

## Evaluation of Chilli (*Capsicum annuum* L.) Genotypes for Growth, Yield and Quality Characters under Allahabad Agro Climatic Conditions

Anita Kerketta\*, J. P. Collis, Mukti Tirkey, Radhe Lal, Nikhil V. Singh,

Department of Horticulture, Sam Higginbottom University of Agriculture,

Technology & Science, Allahabad, U.P., (India)

\*Corresponding Author E-mail: [anitadgn1@gmail.com](mailto:anitadgn1@gmail.com)

Received: 3.08.2017 | Revised: 10.09.2017 | Accepted: 15.09.2017

### ABSTRACT

Among the Vegetable crops, Chilli is the one of the important fruit or spices crop. An experiment was conducted at research field, Department of Horticulture, Allahabad, during the year 2014-2015, the experiment was laid out in a Randomized Block Design having ten treatments of "Evaluation of Chilli (*Capsicum annuum* L.) genotypes for growth yield and quality characters under Allahabad Agro Climatic Conditions." Seventeen genotypes were used to study the genetic variability, heritability, genetic advance and correlation for growth and yield contributing characters in chilli at Eighteen different characters viz. plant height (cm), number of branches per plant, plant spread (E-W, N-S), days to flower anthesis, days to 50% flowering, days to first harvest, fruit length (cm), fruit diameter (mm), fruit weight (g), number of fruits plant<sup>-1</sup>, number of seeds fruit<sup>-1</sup>, seeds weight fruit<sup>-1</sup>, green fruit yield plant<sup>1</sup>, 100 seeds weight fruit yield hectare<sup>-1</sup>(q), ascorbic acid (mg/100g), fruit TSS (Brix<sup>0</sup>) were taken into consideration parameter studied, The result revealed that the genotype in terms of yield G<sub>12</sub> is highest fruit yield per plant (1432.83 g), and fruit yield per hectare (36.42 q/ha).

**Key words:** Chilli, *Capsicum annuum* L., Genotypes, Growth and Yield.

### INTRODUCTION

Chilli or pepper (*Capsicum annuum* L.) belongs to family Solanaceae, which is emerging as one of the commercial vegetable crops at the global level, and is probably most important vegetable after Tomato<sup>2</sup>. Chilli also known as hot pepper was introduced into India from Brazil in the 16<sup>th</sup> century by Portuguese<sup>16</sup>.

The pungency is due to the present of a crystalline volatile alkaloid called capsaicin

(8-methyl-N vanillyl-6-enamide). Chilli is a rich source of vitamin C (143.7µg). It also contains vitamin A (292.04 IU), vitamin K (14 µg), vitamin E (0.69 mg), and other minerals per 100g of chilli fruits. It is also a good source of chilli oleoresin, which is the total flavour extract of dried and ground chillies. The natural colour extracts of chilli are also finding their increased value in place of artificial colours in the food items.

**Cite this article:** Kerketta, A., Collis, J.P., Tirkey, M., Lal, R., Singh, N.V., Evaluation of Chilli (*Capsicum annuum* L.) Genotypes for Growth, Yield and Quality Characters under Allahabad Agro Climatic Conditions, *Int. J. Pure App. Biosci.* 6(4): 451-455 (2018). doi: <http://dx.doi.org/10.18782/2320-7051.5367>

India is a major producer, exporter and consumer of chilli. In India, it is grown throughout the country but principal chilli growing states Andhra Pradesh is the largest chilli growing state followed by Karnataka and Maharashtra. Andhra Pradesh contributes 28 per cent of area and 62 per cent of production followed by Karnataka with 17 per cent of area and 12 per cent of production. India is the largest exporter of chillies in the world<sup>4</sup>.

In Uttar Pradesh chillies are mostly grown in eastern districts viz., Ballia, Azamgarh, Mirzapur, Basti, Faizabad & Ghazipur. Majority of farmers are still growing local cultivars. Besides soil and climatic factors the cultivar itself is very important in respect of its performance regarding earliness, disease resistance and yield. Many cultivars have been developed and recommended by various research institute and State Agricultural Universities but the adoptability and yielding capacity of the cultivars is not the same in all regions. So there is a pressing demand for a suitable

variety in Allahabad climatic conditions. Hence, an experiment was conducted at Department of Horticulture, SHUATS, and Allahabad, to evaluate different chilli genotypes for growth, yield and quality attributes

### MATERIAL AND METHOD

The present investigation “Genetic variability and correlation studies on growth, yield and characters in different genotypes of chilli (*Capsicum annum* L.) Under Allahabad agro-climatic condition” was conducted during the kharib season of the year 2014-15. The planting materials for the present study comprised of the 17 genotypes (released varieties, breeding lines and local collection) which were collected from different sources (Table-1). The data recorded during the course of investigation was subjected to analysis by Randomized block design with three replications as per the method of analysis of variance (ANOVA) technique in respect of the various characters was done<sup>13</sup>.

**Table 1: Name of Genotypes and their sources**

Genotypes Name	Notation	Sources	Genotypes Name	Notation	Sources
AVT-II 2013 CHIVAR-1	G <sub>1</sub>	IIVR, Varanasi	LCA 334 (C)	G <sub>10</sub>	IIVR, Varanasi
CHIVAR-2	G <sub>2</sub>	IIVR, Varanasi	Kashi Anmol	G <sub>11</sub>	IIVR, Varanasi
CHIVAR-3	G <sub>3</sub>	IIVR, Varanasi	Pant chilli-4	G <sub>12</sub>	GBPAU, Pantnagar
CHIVAR-4	G <sub>4</sub>	IIVR, Varanasi	IIHR-2006	G <sub>13</sub>	IIHR, Bangalore
CHIVAR-5	G <sub>5</sub>	IIVR, Varanasi	VNR-332	G <sub>14</sub>	Chhattisgarh
CHIVAR-6	G <sub>6</sub>	IIVR, Varanasi	ACS-06-2	G <sub>15</sub>	Gujarat Anand
CHIVAR-8	G <sub>7</sub>	IIVR, Varanasi	Badaygi dabbi	G <sub>16</sub>	Karnataka
CHIVAR-9	G <sub>8</sub>	IIVR, Varanasi	Badaygi kaddi	G <sub>17</sub>	Karnataka
KA-2 (C)	G <sub>9</sub>	IIVR, Varanasi			

**Table 2: Mean performance of chilli genotypes for different characters like growth, quality and yield parameters**

Sl. No.	Genotypes	Plant Height (cm)	Number of branches	Plant spread E-W (cm)	Plant spread N-S (cm)	Days to flower Anthesis	Days to 50% flowering	Days to first harvest	Fruit Length (cm)	Fruit Diameter (mm)	Fruit weight (g)
		150 DAT	150 DAT	150 DAT	150 DAT						
1	G <sub>1</sub>	81.61	38.59	57.71	53.30	28.45	30.87	66.24	6.41	0.56	2.22
2	G <sub>2</sub>	48.16	37.67	40.41	40.81	29.71	27.08	58.24	7.92	0.85	2.50
3	G <sub>3</sub>	40.36	38.20	38.83	38.46	25.56	32.45	60.71	5.25	1.49	2.90
4	G <sub>4</sub>	44.46	34.19	37.54	38.90	27.16	34.08	63.96	5.84	1.15	4.25
5	G <sub>5</sub>	54.82	41.33	47.63	41.80	30.47	33.09	61.91	9.66	1.22	4.17
6	G <sub>6</sub>	39.22	28.53	35.89	34.79	27.40	30.70	54.23	8.91	0.79	2.63
7	G <sub>7</sub>	34.85	31.44	36.11	36.48	30.11	38.01	64.69	9.42	0.95	2.85
8	G <sub>8</sub>	35.41	37.85	36.80	38.53	31.11	36.27	60.15	10.24	1.43	4.65
9	G <sub>9</sub>	44.70	45.06	40.22	41.07	30.83	36.99	75.26	7.29	1.47	3.67
10	G <sub>10</sub>	50.55	37.58	37.75	37.81	35.34	34.07	73.47	8.82	0.75	3.82
11	G <sub>11</sub>	64.93	48.27	40.56	40.75	31.74	40.05	55.36	6.27	0.87	2.73
12	G <sub>12</sub>	74.45	35.18	34.48	39.65	40.28	44.08	89.45	7.72	0.75	6.98
13	G <sub>13</sub>	50.86	37.27	28.61	42.66	36.16	30.68	52.42	5.17	0.99	5.32
14	G <sub>14</sub>	118.28	43.52	75.78	75.87	45.28	37.72	52.53	11.07	0.92	7.43
15	G <sub>15</sub>	58.49	44.50	35.36	32.31	43.38	49.82	74.53	12.80	2.98	5.51
16	G <sub>16</sub>	39.32	30.44	35.22	31.09	30.86	40.72	56.42	10.04	1.26	3.37
17	G <sub>17</sub>	40.15	32.59	38.76	35.53	34.66	43.85	58.38	11.46	0.50	4.43
	GM	<b>54.15</b>	<b>37.78</b>	<b>41.04</b>	<b>41.17</b>	<b>32.89</b>	<b>36.51</b>	<b>63.43</b>	<b>8.49</b>	<b>1.11</b>	<b>4.08</b>
	F test	S	S	S	S	S	S	S	S	S	S
	SEm (+)	0.60	0.57	1.14		0.54	1.13	0.73	0.22	0.16	0.32

Sl. No.	Genotypes	No of Seeds Fruit <sup>-1</sup>	100 seeds weight (g)	Seeds weight Fruit <sup>-1</sup> (g)	Ascorbic acid (mg/100gm)	Total soluble solids (Brix <sup>o</sup> )	No of Fruit plant <sup>-1</sup>	Fruit yield plant <sup>-1</sup> (g)	Fruit yield ha <sup>-1</sup> (q)
1	G <sub>1</sub>	72.33	0.41	0.25	131.51	8.84	35.67	79.36	2.64
2	G <sub>2</sub>	82.36	0.55	0.51	143.49	6.85	152.40	380.55	10.50
3	G <sub>3</sub>	42.90	0.41	0.15	168.95	9.92	145.50	422.59	11.56
4	G <sub>4</sub>	36.87	0.53	0.15	167.07	8.16	89.93	381.08	10.52
5	G <sub>5</sub>	52.53	0.42	0.23	149.56	7.97	79.33	330.58	9.26
6	G <sub>6</sub>	77.62	0.40	0.31	153.64	7.89	54.67	143.72	4.59
7	G <sub>7</sub>	55.67	0.43	0.20	165.42	6.82	115.67	330.25	9.25
8	G <sub>8</sub>	64.44	0.51	0.50	163.23	7.55	124.67	579.23	15.48
9	G <sub>9</sub>	68.22	0.51	0.29	147.62	7.43	201.00	736.92	19.42
10	G <sub>10</sub>	34.15	0.55	0.18	151.49	7.69	134.33	513.08	13.82
11	G <sub>11</sub>	49.00	0.25	0.21	150.94	8.74	195.32	533.53	14.33
12	G <sub>12</sub>	79.02	0.59	0.39	144.12	8.85	205.25	1432.83	36.82
13	G <sub>13</sub>	68.53	0.39	0.37	147.12	7.44	134.85	717.95	18.94
14	G <sub>14</sub>	64.61	0.51	0.22	150.19	6.92	153.40	1150.96	29.44
15	G <sub>15</sub>	50.28	0.37	0.16	159.40	7.56	72.67	400.75	11.01
16	G <sub>16</sub>	73.09	0.46	1.03	127.02	6.92	74.10	250.16	7.25
17	G <sub>17</sub>	78.32	0.73	1.02	130.85	7.63	33.40	148.37	4.70
	GM	<b>61.76</b>	<b>0.47</b>	<b>0.36</b>	<b>150.09</b>	<b>7.83</b>	<b>118.14</b>	<b>501.22</b>	<b>13.50</b>
	F test	S	S	S	S	S	S	S	S
	SEm (+)	0.85	0.03	0.05	2.32	0.19	2.28	29.71	0.93

## RESULT AND DISCUSSION

The Data obtained during investigation on various growth, yield and quality parameters were subjected to statistical analysis and are interpreted with help of 'F' test and CD values. Observation was recorded on the five randomly selected plants, for different genotypes and used for calculating the mean performance for different traits. Analysis of variance showed significant differences among the genotypes for the 26 characters studied. Analysis of variance showed significant differences among the genotypes for the at 5% and 1% significance. The mean sum of square due to genotypes for different characters are presented in Table 1- 3.

Significant differences were obtained among the genotypes for all the characters it indicated adequate variability among all the genotypes.

### Growth parameters

The highest plant height was recorded in genotypes *viz.* G<sub>14</sub> (118.28 cm) and lowest plant height (34.85 cm) was noted in G<sub>7</sub> at 150 DAT. Highest number of branches was observed in the genotype G<sub>11</sub> (48.27) and lowest number of branches reported in genotype G<sub>7</sub> (28.53) at 150 DAT. The results are in agreement with the finding of Saravaiya *et al.*<sup>14</sup> and Patil *et al.*<sup>12</sup>.

### Earliness parameters

The highest days to flower anthesis was counted in genotype *viz.* G<sub>14</sub> (45.28) and lowest days to flower anthesis 25.56, 27.16 was recorded to be which were observed in genotypes G<sub>3</sub> and G<sub>4</sub> respectively. Days to 50% flowering ranged from 49.82 (ACS-06-2) to 27.08 (CHIVAR-2) with overall mean of 36.51. Days to first harvest ranged from G<sub>12</sub> (89.45) to G<sub>14</sub> (52.42) with the mean of 63.43. The results are in close conformity with finding of Anu *et al.*<sup>1</sup>, Amit *et al.*<sup>5</sup> and Gupta *et al.*<sup>3</sup>

### Fruit quality parameters

The Fruit length (cm) ranged from 12.80 (ACS-06-2) to 5.17 (IIHR-2006) with the mean of 8.49. The Fruit diameter (mm) ranged from 2.98 (ACS-06-2) to 0.50 (Badaygi Kaddi) with an overall mean of 1.11. The fruit weight (g) ranged from 7.43g (VNR-332) to 2.22g (CHIVAR-1) with an overall average of

4.08g. Weight of seeds fruit<sup>-1</sup> (g) ranged from 1.03g (Badaygi Dabbi)

to 0.15 (CHIVAR-4 and CHIVAR-5) with an overall mean of 0.36. Number of seeds fruit<sup>-1</sup> ranged from 82.36 (CHIVAR-2) to 34.15 (LCA-334(C)) with overall mean of 61.76. 100 seeds weight (g) ranged from 0.73g (Badaygi Kaddi) to 0.25g (Kashi Anmol) with an overall mean of 0.47. The results are in agreement with the finding of Mantano *et al.*<sup>9</sup>, Mishra *et al.*<sup>15</sup> and Verma *et al.*<sup>17</sup>.

### Quality parameters

The highest Ascorbic acid (mg/100g) was recorded in genotype; CHIVAR-3 (168.95) lowest Ascorbic acid (mg/100g) was recorded in genotype Badaygi Dabbi (127.02). The highest Total soluble solid (Brix<sup>o</sup>) was recorded in genotype, CHIVAR-3 (9.92) lowest TSS (Brix<sup>o</sup>) was recorded in genotype VNR-332 (6.92<sup>o</sup>). Such wide variation was also reported by Kumar *et al.*<sup>6, 7</sup>, Manju and Sreelathakumary<sup>8</sup>.

### Yield components

The highest number of fruits plant<sup>-1</sup> was recorded in genotype, Pant chilli-4 (205.25) which was statistically *at par* with genotype *viz* KA-2 (C) (201.00), Kashi Anmol (195.32), VNR-332 (153.40) and CHIVAR-2 (152.40). However, lowest number of fruits plant<sup>-1</sup> was recorded in genotype Badaygi Kaddi (33.40). The highest fruit yield plant<sup>-1</sup> was recorded in genotype, which was Pant chilli-4 (1432.83g) statistically *at par* with genotype *viz* VNR-334 (1150.96g) KA-2 (C) (736.92g), IIHR-2006 (717.95g), CHIVAR-9 (579.23g) and Kashi Anmol (533.53). However, lowest fruit yield plant<sup>-1</sup> was recorded in genotype CHIVAR-1 (79.36g). The highest fruit yield hectare<sup>-1</sup> (q) was recorded in genotype, which was Pant chilli-4 (36.82 q/ha) statistically *at par* with genotype *viz.* VNR-334 (29.44 q/ha) KA-2 (C) (19.42 q/ha), IIHR-2006 (18.94 q/ha), CHIVAR-9 (15.48 q) and Kashi Anmol (14.33 q). However, lowest fruit yield hectare<sup>-1</sup> (q) was recorded in genotype G<sub>1</sub> (2.64 q/ha). Mishra *et al.*<sup>10</sup>.

## CONCLUSION

From the present study Based on the overall performance of various genotypes under study the genotypes G<sub>12</sub> (Pant chilli-4) and G<sub>14</sub>

(ACS-06-2) were found to be best under Allahabad Agro climatic conditions with respect to yield and its associated characters.

### Acknowledgement

This paper forms a part of M.Sc. (Ag.) Horticulture Vegetable Science. Thesis of Anita Kerketta submitted to SHUATS, 2015. Authors are sincerely thankful to Dr. J.P. Collis Assistant Prof. Naini Institute of Agricultural SHUATS, Allahabad. We thank the Project Coordinator, AICRP (Vegetable Crops), IIVR, Varanasi, for providing the seed material of different chilli genotypes to the first author.

### REFERENCES

- Anu, A., Babu, K.N. and Peter, K.V., Evaluation of Paprika Genotypes in Kerala. *Indian journal of Plant Genetic Resource*, **15(2)**: 93-99 (2002).
- Grubeen, Tropical vegetables and their genetic resource, 1994, IBPGR, Rome (1977).
- Gupta, A M., Singh Daljeet & kumar Ajay, Genetic variability, genetic advance and correlation studies in chilli (*Capsicum annuum* L.). *Indian J. Agri Sci.*, **79**: 221-223 (2009).
- Indian Horticulture Database-2013, (eds). Ministry, N.C., Singh, B. and Gandhi, P. C. Pp.6 (2013).
- Amit, K, Ahad, I, V, Kumar & S, Thakur, Genetic variability and correlation studies for growth and yield character in chilli (*Capsicum annuum* L.). *Journal of spice and Aromatic crops*. vol.23 **(2)**: 170-177 (2014).
- Kumar, B.K., Munshi, A.D., Subodh Joshi and Charanjit Kaur, Note on evaluation of chilli (*Capsicum annuum* L.) genotypes for biochemical constituents. *Capsicum & Eggplant Newsletter*, **22**: 41-42 (2003).
- Kumar Diwaker, Bahadur Vijay, Rangare S.B. & Singh Devi, Genetic variability, heritability and correlation studies in chilli (*Capsicum annuum* L.). *Hortflora Research spectrum*, **1(3)**: 248-252 (2012).
- Manju P. R. and Sreelathakumary I., Quality parameters in Hot Chilli (*Capsicum chinense*). *Journal of Tropical Agriculture*, **40**: 4-6 (2002).
- Mantano Mata, Nelson and Cedeno, E. Agronomic evaluation of seven pepper (*Capsicum annuum* L.) cultivars. *Revista Cientifica UDO Agricola*, **2(1)**: 95-100 (2002).
- Mishra, R.K., Kumar, S., Pandey, A.K., Singh, G. and Singh, S.K., Stability analysis of chilli genotypes for yield and quality traits at different state if transplanting. *New agriculturist*, **20 (1&2)**: 33-38, 2009 (2009).
- Mishra, T.S., Chaturvedi, A. and Tripathi, A.N., Genetic analysis of agro-economic traits in chillies (*Capsicum annuum*). *Progressive Horticulture*, vol. 47, No. 2, September 2015 (2015).
- Patil, S. Manjunath, Chougula Shivanand, B. Arunkumar, Karoshi Manjunath, A.C.K. Pramila and Mehendrakar Praveen, Effect of organic manure on growth, yield and quality of chilli (*Capsicum annuum* L.). *Haryana J. hortic.Sci*, **37(1&2)**: 147-149 (2008).
- Panse, V.G. and Sukhatme, P.V., Statistical Methods for Agricultural Workers, ICAR, New Delhi, India, pp. 115 (1967).
- Saravaiya, S.N., Koladiya, P.B., Patel, H.B., Patel, D.A., Parmar V.L. and Patel, J.B. Evaluation of different genotypes of chilli through IET under South Gujarat conditions. *The Asian Journal of Horticulture*, **6(1)**: 71-73 (2011).
- Singh, M. D, Laisharam, J. M & Bhagirath, T, Genetic variability in local chillies (*Capsicum annuum* L) of Manipur. *Indian J. Hort.*, **62**: 203-205 (2005).
- Thamburaj, S., and Singh, N., Vegetables, Tuber crops and spices (4<sup>th</sup> ed.) Directorate of Knowledge Management in Agriculture, ICAR, New Delhi, Pg: 49-51 (2014).
- Verma, S. K., Negi, K. S., Muneem, K. C. and Arya, R. R., Preliminary evaluation of chilli germplasm. *Pantnagar Journal of Research*, **6 (1)**: 81-85 (2008).