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Evaluation of Chilli Genotypes for Growth and Fruit Yield Attributing Traits under Chhattisgarh Plain Conditions

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A B S T R A C T

In order to evaluate the performance of sixteen genotypes of Chilli for fruit yield and its component traits, the present experiment was laid under randomized complete block design with three replications at Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur during *rabi* season of 2016-17. Analysis of variance revealed that the genotypes differed significantly for all the characters namely, days to first flowering, days to 50 % flowering, plant height (cm), number of primary branches, stem girth (cm), days to first picking, fruit length (cm), fruit girth (cm), stalk length (cm), number of seeds per fruit, number of fruits per plant, fresh weight of fruits (gm), dry weight of fruits (gm), dry matter % of fruits, fruit yield per plant (gm), fruit yield per plot (kg), fruit yield per ha (q) indicating the existence of the enough amount of variability in the material studied. Mean performance of all the genotype for different characters was studied and the genotype namely, 2014/CHIVAR-9 was found to give highest total fruit yield plot^{-1}. Fruit yield per plot ranged from 8 kg to 19.52 kg with an overall mean of 14.03 kg. The highest total fruit yield was recorded in genotype 2014/CHIVAR-9, which was statistically *at par* with the performance of Kashi Anmol-2 (18.50 Kg), 2014/CHIVAR-7(17.83 kg), 2014/CHIVAR-10 (16.99 kg) and 2016/CHIVAR-6 (15.9 kg). Genotype 2016/CHIVAR-5 (8 kg) was yielded minimum fruit yield per plot.

Introduction

Chilli is the most economic and popular additive to improve food acceptability. It is grown for use as a vegetable (green chilli) and spice (dry chilli) under tropical, subtropical and temperate climates. The presence of capsaicin in chilli is responsible for its pungency and it has medicinal value as well. It also contains vitamin A (292.04 IU), vitamin C (143.7 µg), vitamin K (14 µg), vitamin E (0.69 mg), and other minerals. A wealth of information and scientific evidences are rapidly accumulating on the beneficial effects of wide variety of food components on human health. The most important vitamin in fruits and vegetables is vitamin C. Chilli is quite high in other nutritive value containing moisture (87.7 g), protein (2.9 g), carbohydrate (3.0 g), fiber (6.8 g), it has covered a vast agricultural area throughout the country and contributes an important share in Indian table food. Although the crop is available throughout the year, the demand of chilli is further increasing with the expanding population. A wide range of

variability reportedly exists in this crop. Therefore, the present study was aimed at comparison of different chilli genotypes to identify and select the most appropriate one with enhanced potential for growth and yield in Chhattisgarh plain conditions.

Materials and Methods

The present experiment was conducted at Indira Gandhi Krishi Viswavidayalaya (IGKV), Raipur during *rabi* season of 2016-17 in order to evaluate the performance of sixteen genotypes of chilli for various yield and its component traits under field condition with three replications of each genotype. Each plot measuring 4.2 x 3.5 m^2 had six rows spaced at 60 cm apart with intra-row spacing of 50 cm. The chilli seeds were planted during second week of September, 2016. The recommended dose of fertilizer *i.e.* nitrogen 150 Kg, phosphorus 75 Kg and potassium 60 Kg per hectare was applied. Half nitrogen was applied at the time of planting and remaining was applied in two splits *i.e.,* at 30 and 60 DAP. Crop was visited regularly throughout the growing season and intercultural operations such as weeding, irrigation and plant protection measures were performed as and when necessary. The study on analysis of variance and mean performance of genotypes was carried out for different growth and yield parameters.

Results and Discussion

Analysis of variance

Analysis of variance revealed that mean sum of squares due to genotypes was found to be highly significant (at 1% level of significance) for Days to first flowering, Days to 50 % flowering, Plant height (cm), Number of primary branches, Stem girth (cm), Days to first picking, Fruit length (cm), Fruit girth (cm), Stalk length (cm), Number of seeds per fruit, Number of fruits per plant, Fresh weight of fruits (gm), Dry weight of fruits (gm), Dry matter % of fruits, Fruit yield per plant (gm), Fruit yield per plot (Kg), Fruit yield per ha (q). This suggested the presence of substantial amount of genetic variation among the genotypes that could be exploited in selection for desirable traits. All the above findings are in close agreement with the findings of Sahu *et al.,* (2016) for total fruit yield and number of shoots; Janaki *et al.,* (2016) and Patel *et al.,* (2014) who reported variability for flowering, fruit size, number of fruit per plant, fruit weight and yield/plant. The result of analysis of variance for all the characters under study is presented in Table 1.

Mean performance of genotype for different characters

Mean performance of genotypes for various growth and yield attributing traits is presented in Table 2 and the results are explained below:

Plant height (cm)

Plant height ranged from 33.37 to 66.50 cm with an overall mean of 55.01 cm. Genotype 2014/CHIVAR-4 was recorded for maximum plant height and lowest plant height was recorded in Kashi Anmol - 2.

Stem girth (cm)

Stem girth ranged from 3.41 cm to 4.88 cm with an overall mean of 4.11cm. Genotype 2012/CHIVAR-8 was recorded with maximum stem girth and lowest stem girth was recorded in 2016/CHIVAR-3.

Number of primary branches per plant

Number of primary branches ranged from 9.73 to 2.93 with an overall mean of 6.49. Genotype 2016/CHIVAR-4 was recorded

with maximum number of primary branches and lowest Number of primary branches was recorded in 2016/CHIVAR-3.

Days to first flowering

The first flowering date ranged from 35 days to 58.67 days with an overall mean of 47.29 days.

Earliest flowering was recorded in 2016/CHIVAR-4 and delayed flowering was recorded in 2014/CHIVAR-2.

Days to 50% flowering

Days to 50% flowering ranged from 43.67 days to 69.30 days with an overall mean of 59.65 days. Earliest 50% flowering was recorded in 2016/CHIVAR-4) and delayed 50% flowering was recorded in 2016/CHIVAR-2.

Days to first picking

Days taken to first green fruit picking ranged from 91 days to 103.11 days with an overall mean of 99.48 days. Earliest harvest was recorded in the genotype 2016/CHIVAR-5 whereas, maximum days to first fruit picking was recorded in the genotype 2014/CHIVAR-2.

Fruit length (cm)

Length of fruit ranged from 8.09 cm to 13.84 cm with an overall mean of 8.99 cm. Genotype 2014/CHIVAR-9 was recorded for maximum fruit length lowest fruit length was recorded in genotype 2016/CHIVAR-5

Table.1 Analysis of variance for fruit yields and its component

S. No.	Characters	Mean Sum of Square		
		Replication	Treatments	Error
		Degree of freedom		
		2	15	30
1	Days to first flowering	39.400	142.440**	21.550
2	Days to 50 % flowering	14.330	215.890**	13.870
3	Plant height (cm)	21.590	261.710**	10.350
4	Number of primary branches	0.410	17.630**	0.570
5	Stem girth (cm)	0.090	0.640**	0.050
6	Days to first picking	0.271	52.176**	3.760
7	Fruit length (cm)	0.100	7.960**	0.253
8	Fruit girth (cm)	0.036	4.333**	0.012
9	Stalk length (cm)	0.054	0.599**	0.084
10	Number of seeds per fruit	59.391	478.556**	22.766
11	Number of fruits per plant	47.206	1285.059**	360.741
12	Fresh weight of fruits (gm)	22.602	295.842**	9.451
13	Dry weight of fruits (gm)	0.083	18.565**	0.424
14	Number of pickings	0.583	0.617	0.317
15	Dry matter % of fruits	9.440	117.407**	3.397
16	Fruit yield per plant (gm)	337.133	12928.090**	870.557
17	Fruit yield per plot (Kg)	2.838	33.389**	2.757
18	Fruit yield per ha (q)	129.553	1543.586**	127.934

***** Significant at 5% level of significance, ****** Significant at 1% level of significance

Table.2 Mean performance for fruit yield and its components in chilli

Genotypes	Characters																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
2016/CHIVAR-3	43.33	60.33	49.78	2.93	3.41	102.67	8.43	3.31	3.45	58.20	111.07	15.17	2.43	5.67	16.80	292.30	12.37	84.14
2016/CHIVAR-4	35.00	43.67	66.50	9.73	3.45	91.33	8.29	3.35	3.25	70.53	106.47	14.02	3.47	5.36	24.73	271.40	11.29	76.77
2016/CHIVAR-5	36.67	45.33	57.30	4.60	4.73	91.00	8.09	4.54	3.95	33.67	88.80	31.06	8.67	4.67	27.43	177.78	8.00	54.41
2016/CHIVAR-6	51.33	68.67	34.59	6.47	3.67	98.00	7.56	3.05	3.33	50.87	120.53	29.17	1.70	4.67	5.77	344.31	15.95	108.49
2016/CHIVAR-8	56.33	69.00	52.23	3.07	4.88	102.67	7.37	7.93	3.29	78.33	104.33	37.87	5.93	4.33	15.70	199.67	9.34	63.48
2014/CHIVAR-2	58.67	69.30	59.70	5.93	4.46	103.11	9.55	3.31	3.60	53.53	134.73	23.17	2.40	4.67	10.03	238.90	10.39	70.63
2014/CHIVAR-3	51.00	64.33	61.83	6.67	4.11	101.33	9.24	3.12	3.05	84.20	120.20	20.67	4.00	5.33	18.77	326.65	14.71	100.00
2014/CHIVAR-4	56.33	64.33	60.61	3.47	4.09	98.00	10.15	3.80	4.42	64.67	111.20	37.00	6.93	5.33	18.77	323.38	14.60	99.09
2014/CHIVAR-5	43.33	52.67	55.23	9.67	4.11	93.67	9.68	3.04	3.88	56.67	145.47	18.67	2.20	4.67	12.13	340.15	15.68	106.63
2014/CHIVAR-6	51.67	68.33	60.43	7.33	4.48	102.67	9.66	4.20	3.93	67.80	122.67	33.23	3.63	5.00	10.43	296.32	14.07	95.64
2014/CHIVAR-7	44.33	53.33	53.98	7.47	3.74	98.00	10.11	3.97	4.31	70.13	139.07	32.07	2.40	5.00	8.87	371.88	17.83	121.25
2014/CHIVAR-8	41.00	59.00	64.77	5.13	4.40	103.00	7.11	3.11	4.13	64.53	127.87	13.83	1.27	5.67	10.00	282.17	13.12	89.20
2014/CHIVAR-9	45.00	50.00	57.33	7.40	4.46	103.00	13.84	4.50	4.34	82.73	79.40	48.33	8.83	4.13	18.23	414.99	19.52	132.75
2014/CHIVAR-10	50.33	63.33	59.12	9.33	3.45	102.00	7.99	3.20	3.33	59.33	122.13	18.50	1.93	5.77	11.00	320.26	16.99	115.55
LCA-334	48.33	66.00	53.33	6.87	4.32	99.67	8.99	3.69	4.08	67.80	96.33	24.43	3.07	5.00	12.07	242.88	12.13	82.47
Kashi Anmol-2	44.00	57.00	33.37	5.73	3.98	101.67	7.73	3.25	3.38	67.07	157.67	20.00	1.33	5.33	6.07	388.69	18.50	125.80
GRAND MEAN	**47.29**	**59.65**	55.01	**6.49**	**4.11**	**99.48**	**8.99**	**3.84**	**3.73**	**64.38**	**118.00**	**26.07**	**3.76**	**5.04**	**14.18**	**301.98**	**14.03**	**95.39**
S Em ±	**2.68**	**2.15**	1.86	**0.44**	**0.13**	**1.12**	**0.29**	**0.06**	**0.17**	**2.75**	**10.97**	**1.77**	**0.38**	**0.32**	**1.06**	**17.03**	**12.37**	**6.53**
CD (0.05)	**7.74**	**6.21**	5.36	**1.26**	**0.38**	**3.23**	**0.84**	**0.18**	**0.48**	**7.96**	**31.67**	**5.13**	**1.09**	**0.94**	**3.07**	**49.20**	**11.29**	**18.86**
CV	**9.82**	**6.24**	5.85	**11.63**	**5.59**	**1.95**	**5.59**	**2.83**	**7.77**	**7.41**	**16.10**	**11.79**	**17.31**	**11.16**	**13.00**	**9.77**	**8.00**	**11.86**

1= Days to first flowering
2= Days to 50 % flowering
3= Plant height (cm)
4= Number of primary branches
5= Stem girth (cm)
6= Days to first picking
7= Fruit length (cm)
8= Fruit girth (cm)
9= Stalk length (cm)
10= Number of seeds per fruit
11= Number of fruits per plant
12= Fresh weight of fruits (gm)
13= Dry weight of fruits (gm)
14. Number of pickings
15. Dry matter % of fruits
16. Fruit yield per plant (gm)
17. Fruit yield per plot (Kg)
18. Fruit yield per ha (q)

Fruit girth (cm)

Fruit girth ranged from 3.04cm to 7.93 cm. with an overall mean of 3.84 cm. Genotype 2016/CHIVAR-8 was recorded maximum fruit girth and lowest fruit girth was recorded in genotype 2016/CHIVAR-5.

Fresh weight of fruit (g)

Fresh weight of fruits ranged from 13.83 gm to 48.33 gm. Genotype 2014/CHIVAR-9 was recorded maximum fresh weight of fruits with an overall mean of 26.07 g.

Number of fruits per plant

Among the genotypes number of fruits per plant ranged from 79 to 157.67 with an overall mean of 118 fruits per plant. Maximum number of fruits per plant was recorded in the genotype Kashi Anmol-2 and genotype 2014/CHIVAR-9 was yielded minimum number of fruits per plant.

Fruit yield per plant (g)

Fruit yield per plant ranged from 177.78 gm to 414.99 gm with an overall mean of 301.98 gm. Maximum fruit yield per plant was recorded in the genotype 2014/CHIVAR-9 and genotype 2016/CHIVAR-8 was yielded minimum fruit yield per plant.

Fruit yield per plot (kg)

Fruit yield per plot ranged from 8 kg to 19.52 kg with an overall mean of 14.03 kg. Maximum fruit yield per plot was recorded in the genotype 2014/CHIVAR-9 and genotype 2016/CHIVAR-5 was yielded minimum fruit yield per plot.

Fruit yield (q/ha)

Fruit yield quintal per hectare ranged from 54 to 132.75 q with an overall mean of 95.39 q. Maximum fruit yield quintal per hectare was recorded in the genotype 2014/CHIVAR-9 and genotype 2016/CHIVAR-5 (54 q) was yielded minimum fruit yield quintal per hectare.

Analysis of variance revealed significant mean sum of squares for all the characters studied indicating the presence of variability among the genotypes. Thus, it could be concluded that there exists a lot of genetic variation among the genotypes and improvement could be brought through simple selection. On the basis of mean performance of genotypes for different characters, the varieties namely, 2014/ CHIVAR-9, 2014/CHIVAR-7, 2014/ CHIVAR-10 and 2014/CHIVAR-5 showed best performance in terms of total fruit yield plot^{-1}. Thus, the above mentioned varieties can be recommended to be grown in order to achieve higher production in the region.

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