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Research Article

Performance of F_1 hybrids in cherry tomato [*Solanum lycopersicum* (L.) var. *cerasiforme* Mill.] for yield and quality

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Abstract
Field experiment was conducted in the Department of Vegetable Crops, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India to evaluate the cherry tomato F_1 hybrids along with their parents and checks for yield and quality characters under shade net condition. Among the hybrids, the hybrid LE 1223 x Pusa Cherry Tomato 1 recorded the highest fruit yield/plant (2325.35 g) followed by VGT 89 x LE 13 (2323.47 g), Pusa Cherry Tomato 1 x LE 87 (1598.54 g) and Pant Cherry Tomato 1 x VGT 89 (1568.34 g). Pant Cherry Tomato 1 x LE 1223 recorded the highest fruit firmness (1.61 kg/ sq. cm) followed by Pant Cherry Tomato 1 x IIHR 2754 (1.33 kg/ sq. cm). The cross Pusa Cherry Tomato 1 x LE 1223 recorded the highest pericarp thickness (2.54 mm) followed by Pusa Cherry Tomato 1 x LE 87 (2.51 mm). Among the hybrids, Pusa Cherry Tomato 1 x LE 87 and Pusa Cherry Tomato 1 x LE 1223 recorded the highest shelf life (32.00 days) followed by VGT 89 x LE 1223 (31.50 days). LE 1223 x LE 87 registered the highest total soluble solids of 8.75 °Brix, followed by LE 87 x IIHR 2753 (8.72 °Brix) and Pant Cherry Tomato 1 x IIHR 2753 (8.70 °Brix). IIHR 2753 x VGT 89 registered the highest lycopene content (8.72 mg/ 100 g) followed by LE 1223 x LE 87 (8.65 mg/ 100 g) and LE 1223 x LE 13 (8.61 mg/ 100 g).

Key words
Cherry tomato, *Cerasiforme*, Hybrid, Yield, Quality

INTRODUCTION

Tomato is the most imperative warm-season fruit vegetable grown throughout the world (Pedapati *et al.,* 2014). It contains vitamin C and lycopene, an antioxidant and anti cancerous properties (Kumar *et al.,* 2020). Cherry tomato [*Solanum lycopersicum* (L.) var. *cerasiforme* Mill.] is a popular, table purpose tomato with small fruits with a bright red colour resembling a cherry and having an excellent taste. This is a warm season crop and require long growing periods to reap more harvests and is the most promising crop under protected structures (Vidyadhar *et al.,* 2014). In order to produce high quality fruits with enhanced productivity, cherry tomatoes could be grown under shade houses. Cherry tomatoes, one of the promising wild types of *Solanum*, in breeding program offers great potential because of their valuable characteristics in terms of genetic diversity. The cherry tomatoes developed for fresh market and processing should have distinct quality characteristics (Kumar *et al.,* 2014). Therefore, the aim of the present study is to evaluate the cherry tomato hybrids for yield and quality characters under shade net conditions.

MATERIALS AND METHODS

The experiment was conducted in the Department of Vegetable Crops, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu. In the present investigation, eight cherry tomato parents *viz.,* LE 13, LE 87, LE 1223, VGT 89, IIHR 2753, IIHE 2754, Pant Cherry Tomato 1 and Pusa Cherry Tomato 1 were selected based on their superiority in the yield and quality traits. These eight parents were crossed in 'full diallel mating design' to develop fifty six hybrid combinations and they were evaluated along with their parents and checks (Lara and Sweet Bite). The study was aimed to evaluate the F_1 hybrids of cherry tomato along with their parents and checks for yield and quality. The experiment was laid out in a Randomized Block Design and was replicated thrice. The quality parameters *viz.,*

Table 1. *Per se* performance of parents and hybrids of cherry tomato for yield and quality traits

Parents / Hybrids / Checks	Yield/ plant (g)	Fruit firmness (kg/ sq. cm)	Pericarp thickness (mm)	Shelf life of fruits (days)	Total soluble solids (°Brix)	Lycopene (mg /100 g)
P1	1222.05	1.08	2.05	30.00	6.08	7.69
P2	1147.48	0.99	1.52	26.00	5.65	6.18
P3	1425.53	1.19	2.55	32.00	6.12	6.16
P4	1283.23	1.21	1.72	28.00	5.57	6.09
P5	1242.68	1.10	1.56	26.50	6.07	8.18
P6	986.02	1.18	1.34	24.50	6.05	8.13
P7	1095.82	1.17	1.29	24.00	6.10	8.17
P8	1061.46	1.05	1.21	23.00	5.98	8.16
P1 x P2	983.74	0.92	1.39	25.00	6.93	6.54
P1 x P3	816.34	0.89	1.91	29.00	5.80	6.52
P1 x P4	1143.42	1.15	2.12	30.50	5.37	6.65
P1 x P5	809.55	0.90	2.08	30.00	6.39	6.65
P1 x P6	1201.46	1.12	1.93	29.00	6.39	6.49
P1 x P7	659.07	0.87	1.62	27.00	7.28	6.45
P1 x P8	759.87	0.87	1.72	28.00	6.74	6.35
P2 x P1	993.07	0.85	1.49	26.00	7.27	7.75
P2 x P3	595.41	0.87	1.76	28.00	5.99	6.69
P2 x P4	866.38	0.93	2.01	29.00	6.00	6.27
P2 x P5	1032.20	0.90	1.72	28.00	8.72	8.32
P2 x P6	804.41	0.82	1.39	25.00	8.23	7.60
P2 x P7	516.31	0.75	1.28	23.50	6.52	6.28
P2 x P8	665.03	0.83	1.10	22.50	6.04	6.54
P3 x P1	1449.40	0.82	1.45	25.50	7.60	8.61
P3 x P2	1121.13	0.91	1.47	25.50	8.75	8.65
P3 x P4	640.76	0.96	2.14	30.50	7.27	6.35
P3 x P5	1394.50	0.85	1.69	27.50	6.57	7.34
P3 x P6	1503.72	0.87	1.53	26.00	6.19	7.86
P3 x P7	988.81	1.01	1.68	27.50	6.13	7.12
P3 x P8	2325.35	0.96	1.43	25.50	6.90	6.80
P4 x P1	2323.47	1.03	2.17	31.00	7.22	6.20
P4 x P2	1140.91	0.91	1.93	29.00	6.64	6.41
P4 x P3	1048.13	0.94	2.40	31.50	6.30	6.45
P4 x P5	1532.23	0.90	1.68	27.00	7.35	7.98
P4 x P6	1103.89	0.92	2.22	31.00	6.72	8.41
P4 x P7	804.67	0.94	2.12	30.00	5.77	6.37
P4 x P8	1092.30	0.99	1.61	27.00	6.10	6.11
P5 x P1	925.35	0.86	1.41	25.00	7.62	8.21
P5 x P2	1247.20	0.86	1.47	25.50	7.23	6.47
P5 x P3	882.13	0.86	1.23	23.00	5.80	8.09
P5 x P4	1283.84	0.87	1.62	27.00	6.92	8.72

Table 1 (Continued…)

Parents / Hybrids / Checks	Yield plant-1 (g)	Fruit firmness (kg sq. cm-1)	Pericarp thickness (mm)	Shelf life of fruits (days)	Total soluble solids (°Brix)	Lycopene (mg 100 g-1)
P5 x P6	393.42	0.82	1.31	24.00	5.40	6.12
P5 x P7	533.18	1.04	1.29	24.00	5.77	6.45
P5 x P8	464.59	0.95	1.24	23.00	5.78	6.17
P6 x P1	469.84	1.09	1.71	27.50	4.84	6.64
P6 x P2	901.29	1.05	2.17	30.50	5.87	6.27
P6 x P3	1146.26	1.00	2.11	30.00	5.32	7.24
P6 x P4	641.36	1.01	1.60	26.50	8.47	6.62
P6 x P5	658.72	1.17	1.54	26.50	8.24	7.63
P6 x P7	376.90	1.08	1.26	23.00	6.60	6.12
P6 x P8	534.38	1.12	1.36	24.50	6.97	6.57
P7 x P1	780.33	1.04	1.38	24.50	8.32	6.57
P7 x P2	829.69	0.99	1.61	27.00	6.15	6.08
P7 x P3	915.80	1.61	1.30	24.00	5.27	6.02
P7 x P4	1568.34	1.25	1.52	26.00	5.94	6.06
P7 x P5	1032.55	1.09	1.01	22.00	8.70	6.73
P7 x P6	835.57	1.33	1.16	22.50	7.35	6.00
P7 x P8	1086.12	1.11	0.98	21.50	7.70	6.06
P8 x P1	957.52	1.14	1.60	26.50	4.75	6.37
P8 x P2	1598.54	1.20	2.51	32.00	6.94	6.08
P8 x P3	1447.29	1.09	2.54	32.00	6.19	6.31
P8 x P4	1280.14	1.29	2.43	31.50	6.79	6.59
P8 x P5	1141.05	1.07	1.85	28.50	6.14	7.01
P8 x P6	615.29	1.16	1.82	28.00	6.09	6.94
P8 x P7	707.35	1.14	2.22	31.00	6.04	7.44
Varietal Check	1114.72	1.13	1.50	26.00	5.80	7.41
Hybrid Check 1	1208.18	1.51	2.04	29.00	8.39	7.51
Hybrid Check 2	1418.22	1.27	2.70	32.50	8.60	6.14
Parents mean	1183.03	1.12	1.66	26.75	5.95	7.35
Hybrids mean	992.31	1.00	1.68	27.00	6.65	6.85
Grand mean	1016.15	1.01	1.68	26.97	6.56	6.91
SEd	164.218	0.081	0.154	1.170	0.255	0.355
C.D (0.05)	328.166	0.163	0.308	2.338	0.509	0.709

P_1: LE 13 **P_3:** LE 1223 **P_5:** IIHR 2753 **P_7:** Pant Cherry Tomato 1
P_2: LE 87 **P_4:** VGT 89 **P_6:** IIHR 2754 **P_8:** Pusa Cherry Tomato 1
Varietal Check: Swarna Ratan **Hybrid Check 1:** Lara (Red) **Hybrid Check 2:** Sweet Bite (Orange)

fruit firmness (Dhatt and Singh, 2004), pericarp thickness, shelf life of fruits (Abound, 1974), the total soluble solids and lycopene (Ranganna, 1979) were studied. The estimates of mean, variance and standard error were done as per Panse and Sukhatme (1957).

RESULTS AND DISCUSSION

Based on *per se* performance, the highest fruit/plant (**Table 1**) was recorded in the parent LE 1223 (1425.53g) followed by VGT 89 (1283.23g), IIHR 2753 (1242.68 g) and LE 13 (1222.05g). Among the hybrids, the hybrid LE 1223 x Pusa Cherry Tomato 1 recorded the highest fruit yield/ plant[1] (2325.35g) followed by VGT 89 x LE 13 (2323.47g), Pusa Cherry Tomato 1 x LE 87 (1598.54g), Pant Cherry Tomato 1 x VGT 89 (1568.34g), VGT 89 x IIHR 2753 (1532.23g) and LE 1223 x IIHR 2754 (1503.72g). Similar results were observed by Kumar *et al*. (2012). Among the eight parents, VGT 89 registered the highest fruit firmness (1.21 kg /sq. cm) and the least was recorded by LE 87 (0.99 kg/sq cm). Among the 56 hybrids evaluated, Pant

Cherry Tomato 1 x LE 1223 recorded the highest fruit firmness (1.61kg/sq cm) followed by Pant Cherry Tomato 1 x IIHR 2754 (1.33 kg/sq cm) and Pusa Cherry Tomato 1 x VGT 89 (1.29kg/ sq cm). The supporting evidences on fruit firmness were available from the results of Kaur and Cheema (2005). The pericarp thickness was highest in parent LE 1223 (2.55mm) and the least in Pusa Cherry Tomato 1 (1.21mm). Among the hybrids developed, the cross Pusa Cherry Tomato 1 x LE 1223 recorded the highest pericarp thickness (2.54mm) followed by Pusa Cherry Tomato 1 x LE 87 (2.51mm) and Pusa Cherry Tomato 1 x VGT 89 (2.43mm). Vinay *et al*. (2012) also recorded the highest pericarp thickness in their trails. The parent LE 1223 remained fresh for more number of days (32.00) while Pusa Cherry Tomato 1 was found to have the least value for shelf life (23.00 days). Among the hybrids, the cross Pusa Cherry Tomato 1 x LE 87 and Pusa Cherry Tomato 1 x LE 1223 recorded the highest shelf life (32.00 days) followed by VGT 89 x LE 1223 (31.50 days) and this was in conformity with the findings made by Yadav *et al*. (2013). The parental mean values for the total soluble solids ranged from 5.57 to 6.12 °Brix as recorded by VGT 89 and LE 1223 respectively. Among the hybrids LE 1223 x LE 87 registered the highest total soluble solids of 8.75 °Brix, followed by LE 87 x IIHR 2753 (8.72 °Brix), Pant Cherry Tomato 1 x IIHR 2753 (8.70 °Brix), IIHR 2754 x VGT 89 (8.47 °Brix) and Pant Cherry Tomato 1 x LE 13 (8.32 °Brix). Similar results were observed by Kumari and Sharma (2011) for this trait. Estimation of lycopene content of cherry tomato revealed that among the eight parents the highest value of 8.18 mg/100g was observed in the parent IIHR 2753. Among the hybrids, IIHR 2753 x VGT 89 registered the highest lycopene content (8.72 mg/100g) followed by LE 1223 x LE 87 (8.65mg/100g) and LE 1223 x LE 13 (8.61mg/100g) and this was in conformity with the findings of Nair (2010).

Among the hybrids, LE 1223 x Pusa Cherry Tomato 1 and VGT 89 x LE 13 recorded the highest fruit yield/plant. The hybrids Pant Cherry Tomato 1 x LE 1223 (fruit firmness), Pusa Cherry Tomato 1 x LE 1223 (pericarp thickness and shelf life), LE 1223 x LE 87 (the total soluble solids) and IIHR 2753 x VGT 89 (lycopene) excelled in quality contributing characters. Hence, these hybrids could be better utilized for further breeding programme for the improvement of cherry tomato.

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