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Identification of Tomato Genotypes for Growth, Yield and Quality Attributes under Eastern Dry Zone of Karnataka, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The experiment was conducted to study the 200 tomato genotypes for growth, yield and quality attributes. Among the 200 genotypes, the genotype Akshaya was exhibited least days taken to fifty percent flowering (21.00). In case of growth parameters maximum plant height noticed in genotype (13P3) 202.33 cm and maximum branches was observed in genotype (AR-56) i.e. 11.33 branches per plant. The highest fruit width and average fruit weight reported in (H-86) 8.15cm and (131.94 g). Yield attributing characters like number of fruits per plant (204.37) was highest recorded in EC-338717. The total tomato fruit yield highest was recorded per plant 6.48 kg genotype (4P1). With

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respect to quality parameters like Pericarp thickness highest was observed in (AOTD-10) i.e. 7.42 mm. The genotype AR-56 (7.00) was recorded highest total soluble solids. High range of fruit firmness was observed in (AOTD-18) 6.25 kg/cm^2. This study gives information on the agronomic variation in the 200 tomato genotypes assessed which can invariably serve as an index to selecting putative parents in breeding for new tomato variety that will combine desirable agronomic characteristics with high yield and its attributing characters.

Keywords: Growth; yield; tomato; genotypes.

1. INTRODUCTION

Tomato (*Solanum lycopersicon* L.) is one of the most popular and widely grown vegetable in the world ranking second in importance only next to potato and ranked first in preserved and processed vegetables and in the international market there is great demand for tomato [1]. Tomato crop has wider adaptability, high yielding potential and multipurpose uses in fresh as well as processed food industries. Tomatoes are an excellent source of minerals, vitamins [2], antioxidants viz., lycopene and betacarotene which prevent cancer and other heart diseases [3]. Development of tomato genotypes of a promising nature has been important to the vegetable industry throughout the world. New bred varieties have enriched and advanced the agriculture of many countries. Evaluation of germplasm is of immense important in genetic improvement of the crop. For the selection of parents in hybridization, diversity among parents for the character of interest [4]. The production and productivity not only depends on cultural practices and area of cultivation but on high yielding genotypes which have good adaptability to the growing area [5]. Inclusion of genetically diverse parents in any breeding programme is essential to generate new variability and desirable recombinants. Considering the above facts, the research has been planned with the following objectives to investigate the performance of different tomato genotypes in the Karnataka for its yield and related attributes.

2. MATERIALS AND METHODS

Field 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 130 N latitude and 77.370 E longitude in the Eastern Dry Zone of Karnataka (Zone-5). The soil of the experimental area was red sandy loam (Alfisol) with uniform fertility having soil pH range 6 to 7.3. The material for the present study comprised a total of 200 genotypes which were procured from Indian Institute of Vegetable Research (IIVR), Varanasi, Uttara Pradesh, Indian Institute of Horticultural Research (IIHR), Hessarghatta, Bengaluru and University of Agricultural Sciences, GKVK, Bengaluru (Tables 1 and 2).

The seeds were sown in protrays containing 98 holes. Coir pith was used as growing media. The sown trays were stacked and covered with polythene for three days in order to get early as well as uniform germination. Trays were irrigated daily once or twice depending on the temperature. After fifteen days of sowing the trays were drenched with 19:19:19 (NPK) at the concentration of 1g/lit in order to get good rooting as well as growth. The prophylactic sprays were taken against pest and diseases.

The field was brought to fine tilth by disc ploughing followed by harrowing and cross cultivation. Farm yard manure at the rate of 25 tonnes per hectare was also incorporated at the time of land preparation. Ridges and furrows were prepared at 60 cm spacing. The half dose of the nitrogen and full dose of phosphorus and potash at the rate of 150:150:150 kg (NPK) per hectare was applied at the time of planting. Twenty five days old seedlings were transplanted in the main field with a spacing of 60 cm between plants, on one side, half way up the ridges. Light irrigation was given at the time of planting. Subsequent irrigations were provided whenever it was required. Just prior to earthing up i.e. 30 days after transplanting, half of nitrogen was given as top dress. Regular weeding was carried out and staking was provided forty five days after transplanting [6].

The experiments were carried out in randomized complete block design (RCBD) with ten plants in each genotype. The experimental field was fairly leveled land with red sandy loam soil of uniform fertility status. The seeds of tomato genotypes were sown in january-15, in the protrays of 98

cells at nursery, department of vegetable science, College of Horticulture, Bengaluru. Four week old seedlings were transplanted in the main field at the spacing of (60x 60cm). All the package of practices recommended by UHS, Bagalkot were followed.

Five plants were selected and labeled at random from each replication in each treatment for recording the following observations and the average from these plants was worked out for the purpose of statistical computation (analysis). The details of observations recorded in each experiment and techniques adopted for the recording the observations were as follows.

2.1 Statistical Analysis

2.1.1 Analysis of variance

Analysis of variance was computed for 13 characters. Highly Significant difference was observed among the genotypes for all the characters (Table 3) studied.

3. RESULTS

3.1 *Per se* Performance

Two hundred genotypes collected from different parts of India were evaluated for the growth, yield and quality parameters during summer, season 2015-16. The *per se* performance is presented in the Table 5. The plant height ranged from 43.67 (9P4) to 202.33 cm (13P3) with a population mean of 74.54 cm (Table 4). The genotypic and phenotypic variances were 365.82 and 417.51, respectively. The number of branches per plant ranged from 2.00 (IIHR-2197) to 11.33 (AR-56) with an average of 6.34 branches per plant. The GV and PV were 2.06 and 2.52, respectively. Days to first flowering tomato genotype IIHR-2195 took least number of days for anthesis (15.00) after transplanting, while Sioux and Utkal Local-2 took maximum number of days (37.00). On an average, tomato genotypes took 25.27 days for appearance of first flower after transplanting in the main field.

Days to 50 per cent flowering, the days taken for 50 per cent flowering was maximum in Sioux and A. Ahuti (44.00 days after transplanting) and minimum (21.00 days after transplanting) in Akshaya. The tomato genotypes in general took 31.45 days for the days to 50 per cent of the plants to flower after their transplanting in main field. Fruit width (cm)of the tomato shown Wide variability was observed for fruit width in tomato. The width of tomato fruit ranged between 2.50 (62P4) and 8.15 cm (H-86). The average fruit width was 4.41cm. Fruit length (cm) wide variability was observed for tomato fruit length. The length of tomato fruit ranged between 2.00 cm (73P2) and 7.45 cm (EC-321426). The average fruit length was 4.21 cm. Number of locules per fruit tomato The maximum number of locules per fruit was observed in EC-501580 (13.00) and lowest was observed in ARTD-1 (2.00) with over all mean of 3.74.Pericarp thickness (mm) Pericarp thickness varied from 7.42 mm (AOTD-10) to 1.05 mm (8) with over all mean of 2.96 mm. Number of fruits per plant The highest number of fruits per plant (204.37) was recorded in EC-338717 and the least (11.66) was recorded in PKM-1. On an average, the tomato genotypes had 67.53 fruits per plant. Average fruit weight (g), highest average fruit weight was observed in H-86 (131.94 g) and the lowest in 73P2 (20.00 g) with over all mean of 48.47 g. Yield per plant (kg) The mean total tomato fruit yield recorded per plant was 2.96kg. The quantum of variation for this trait ranged between 0.39 kg (Roma) and 6.48 kg (4P1).Total soluble solids (^{0}Brix) genotype AR-56 (7.00) was recorded highest total soluble solids and the genotype ARTD-3 (2.67) recorded lowest total soluble solids with over all mean of 4.23.Fruit firmness (kg/cm^2) of tomato range for fruit firmness was varied from 0.33 kg/cm^2 (83P1) to 6.25 kg/cm^2 (AOTD-18) with the overall mean of 1.33kg/cm^2 (Table 4).

4. DISCUSSION

Vegetable improvement for yield and quality needs a sound knowledge on the genetic architecture of the crop and inheritance of economic characters are of great interest to the breeder. Tomato is one of the important and most demanded vegetable crop. Therefore, improvement of tomato productivity with quality and high nutritional value and resistance to diseases can play significant role in the overall production and nutritional security.

4.1 Growth Parameters

With respect to the growth parameter the genotype 13P3 recorded highest plant height (202.33 cm) followed by Pant Polyhouse (138.33cm) at final harvesting stage [7,8] and [9] indicated that, different genotypes recorded the different heights due to each genotype having different potential of growth. With regard to number of branches per plant, the genotype AR-56 (11.33) recorded maximum branches per

Table 1. List of genotypes used in the present study

Sl. No.	Name of the institute	Number of genotypes collected
1	NBPGR, New Dehli	10
2	IIHR, Hessarghatta, Bengaluru, Karnataka	06
3	IARI, RS, Katrain	03
4	IARI, New Delhi	06
5	IIPR, Kanpur	02
6	IIVR, Varanasi	08
7	PAU, Ludhiana	09
8	MPKV, Rahuri	03
9	TNAU, Coimbatore	01
10	KAU, Thrissur	01
11	UAS, Bengaluru	01
12	UAS, Raichur	02
13	HRS, Devihosur, Haveri, Karnataka	20
14	COH, Mudigere	05
15	COH, Mysuru	73
16	Dept. of Vegetable Science, COH, Bengaluru	14
17	Dept. of BCI, COH, Bengaluru	27
18	Ahmedabad local	01
19	Alahabad local	03
20	Guntur	01
21	Rajamundri	01
22	Madanapalli	01
23	Sakura Seeds Pvt, Ltd	01
24	Sungro Seeds Pvt, Ltd	01
	Total	**200**

Table 2. Details of tomato genotypes and checks used in the experiment and their source of collection

Sl. No.	Original Code	Field Code	Source of Collection
1	ARTD-1	G-1	HRS, Devihosur, Haveri, Karnataka
2	ARTD-2	G-2	HRS, Devihosur, Haveri, Karnataka
3	ARTD-3	G-3	HRS, Devihosur, Haveri, Karnataka
4	ARTD-4	G-4	HRS, Devihosur, Haveri, Karnataka
5	ARTD-5	G-5	HRS, Devihosur, Haveri, Karnataka
6	ARTD-6	G-6	HRS, Devihosur, Haveri, Karnataka
7	ARTD-7	G-7	HRS, Devihosur, Haveri, Karnataka
8	ARTD-8	G-8	HRS, Devihosur, Haveri, Karnataka
9	AOTD-9	G-9	HRS, Devihosur, Haveri, Karnataka
10	AOTD-10	G-10	HRS, Devihosur, Haveri, Karnataka
11	AOTD-11	G-11	HRS, Devihosur, Haveri, Karnataka
12	AOTD-12	G-12	HRS, Devihosur, Haveri, Karnataka
13	AOTD-13	G-13	HRS, Devihosur, Haveri, Karnataka
14	AOTD-14	G-14	HRS, Devihosur, Haveri, Karnataka
15	AOTD-15	G-15	HRS, Devihosur, Haveri, Karnataka
16	AOTD-16	G-16	HRS, Devihosur, Haveri, Karnataka
17	AOTD-17	G-17	HRS, Devihosur, Haveri, Karnataka
18	AOTD-18	G-18	HRS, Devihosur, Haveri, Karnataka
19	AOTD-19	G-19	HRS, Devihosur, Haveri, Karnataka
20	AOTD-20	G-20	HRS, Devihosur, Haveri, Karnataka
21	EC-321426	G-23	NBPGR, New Delhi
22	EC-326146	G-31	NBPGR, New Delhi
23	EC-338714	G-33	NBPGR, New Delhi
24	EC-338717	G-35	NBPGR, New Delhi
25	EC-338725	G-37	NBPGR, New Delhi
26	EC-338735	G-38	NBPGR, New Delhi
27	EC-9057	G-39	NBPGR, New Delhi
28	EC-357839	G-40	NBPGR, New Delhi
29	EC-357846	G-42	NBPGR, New Delhi
30	EC-362940	G-43	NBPGR, New Delhi
31	Punjab Varkha Bahar-1	G-46	PAU, Ludhiana
32	PNR-1	G-47	PAU, Ludhiana
33	S-12	G-48	PAU, Ludhiana
34	Punjab Varkha Bahar-2	G-49	PAU, Ludhiana
35	Hisar Lal	G-50	PAU, Ludhiana
36	Punjab Upama	G-51	PAU, Ludhiana
37	Punjab Chhuhara	G-52	PAU, Ludhiana
38	Punjab Kesari	G-53	PAU, Ludhiana
39	Punjab Ratta	G-54	PAU, Ludhiana
40	52135	G-57	IIPR, Kanpur
41	Azad-T-1	G-61	IIPR, Kanpur

Sl. No.	Original Code	Field Code	Source of Collection
42	Kashi Sharad	G-62	IIVR, Varanasi
43	Kashi Hemanth	G-63	IIVR, Varanasi
44	Kashi Amrith	G-64	IIVR, Varanasi
45	Kashi Anupama	G-65	IIVR, Varanasi
46	H-86	G-66	IIVR, Varanasi
47	Kalyanpur Type	G-68	IIVR, Varanasi
48	ArkaAbha	G-69	IIHR, Hessarghatta, Bengaluru, Karnataka
49	Arka Sourabh	G-70	IIHR, Hessarghatta, Bengaluru, Karnataka
50	DT-10	G-72	IIVR, Varanasi
51	H-24	G-73	IIVR, Varanasi
52	PTR-4	G-75	UAS, Raichur
53	PTR-6	G-76	UAS, Raichur
54	Bhagyashree	G-77	MPKV, Rahuri
55	Dhanashree	G-78	MPKV, Rahuri
56	Pule Raja	G-79	MPKV, Rahuri
57	Utkal Kumari	G-80	Dept. of Vegetable Science, COH, Bengaluru
58	Utkal Deepti	G-81	Dept. of Vegetable Science, COH, Bengaluru
59	Utkal Raja	G-82	Dept. of Vegetable Science, COH, Bengaluru
60	Pragnya	G-83	Dept. of Vegetable Science, COH, Bengaluru
61	Roma	G-84	IARI, RS, Katrain
62	Best of All	G-85	IARI, RS, Katrain
63	Sioux	G-86	IARI, RS, Katrain
64	PKM-1	G-87	TNAU, Coimbatore
65	Akshaya	G-88	KAU, Thrissur
66	Rajamundri Local	G-90	Rajamundri
67	Guntur Local	G-91	Gunturu
68	Arka Alok	G-92	IIHR, Hessarghatta, Bengaluru, Karnataka
69	Arka Vikas	G-93	IIHR, Hessarghatta, Bengaluru, Karnataka
70	ArkaMeghali	G-95	IIHR, Hessarghatta, Bengaluru, Karnataka
71	ArkaAhuthi	G-96	IIHR, Hessarghatta, Bengaluru, Karnataka
72	Madanapalli Local	G-98	Madanapalli
73	Pusa Sheetal	G-99	IARI, New Delhi
74	PusaSadabahar	G-100	IARI, New Delhi
75	Pusa Rohini	G-101	IARI, New Delhi
76	PusaGourava	G-102	IARI, New Delhi
77	P-120	G-103	IARI, New Delhi
78	Pusa Ruby	G-104	IARI, New Delhi
79	S-22	G-105	Sakura Seeds PVT, LTD
80	Navodaya	G-106	Sungro Seeds PVT, LTD
81	Selection	G-107	Ahmedabad local
82	C-10-2	G-108	Dept. of BCI, COH, Bengaluru
83	C-11-2	G-109	Dept. of BCI, COH, Bengaluru
84	C-20-1	G-110	Dept. of BCI, COH, Bengaluru

Sl. No.	Original Code	Field Code	Source of Collection
85	CO-3	G-111	Dept. of BCI, COH, Bengaluru
86	CLN-2026	G-112	Dept. of BCI, COH, Bengaluru
87	41	G-113	Dept. of BCI, COH, Bengaluru
88	DVRT-2	G-114	Dept. of BCI, COH, Bengaluru
89	EC-13904	G-116	Dept. of BCI, COH, Bengaluru
90	C-1-4	G-119	Dept. of BCI, COH, Bengaluru
91	C-4-1	G-120	Dept. of BCI, COH, Bengaluru
92	EC-381263	G-121	Dept. of BCI, COH, Bengaluru
93	EC-501574	G-123	Dept. of BCI, COH, Bengaluru
94	EC-501580	G-124	Dept. of BCI, COH, Bengaluru
95	EC-501583	G-126	Dept. of BCI, COH, Bengaluru
96	EC-538404	G-129	Dept. of BCI, COH, Bengaluru
97	EC-538405	G-130	Dept. of BCI, COH, Bengaluru
98	EC-620383	G-133	Dept. of BCI, COH, Bengaluru
99	EC-620398	G-134	Dept. of BCI, COH, Bengaluru
100	EC-620401	G-135	Dept. of BCI, COH, Bengaluru
101	EC-620446	G-136	Dept. of BCI, COH, Bengaluru
102	EC-620464	G-137	Dept. of BCI, COH, Bengaluru
103	EC-620469	G-138	Dept. of BCI, COH, Bengaluru
104	EC-620470	G-139	Dept. of BCI, COH, Bengaluru
105	Monte Fevarate	G-140	Dept. of BCI, COH, Bengaluru
106	Rio Grande	G-141	Dept. of BCI, COH, Bengaluru
107	Angoorlata	G-143	Dept. of BCI, COH, Bengaluru
108	Ageta-2	G-144	Dept. of BCI, COH, Bengaluru
109	85	G-145	COH, Mysuru
110	4	G-148	COH, Mysuru
111	80	G-149	COH, Mysuru
112	200	G-150	COH, Mysuru
113	8	G-151	COH, Mysuru
114	1P2	G-152	COH, Mysuru
115	2P2	G-153	COH, Mysuru
116	3P2	G-154	COH, Mysuru
117	4P1	G-155	COH, Mysuru
118	5T5P6	G-156	COH, Mysuru
119	6T6P8	G-157	COH, Mysuru
120	7	G-158	COH, Mysuru
121	8P3	G-159	COH, Mysuru
122	9P4	G-160	COH, Mysuru
123	10P6	G-161	COH, Mysuru
124	11P4	G-162	COH, Mysuru
125	12P1	G-163	COH, Mysuru
126	13P3	G-164	COH, Mysuru
127	14P6	G-165	COH, Mysuru

Sl. No.	Original Code	Field Code	Source of Collection
128	15P4	G-166	COH, Mysuru
129	16P2	G-167	COH, Mysuru
130	17P5	G-168	COH, Mysuru
131	18P3	G-169	COH, Mysuru
132	19P8	G-170	COH, Mysuru
133	20	G-171	COH, Mysuru
134	21	G-172	COH, Mysuru
135	23P4	G-173	COH, Mysuru
136	25P2	G-175	COH, Mysuru
137	27P2	G-177	COH, Mysuru
138	28P2	G-178	COH, Mysuru
139	29P4	G-179	COH, Mysuru
140	30P2	G-180	COH, Mysuru
141	33P2	G-183	COH, Mysuru
142	34P2	G-184	COH, Mysuru
143	35P2	G-185	COH, Mysuru
144	36	G-186	COH, Mysuru
145	37P2	G-187	COH, Mysuru
146	38P2	G-188	COH, Mysuru
147	40P4	G-190	COH, Mysuru
148	43	G-193	COH, Mysuru
149	44P2	G-194	COH, Mysuru
150	45	G-195	COH, Mysuru
151	46P5	G-196	COH, Mysuru
152	47P2	G-197	COH, Mysuru
153	48P4	G-198	COH, Mysuru
154	51	G-201	COH, Mysuru
155	53	G-202	COH, Mysuru
156	54P3	G-203	COH, Mysuru
157	55P2	G-204	COH, Mysuru
158	56P2	G-205	COH, Mysuru
159	58	G-206	COH, Mysuru
160	59	G-207	COH, Mysuru
161	61P4	G-208	COH, Mysuru
162	62P4	G-209	COH, Mysuru
163	63P3	G-210	COH, Mysuru
164	64	G-211	COH, Mysuru
165	65P5	G-212	COH, Mysuru
166	66P1	G-213	COH, Mysuru
167	70	G-214	COH, Mysuru
168	71P2	G-215	COH, Mysuru
169	72P2	G-216	COH, Mysuru
170	73P2	G-217	COH, Mysuru

Sl. No.	Original Code	Field Code	Source of Collection
171	74P5	G-218	COH, Mysuru
172	75P3	G-219	COH, Mysuru
173	76P1	G-220	COH, Mysuru
174	77P1	G-221	COH, Mysuru
175	78P4	G-222	COH, Mysuru
176	83P1	G-223	COH, Mysuru
177	84P1	G-224	COH, Mysuru
178	86P2	G-225	COH, Mysuru
179	67	G-226	COH, Mysuru
180	68	G-227	COH, Mysuru
181	Nandhi	G-228	UAS, Bengaluru
182	Pant Polyhouse-2	G-229	Alahabad local
183	AR-28	G-230	COH, Mudigere
184	Anaga	G-231	Dept. of Vegetable Science, COH, Bengaluru
185	IIHR -2195	G-233	Dept. of Vegetable Science, COH, Bengaluru
186	AR-21	G-234	COH, Mudigere
187	AR-56	G-235	COH, Mudigere
188	AR-4	G-237	COH, Mudigere
189	IIHR – 2199	G-239	Dept. of Vegetable Science, COH, Bengaluru
190	IIHR – 2198	G-240	Dept. of Vegetable Science, COH, Bengaluru
191	IIHR – 2197	G-242	Dept. of Vegetable Science, COH, Bengaluru
192	AR-29	G-244	COH, Mudigere
193	IIHR – 2196	G-246	Dept. of Vegetable Science, COH, Bengaluru
194	Utkal Local-2	G-247	Dept. of Vegetable Science, COH, Bengaluru
195	Pant Polyhouse	G-248	Alahabad local
196	Pant-3	G-249	Alahabad local
197	IIHR – 2200	G-250	Dept. of Vegetable Science, COH, Bengaluru
198	IIHR – 2201	G-251	Dept. of Vegetable Science, COH, Bengaluru
199	H-24-1	G-252	Dept. of Vegetable Science, COH, Bengaluru
200	Solan-2	G-254	COH, Mysuru
Checks			
1	Arka Samrat	Check-1	IIHR, Hessarghatta, Bengaluru, Karnataka
2	ArkaRakshak	Check-2	IIHR, Hessarghatta, Bengaluru, Karnataka
3	5105	Check-3	IIPR, Kanpur

Table 3. Analysis of variance (ANOVA) for growth, yieldand quality parameters in tomato

Sl. No.	Source of variation	Mean sum of squares					
		Blocks	**Entries**	**(a) Checks**	**(b) Varieties**	**(c) Checks Vs Varieties**	**Error**
	Degrees of freedom	10	200	3	203	1	18
A	**Growth parameters**						
1	Plant height (cm)	164.87	456.12 **	2502.06 **	487.40 **	2683.26**	51.68
2	Number of branches/plant	1.35	2.74 **	7.34 **	2.78**	2.58*	0.46
3	Days to first flowering	4.53	20.63*	8.53*	20.49**	17.04*	1.64
4	Days to 50 per cent flowering	3.77	20.37**	14.53**	20.67**	92.52**	1.53
B	**Yield parameters**						
5	Fruit width (cm)	0.46	0.87 **	10.96 **	0.98**	2.89**	0.14
6	Fruit length (cm)	0.59	0.97 **	7.99 **	1.05 **	1.96**	0.20
7	Number of locules per fruit	0.33	2.16 **	2.03 **	2.22**	15.60**	0.10
8	Pericarp thickness (mm)	0.93	1.30 **	2.19 *	1.32**	1.87*	0.36
9	Fruits per plant	313.58	1160.81 **	931.26 **	1155.28**	502.04*	106.79
10	Average fruit weight (g)	172.95	312.47 **	6337.77 **	372.16**	319.86*	62.41
11	Yield per plant (kg)	0.81	1.45 **	13.01 **	1.57**	1.58*	0.31
C	**Quality parameters**						
12	TSS (^{0}B)	0.341	0.601 **	5.410 **	0.650 **	0.990 **	0.110
13	Firmness (kg/cm^{2})	0.007	0.519 **	19.004 **	0.932 **	46.853 **	0.003

**Significant at 5 % level, ** Significant at 1 % level*

Table 4. *Per se* performance of 200 tomato genotypes for growth, yield and quality attributes

Sl. No.	Original code	Genotypes	Plant height (cm)	Number of branches/ plant	Days to first flowering	Days to 50 per cent flowering	Fruit width (cm)	Fruit length (cm)	Number of locules per fruit	Pericarp thickness (mm)
1	ARTD-1	G-1	60.33	6.67	23.00	29.00	4.90	5.95	2.00	2.61
2	ARTD-2	G-2	65.67	4.00	24.00	30.00	4.95	6.50	2.00	4.56
3	ARTD-3	G-3	56.00	5.67	24.00	28.00	5.10	4.70	3.00	3.63
4	ARTD-4	G-4	53.00	5.67	23.00	31.00	5.55	5.20	3.00	4.17
5	ARTD-5	G-5	62.67	5.00	23.00	30.00	4.80	6.45	3.00	2.45
6	ARTD-6	G-6	63.67	3.67	23.00	31.00	4.50	4.60	2.00	4.49
7	ARTD-7	G-7	51.33	4.33	24.00	28.00	4.25	4.60	2.00	1.41
8	ARTD-8	G-8	48.33	4.00	22.00	27.00	5.10	6.45	2.00	4.80
9	AOTD-9	G-9	61.67	4.67	23.00	28.00	4.70	6.50	3.00	5.03
10	AOTD-10	G-10	58.33	4.33	24.00	30.00	4.95	6.45	2.00	7.42
11	AOTD-11	G-11	70.33	7.67	24.00	29.00	4.75	5.80	3.00	4.36
12	AOTD-12	G-12	59.67	6.00	25.00	30.00	4.50	4.45	3.00	2.81
13	AOTD-13	G-13	52.00	7.33	19.00	26.00	5.20	4.85	2.00	2.29
14	AOTD-14	G-14	45.67	7.33	22.00	27.00	4.55	4.55	3.00	2.72
15	AOTD-15	G-15	53.00	6.00	24.00	31.00	5.05	4.80	3.00	3.24
16	AOTD-16	G-16	84.00	4.67	20.00	27.00	4.90	4.70	4.00	3.25
17	AOTD-17	G-17	52.00	6.33	21.00	26.00	5.20	5.05	3.00	2.78
18	AOTD-18	G-18	47.00	5.00	18.00	31.00	4.80	4.75	3.00	4.02
19	AOTD-19	G-19	58.00	5.67	27.00	31.00	4.70	5.05	2.00	5.60
20	AOTD-20	G-20	56.33	5.67	26.00	31.00	4.45	4.60	3.00	5.92
21	EC-321426	G-23	55.00	6.00	26.00	31.00	7.45	7.45	4.00	6.11
22	EC-326146	G-31	78.67	6.33	21.00	26.00	4.00	5.05	2.00	2.61
23	EC-338714	G-33	66.33	4.67	23.00	27.00	4.25	3.75	3.00	3.15
24	EC-338717	G-35	110.00	7.33	19.00	35.00	3.30	3.15	2.00	2.81
25	EC-338725	G-37	96.00	6.33	33.00	32.00	3.85	3.55	3.00	6.05
26	EC-338735	G-38	58.33	5.00	27.00	33.00	4.90	3.90	7.00	1.31
27	EC-339057	G-39	66.67	5.00	17.00	23.00	3.35	3.25	2.00	1.71
28	EC-357839	G-40	83.67	6.00	15.00	22.00	4.65	4.50	5.00	2.20
29	EC-357845	G-41	130.00	6.67	16.00	22.00	4.75	3.95	3.00	4.77
30	EC-362940	G-43	78.33	9.00	18.00	23.00	4.70	3.00	6.00	3.94
31	Punjab Varkha Bahar-1	G-46	93.33	5.00	27.00	33.00	5.75	5.80	4.00	2.80
32	PNR-1	G-47	102.67	6.67	24.00	33.00	5.55	4.90	3.00	2.96
33	S-12	G-48	63.67	4.67	24.00	27.00	4.10	3.60	5.00	3.19
34	Punjab Varkha Bahar-2	G-49	56.67	5.67	23.00	29.00	5.70	4.55	4.00	3.16
35	Hisar Lal	G-50	61.00	5.67	23.00	29.00	4.15	6.50	3.00	3.18
36	Punjab Upama	G-51	73.67	4.67	22.00	27.00	4.60	5.45	3.00	2.45
37	Punjab Chhuhar	G-52	75.00	6.33	24.00	28.00	4.20	6.50	3.00	3.40
38	Punjab Kesari	G-53	71.67	3.67	23.00	27.00	4.90	4.35	4.00	2.03
39	Punjab Ratta	G-54	69.33	6.67	27.00	33.00	5.35	6.20	2.00	4.48

Sl. No.	Original code	Genotypes	Plant height (cm)	Number of branches/ plant	Days to first flowering	Days to 50 per cent flowering	Fruit width (cm)	Fruit length (cm)	Number of locules per fruit	Pericarp thickness (mm)
40	52135	G-57	98.00	6.67	22.00	27.00	4.45	3.80	3.00	2.55
41	Azad-T-1	G-61	80.33	6.67	31.00	37.00	4.30	3.80	5.00	2.55
42	Kashi Sharad	G-62	96.00	6.33	24.00	31.00	5.35	5.45	5.00	6.74
43	Kashi Hemanth	G-63	102.33	7.67	24.00	32.00	6.35	6.70	4.00	3.49
44	Kashi Amrith	G-64	59.00	8.33	33.00	37.00	5.50	4.85	3.00	2.71
45	Kashi Anupama	G-65	51.00	6.33	29.00	35.00	6.60	4.45	4.00	2.50
46	H-86	G-66	62.00	6.00	29.00	32.00	8.15	5.85	5.00	1.49
47	Kalyanpur Type	G-68	109.33	7.67	27.00	31.00	7.20	5.05	3.00	4.05
48	A Abha	G-69	72.67	5.67	27.00	33.00	5.60	4.35	5.00	2.23
49	A Saurabh	G-70	78.67	7.00	27.00	34.00	3.25	3.10	5.00	2.91
50	DT-10	G-72	94.33	9.00	24.00	30.00	6.00	4.60	3.00	3.18
51	H-24	G-73	61.00	9.00	27.00	33.00	3.85	3.75	4.00	2.03
52	PTR-4	G-75	64.33	4.67	15.00	23.00	4.20	4.15	4.00	1.13
53	PTR-6	G-76	68.00	5.00	26.00	30.00	5.10	4.75	3.00	5.72
54	Bhagyashree	G-77	58.33	6.00	22.00	28.00	6.55	5.60	6.00	3.69
55	Dhanashree	G-78	72.33	6.33	27.00	30.00	4.85	4.25	3.00	2.40
56	Pule Raja	G-79	105.67	8.00	25.00	29.00	4.95	5.40	3.00	4.10
57	Utkal Kumari	G-80	61.67	5.33	25.00	33.00	5.20	3.95	5.00	2.97
58	Utkal Deepti	G-81	64.00	6.33	25.00	31.00	3.45	3.65	3.00	2.30
59	Utkal Raja	G-82	84.00	6.33	16.00	22.00	5.25	4.30	4.00	2.75
60	Pragnya	G-83	63.67	6.00	25.00	33.00	4.40	4.05	3.00	2.75
61	Roma	G-84	68.67	5.67	27.00	42.00	4.10	6.65	2.00	3.35
62	Best of all	G-85	105.67	5.67	28.00	35.00	3.45	3.60	4.00	1.50
63	Sioux	G-86	108.33	6.33	37.00	44.00	4.85	4.15	4.00	2.60
64	PKM-1	G-87	45.33	6.33	28.00	37.00	4.60	3.65	5.00	2.70
65	Akshaya	G-88	49.33	4.00	15.00	21.00	5.60	3.95	3.00	3.15
66	Rajamundri	G-90	69.67	6.33	28.00	34.00	4.70	3.75	4.00	3.84
67	Guntur Local	G-91	66.00	5.33	25.00	34.00	5.10	3.70	5.00	2.00
68	A Alok	G-92	48.33	6.00	27.00	34.00	5.85	5.35	3.00	2.00
69	A Vikash	G-93	56.33	5.00	27.00	33.00	5.05	3.85	4.00	2.80
70	A Meghali	G-95	78.67	5.33	23.00	33.00	4.70	4.10	3.00	2.25
71	A Ahuthi	G-96	68.67	4.67	33.00	44.00	4.00	6.50	2.00	2.05
72	Madanapalli	G-98	90.00	5.67	22.00	32.00	6.30	4.70	4.00	2.70
73	Pusa Sheetal	G-99	73.00	4.00	29.00	36.00	5.05	5.00	3.00	3.44
74	PusaSadabahar	G-100	56.67	3.33	25.00	33.00	3.80	5.00	5.00	3.14
75	Pusa Rohini	G-101	77.00	4.33	24.00	32.00	5.80	5.25	3.00	3.37
76	PusaGourava	G-102	60.33	5.00	17.00	29.00	4.70	5.55	2.00	4.50
77	P-120	G-103	61.67	3.00	23.00	28.00	5.00	4.35	5.00	2.37
78	Pusa Ruby	G-104	70.00	5.67	23.00	27.00	4.50	3.60	7.00	2.25
79	S-22	G-105	59.67	4.33	24.00	31.00	5.50	4.45	9.00	4.20
80	Navodaya	G-106	57.67	4.67	29.00	42.00	4.50	3.80	3.00	1.65

Sl. No.	Original code	Genotypes	Plant height (cm)	Number of branches/ plant	Days to first flowering	Days to 50 per cent flowering	Fruit width (cm)	Fruit length (cm)	Number of locules per fruit	Pericarp thickness (mm)
81	Selection	G-107	74.00	7.33	15.00	32.00	4.80	3.85	4.00	2.50
82	C-10-2	G-108	73.00	5.00	18.00	28.00	4.95	3.60	4.00	2.82
83	C-11-2	G-109	54.00	5.00	26.00	33.00	3.85	3.20	5.00	2.71
84	C-20-1	G-110	70.67	4.67	26.00	32.00	5.95	5.35	5.00	4.75
85	CO-3	G-111	49.67	5.00	28.00	33.00	5.00	4.05	4.00	2.58
86	CLN-2026	G-112	63.67	5.33	25.00	29.00	3.90	4.80	3.00	2.10
87	41	G-113	75.33	2.67	32.00	37.00	4.95	5.70	3.00	3.25
88	DVRT-2	G-114	71.67	4.33	27.00	33.00	4.85	3.75	6.00	1.50
89	EC-13904	G-116	86.67	6.00	18.00	25.00	4.35	3.65	4.00	2.34
90	C-1-4	G-119	60.33	8.33	32.00	44.00	4.95	4.00	4.00	2.80
91	C-4-1	G-120	110.67	7.67	28.00	33.00	3.10	3.40	3.00	2.80
92	EC-381263	G-121	114.33	7.67	27.00	33.00	3.20	4.00	3.00	3.00
93	EC-501574	G-123	101.67	6.67	19.00	27.00	5.80	4.30	5.00	2.12
94	EC-501580	G-124	74.67	9.00	27.00	33.00	5.15	4.40	13.00	4.11
95	EC-501583	G-126	81.67	10.00	33.00	39.00	3.90	3.10	4.00	2.13
96	EC-538404	G-129	65.00	4.67	26.00	32.00	6.15	4.80	8.00	1.90
97	EC-538405	G-130	61.67	5.00	28.00	32.00	5.50	5.35	5.00	4.16
98	EC-620383	G-133	77.67	7.00	25.00	29.00	3.20	3.50	2.00	3.38
99	EC-620398	G-134	50.67	4.33	24.00	30.00	4.05	5.35	2.00	3.33
100	EC-620401	G-135	66.33	6.00	25.00	31.00	5.20	5.20	3.00	1.99
101	EC-620446	G-136	54.00	3.67	23.00	28.00	5.05	5.80	3.00	3.00
102	EC-620464	G-137	56.67	5.33	27.00	37.00	4.85	5.00	2.00	2.55
103	EC-620469	G-138	57.00	5.33	24.00	28.00	4.40	5.80	3.00	4.11
104	EC-620470	G-139	59.33	4.67	27.00	33.00	4.10	4.25	4.00	1.50
105	Monte Fevarate	G-140	55.33	4.67	26.00	32.00	4.15	4.90	2.00	2.67
106	Rio Grande	G-141	67.00	7.33	33.00	37.00	3.30	3.45	6.00	2.26
107	Angoorlata	G-143	76.67	4.33	25.00	33.00	3.95	3.70	3.00	2.61
108	Ageta-2	G-144	59.33	5.00	22.00	26.00	5.50	5.35	3.00	3.00
109	85	G-145	96.00	7.00	27.00	32.00	4.20	4.10	3.00	2.50
110	4	G-148	99.00	8.67	15.00	24.00	4.15	4.20	3.00	2.30
111	80	G-149	54.67	5.67	28.00	33.00	4.95	3.25	6.00	1.56
112	200	G-150	69.67	5.33	33.00	37.00	4.30	5.05	2.00	5.40
113	8	G-151	57.33	7.33	29.00	33.00	5.05	4.80	4.00	1.05
114	1P2	G-152	76.67	9.67	29.00	33.00	4.55	3.20	4.00	2.06
115	2P2	G-153	95.67	7.00	24.00	29.00	4.75	4.40	5.00	1.62
116	3P2	G-154	86.33	9.33	28.00	33.00	3.45	3.05	4.00	2.71
117	4P1	G-155	85.33	9.00	28.00	33.00	5.80	4.65	4.00	2.16
118	5T5P6	G-156	71.67	8.67	28.00	33.00	3.35	2.80	6.00	3.86
119	6T6P8	G-157	69.33	7.00	24.00	28.00	4.05	4.50	3.00	2.18
120	7	G-158	58.67	10.00	29.00	33.00	4.40	3.95	4.00	2.60
121	8P3	G-159	49.67	6.33	18.00	33.00	4.75	3.40	5.00	3.70

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122	9P4	G-160	43.67	6.00	29.00	33.00	5.00	4.85	3.00	2.41
123	10P6	G-161	82.00	7.00	17.00	23.00	3.60	3.45	3.00	3.17
124	11P4	G-162	122.33	9.00	29.00	33.00	4.25	3.45	4.00	4.60
125	12P1	G-163	77.67	6.00	30.00	37.00	4.00	3.50	3.00	5.56
126	13P3	G-164	202.33	6.00	31.00	36.00	2.55	3.40	3.00	2.60
127	14P6	G-165	60.00	6.67	28.00	33.00	3.45	3.20	2.00	3.10
128	15P4	G-166	102.33	7.00	22.00	24.00	4.55	3.55	3.00	2.69
129	16P2	G-167	61.33	5.67	28.00	33.00	3.00	2.60	4.00	3.79
130	17P5	G-168	86.67	7.33	31.00	37.00	3.25	2.85	4.00	2.08
131	18P3	G-169	115.33	5.67	29.00	33.00	3.70	3.45	3.00	3.42
132	19P8	G-170	81.00	6.67	26.00	33.00	4.20	3.85	4.00	4.05
133	20	G-171	76.33	6.67	17.00	24.00	3.55	3.35	5.00	3.02
134	21	G-172	82.33	9.00	30.00	35.00	4.10	3.20	5.00	2.41
135	23P4	G-173	105.67	8.00	24.00	28.00	3.85	3.60	6.00	2.54
136	25P2	G-175	78.33	7.33	30.00	37.00	3.75	3.10	4.00	6.23
137	27P2	G-177	96.00	8.33	24.00	30.00	5.45	4.30	3.00	4.29
138	28P2	G-178	115.00	9.67	28.00	33.00	2.85	3.45	4.00	3.63
139	29P4	G-179	57.33	5.67	29.00	33.00	3.45	3.55	5.00	4.88
140	30P2	G-180	96.00	9.33	24.00	37.00	3.90	3.75	2.00	3.26
141	33P2	G-183	92.67	7.00	30.00	36.00	3.75	3.35	3.00	1.53
142	34P2	G-184	61.00	6.33	29.00	35.00	3.50	4.35	2.00	2.45
143	35P2	G-185	68.00	8.00	16.00	25.00	5.35	3.10	6.00	2.59
144	36	G-186	73.33	5.00	33.00	37.00	4.55	4.95	3.00	2.60
145	37P2	G-187	71.67	8.00	24.00	30.00	4.55	3.65	5.00	2.50
146	38P2	G-188	87.00	6.00	24.00	30.00	4.05	3.70	3.00	1.37
147	40P4	G-190	91.33	5.00	30.00	37.00	3.05	3.00	4.00	2.75
148	43	G-193	80.67	6.67	30.00	35.00	2.85	3.00	3.00	1.65
149	44P2	G-194	86.33	7.33	29.00	34.00	4.10	3.30	3.00	2.25
150	45	G-195	84.67	7.33	29.00	33.00	4.35	3.60	4.00	3.19
151	46P5	G-196	66.00	5.33	30.00	33.00	4.15	3.90	7.00	1.50
152	47P2	G-197	59.00	5.33	29.00	33.00	3.30	2.95	4.00	3.50
153	48P4	G-198	59.00	6.33	30.00	34.00	3.65	3.90	3.00	2.30
154	51	G-201	103.33	8.33	28.00	30.00	4.10	3.50	2.00	4.45
155	53	G-202	63.67	7.33	29.00	33.00	2.70	3.75	2.00	3.87
156	54P3	G-203	79.00	8.00	29.00	37.00	4.15	3.55	3.00	2.00
157	55P2	G-204	108.67	8.33	28.00	33.00	3.85	3.25	7.00	2.50
158	56P2	G-205	80.00	6.67	22.00	29.00	3.80	4.00	5.00	1.40
159	58	G-206	62.67	7.00	22.00	28.00	4.90	3.85	4.00	4.50
160	59	G-207	44.67	8.33	28.00	34.00	4.30	3.35	4.00	2.53
161	61P4	G-208	58.33	9.00	29.00	34.00	3.40	3.60	3.00	2.37
162	62P4	G-209	88.00	7.33	28.00	40.00	2.50	3.90	3.00	1.63

Sl. No.	Original code	Genotypes	Plant height (cm)	Number of branches/ plant	Days to first flowering	Days to 50 per cent flowering	Fruit width (cm)	Fruit length (cm)	Number of locules per fruit	Pericarp thickness (mm)
163	63P3	G-210	70.67	9.00	22.00	28.00	4.05	2.60	4.00	1.13
164	64	G-211	56.67	7.67	30.00	42.00	4.00	3.50	5.00	1.32
165	65P5	G-212	87.00	9.33	23.00	28.00	5.30	2.20	5.00	3.10
166	66P1	G-213	54.33	7.33	29.00	37.00	4.00	4.45	5.00	4.92
167	70	G-214	52.33	8.33	24.00	30.00	3.10	3.60	2.00	3.28
168	71P2	G-215	51.00	7.67	22.00	28.00	3.75	4.55	3.00	3.12
169	72P2	G-216	50.33	8.33	29.00	33.00	5.05	3.15	6.00	2.98
170	73P2	G-217	95.00	9.00	28.00	33.00	2.50	2.00	3.00	2.78
171	74P5	G-218	51.00	8.00	22.00	29.00	3.95	3.05	4.00	1.60
172	75P3	G-219	54.00	6.67	30.00	34.00	4.90	3.15	4.00	3.70
173	76P1	G-220	92.00	4.00	29.00	33.00	3.90	2.95	4.00	2.44
174	77P1	G-221	92.00	6.33	25.00	28.00	3.80	4.00	5.00	3.62
175	78P4	G-222	113.33	6.33	29.00	33.00	2.70	2.30	3.00	3.62
176	83P1	G-223	80.67	6.67	15.00	23.00	4.65	3.05	5.00	2.99
177	84P1	G-224	60.33	5.33	29.00	33.00	3.85	5.05	4.00	1.66
178	86P2	G-225	89.67	7.00	17.00	24.00	3.85	3.90	5.00	3.37
179	67	G-226	82.00	5.67	29.00	36.00	2.85	3.30	2.00	2.21
180	68	G-227	66.67	6.67	28.00	33.00	3.80	3.40	4.00	1.27
181	Nandhi	G-228	65.33	3.33	17.00	33.00	3.45	3.85	2.00	2.20
182	Pant Polyhouse-2	G-229	107.33	6.33	24.00	27.00	4.70	4.75	2.00	1.62
183	AR-28	G-230	92.67	6.33	29.00	33.00	3.05	4.85	3.00	2.74
184	Anaga	G-231	55.33	2.67	33.00	37.00	2.65	3.00	7.00	1.45
185	IIHR-2195	G-233	67.00	3.33	15.00	24.00	3.00	3.00	2.00	2.55
186	AR-21	G-234	96.67	5.67	15.00	25.00	5.20	4.00	6.00	1.69
187	AR-56	G-235	132.67	11.33	16.00	24.00	3.20	4.00	4.00	2.99
188	AR-4	G-237	109.33	7.00	23.00	28.00	3.65	4.00	5.00	1.62
189	IHR-2199	G-239	66.00	6.00	28.00	24.00	4.00	4.30	3.00	1.80
190	IIHR-2198	G-240	75.00	4.00	25.00	28.00	4.05	4.35	2.00	3.11
191	IHR-2197	G-242	59.00	2.00	23.00	27.00	4.10	5.05	3.00	4.15
192	AR-29	G-244	93.33	8.67	20.00	33.00	3.00	3.50	2.00	1.50
193	IIHR-2196	G-246	60.00	5.67	28.00	32.00	3.25	4.45	2.00	2.95
194	Utkal Local-2	G-247	98.00	5.67	37.00	43.00	3.95	3.30	4.00	2.15
195	Pant Polyhouse	G-248	138.33	6.67	30.00	44.00	4.65	3.50	4.00	2.90
196	Pant-3	G-249	55.33	9.00	24.00	27.00	3.70	4.00	5.00	1.89
197	IIHR-2200	G-250	65.00	5.33	27.00	32.00	3.75	4.05	3.00	1.75
198	IIHR-2201	G-251	60.33	6.33	23.00	26.00	4.10	4.75	2.00	2.50
199	H-24-1	G-252	57.33	8.33	28.00	33.00	4.40	3.50	5.00	2.58
200	Solan-2	G-254	80.33	10.67	27.00	37.00	4.20	3.65	3.00	4.03

Table 5. Per se performance of 200 tomato genotypes for fruit weight, average yield and quality attributes

Sl. No	Original code	Genotypes	Fruits per plant	Average fruit weight (g)	Yield per plant (kg/cm^2)	TSS (^{o}Brix)	Firmness (kg/cm^2)
1	ARTD-1	G-1	40.70	52.85	2.15	3.33	0.84
2	ARTD-2	G-2	34.00	69.05	1.49	2.83	2.41
3	ARTD-3	G-3	48.09	61.25	2.95	2.67	1.65
4	ARTD-4	G-4	37.97	54.38	2.06	2.83	2.81
5	ARTD-5	G-5	57.38	56.19	3.22	3.40	2.69
6	ARTD-6	G-6	46.40	64.71	3.00	3.07	3.37
7	ARTD-7	G-7	23.24	43.80	1.02	2.67	1.63
8	ARTD-8	G-8	41.93	63.17	2.65	3.03	1.43
9	AOTD-9	G-9	48.89	51.97	2.54	3.00	1.17
10	AOTD-10	G-10	64.24	56.98	3.66	2.70	1.46
11	AOTD-11	G-11	49.03	49.62	2.43	5.03	2.27
12	AOTD-12	G-12	75.62	42.50	3.21	3.67	1.84
13	AOTD-13	G-13	104.10	44.85	4.67	3.70	1.97
14	AOTD-14	G-14	78.87	43.64	3.44	3.80	1.53
15	AOTD-15	G-15	83.30	42.45	3.54	3.33	0.96
16	AOTD-16	G-16	72.14	57.70	4.16	3.67	0.84
17	AOTD-17	G-17	32.41	75.24	2.44	3.03	1.42
18	AOTD-18	G-18	75.80	52.84	4.01	3.67	6.25
19	AOTD-19	G-19	23.45	66.50	1.56	3.67	0.80
20	AOTD-20	G-20	46.05	62.53	2.88	3.67	2.96
21	EC-321426	G-23	20.08	94.85	1.90	3.47	1.70
22	EC-326146	G-31	57.89	34.16	1.98	5.00	1.01
23	EC-338714	G-33	45.31	42.79	1.94	3.33	1.06
24	EC-338717	G-35	204.37	24.11	4.93	5.00	1.36
25	EC-338725	G-37	55.52	32.03	1.78	5.00	0.94
26	EC-338735	G-38	85.54	43.18	3.69	3.00	0.93
27	EC-339057	G-39	70.94	22.86	1.62	4.33	1.34
28	EC-357839	G-40	43.25	74.02	3.20	4.17	1.08
29	EC-357845	G-41	108.31	40.53	4.39	4.00	1.28
30	EC-362940	G-43	79.43	28.98	2.30	3.67	0.67
31	Punjab Varkha Bahar-1	G-46	38.98	72.90	2.84	4.17	1.37
32	PNR-1	G-47	44.35	61.80	2.74	6.67	0.96
33	S-12	G-48	89.25	34.21	3.05	4.67	0.57
34	Punjab Varkha Bahar-2	G-49	58.49	73.09	4.28	4.67	2.27
35	Hisar Lal	G-50	57.97	51.06	2.96	4.00	2.64
36	Punjab Upama	G-51	75.66	58.12	4.40	3.73	1.97
37	Punjab Chhuhar	G-52	97.69	51.44	5.03	3.33	1.06
38	Punjab Kesari	G-53	42.35	40.40	1.71	3.70	0.76
39	Punjab Ratta	G-54	42.25	79.95	3.38	3.80	2.31
40	52135	G-57	49.32	46.29	2.28	4.13	1.17
41	Azad-T-1	G-61	62.76	60.52	3.80	5.07	1.45

Sl. No	Original code	Genotypes	Fruits per plant	Average fruit weight (g)	Yield per plant (kg/cm^2)	TSS (^{o}Brix)	Firmness (kg/cm^2)
42	Kashi Sharad	G-62	27.68	95.00	2.63	4.60	1.16
43	Kashi Hemanth	G-63	33.51	102.36	3.43	4.93	0.49
44	Kashi Amrith	G-64	74.33	67.28	5.00	3.00	0.66
45	Kashi Anupama	G-65	71.88	77.77	5.59	3.07	1.18
46	H-86	G-66	48.85	131.94	6.45	2.93	1.13
47	Kalyanpur Type	G-68	81.32	48.87	3.97	4.03	1.14
48	A Abha	G-69	37.41	63.91	2.39	4.00	1.45
49	A Saurabh	G-70	39.42	52.30	2.06	6.07	1.05
50	DT-10	G-72	74.08	47.80	3.54	4.50	1.02
51	H-24	G-73	111.18	34.78	3.87	4.03	0.72
52	PTR-4	G-75	74.50	53.18	3.96	4.00	2.23
53	PTR-6	G-76	79.80	74.66	5.96	2.67	2.03
54	Bhagyashree	G-77	58.78	90.86	5.34	3.93	1.19
55	Dhanashree	G-78	85.83	52.05	4.47	3.73	1.02
56	Pule Raja	G-79	65.48	76.65	5.02	4.07	1.61
57	Utkal Kumari	G-80	55.18	56.61	3.12	3.60	0.89
58	Utkal Deepti	G-81	135.55	26.13	3.54	4.60	0.99
59	Utkal Raja	G-82	36.96	73.31	2.71	4.93	0.83
60	Pragnya	G-83	87.68	35.72	3.13	3.60	1.34
61	Roma	G-84	33.00	29.46	0.39	4.93	0.96
62	Best of all	G-85	56.46	29.69	1.68	5.07	0.62
63	Sioux	G-86	24.68	102.22	2.52	4.00	1.00
64	PKM-1	G-87	11.66	43.85	0.51	4.50	2.60
65	Akshaya	G-88	64.57	43.18	2.79	2.77	1.88
66	Rajamundri	G-90	39.56	56.17	2.22	3.90	1.77
67	Guntur Local	G-91	38.28	52.26	2.00	4.00	1.61
68	A Alok	G-92	36.55	74.22	2.71	3.60	1.06
69	A Vikash	G-93	58.08	34.46	2.00	4.90	1.62
70	A Meghali	G-95	75.58	60.64	4.58	4.27	0.92
71	A Ahuthi	G-96	43.00	56.02	2.41	3.27	0.83
72	Madanapalli	G-98	19.69	48.19	2.50	4.27	0.62
73	Pusa Sheetal	G-99	50.34	50.68	2.55	3.87	0.78
74	PusaSadabahar	G-100	29.76	40.27	1.20	3.33	0.66
75	Pusa Rohini	G-101	31.30	64.53	2.02	3.60	1.49
76	PusaGourava	G-102	67.02	57.19	3.83	3.67	1.06
77	P-120	G-103	23.99	57.70	1.38	4.33	1.19
78	Pusa Ruby	G-104	102.69	36.97	3.80	4.57	0.62
79	S-22	G-105	65.40	58.04	3.80	4.00	0.46
80	Navodaya	G-106	48.38	31.81	1.54	4.40	0.64
81	Selection	G-107	83.46	35.95	3.00	4.03	0.67
82	C-10-2	G-108	81.34	27.66	2.25	4.73	0.78
83	C-11-2	G-109	85.56	26.74	2.29	5.00	3.78
84	C-20-1	G-110	73.02	63.10	4.61	5.17	1.47

Sl. No	Original code	Genotypes	Fruits per plant	Average fruit weight (g)	Yield per plant (kg/cm^2)	TSS (^{o}Brix)	Firmness (kg/cm^2)
85	CO-3	G-111	96.68	39.41	3.81	4.57	1.16
86	CLN-2026	G-112	123.07	27.61	3.40	5.17	2.24
87	41	G-113	32.00	58.35	0.61	3.67	1.71
88	DVRT-2	G-114	54.37	59.06	3.21	3.10	0.56
89	EC-13904	G-116	51.12	45.58	2.33	3.80	0.67
90	C-1-4	G-119	55.49	44.46	2.47	3.40	1.29
91	C-4-1	G-120	80.72	25.67	2.07	4.40	1.85
92	EC-381263	G-121	133.39	22.64	3.02	4.93	2.22
93	EC-501574	G-123	41.29	41.85	1.73	4.40	0.89
94	EC-501580	G-124	54.13	74.64	4.04	4.77	1.71
95	EC-501583	G-126	101.61	25.70	2.61	5.43	1.18
96	EC-538404	G-129	38.43	74.65	2.87	4.43	1.10
97	EC-538405	G-130	58.16	70.93	4.13	4.63	0.80
98	EC-620383	G-133	88.54	27.92	2.47	6.00	1.10
99	EC-620398	G-134	29.61	36.53	1.08	4.33	1.04
100	EC-620401	G-135	61.04	62.49	3.81	3.93	2.57
101	EC-620446	G-136	52.03	82.28	4.28	4.13	1.13
102	EC-620464	G-137	18.82	54.46	1.03	4.93	1.00
103	EC-620469	G-138	45.78	57.08	2.61	4.47	1.88
104	EC-620470	G-139	33.00	28.38	0.57	4.97	1.24
105	Monte Fevarate	G-140	49.15	43.36	2.13	4.97	1.18
106	Rio Grande	G-141	62.95	22.76	1.43	4.00	1.61
107	Angoorlata	G-143	30.89	28.93	0.89	4.23	1.86
108	Ageta-2	G-144	28.96	57.65	1.67	4.00	1.81
109	85	G-145	45.92	42.74	1.96	4.23	0.82
110	4	G-148	74.70	40.23	3.01	5.00	1.11
111	80	G-149	76.08	45.31	3.45	4.83	1.49
112	200	G-150	70.76	52.69	3.73	3.57	1.28
113	8	G-151	125.16	30.45	3.81	3.93	1.10
114	1P2	G-152	114.36	31.98	3.66	4.37	0.80
115	2P2	G-153	99.43	31.63	3.15	5.03	1.03
116	3P2	G-154	154.75	36.83	5.70	5.33	0.81
117	4P1	G-155	108.31	59.79	6.48	3.17	0.35
118	5T5P6	G-156	121.91	38.88	4.74	5.17	2.40
119	6T6P8	G-157	33.34	54.68	1.82	4.33	1.64
120	7	G-158	76.46	54.13	4.14	4.43	0.71
121	8P3	G-159	60.54	48.57	2.94	3.90	1.01
122	9P4	G-160	142.78	40.39	5.77	4.00	1.10
123	10P6	G-161	116.16	40.53	4.71	4.00	0.83
124	11P4	G-162	81.06	38.51	3.12	4.67	0.97
125	12P1	G-163	68.12	50.17	3.42	3.67	2.47
126	13P3	G-164	129.52	25.76	3.34	4.00	0.95
127	14P6	G-165	146.23	30.97	4.53	4.67	1.06

Sl. No	Original code	Genotypes	Fruits per plant	Average fruit weight (g)	Yield per plant (kg/cm^2)	TSS (^{o}Brix)	Firmness (kg/cm^2)
128	15P4	G-166	88.80	64.54	5.73	4.00	1.20
129	16P2	G-167	99.61	48.77	4.86	3.67	1.58
130	17P5	G-168	81.47	39.28	3.20	6.67	1.47
131	18P3	G-169	65.82	33.51	2.21	4.07	1.94
132	19P8	G-170	97.58	37.35	3.64	4.00	0.97
133	20	G-171	88.40	41.97	3.71	4.67	0.57
134	21	G-172	56.01	52.59	2.95	4.37	0.59
135	23P4	G-173	96.04	43.99	4.23	3.83	0.93
136	25P2	G-175	125.45	32.12	4.03	5.17	0.99
137	27P2	G-177	132.23	41.51	5.49	3.33	0.60
138	28P2	G-178	173.31	22.89	3.97	5.00	2.54
139	29P4	G-179	95.39	30.61	2.92	5.00	1.37
140	30P2	G-180	118.69	43.27	5.14	4.90	1.01
141	33P2	G-183	135.63	34.00	3.68	5.00	1.35
142	34P2	G-184	50.43	59.62	3.01	3.67	2.76
143	35P2	G-185	82.38	43.14	3.55	5.33	0.50
144	36	G-186	42.78	51.75	2.21	4.67	0.98
145	37P2	G-187	56.76	36.85	2.09	4.33	0.55
146	38P2	G-188	92.06	40.03	3.69	5.00	1.55
147	40P4	G-190	56.27	33.89	1.91	4.33	1.12
148	43	G-193	48.06	31.80	1.53	4.67	1.69
149	44P2	G-194	18.86	52.73	1.30	5.83	0.92
150	45	G-195	51.17	46.48	2.38	4.00	1.10
151	46P5	G-196	37.26	63.94	2.38	3.90	0.37
152	47P2	G-197	38.08	64.45	2.45	2.77	0.84
153	48P4	G-198	181.58	30.85	5.60	4.23	1.84
154	51	G-201	69.51	37.83	2.63	6.00	0.94
155	53	G-202	86.16	40.04	3.45	4.33	1.96
156	54P3	G-203	91.70	54.25	4.97	5.23	1.13
157	55P2	G-204	56.00	54.05	3.03	5.67	1.82
158	56P2	G-205	53.30	52.80	2.81	4.00	3.05
159	58	G-206	30.88	73.31	2.26	3.40	2.42
160	59	G-207	54.56	40.29	2.20	4.00	0.80
161	61P4	G-208	110.96	35.00	2.53	4.50	0.92
162	62P4	G-209	49.26	35.00	1.72	5.50	1.26
163	63P3	G-210	87.08	40.68	3.54	3.90	1.29
164	64	G-211	25.91	77.71	2.01	4.47	0.80
165	65P5	G-212	83.94	45.52	3.82	5.00	0.65
166	66P1	G-213	72.72	37.44	2.72	3.83	1.01
167	70	G-214	62.25	27.68	1.72	4.00	0.80
168	71P2	G-215	62.48	42.79	2.67	3.50	0.94
169	72P2	G-216	39.35	61.34	2.41	4.00	0.59
170	73P2	G-217	120.81	20.00	1.92	4.53	0.90

Sl. No	Original code	Genotypes	Fruits per plant	Average fruit weight (g)	Yield per plant (kg/cm^2)	TSS (^{o}Brix)	Firmness (kg/cm^2)
171	74P5	G-218	70.26	46.30	3.25	5.00	0.83
172	75P3	G-219	55.23	45.31	2.50	4.00	1.54
173	76P1	G-220	31.63	28.77	0.91	4.17	0.96
174	77P1	G-221	22.47	50.65	1.14	3.83	1.08
175	78P4	G-222	70.41	22.97	1.62	4.50	1.30
176	83P1	G-223	51.18	47.38	2.43	5.50	0.33
177	84P1	G-224	52.77	55.51	2.93	4.33	0.58
178	86P2	G-225	75.41	45.15	3.40	4.00	1.54
179	67	G-226	63.60	48.53	3.09	4.07	2.10
180	68	G-227	40.49	59.26	2.40	4.67	0.95
181	Nandhi	G-228	13.84	31.35	2.00	4.50	2.72
182	Pant Polyhouse-2	G-229	17.29	83.04	1.44	3.67	0.78
183	AR-28	G-230	92.10	24.25	2.23	4.17	0.80
184	Anaga	G-231	57.03	35.23	2.01	4.00	0.56
185	IIHR-2195	G-233	111.66	24.92	2.78	4.00	1.53
186	AR-21	G-234	71.05	47.71	3.39	4.83	1.95
187	AR-56	G-235	140.65	21.00	2.26	7.00	0.72
188	AR-4	G-237	85.45	38.21	3.27	5.33	0.92
189	IHR-2199	G-239	78.29	38.04	2.98	3.83	1.25
190	IIHR-2198	G-240	30.09	42.63	1.28	4.00	1.45
191	IHR-2197	G-242	33.00	30.06	2.00	4.00	1.78
192	AR-29	G-244	106.14	23.47	2.49	5.67	1.14
193	IIHR-2196	G-246	102.02	24.45	2.49	4.50	1.92
194	Utkal Local-2	G-247	31.00	62.69	2.00	4.50	1.01
195	Pant Polyhouse	G-248	21.05	73.38	1.55	4.00	2.33
196	Pant-3	G-249	124.36	30.46	3.79	4.50	0.59
197	IIHR-2200	G-250	23.91	55.44	1.33	4.50	2.77
198	IIHR-2201	G-251	42.89	41.17	1.77	3.83	1.53
199	H-24-1	G-252	53.62	41.20	2.21	4.17	0.71
200	Solan-2	G-254	69.17	49.50	3.42	5.17	1.07

plant at final harvesting stage and earliness characters like days to first flowering the genotype IIHR-2195 took least number of days (15.00) for anthesis after transplanting and in case of days to 50 per cent of flowering the genotype Akshaya took minimum (21.00) days after transplanting [10,11,7,4] and [9] (Table 4). This indicated that the trait is conditioned by additive gene effects and simple selection would be rewarding in improvement of these earliness characters.

4.2 Yield Parameters

Among yield and yield related attributes (Table 4) yield per plant is very important trait as it is dependent character. The highest yield per plant was recorded in genotype 6.48 kg (4P1) followed by H-86 (6.45kg), PTR-6 (5.96kg) because increase in yield per plant in these germplasm was due to higher number of fruits per plant in 4P1 (108.31) followed by H-86 (48.85) and PTR-6 (79.80) [9,8]. Maximum average fruit weight is observed in H-86 (131.94) [9,8,7,11] and [10].

4.3 Quality Parameters

Important quality parameters of tomato are TSS, fruit firmness (Table 4). Genotype AR-56 recorded maximum TSS of 7.00^{o}Brix [9] and [8], maximum fruit firmness was recorded in AOTD-18 (6.25kg/cm^{2}), lowest number of locules per fruit was observed in ARTD-1 (2.00) and highest pericarp thickness was observed in genotype AOTD-10 (7.42mm) [11,7] and [10].

5. CONCLUSIONS

This study is an important step of the tomato breeding program to identify the best genotypes for hybrids production in the future days. Generally, differences among genotypes are necessary. Therefore, when starting the breeding program, a large number of genotypes with good traits should be selected. However, further studies should be carried out in different area to know the performance of genotypes for best traits.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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