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PERFORMANCE OF HYBRIDS FOR SOME GROWTH, YIELD AND QUALITY TRAITS IN TOMATO *(LYCOPERSICON ESCULENTUM* MILL.)

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Abstract

In tomato, through a line × tester (6 × 3) analysis, the combination EC- 461070 × MTM Local was identified as the high yielder. It recorded maximum value for plant height, spread of the plant, number of fruits per plant, pericarp thickness and carotene content among the hybrids. Among the hybrids highest Vitamin C content was recorded by EC-461018 × EC- 461035. Arka Alok × MTM Local as best for long shelf life, suitable for long distance transport.

Key words : Tomato, hybrids, yield, quality.

Introduction

Tomato (*Lycopersicon_esculentum* Mill.) is an important solanaceous vegetable crop around the world. It ranks second among vegetables in commercial importance in many countries including India. Its cultivation has became increasingly popular since mid nineteenth centuary, because of its varied climatic tolerance and high nutritive value. It is a rich source of Vitamin A and C. Now a days cultivation of tomato is the focus of horticulture industry in the world and takes a distinct place in the realm of vegetable crops. The recent trend in crop improvement programme has been in the direction of evolving hybrid varieties by exploiting heterosis in order to boost the productivity of tomato from a meager average of 10.33 tonnes/ha. Keeping in view the above facts, the present study was under taken to identify the promising hybrids to boost the productivity of tomato.

Materials and Methods

Eighteen F_1 hybrids were obtained by crossing six lines and three testers. Six lines were selected based on high yield and quality using selection index method. Three testers were selected based on fruit borer resistance. The exotic genotypes were introduced from AVRDC (Asian Vegetable Research and Development Centre), Taiwan. The hybrids along with parents were raised in randomized block design with three replications. The study was carried out at Research Form College of Agriculture, Kerala Agricultural University, Vellayani, Thiruvananthapuram. Well developed good quality seeds of nine parents and eighteen hybrids were sown in nursery. Twenty five days after sowing the seedlings were transplanted in the main field. The plot size is 1.8m x 3m. The seedlings were planted at a spacing of 60cm × 60cm. The cultural and management practices were done as per package of practices, recommendations (KAU, 1996) were followed. The data recorded in ten randomly selected plants in each replication for yield and its component traits were subjected to statistical scrutiny.

Results and Discussion

Data obtained on yield and quality traits of 18 hybrids were evaluated along with their parents are presented in tables 1 and 2, respectively. Significant difference were detected among the parents and hybrids with respect to all the characters studied. The plant height is an important trait by which growth and vigour of plants are measured. Indeterminate varieties/hybrids are generally preferred due to longer harvest duration and high yield. Among the parents, the maximum plant height was recorded in EC-461070 (112.33cm). Among the F_1's maximum plant height was recorded in EC-461070 × MTM Local (121.87cm). Similar results were also reported by Santhosh Kumari and Manishksharma (2011). The number of fruits per plant is a major yield contributing character and it was found maximum in EC-461070 (48.80) among the parents. Among the crosses, EC-461070 × MTM Local had maximum number of fruits per plant. These results are in

Table 1: Mean performance of line × tester hybrids for yield traits in tomato.

S. no.	Characters/ treatments	Plant height cm	No. of branches	Spread of the plant (cm)	No. of days to first flower	No. of days to first fruit harvest	No. of fruits per plant	Weight of individual fruit (g)	Weight of fruits per plant (g)
1	EC-461070(L_1)	112.33	24.67	78.10	52.27	95.07	48.80	70.38	3052.90
2	EC-461018(L_2)	84.66	14.73	53.47	43.56	75.67	32.93	83.26	2381.46
3	EC-461078(L_3)	64.87	12.71	33.26	47.18	77.17	21.97	61.28	1236.91
4	Arka Alok(L_4)	103.54	19.03	67.49	52.17	96.20	21.17	63.67	1217.38
5	PKM-1(L_5)	63.67	15.53	62.92	49.68	83.57	27.23	39.67	995.74
6	Mukthi (L_6)	83.43	12.77	57.93	50.61	93.53	18.10	65.87	1084.14
7	MTM Local(T_1)	84.07	14.17	56.95	50.71	93.23	28.00	79.75	2004.62
8	EC-461035(T_2)	81.07	13.03	61.19	49.05	81.30	20.53	70.00	1319.68
9	EC-461057(T_3)	71.65	13.27	52.96	51.95	81.03	31.33	36.12	1030.00
10	L_1 x T_1	121.87	25.80	81.87	47.40	91.03	50.43	90.01	3994.58
11	L_1 xT_2	100.54	21.03	70.73	50.95	86.47	27.33	71.63	1778.71
12	L_1 xT_3	84.94	18.47	69.02	48.81	77.73	23.73	49.73	1087.92
13	L_2 xT_1	90.03	15.47	60.62	43.97	91.13	32.90	90.37	2714.82
14	L_2 xT_2	90.82	15.57	64.22	41.96	77.13	34.67	88.59	2578.90
15	L_2 xT_3	80.34	11.40	53.23	52.08	75.10	32.23	52.43	1302.00
16	L_3 xT_1	81.95	14.70	48.24	51.46	85.33	29.07	70.72	1866.15
17	L_3 xT_2	73.55	13.80	46.48	50.75	76.60	24.46	71.34	1595.98
18	L_3 xT_3	71.08	14.67	44.20	49.92	78.53	21.53	49.28	934.97
19	L_{41} xT_1	86.54	20.27	65.71	47.68	86.03	23.97	71.86	1588.53
20	L_4 xT_2	93.80	17.50	67.45	48.34	77.17	22.37	75.50	1526.88
21	L_4 xT_3	76.06	16.37	64.49	52.43	75.97	26.47	45.92	1111.68
22	L_5 xT_1	87.97	16.57	61.93	47.74	83.27	33.17	76.52	2267.86
23	L_5 xT_2	79.42	16.73	65.03	49.74	80.27	22.57	52.95	1071.94
24	L_5 xT_3	66.61	16.90	63.82	51.50	89.03	32.87	54.96	1647.07
25	L_6 xT_1	87.76	15.30	60.28	52.66	86.20	22.30	70.21	1439.68
26	L_6 xT_2	87.10	15.53	62.96	49.42	90.13	23.23	72.19	1534.04
27	L_6 xT_3	85.29	16.20	63.36	47.41	75.57	28.80	42.56	1127.48
	F	23.77	19.51	20.23	5.77	47.44	8.89	58.34	20.03
	SE	2.76	0.77	2.26	1.17	0.99	2.59	2.01	164.31
	CD	7.85	2.10	6.42	3.32	2.82	7.31	5.73	467.08

line with the findings of Mrshamssi *et al*. (2006), Rani and Veeraragavathatham (2008).

High average fruit weight is prime importance in breeding of high yielding cultivars or hybrids. The parents showed significant differences in mean weight of individual fruit ranging from 36.12 g in EC-461057 to 83.26g in EC-461018. The hybrids also showed significant difference for this character. Among the hybrids maximum fruit weight was recorded in EC-461018 × MTM Local (90.37g). Higher fruit weight over the parents was also reported by Santhosh Kumari and Manishksharma (2011). High fruit yield per plant is the ultimate goal of any breeding programme, so requires higher consideration. The minimum weight of fruits per plant among the parents was exhibited by PKM-1 (995.74 g) and maximum by EC-461070 (3052.90g). Among the hybrids the minimum value was recorded by EC- 461078 × EC-461057 (934.97g) and maximum by EC-461070 × MTM Local (3994.58g), which was higher than the maximum value observed among the parents. Similar results were also reported by Harer *et al.* (2006).

Pericarp thickness is a major trait controlling firmness and keeping quality of tomato fruits. Fruits having high pericarp thickness can withstand shipping and remain firm for more number of days as compared to thin fleshed fruits. It was minimum in EC-461018 (3.47mm) and was maximum in MTM Local (6.46mm) among the parents. Among the F_1's, it ranged from 4.54 to 5.8 mm in the

Table 2: Mean performance of line x tester hybrids for quality traits in tomato.

S. no.	Characters/ treatments	No.of locules per fruit	No.of seeds per fruit	Pericarp thickness (mm)	Vitamin C (mg)	Carotene (mg)	pH of juice	TSS (%)	Sugar Content (%)	Shelf life (days)
1	EC-461070(L_1)	3.53	55.85	4.46	21.02	2126.67	4.62	4.58	3.46	10.36
2	EC-461018(L_2)	4.15	75.17	3.47	18.46	1806.67	4.62	5.31	3.70	9.47
3	EC-461078(L_3)	3.38	75.86	4.21	19.49	2230.00	4.59	4.52	3.26	8.27
4	Arka Alok(L_4)	4.03	82.07	4.81	19.48	2330.00	4.67	4.04	3.11	12.40
5	PKM-1(L_5)	3.00	85.42	4.94	21.02	1643.00	4.49	4.60	3.64	6.63
6	Mukthi (L_6)	4.09	85.64	5.22	22.57	1846.67	4.67	4.62	3.45	10.67
7	MTM Local(T_1)	3.20	96.83	6.46	24.10	1963.33	4.71	3.55	2.82	20.10
8	EC-461035(T_2)	4.04	127.88	6.09	27.69	1786.67	4.59	3.69	2.96	11.70
9	EC-461057(T_3)	3.58	84.46	4.71	27.69	1586.67	4.34	4.00	3.02	6.50
10	L_1 x T_1	3.66	124.23	5.80	22.57	2723.33	4.40	3.90	2.98	14.60
11	L_1 xT_2	3.57	131.39	5.63	25.64	2056.67	4.57	4.11	3.04	10.60
12	L_1 xT_3	3.56	75.59	4.54	25.13	2593.33	4.41	4.35	3.25	9.60
13	L_2 xT_1	3.68	85.44	5.12	21.02	2016.67	4.60	4.37	3.23	13.57
14	L_2 xT_2	4.17	139.02	5.00	27.69	1973.33	4.42	4.88	3.58	9.93
15	L_2 xT_3	3.85	78.17	4.75	24.10	1860.00	4.46	5.32	3.90	7.97
16	L_3 xT_1	3.29	80.70	4.55	23.07	2060.00	4.70	4.02	3.02	11.73
17	L_3 xT_2	3.52	120.26	5.32	23.59	1923.33	4.55	4.12	3.07	9.87
18	L_3 xT_3	3.46	96.32	4.87	23.07	2296.67	4.45	4.26	3.16	7.93
19	L_{41} xT_1	3.78	85.72	5.63	22.05	2633.33	4.61	3.95	2.94	15.07
20	L_4 xT_2	4.03	125.09	5.45	24.61	1880.00	4.62	4.15	3.09	11.20
21	L_4 xT_3	3.71	91.71	4.77	24.10	1980.00	4.44	4.15	3.00	8.70
22	L_5 xT_1	3.28	87.96	5.68	21.02	2013.33	4.15	4.68	3.27	10.63
23	L_5 xT_2	3.83	95.71	5.74	24.61	1963.33	4.48	4.08	3.03	9.03
24	L_5 xT_3	3.41	96.54	4.96	27.18	1750.00	4.42	4.76	3.57	8.17
25	L_6 xT_1	3.77	92.91	5.48	24.10	2073.33	4.67	3.64	2.83	12.93
26	L_6 xT_2	4.12	134.46	5.79	23.59	1836.67	4.63	4.60	3.38	10.60
27	L_6 xT_3	3.80	89.54	5.38	27.18	1646.67	4.26	4.10	3.1	8.17
	F	4.94	13.91	19.39	8.99	4.31	5.17	14.45	9.15	29.77
	SE	0.14	5.80	0.144	0.87	140.27	0.06	0.12	0.09	0.53
	CD	0.40	16.48	0.41	2.48	398.73	0.174	0.34	0.26	1.51

hybrids EC- 461070 × EC-461057 and EC-461070 × MTM Local, respectively. The parents showed a wide range of variability for shelf life ranging from 6.50 days in EC-461047 to 20.10 days in MTM Local. The hybrids also showed a wide range of variability from 7.93 days (EC-461078 × EC-461057) to 15.07 days (Arka Alok × MTM Local) for this character.

Total soluble solids (TSS) directly influences flavour of tomato and is an important quality parameter in the processing industry. Total soluble solid among the parents was found highest in EC-461018(5.31%). Among F_1's maximum total soluble solids was recorded in EC-461018 × EC-461057 (5.32%). Similar results were also reported by Anita *et al.* (2005). Ascorbic acid (vitamin C) content is nutritionally an important constituent. Small fruited genotypes are generally richer in Ascorbic acid (vitamin C) content. The mean for Vitamin C content ranged from 18.46 mg/100 g of fruit in EC-461018 to 27.69 mg/100g of fruit in EC-461035 in the parents, while the range of this character was from 21.02 mg/100g (Pkm-1 × MTM Local) to 27.69 mg/ 100g (EC-461018 × EC-461035) in the hybrids. Anita *et al.* (2005) and Singh *et al.* (2005) also found similar results. Carotenoids are important factors in human health and essential for vision. The Carotenoids are the main dietary source of Vitamin A. More recently protective effects of Carotenoids against serious disorders such as cancer, heart disease and degenerative eye disease have been recognized and have stimulated intensive research into the role of Carotenoids as antioxidants and as regulators of the immune response

system. Carotene content among the parents was found highest in Arka Alok (2330 Mg/100g). Among the hybrids maximum Carotene content was recorded in EC-461070 x MTM Local (2723.33 Mg/100g).

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