

Original Research Article

<https://doi.org/10.20546/ijcmas.2020.907.294>

Performance of Chilli (*Capsicum annuum* L.) Genotypes for Yield and Yield Attributing Traits

G. Harika^{1*}, C. Sarada² and B. Srinivasulu³

¹ Department of Vegetable Science, College of Horticulture, Venkataramannagudem, West Godavari District, A.P., India

² Horticultural Research Station, Lam, Guntur, India

³ Department of Vegetable Science, Sher-e Kashmir University of Agricultural Sciences and Technology, Srinagar J&K, India

*Corresponding author

ABSTRACT

Keywords

Capsicum annuum L., Chilli, Genotypes, Yield

Article Info

Accepted:

20 June 2020

Available Online:

10 July 2020

An experiment was conducted during *kharif* 2018-19 at Horticultural Research Station, Lam, Guntur, Andhra Pradesh (India) to identify potential genotypes for nine quantitative traits among sixty four genotypes of chilli (*Capsicum annuum* L.). The analysis of variance revealed significant differences among the genotypes for all the nine characters indicating the presence of genetic variability among the genotypes. Among sixty four genotypes, the genotype LCA-53 recorded maximum plant height and plant spread, the genotypes, LCA-39 recorded the highest number of primary branches per plant. The genotype LCA-8 came to flowering early, while maximum number of fruits, ripe yield per plant and length of pedicel was observed for LCA-49. The genotype LCA-57 recorded maximum fruit length, whereas the maximum fruit diameter was observed for the genotype LCA-3.

Introduction

Chilli (*Capsicum annuum* L.) belongs to family Solanaceae, originated from South and Central America. Chilli has diverse uses as spice, condiment, culinary supplement, medicine, vegetable and ornamental plant. It is an indispensable spice due to its pungency, taste, appealing colour and flavor and has its unique place in the diet as a vegetable cum spice crop. The pungency in chilli is due to volatile alkaloid, capsaicin present in placenta and pericarp of fruit which has diverse uses in

allopathic and ayurvedic medicine value (Sumathy and Mathew, 1984). The fruits are rich in vitamin A, C and E (Hosamani, 1993). It is also good source of oleoresin which has varied uses in processed food and beverage industries and got high export potential. India is the largest producer, consumer and exporter of chilli in the world with an annual production of 2.39 million tonnes from 0.85 million ha with productivity of 2.1 tonne per ha (N. H. B., 2017). Andhra Pradesh leads the country in its production, productivity and export followed by Karnataka, Maharastra,

Orissa, Tamil nadu, and Madhya Pradesh. The assessment of nature and magnitude of variability in the available germplasm is the prerequisite of any breeding programme. The effectiveness of selection and development of improved varieties depends on the nature of variability expressed for yield and its contributing characters in the gene pool. High yield and yield contributing characters with improved quality parameters have been the major objective of chilli breeding programme.

The importance of genetically diverse genotypes with desirable combinations has also been realized by several workers (Nagraju *et al.*, 2018) Keeping in view the above facts, the present investigation was undertaken to observe the performance of genotypes of chilli for quantitative traits and to screen the best performing genotypes for utilization in further breeding programme.

Materials and Methods

The investigation was carried out during *khariif* 2018-19 at Horticultural Research Station, Lam, Guntur with 64 genotypes of chilli in randomized block design with two replications.

Nursery was raised during august and the seedlings were transplanted at a spacing of 75× 30 cm in a plot of size 2 × 1.5m² during September. Five competitive plants were selected at random for recording the observations on plant height (cm), plant spread (cm), number of primary branches per plant, days to 50 per cent flowering, number of fruits per plant, fruit diameter (cm), fruit length (cm), length of pedicel (cm), ripe fruit yield per plant (g).

The crop was raised as per the recommended package of practices. Analysis of variance was carried out as per the procedure given by Panse and Sukhatme (1985).

Results and Discussion

The analysis of variance (table 2) revealed significant differences among the genotypes for all the 14 characters studied indicating the presence of genetic variability in the genotypes and considerable scope for their improvement. These results are in conformity with earlier reports of Nagaraju *et al.*, (2018), Nahak *et al.*, (2018), Parmajeeth and Akhilesh (2019) in chilli.

Growth attributes

The plant height ranged from 30 to 170 cm with a mean of 72.33 cm. The genotype LCA-49 recorded maximum plant height (170 cm) which was significantly superior over other genotypes followed by LCA-49 (114.70cm), which is on par with LCA-25 (106.70cm), while LCA-43 recorded minimum plant height (30.30 cm). Similar findings of variation in the plant height were recorded by, Satish *et al.*, (2016), Nagaraju *et al.*, (2018).

The plant spread observed among the genotypes ranged from 30.3- 130 cm with mean of 75.58 cm. The genotype LCA -53 recorded maximum plant spread (130 cm) which is on par with LCA-47 (125.90cm) and LCA-31(120.40cm), while the genotype LCA-3 recorded minimum plant spread (30.30cm). Similar findings of variation in the plant spread were recorded by Nagaraju *et al.*, (2018), Vidya *et al.*, (2018). The number of primary branches ranged from 2.65-6.75 with a mean of 4.44.

The genotype LCA-39 recorded the highest number of branches (6.75) which is on par with LCA- 25 (6.40) and LCA-42 (6.25), while the lowest number of branches were recorded for LCA-960 (2.65) Similar findings of variation in number of primary branches were recorded by Pujar *et al.*, (2017), Pandiyaraj *et al.*, (2017).

Table.1 List of chilli genotypes used in the experiment and their source

Treatment	Accession Number	Source
T ₁ .	LCA-1	HRS, Lam, Guntur
T ₂ .	LCA-2	HRS, Lam, Guntur
T ₃ .	LCA-3	HRS, Lam, Guntur
T ₄ .	LCA-4	HRS, Lam, Guntur
T ₅ .	LCA-5	HRS, Lam, Guntur
T ₆ .	LCA-6	HRS, Lam, Guntur
T ₇ .	LCA-7	HRS, Lam, Guntur
T ₈ .	LCA-8	HRS, Lam, Guntur
T ₉ .	LCA-9	HRS, Lam, Guntur
T ₁₀ .	LCA-10	HRS, Lam, Guntur
T ₁₁ .	LCA-11	HRS, Lam, Guntur
T ₁₂ .	LCA-12	HRS, Lam, Guntur
T ₁₃ .	LCA-13	HRS, Lam, Guntur
T ₁₄ .	LCA-14	HRS, Lam, Guntur
T ₁₅ .	LCA-15	HRS, Lam, Guntur
T ₁₆ .	LCA-16	HRS, Lam, Guntur
T ₁₇ .	LCA-17	HRS, Lam, Guntur
T ₁₈ .	LCA-18	HRS, Lam, Guntur
T ₁₉ .	LCA-19	HRS, Lam, Guntur
T ₂₀ .	LCA-20	HRS, Lam, Guntur
T ₂₁ .	LCA-21	HRS, Lam, Guntur
T ₂₂ .	LCA-22	HRS, Lam, Guntur
T ₂₃ .	LCA-23	HRS, Lam, Guntur
T ₂₄ .	LCA-24	HRS, Lam, Guntur
T ₂₅ .	LCA-25	HRS, Lam, Guntur
T ₂₆ .	LCA-26	HRS, Lam, Guntur
T ₂₇ .	LCA-27	HRS, Lam, Guntur
T ₂₈ .	LCA-28	HRS, Lam, Guntur
T ₂₉ .	LCA-29	HRS, Lam, Guntur
T ₃₀ .	LCA-30	HRS, Lam, Guntur
T ₃₁ .	LCA-31	HRS, Lam, Guntur
T ₃₂ .	LCA-32	HRS, Lam, Guntur
T ₃₃ .	LCA-33	HRS, Lam, Guntur
T ₃₄ .	LCA-34	HRS, Lam, Guntur
T ₃₅ .	LCA-35	HRS, Lam, Guntur
T ₃₆ .	LCA-36	HRS, Lam, Guntur
T ₃₇ .	LCA-37	HRS, Lam, Guntur
T ₃₈ .	LCA-38	HRS, Lam, Guntur
T ₃₉ .	LCA-39	HRS, Lam, Guntur
T ₄₀ .	LCA-40	HRS, Lam, Guntur

T ₄₁ .	LCA-41	HRS, Lam, Guntur
T ₄₂ .	LCA-42	HRS, Lam, Guntur
T ₄₃ .	LCA-43	HRS, Lam, Guntur
T ₄₄ .	LCA-44	HRS, Lam, Guntur
T ₄₅ .	LCA-45	HRS, Lam, Guntur
T ₄₆ .	LCA-46	HRS, Lam, Guntur
T ₄₇ .	LCA-47	HRS, Lam, Guntur
T ₄₈ .	LCA-48	HRS, Lam, Guntur
T ₄₉ .	LCA-49	HRS, Lam, Guntur
T ₅₀ .	LCA-50	HRS, Lam, Guntur
T ₅₁ .	LCA-51	HRS, Lam, Guntur
T ₅₂ .	LCA-52	HRS, Lam, Guntur
T ₅₃ .	LCA-53	HRS, Lam, Guntur
T ₅₄ .	LCA-54	HRS, Lam, Guntur
T ₅₅ .	LCA-55	HRS, Lam, Guntur
T ₅₆ .	LCA-56	HRS, Lam, Guntur
T ₅₇ .	LCA-57	HRS, Lam, Guntur
T ₅₈ .	LCA-58	HRS, Lam, Guntur
T ₅₉ .	LCA-59	HRS, Lam, Guntur
T ₆₀ .	LCA-60	HRS, Lam, Guntur
T ₆₁ (check)	LCA-960	HRS, Lam, Guntur
T ₆₂ (check)	LCA-334	HRS, Lam, Guntur
T ₆₃ (check)	LCA-620	HRS, Lam, Guntur
T ₆₄ (check)	LCA-625	HRS, Lam, Guntur

Table.2 Analysis of variance of various quantitative characters in chilli (*Capsicum annuum* L.)

S. No.	Characters	Mean sum of squares		
		Replications	Genotypes	Error
1.	Plant height	29.93	814.60**	23.27
2.	Plant spread	227.91	1014.48**	65.24
3.	Number of primary branches	0.19	2.023**	0.163
4.	Days to 50% flowering	0.812	47.017**	0.611
5.	Number of fruits per plant	74.57	1782.66**	20.23
6.	Fruit length (cm)	1.711	5.367**	0.606
7.	Fruit diameter (cm)	0.0205	0.366**	0.020
8.	Length of the pedicel (cm)	0.011	1.077**	0.0412
9.	Ripe yield per plant (g)	1442.8	17210**	371.7

*Significant at 5 per cent level; ** Significant at 1 per cent level

Table.3 Mean performance of various quantitative characters in chilli (*capsicum annum L.*) genotypes

Genotype	PH (cm)	PS (cm)	NPB	DFP	NFP	FL (cm)	FD (cm)	LP (cm)	RYPP (g)
LCA-1	64.95	50.10	4.60	47.75	77.50	7.30	1.55	3.15	160.40
LCA -2	89.50	76.50	5.80	39.85	118.5	9.30	1.75	2.95	278.35
LCA -3	47.50	30.30	3.03	37.95	44.50	6.45	3.15	2.55	160.00
LCA -4	56.55	40.40	4.20	38.10	108.05	7.50	2.20	3.65	165.35
LCA -5	72.70	56.20	4.20	33.50	110.50	7.80	1.65	4.25	179.05
LCA -6	84.60	73.40	5.80	37.70	117.15	9.25	2.25	4.15	217.00
LCA -7	78.60	66.90	5.20	44.20	76.95	7.90	2.75	2.50	170.00
LCA -8	71.10	35.40	5.10	27.80	62.40	7.60	2.50	3.30	160.00
LCA -9	76.00	73.30	4.10	42.95	82.35	7.90	1.90	3.40	159.00
LCA -10	64.45	48.10	3.50	40.50	70.70	9.30	1.65	3.20	165.50
LCA -11	86.90	70.10	4.20	39.50	105.4	9.30	1.70	4.25	193.25
LCA -12	73.05	53.80	4.20	40.75	60.50	7.20	1.60	3.80	134.20
LCA -13	78.70	62.40	3.35	41.00	100.20	7.50	1.50	4.25	167.00
LCA -14	69.10	60.90	5.65	42.80	71.70	7.40	2.35	4.65	140.00
LCA -15	75.30	110.30	4.65	41.30	117.65	9.30	1.20	3.10	220.25
LCA -16	80.60	69.40	5.70	33.80	100.0	9.00	1.60	4.55	232.00
LCA -17	96.20	88.40	5.00	42.65	132.00	9.50	1.65	3.85	319.35
LCA -18	52.10	49.70	3.85	39.25	60.50	6.00	1.25	3.15	165.00
LCA -19	80.80	87.80	6.15	40.65	110.00	9.20	1.41	4.25	270.00
LCA -20	60.30	49.40	3.50	39.60	70.50	7.50	1.60	3.40	214.00
LCA -21	71.80	62.70	4.60	36.90	89.90	9.20	1.60	4.25	221.25
LCA -22	60.80	51.70	5.10	40.20	63.40	8.90	1.65	2.55	142.15
LCA -23	93.80	85.50	4.80	41.95	120.0	9.30	1.70	2.35	406.00
LCA -24	82.90	70.50	3.60	46.75	90.50	7.80	2.25	3.15	216.40
LCA -25	106.7	103.20	6.40	40.80	150.0	9.70	2.35	4.65	231.80
LCA -26	65.80	82.70	4.80	36.40	75.50	7.50	1.25	3.70	154.20
LCA -27	76.00	45.20	5.10	28.80	71.35	7.60	1.45	3.65	325.35
LCA -28	43.30	53.50	4.00	39.10	76.15	6.00	1.10	3.85	113.50
LCA -29	72.50	91.70	4.80	39.00	87.00	9.50	1.35	3.35	167.00
LCA -30	72.90	105.40	4.00	39.50	100.00	9.50	1.25	2.65	200.30
LCA -31	66.80	120.40	3.70	29.55	80.50	7.50	1.65	4.25	169.70
LCA -32	68.60	96.80	4.80	43.95	71.50	6.30	2.20	4.25	160.50
LCA -33	79.40	59.15	4.25	44.10	89.40	9.60	1.25	3.10	266.55
LCA -34	63.70	89.50	3.80	42.80	61.40	7.70	1.10	4.25	162.10
LCA -35	53.10	59.90	5.10	38.50	57.00	5.70	1.55	4.65	120.00
LCA -36	76.80	62.45	3.50	38.15	90.45	7.15	1.20	3.85	189.50
LCA -37	46.10	71.20	4.75	39.55	45.20	5.75	1.45	4.15	110.00
LCA -38	47.00	67.60	5.30	34.55	79.70	5.20	1.60	3.25	240.35

Genotype	PH (cm)	PS (cm)	NPB	DDF	NFP	FL (cm)	FD (cm)	LP (cm)	RYPP (g)
LCA -39	44.00	77.70	6.75	32.85	100.00	2.60	1.25	4.20	412.00
LCA -40	90.00	87.65	3.30	38.90	105.50	7.20	1.00	3.25	262.00
LCA -41	67.10	101.15	4.40	41.70	74.50	6.60	1.20	4.35	169.10
LCA -42	38.50	64.15	6.25	34.85	55.00	4.60	1.25	4.55	106.75
LCA -43	30.30	74.75	3.00	43.00	32.60	7.70	1.15	4.50	64.40
LCA -44	58.90	67.05	3.60	37.75	74.50	7.90	1.10	4.65	139.00
LCA -45	86.20	64.35	5.70	44.50	105.0	6.60	1.60	4.25	240.00
LCA -46	89.80	84.20	6.10	32.65	110.00	9.05	1.70	3.15	250.00
LCA -47	62.60	125.90	2.75	36.00	83.10	6.55	1.85	2.45	149.10
LCA -48	81.60	106.80	5.30	40.60	95.80	8.55	1.60	2.35	195.00
LCA -49	114.7	107.50	3.25	41.00	200.00	7.500	1.40	5.30	526.00
LCA -50	68.40	101.50	3.55	29.50	52.40	7.80	1.35	4.15	160.25
LCA -51	67.30	87.50	5.40	34.75	145.40	4.40	1.40	4.40	500.00
LCA -52	93.20	75.70	5.85	28.75	109.00	9.20	1.45	3.35	270.00
LCA -53	170.2	130.00	4.65	44.75	110.80	8.85	1.40	3.15	256.07
LCA -54	66.80	81.95	4.25	39.60	70.35	10.35	2.10	2.75	153.00
LCA -55	78.0	81.40	4.45	31.75	83.40	5.55	2.20	3.50	158.00
LCA -56	67.10	94.70	5.05	37.65	55.70	4.60	1.70	3.80	147.50
LCA -57	40.80	86.60	4.30	29.80	52.40	11.15	1.25	4.25	122.50
LCA -58	72.00	42.00	3.70	41.80	80.50	5.85	1.35	4.15	337.00
LCA -59	75.40	98.20	3.25	41.90	124.10	10.55	1.40	2.25	260.00
LCA -60	77.05	36.50	2.80	32.60	85.55	8.80	1.15	2.35	157.00
LCA 960	68.30	74.70	2.65	36.50	108.00	7.65	1.30	3.65	277.00
LCA 334	64.65	73.05	3.15	29.50	127.85	8.15	1.50	3.10	279.00
LCA 620	75.45	85.05	3.85	36.50	137.40	8.65	1.65	3.10	385.00
LCA 625	74.40	95.40	3.25	36.50	137.40	8.70	1.35	4.55	390.00
Mean	72.33	75.58	4.44	38.34	90.81	7.76	1.60	3.65	216.00
CD (P=0.05)	9.66	16.17	0.80	1.56	9.01	1.55	0.28	0.40	38.62
SEm ±	3.41	5.71	0.28	0.55	3.18	0.55	0.10	0.14	13.63
CV %	6.67	10.68	9.08	2.04	5.95	10.02	8.85	5.56	8.92

Where, PH= plant height (cm), PS = plant spread (cm), NPB= number of primary branches, DDF= Days to 50% flowering, NFP= Number of fruits per plant, FL= Fruit length (cm), FD= Fruit Diameter (cm), LP= Length of pedicel (cm), RYPP= Ripe yield per plant (g)

Flowering attributes

Days to 50% flowering ranged from 27.8-47.75 with a mean of 38.34. The genotype LCA- 1 recorded maximum number of days to 50% flowering (47.75), while LCA-8 (27.80), was earliest for days to 50% flowering which is on par with LCA-27 (28.80). Similar findings of variation in the

days to 50% flowering were recorded by Nagaraju *et al.*, (2018), Pujar *et al.*, (2017).

Yield attributes

The number of fruits per plant ranged from 32.6-200 with a mean of 90.81. The genotype LCA-49(200) recorded maximum number of fruits per plant which is significantly superior

over other genotypes followed by LCA-25(150.00) which is on par with LCA-51(145.500), while the least number of fruits were recorded for LCA-43(32.60). similar findings of variation in number of fruits were recorded by Satish *et al.*, (2016), Parmajeeth and Akhilesh (2019). The fruit length ranged from 2.6-11.15 cm with a mean of 7.76 cm. The genotype LCA-57 recorded maximum fruit length (11.15), which is on par with LCA-59 (10.55cm) and LCA-54(10.35cm), while the least was recorded by LCA-39 (2.66cm). Similar findings of variation in the fruit length were recorded by Pandiyaraj *et al.*, (2017), Parmajeeth and Akhilesh (2019). Fruit Diameter ranged from 1- 3.15 cm with a mean of 1.60 cm. the genotype LCA-3 recorded maximum fruit diameter (3.15) which is significantly superior over other genotypes followed by LCA-7(2.75cm) which is on par with LCA-8 (2.50cm) where as lowest was recorded by LCA-40 (1.00cm). Similar findings of variation in the fruit diameter were recorded by Pandiyaraj *et al.*, (2017), Nagaraju *et al.*, (2018). Length of pedicel ranged from 2.25- 5.3 cm with a mean of 3.65 cm. The genotype LCA-49 recorded maximum length of pedicel (5.3) which is significantly superior over other genotypes followed by LCA-14 (4.65), while the least was recorded by LCA-59 (2.25cm). Similar findings of variation in the length of pedicel were recorded by Abinaya *et al.*, (2016), Parmajeeth and Akhilesh (2019). Ripe yield per plant ranged from 64.40 to 526.00g with a mean of 216.00. The genotype LCA-49 recorded significantly highest ripe yield per plant (526.00g) which is on par with LCA-51 (500.00g), while the least was recorded by LCA-43 (64.40g). Similar findings of variation in the ripe yield per plant were recorded by Abinaya *et al.*, (2016), Parmajeeth and Akhilesh (2019).

In conclusion the present study, a high degree of variability was observed for all the

characters. It was maximum for ripe yield per plant (64.40 to 526.00g) and minimum for fruit diameter (1- 3.15cm). The characters showing wide range of variation provide ample scope for selecting desired types. These results are in accordance with those reports of earlier workers like Nagaraju *et al.*, (2018), Nahak *et al.*, (2018), Parmajeeth and Akhilesh (2019). The genotypes LCA-49, LCA-51, LCA-39, LCA-23 were identified as promising genotypes due to more number of fruits, ripe yield per plant.

Acknowledgements

I extend my deep sense of reverence and gratitude to Associate Dean, Horticultural College and Research Institute, Venkataramannagudem, Dr. Y.S.R.H.U for allotting me to HRS, Lam to take up my research work. I am highly thankful to Dr. Y.S.R. Horticultural University Venkataramannagudem for providing financial assistance in the form of stipend to complete this endeavour.

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How to cite this article:

Harika, G., C. Sarada and Srinivasulu, B. 2020. Performance of Chilli (*Capsicum annuum* L.) Genotypes for Yield and Yield Attributing Traits. *Int.J.Curr.Microbiol.App.Sci*. 9(07): 2509-2516. doi: <https://doi.org/10.20546/ijcmas.2020.907.294>