flowering, fruit yield per plant, days to first picking, number of branches per plant, fruit diameter, pedicel length and plant height at last picking suggested that selection will be effective for these. These results are in conformity with those of report Manju and Sreelathakumary (2002) [10], Ukkund *et al.* (2007) [11], Chattopadhyay *et al.* (2011) [12] and Jogi *et al.* (2013) [13]. High genetic advance as percentage of mean was observed for fruit weight at edible maturity followed by fruit yield per plant, number of fruits per plant, pericarp thickness, ascorbic acid content, fruit diameter, number of branches per plant, leaf area, fruit length, days to 50% flowering and pedicel length. These characters had high to moderate heritability values. The results of present investigation were in close agreement with those of Nandadevi and Hosamani (2003) [14], Kumar and Hosamani (2006) [15], Ajjapplavara and Channagoudra (2009) [16], Gupta *et al.* (2009) [17], Jyothi *et al.* (2011) [18], Datta and Das (2013) [19], Pandit and Adhikary (2014) [20] who have reported high genetic advance as percentage of mean for plant height, number of fruits per plant, fruit length, number branches per plant and green fruit yield per plant.

On the basis of overall results it was observed that high GCV & PCV, heritability and genetic advance as percentage of mean were noted for fruit weight at edible maturity (61.04% & 61.37%, 99.02% and 125.09%), fruit yield per plant (47.67% & 48.24%, 97.63% and 97.03%) and number of fruits per plant (39.77% & 40.11%, 98.31% and 81.24%). So, these characters can be exploited through hybridization followed by selection to develop suitable plant type.

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