RESEARCH ARTICLE

SELECTION PARAMETERS OF CHILLI (*CAPSICUM ANNUUM* L.) GENOTYPES FOR YIELD AND RELATED TRAITS

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Abstract: Fifteen genotypes of chilli were evaluated in RBD with three replications was conducted at Vegetable Research Farm, Department of Horticulture, Allahabad School of Agriculture Sam Higginbottom Institute of Agriculture, Technology and Sciences (Deemed to-be-University), Allahabad during the Rabi season of 2014-2015 to study the selection parameters of chilli genotypes for yield and related traits. Altogether fifteen genotypes of chilli laid out in Randomized Block Design (RBD) with three replication. All these fifteen chilli genotypes showed significant variation in characters *viz*., average fruit weight (g), number of seeds per fruits , weight of Seeds /fruits (mg), number of fruits /plant, Fruit yield per plant (g), yield per hectare (q), yield of dry green chilli (q ha-1), fruit set percent, estimation of ascorbic acid (mg/100g), estimation of capsaicin (°Brix). The mean of the different traits for 15 genotypes of Chilli (*Capsicum annum* L.) with three replications treatment details viz. LCA-334(C), KA-2(C), 12CHIV AR-1, 12CHIV AR-2, 12CHIV AR-3, 12CHIV AR-4, 12CHIV AR-5, 12CHIV AR-6, 12CHIV AR-8, IIHR- 2006, ACS- 08-09, HC- 50, KASHI ANMOL, HC- 68 and G4 (Local) were tried in Randomized Block Design (RBD). On the basis of fifteen genotypes studied, for different characters genotype KA-2(C) (22.01q) was found superior in terms of fruit yield per hectare followed by 12CHIV AR-2 (17.72q) and LCA-334(C) (13.37q). The genotype 12 CHIV AR-5 recorded significantly for average fruit weight (4.65 (g)) and Weight of Seeds/fruits (mg) (249.08). However, the genotype 12CHIV AR-4 showed the maximum number of seeds per fruits (46.22). The highest Number of fruits/plant was noticed in genotype 12CHIV AR-8 (116.03) and maximum yield per hectare (q) recorded in genotype KA-2(C) (621.98 q) while, maximum ascorbic acid content (mg/100g) was noticed in genotype 12 CHIVAR-6 and highest capsaicin (°Brix) content was observed in LCA-334(C).

Keywords: Chilli (*Capsicum annuum* L.), Evaluation, Genotypes, Yield

INTRODUCTION

Pungent peppers, commonly known as chilli (*Capsicum annuum* L.), is one of the world's major vegetable and spice crop and it occupied fourth position as a spice crop. India is the world leader in chilli production followed by China and Pakistan (Anon., 2004). Indian chillies are considered to be world famous for its colour and pungency. Globally, 1776 thousand ha land is estimated to be under cultivation of chillies producing around 7182 thousand tons. Chilli is the third important crop of the family *Solanaceae* after tomato and potato. The production is seasonal due to lack of appropriate cultivars and techniques. Early summer to early rainy season is the lean period of production. Prevailing high temperature, blowing of hot wind and shortage of soil moisture during early summer, and high temperature and excessive moisture during rainy summer are the major factors limiting its cultivation during summer and rainy months. Such condition induces the abscission of flower buds, flowers and young fruits which is the most important factors limiting the production of chilli (AVRDC, 1986). Around 30 % of the area shared among major spice crops of the country is occupied by chilli (Indian Horticulture Database 2011). Though chillies are grown all over India, North Eastern (NE) states contribute 51.72 % of its annual production while having only 8 % area under chilli cultivation (Spice Statistics, Spice Board 2004).

Chilli is believed to have been introduced to India by Portuguese explorers (Basu and De 2003) and to north eastern India by Christian missionaries (Dhaliwal 2007). It is also used as medicinal herb and ornamental plants in different parts of world. It is an important constituent of many food adding. However, colour, vitamin and pungency and therefore indispensible to the United States and World food Industries (Green leaf 1986). A wide variability in chilli fruit morphology, pungency, bearing habit and crop duration is found throughout India (Asati and Yadav 2004). The principal environmental factor for the abscission is the extreme temperatures i.e. too low or high (Cochran, 1936; Rylski and Spigelman, 1982; Olarewaju, 1989; Erickson and Markhart, 2001). Studies on chilli genotypes revealed that great variation exists in ability to flowering, fruit set, yield and other qualitative attributes under different agro-climates (Wien *et al.*, 1989; Rani, 1996; Gupta, 2003). Pungency in chilli is due to capsaicin and its analogues, collectively called capsaicinoids (Thresh 1876). It is therefore indispensable to the world food and industries. India has 25 per cent share in the total quantity of hot pepper exported in the world. Major hot pepper growing states are Andhra Pradesh,

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Maharashtra, Karnataka, Orissa, Tamil Nadu and Madhya Pradesh. These account for nearly 80 per cent of the total hectare and production. The production and consumption of chilli in North eastern region of India has immense potential considering its congenial agro-climatic conditions.

The fruits are, therefore, available in the market throughout the year. Recent trend in vegetable cultivation is by using improved or hybrid cultivars to get more yield and/or quality. But insufficient availability of seed of the improved or hybrid varieties is an important constraint of cultivation. However, different well-known local cultivars are grown by the farmers of these areas.

MATERIAL AND METHOD

The present research was carried out in the Vegetable Research Farm, Department of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad (Uttar Pradesh) during 2014-2015. Which is situated at an elevation of 78 meters above sea level at 25.87 degree North latitude and 81.15 degree E longitude. This region has a sub-tropical climate prevailing in the south-east part of U.P. with both the extremes in temperature, i.e. the winter and the summer. In cold winters, the temperature sometimes is as low as 32°F in December – January and very hot summer with temperature reaching up to 115°F in the months of May and June. During winter, frosts and during summer, hot scorching winds are also not uncommon. The average rainfall is around 1013.4 (cm) with maximum concentration during July to September months with occasional showers in winters. The soil of field was sandy loam in texture, poor in nitrogen, comparatively rich in phosphorus and medium in potash with slightly alkaline reaction with pH 7.2. The experimental material for the present study was comprised of 15 genotypes of chilli. The experiment was laid out in RBD with three replications. The spacing between row to row 60.0 cm and plant to plant 45.0 cm was maintained with plot of 2.1 × 2.25 m. About 20 t/ha. of well decomposed cow-dung manure was mixed in the soil at field preparation. Fertilizer was applied @ 120 kg N, 80 kg P_2O_5 and 80 kg K_2O per hectare.

The standard cultural operations were adopted whenever needed. to ensure good crop The observations were recorded on five randomly selected plants of each genotype are already tagged as mark for average fruit weight, Number of seeds per fruits , Weight of Seeds/fruits, Number of fruits/plant, Fruit yield per plant, Yield per hectare, Yield of dry green chilli, fruit set percent, Estimation of ascorbic acid, Estimation of capsaicin. For qualitative analysis matured green and ripe fruits were taken from those plants for ascorbic acid and capsaicin content respectively. Ascorbic acid content was determined by the method as described by Jagota and Dani (1982). The data were analysed statistically as per Fisher's Analysis of Variance Technique as described by Gomez and Gomez (1984).

RESULT AND DISCUSSION

Mean performance of all fifteen genotypes for all traits and fifteen chilli genotypes are presented in Table 1. The analysis of variance revealed significant differences among the genotypes for the ten traits studied, indicating the validity of further statistical analysis. The pertinent data on mean performance of genotypes are detailed in Table 1.

Average fruit weight (g)

The maximum fruit weight was observed in genotypes 12CHIV AR-5 (4.67) followed by KASHI ANMOL (4.42) and 12CHIV AR-4 (3.86) whereas minimum fruit weight was found in genotype 12CHIV AR-1 (2.15) followed by HC- 50 (2.23) and HC- 68 (2.41) with an average mean of 3.03.

Number of seeds per fruits

The maximum number of seeds per fruits was noticed in genotypes 12CHIV AR-4 (46.22) followed by G4 (Local) (42.51) and KASHI ANMOL (42.28) whereas number of seeds per fruits was observed in minimum 12CHIV AR-5 (23.05) genotypes followed by 12CHIV AR-8 (23.54) and ACS- 08-09 (23.94) with an average mean of 32.51.

Weight of Seeds /fruits (mg)

The maximum weight of seeds per fruits was found in genotypes 12CHIV AR-5 (249.08) followed by KA-2(C) (202.56) and KASHI ANMOL (202.24) and the minimum weight of seeds per fruits was showed in genotypes 12CHIV AR-1 (76.95) followed by 12CHIV AR-4 (92.54) and 12CHIV AR-8 (105.46) with an average mean of 153.90.

Number of fruit per plant

The maximum number of fruits/plants was noted in genotypes 12CHIV AR-8 (116.03) followed by 12CHIV AR-3 (94.77) and 12CHIV AR-4 (86.84) and the minimum no. of fruit per plants was showed in genotypes 12CHIV AR-6 (54.45) followed by HC-68 (58.43) and LCA-334(C) (58.43) with an average mean of 75.95.

Fruit yield per plant (g)

The maximum yield per plant was noticed in genotypes KA-2(C) (621.98) followed by 12CHIV AR-2 (508.11), LCA-334(C) (397.23) and 12CHIV AR-3 (382.44) and whereas minimum yield/plant was observed in genotypes 12CHIV AR-1 (85.52) followed by 12CHIV AR-6 (128.66) and HC- 68 (137.67) with an average mean of 294.72.

Yield / ha (q)

The maximum yield per hectare was observed in genotype KA-2(C) (22.01) followed by 12CHIV AR-2 (17.72) and LCA-334(C) (13.37). The minimum yield per hectare was observed in genotypes 12CHIV AR-1 (3.99) followed by 12CHIV AR-6 (4.95) and G4 (Local) (5.16) with an average mean of 9.70.

Yield of dry green chilli (q ha-1)

The maximum yield of dry green chilli quantal per hectare was observed in genotype KA-2(C) (1.51) followed by 12CHIV AR-2 (1.21) and LCA-334(C) (1.17). The minimum yield per hectare was observed in genotypes 12CHIV AR-1 (0.38) followed by 12CHV AR-06 (0.45) and G4 (Local) (0.50) with an average mean of 0.85.

Fruit set percent

The maximum fruit set percent was observed in genotype 12CHIV AR-3 (31.28) followed by Kashi Anmol (16.66) and 12CHIV AR-4 (15.02). The minimum yield per hectare was observed in genotypes 12CHIV AR-1 (2.48) followed by 12CHIV AR- 6 (5.45) and HC 50 (6.66) with an average mean of 11.17.

Estimation of ascorbic acid (mg/100g)

The maximum vitamin C was observed in genotypes 12CHIV AR-6 (164.92) followed by 12CHIV AR-4 (160.25) and 12CHIV AR-8 (157.42) and the minimum vitamin 'C' was showed in genotype KA-2(C) (121.81) followed by IIHR- 2006 (123.98) and HC- 50 (127.14) mg/100g) with an average mean of 142.31.

Estimation of capsaicin (°Brix)

The maximum estimation of capsaicin (°Brix) was observe in genotypes LCA-334(C) (0.61) followed by 12CHIV AR-5 (0.59) and G4 (Local) (0.56) and the minimum estimation of capsaicin was showed in genotypes KA-2(C) (0.23) followed by 12CHIV AR-2 (0.26) and HC- 68 (0.26) with an average mean of 0.42.

A wide range of variation was recorded for plant height, weight of seeds per fruit, number of fruits per plant, fruit yield per plant, Ascorbic acid, yield q per ha which indicated that there is better scope for selection for the improvement of these characters.

Table 1. Mean performance of different chilli genotypes various character

S. No	Character / Genotypes	Average fruit weight (g)	Number of seeds per fruits	Weight of Seeds /fruits (mg)	Number of fruits /plant	Fruit yield per plant (g)	Yield per hectare (q)	Yield of dry green chilli (q ha-1)	Fruit set percent	Estimation of ascorbic acid (mg/100g)	Estimation of capsaicin (°Brix)
1.	LCA-334(C)	3.05	35.95	132.17	58.43	397.23	13.37	1.17	9.33	147.06	0.61
2.	KA-2(C)	3.51	38.43	202.56	72.20	621.98	22.01	1.51	14.00	121.81	0.23
3.	12CHIV AR-1	2.15	35.12	76.95	73.97	85.52	3.99	0.38	2.48	135.10	0.35
4.	12CHIV AR-2	2.46	24.37	151.43	82.73	508.11	17.72	1.21	10.68	144.63	0.26
5.	12CHIV AR-3	2.91	25.41	145.10	94.77	382.44	13.34	1.15	31.28	138.47	0.29
6.	12CHIV AR-4	3.86	46.22	92.54	86.84	299.07	10.29	1.15	15.02	160.25	0.38
7.	12CHIV AR-5	4.67	23.05	249.08	79.51	321.15	11.42	1.10	6.67	132.82	0.59
8.	12CHIV AR-6	2.84	24.17	136.12	54.45	128.66	4.95	0.45	5.45	164.92	0.53
9.	12CHIV AR-8	2.45	23.54	105.46	116.03	324.01	11.04	1.08	12.66	157.42	0.45
10.	IIHR- 2006	2.68	25.12	164.72	80.97	293.00	5.50	0.51	7.33	123.98	0.51
11.	ACS- 08-09	2.72	23.94	181.38	68.63	156.00	6.75	0.63	7.25	154.33	0.49
12.	HC- 50	2.23	37.55	169.89	74.40	276.00	6.18	0.60	6.66	127.14	0.31
13.	KASHI ANMOL	4.42	42.28	202.24	65.63	237.67	8.91	0.91	16.66	151.19	0.43
14.	HC- 68	2.41	39.98	112.63	58.43	137.67	5.85	0.52	12.56	130.25	0.26
15.	G4 (Local)	3.10	42.51	186.27	72.20	252.33	5.16	0.50	9.58	145.28	0.56
	Mean	**3.03**	**32.51**	**153.90**	**75.95**	**294.72**	**9.70**	**0.85**	**11.17**	**142.31**	**0.42**
	S.E.	0.60	2.51	104.27	3.14	6.23	0.20	0.04	7.25	1.50	0.011
	C.D. 5%	0.73	7.47	330.78	10.40	19.67	0.58	0.11	2.48	4.28	0.32
	F test	S	S	S	S	S	S	S	S	S	S
	Min	**2.15**	**23.05**	**76.95**	**54.45**	**85.52**	**3.99**	**0.38**	**2.48**	**121.81**	**0.23**
Range	**Max.**	**4.67**	**46.22**	**249.08**	**116.03**	**621.98**	**22.01**	**22.01**	**31.28**	**164.92**	**0.61**

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