Original Research Article

Evaluation of Cherry Tomato genotypes for yield and quality in polyhouse in Prayagraj agro-climatic condition [*Solanum lycopersicum* (L) var. *cerasiforme* Mill.]

ABSTRACT

A field experiment entitled "Evaluation of Cherry tomato genotypes for yield and quality in polyhouse in Prayagraj agro-climatic condition [*Solanum Lycopersicum* (L.) var. *cerasiforme Mill.]*" was conducted from July, 2022 to December, 2022 at the Horticulture Research Farm, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. The experiment was laid out in Randomized Block Design (RBD) with three replications. The present investigation was carried out to find out the best cultivar (Yellow Cherry Tomato-round shape, Cherry Red-round shape, Nagmoti, Cherry Red-plum shape, Yellow Cherry Tomato-Pear shape and Pusa Cherry-1).Pusa Cherry -1 was found the best in overall growth, yield and economic parameters like days of 1st flowering, no. of flower per cluster, no. of fruit per cluster, no of fruits per plant, total yield, high cost benefit ratio.

Among all the varieties highest total yield was found in Pusa cherry-1 (142.9q/ha) whereas lowest in Yellow pear cherry tomato (74.6q/ha). The highest gross return (283883 Rs/ha) and cost benefit ratio (2.133) were obtained from Pusa Cherry-1. Considering the experimental findings variety Pusa Cherry -1 found the most suitable for higher productivity and economic return under Prayagraj agro-climatic conditions.

Keywords: Cherry tomato, Growth, Yield and Quality

Introduction

Fruits and vegetables have long been recommended for their high levels of vitamins, minerals, and phytochemicals, and India is the world's second-largest producer of these crops, accounting for 14% of global vegetable production. Despite this impressive output, close to 25% of India's agricultural production goes to waste. However, the country's vegetable production is particularly impressive, contributing 15% of global vegetable production despite utilizing only 3% of its arable land. These figures highlight the potential for India to increase its agricultural output while also reducing waste, which could have a significant impact on global food security and nutrition.

Cherry tomato (*Solanum lycopersicum* var. *cerasiforme*) is a warm season crop and requires long growing periods to reap more harvests, it is the most promising crop under protected structures as a small variety of tomato and generally considered to be similar but not identical to the wild precursor of the domestic tomato. It is characterized by small size fruits, with a bright red colour resembling a cherry, having an excellent taste. Cherry tomato is becoming

popular in the retail chains and marketed at a premium price compared to regular tomato. It is joining the growing market of mini vegetables and is one of the most promising in the line of differentiated products. It is considered as an exotic vegetable, bringing new taste and appearance to dishes.

Cherry tomato is a highly-priced culinary as well as it is an ornamental vegetable. Cherry tomatoes are normally much sweeter than large tomatoes. Cherry tomato has several medicinal values as it promotes gastric secretion, blood purification, intestinal antiseptic, cure cancer of the mouth and sour throat, apart from improving quality of the prepared foods. It is highly nutritious with good amount of vitamins. It is a good appetizer having pleasing test. Tomato juice contains lycopene one of the most powerful antioxidant and vitamin C which are most beneficial to human beings.

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Presently, cherry tomatoes are widely cultivated in Central America and are distributed in California, Korea, Germany, Mexico and Florida (Renuka *et al.*, 2014). About 24.00 per cent of retail sales of tomatoes in the U.S are contributed by cherry tomato. They are becoming popular in the retail chains and marketed at a premium price compared to regular tomatoes. Cherry tomato adaptation provides high possibilities for inclusion in breeding programs, using their valuable characteristics on genetic diversity for selecting parents, together with their large geographical diversity (Medina and Lobo, 2001).

Materials and Method

Location of Experimental site

The experiment was conducted during Rabi season of the year 2022 at Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj. The experimental site is located in the sub–tropical region which is located at 25º24’46.14” N latitude, 81º50’49.95” E longitude and 98 m above the mean sea level.

Climate and weather condition

Area of Prayagraj district comes under subtropical belt in the south east of Uttar Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46 ºC – 48 ºC and seldom falls as low as 4ºC – 5ºC. The relative humidity ranges between 20 to 94 per cent. The average rainfalls in this area are around 1013.4 mm annually.

Meterological condition

It comes under subtropical climate receiving the mean annual rainfall of about 1100mm, major rainfall from July to end September. However, occasional precipitation was also not uncommon during winter. The winter months were cold while summer months were very hot and dry. The minimum temperature during the crop season was to be 21.38℃ and the maximum is to be 37.82℃. The minimum humidity was to be 46.42% and maximum was to be 96.85%.

Result and Discussion

The present investigation entitled **Evaluation of Cherry Tomato genotypes for yield and quality in polyhouse in Prayagraj agro-climatic condition** was carried out during October 2022 to March 2023 at the Horticulture Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. The experiment was laid out in Randomized Block Design (RBD) with 6 genotypes and each genotype replicated thrice. The result of the present investigation, Evaluation of Cherry Tomato genotypes for yield and quality has been presented in the tables, wherever required. The data obtained from the experiment were statistically analyses and the results are presented as under.

GROWTH PARAMETERS

Germination Percentage

Significantly the maximum germination percentage 89.9 was recorded in variety Yellow Cherry Tomato (round) followed by variety Red Cherry (plum shape) 85.103 whereas minimum germination percentage 71.1 was recorded in variety Cherry Red (round shape).

Survival Percentage

Significantly the maximum survival percentage 88.297 was recorded in variety Nagmoti followed by variety Yellow Cherry Tomato (round) 85.803 whereas minimum survival percentage 70.3 was recorded in variety Red Cherry Tomato (plum shape).

Plant Height (cm)

The height of five randomly selected plants from each plot was measured from ground level to tip of the shoot at 30, 60 90,120 DAT and was recorded. Critical analysis of data displayed in table clearly marked out the obvious difference among the treatments with respect to plant height.

Plant height at 30 days after transplanting:

Non Significantly the maximum plant height 56.76 cm at 30 days after sowing was recorded in variety Red cherry (plum shape) followed by variety followed by cherry red 54.66 cm whereas minimum plant height 45.03 was recorded in variety Nagmoti.

Plant height at 60 days after transplanting:

Significantly the maximum plant height 101.93 cm at 60 days after sowing was recorded in variety Pusa cherry 1 followed by Red cherry (plum shape) 98.007 cm whereas minimum plant height 77.75 was recorded in variety Nagmoti.

Plant height at 90 days after transplanting:

Significantly the maximum plant height 189.203 cm at 90 days after sowing was recorded in variety red cheery (plum shape) followed by Pusa cheery 1 186 cm whereas minimum plant height 150.1 was recorded in variety Nagmoti.

Plant height at 120 days after transplanting:

Significantly the maximum plant height 243.46 cm at 120 days after sowing was recorded in variety Cherry red (round) followed by Yellow cherry tomato (round shape) 231.223 cm whereas minimum plant height 174.87 was recorded in variety Nagmoti.

Numbers of primary branches per plant at 30 days after transplanting:

Significantly the maximum number of primary branches 9.18 at 30 days after sowing was recorded in variety Cherry Red (round shape) followed by variety followed by Pusa cherry-1 8.137 whereas minimum number of primary branches 4.69 was recorded in variety Yellow Pear Cherry Tomato.

Numbers of primary branches per plant at 60 days after transplanting:

Significantly the maximum number of primary branches 11.64 at 60 days after sowing was recorded in variety Cherry Red (round shape) followed by variety followed by Pusa cherry-1 9.627 whereas minimum number of primary branches 5.25 was recorded in variety Yellow Pear Cherry Tomato.

Numbers of primary branches per plant at 90 days after transplanting:

Significantly the maximum number of primary branches 16.153 at 90 days after sowing was recorded in variety Cherry Red (round shape) followed by variety followed by Pusa cherry-1 12.853 whereas minimum number of primary branches 7.19 was recorded in variety Yellow Pear Cherry Tomato.

Numbers of primary branches per plant at 120 days after transplanting:

Significantly the maximum number of primary branches 18.42 at 30 days after sowing was recorded in variety Cherry Red (round shape) followed by variety followed by Pusa cherry-1 16.62 whereas, minimum number of primary branches 8.45 was recorded in variety Yellow Pear Cherry Tomato.

Plant Spread (cm)

Significantly the maximum plant spread (EW) 75.1 was recorded in variety Yellow Cherry Tomato (round shape) followed by variety Cherry Red (round) 66.7 whereas minimum plant spread 42.297 was recorded in variety Nagmoti.

Significantly the maximum plant spread (SW) 81.503 was recorded in variety Pusa Cherry-1 followed by variety Nagmoti 78.4 whereas minimum plant spread 42.003 was recorded in variety Yellow Cherry Tomato (round shape).

Leaf Area Index (cm^2)

Significantly the maximum leaf area index 6.627cm^2 was recorded in variety Yellow Cherry Tomato (round) followed by variety Yellow Cherry Tomato (Pear shape) 6.577 whereas minimum leaf area index 4.65 was recorded in Nagmoti.

Chart 1 : Varieties and their sources

SR.NO	NAME OF VARIETY	SOURCE OF VARIETY
1.	Yellow Cherry Tomato- Round Shape	CISH, Lucknow
2.	Cherry Red -Round	CISH, Lucknow
3.	Nagmoti	CISH, Lucknow
4.	Red Cherry- Plum Shape	CISH, Lucknow
5.	Yellow Pear Cherry Tomato	CISH, Lucknow
6.	Pusa Cherry 1	IARI, New Delhi

Figure 1: Field experiment and variety of fruits.

Table 1 Growth parameters – germination percentage, survival percentage, plant height (30,60,90,120 days), no. of primary branches (30,60,90,120 days), plant spread (EW,NS),Leaf area index

Sr. No.	Genotypes	Germination percentage (%)	Survival percentage (%)	(30 Days)	(60 Days)	(90 Days)	(120 Days)	(30 Days)	(60 Days)	(90 Days)	(120Days)	Plant spread (EW)	Plant spread (NS)	Leaf area index(cm2)
1	**Yellow Cherry Tomato-Round Shape**	89.9	85.803	51.69	85.457	172.3	231.223	4.86	5.97	7.193	8.49	75.1	42.003	6.627
2	**Cherry Red - Round**	71.1	80	54.66	97.657	182.2	243.6	9.18	11.64	16.153	18.42	66.7	49.7	6.567
3	**Nagmoti**	83	88.297	45.03	77.75	150.1	174.87	5.297	5.96	8.23	9.14	42.297	78.4	4.65
4	**Red Cherry - Plum Shape**	85.103	70.3	56.76	98.007	189.203	224.77	7.64	9.38	12.313	14.197	49.697	52.5	4.87
5	**Yellow Pear Cherry Tomato**	78	77.997	50.103	89.18	167.003	221.28	4.69	5.25	7.19	8.453	58.597	59.797	6.577
6	**Pusa Cherry 1**	82.797	72.8	55.8	101.93	186	231.01	8.137	9.627	12.853	16.62	47.4	81.503	5.747
	Mean	**81.65**	**79.2**	**52.34**	**91.66**	**174.47**	**221.13**	**6.63**	**7.97**	**10.66**	**12.55**	56.63	60.65	5.84
	CV	**6.61**	**7.29**	**8.27**	**8.51**	**8.21**	**7.58**	**7.88**	**4.38**	**3.27**	**3.33**	10.97	4.19	6.85
	SEm	**3.12**	**3.33**	**2.5**	**4.5**	**8.27**	**9.68**	**0.3**	**0.2**	**0.2**	**0.24**	3.59	1.47	0.23
	CD at 5%	**9.83**	**10.5**	**7.88**	**14.18**	**26.06**	**30.49**	**0.95**	**0.63**	**0.63**	**0.76**	11.3	4.62	0.73
	F Value	**S**	**S**	**NS**	**S**	**NS**	**S**	**S**	**S**	**S**	**S**	S	S	S

Days of first flowering

Significantly the maximum number of days taken to first harvesting 89.5 was recorded in variety Nagmoti followed by variety Pusa Cherry-1 84.5 whereas minimum number of days taken to first harvesting 66 was recorded in variety Yellow cherry tomato (pear shape).

No. of flowers per cluster

Significantly the maximum number of flowers per cluster 11.78 was recorded in variety Pusa cherry 1 followed by variety yellow cherry (round) 9.01 whereas minimum number of flowers per cluster 7.713 was recorded in variety Yellow cherry tomato (pear shape).

No. of fruits per cluster

Significantly the maximum number of fruits per cluster 11.47 was recorded in variety Pusa cherry -1 followed by variety yellow cherry (round) 8.56 whereas minimum number of fruits per cluster 3.437 was recorded in variety Yellow cherry tomato (pear shape).

Days to first harvesting

Significantly the maximum number of days taken to first harvesting 89.5 was recorded in variety Nagmoti followed by variety Pusa Cherry-1 84.5 whereas minimum number of days taken to first harvesting 66 was recorded in variety Yellow cherry tomato (pear shape).

Fruit length (cm)

Significantly the maximum fruit length 4.22 cm was recorded in variety Red cherry tomato (plum shape) followed by variety Yellow Cherry Tomato (round) 4.15cm whereas minimum fruits length 1.72 was recorded in variety Nagmoti.

Fruit Diameter (cm)

Significantly the maximum fruit diameter 35 mm was recorded in variety Red Cherry (plum shape) followed by variety Cherry Red (round) 30 whereas minimum number of fruits diameter 15 was recorded in variety Nagmoti.

Average fruit weight (g)

Significantly the maximum average fruit weight 14.59g was recorded in variety Red Cherry (plum shape) followed by variety Cherry Red (round) 14.02 whereas minimum average fruit weight 9.3 was recorded in variety Nagmoti.

Numbers of fruit per plant (kg)

Significantly the maximum number of fruits per plant 63.8 was recorded in variety Pusa cherry-1 followed by variety Red Cherry (plum shape) 47.397 whereas minimum number of fruits per plant 24.6 was recorded in variety Yellow cherry tomato (pear shape).

Average yield per plot

Significantly the maximum average yield per plot 14.29kg was recorded in variety Red Cherry (plum shape) followed by variety Cherry Red (round) 14.03 whereas minimum average yield per plot 7.46 was recorded in variety Yellow cherry tomato (pear shape).

Total yield (t/ha)

Significantly the maximum total yield 142.9 was recorded in variety Pusa cherry-1 followed by variety Red cherry (plum shape) 140.3 whereas minimum total yield 74.6 was recorded in variety Yellow cherry tomato (pear shape).

Total soluble solids (°Brix)

Significantly the maximum TSS 10.72 was recorded in variety Cherry Red (plum shape) followed by variety Yellow cherry tomato (round) 10.54 whereas minimum TSS 7.723 was recorded in variety Nagmoti.

Ascorbic acid

Significantly the maximum ascorbic acid 20.94 was recorded in variety Pusa Cherry-1 followed by variety Yellow Cherry Tomato (round) 19.89 whereas minimum ascorbic acid 16.94 was recorded in variety Cherry Red (round).

Table 2 - Days of first flowering, No. of flowers per cluster, No. of fruits per cluster, Days to first harvesting, Fruit length (cm), Fruit Diameter (mm), Average fruit weight (g), Numbers of fruit per plant, Average yield per plot(Kg), Total yield (q/ha), Total soluble solids (°Brix), Ascorbic acid (mg/100g)

Sr. No.	Genotypes	Days of first flowering	No. of flowers per cluster	No. of fruits per cluster	Days to first harvesting	Fruit length (cm)	Fruit Diameter (mm)	Average fruit weight (g)	Numbers of fruit per plant	Average yield per plot(Kg)	Total yield (q/ha)	Total soluble solids (°Brix)	Ascorbic acid (mg/100g)
1	**Yellow Cherry Tomato-Round Shape**	53.9	9.01	8.56	74.697	4.15	24.997	12.903	44.203	11.273	112.7	10.54	19.89
2	**Cherry Red -Round**	49.9	8.09	3.57	67.303	4	30	14.02	31.3	9.463	94.6	9.573	16.94
3	**Nagmoti**	54.497	8.467	6.31	89.5	1.72	15	9.3	42.297	9.927	99.3	7.723	17.437
4	**Red Cherry-Plum Shape**	53.9	8.21	5.85	75.4	4.22	35	14.59	47.397	14.03	140.3	10.72	17.68
5	**Yellow Pear Cherry Tomato**	46.5	7.713	3.437	66	3.03	22	12.12	24.6	7.46	74.6	9.21	19.87
6	**Pusa Cherry 1**	55.497	11.78	11.47	84.5	3.387	20	9.303	63.8	14.29	142.9	9.28	20.94
Mean		**52.4**	**8.88**	**6.53**	**76.23**	3.42	**24.5**	12.04	**42.27**	**11.07**	**110.73**	**9.51**	**18.79**
CV		**5.82**	**7.11**	**4.47**	**4.91**	6.96	**4.69**	9.06	**11.31**	**7.07**	**8.05**	**8**	**7.81**
SEm		**1.76**	**0.36**	**0.17**	**2.16**	0.14	**0.66**	0.63	**2.76**	**0.45**	**5.14**	**0.44**	**0.85**
CD at 5%		**5.54**	**1.15**	**0.53**	**6.81**	0.43	**2.09**	1.98	**8.7**	**1.42**	**16.21**	**1.38**	**2.67**
F Value		**S**	**S**	**S**	**S**	S	**S**	S	**S**	**S**	**S**	**S**	**S**

Economics of different genotypes

Economics of all genotypes were calculated according to the expenditure occurred from then nursery till harvesting of fruits viz. Cost of cultivation, gross return, net return and benefit cost ratio has been worked out presented in table 3

Maximum cost benefit ratio was recorded in Pusa Cherry-1 (2.133) and minimum was recorded in Yellow Pear cherry tomato (1.88).

Table 3 Economic parameters

Sr. No.	Genotypes	Cost of cultivation	Gross return	Cost: Benefit ratio
1	**Yellow Cherry Tomato- Round Shape**	130401	255290	1.957
2	**Cherry Red -Round**	171402	326043	1.9
3	**Nagmoti**	149602	290689	1.943
4	**Red Cherry- Plum Shape**	140802	284699	2.023
5	**Yellow Pear Cherry Tomato**	163188	307161	1.88
6	**Pusa Cherry-1**	133089	283883	**2.133**
	Mean	**148080.67**	**291294.17**	**1.97**
	CV	**6.9**	**7.57**	**5.19**
	SEm	**5902.33**	**12727.92**	**0.06**
	CD at 5%	**18598.61**	**40106.48**	**0.19**
	F Value	**S**	**S**	**NS**

CONCLUSION

In terms of yield parameters like days to first flowering, no. of flowers per cluster, no. of fruit per cluster, no. of fruit per plant, average yield per plot, total yield variety and in Quality parameters –Ascorbic acid and Benefit cost ratio of Pusa cherry -1 is best over all varieties.

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