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## Evaluation of cherry tomato [*Solanum lycopersicum* L. var. *cerasiforme* (Dunnal) A. Gray] genotypes for yield and quality traits

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**ABSTRACT :** The present research work was undertaken to identify the genetically divergent genotypes for higher yield and desirable quality traits under shade net in tropical climatic condition. The study consisted of eighteen genotypes collected from different places were raised, evaluated and studied for mean performance for yield and yield contributing traits and for quality traits. Based on *per se* performance of genotypes, the genotype Solan Red Round was adjusted as the best for tropical condition, since it had recorded superior performance for twelve characters *viz.*, number of branches per plant (21.1), number of fruits per cluster (5.13), single fruit weight (10.57g), pericarp thickness (2.24mm), fruit yield per plant (2.94kg), estimated fruit yield per hectare (73.42t), total chlorophyll content (4.08mg/g), leaf area index (1.91), dry matter production (2.5t/ha), titratable acidity (0.42%), total soluble solids (6.03 °Brix) and lycopene (1.96mg/100g). It was followed by Kamanoor Local, K C Patti Local, Aadalur Local and Kodalangadu Local under shade net condition. The highest plant height (5.18m) and number of clusters per plant (96.57) was recorded in Aranuttrumalai Local and Thandikudi Local, respectively.

**KEY WORDS :** Cherry tomato, Cerasifomae, Genotypes, Shadenet, Lycopene

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Cherry tomato [*Solanum lycopersicum* L. var. *cerasiforme* (Dunnal) A. Gray] is a cultivated variety of tomato and belongs to the family Solanaceae. It is thought to have originated in Peru and Northern Chile. It is the probable ancestor of all cultivated tomatoes. The variety is generally considered to be similar but not identical to the wild relatives of the domestic tomato (Prema *et al.*, 2011). Cherry tomatoes are widely cultivated in Central America and are distributed in California, Korea, Germany, Mexico and Florida. Cherry tomato is grown for its edible fruits; they are perfect for making processed products like sauce, soup, ketchup, puree, curries, paste, powder, rasam and sandwich (Anonymous, 2009).

Cherry tomato is a tomato variety with small fruit, with different shapes and colours and it is mainly used for fresh consumption. Cherry tomato is small in size, has a sweeter taste and offers several significant nutritional benefits, noted that cherry tomatoes have intense colour and flavour, generally round in shape and weighing 10 to 30g. Its fruits are consumed more as a salad fruit rather than as a vegetable. Cherry tomato often called 'salad tomato'. The cherry tomato is also beneficial to human health because of its high content of antioxidant and phytochemical compounds including lycopene,  $\beta$ - carotene, flavonoids, Vit C and many essential nutrients.

Cherry tomato has good nutritional information

Table A : Details of genotypes used in the study		
Accession numbers	Name of accessions	Sources
ACC.1	Ammikulavi Local	Ammikulavi estate, Lower Pulney hills, Kodaikanal
ACC.2	Periyur Local	Periyur, Lower Pulney hills, Kodaikanal
ACC.3	Naduppatti Local	Naduppatti, Lower Pulney hills, Kodaikanal
ACC.4	Karumandhurai Local	Kalrayan hills, Salem
ACC.5	Ambedkar nagar Local	Thandigudi, Lower Pulney hills, Kodaikanal
ACC.6	Mangalamkombu Local	Mangalamkombu, Lower Pulney hills, Kodaikanal
ACC.7	Adalur Local	Adalur, Lower Pulney hills, Kodaikanal
ACC.8	Aranuttrumalai Local	Kalrayan hills, Salem
ACC.9	Ragavendra estate Local	Ragavendra estate, Lower Pulney hills, Kodaikanal
ACC.10	Yercaud Local	Shevaroy hills, Salem
ACC.11	Batlangadu Local	Lower Pulney hills, Kodaikanal
ACC.12	Thandigudi Local	Lower Pulney hills, Kodaikanal
ACC.13	K C Patti Local	Lower Pulney hills, Kodaikanal
ACC.14	Kamanoor Local	Lower Pulney hills, Kodaikanal
ACC.15	Pandrimalai Local	Panrimalai , Lower Pulney hills, Kodaikanal
ACC.16	Kodalangadu Local	Lower Pulney hills, Kodaikanal
ACC.17	Nalloorkadu Local	Lower Pulney hills, Kodaikanal
ACC.18	Solan Red Round	UHF, Nauni, Solan, Himachal Pradesh

being, total carbohydrate, sugars, protein, calcium, and iron. They are a great source of vitamin-C (13 mg/100 g), dietary fibre (2.0 g), vitamin A (25%) and vitamin K and also a good source of vitamin E (Alpha Tocopherol), thiamine, niacin, vitamin B<sub>6</sub>, foliate, phosphorus, copper, potassium and manganese (Anonymous, 2009).

Cherry tomato is widely present in sub-tropical areas of Tamil Nadu state namely, Kodaikanal hills, Shervroy hills, Kalrayan hills and other hills. Usually the crop is ideally available in a hill track. Now we want to introduce and evaluate more in tropical plain condition. For which cherry tomato introduce under protected structures. Because the evaluation started under shade net house condition to suit and acclimatize at this tropical climate. The present investigation was undertaken to evaluate the cherry tomato genotypes for yield and quality.

## RESEARCH METHODS

The experiment was conducted in shade net house at College Orchard, Department of Horticulture, Agricultural College and Research Institute, Madurai the research area located at 09°58' 30.5" N latitude, 078°12' 27.4 E longitude and at an altitude of 158 m above the mean sea level during 2015-16. Eighteen genotypes were collected different locations (Table A) and the details are given below. The seedlings were raised in pro trays and transplanted in shadenet house with 33 per cent

shade. They were planted at spacing of 100cm x 40cm in Randomized Block Design with three replication.

The growth, yield, and quality parameters leaf area index (Hoffman, 1971), total chlorophyll (Yoshida *et al.*, 1971). The estimation quality traits *viz.*, ascorbic acid and titrable acidity by using the procedure of A.O.A.C. (1975), Lycopene content by was estimated in the fresh cherry tomato samples (Ranganna, 1979). The mean performance of the different genotypes for quantitative and biochemical characters was studied. The estimates of mean, variance and standard error were done as per Panse and Sukhatme (1967). The Data from mean of individual genotypes were subjected to usual method of analysis of variance (ANOVA). The significance tests were carried out for the F value by referring to the table given by Snedecor (1967).

## RESEARCH FINDINGS AND DISCUSSION

The success of crop improvement lines in the selection of suitable parents. The analysis of variance revealed that significant differences among the genotypes for all the traits under shade net condition. In the present study, the result showed that the height of plants under shade net house was significantly high. Among the eighteen genotypes, the genotype Aranuttrumalai Local (5.17m) was found to be the tallest. This may be due to etiolation effect under shade net condition and low light

throw the plant height. Optimum temperature, increased carbon dioxide concentration, better light distribution may also be the reason for better crop growth. This was in agreement with the results of Kumar and Arumugam (2010).

The number of branches per plant is one of the yield increasing traits in cherry tomato. The genotype Solan Red Round (21.1) recorded more number of branches followed by Kamanoor Local and K C Patti Local. This might be due to the prevalence of micro climate and optimum light intensity inside the shade net house for vigorous growth and this result was in accordance with the findings of Rana *et al.* (2014) in tomato.

### **Yield and yield contributing traits :**

The higher number of clusters per plant was registered in the genotype Thandigudi Local (96.57) maximum followed by Aadalur Local (95.88), Batlangadu Local (95.12), might have been exposed to favourable environment, like accumulation of more photosynthates, optimum light, temperature which would result in increased yield. Similar findings were also reported by Singh *et al.* (2005) in tomato under shade net condition (Table 1).

The genotype Solan Red Round (5.13) and Kodalangadu Local (5.13) registered more number of fruits per cluster followed by Thandigudi Local (5.08) and K C Patti Local (5.03) under shade net condition. This might be due to the prevalence of micro climate with better environmental conditions with optimum temperature would helped in the better pollination and ultimately leads to more fruit set as revealed by Cheema *et al.* (2013).

Among the eighteen entries investigated in the present study, the highest pericarp thickness was observed in Solan Red Round (2.24mm) followed by Kamanoor Local (1.98mm) and K C Patti Local (1.81mm). Tomatoes with thicker pericarp would stand for long distance transport and keeps well (Bhutani and Kalloo, 1991). The pericarp thickness also important character for more storability which inturn indirectly helps in getting more market price.

In the present study, the genotype Thandigudi Local (490.8) registered more number of fruits per plant followed by K C Patti Local (464.3), Kodalangadu Local (462.7), Aadalur Local (439.8) and Batlangadu Local (430.9) under shade net condition. Cherry tomato cultivated under shade net house, might have exposed to

optimum growing environment, besides accumulation of more photosynthates, which might reflect on more number of fruits. The similar findings were also obtained by Ngouajio *et al.* (2007) in tomato under shade net house condition.

In respect of single fruit weight, the genotypes Solan Red Round (10.57g), followed by Kamanoor Local (6.49) and Yercaud Local (5.82) excelled than other genotypes studied under shade net condition. The results are in accordance with Choudhury and Bhuyan (1992) reported that shading net resulted in higher rate of photosynthesis, which might reflect on higher fruit weight in tomato. Similarly, the fruit yield per plant were also found to be highest under shade net house during summer and winter seasons as compared to open field condition. The genotype Solan Red Round recorded the highest fruit yield per plant (2.94kg) and estimated fruit yield (73.42t/ha), while, lowest fruit yield was recorded in the genotype Periyur Local (0.89kg/plant) and Panimalai Local (24.73t/ha). This may be due to the increased yield through yield contributing characters *viz.*, more number of branches, and more number of fruits per cluster, fruit weight under shade net house than field condition. El-Gizawy *et al.* (1993) reported that increasing shading intensity in a tomato crop resulted in an upto 51 per cent total production increase.

### **Physiological traits :**

The genotype Solan Red Round (4.08mg/g) registered the highest total chlorophyll content under shade net condition. The total dry matter production was found the highest in Solan Red Round (2.5t/ha) followed by Kamanoor Local (1.82t/ha) and K C Patti Local (1.78t/ha) under shade net condition.

The genotype Solan Red Round (1.90) recorded the highest leaf area index followed by Yercaud Local (1.89) and K C Patti Local (1.88) under shade net condition. This might be due to leaf physiology and increased number of stomatoes and photosynthesis. The light intensity in the shade net house was lower than in the open field. Similar result also reported by Rajasekar *et al.* (2013). Being Solan Red Round is highly amenable to grow under shade net condition in tropical plains because this variety is basically grown in sub-tropical climate under open condition in north-India.

### **Qualitative traits :**

The genotypes Karumandhurai Local (5.36mg/100g)

**Table 1 : Mean performance of cherry tomato genotypes for quantitative traits under shade net condition**

Sr. No.	Genotypes	Plant height (cm)	Number of branches for plant	Number of cluster per plant	Number of fruits per cluster	Pericarp thickness (mm)	Single fruit weight (g)	Number of fruits per plant	Fruit yield per plant (kg/plant)	Estimated fruit yield/ha (ton/ha)
1.	Ammikulavi local	4.08*	13.1	64.23	4.23	1.30	4.49	271.5	1.22	30.48
2.	Periyur local	4.14*	10.0	59.93	3.81	1.09	3.88	228.5	0.89	22.15
3.	Naduppatti local	3.27	11.3	64.33	4.09	0.63	4.33	262.9	1.14	28.48
4.	Karumandhurai local	3.37	12.3	86.57*	4.73*	1.01	3.78	409.2*	1.54	38.61
5.	Ambedkar nagar local	4.23*	15.3*	87.90*	3.65	1.17	4.29	320.6	1.38	34.48
6.	Mangalamkombu local	3.23	14.6	67.63	4.38	1.28	4.43	296.3	1.31	32.87
7.	Aadalur local	3.85*	15.2*	95.88*	4.59*	1.72*	4.67	439.8*	2.06*	51.38*
8.	Aranuttrumalai local	5.17*	15.1*	93.07*	4.58*	1.00	3.74	411.0*	1.54	38.54
9.	Ragavendra estate local	3.01	10.8	82.17	4.26	0.76	5.16*	349.7	1.81	45.18
10.	Yercaud local	3.33	17.0*	83.37*	3.66	1.48*	5.82*	305.2	1.78	44.43
11.	Batlangadu local	4.26*	15.6*	95.12*	4.53*	1.06	4.74	430.9*	2.04*	51.05*
12.	Thandigudi local	4.07*	15.4*	96.57*	5.08*	1.52*	4.15	490.8*	2.04*	51.07*
13.	K C patti local	2.96	17.6*	92.23*	5.03*	1.81*	5.34*	464.3*	2.47*	61.83*
14.	Kamanoor local	3.61	19.7*	90.05*	4.65*	1.98*	6.49*	418.6*	2.71*	67.83*
15.	Pandrimalai local	3.61	10.7	69.13	3.76	0.86	3.80	259.9	0.99	24.73
16.	Kodalangadu local	3.81*	16.6*	90.27*	5.13*	1.25	4.70	462.7*	2.17*	54.36*
17.	Nalloorkadu local	3.52	15.4*	90.77*	4.34	1.14	4.20	394.5*	1.66	41.41
18.	Solan red round	3.42	21.1*	54.18	5.13*	2.24*	10.57*	278.3	2.94*	73.42*
	Mean	3.72	14.8	81.30	4.42	1.29	4.92	360.8	1.76	44.02
	S.E.±	1.56	0.26	3.50	0.22	0.08	0.32	20.52	0.11	2.95
	C.D. (P=0.05)	3.18	0.53	7.12	0.45	0.17	0.66	41.72	0.23	6.01

\* indicates significance of value at P=0.05

**Table 2 : Mean performance of cherry tomato genotypes for physiological and qualitative traits under shade net condition**

Sr. No.	Genotypes	Total chlorophyll (mg/g)	Total dry matter production (t/ha)	Leaf area index	Total soluble solids (°Brix)	Titrateable acidity (%)	Ascorbic acid (mg/100g)	Lycopene (mg/100g)
1.	Ammikulavi local	2.58	1.50	1.377	6.67*	0.53*	57.08*	0.14
2.	Periyur local	3.04*	1.56	1.233	4.90	0.73	41.47	0.60
3.	Naduppatti local	2.52	1.54	1.259	5.01	0.58*	42.99	0.83
4.	Karumandhurai local	2.22	1.33	1.443	5.97	0.84	26.76	5.36*
5.	Ambedkar nagar local	1.89	1.50	1.315	5.81	0.60	44.89*	2.18*
6.	Mangalamkombu local	2.73	1.67*	1.354	5.19	0.80	38.87	3.64*
7.	Aadalur local	3.14*	1.73*	1.735*	6.62*	0.24*	39.59	2.87*
8.	Aranuttrumalai local	3.38*	1.50	1.458	6.09*	0.41*	55.34*	3.08*
9.	Ragavendra estate local	3.26*	1.28	1.534	5.23	0.68	61.45*	1.45
10.	Yercaud local	2.53	1.57	1.894*	7.47*	0.73	42.78	2.68*
11.	Batlangadu local	3.31*	1.73*	1.620*	6.19*	0.32*	40.74	0.52
12.	Thandigudi local	2.85*	1.59	1.670*	5.28	0.76	40.92	1.56
13.	K C patti local	2.58*	1.78*	1.886*	6.77*	0.63	41.55	0.28
14.	Kamanoor local	3.53*	1.82*	1.549	5.58	0.39*	38.35	1.38
15.	Pandrimalai local	2.83	1.58	1.293	5.71	0.49*	38.53	1.49
16.	Kodalangadu local	2.82	1.76*	1.773*	6.19*	0.85	42.43	1.67
17.	Nalloorkadu local	2.33	1.47	1.488	4.50	0.88	57.71*	0.48
18.	Solan red round	4.08*	2.50*	1.905*	6.03*	0.42*	30.75	1.96*
	Mean	2.87	1.63	1.544	5.85	0.60	43.46	1.79
	S.E.±	0.17	0.07	0.03	0.30	0.02	1.94	0.14
	C.D. (P=0.05)	0.35	0.14	0.06	0.62	0.05	3.94	0.29

\*indicates significance of value at P=0.05

registered high lycopene content followed by Mangalamkombu Local (3.64mg/100g) and Aranuttrumalai Local (3.08mg/100g) under shade net condition. This is in consonance with the experiments conducted by Cheema *et al.* (2013) in tomato.

Among the genotypes, titrable acidity was the lowest in Aadalur Local (0.24%) followed by Batlangkadu Local (0.32%) and Kamanoor Local (0.39%) under shade net condition. The lower acidity of the fruits grown in the protected environment may be a result of the lower photosynthetic activity of the plant (shading in protected environment) in this environment and lower carbohydrate accumulation in the fruits during summer season. The low values of titratable acidity were because of red tomato fruits used for analysis (Rana *et al.*, 2014).

For total soluble solids, the genotype Yercaud Local (7.47 °Brix) recorded more total soluble solids followed by K C Patti Local (6.77 °Brix) and Ammikulavi Local (6.67 °Brix) under shade net condition. Higher ascorbic acid content was registered in the genotype Ragavendra estate Local (61.45mg/100g) recorded more ascorbic acid content, followed by Nalloorkadu Local (57.7 mg/100g) and Ammikulavi Local (57.08 mg/100g). Increased ascorbic acid content of tomato under shading was also reported by Smitha (2002). The genotype Solan Red Round registered the highest moisture content, followed by Thandigudi Local and Kamanoor Local (Table 2).

Over all, considering the quantitative, physiological and qualitative traits Solan Red Round was adjudged as the best genotype as evidenced by superior performance for twelve characters out of the sixteen characters studied *viz.*, number of branches per plant, number of fruits per cluster, pericarp thickness, single fruit weight, fruit yield per plant, estimated fruit yield per hectare, total chlorophyll content, leaf area index and dry matter production, titratable acidity, total soluble solids and lycopene. The other genotypes *viz.*, K C Patti Local had superiority for twelve characters out of sixteen characters whereas Kamanoor Local had superiority for ten characters based on mean performance. Hence, these genotypes could be better utilized for further breeding programme for the improvement of fruit yield and quality traits.

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