



Short communication

## Variability studies in Chilli for horticultural traits

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### Abstract

In the thirty five chilli genotypes evaluated in 2016, wide variability was observed in morphological characters viz. plant height (49.2 cm - 120.25 cm), leaf length (3.69 cm - 9.81 cm), leaf breadth (1.4 cm - 4.28 cm), days to 50% flowering (32 - 79), fruit weight (3.85 g - 12.3 g), number of fruits per plant (11.9 - 45.4) and fresh yield (39.72 g - 318.6 g). Among the chilli genotypes, CA 25 and CA 21 were found to be early in fruiting. Fruits were found to be long in CA 29, CA 31 and CA 32 whereas number of fruits per plant was maximum in CA 7 and CA 22. Fresh fruit yield obtained from a plant was the highest in CA 32 followed by CA 25 and CA 22.

**Keywords :** Chilli, Morphological characters , Variability,

Chilli (*Capsicum* spp.) is one of the most valuable spice crops of India having good export potential in the international market. India is the largest producer, consumer and exporter of chillies, accounting for 33 per cent of the total spice export. Chilli is cultivated for various purposes, i.e., as green chillies, dried spice (whole and ground form), process products and industrial extracts (oleoresin, capsaicinoids, carotenoids). Considerable variability is noticed among chilli genotypes for different characters. It is necessary to study the performance of chilli genotypes collected from different sources in order to assess their variability and suitability to growing in the warm humid tropics of Kerala.

Thirty five chilli genotypes collected from different sources were grown in the field of the Department of Plantation Crops and Spices, College of Horticulture, Kerala Agricultural University, Vellanikkara during September 2015 to January 2016. Randomised block design was adopted, with two replications and a plot size of 2 m<sup>2</sup>, and the POP recommendations of KAU were followed for

cultivation. Ten randomly selected plants were studied in each genotype for yield and other horticultural characters viz., plant height, leaf length, leaf breadth, days to 50% flowering, fruit length, fruit width, fruit weight, number of fruits per plant and fresh fruit yield. Genotypes included indigenous types and varieties from different sources and the details are given in table 1. Out of the total 35 genotypes, 32 were found to belong to *Capsicum annum* species (CA) and three were *Capsicum chinense* types (CC).

Analysis of variance (ANOVA) among the accessions revealed highly significant differences for all the characters studied, indicating wide variability. The data pertaining to the performance of chilli genotypes in relation to different horticultural traits are presented in table 3. The values of general mean for individual characters along with range are given in table 2.

Plant height is an important growth parameter which varies according to the genotype and in this study it ranged from 49.2 cm to 120.25 cm. Among

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Table 1. Chilli genotypes and their sources

Accession No.	Name of genotype	Source
CA 1	KKM-1	Agricultural College and Research Station, Killikulam
CA 2	K-1	Agricultural Experimental Research Station, Kovilpatti
CA 3	CO-4	TNAU, Coimbatore
CA 4	PKM-1	College of Horticulture, TNAU, Periyakulam
CA 5	G3	Horticultural Research Station, LAM
CA 6	G4	Horticultural Research Station, LAM
CA 7	LCA 353	Horticultural Research Station, LAM
CA 8	LCA 235	Horticultural Research Station, LAM
CA 9	LCA 960	Horticultural Research Station, LAM
CA 10	LCA 625	Horticultural Research Station, LAM
CA 11	LCA 206	Horticultural Research Station, LAM
CA 12	LCA 334	Horticultural Research Station, LAM
CA 13	Arka Lohit	IIHR, Bangalore
CA 14	Arka Kyathi	IIHR, Bangalore
CA 15	Arka Haritha	IIHR, Bangalore
CA 16	Arka Suphal	IIHR, Bangalore
CA 17	Arka Meghna	IIHR, Bangalore
CA 18	Kodakara-1	Local collection
CA 19	Pusa Anmol	11VR, Varanasi
CA 20	Utkal-Ava	Ouat, Bhubaneswar
CA 21	Utkal Rasmi	Ouat, Bhubaneswar
CA 22	Athavanad-1	Local collection (Malappuram)
CA 23	Edayur	Local collection (Malappuram)
CA 24	Daritri	Private seed company, Bangalore
CA 25	Tejasvi	Private seed company, Bangalore
CA 26	Chivar-1	Vegetable Research Farm, Allahabad
CA 27	Thriprayar-1	Local collection (Thrissur)
CA 28	Palakkad	Local collection (Palakkad)
CA 29	Athavanad-2	Local collection (Malappuram)
CA 30	Ujwala	KAU, Thrissur
CA 31	Anugraha	KAU, Thrissur
CA 32	Vellayani Athulya	KAU, Thrissur
CC 1	Kodakara-2	Local collection (Thrissur)
CC 2	Thriprayar-2	Local collection (Thrissur)
CC 3	Mattathur	Local collection (Thrissur)

the thirty five genotypes analysed, accession CA 22 recorded greatest plant height (120.25 cm) which was followed by CA 28 (109.6 cm), CA 29 (103.8 cm) and CA 27 (103.02 cm) whereas plant height was lowest in CA 31 (49.2 cm). Leaf length varied from 3.69 cm to 9.81 cm with a mean value of 6.75 cm. Accession CA 27 recorded highest leaf length (9.81 cm) whereas CA 3 recorded lowest leaf length. Leaf breadth ranged from 1.4 cm (CA 19) to 4.28 cm (CA 6) with a mean value of 2.84 cm. Such variability in different characters was also

Table 2. Range and mean values for different horticultural traits in chilli genotypes

Character	Range	Mean
Plant height (cm)	49.2 - 120.25	84.85
Leaf length (cm)	3.69 - 9.81	6.75
Leaf breadth (cm)	1.4 - 4.28	2.84
Days to 50% flowering	32 - 79	55.5
Fruit length (cm)	3.85 - 12.3	8.1
Fruit width (cm)	0.61 - 2.32	1.46
Fruit weight	2.31 - 13.31	7.81
No. of fruits/plant	11.9 - 45.4	28.65
Fresh yield/plant (g)	39.72 - 318.6	179.16

Table 3. Horticultural traits of chilli genotypes

Genotypes	Plant height (cm)	Leaf length (cm)	Leaf breadth (cm)	Daysto 50% flowering	Fruit length (cm)	Fruit width (cm)	Fruit weight (fresh) (g)	No. of fruits/plant	Fresh yield/plant (g)
CA 1	69.87 <sup>g-m</sup>	5.11 <sup>qr</sup>	2.05 <sup>l-n</sup>	54.00 <sup>ef</sup>	5.86 <sup>n-q</sup>	0.89 <sup>g-k</sup>	3.08 <sup>l-n</sup>	24.80 <sup>l</sup>	75.51 <sup>m-q</sup>
CA 2	82.85 <sup>c-j</sup>	4.25 <sup>x</sup>	1.97 <sup>qr</sup>	45.50 <sup>ij</sup>	7.01 <sup>j-m</sup>	1.00 <sup>e-j</sup>	3.95 <sup>h-j</sup>	15.60 <sup>r</sup>	61.78 <sup>qr</sup>
CA 3	71.55 <sup>g-m</sup>	3.69 <sup>z</sup>	1.97 <sup>qr</sup>	43.50 <sup>jk</sup>	5.12 <sup>qr</sup>	1.29 <sup>c-f</sup>	4.35 <sup>gh</sup>	19.80 <sup>mn</sup>	85.58 <sup>k-m</sup>
CA 4	73.05 <sup>f-m</sup>	5.76 <sup>l</sup>	2.05 <sup>l-n</sup>	47.50 <sup>hi</sup>	9.21 <sup>ce</sup>	0.86 <sup>g-k</sup>	4.43 <sup>gh</sup>	17.30 <sup>n-r</sup>	76.38 <sup>m-q</sup>
CA 5	55.80 <sup>k-m</sup>	5.07 <sup>rs</sup>	1.96 <sup>q-s</sup>	37.50 <sup>mn</sup>	6.83 <sup>k-n</sup>	1.00 <sup>e-j</sup>	4.10 <sup>g-i</sup>	17.10 <sup>n-r</sup>	69.52 <sup>m-r</sup>
CA 6	85.70 <sup>b-j</sup>	4.41 <sup>w</sup>	4.28 <sup>a</sup>	42.50 <sup>k</sup>	7.41 <sup>h-k</sup>	0.68 <sup>ik</sup>	5.00 <sup>ef</sup>	15.80 <sup>qr</sup>	79.02 <sup>l-q</sup>
CA 7	78.95 <sup>c-l</sup>	4.62 <sup>v</sup>	1.94 <sup>rs</sup>	38.00 <sup>mn</sup>	8.92 <sup>ef</sup>	1.61 <sup>bc</sup>	2.67 <sup>n-q</sup>	45.40 <sup>a</sup>	120.40 <sup>hi</sup>
CA 8	71.10 <sup>g-m</sup>	4.09 <sup>y</sup>	1.36 <sup>u</sup>	39.50 <sup>lm</sup>	6.29 <sup>l-p</sup>	1.00 <sup>e-j</sup>	2.82 <sup>n-q</sup>	41.90 <sup>c</sup>	117.97 <sup>hi</sup>
CA 9	73.10 <sup>f-m</sup>	5.06 <sup>rs</sup>	2.55 <sup>g</sup>	41.00 <sup>kl</sup>	7.13 <sup>j-m</sup>	1.54 <sup>cd</sup>	5.84 <sup>d</sup>	20.60 <sup>m</sup>	120.18 <sup>hi</sup>
CA 10	88.55 <sup>b-i</sup>	5.36 <sup>m</sup>	2.03 <sup>m-p</sup>	38.00 <sup>mn</sup>	8.26 <sup>e-i</sup>	0.90 <sup>g-k</sup>	3.18 <sup>l-n</sup>	20.80 <sup>m</sup>	66.33 <sup>n-r</sup>
CA 11	89.90 <sup>b-h</sup>	5.09 <sup>qr</sup>	2.27 <sup>k</sup>	41.00 <sup>kl</sup>	7.97 <sup>f-j</sup>	1.04 <sup>e-j</sup>	4.12 <sup>g-i</sup>	34.70 <sup>ef</sup>	142.97 <sup>g</sup>
CA 12	97.50 <sup>a-f</sup>	5.28 <sup>n</sup>	1.97 <sup>qr</sup>	42.00 <sup>kl</sup>	6.31 <sup>l-p</sup>	0.94 <sup>f-k</sup>	2.42 <sup>o-q</sup>	32.90 <sup>fg</sup>	80.43 <sup>l-p</sup>
CA 13	99.45 <sup>a-e</sup>	5.93 <sup>ij</sup>	2.38 <sup>i</sup>	72.50 <sup>b</sup>	6.15 <sup>m-p</sup>	0.83 <sup>g-k</sup>	5.73 <sup>d</sup>	32.20 <sup>f-h</sup>	184.89 <sup>de</sup>
CA 14	78.65 <sup>c-l</sup>	5.02 <sup>st</sup>	1.99 <sup>o-q</sup>	46.50 <sup>i</sup>	7.32 <sup>i-k</sup>	0.61 <sup>k</sup>	4.27 <sup>g-i</sup>	18.90 <sup>m-p</sup>	80.64 <sup>l-p</sup>
CA 15	80.70 <sup>c-k</sup>	5.86 <sup>k</sup>	1.92 <sup>s</sup>	36.00 <sup>n-p</sup>	7.20 <sup>l-i</sup>	0.81 <sup>h-k</sup>	4.61 <sup>fg</sup>	33.60 <sup>ef</sup>	155.87 <sup>fg</sup>
CA 16	98.83 <sup>a-e</sup>	4.61 <sup>v</sup>	2.07 <sup>lm</sup>	77.50 <sup>a</sup>	7.91 <sup>g-j</sup>	1.09 <sup>e-i</sup>	5.72 <sup>d</sup>	30.20 <sup>g-i</sup>	170.37 <sup>ef</sup>
CA 17	77.13 <sup>e-l</sup>	6.01 <sup>h</sup>	2.02 <sup>n-p</sup>	36.50 <sup>n-p</sup>	10.47 <sup>b</sup>	0.97 <sup>e-k</sup>	5.76 <sup>d</sup>	28.90 <sup>ij</sup>	168.44 <sup>ef</sup>
CA 18	71.46 <sup>g-m</sup>	5.35 <sup>m</sup>	3.31 <sup>b</sup>	57.50 <sup>d</sup>	7.97 <sup>f-j</sup>	1.186 <sup>d-g</sup>	7.66 <sup>c</sup>	25.50 <sup>kl</sup>	195.24 <sup>cd</sup>
CA 19	63.92 <sup>i-m</sup>	5.90 <sup>jk</sup>	1.40 <sup>u</sup>	37.50 <sup>mn</sup>	5.78 <sup>o-q</sup>	0.88 <sup>g-k</sup>	3.80 <sup>l-k</sup>	44.00 <sup>a-c</sup>	167.32 <sup>ef</sup>
CA 20	55.26 <sup>k-m</sup>	5.21 <sup>op</sup>	2.09 <sup>l</sup>	52.00 <sup>fg</sup>	4.41 <sup>rs</sup>	1.31 <sup>c-e</sup>	3.43 <sup>j-l</sup>	18.60 <sup>m-q</sup>	63.43 <sup>o-r</sup>
CA 21	55.25 <sup>k-m</sup>	5.98 <sup>hi</sup>	1.94 <sup>rs</sup>	34.00 <sup>o-q</sup>	6.58 <sup>k-p</sup>	0.94 <sup>f-k</sup>	3.35 <sup>k-m</sup>	16.30 <sup>o-r</sup>	54.10 <sup>rs</sup>
CA 22	120.25 <sup>a</sup>	5.13 <sup>q</sup>	1.97 <sup>qr</sup>	42.50 <sup>k</sup>	10.19 <sup>bc</sup>	0.98 <sup>e-j</sup>	5.01 <sup>ef</sup>	45.30 <sup>ab</sup>	227.74 <sup>b</sup>
CA 23	94.05 <sup>b-g</sup>	4.91 <sup>u</sup>	3.05 <sup>d</sup>	46.00 <sup>ij</sup>	9.03 <sup>de</sup>	2.32 <sup>a</sup>	13.31 <sup>a</sup>	15.50 <sup>r</sup>	206.10 <sup>c</sup>
CA 24	82.650 <sup>c-j</sup>	6.19 <sup>g</sup>	2.47 <sup>hi</sup>	50.00 <sup>gh</sup>	7.47 <sup>h-k</sup>	0.99 <sup>e-j</sup>	2.90 <sup>m-p</sup>	14.70 <sup>rs</sup>	42.44 <sup>s</sup>
CA 25	54.55 <sup>l-m</sup>	6.27 <sup>f</sup>	2.63 <sup>f</sup>	32.50 <sup>q</sup>	9.97 <sup>b-d</sup>	1.13 <sup>e-h</sup>	5.52 <sup>de</sup>	42.40 <sup>bc</sup>	234.16 <sup>b</sup>
CA 26	91.680 <sup>b-j</sup>	5.23 <sup>n-p</sup>	2.44 <sup>i</sup>	55.50 <sup>de</sup>	8.72 <sup>e-g</sup>	0.73 <sup>i-k</sup>	2.31 <sup>q</sup>	17.10 <sup>n-r</sup>	39.72 <sup>s</sup>
CA 27	103.02 <sup>a-d</sup>	9.81 <sup>a</sup>	2.52 <sup>g</sup>	36.50 <sup>n-p</sup>	8.81 <sup>e-g</sup>	0.85 <sup>g-k</sup>	4.31 <sup>g-i</sup>	25.00 <sup>l</sup>	107.77 <sup>h-j</sup>
CA 28	109.60 <sup>ab</sup>	4.97 <sup>t</sup>	2.51 <sup>gh</sup>	52.50 <sup>fg</sup>	8.31 <sup>e-h</sup>	1.02 <sup>e-j</sup>	4.22 <sup>g-i</sup>	28.00 <sup>i-k</sup>	117.77 <sup>hi</sup>
CA 29	103.80 <sup>a-c</sup>	5.91 <sup>jk</sup>	3.19 <sup>c</sup>	52.50 <sup>fg</sup>	12.30 <sup>a</sup>	1.96 <sup>ab</sup>	12.43 <sup>b</sup>	11.90 <sup>s</sup>	148.14 <sup>g</sup>
CA 30	62.35 <sup>j-m</sup>	9.51 <sup>b</sup>	2.76 <sup>e</sup>	62.50 <sup>c</sup>	3.97 <sup>s</sup>	1.06 <sup>e-i</sup>	2.69 <sup>n-q</sup>	38.00 <sup>d</sup>	102.30 <sup>i-k</sup>
CA 31	49.20 <sup>m</sup>	7.50 <sup>d</sup>	1.50 <sup>t</sup>	52.50 <sup>fg</sup>	11.62 <sup>a</sup>	0.94 <sup>f-k</sup>	3.06 <sup>l-n</sup>	29.60 <sup>h-j</sup>	84.53 <sup>k-n</sup>
CA 32	54.85 <sup>l-m</sup>	7.84 <sup>c</sup>	2.35 <sup>i</sup>	51.50 <sup>fg</sup>	12.03 <sup>a</sup>	1.02 <sup>e-j</sup>	11.93 <sup>b</sup>	26.70 <sup>i-l</sup>	318.60 <sup>a</sup>
CC 1	64.61 <sup>h-m</sup>	5.10 <sup>qr</sup>	3.07 <sup>d</sup>	70.00 <sup>b</sup>	3.85 <sup>s</sup>	1.98 <sup>a</sup>	3.47 <sup>j-l</sup>	35.90 <sup>de</sup>	123.97 <sup>h</sup>
CC 2	75.70 <sup>e-l</sup>	5.23 <sup>n-p</sup>	2.79 <sup>e</sup>	72.50 <sup>b</sup>	4.0 <sup>s</sup>	2.01 <sup>a</sup>	3.48 <sup>j-l</sup>	27.60 <sup>i-l</sup>	96.18 <sup>i-l</sup>
CC 3	77.89 <sup>d-l</sup>	6.99 <sup>e</sup>	3.08 <sup>d</sup>	79.00 <sup>a</sup>	3.91 <sup>s</sup>	1.98 <sup>a</sup>	3.42 <sup>k-m</sup>	21.30 <sup>m</sup>	74.15 <sup>m-q</sup>
CD (0.05)	25.71	0.05	0.05	2.98	0.98	0.36	0.52	2.97	18.29

reported by Krishna et al. (2007), Verma et al. (2008), Thul et al. (2009) and Vijaya et al (2014) in chilli genotypes.

Earliness in flowering is one of the important attributes included in crop improvement programmes. Genotypes like CA 25 and CA 21 were early in flowering (<35 days) and fruiting

(<40 days) whereas CC 1, CC 2, CC3 were late in flowering (>70 days) and fruiting (>75 days).

Fruit length, width and weight are some of the yield contributing characters and they can decide consumer acceptability. Considerable variation was observed for fruit length, breadth and weight. It is observed from the present investigation that fruits

of the *Capsicum annuum* genotypes were longer than *Capsicum chinense* types. Among *Capsicum annuum* types, CA 29 had the greatest fruit length measuring up to 12.3 cm whereas lowest fruit length was recorded in CA 30 (3.97cm). Fruits of *Capsicum chinense* were found to be short with a length of less than 4 cm. Twenty seven genotypes recorded more than 6 cm fruit length and three genotypes (CA 29, CA 31 and CA 32) were found to be extra long with a fruit length of more than 11 cm.

The range of variation for fruit width was 0.61 cm in CA 14 to 2.32 cm in CA 23. Fruits of *Capsicum chinense* types (CC 1, CC 2, CC 3) were found slightly broader than *Capsicum annuum* types. Five genotypes namely CA 23, CA 29, CC 1, CC 2 and CC 3 recorded a fruit width of more than 1.9 cm. Such variations were reported in fruit characters by Krishna et al. (2007), Verma et al. (2008) and Phulari (2012).

Fruit weight and number of fruits are the important economic parameters in chilli contributing to its total yield. Individual fruit weight was found varying from 2.31 g to 13.31 g among the chilli genotypes studied. Individual fruit weight was more than 10 g in three genotypes (CA 23, CA 29 and CA 32) and among these, CA 23 recorded highest fruit weight of 13.3 g followed by CA 29 (12.43 g) and CA 32 (11.93 g). Varietal variation in fresh weight of fruits was also reported by Chattopadhyay et al. (2011) and Misra et al. (2011).

Number of fruits per plant is highly dependent on genotypic, environmental and soil conditions. Significant variation was observed among the genotypes studied with the number ranging from 11.9 to 45.4 (Figure 1). Highest number of fruits per plant was observed in CA 7(45.4) followed by CA 22 (45.3), CA 19 (44) and CA 25 (42.4). Number of fruits obtained from a plant was very low in CA 29 (11.9).

Among the genotypes studied, significant variation was observed for ripe fruit yield (fresh) per plant. CA 32 was found to be the highest yielder with 318.6 g from a single plant. The next high yielders were CA 25(234.16 g) and CA 22 (227.74 g). Per plant yield was the lowest in CA 26 (39.72 g). Such genotypic variation was also reported by Krishna et al. (2007), Verma et al. (2008) and Sharma et al. (2009).

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