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Evaluation of growth character and physical parameters of fruits in selected F₄ progenies of chilli (*Capsicum annum* L.) under Konkan agroclimatic conditions

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Abstract

A field experiment was conducted at Vegetable Improvement Scheme, Central Experimental Station, Wakawali, Dapoli, Dist. Ratnagiri during *Rabi* season under Konkan agroclimatic conditions to assess the eight F₄ progenies of chilli (*Capsicum annum* L.) along with check (Konkan Kirti) for vegetative growth and fruit characters. The plant height at 30 DAT (23.31 cm), 60 DAT (56.20 cm), 90 DAT (67.87 cm) and at last harvest was highest in progeny 'BC-24 x ACSS9818'. The maximum number of branches per plant at last harvest stage was in 'Pant C-3 x Konkan Kirti' (9.80) progeny. The maximum average plant spread was observed in progeny 'BC-24 x ACSS9818' (58.00 cm). All progenies showed 'Solitary' flowering habit and 'Pendent' position habit.

Keywords: Growth character, physical parameters, fruits, *Capsicum annum* L.

Introduction

The native of Chilli is considered to be Mexico with secondary origin in Guatemala. Chilli (*Capsicum annum* L.) is the universal spice of India. Botanically, it is an annual sub herb belonging to the family Solanaceae. It is also known as hot pepper, red pepper, cayenne pepper, capsicum, etc. 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 has medicinal values. It imparts pungency and colour to the dishes.

In India, the huge diversity is being observed among different chilli genotypes with respect to shape, size, yield, quality and other traits. Development of suitable variety of any vegetable for a particular region through crop improvement is a task as the acceptance of the vegetable varied from location to location based. In Konkan region of Maharashtra, 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. In chilli, hybridization and evaluation of prominent progenies in different generation is a method adopted for variety development. Besides yield, the morphological characters are to be assessed during the evaluation of progenies as these factors are yield governing factors and external appearance of the fruit is a focus for to market preference. In this view, the present investigation will be carried out to study some morphological parameters of selected F₄ progenies under agroclimatic conditions of Konkan region.

Material and Methods

The experiment was conducted at the Vegetable Improvement Scheme, Central Experimental Station, Wakawali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli during *Rabi* season. The soil of the experimental field was lateritic in nature and sandy loam in texture. It is acidic in reaction having pH 6.4. The experiment was laid out in Randomized Block Design (RBD) with three replications with nine progenies (8 progenies + 1 checks) with spacing of 65 x 45 cm row to row and plant to plant. All the recommended package of practice and plant protection measures were followed to raise the crop health. Observations were made on randomly selected five plants from each progenies and replication. Nine chilli genotypes were collected from Vegetable Improvement Scheme, Central Experimental Station, Wakawali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli 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). A basal dose of 150 kg N, 80 kg P₂O₅ and 100 kg K₂O/ha was

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applied. Half of the nitrogen and full amount of the phosphorus and potash were given as basal dose at the time of transplanting, remaining half quantity of nitrogen was applied in two split doses at 30 days and 60 days after transplanting. The healthy seedlings of uniform growth and healthy were selected for planting. Light irrigation was given before uprooting seedlings from the nursery beds so that minimum damage may occur to the roots of seedling. Appropriate agronomic practices were followed to raise a good crop. Various observations were recorded on growth parameters viz., Plant height (cm) at 30, 60, 90 and last harvest stage, Number primary branches per plant and plant spread at last harvest. Flowering observation viz., Flowering attributes, Fruiting behaviour and Position of fruit. Statistical analysis of the data was carried out by standard method of analysis of variance as given by Panse and Sukhatme (1995) [8].

Results and Discussion

Plant height

Height of plant is an important growth character in chilli. The yield of any crop is influenced by vigour of plant, where the height of plant plays an important role. The data presented in Table 1 in relation to plant height of nine chilli progenies of F₄ revealed that the plant height at 30, 60, 90 days after transplanting and at last harvest varied significantly.

From data presented in Table 1 it is clear that the height of plant at 30 DAT was significantly differ with each other which was in the range of 15.65 cm to 23.31 cm. The highest height of plant (23.31 cm) was recorded by T₂ (BC-24 x ACSS9818) which was at par with T₈, while lowest height of plant (15.65 cm) was recorded by T₄ (Pant C-3 x ACSS9818). The mean for height of plant at 30 DAT, was 18.45 cm.

The height of plant at 60 DAT was in the range of 40.73 cm to 56.20 cm with mean of 48.29 cm. At 60 DAT the significantly highest height of plant (56.20 cm) was observed in the T₂ (BC-24 x ACSS9818). It was at par with treatment T₈ and the lowest height of the plant (40.73 cm) was recorded in the T₄ (Pant C-3 x ACSS9818).

The height of plant at 90 DAT was in the range of 49.33 cm to 67.87 cm with mean of 58.07 cm. At 90 DAT, the highest height of plant (67.87cm) was observed in the T² (BC-24 x ACSS9818) and it was at par with T⁷, T¹ and T⁸. The lowest height of the plant (49.33 cm) was recorded in the treatment T³ (BC-24 x Konkan Kirti). The height of plant at last harvest was in the range of 55.00 cm to 73.33 cm with mean of 63.22 cm. At last harvest, the highest height of plant (73.33 cm) was observed in T² (BC-24 x ACSS9818) progeny. It was at par with T⁷ and T¹ and the lowest height of the plant (55.00 cm) was recorded in the T⁴ (Pant C-3 x ACSS9818). The height of plant in Konkan Kirti (Check) was 59.00 cm.

The variation in the growth especially height is governed by genetic factor which is responsible for dwarfism. Plant height is also related to prevailing agro-climate, season when the crop grown. These results are in accordance with the finding of Sreelatha kumary and Rajamony (2004) [14], Tembhurne *et al.* (2008), Rohini and Lakshmanan (2014) [10], Dhaliwal *et al.* (2015) [15], and Kumari *et al.* (2017) [5]

1.3.1.2 Number of primary branches per plant

The diameter of chilli fruit ranged from 0.79 cm to 1.19 cm and the average was calculated to be 1.00 cm (Table 1). Maximum diameter of fruit (1.19 cm) was recorded in the T₈ (ACSS9818 x Pant C-3) progeny and it was significantly superior over all the genotypes while, the minimum diameter of fruit (0.79 cm) in the T₅ (Pant C-3 x Konkan kirti) progeny.

Such variation in the number of branches per plant might be due to characteristics of genotypes, interaction with environment and soil factors. The result found conformity with the Ukkund *et al.* (2007) [16], Sandeep *et al.* (2008) [11], Amit *et al.* (2014) [1], Vijaya, *et al.* (2014) [17], Magar *et al.* (2016) [6] and Kumari *et al.* (2017) [5].

1.3.1.3 Plant spread (cm)

Spread of plant is an important growth character in chilli. The yield of chilli crop depends upon the spread of plant. The spread of plant at last harvest was in the range of 46.23 cm to 58.00 cm with mean of 54.81 cm. The highest spread of plant at last harvest (58.00 cm) was observed in the progeny T₂ and it was at par with T₆, T₇, T₅, T₉, T₃ and T₈. The lowest spread of plant (46.23 cm) was observed in the T₄ progeny.

The wide range of variation in the spread of plant might be due to genetic character of that particular genotype and also the direct effect of soil and agro-climatic conditions and indirect effect of number of branches per plant. The significant results variation in spread of plant was agreed with Smitha and Basavaraja (2006) [12], Vijaya *et al.* (2014) [17] and Sharma *et al.* (2015) [13].

Flowering habit

From Table 2 it was revealed that the all progenies showed 'Solitary' flowering habit. These results were due to highly effect of genetic behavior of genotypes. These results associated with Dhumal (2016) [4].

Position of fruit

It was observed that from Table 2, all the F₄ progenies of chilli showed 'Pendent' position habit. Variation of the position of fruit in different progenies could be progenies characters. These was due to maximum possibility of genetic make-up and less effect of environmental factors. Chattopadhyay *et al.* (2011) [2] and Dhumal (2016) [4] are also associated results in chilli genotypes.

Fruit shape

From Table 2 it was revealed that the long fruits were observed in all progenies except T₅ (Pant C-3 x Konkan kirti) and T₂ (BC-24 x ACSS9818) while, very long fruits were observed in the progeny T₅ and T₂. The variation might be due to moderate environmental factors and highly genetic factors of genotypes. Similar finding have been also reported by Chattopadhyay *et al.* (2011) [2], Dhumal (2016) [4] and Pawar (2016) [9].

1.3.3 4 Fruit colour

All the progenies are light green colour except, T₃, variety Konkan Kirti and T₄, whereas treatment T₃ (BC-24 x Konkan Kirti) and variety Konkan Kirti were found with Dark green colour, and treatment T₄ (Pant C-3 x ACSS9818) was found with faint light green colour. The variation was due to moderately environmental factors and highly genetics factors. Colour variation was also observed by Mahmood *et al.* (2002), Dhumal (2016) [4] and Pawar (2016) [9].

From the present findings, all the growth parameters, flowering attributes, yield and yield contributing characters and fruit parameters were significantly varied. The progenies viz; BC-24 x Konkan Kirti, ACSS9818 x BC-24, ACSS9818 x Pant C-3 and Konkan Kirti found promising for growth performance.

Table 1: Growth performance of selected F₄ chilli progenies under Konkan agro climatic condition

S. No.	Progenies	Plant height (cm)				Number of branches/ plant	Plant spread (cm)
		30 DAT	60 DAT	90 DAT	Last harvest		
T ₁	Konkan Kirti x DPLC-5	16.55	48.20	62.87	68.60	6.53	50.57
T ₂	BC-24 x ACSS9818	23.31	56.20	67.87	73.33	6.47	58.00
T ₃	BC-24 x Konkan kirti	16.55	41.27	49.33	56.13	7.87	54.67
T ₄	Pant C-3 x ACSS9818	15.65	40.73	49.77	55.00	7.13	46.23
T ₅	Pant C-3 x Konkan Kirti	20.60	48.40	56.40	59.73	9.80	57.37
T ₆	DPLC-5 x Konkan Kirti	17.47	45.13	53.00	58.93	7.87	57.27
T ₇	ACSS9818 x BC-24	16.85	51.20	65.20	70.33	9.47	57.40
T ₈	ACSS9818 x Pant C-3	21.47	55.13	62.43	67.93	9.27	54.33
T ₉	Konkan Kirti (check)	17.62	48.37	55.80	59.00	9.20	57.30
	Mean	18.45	48.29	58.07	63.22	8.18	54.81
	S.E.±	0.750	1.160	1.997	1.891	0.292	1.506
	C.D. at 5 %	2.249	3.478	5.570	5.279	1.145	4.222

Table 2: Physical parameters of fruit in various chilli genotypes

Progenies	Flowering habit	Position of fruit	Fruit shape	Fruit colour
Konkan Kirti x DPLC-5	Solitary	Pendent	Long	Light green
BC-24 x ACSS9818	Solitary	Pendent	Very long	Light green
BC-24 x Konkan Kirti	Solitary	Pendent	Long	Dark green
Pant C-3 x ACSS9818	Solitary	Pendent	Long	Faint light green
Pant C-3 x Konkan kirti	Solitary	Pendent	Very long	Light green
DPLC-5 x Konkan kirti	Solitary	Pendent	Long	Light green
ACSS9818 x BC-24	Solitary	Pendent	Long	Light green
ACSS9818 x Pant C-3	Solitary	Pendent	Long	Light green
Konkan Kirti (Check)	Solitary	Pendent	long	Dark green

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