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EVALUATION OF F_1 HYBRIDS IN CHERRY TOMATO [*Solanumly copersicum* (L.) var. *Cerasiforme* Mill.] FOR YIELD AND QUALITY

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ABSTRACT

A filed experiment was conducted in the university orchard, 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^{-1} (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^{-1}) followed by Pant Cherry Tomato 1 x IIHR 2754 (1.33 kg sq. cm^{-1}). 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^{-1}) followed by LE 1223 x LE 87(8.65 mg 100 g^{-1}) and LE 1223x LE 13 (8.61 mg 100 g^{-1}).

(Key words: Cherry tomato, *Cerasiforme*, Hybrid, Yield, Quality)

INTRODUCTION

Tomato is one of the highly consumed vegetable after potato (Patil and Paranidharan, 2019). 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 required long growing periods to reap more harvests and is the most promising crop under protected structures (Vidyadhar *et al.,* 2014). Protected cultivation provides potential area for higher production of vegetables (Kadam *et al.,* 2017). In order to produce high quality fruits with enhanced productivity, cherry tomato could be grown under shade houses. Cherry tomatoes, one of the promising wild types of *Solanum*, in breeding programs offers great potential because of their valuable characteristics in terms of genetic diversity. Cherry tomato often called 'salad tomato' and being high content of antioxidant and phytochemical compounds, it is needless to emphasis the importance of quality parameter for fresh and processed produce. 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 was to evaluate the cherry tomato hybrids for yield and quality characters under shade net conditions.

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MATERIALS AND METHODS

The experiment was conducted in the university orchard, 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.The study was aimed at 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.,* fruit firmness (Dhatt and Singh, 2004), pericarp thickness, shelf life of fruits (Abound, 1974), 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 yield plant^{-1}(Table 1) was recorded in the parent LE 1223(1425.53 g) followed by VGT 89 (1283.23 g), IIHR 2753(1242.68 g) and LE 13(1222.05 g). Among the hybrids, the hybrid LE 1223 x Pusa Cherry Tomato 1 recorded the highest fruit yield plant^{-1} (2325.35 g) followed by VGT 89 x LE 13 (2323.47 g), Pusa Cherry Tomato 1 x LE 87 (1598.54 g), Pant Cherry Tomato 1 x VGT 89 (1568.34 g), VGT 89 x IIHR 2753(1532.23 g) and LE 1223 x IIHR 2754 (1503.72 g).The increased yield of first generation hybrids obtained in the present study had found to be correlated with the findings of Kumar *et al*. (2012).Among the eight parents, VGT 89 registered the highest fruit firmness (1.21 kg sq. cm^{-1}) and the least was recorded by LE 87 (0.99 kg sq. cm^{-1}). Among the 56 hybrids evaluated, Pant Cherry Tomato 1 x LE 1223 recorded the highest fruit firmness (1.61 kg sq. cm^{-1}) followed by Pant Cherry Tomato 1 x IIHR 2754 (1.33 kg sq. cm^{-1}) and Pusa Cherry Tomato 1 x VGT 89 (1.29 kg sq. cm^{-1}). Supporting evidences on fruit firmness were available from the results of Kaur and Cheema (2005). Pericarp thickness was highest in parent LE 1223 (2.55 mm) and least in Pusa Cherry Tomato 1 (1.21 mm). Among the hybrids developed, 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) and Pusa Cherry Tomato 1 x VGT 89 (2.43 mm). 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). They registered the highest shelf life in the cross Potato Leaf x VR 20 (14.97 days) of tomato. The parental mean values for total soluble solids ranged from 5.57 to 6.12 °Brix as recorded by VGT 89 andLE 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. They evaluated 45 F_1 hybrids and noted the highest value of 4.6 per cent total soluble solids in cross EC 521051 x SolanVajr of tomato.Estimation of lycopene content of cherry tomato revealed that among the eight parents the highest value of 8.18 mg 100 g^{-1} was observed in the parent IIHR 2753. Among the hybrids, IIHR 2753 x VGT 89 registered the highest lycopene content (8.72 mg 100 g^{-1}) followed by LE 1223 x LE 87 (8.65 mg 100 g^{-1}) and LE 1223x LE 13 (8.61 mg 100 g^{-1}) and this was in conformity with the findings of Nair (2010). He registered the highest lycopene in the cross LE 1250 x LE 1251 (6.24 mg 100 g^{-1}) and the least value in the cross LE 1249 x CLN 2123 A (1.17 mg 100 g^{-1}) of tomato.

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

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})
P_1	1222.05	1.08	2.05	30.00	6.08	7.69
P_2	1147.48	0.99	1.52	26.00	5.65	6.18
P_3	1425.53	1.19	2.55	32.00	6.12	6.16
P_4	1283.23	1.21	1.72	28.00	5.57	6.09
P_5	1242.68	1.10	1.56	26.50	6.07	8.18
P_6	986.02	1.18	1.34	24.50	6.05	8.13
P_7	1095.82	1.17	1.29	24.00	6.10	8.17
P_8	1061.46	1.05	1.21	23.00	5.98	8.16
$P_1 \times P_2$	983.74	0.92	1.39	25.00	6.93	6.54
$P_1 \times P_3$	816.34	0.89	1.91	29.00	5.80	6.52
$P_1 \times P_4$	1143.42	1.15	2.12	30.50	5.37	6.65
$P_1 \times P_5$	809.55	0.90	2.08	30.00	6.39	6.65
$P_1 \times P_6$	1201.46	1.12	1.93	29.00	6.39	6.49
$P_1 \times P_7$	659.07	0.87	1.62	27.00	7.28	6.45
$P_1 \times P_8$	759.87	0.87	1.72	28.00	6.74	6.35
$P_2 \times P_1$	993.07	0.85	1.49	26.00	7.27	7.75
$P_2 \times P_3$	595.41	0.87	1.76	28.00	5.99	6.69
$P_2 \times P_4$	866.38	0.93	2.01	29.00	6.00	6.27
$P_2 \times P_5$	1032.20	0.90	1.72	28.00	8.72	8.32
$P_2 \times P_6$	804.41	0.82	1.39	25.00	8.23	7.60
$P_2 \times P_7$	516.31	0.75	1.28	23.50	6.52	6.28
$P_2 \times P_8$	665.03	0.83	1.10	22.50	6.04	6.54
$P_3 \times P_1$	1449.40	0.82	1.45	25.50	7.60	8.61
$P_3 \times P_2$	1121.13	0.91	1.47	25.50	8.75	8.65
$P_3 \times P_4$	640.76	0.96	2.14	30.50	7.27	6.35
$P_3 \times P_5$	1394.50	0.85	1.69	27.50	6.57	7.34
$P_3 \times P_6$	1503.72	0.87	1.53	26.00	6.19	7.86
$P_3 \times P_7$	988.81	1.01	1.68	27.50	6.13	7.12
$P_3 \times P_8$	2325.35	0.96	1.43	25.50	6.90	6.80
$P_4 \times P_1$	2323.47	1.03	2.17	31.00	7.22	6.20
$P_4 \times P_2$	1140.91	0.91	1.93	29.00	6.64	6.41
$P_4 \times P_3$	1048.13	0.94	2.40	31.50	6.30	6.45
$P_4 \times P_5$	1532.23	0.90	1.68	27.00	7.35	7.98
$P_4 \times P_6$	1103.89	0.92	2.22	31.00	6.72	8.41
$P_4 \times P_7$	804.67	0.94	2.12	30.00	5.77	6.37
$P_4 \times P_8$	1092.30	0.99	1.61	27.00	6.10	6.11
$P_5 \times P_1$	925.35	0.86	1.41	25.00	7.62	8.21
$P_5 \times P_2$	1247.20	0.86	1.47	25.50	7.23	6.47
$P_5 \times P_3$	882.13	0.86	1.23	23.00	5.80	8.09
$P_5 \times P_4$	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})
P_5 x P_6	393.42	0.82	1.31	24.00	5.40	6.12
P_5 x P_7	533.18	1.04	1.29	24.00	5.77	6.45
P_5 x P_8	464.59	0.95	1.24	23.00	5.78	6.17
P_6 x P_1	469.84	1.09	1.71	27.50	4.84	6.64
P_6 x P_2	901.29	1.05	2.17	30.50	5.87	6.27
P_6 x P_3	1146.26	1.00	2.11	30.00	5.32	7.24
P_6 x P_4	641.36	1.01	1.60	26.50	8.47	6.62
P_6 x P_5	658.72	1.17	1.54	26.50	8.24	7.63
P_6 x P_7	376.90	1.08	1.26	23.00	6.60	6.12
P_6 x P_8	534.38	1.12	1.36	24.50	6.97	6.57
P_7 x P_1	780.33	1.04	1.38	24.50	8.32	6.57
P_7 x P_2	829.69	0.99	1.61	27.00	6.15	6.08
P_7 x P_3	915.80	1.61	1.30	24.00	5.27	6.02
P_7 x P_4	1568.34	1.25	1.52	26.00	5.94	6.06
P_7 x P_5	1032.55	1.09	1.01	22.00	8.70	6.73
P_7 x P_6	835.57	1.33	1.16	22.50	7.35	6.00
P_7 x P_8	1086.12	1.11	0.98	21.50	7.70	6.06
P_8 x P_1	957.52	1.14	1.60	26.50	4.75	6.37
P_8 x P_2	1598.54	1.20	2.51	32.00	6.94	6.08
P_8 x P_3	1447.29	1.09	2.54	32.00	6.19	6.31
P_8 x P_4	1280.14	1.29	2.43	31.50	6.79	6.59
P_8 x P_5	1141.05	1.07	1.85	28.50	6.14	7.01
P_8 x P_6	615.29	1.16	1.82	28.00	6.09	6.94
P_8 x P_7	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
CD (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)

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