



Evaluation of Tomato Genotypes for Growth, Yield and Quality Attributes Under Eastern Dry Zone of Karnataka

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Received: 24.12.2019 | Revised: 30.01.2020 | Accepted: 10.02.2020

ABSTRACT

The objective of this investigation was to evaluate tomato genotypes for their growth, yield and quality under Eastern Dry Zone of Karnataka. The results showed that there were significant differences in evaluated parameters among cultivars. Among the 22 genotypes, EC322634 recorded the highest plant height at last harvest. The number of branches per plant at last harvest was highest in the genotype 29P4. With respect to the earliness, genotypes EC-322634 and 10P6 recorded the lowest days for flowering. The number of days taken for fifty per cent flowering was lowest in COHMUD-3. Highest number of fruits per cluster, clusters per plant and fruits per plant was recorded by the genotype EC-322634. Kashi Hemanth recorded highest average fruit weight. Highest fruit yield per plant was observed in COHMUD-2 followed by Kashi Hemanth. Highest pericarp thickness was recorded by Arka Meghali. Kashi Sharad recorded highest fruit firmness. Highest lycopene content was recorded by COHMUD-3 followed by 11P4 and EC528388. Genotype 16P2 recorded highest ascorbic acid content among 22 genotypes. The findings of this study may provide valuable information about nutritional value of studied cultivars for vegetable experts, researchers and growers under Eastern Dry Zone of Karnataka.

Keywords: Kashi Hemanth, Genotypes, Growth, Yield, Tomato

INTRODUCTION

Tomato (*Solanum lycopersicum* L.; 2n=24) is one of the important and most widely grown versatile vegetable crops of both tropics and sub tropics. It is grown for its edible fruit, which can be consumed, either raw or cooked in the form of various processed products like juice, ketchup, sauce, pickle, pastes, puree and powder. It is an important commercial and

dietary crop. Tomato cultivation has become increasingly popular since the mid-nineteenth century due to the short duration of the crop and high yield. It occupies the most prestigious berth not only in the sophisticated, ultra modern kitchen, but also equally in the kitchen of the poor man, because of diverse nutrition and value added products that can be prepared from it.

Cite this article: Ibaad, M.H., Lingaiah, H.B., Shivapriya, M., Suresh, G.J., Singh, T.H., & Gowda, D.M. (2020). Evaluation of Tomato Genotypes for Growth, Yield and Quality Attributes Under Eastern Dry Zone of Karnataka, *Ind. J. Pure App. Biosci.* 8(3), 193-198. doi: <http://dx.doi.org/10.18782/2582-2845.7899>

In many countries it is considered as “poor man’s orange” because of its attractive appearance and nutritive value (Singh et al., 2004). It is considered as an important source of vitamin A, C and minerals (Hari, 1997). Apart from these, lycopene is valued for its anti-cancer property (Bose et al., 2002). It acts as an antioxidant and scavenger of free radicals, which is often associated with anticarcinogenesis. Thus, lycopene has got great beneficial effects on human health. It may also interfere with oxidative damage to DNA and lipoproteins and inhibits the oxidation of LDL (low density lipoprotein) cholesterol. The increased consumer awareness and the demand for food containing bioactive compounds makes lycopene a key trait for tomato breeders. Considering all the above mentioned facts, a field evaluation was undertaken to evaluate the tomato genotypes under Eastern Dry Zone of Karnataka.

MATERIAL AND METHODS

The experiment was conducted at vegetable block, College of Horticulture, UHS Campus, GKVK, Bengaluru. The experimental site is located at an altitude of 930 meters above mean sea level (MSL) and 13° N latitude and 77.37° E longitude in the Eastern Dry Zone of Karnataka (Zone-5). The soil of the experimental area was red sandy loam (Alfisol) with an uniform fertility having soil pH range 6 to 7.3. The material for the present study comprised a total of 22 genotypes which were procured from Indian Institute of Vegetable Research (IIVR), Varanasi, Indian Institute of Horticultural Research (IIHR), Hessarghatta, Bengaluru, College of Horticulture, Mudigere and College of Horticulture, Bengaluru.

RESULT AND DISCUSSION

In the present study 22 tomato genotypes were evaluated in the field for growth, yield, quality parameters and analysis of variance revealed that the treatment variances (due to genotypes) for all the growth, yield and quality parameters were highly significant except for the titrable

acidity indicating large amount of variation for all the characters under study (Table. 1).

Growth and yield parameters

Genotype EC322634 recorded the highest plant height at last harvest (119.30 cm), followed by COHMUD-2 (113.42 cm) and COHMUD-3 (112.35 cm). The number of branches per plant at last harvest was highest in the genotype 29P4 (14.17). With respect to the earliness, genotypes EC-322634 (21.50) and 10P6 (21.50) recorded lowest days for flowering (Table. 2). The number of days taken for fifty per cent flowering was lowest in COHMUD-3 (23.50). Highest number of fruits per cluster (11.67), clusters per plant (19.50) and fruits per plant (117.50) was recorded by the genotype EC-322634. Kashi Hemanth recorded highest average fruit weight (98.87 g) followed by 16P2 (88.33 g).

Among the yield and yield related attributes, yield per plant is very important trait as it is a dependent character. Highest fruit yield per plant was observed in COHMUD-2 (3.80 kg) followed by Kashi Hemanth (3.78 kg) and 16P2 (3.42 kg). The increase in yield per plant in these genotypes was due to higher average fruit weight and more number of fruits per plant (Sureshkumara, 2016). All above genotypes mentioned for different growth and yield parameters could be utilized in breeding programme for tomato crop improvement.

Quality parameters

Exploring natural biodiversity as a source of novel alleles to improve the productivity, adaptation, quality and nutritional value of crop is of prime importance in 21st century breeding programme (Fernie et al., 2006). Important quality parameters of tomato are less number of locules per fruit, TSS, pericarp thickness, fruit firmness, lycopene, titrable acidity and ascorbic acid. The genotype 29P4 (2.00) recorded least number of locules per fruit (Table. 3). Total solids comprise all fruit components such as aromas except water and volatiles. In cultivated tomato, the soluble and insoluble solids account for about 75 % and 25 %, respectively, of total solids (Majid, 2007).

Total soluble solids was found maximum in 55P2 (6.65 °B).

Pericarp thickness is considered to be very important criteria among breeders for selecting cultivars and it relates to storage capacity and also transportation. Highest pericarp thickness was recorded by Arka Meghali (5.24 mm). Textural quality of tomato is influenced by firmness of flesh. Kashi

Sharad recorded highest fruit firmness (1.07 kg/cm²). Lycopene predominates among carotenoids and is mainly responsible for the red colour of tomato fruit (Valverde et al., 2002). Highest lycopene content was recorded by COHMUD3 (8.59 mg/100g) followed by 11P4 (8.44 mg/100g). 16P2 recorded highest ascorbic acid content (25.82 mg/100g) among 22 tomato genotypes.

Table 1: Analysis of variance (mean sum of squares) for growth, yield and quality parameters in tomato

Sl. No.	Source of variation/ Characters	Replication	Treatments (Genotypes)	Error
	Degrees of freedom	1	21	21
A. Growth parameters				
1	Plant height at last harvest (cm)	263.767	729.433**	17.846
2	Number of branches at last harvest (cm)	4.448	12.143**	1.612
B. Yield parameters				
3	Days to flowering	5.818	21.294**	2.152
4	Days to 50 per cent flowering	12.023	41.209**	2.785
5	Number of fruits per cluster	0.209	7.565**	0.145
6	Number of clusters per plant	30.113	22.727**	0.046
7	Number of fruits per plant	6.952	1008.341**	14.131
8	Average fruit weight (g)	6.849	1167.976**	5.984
9	Yield per plant (kg)	1.530	1.729**	0.031
C. Quality parameters				
10	Number of locules per fruit	0.091	3.805**	0.377
11	Total soluble solids (°B)	0.464	1.227**	0.098
12	Pericarp thickness (mm)	0.057	1.426**	0.134
13	Firmness (kg/cm ²)	0.003	0.039**	0.005
14	Lycopene (mg/100g)	0.238	5.131**	0.139
15	Titration acidity (%)	0.006	0.006	0.006
16	Ascorbic acid (mg/100g)	17.795	17.674**	5.779

*, ** Significant at 5 % and 1 % levels, respectively

Table 2: Per se performance for growth and yield parameters in 22 tomato genotypes

Sl. No.	Genotypes	X1	X2	X3	X4	X5	X6	X7	X8	X9
1	EC-321425	62.46	5.60	22.50	24.50	4.65	15.40	96.40	19.91	1.10
2	EC-322634	119.30	9.50	21.50	25.50	11.67	19.50	117.50	7.19	0.69
3	Kashi Sharad	78.40	8.65	25.00	26.00	3.25	6.80	26.10	88.33	3.30
4	Kashi Hemanth	77.10	6.30	24.00	27.00	3.30	10.00	30.21	98.87	3.78
5	DT-10	63.99	6.38	30.00	33.50	2.70	11.40	27.20	40.62	1.44
6	Bhagyashree	61.68	10.25	26.50	29.50	3.20	14.13	36.45	65.08	2.90
7	Utkal Deepti	57.60	12.00	25.50	28.50	2.65	18.20	48.35	31.51	1.14
8	Arka Meghali	72.51	9.60	29.00	28.50	2.25	16.10	43.30	54.65	2.27
9	1P2	98.58	7.50	29.00	32.00	3.05	13.80	39.00	45.77	1.75
10	COHM7	59.50	7.80	26.00	27.50	2.75	16.40	50.91	42.98	1.43
11	10P6	59.75	7.75	21.50	29.00	2.70	11.80	34.00	37.70	1.71
12	11P4	91.45	8.97	24.50	28.50	3.15	17.00	27.17	21.63	1.20
13	16P2	76.90	11.60	30.00	34.50	2.35	19.20	40.80	91.83	3.42
14	28P2	91.25	10.17	29.00	36.00	2.80	11.80	31.47	35.53	1.93
15	29P4	104.53	14.17	25.00	34.50	4.15	11.60	28.40	22.23	1.13
16	55P2	76.20	8.60	25.50	29.00	3.80	14.40	39.80	29.93	1.60
17	56P2	79.45	9.17	24.00	30.00	2.75	14.13	25.33	52.08	2.92
18	EC528388	96.85	12.60	26.50	33.50	2.60	17.46	32.93	24.55	1.27
19	COHMUD-1	99.83	12.87	28.50	36.00	3.25	19.13	48.83	33.86	1.83
20	COHMUD-2	113.42	13.67	33.00	41.50	2.25	13.02	37.20	66.68	3.80
21	17P5	84.30	8.92	31.50	36.00	3.75	10.05	30.17	43.44	2.41
22	COHMUD-3	112.35	12.63	22.00	23.50	4.70	14.30	40.42	39.49	2.17
	Mean	83.52	9.76	26.36	30.66	3.53	14.35	42.36	45.17	2.05
	SEm±	2.99	0.90	1.04	1.18	0.27	0.15	2.66	1.73	0.13
	CD @ 5 %	8.79	2.64	3.05	3.47	0.79	0.45	7.82	5.09	0.37

X1. Plant height at last harvest (cm)	X2. Number of branches at last harvest	X3. Days to flowering
X4. Days to 50 per cent flowering	X5. Number of fruits per cluster	X6. Number of clusters per plant
X7. Number of fruits per plant	X8. Average fruit weight (g)	X9. Yield per plant (kg/plant)

Table 3: *Per se* performance of quality parameters in 22 tomato genotypes

Sl. No.	Genotypes	X10	X11	X12	X13	X14	X15	X16
1	EC-321425	3.00	3.41	2.87	0.95	5.61	0.25	15.09
2	EC322634	4.00	4.45	2.05	0.81	4.57	0.30	21.61
3	Kashi Sharad	3.00	5.75	3.01	1.07	4.30	0.26	20.86
4	Kashi Hemanth	4.00	4.85	4.29	0.79	5.49	0.27	21.22
5	DT-10	2.50	4.85	4.70	1.02	3.24	0.33	16.11
6	Bhagyashree	5.50	5.10	5.17	0.71	3.74	0.31	16.14
7	Utkal Deepti	2.50	4.65	3.17	0.89	4.00	0.17	16.82
8	Arka Meghali	5.00	4.75	5.24	0.83	6.05	0.26	15.54
9	1P2	2.50	4.90	3.02	0.68	3.78	0.24	20.50
10	COHM7	4.00	4.55	3.42	0.58	6.66	0.29	19.18
11	10P6	4.50	5.95	2.91	0.64	3.39	0.36	15.04
12	11P4	3.00	5.65	3.00	1.06	8.44	0.32	13.72
13	16P2	6.50	5.60	3.82	0.76	5.93	0.26	25.82
14	28P2	3.00	6.30	2.74	0.75	4.21	0.20	18.61
15	29P4	2.00	6.45	2.82	0.59	3.67	0.39	17.57
16	55P2	3.00	6.65	3.28	0.67	3.96	0.28	14.68
17	56P2	7.00	4.30	2.39	0.85	5.98	0.24	19.00
18	EC528388	6.00	5.65	3.17	0.91	7.36	0.32	13.89
19	COHMUD-1	4.50	4.60	3.27	0.69	4.41	0.32	15.86
20	COHMUD-2	4.50	4.85	2.73	0.80	4.49	0.26	17.64
21	17P5	3.00	5.60	3.30	0.81	3.32	0.22	16.82
22	COHMUD-3	4.00	5.50	2.52	0.82	8.59	0.37	18.93
	Mean	3.95	5.20	3.31	0.80	5.05	0.28	17.76
	SEm±	0.43	0.22	0.26	0.05	0.26	NS	1.70
	CD @ 5 %	1.28	0.65	0.76	0.15	0.77	NS	5.00

X10. Number of locules per fruit	X11. Total soluble solids (⁰ B)	X12. Pericarp thickness (mm)
X13. Firmness (kg/cm ²)	X14. Lycopene content (mg/100g)	X15. Titrable acidity (%)
X16. Ascorbic acid (mg/100g)		

CONCLUSION

Tomato is more accepted vegetable crop all over the globe from the above results it was revealed that wide ranges of variabilities were existed among the 22 tomato genotypes in respect of growth, yield and quality parameters.

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