

Short Communication

## Evaluation of cherry tomato varieties (*Solanum lycopersicum* var. *cerasiforme*) for growth, yield and quality under naturally ventilated polyhouse

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Cherry tomato (*Solanum lycopersicum* var. *cerasiforme*) is a botanical variety of the cultivated tomato. It is a small garden variety of tomato which bears tasty, numerous small sized fruits in clusters along the stems and branches of the plant having chromosome number  $2n = 24$ . It has become more popular all over the world because of a good source of vitamins A and C, TSS content and good taste. It is marketed at a premium to ordinary tomatoes. The demand for tomato, especially cherry tomato (*Lycopersicon esculentum* var. *cerasiforme*) has increased primarily due to the increase in quality (Alarcon et al. 1994). Flavour is generally determined by total soluble solids (TSS) and can be high in cherry tomatoes. Red color is more common, but other varieties such as yellow, green, and black also exist. The cherry tomato is also beneficial to human health because of its high content of antioxidant and phytochemical compounds including lycopene, Beta carotene, flavonoids, vitamin C and many essential nutrients (Rosales et al. 2010). Cherry tomatoes are widely used in salads, as appetizer and for garnishing foods in hotels and restaurants. No research on cherry tomato was done till now and still infancy for farmer's field and as well as for consumption market. In view of this the present experiment was done to see the performance of some cherry tomato varieties in Assam under NV polyhouse condition.

A field investigation was carried out under naturally ventilated polyhouse in the Experimental Farm Department of Horticulture, Assam Agricultural University, Jorhat-785013 during 2017-18. The objective of this investigation was to study the relative

performance of cherry tomato varieties under naturally ventilated polyhouse. The experiment was conducted in during rabi season in Randomized Block Design replicated for three times. There were twelve varieties of cherry tomato viz., Roja, Laila, Sheeja, Ruhi, Cherry Tomato Red, Cherry Tomato Yellow, Lara, Sweet Bite, Yellow Pear tomato, Garden's Delight, Pusa Cherry-1 and Meghalaya local in this study. The seedlings were raised in portray containing cocopeat, vermiculite and perlite in the ratio of 3:1:1 volume by volume in the month of October and thirty days old seedlings were planted in the NV Polyhouse in the first week of November. The soil of the polyhouse was prepared to fine tilth and seedlings were plants at a distance of 1 m between rows and 60 cm within rows. Each treatment i.e. variety in each replication was 10 nos of plants. The crop was raised as per package of practices of tomato. Observations on five randomly selected plants were recorded for various growth, yield and quality attributing traits as per standard procedure. Total Soluble Solids (TSS) of the cherry tomato fruits were determined by Zeiss Hand Refractometer. Ascorbic acid content were determined by 2,6 Dichlorophenol indophenols dye visual titration method, carotenoids content was estimated by spectrophotometric method. Sugar and acidity of the fruit juice were determined by adopting the standard methods of AOAC (1990)

Mean plant height ranged from 2.55 m to 5.01 m (Table 1). The maximum plant height was observed in Laila (5.01 m) followed by Cherry Tomato Yellow (4.82 m) and Cherry Tomato Red (4.73 m). The lowest plant height (2.55m) was observed in Sweet Bite. The mean number of primary branches ranged 8.33 to 4.33. The variety Meghalaya Local produced significantly highest number of branches plant<sup>-1</sup> (8.33) followed by Pusa Cherry -1 (8.00). Significantly lowest branch number

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**Table 1:** Growth and yield attributing characters of cherry tomato varieties

Variety	Plant height(m)	Branch number	Flowers/cluster	Fruit set(%)	Fruiting cluster/plant	Rachis length (cm)
Roja	3.65	5.33	14.63	93.39	24.50	29.72
Laila	5.01	6.00	11.44	96.52	23.10	25.53
Sheeja	3.47	6.33	17.85	94.47	21.40	34.34
Ruhi	4.36	4.67	12.57	88.34	24.20	17.84
Cherry Tomato Red	4.73	5.00	9.87	90.21	10.00	16.53
Cherry Tomato Yellow	4.82	4.33	12.69	75.42	13.00	22.83
Lara	2.93	7.33	11.54	87.78	29.00	25.12
Sweet Bite	2.55	5.67	15.37	97.91	20.00	31.65
Yellow Pear Tomato	2.65	7.00	7.39	50.04	12.00	7.62
Garden's Delight	3.54	7.67	15.56	55.70	13.33	23.2
Pusa Cherry-1	4.51	8.00	44.51	75.21	9.00	38.68
Meghalaya Local	4.25	8.33	7.36	61.46	8.00	16.56
SEm(±)	0.06	0.83	2.84	6.41	0.91	0.11
CD(0.05)	0.14	1.91	6.51	14.67	2.09	0.25

was found in Cherry Tomato Yellow (4.33) followed by Cherry Tomato Red (5.00). The more plant height and branch number might be due to better acclimatization and adaptation to the congenial polyhouse climate coupled with inherent genetic potential of the varieties. Similar results were recorded by Prema et al. (2011), Renuka et al. (2014) in cherry tomato. The mean of number of flowers cluster<sup>-1</sup> ranged from 7.39 to 44.51. The highest number of flowers cluster<sup>-1</sup> was observed in the variety Pusa Cherry-1 (44.51) followed by Sheeja (17.85). The mean of number of fruits cluster<sup>-1</sup> ranged from 3.67 (Yellow Pear Tomato) to 33.33 (Pusa Cherry-1) presented in Table 1. Such variation in flower as well as fruit production might be due to inherent capacity of the varieties and response to the favourable micro climate under polyhouse. Similar results were obtained by Singh et al. (2013) and Renuka et al. (2017) under protected condition. Highly significant differences were noticed among the variety with respect to fruit set percentage.

**Table 2:** Yield and economics of cherry tomato varieties

Variety	Weight/ fruit (g)	Fruits/ plant	Yield/ plant (Kg)	Yield/ 1000 m <sup>2</sup> (t)	B:C ratio
Roja	16.32	234.87	3.83	6.36	2.16
Laila	15.40	203.83	3.12	5.17	1.57
Sheeja	13.35	256.63	3.44	5.73	1.84
Ruhi	18.33	232.00	4.24	7.06	2.49
Cherry Tomato Red	12.08	76.33	0.91	1.52	-0.25
Cherry Tomato Yellow	12.60	83.33	1.03	1.72	-0.15
Lara	18.80	228.87	4.30	7.16	2.56
Sweet Bite	17.10	183.37	3.13	5.23	1.58
Yellow Pear Tomato	11.00	26.67	0.30	0.52	-0.75
Garden's Delight	23.93	89.00	2.13	3.55	0.76
Pusa Cherry-1	9.11	190.67	1.74	2.87	0.44
Meghalaya Local	12.93	26.00	0.34	0.57	-0.72
SEm(±)	0.29	3.33	0.07	0.014	2.16
CD(0.05)	0.66	7.63	0.16	0.033	1.57

**Table 3:** Quality parameters of cherry tomato varieties

Variety	TSS (%)	Ascorbic acid (mg)	Acidity (%)	Total sugar (%)	Carotene (µg/g)
Roja	7.10	13.68	0.37	6.12	25.78
Laila	6.42	19.20	0.19	7.27	34.79
Sheeja	6.31	24.48	0.25	5.68	4.55
Ruhi	6.22	21.60	0.28	7.22	23.55
Cherry Tomato Red	5.23	33.60	0.24	6.02	19.55
Cherry Tomato Yellow	6.22	28.80	0.22	5.81	3.43
Lara	6.13	21.60	0.29	7.01	27.14
Sweet Bite	5.72	21.12	0.32	6.45	3.37
Yellow Pear Tomato	4.83	24.72	0.15	5.06	3.43
Garden's Delight	5.53	25.44	0.19	5.27	27.52
Pusa Cherry-1	6.30	31.20	0.23	7.18	27.08
Meghalaya Local	6.25	19.92	0.29	4.65	20.36
SEm(±)	0.08	0.02	0.004	0.04	0.03
CD(0.05)	0.18	0.05	0.01	0.08	0.06

The mean fruit set percentage varied between 50.04 and 96.52. The fruit set percentage was highest in Sweet Bite (97.91%). The increase in number of flowers and fruits cluster<sup>-1</sup> might be the reason for higher fruit set percentage and similar results were obtained by Singh et al. (2013) and Wahundeniya et al. (2013) in poly house tomato. Apart from other factors, pollen viability is one of the major factors influencing fruit set. The increased fruit set might be due to higher rate of anther dehiscence, higher pollen viability and better response to polyhouse conditions (Omomprasad 2014). The mean number of fruiting clusters plant<sup>-1</sup> ranged from 8.00 to 23.00. Among the variety, Lara (29.00) had recorded the highest number of fruiting clusters plant<sup>-1</sup> followed by Roja (24.50). High number of fruiting clusters plant<sup>-1</sup> might be due to the genetic potentiality of these varieties responding to the favourable micro climate under poly house. Regarding average fruit weight, Table 1 showed

highly significant values among all the cherry tomato variety. Rachis length was found highest in the variety Pusa Cherry-1, this is an important character for fruit number per bunch. The mean fruit weight ranged from 9.11 g to 23.93 g. This variation in average fruit weight might be due to inverse relationship existing between average fruit weight, and number of fruits cluster<sup>-1</sup>. This was conformity with the findings of Prema et al. (2011). The highest mean fruit yield plant<sup>-1</sup> was recorded highest in Lara (4.30 kg) followed by Ruhi (4.24 kg) and Roja (3.83 kg). The highest yield of 60.90 t ha<sup>-1</sup> was recorded in the variety Lara followed by 60.00 t in Ruhi. The cherry tomato varieties Lara, Ruhi and Roja outperformed other varieties in terms of yield when grown under NV polyhouse. Yield is the cumulative effect of number of fruits and fruit size.

The highest TSS (7.10%) was found in Roja followed by Laila (6.42%) while the ascorbic acid content was found highest in Cherry Tomato Red (33.60 mg 100g<sup>-1</sup>) followed by Pusa Cherry-1 (3.12 mg 100g<sup>-1</sup>). Higher TSS in Roja and Laila variety might be due to the enhanced deposition of solids and more conversion of organic acids to sugars. Similar result was also reported by Prema et al. (2011) and Islam *et al.* (2012) in polyhouse grown cherry tomato. Significantly the highest ascorbic acid was recorded in the variety Cherry tomato red (33.60 mg 100g<sup>-1</sup>) followed by Pusa cherry-1 (31.20 mg 100g<sup>-1</sup>) recorded significantly highest ascorbic acid content. While Roja (13.68 mg /100g<sup>-1</sup>) followed by Laila (19.92 mg 100g<sup>-1</sup>) recorded the lowest ascorbic acid content. This significantly varied ascorbic acid content in the present study might be due to immense variation among different cherry tomato cultivars and their genetic makeup of the variety to perform better under protected environmental condition. Acidity percentage ranged from 0.15 to 0.37. The highest titrable acidity was registered from the variety Roja (0.37 %) followed by Sweet Bite (0.32 %) and lowest acidity in the variety Yellow Pear Tomato (0.15 %). The lower acidity in these cultivars might be due to rapid utilization of organic acids in respiration during maturity. Similar results of significant differences among variety were also reported by Prema et al. (2011) and Razzak et al. (2013) in cherry tomato under polyhouse. Sugar content of different variety ranged from 4.65-7.27%, variety Laila had the highest value (7.27%) followed by Ruhi

(7.22%). While, Meghalaya Local (4.65 %) followed by Yellow Pear tomato (5.06%) showed least values for total sugars content. Degradation of acids during ripening and senescence in the protected environment may be the causes for sugar content in cherry tomato variety. Similar results were also reported by Razzak et al. (2013) in tomatoes produced under shade net.

In this study the highest benefit cost ratio of 2.56 was obtained in variety Lara. However the varieties Ruhi and Roja are also good performing for various characters taken under study. They could be exploited further in different breeding programs. The promising hybrids can be utilized for the selection to isolate the desirable genotypes in cherry tomato.

## References

- AOAC (1990) Official Methods of Analysis. Association of Official Analytical Chemist, Arlington, VA, USA
- Alarcon J, Bolasin M, Sanchez-Blanco M and Torrecillas (1994) Growth, yield and water relations of normal fruited and cherry tomato cultivars irrigated with saline water. *J Hort Sci* 69 (2): 283-288.
- Prema G, Indiresk KM and Santhosha HM (2011) Evaluation of cherry tomato (*Solanum lycopersicum* var. *cerasiforme*) genotypes for growth, yield and quality traits. *Asian J Hort* 6(1): 181-184.
- Razzak HA, Ibrahim A, Allah MW and Alsdon A (2013) Response of cherry tomato (*Solanum lycopersicum* var. *cerasiforme*) to pruning systems and irrigation rates under greenhouse conditions. *Asian J Crop Sci* 5(3): 275-285.
- Renuka DM, Sadashiva AT, Kavita BT, Vijendrakuma RC and Hanumanthiah MR (2014) Evaluation of cherry tomato lines (*Solanum lycopersicum* var. *cerasiforme*) for growth, yield and quality traits. *Plant Archives* 14(1):151-154.
- Rosales MA, Cervilla LM, Rodriguez ES, Wilhelmi MR, Blasco B, Rios JJ, Scoriano T, Castilla N, Romero L. and Ruiz JM (2010) The effect of environmental conditions on nutritional quality of cherry tomato fruits evaluation of two experimental Mediterranean greenhouse. *J Sci Food Agric* 91 (1):649-652
- Singh HM and Tiwari JK (2013) Impact of micronutrient spray on growth, yield and quality of tomato (*Lycopersicon esculentum* Mill). *Hort Flora Res Spectrum* 2(1): 87-89.
- Wahundeniya WMKB, Ramanan R, Wicramathunga C and Weerakkody WAP (2006) Comparison of growth and yield performances of tomato varieties under controlled environment conditions. *Ann M Veneman Department of Agriculture* 8: 251-262.