

Evaluation of cherry tomato cultivars under open and protected conditions

Opinder Singh and *Savita

Department of Horticulture, Lovely Professional University, Phagwara, Punjab-144411

*Corresponding author: savita.19536@lpu.co.in

Abstract

Production of the crop depends on the better growing condition and favorable climate. Present study was conducted to determine comparative studies of cherry tomato cultivars under polyhouse and open conditions for growth and yield parameters. Three cherry tomato cultivars Laila, Roja and Punjab Red Cherry were cultivated in natural and protected environment condition during summer season in 2018. Polyhouse grown cherry tomato recorded maximum plant height (306.61 cm), days to 1st flowering (29.53 DAT), fruits plant⁻¹ (232.15), fruit set (79.37%), average fruit weight (13.53 g), fruit length (3.59 cm), fruit diameter (2.57 cm), and fruit yield (44.32 t·ha⁻¹). Further among the treatment combinations, variety Punjab Red Cherry was found significantly superior for plant height (312.1 cm), days to 1st flowering (23.26), fruits plant⁻¹ (275.33), fruit weight (82.84 gm) and Laila was best for fruit weight (15.85 gm) and fruit yield (51.22 t·ha⁻¹) under protected condition as compared to open field condition. Therefore, Laila and Punjab Red Cherry are suitable for cultivation under protected condition as compared to open field condition and may be recommended to the farmers for commercial cultivation.

Keywords: Cherry tomato, protected condition, growth, yield.

Introduction

Cherry tomato (*Solanum lycopersicum* var. *cerasiforme*), is a highly-priced culinary as well as ornamental vegetable, considered as probable ancestor of all cultivated tomatoes. Being a warm-season crop, it can be grown in all types of soil and climatic conditions. The best temperature for tomato crop cultivation is 20-24°C. For better fruit set in tomato, night temperature plays an important role than day temperature. Optimum temperature requirement for fruit set in tomato is 15-20°C (Thamburaj and Singh, 2005). One of the most popular high-value exotics, it is a favorite among chefs who cook for high profile restaurants and hotels, anyway cherry tomato ended up well known as a money crop in some Asian nations. It is generally considered to be

similar but not identical to the wild relatives of the domestic tomato (Premaet *al.*, 2011). Cherry tomatoes look not only attractive in kitchen gardens but are a commercially valuable horticultural commodity and have impressive nutritional and pharmaceutical properties. According to the USDA nutritional information, one cup of cherry tomatoes (149 g) provides 26.8 calories, 1.3 g protein, 4.5 mg omega-3 fatty acids, 119 mg omega-6 fatty acids, 1241 IU of vitamin A, 18.9 mg vitamin C, 22.3 mcg folic acid, 11.8 mcg vitamin C, 353 mg potassium, 35.8 mg phosphorus and 14.9 mg calcium. All these nutrients and additives put the cherry tomato into the category of functional foods. Whole cherry tomatoes are sold afresh as well as preserved in brine. Cultivation of cherry tomato can be done anywhere viz; open field, polyhouse, glass or shade houses. Despite having a diverse climate in India, cherry tomato requires regional and seasonal needs for the successful cultivation. In general, protected cultivation is done to give plant protection against severe cold in temperate regions or high temperature in tropical regions, whereas in many regions it is grown in open field under favorable climate conditions. Protected cultivation provided off-season crops, good quality fruits, high yield and good income whereas open conditions cultivation can be done during crop growing season it fulfills needs of food during the season, become a source of income for small farmers, consume free land. Therefore, by considering all the above said facts, present investigation was carried out to check the performance of 3 cherry tomato cultivars under open and protected condition for growth and yield parameters.

Materials and Methods

Experiments were conducted under polyhouse and open condition at the research farm of Lovely Professional University, Phagwara (Punjab) during the summer season of 2018. In both, the experiment, three varieties of cherry tomato Laila, Roja and Punjab Red Cherry were evaluated comparatively for growth and yield parameters. The experiments were arranged in a factorial randomized block design following the recommended cultural practices. Seedling transplanting was done on 1st and 2nd of March with 45 x 60 cm spacing. Number of replications and treatment were three, in poly house each plot was 9m in size while in open field plot consist of two beds 4.5 m in size. Irrigation and other agronomic practices were followed as per the requirement of crop for polyhouse and open field conditions (Razzaket *al.*, 2013). Observations

on plant height (cm), days to 1st flowering, fruits plant⁻¹, fruit weight (gm), fruit set (%), fruit length (cm), fruit diameter (cm), fruit yield (t·ha⁻¹) were recorded.

Results and Discussion

Comparative study of cherry tomato cultivars had significantly influenced on growth and yield. Among the growing conditions the protected condition was more preferable than open field condition for all the parameters. Under polyhouse condition, maximum plant height (306.61 cm), fruits plant⁻¹ (232.15), Fruit weight (13.53 gm), Fruit set (79.37%), Fruit length (3.59 cm), fruit diameter (2.57 cm), fruit yield (44.32 t·ha⁻¹) and minimum no. of days taken to first flowering (29.53) were recorded as compared with open field condition.

The mean data of 3 cultivars namely Roja, Laila and Punjab Red Cherry was recorded for all the growth and yield parameters where Punjab Red Cherry performed best for most of the parameters viz; plant height (226.11 cm), fruit cluster⁻¹ (11.10), fruits plant⁻¹ (175.53), fruit set (69.69%) and days to 1st flowering (26.83) while Lila performed best for fruit weight (14.97 gm), fruit length (3.92 cm) and fruit yield (36.24 t·ha⁻¹).

Although the interaction among the growing condition and cultivars the tallest cultivar was Punjab Red Cherry under protected condition valued (312.10 cm) found to be significant over open field condition. The minimum plant height was recorded in cultivar Roja under open condition valued (128.40 cm) respectively. Highest plant height in protected condition in comparison to open condition might be associated with the controlled atmosphere inside polyhouse and also due to the fact that in polyhouse there is the availability of more favorable climate which leads to the photosynthetic activity and respiration.

Punjab red cherry took less numbers of the days (23.26) for the first flowering under protected condition while maximum days was recorded in Laila (49.66) under protected condition. Days to 1st flowering is an important character of the crop because it directly affects the days to maturity of fruit by indicating early fruit formation and it is controlled by genetic make-up of the plant which is least affected by the changes in micro-climate under protected conditions. Similar findings were outlined by Prema *et al.*, (2011) & Omprasad *et al.* (2018) in cherry tomato.

The interaction among the condition and cultivars was significantly different for yield parameter in all the three cultivars. Growing conditions has great effect on fruits plant⁻¹, fruit weight (gm), fruit set (%), fruit length (cm), fruit diameter (cm) & fruit yield (t·ha⁻¹). Mean data for fruits plant⁻¹ was highly significant under protected house in the cultivar Punjab Red Cherry (275.33) and

minimum in cultivar Roja in open field (45.26). Highly significant difference was observed for fruit set in both the growing environment where maximum fruit set occurred in the cultivar Punjab Red cherry (82.84%) and minimum in Laila (45.23%) under open field while maximum fruit weight was observed in cultivar Laila (15.85gm) under protected condition and minimum in Punjab Red Cherry (9.91gm) in open field. Fruit set in present experiment was higher in protected condition in cultivar Punjab red cherry might be due to the genetic potentiality of genotype responding to favorable microclimate have been reported by Sharma *et al.* (2011) and Arora *et al.* (2007) in cherry tomato.

The fruit length and fruit diameter was significantly differ in each cultivars the maximum fruit length was in cultivar Laila (3.97 cm) and maximum diameter was recorded in cultivar Roja (2.85 cm) in polyhouse while in open field condition Roja has minimum fruit length (2.58 cm) and minimum fruit diameter was recorded in cultivar Laila (2.17 cm). Interaction in growing condition and cultivars has high significance result for fruit yield ($\text{t}\cdot\text{ha}^{-1}$). The maximum yield was observed in cultivar Laila ($51.22 \text{ t}\cdot\text{ha}^{-1}$) under protected condition while the lowest yield was in open field cultivar Roja ($15.36 \text{ t}\cdot\text{ha}^{-1}$). Maximum fruit length and diameter among the cultivars might be due to the genetic characters and the response of these varieties to acclimatize to the polyhouse conditions. While fruit yield ($\text{t}\cdot\text{ha}^{-1}$) was high in Punjab Red Cherry might be due to highest average fruit weight, good vegetative growth under protected condition and performance of off springs due to genetic makeup. Results were comparable with Parvej *et al.* (2010), Uddin *et al.* (2015) and Aguirre and Cabrera (2012) for fruit yield in different varieties of tomato under polyhouse and natural climate.

Conclusion

Polyhouse provides protected environment to the plant against frost and cold during winter and heat during summer season. It also influenced morphological and physiological characteristics of tomato plants in a positive way. Therefore, it is concluded that tomato growth, yield and quality was best under protected condition in comparison to open field. All the three cultivars performed best under protected condition as compare to open field. Among the three cultivars studied Laila and Punjab Red Cherry showed best results in terms of fruit yield (51.22 and $43.64 \text{ t}\cdot\text{ha}^{-1}$) and fruits plant^{-1} (235.40 and 275.33) under protected condition. Hence, cultivation of Laila and Punjab Red Cherry under protected condition was found to be suitable for getting good yield and quality of fruits in off season.

References

- Abdel-Razzak, H., Ibrahim, A., Wahb-Allah, M., & Alsadon, A. (2013). Response of cherry tomato (*Solanum lycopersicum* var. *cerasiforme*) to pruning systems and irrigation rates under greenhouse conditions. *Asian J. Crop Sci*, 5, 275-285.
- Arora, S. K., Bhatia, A. K., Malik, T. P., Batra, V. K., Yadav, S. P. S., Singh, V. P., & Rakesh, M. (2007). Studies on performance of different tomato hybrids (semi-indeterminate) in off-season under greenhouse conditions in semi-arid zone of Haryana. *Haryana Journal of Horticultural Sciences*, 36(1/2), 111-113.
- Ceballos Aguirre, N., & Vallejo Cabrera, F. A. (2012). Evaluating the fruit production and quality of cherry tomato (*Solanum lycopersicum* var. *cerasiforme*). *Revista Facultad Nacional de Agronomía Medellín*, 65(2), 6593-6604.
- Omprasad, J., Reddy, P. S. S., Madhumathi, C., & Balakrishna, M. Evaluation of cherry tomatoes for quality characters under shade net.
- Parvej, M. R., Khan, M. A. H., & Awal, M. A. (2010). Phenological development and production potentials of tomato under polyhouse climate. *Journal of Agricultural Sciences–Sri Lanka*, 5(1).
- Prema, G., Indires, K. M., & Santhosha, H. M. (2011). Evaluation of cherry tomato (*Solanum lycopersicum* var. *Cerasiforme*) genotypes for growth, yield and quality traits. *Asian Journal of Horticulture*, 6(1), 181-184.
- Sharma, M. K., Kumar, R., & Kumari, S. (2011). Identifying superior quality F1 tomato hybrids for year-round production under low cost plastic greenhouses in North-West Himalayas. *Vegetable science*, 38(1), 30-34.
- Thamburaj, S., & Singh, N. (2005). Textbook of vegetables, tuber crops and spices Published by Directorate of Information and Publication of Agriculture. *ICAR New Delhi*, 468.
- Uddin, A. F. M. J., Roni, M. Z. K., Rahman Sk, S., Momona, K., & Nahiyani, A. S. M. (2015). Study on Growth and Yield Characteristics of Seven Exotic Cherry Tomato Varieties. *Int. J. Bus. Soc. Sci. Res*, 3(2), 125-130.

Table1. Mean performance for growth and yield parameters of cherry tomato cultivars under polyhouse and open condition

Growing condition (C)	Plant height (cm)	Days to 1 st flowering	Fruits plant ⁻¹	Fruit weight (g)	Fruit set (%)	Fruit length (cm)	Fruit diameter (cm)	Fruit yield (t·ha ⁻¹)
C ₁	306.61	29.53	232.15	13.53	79.37	3.59	2.57	44.32
C ₂	125.55	37.53	58.22	12.12	51.75	3.39	2.45	18.49
CD at 5%	3.31	2.40	18.34	0.37	2.42	0.05	0.03	2.56
SE (m) ±	1.03	0.75	5.74	0.11	0.76	0.01	0.01	0.80
Varieties (V)								
V ₁	204.01	42.50	144.53	14.97	62.76	3.92	2.20	36.24
V ₂	218.12	31.26	115.50	13.04	64.23	2.75	2.75	27.22
V ₃	226.11	26.83	175.53	10.47	69.69	3.80	2.58	30.75
CD at 5%	2.34	2.94	22.46	0.45	2.97	0.06	0.03	3.139
SE (m) ±	0.73	0.92	7.03	0.14	0.93	0.01	0.01	0.983
Treatments								
C ₁ V ₁	299.88	35.33	235.40	15.85	80.29	3.97	2.23	51.22
C ₁ V ₂	307.84	30.00	185.75	13.72	74.98	2.91	2.85	38.09
C ₁ V ₃	312.10	23.26	275.33	11.02	82.84	3.88	2.63	43.64
C ₂ V ₁	108.14	49.66	53.66	14.10	45.23	3.87	2.17	21.27
C ₂ V ₂	128.40	32.53	45.26	12.36	54.48	2.58	2.64	15.36
C ₂ V ₃	140.11	30.40	58.22	9.91	56.55	3.72	2.53	17.85
CD at 5%	1.91	4.16	31.77	N/A	4.20	0.08	0.05	4.43
SE (m) ±	0.60	1.30	9.95	0.20	1.31	0.02	0.01	1.39

Note: C₁ = Polyhouse condition, C₂ = Open field condition, V₁ = Laila, V₂ = Roja, V₃= Punjab Red cherry.