



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2019; 7(3): 5151-5154

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Received: 19-03-2019

Accepted: 21-04-2019

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Evaluation of yield attributing characters of selected F₄ progenies of chilli (*Capsicum annum* L.) during rabi season under Konkan conditions

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Abstract

Nine chilli genotypes were evaluated for yield and yield attributing characters during *rabi* season at Vegetable Improvement Scheme, Central Experimental Station, Wakawali. Among nine genotypes ACSS9818 x BC-24 exhibited significantly superior performance with the production of highest green fruit yield per plant (0.719kg), maximum number of fruits (229.73) per plant, green fruit yield per hectare (9.14T) and maximum pickings (5.47) over rest of progenies. As regards to other yield components, the progeny ACSS9818 x Pant C-3 was earliest (66.47 DAT) days with respect to first picking, highest green fruit weight (3.37g) and fruit diameter (1.19cm), progeny Pant C-3 x Konkan Kirti recorded maximum length of fruit (9.01cm). Overall performance of the progenies revealed that progenies BC-24 x Konkan Kirti, ACSS9818 x BC-24, ACSS9818 x Pant C-3 and Konkan Kirti are the superior progenies for most of the traits studied under konkan climatic conditions among the nine chilli progenies.

Keywords: Yield attributing characters, F₄ progenies, chilli, *Capsicum annum* L., Rabi, Konkan

Introduction

Chilli is an annual sub herb belonging to the family *Solanaceae* and known as hot pepper, red pepper, cayenne pepper, capsicum, etc. It is the universal spice of India. Immature chilli fruits contain phytonutrients, ascorbic acid, caretenoids and rutin which are valued for pharmaceutical needs (Purseglove, 1977) ^[14]. It imparts pungency and colour to the dishes. It is an important ingredient in day to day curries, pickles and chutneys and also a rich source of Vitamin A, C and E and assists in digestion. It also prevents heart diseases by dilating blood vessels.

In India, the area under chilli cultivation is 2.87 lakh ha with annual production of 34,07lakh MT (Anonymous, 2016-17a) ^[2]. In Maharashtra, it is one of the important vegetable crop under cultivation, which covers an area of 99580 ha with annual production is about 45.60 MT (Anonymous, 2014b) ^[1].

India is the only rich country in many varieties of chilli with different quality factors. The great diversity is observed among different cultivars available in India and outside with respect to shape, size, yield, quality and other traits. Identification of a variety better suited for a particular region and its improvement is of immediate task to exploit its potential. However, information available regarding the performance of the different genotypes of chilli, particularly in the konkan region of the Maharashtra is so meagre.

Though in konkan region, diverse types of chilli are found with varying characters, no systematic research works in respect of selection of suitable type has been undertaken so far. So there is need to evaluate chilli types for konkan condition which are of excellent quality, yield and growth performance in every generation of crop improvement. The breeding is a tool for crop improvement which is mostly followed in solanaceous crops. Hybridization and evaluation of prominent progenies in different generation is a method adopted for variety development. The evaluation of identical types in the advanced generation may put forward a genotype which can be suited for abiotic and biotic stress under specific locality. Considering this view, the present investigation will be carried out to study the growth and yield performance of selected F₄ progenies under Konkan conditions.

Material and methods

The experiment was conducted at Vegetable Improvement Scheme, Central Experimental Station, Wakawali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli during Rabi 2016-17 season. The soil of the experimental field was lateritic in nature and sandy loam texture. It is acidic in reaction having pH 6.4. The experiment was laid out in Randomized Block Design (RBD) as nine chilli genotypes namely T₁ - Konkan Kirti x DPLC-5, T₂ - BC-24 x ACSS9818, T₃ - BC-24 x Konkan Kirti, T₄ - Pant C-3 x ACSS9818, T₅ - Pant C-3 x Konkan kirti, T₆ - DPLC-5 x Konkan kirti, T₇ - ACSS9818 x BC-24, T₈ - ACSS9818 x Pant C-3, T₉ - Konkan Kirti (Check) were tested in three replications. The transplanting of each chilli progeny was done in beds at spacing of 65 x 45 cm row to row and plant to plant. All the recommended package of practices was followed to raise the crop health. Observations were recorded on randomly selected five plants from each progenies and replication. The statistical analysis of the data was carried out by standard method of analysis of variance as given by Panse and Sukhatme (1995) [12].

Results and discussion

The data on the harvesting behaviour of selected F₄ progenies in respect of first and last harvest, number of picking are presented in Table 1. The days to first harvest were ranged from 66.47 to 72.28 days with mean of 69.05 days. The progeny T₈ (ACSS9818 x Pant C-3) was found with lowest days (66.47) to first harvest and it was at par with T₅ and T₇ while Konkan Kirti (Check) took maximum days (72.28) to first harvest. The progeny T₁ (Konkan Kirti x DPLC-5) had noticed lowest days (120.13) to last harvest, while variety Konkan Kirti had noticed highest days (134.20) to last harvest. Harvesting duration is the important character especially in vegetable crops, which are consumed at immature tender stage. The more harvesting span is considered as favourable character and given due consideration during selection. The harvesting span (duration) was shortest (50.06 days) in T₁ progeny (Konkan Kirti x DPLC-5) while extended harvesting (61.92 days) was noticed in Konkan Kirti (T₉) followed by ACSS9818 x Pant C-3 (T₈). Numbers of days to first harvest determines earliness of genotypes. It is obvious that, the genotype producing early yield is considered because, the early receives higher price in market. It is therefore necessary to give due consideration for this trait while selection of genotypes for earliness in yield. Results in variation for first harvest of different genotypes may be due to the genetic influence of genotypes and prevailing environment. The variation of the harvest span in different varieties may be due to the difference in flowering behaviour and bearing habit. These variation in results agree with findings of Sharma *et al.* (2010) [17], Dhupal (2016) [7], Pawar (2016) [13] and Yatagiri *et al.*, (2017) [24] in chilli. Number of pickings indicates the longevity or harvesting duration. It was revealed that the number of pickings in F₄ chilli progenies was ranged from 4.53 to 5.47 with the general mean 5.11 (Table 1). The highest number of pickings per plant (5.47) were observed in the treatment T₇ (ACSS9818 x BC-24) and it was at par with treatments T₉, T₃, T₆, T₈ and T₅.

The lowest number of pickings per plant (4.53) was recorded in the T₄ (Pant C-3 x ACSS9818) progeny. The variations may be due to the appearance of days to 50 per cent flowering, number of fruits per plant, moderately and less effect of climatic conditions in Konkan region. Similar results regarding the number of picking per plant had noticed by Manju and Sreelatha Kumary (2002) [11] and Pawar (2016) [13] in chilli.

The data regarding chilli fruit characters and yield are presented in Table 2 revealed that there was significant variation in the fruit and yield among the selected F₄ progenies. The highest length of fruit (9.01cm) was observed in the T₅ (Pant C-3 x Konkan kirti) and it was at par with treatment T₂ (BC-24 x ACSS9818). The minimum length of fruit (7.94cm) was observed in the T₄ (Pant C-3 x ACSS9818). However, the diameter of chilli fruit ranged from 0.79cm (Pant C-3 x Konkan kirti) to 1.19cm (ACSS9818 x Pant C-3) and the average was calculated to be 1.00 cm. The highest fruit weight (3.37g) was observed in the progeny T₈ (ACSS9818 x Pant C-3) and it was at par with T₁ progeny. The fruit weight was lowest (2.23g) in the Pant C-3 x Konkan kirti (T₅) progeny. The variations in the fruit size and weight of F₄ genotypes of chilli might be due to genetics make up of genotypes. The similar variation in fruit size was also reported by Smitha and Basavaraja (2006) [18], Chattopadhyay *et al.* (2011) [3], Dhaliwal *et al.* (2014) [5], Vijaya *et al.* (2014) [23], Dhupal (2016) [7], Pawar (2016) [13] and Yatagiri *et al.* (2017) [24].

Number of fruits is one of the most important yield attributing characters. Some promising lines were found in present investigation and needs to strengthen the selection. The highest number of fruits per plant (229.73) was recorded in ACSS9818 x BC-24 progeny (T₇) and it was significantly superior over all the progenies (Table 2). While, least number of fruits (109.47) were found in Pant C-3 x ACSS9818 (T₄) progeny. Variations in respect of number of fruits per plant in different genotypes might be due to fruit set percent.

The maximum fruit yield per plant (0.719kg) was recorded in ACSS9818 x BC-24 progeny (T₇) and it was significantly superior over all progenies while, minimum fruit yield per plant (0.279kg) was observed in the treatment T₄. In Konkan Kirti (Check) the yield was 0.494kg plant⁻¹. The fruit yield per hectare was significantly highest (9.14t/ha) in ACSS9818 x BC-24 progeny (T₇) and it was at par with T₃ and variety Konkan Kirti while, the minimum fruit yield (3.77t/ha) was observed in the Pant C-3 x ACSS9818 progeny (T₄). The yield potential of the particular progeny is determined by its genetic potential, inheritance characters from their parents. The difference in fruit yield per plant may be due to fruit set percent, fruit length, diameter and weight of fruit showed highly positive direct effect on fruit yield per plant. The results are analogous with the earlier findings of Smitha and Basavaraja (2006) [18], Vijaya *et al.* (2014) [23], Pawar (2016) [13] and Kumari *et al.* (2017) [9] in chilli.

Among the evolved F₄ progenies of chilli, performance of the progenies BC-24 x Konkan Kirti, ACSS9818 x BC-24 and ACSS9818 x Pant C-3 were found superior for most of the yield traits studied under Konkan climatic conditions.

Table 1: Harvesting span of selected F4 progenies of chilli

Sr. No.	Progeny	Days to first harvest*	Days to last harvest*	Harvesting span	Number of pickings per plant
T ₁	Konkan Kirti x DPLC-5	70.07	120.13	50.06	4.93
T ₂	BC-24 x ACSS9818	70.13	120.40	50.27	4.67
T ₃	BC-24 x Konkan Kirti	68.33	121.93	53.60	5.33
T ₄	Pant C-3 x ACSS9818	69.73	122.60	52.87	4.53
T ₅	Pant C-3 x Konkan kirti	66.73	123.33	56.60	5.13
T ₆	DPLC-5 x Konkan kirti	69.67	124.13	54.46	5.27
T ₇	ACSS9818 x BC-24	68.07	123.73	55.66	5.47
T ₈	ACSS9818 x Pant C-3	66.47	123.60	57.13	5.27
T ₉	Konkan Kirti (Check)	72.28	134.20	61.92	5.43
	Mean	69.05	123.79	54.73	5.11
	S.E.±	0.57	0.326	-	0.124
	C.D. at 5 %	1.720	0.976	-	0.371

(* Days after transplanting)

Table 2: Fruit characters and yield of different F4 progenies of chilli in rabi season

Progeny	Fruit length (cm)	Fruit diameter (cm)	Average weight of green fruit(g)	Number of fruits per plant	Green fruit yield per plant (kg)	Green fruit yield ha ⁻¹	Fruit length (cm)
T ₁	7.99	1.04	3.23	110.93	0.356	6.02	7.99
T ₂	8.63	0.95	3.10	125.60	0.384	6.24	8.63
T ₃	8.34	0.97	3.10	160.47	0.494	9.13	8.34
T ₄	7.54	0.95	2.53	109.47	0.279	3.77	7.54
T ₅	9.01	0.79	2.23	157.00	0.351	7.04	9.01
T ₆	7.74	1.02	2.67	147.13	0.392	5.43	7.74
T ₇	7.60	0.98	3.17	229.73	0.719	9.14	7.60
T ₈	8.20	1.19	3.37	137.33	0.466	6.08	8.20
T ₉	7.67	1.07	2.83	173.87	0.494	8.79	7.67
Mean	8.08	1.00	2.91	150.17	0.437	6.85	8.08
S.E.±	0.204	0.032	0.059	12.45	0.013	0.66	0.204
C.D. at 5 %	0.612	0.096	0.175	37.32	0.038	1.99	0.612

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