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Evaluation of different chilli Genotypes for Growth, Phenological Behaviour and Physical fruit Parameters in Kymore plateau region of Madhya Pradesh

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Abstract

In this work a field study was conducted at the Horticulture complex, Maharajpur, Department of Horticulture, JNKVV, Jabalpur (M.P.) during *Rabi* season in Randomized Block Design with three replications with row and plant spacing was maintained at 60 cm and 50 cm respectively to investigate the most suitable genotype of chilli under agro-climatic region of (Jabalpur) Madhya Pradesh. The present investigation is carried out to study the Growth, Phenological Behaviour and fruit yield, quality parameters in 18 genotypes of chilli which were found significantly. In the experimental material plant height at 30 DAT, 60DAT, 90DAT, 120DAT and 150DAT (days after transplanting) was observed maximum in genotype 2014/CHIVAR-9 (937.22, 60.53, 65.63, 73.43 and 74.21 cm) respectively. The maximum number of branches per plant was recorded in 2014/CHIVAR-6 at harvest stage. In Phenological behaviour of genotype 2014/CHIVAR-8 was found to be earliest (32.00 days) for days to first flowering, Days to 50% flowering (53.33 days). Some desirable physical fruit parameters like fruit behaviour, Fruit shape, fruit colour, were recorded for these genotypes of chilli.

Keywords: genotypes, growth, phenological behaviour, kymore plateau

Introduction

Chilli (*Capsicum annum* L.) belongs to the genus capsicum under the solanaceae family and having chromosome number $2n= 24$. Chilli is the most important spice and commercial crop of India due to its pungency, taste, appealing colour and flavour. Chillies are native of Peru and Mexico and Portuguese were the first to introduce chillies in India. In India, it is grown on an area of 0.805 million ha with an annual production of 1.276 million tons of dry chilli. (Anonymous, 2013) ^[1].

The pungency is due to alkaloid capsaicin. It is also used for industrial purpose due to extraction of oleoresin. Green fruit of chilli is one of the richest sources of anti-oxidant. Pungency in chilli is present in placenta and pericarp of fruit. The pungency and heating properties of capsaicin it is used in cosmetic and pharmaceutical industries in lowering cholesterol and also in pain balms. Fresh chilli peppers, red and green, are a rich source of vitamin-C. Chillies used as a condiment in the preparation of soups, chilli sauce, chilli oil, vinegar-spice mix etc.

India has large variability of chilli with different quality factors and other traits. A wide range of variability in chilli is available which provide a great scope for improving different traits of chilli through a systemic and planned selection programme. The success of any crop improvement programme mainly depends upon the resistant to biotic and abiotic stress and identification of a superior genotype which is better suited for a particular region. Studies on chilli genotypes revealed the potential for Growth, Phenological Behaviour and physical fruit parameters under Kymore plateau region of Madhya Pradesh.

Materials and Methods

The experiment was conducted at Horticulture complex, Maharajpur, Department of Horticulture, J.N.K.V.V. Jabalpur (M.P.) during *Rabi* season of 2015- 2016. The soil of the experimental field was medium black with pH 6.5 and good drainage uniform texture. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. The nursery was raised during first week of September and the seedlings were transplanted at a spacing of 60 cm × 50 cm in a row during last week of October. The experimental material for this study comprised of 18 genotypes with two checks (KA-2)

collected from IIVR, Varanasi and another check LCA-334 from LAM, Guntur. Well rotted FYM was applied @ 20 t/ha before second harrowing while preparing the field. Nitrogen, Phosphorus and Potash were applied @ 150, 80, and 100 kg/ha in the form of Urea, Di ammonium phosphate (DAP) and Murate of potash (MOP), respectively. All the other agronomic package of practices was followed to raise a healthy crop. Data were recorded on growth parameters viz., Plant height (cm) at 30, 60, 90, 120 DAT and 150 DAT (days after transplanting), No. of primary branches / plant at harvest, different flowering observation Days to 1st flowering, Days to 50% flowering, physical fruit parameters like fruit behaviour, Fruit shape, fruit colour. The data recorded were analyzed statistically as per the concept of ANOVA method given by Panse and Sukhatme (1985) [5].

Results and Discussion

Growth parameters

Plant height

Present study revealed that plant height and is primary growth parameter of plant which is very important for plant architecture. The data were recorded for mean height of the plant in chilli genotypes under study at different growth stages is presented in table 2. At 30 DAT the maximum plant height was observed in the genotype 2014/CHIVAR-9 (37.22cm) followed by 2013/CHIVAR – 2 (36.23cm) while minimum plant height was recorded for genotype Pusa Jwala (20.25cm).

At 60 DAT the maximum plant height was observed in the genotype 2014/CHIVAR-9(60.53cm) followed by 2014/CHIVAR – 5(58.39) while minimum plant height was recorded for genotype Pusa Jwala (35.37cm). At 90 DAT, 120 DAT and 150 DAT maximum plant height was observed in the genotype 2014/CHIVAR-9 (65.63, 73.43 and 74.21 cm), respectively. While genotype Pusa Jwala exhibited 20.25, 35.37, 41.42, 47.42 and 46.86 cm plant height at 30, 60, 90, 120 and 150 DAT, respectively. In all the genotypes 2014/CHIVAR-9 was recorded significantly superior, observed maximum plant height among all the genotypes. This difference observed in plant height in all genotypes in all stages of plant growth due to genetic variability, environment and soil type of Kymore plateau region of Madhya Pradesh. These findings are in accordance with earlier findings of Nandadevi and Hosmani (2003) [4], Tembhurne *et al.*, (2008) [7] and Smitha and Basavaraja (2006) [6].

Number of primary branches/ plant

The number of primary branches produced per plant varied significantly in all chilli genotypes at harvest of growth presented in table 2. The genotype 2014/CHIVAR-6 was recorded maximum 19.60 branches plant⁻¹ followed by genotype 2013/CHIVAR – 4(18.87) branches plant⁻¹ while minimum 16.87 branches plant⁻¹ were recorded in genotype Pusa Jwala at harvest stage of growth. The genotype 2014/CHIVAR-6 found significantly superior among all the genotypes of chilli. These variations found in Number of primary branches/ plant due to genetic makeup of genotypes with environment and soil factors. These findings are in accordance with earlier findings of Ukkud *et al.*, (2007) [8] and Kumar *et al.*, (2014) [2].

Flowering parameters

Days to 1st flowering

The data recorded for days to first flowering is presented in

table 2. The minimum number of days to first flowering observed in genotype 2014/CHIVAR-8 (32.00 days) followed by genotype 2014/CHIVAR-3 (32.33 days). The maximum days was observed in Guljar (42.00 days) followed by genotype 2014/CHIVAR – 1(37.67days). The genotype 2014/CHIVAR-8 found significantly superior in all the genotype. The variation in days to flowering is due to influence of genetic factors of varieties. These results are supported by earlier findings of Yatung *et al.* (2014) [11].

Days to 50% of Flowering

The data presented in the table 2 revealed that genotypes 2014/CHIVAR-3 and 2014/CHIVAR-8 were recorded minimum (53.33 days) for days to 50% flowering followed by genotype 2014/CHIVAR – 9(54.67days). It was found that the Guljar recorded for maximum (67.0 days) for days to 50% flowering. The genotype 2014/CHIVAR-3 found significantly superior in all the genotype. The variation of the days to 50% flowering due to genetic variation of genotype and less influence of environment and soil type. The results are in conformity with the findings of Vijaya *et al.*, (2014) and Yatagiri *et al.*, (2017) [10].

Physical parameters of fruit

Fruit colour

Colour of fruit presented in table 3 and it was found that Fruit colour was observed to be green, light green and dark green. Genotypes 2014/CHIVAR-2, 2014/CHIVAR-7, 2013/CHIVAR-1, 2013/ CHIVAR-3 and 2014/CHIVAR-10 exhibited green fruits. Whereas, genotypes 2014/CHIVAR-1, 2014/CHIVAR-3, 2014/CHIVAR-4, 2014/CHIVAR-5, 2014/CHIVAR-6, 2014/CHIVAR-8, 2014/CHIVAR-9, LCA-334(C), Guljar and Pusa Jwala exhibited light green fruits whereas, genotypes 2013/CHIVAR-4, 2013/CHIVAR-2, and KA-2 (C) were observed as dark green fruit. These colour variation found in genotypes due to genetic makeup of variety and environmental factors. These results are supported by earlier findings of Yatagiri *et al.*, (2017) [10].

Tables 1: Details of Genotypes used in study

S. No.	Genotypes	Treatments	Sources
01	2014/CHIVAR-1	T ₁	IIVR, Varanasi
02	2014/CHIVAR-2	T ₂	IIVR, Varanasi
03	2014/CHIVAR-3	T ₃	IIVR, Varanasi
04	2014/CHIVAR-4	T ₄	IIVR, Varanasi
05	2014/CHIVAR-5	T ₅	IIVR, Varanasi
06	2014/CHIVAR-6	T ₆	IIVR, Varanasi
07	2014/CHIVAR-7	T ₇	IIVR, Varanasi
08	2014/CHIVAR-8	T ₈	IIVR, Varanasi
09	2014/CHIVAR -9	T ₉	IIVR, Varanasi
10	2014/CHIVAR -10	T ₁₀	IIVR, Varanasi
11	2013/CHIVAR -1	T ₁₁	IIVR, Varanasi
12	2013/CHIVAR -2	T ₁₂	IIVR, Varanasi
13	2013/CHIVAR -3	T ₁₃	IIVR, Varanasi
14	2013/CHIVAR -4	T ₁₄	IIVR, Varanasi
15	GULJAR	T ₁₅	ANKUR Seeds
16	PUSA JWALA	T ₁₆	IARI, New, Delhi
17	KA-2(Check)	T ₁₇	IIVR, Varanasi
18	LCA-334(Check)	T ₁₈	LAM

Fruit shape

Fruit shape of chilli genotypes presented in table 3. Shape of fruit was observed to be straight and curve. Genotypes 2014/CHIVAR-3, 2014/CHIVAR-9, Guljar and KA-2 (C),

exhibited curve shape fruit whereas, 2014/CHIVAR-1, 2014/CHIVAR-2, 2014/CHIVAR-4, 2014/ CHIVAR-5, 2014/CHIVAR-6, 2014/CHIVAR-7, 2014/CHIVAR-8, 2014/CHIVAR-10, 2013/CHIVAR-1, 2013/CHIVAR-2, 2013/CHIVAR-3, 2013/ CHIVAR-4, Pusa Jwala and LCA-334 (C) were found to be straight shape fruit. These results are supported by earlier findings of Yatagiri *et al.*, (2017) [10].

Fruiting behaviour

Fruiting behaviour of chilli genotypes showed similar behaviour ‘Solitary’ for all presented in table 2. These all variable genotypes showing same solitary behaviour may be due to genetic factor and less influence of environmental factor of Kymore plateau region of Madhya Pradesh. These results are supported by earlier findings of Mahmood *et al.*, (2002) [3] and Yatagiri *et al.*, (2017) [10].

Table 2: Mean performance plant height (cm) at 30, 60, 90, 120 and 150DAT, Number of primary branches/plant, Days to 1st flowering, Days to 50% of flowering of various chilli genotypes of Chilli at Kymore plateau region of Madhya Pradesh

Genotypes	Plant height (cm)					No. of primary branches /plant	Days to 1 st flowering	Days to 50% flowering
	30 DAT	60 DAT	90 DAT	120 DAT	150 DAT			
2014/CHIVAR – 1	29.47	44.91	47.12	49.35	52.05	18.07	37.67	62.33
2014/CHIVAR – 2	33.41	46.61	48.33	49.23	53.73	17.13	35.00	55.00
2014/CHIVAR – 3	32.75	46.73	50.64	54.83	55.50	17.27	32.33	53.33
2014/CHIVAR – 4	31.70	54.74	59.55	63.64	64.73	17.60	33.33	58.33
2014/CHIVAR – 5	34.33	58.39	64.73	68.69	69.83	18.60	34.00	55.67
2014/CHIVAR – 6	32.96	54.92	62.75	66.64	67.71	19.60	36.33	55.33
2014/CHIVAR – 7	27.29	48.77	54.24	59.41	60.45	18.07	38.33	65.67
2014/CHIVAR – 8	32.01	50.87	58.11	63.39	64.49	17.53	32.00	53.33
2014/CHIVAR – 9	37.22	60.53	65.63	73.43	74.21	17.87	35.33	54.67
2014/CHIVAR – 10	28.97	46.99	55.01	61.05	62.72	19.07	38.33	62.00
2013/CHIVAR – 1	30.98	46.76	48.73	49.07	61.63	18.20	33.67	62.33
2013/CHIVAR – 2	36.23	46.19	47.76	49.71	50.56	18.80	32.33	58.33
2013/CHIVAR – 3	33.71	43.13	43.43	51.08	53.69	17.93	34.33	58.33
2013/CHIVAR – 4	34.15	45.37	46.40	53.00	56.15	18.87	35.00	55.33
Guljar	32.61	40.41	42.15	51.53	64.12	18.20	42.00	67.00
Pusa Jwala	20.25	35.37	41.42	47.71	46.86	16.87	34.33	56.33
LCA – 334 (C)	30.36	49.59	56.47	58.68	58.73	18.80	37.67	66.33
KA – 2 (C)	30.15	48.41	56.71	58.10	58.34	18.13	39.67	66.67
S.Em±	0.99	1.29	1.08	1.02	1.44	0.27	1.44	2.18
C.D.5% level	2.85	3.73	3.11	2.95	4.15	0.78	4.18	6.29

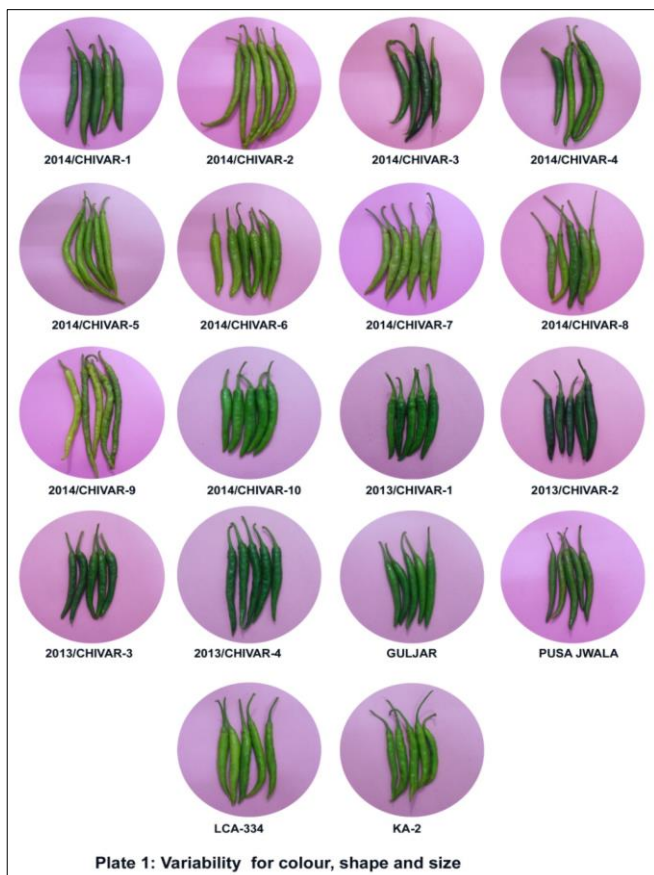


Plate 1: Variability for colour, shape and size

Table 3: Physical parameters of chilli genotypes

Genotypes	Fruit colour	Fruit shape	Fruiting behaviour
2014/CHIVAR-1	Light green	Straight	Solitary
2014/CHIVAR-2	Green	Straight	Solitary
2014/CHIVAR-3	Light green	Curve	Solitary
2014/CHIVAR-4	Light green	Straight	Solitary
2014/CHIVAR-5	Light green	Straight	Solitary
2014/CHIVAR-6	Light green	Straight	Solitary
2014/CHIVAR-7	Green	Straight	Solitary
2014/CHIVAR -8	Light green	Straight	Solitary
2014/CHIVAR -9	Light green	Straight	Solitary
2014/CHIVAR -10	Green	Straight	Solitary
2013/CHIVAR -1	Green	Straight	Solitary
2013/CHIVAR -2	Dark green	Straight	Solitary
2013/CHIVAR -3	Green	Straight	Solitary
2013/CHIVAR -4	Dark green	Straight	Solitary
Guljar	Light green	Curve	Solitary
Pusa Jwala	Light green	Straight	Solitary
LCA-334(C)	Light green	Straight	Solitary
KA-2(C)	Dark green	Curve	Solitary

Conclusion

From the above study after evaluation of 18 genotypes of chilli it is concluded that on the basis of growth parameters, flowering behaviour found that 2014/CHIVAR-9, 2014/CHIVAR-6, 2014/CHIVAR-8, and 2014/CHIVAR-3 suitable for Kymore plateau region of Madhya Pradesh. These genotypes also found suitable for physical fruit parameters and should be given more emphasis in the selection aimed at improving yield of chilli.

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