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Performance of Chilli Genotypes for Yield and Yield Attributes Of Fruit Quality in Southern Telangana

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ABSTRACT

The present investigation was carried out during rabi, in the year 2016-17. Thirty (30) genotypes of Chilli (Capsicum annuum L.) were studied for Nineteen (19) traits using Randomized Block Design with three replications. There are significant differences were observed among the genotypes, except number of flowers per axil. However, the maximum fruit length was recorded in IC-255944 (13.26 cm), maximum total number of fruits per plant was recorded in IC-255916 (110.0) and LCA-625 (110.0), maximum fresh fruit yield per plant was recorded in Warangal Chapata (600.00 g) followed by Devanur Deluxe (409.33) were recorded in these traits. The maximum seed content was recorded in Warangal Chapata (59.00%) and minimum was recorded in IC-214965 (46.33 %). Maximum capsanthin content (ASTA) was recorded in AVPP0514 (287.67) followed by NIC- 19967 (274.00), and minimum capsanthin content were recorded in IC-214965 (181.33). Among the genotypes evaluated in Southern Telangana conditions, four (4) genotypes, such as Warangal Chapata, LCA-625, AVPP0514 and IC-255916 of Chilli were found to be promising based on yield and yield attributes of fruit quality. Hence, they may be used in future breeding programme for multi traits importance.

Key words: *Genotypes, Capsicum annuum, Southern Telangana, Yield and Yield Attributes.*

INTRODUCTION

Chilli (*Capsicum annuum* L.) belongs to the family Solanaceae having diploid species with mostly 2n = 2x = 24 chromosomes, but wild species with 2n = 2x = 26 chromosomes have been reported, Pickersgill[18]. The domestication of chilli first occurred in Central America, most likely in Mexico, with secondary centers in Guatemala and Bulgaria, Salvador[22]. Chilli (*Capsicum annuum* L.) is an important valuable commercial spice-cum-vegetable crop grown in India under various agro climatic conditions *viz.*, tropical, sub- tropical and temperate climates[8].

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India is the major producer, consumer and exporter of chilli, covering an area of 0.774 million hectares with a production of 1.492 million tonnes averaging a productivity of 1.93 metric tonnes per hectare reported that[2]. The genus capsicum consists of a diverse range of plants and fruits, and varies enormously with respect to morphology, yield and nutrition related parameters. Chillies are grown as annual crop, although it can also be grown as perennial shrub in suitable climatic conditions. Among the five (5) cultivated species, (*Capsicum annuum* L.) is the most widely cultivated species for its pungent (hot pepper) and non-pungent (sweet pepper) fruits throughout the world.

The Chilli fruits are used for imparting pungency both at green stage as well as after maturity. The fruit varies in size from 1-20 cm in length from thin, long to conical and thick fleshed blocky shape. The popularity of chilli is due to its wide range of shape, size and sensory attributes such as colour, pungency and piquancy that make generally insipid bulk nutritive flesh, cereal and vegetable foods more appetizing. Similar results were reported by Govidajaran *et al*,[7]. Most of the varieties grown in the country are pungent varying from very pungent to mild pungency. In food and beverage industries chilli is being used in the form of oleoresin which permits better distribution of colour, flavour in food. Pungency is due to the presence of capsaicin content similar results were reported by Parthasarathy *et al*[17]. Capsaicin is used in the preparation of balms, whereas the colour extracts (caratenoids pigments) find use as colour additives in food industry and prawn feed industry. The main functional properties of chilli are pungency, antioxidant activity, vitamin C and natural pigments similar results were reported by Staryth and Nosova[28].

Green chillies are rich source of Vitamin A and Vitamin E. It is widely used in the curry powder, curry paste, all kinds of pickles and preparing sauce, soups, etc. The quality of dried chilli is assessed by a number of different parameters such as colour, hotness, ascorbic acid content and volatile flavour compounds similar results were reported by Henderson,[9]; Ruth *et al*.[21]; Jiang and Kubota[11]; Kim *et al*[12]; Wang, *et al*.[32]; Yaldiz *et al*[33].

The large variability in respect of fruit size, shape and growth among these chilli genotypes exist in whole Telangana state. However, no systematic efforts have been made so far to find out the growth and yield performance of these genotypes under Telangana agroclimatic condition. In Telangana, diverse types of chilli genotypes are found with varying characters. Hence, there is a need to evaluate chilli genotypes under Telangana condition for excellent quality, growth and yield performance, resistant to biotic and abiotic stresses.

MATERIAL AND METHODS

The field experiment carried out Randomized Block Design with three replications at PG Research Block, Department of Vegetable Science, SKLTSHU, Rajendranagar, Hyderabad, during the *rabi*, 2016-17. The study was under taken on 30 genotypes of chilli using it is a inter and intra row spacing of 60 cm x 50 cm. The experimental plot size was kept as 3.5 x 1.2 m and the FYM @ 25 tones/ha was incorporated before transplanting. All the genotypes were fertilized uniformly @ 300:60:120 kg NPK/ha. At the time of transplanting half the dose of nitrogen along with full dose of phosphorus and potash was applied. Remaining nitrogen was top dressed at flowering followed by earthing up stage. The NPK fertilizers were given through urea, single super phosphate and muriate of potash. All the important growth and yield characters, observations were recorded on five randomly selected plants in each plot on nineteen (19) different traits. The data were subjected to analysis of variance techniques as suggested by Panse and Sukhatme[16].

RESULT AND DISCUSSION

The results of the performance of different chilli genotypes are presented below: There is a lot of variation in height of Capsicum plants which has influence on its final performance

similar results were reported by Hosmani[10]. In the present study, plant height of different lines varied widely and significantly. The tallest plant was found from Warangal Chapata (76.17 cm), while the shortest from IC-25913 (46.57 cm) at 139 DAT (Fig-1 & Table 1 (a).)

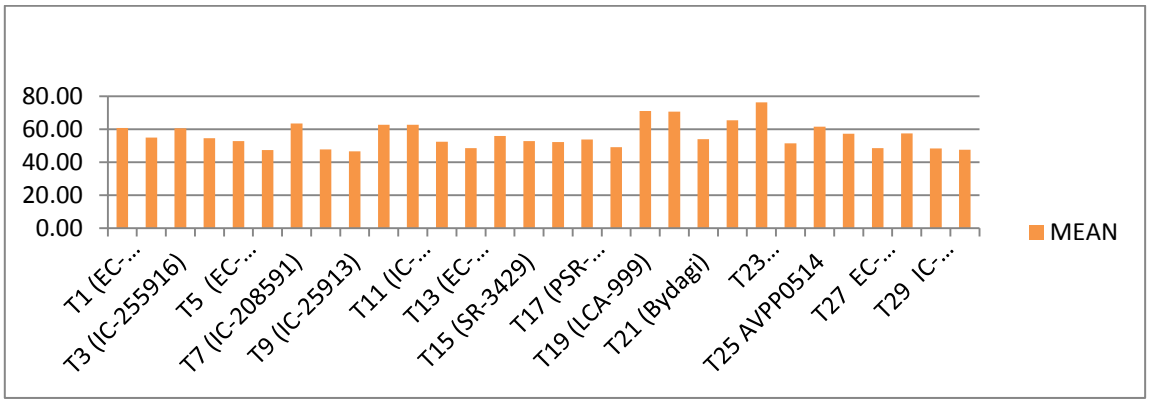


Fig.1: Plant height (cm)

Table: 1 (a) Mean performance of various genotypes for different characters

Genotypes	Plant ht. (cm)	No. of primary branches / plant	Days to first flowering	No. of flowers per axil	Days to first fruiting	Days to maturity	Duration of the crop	Total No. of fruits per plant	Fresh fruit yield per plant (g)	Fruit length (cm)
T_1 (EC-399569)	60.63	5.67	42.00	1.7	84.00	96.67	137.66	75.00	370.67	11.020
T_2 (EC-390033)	54.83	5.00	39.00	1.3	72.00	86.67	121.66	83.33	226.33	10.247
T_3 (IC-255916)	60.53	5.33	41.00	1.7	76.33	92.00	131.66	110.00	378.00	11.667
T_4 (EC-399535)	54.50	6.33	43.00	1.3	79.67	90.33	122.33	99.00	352.00	9.433
T_5 (EC-391083)	52.77	5.00	46.67	1.3	75.33	85.00	119	88.33	236.33	12.633
T_6 (IC-255944)	47.33	5.00	43.00	1.3	76.33	87.00	122.33	72.33	266.67	13.267
T_7 (IC-208591)	63.50	6.67	42.67	1.7	76.33	87.67	117.66	92.00	189.33	12.767
T_8 (IC-255958)	47.77	7.00	41.67	1.3	67.33	86.00	119	72.00	256.67	11.860
T_9 (IC-25913)	46.57	5.67	53.67	1.3	83.67	97.00	135.66	82.33	262.33	10.700
T_{10} (EC-391088)	62.73	6.00	54.33	1.3	82.00	97.00	133	92.00	242.00	9.767
T_{11}(IC-214966)	62.70	4.33	53.67	1.3	86.33	96.33	127.66	66.00	299.00	8.843
T_{12}(IC-208534)	52.40	4.67	43.67	1.3	75.00	86.00	124.33	62.33	325.00	8.370
T_{13}(EC-399572)	48.43	5.33	56.00	1.3	79.00	92.67	118.33	62.33	305.67	11.333
T_{14} (AAT-22)	55.87	4.67	46.00	1.7	72.67	86.00	114.33	77.67	323.00	8.900
A_{15} (SR-3429)	52.73	4.67	54.00	1.7	80.33	90.33	122.66	85.00	330.67	11.600
A_{16} (NIC-19967)	52.07	3.67	49.00	1.3	72.00	85.33	119	61.33	331.67	10.733
T_{17} (PSR-7074)	53.76	5.33	46.33	1.3	76.67	89.00	125.66	72.00	326.00	11.367
T_{18} (LCA-625)	49.00	6.33	54.67	1.3	82.33	94.33	116.33	110.00	330.67	11.367
T_{19} (LCA-999)	70.93	6.00	54.67	1.3	88.33	100.33	136.66	104.33	336.00	11.367
T_{20} (LCA-620)	70.67	6.33	51.00	1.3	87.33	104.33	132.33	86.67	326.00	11.533
T_{21} (Bydagi)	53.87	4.67	43.67	1.3	90.00	97.67	132.33	81.67	308.00	8.900
T_{22} (Devanur Dlx)	65.43	4.33	60.00	1.7	103.67	116.33	155	104.00	409.33	12.100
T_{23} (Wgl Chapata)	76.17	5.67	63.33	1.7	97.33	107.00	139	94.33	600.00	7.967
T_{24} (EC-246019)	51.33	5.67	55.67	1.0	82.00	97.33	128.33	75.00	369.00	9.100
T_{25} AVPP0514	61.50	5.33	53.67	1.7	82.00	96.33	127.66	71.00	375.67	13.200
T_{26} AVPP9813	57.30	6.00	48.00	1.7	76.33	87.33	118.33	72.33	346.67	11.967
T_{27} EC-334182	48.50	5.33	61.00	1.3	89.00	99.33	127.66	78.33	348.00	9.667
T_{28} EC-382175	57.40	5.33	55.67	1.3	82.00	89.00	125.66	76.33	300.67	10.100
T_{29} IC-214965	48.23	4.67	53.00	1.3	79.67	94.33	130.66	77.33	359.67	10.400
T_{30} EC-399533	47.60	5.00	58.00	1.3	90.00	102.33	138.33	75.00	360.33	11.833
SE (m)	**0.63898**	**0.41384**	**0.73631**	**0.32322**	**1.28817**	**1.00744**	**1.90006**	**3.19378**	**23.3344**	**0.39195**
CD at 5%	**1.80098**	**1.16642**	**2.0753**	**0.911**	**3.63075**	**2.83951**	**5.35536**	**9.00177**	**12.3833**	**1.10472**

The maximum number of branches was found from IC-255958 (7/plant), while the minimum from IC-214966 (4.33/ plant) at 139 DAT (Table 1 (a)).

The maximum total number of fruits per plant was recorded in IC-255916 (110.0) and LCA-625 (110.0)/plant, which was followed by LCA-999 (104.33/ plant), whereas the minimum from NIC-19967 (61.33 /plant). (Fig-2 & Table 1(a)). Such variation in chilli genotypes for number of fruits per plant was also noticed by Sreelatha kumary and Rajamony[27]; Smitha and Basavaraja[26]; Sandeep *et al*,[23]; Tembhurne *et al.*[29]; Ajjapplavana and Channa Goudra,[1]; Pramila *et al*.[19] and Chatto padhyay *et al*[4].

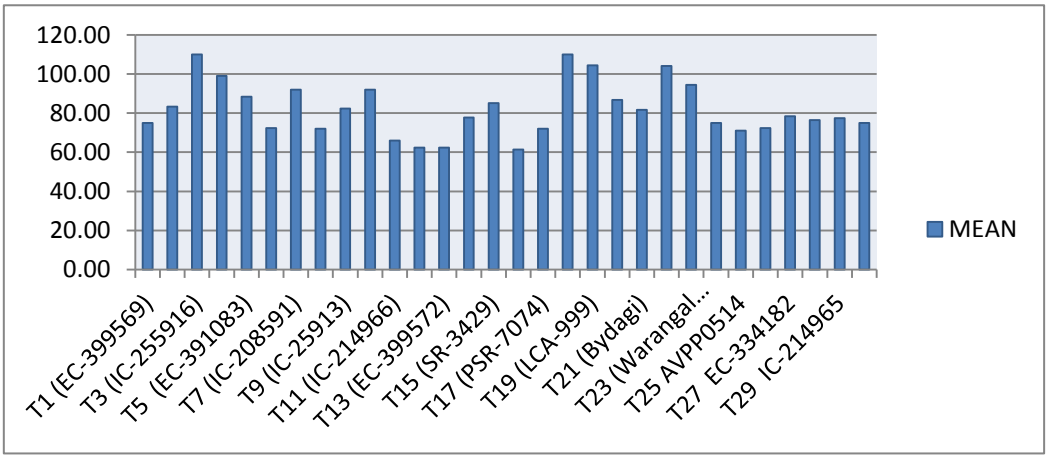


Fig. 2: Total numbers of fruits per plant

Highly significant variation for fresh fruit per plant (g) of the chilli genotypes was studied. Fresh fruit yield per plant (g) ranged from IC-208591 (189.33 g) to Warangal Chapata (600.00 g). Maximum Fresh fruit yield per plant (g) was recorded in Warangal Chapata (600.00 g.) followed by Devanur Deluxe (409.33), while the less fresh fruit yield per plant (g) was recorded for genotype IC-208591 (189.33 g), (Fig-3 & Table 1 (a)).

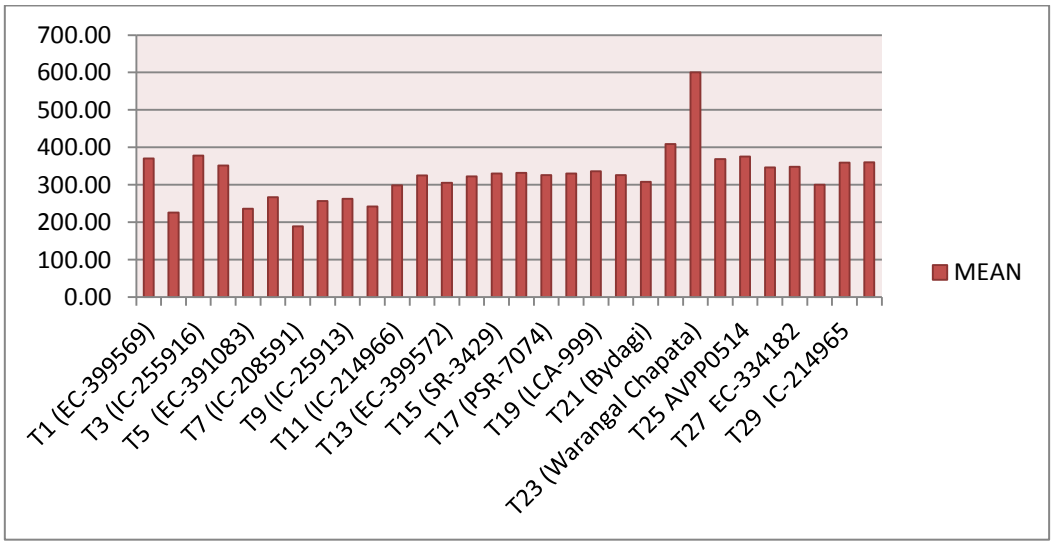
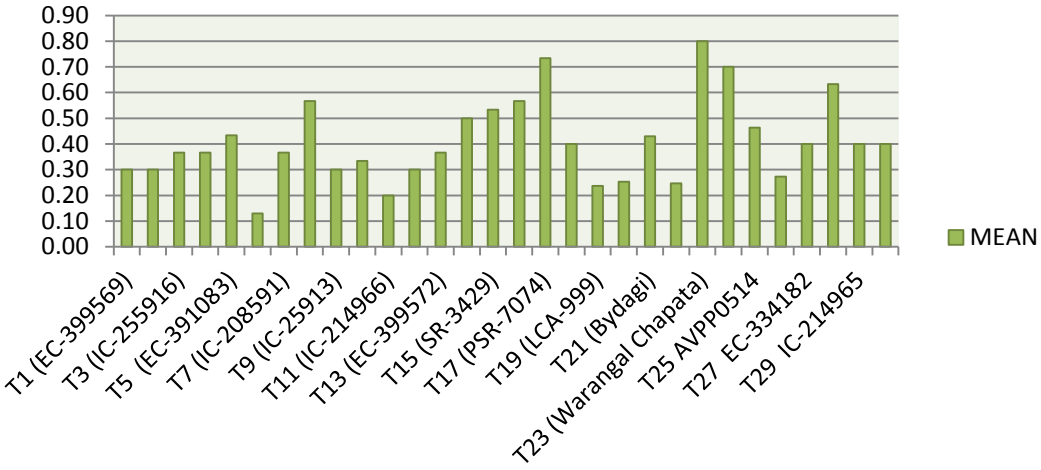


Fig. 3: Fresh fruit yield per plant (g)

The highest length of fruit was observed in IC-255944 (13.267 cm) and AVPP0514 (13.200) were at par with each other was significantly superior followed by IC-208591 (12.767) and also over rest of the genotypes. Whereas lowest fruit length was observed in the treatment Warangal Chapata (7.967 cm) (Table 1 (a)). The variation in chilli in fruit length was also reported by Sreelatha kumary and Rajamony[27]; Smitha and Basavaraja[26], Dahal *et al.*[5]; Tembhurne *et al.*[29], Pramila *et al*.[19]; Chattopadhyay *et al.*[4]; Shiva *et al.*[25], Dhaliwal *et al.*[6]; Rohini and Lakshmanan[20]; Vijaya *et al.*[31]. Significantly, the highest number of seeds content % was observed in the treatment Warangal Chapata (59 %), The lowest number of seeds content % was observed in treatment EC-399572 (33.67%) (Table: 1 (b)). The variation in number of seeds content % of chilli was also noticed by Manju and Sreelathakumary[15]; Smitha and Basavaraja[26]; Chattopadhyay *et al.*[4] and Dhaliwal *et al*.[6] Highest ascorbic acid content was observed in the genotype Warangal Chapata (150.00 mg). The lowest ascorbic acid content was recorded in genotype EC-391083 (61.47) (Table: 1 (b)). Same results of Chilli was also noticed by Kumar and Tata[14]; Bhaskar and Pradhan[3] and Satish kumar *et al.*[24] Capsaicin was maximum in Warangal Chapata (0.80 %) followed by IC-255958 (0.57 %). The minimum ascorbic acid was found in IC-255944 (0.13) (Fig: 4 & Table (b)). Chilli was also noticed by Krishnamurthy *et al.*[13] and Umajyothi *et al.*[30].

Fig: 4. Capsaicin content (%)



Duration of the crop was observed in the genotype Devanur Delux (150 DAS). The lowest Duration of the crop was recorded in genotype LCA- 625 (116 DAS) (Table: 1 (a)).

Table 1: (b) Mean performance of various genotypes for different characters

Genotypes	Fruit diameter (cm)	Fruit pedicel length (cm)	Fresh fruit weight (g)	Dry fruit weight (g)	Seed content (%)	Ascorbic acid content (mg / 100g of fruit)	Oleoresin content (%)	Capsanthin content (ASTA units)	Capsaicin content (%)
T_1 (EC-399569)	0.87	3.23	4.13	1.40	45.33	122.00	8.67	248.67	0.30
T_2 (EC-390033)	0.76	3.37	3.50	1.30	41.00	88.73	8.30	227.33	0.30
T_3 (IC-255916)	0.73	3.53	3.33	1.13	43.67	71.40	7.50	182.67	0.37
T_4 (EC-399535)	1.03	3.60	3.90	1.23	39.00	99.33	6.63	241.67	0.37
T_5 (EC-391083)	1.47	2.50	8.47	2.50	36.67	61.47	8.17	255.00	0.43
T_6 (IC-255944)	1.50	2.30	9.20	2.47	39.00	65.67	8.30	256.67	0.13
T_7 (IC-208591)	1.33	3.03	7.17	2.17	39.33	73.00	11.47	166.33	0.37
T_8 (IC-255958)	0.89	2.30	6.00	3.27	37.67	83.67	8.30	269.33	0.57
T_9 (IC-25913)	0.77	3.53	4.10	0.90	36.67	87.00	8.80	225.67	0.30
T_{10} (EC-391088)	1.73	2.87	8.73	2.70	42.00	67.33	7.03	234.67	0.33
T_{11}(IC-214966)	1.87	3.30	8.40	3.33	43.00	68.00	8.20	192.67	0.20
T_{12}(IC-208534)	1.50	3.07	5.20	1.67	41.67	114.67	8.73	186.00	0.30
T_{13}(EC-399572)	2.00	3.83	12.87	3.33	33.67	118.33	8.53	193.33	0.37
T_{14} (AAT-22)	1.60	3.67	5.17	1.67	42.33	87.67	8.97	230.67	0.50
T_{15} (SR-3429)	1.47	3.43	8.10	2.03	43.00	113.33	10.33	257.33	0.53
T_{16} (NIC-19967)	1.67	3.77	7.50	1.67	39.00	98.67	10.97	274.00	0.57
T_{17} (PSR-7074)	1.13	3.97	8.67	1.87	40.00	113.33	12.13	228.33	0.73
T_{18} (LCA-625)	0.73	2.77	4.83	1.07	37.67	95.00	6.13	247.67	0.40
T_{19} (LCA-999)	0.80	3.90	5.03	1.30	41.67	108.33	6.10	263.00	0.24
T_{20} (LCA-620)	0.93	4.30	4.43	1.50	43.33	106.67	5.57	243.00	0.25
T_{21} (Bydagi)	0.90	3.30	5.37	1.60	36.67	108.00	12.13	223.33	0.43
T_{22} (Devanur Dlx)	1.22	3.24	4.63	1.90	34.13	127.33	11.93	199.37	0.25
T_{23} (Wgl Chapata)	2.37	3.92	11.17	3.23	59.00	150.00	14.32	263.67	0.80
T_{24} (EC-246019)	1.60	2.57	5.00	1.33	39.33	85.67	9.79	181.67	0.70
T_{25} AVPP0514	1.77	5.57	9.17	2.37	44.33	123.00	13.23	287.67	0.46
T_{26} AVPP9813	0.80	4.50	8.47	1.63	41.33	141.33	10.63	258.33	0.27
T_{27} EC-334182	0.87	2.87	7.33	2.47	39.33	105.67	8.30	207.00	0.40
T_{28} EC-382175	0.79	2.77	5.33	1.53	43.33	84.67	8.60	201.13	0.63
T_{29} IC-214965	1.17	3.00	6.33	1.77	46.33	75.00	8.60	181.33	0.40
T_{30} EC-399533	1.28	2.70	7.33	2.10	42.67	91.00	9.10	217.00	0.40
SE (m)	**0.11535**	**0.22307**	**0.25381**	**0.26573**	**1.16923**	**6.17635**	**0.4495**	**9.25001**	**0.06278**
CD at 5%	**0.32511**	**0.62873**	**0.71537**	**0.74896**	**3.29552**	**17.4082**	**1.26692**	**26.0714**	**0.17696**

Oleoresin content was maximum recorded in Warangal Chapata (14.32 %) followed by AVPP0514 (13.23 %). The lowest oleoresin content was recorded in LCA- 620 (5.57 %) (Table:1 (b)).Fresh fruit weight (g) was maximum recorded in EC-399572 (3.3 g) followed by Warangal Chapata (11.17 g). The lowest fresh fruit weight (g) was recorded in IC-255916 (3.33 g) (Table:1 (b)).Dry fruit weight (g) was maximum recorded in IC-214966 (3.3 g) followed by Warangal Chapata (3.23 g). The lowest Dry fruit weight (g) was recorded in IC-25913 (0.90 g) (Table:1 (b)).In conclusion, the performance of different chilli genotypes showed wide variation in plant height, number of primary branches/ plant, number of flowers per axil, duration of the crop total number of fruits per plant, fresh fruit yield per plant, fruit length (cm), fruit pedicel length (cm), seed content (%), fresh fruit weight (g), dry fruit weight (g), ascorbic content mg/ 100 g of fruits, capsanthin content ASTA unit, capsaicin content (%), chilli yield under Southern Telangana climatic conditions. Among the genotypes evaluated in Southern Telangana conditions, four genotypes, Warangal Chapata, LCA-625, AVPP0514 and IC-255916 Chilli were found to be promising based on yield and yield attributes of fruit quality. Hence, they may be used in future breeding programme for multi traits importance.

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