Effect of Growing Conditions on Growth and Yield Attributes of Cherry Tomato (*Solanum lycopersicum* L. var. *cerasiforme*)

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Authors’ contributions

This work was carried out in collaboration among all authors. Author Chandni performed the statistical analysis and wrote the protocol and first draft of the manuscript. Author DS performed final correction of the drafted manuscript for correspondence. Author SA designed the program and analyzed the study. Author RK helped in taking yield data. Author SB helped in analysis. All authors read and approved the final manuscript.

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ABSTRACT

Cherry tomato is a high value crop which due to neutraceautical properties commercially cultivates under protected condition, for its demand in national and international market, it is necessary to develop varieties with high yield. It is need to evaluate cherry tomato varieties with desirable in protected and field conditions. The present investigation was conducted to study the performance of eighteen genetically diverse genotypes of cherry tomato in open field trained on trellis and naturally ventilated polyhouse conditions. Twelve growth and yield traits, viz., plant height, days to 50% flowering, days to first fruiting, number of flowers and fruits per truss, average fruit weight, polar and equatorial fruit diameter, pericarp thickness, number of fruits per plant, yield per plant and total yield were observed. In open field condition, genotype BRCT-30 and BRCT-32 gave the best performance in terms of earliness with maximum values for number of flower-fruits per truss and total yield (415.98 q/ha and 408.75 q/ha).
respectively). In polyhouse condition, genotype BRCT-20 and BRCT-35 gave the maximum value for total yield (701.21 q/ha and 611.21 q/ha, respectively) with mid-early values for flowering and fruiting.

Keywords: Cherry tomato; polyhouse; trellis; yield.

1. INTRODUCTION

Cherry tomato is a botanical variety of cultivated tomato, with small fruits of 1.5 - 3.5 cm diameter [1]. The demand for cherry tomato due to its high quality and good taste is continuously increasing in the domestic and international market. Cherry tomatoes are good source of antioxidants and phytochemical compounds, including lycopene, β-carotene, flavonoids, vitamin C and many essential nutrients [2]. It can be eaten raw as fresh fruit or cooked. Besides, they are also perfect for making processed products like sauce, soup, ketchup, puree, curries, paste, powder, Rasam and sandwich. From one cup (149 g) of cherry tomato, about 27 kcal energy, 1.31g protein and 5.80 g carbohydrates can be easily obtained (USDA, 2018).

It has an anti-inflammatory property with wider application in treatment of chronic diseases and as a pain killer [3]. Though, cherry tomatoes are generally cultivated under polyhouse conditions, but to increase the profitability of marginal farmers at open field, it has become imperative to develop high yielding and qualitative varieties that are suitable for growing in open field conditions. Hence, the present study was carried out to investigate the effect of growing conditions on growth and yield attributes of cherry tomato (Solanum lycopersicum L. var. cerasiforme) and to identify few high yielding variety for both the conditions.

2. MATERIALS AND METHODS

The experiment was conducted in polyhouse covered with green color shading net. Polyhouse dimensions were with 45 m length, 25 m width and 3.5 m height and was constructed with galvanized iron pipes and open field trained on iron trellis at Bihar Agricultural University, Sabour, Bhagalpur which lies in Indo-Gangetic plains of eastern India in Bihar. Eighteen diverse cherry tomato genotypes were evaluated in randomized block design, replicated thrice in the autumn-winter season of 2018-2019. Planting material taken were both indeterminate i.e. which continues to grow and has flowering on every 3rd internodes and determinate type of cherry tomato (Table 1). Thirty days old plants were transplanted maintaining spacing of 50 x 50 cm² with one meter wide bed area and plant population of 12 plants were maintained on one bed per replication. During trial (October 2018 to April, 2019), maximum and minimum temperatures were approximately 25.9°C and 9.8°C, respectively.

Twelve agronomic traits plant height (cm), days to 50% flowering, days to first fruiting, number of flowers and fruits per truss, average fruit weight (g), polar and equatorial diameter (cm), pericarp thickness (mm), number of fruits per plant, yield per plant (kg) and total yield (q/ha) were measured. The yield per plot of each harvest was recorded and that of all them were summed up to get total plot yield.

2.1 Statistical Analysis

Randomized block design was performed using SPSS version 16.2 software [1]. The data collected in respect of various parameters on growth and yield attributes were analyzed statistically as described by [4]. The ANOVA table was drawn using given data [5]. The calculated F value was compared with the tabulated F value and value was found significant, then standard error and critical differences were calculated to find out the superiority of one entry over the others. All the characters which showed significant differences among genotypes were further studied to analysis for the following parameters. The standard error difference and critical differences were calculated as under (Tables 3 and 4):

\[ SE (m) \pm = \sqrt{\frac{M_e}{r}} \times t_{0.05 \text{ error d.f.}} \]
\[ SE(d) \pm = \sqrt{\left(2 \frac{M_e}{r} \right)} \times t_{0.05 \text{ error d.f.}} \]
\[ \text{C.D. (5%)} = SE(d) \times t_{0.05 \text{ error d.f.}} \]

Where
- \( r \) = replication
- \( t \) = Table value at 5% level of ‘t’ of significant at error df
- \( SE(m) \pm = \text{standard error of mean} \)
- \( SE(d) \pm = \text{standard error of difference of two means} \)
- \( \text{C.D. (5%)} = \text{Critical difference at 5% level of significance} \)
3. RESULTS AND DISCUSSION

The ANOVA for quality traits of cherry tomato under both the condition showed that the traits vary significantly among genotypes (Table 2). All traits in different genotype had high variability performance under both growing conditions, viz., in open field and protected structure. Similar results were also reported by [6].

In open field condition, genotype BRCT-32 was earliest to attain 50% flowering (20.00 Days After Transplanting) followed by BRCT-31 (21.00 DAT), BRCT-25 (21.67 DAT), BRCT-29 (22.00 DAT), BRCT-33, BRCT-22, BRCT-23, BRCT-24, BRCT-30 and BRCT-34 (22.33 DAT), whereas BRCT-37 was last to get 50% flowers (26.00 DAT). Under polyhouse condition also, BRCT-37 was last to flower (30.00 DAT), whereas BRCT-25 was the earliest (21.00 DAT), and BRCT-32 (22.67 DAT), BRCT-23 and BRCT-29 (25.33 DAT) and BRCT-20 and BRCT-35 (25.67 DAT). In both open and polyhouse conditions, BRCT-32 was earliest to fruit (36.00 and 33.33 DAT, respectively), however BRCT-37 was last to fruit in open condition (42.00 DAT) and BRCT-31 was last to fruit in protected condition (48.00 DAT) (Table 3). Along with BRCT-32, BRCT-31, BRCT-33, BRCT-23, BRCT-24, BRCT-25, BRCT-29, BRCT-30 and BRCT-34 also yielded early fruits in between 36.67 to 38.33 DAT under field condition and in polyhouse, BRCT-23, BRCT-29, BRCT-35, BRCT-24 and BRCT-30 yielded fruit in between 36.33 to 38.33 DAT (Table 3). Days to 50% flowering were late by 14.31% when compared to open field on trellis. However, BRCT-32, the semi-determinate genotype, showed earlier flowering by 3.09% (Fig. 1). The results, however, contradicted those of [7] and [3] for the indeterminate genotypes. This may be attributed to the fact that in indeterminate genotypes the vegetative phase suppressed the reproductive stage for longer duration due to the higher temperature favourable for vegetative growth. The days to the first fruiting was late by only 2.23% in polyhouse, so not much variation in first fruit set from open field was observed on overall basis (Fig. 1). The lower temperature in the open condition delayed the first fruit set causing flower drop, whereas the high temperature in the polyhouse created favourable environment for fruit set resulting in no or minimum flower drop.

The number of flowers per truss in field condition was highest in BRCT-30 (14.15), followed by BRCT-35 and BRCT-22 and BRCT-32 (14.04 each), whereas under the polyhouse, BRCT-33 and BRCT-34 produced maximum flowers per truss (17.44 each) and BRCT-26 (17.04) and BRCT-30 (16.78). However in field and polyhouse conditions, BRCT-27 attained minimum number of flowers per truss (8.74 and 9.00, respectively) (Table 3). Maximum number of fruits per truss was found in BRCT-32 and BRCT-30 (9.63 and 9.56, respectively) in open field, whereas BRCT-22 was found with minimum value (5.37). In polyhouse, maximum fruits per truss were observed in BRCT-20 (9.78) followed by BRCT-32 (9.00), BRCT-31 (8.85) and BRCT-35 (8.56), however BRCT-24 was the poorest to

### Table 1. Morphological description of different genotypes was used in Bihar Agricultural University, Sabour

| S.N. | Genotype  | Morphological description          |
|------|-----------|------------------------------------|
| 1    | BRCT-20   | Plum shape, red fruits, indeterminate |
| 2    | BRCT-21   | Round, red fruits, indeterminate    |
| 3    | BRCT-22   | Round, red fruits, indeterminate    |
| 4    | BRCT-23   | Oval, red fruits, indeterminate     |
| 5    | BRCT-24   | Round, red fruits, indeterminate    |
| 6    | BRCT-25   | Oval, red fruits, indeterminate     |
| 7    | BRCT-26   | Round, red fruits, indeterminate    |
| 8    | BRCT-27   | Round, red fruits, indeterminate    |
| 9    | BRCT-28   | Round, red fruits, indeterminate    |
| 10   | BRCT-29   | Pyriform, red fruits, indeterminate |
| 11   | BRCT-30   | Round, red fruits, indeterminate    |
| 12   | BRCT-31   | Round, red fruits, indeterminate    |
| 13   | BRCT-32   | Pyriform, red fruits, determinate   |
| 14   | BRCT-33   | Oval, red fruits, indeterminate     |
| 15   | BRCT-34   | Round, red fruits, indeterminate    |
| 16   | BRCT-35   | Oval, red fruits, indeterminate     |
| 17   | BRCT-36   | Oval, red fruits, indeterminate     |
| 18   | BRCT-37   | Round, red fruits, indeterminate    |
produce flowers per truss (6.56) (Table 1). Number of flowers and fruits per truss were more under polyhouse condition (by 17.3% and 13.81% respectively) than open field condition (Fig. 1). [8] and [2], [9] also reported increment of flower and fruit numbers per truss under protected condition. The higher number of flowers per truss may be due to enhanced number of nodes and branching in the inflorescence. The enhanced number of fruits is due to higher flowers per truss that set into fruits besides micro climate with optimum temperature which facilitated better release of pollens that facilitated better fruit set [8,10] when the temperature was lower in the open condition.

For number of fruits per plant in open field condition, BRCT 33, BRCT 28, BRCT 26 and BRCT 30 had the highest fruit (191.76, 189.54, 184.51 and 177.50 fruits per plant, respectively), whereas BRCT-20 (373.52) and BRCT-30 (246.99) yielded maximum of number of fruits per plant in polyhouse (Fig. 1). The number of fruits per plant was also enhanced by 21.41% compared to open field (Fig. 3). In field condition, genotype BRCT-21 (191.56 cm) recorded maximum plant height followed by BRCT-28 (189.33 cm), BRCT-35 (188.89 cm) and BRCT-24 (181.89 cm), whereas BRCT-32 was found with least plant height (120.78 cm). Under protected condition, BRCT-37 (493.83 cm), BRCT-29 (457.67 cm), BRCT-28 (453.67 cm) and BRCT-35 (452.17 cm) recorded maximum plant height and BRCT-32 (152.17 cm) had minimum plant height (Table 3). The overall increase in plant height in polyhouse was 135.43% protected condition than open field condition (Fig. 3). The least increase was in BRCT-32 (25.99%) due to its determinate nature. All the other genotypes, which were indeterminate in growth habit, showed 97.00% to 176.21% increase in plant height in the polyhouse. [11,12,13,7,14,2,6] also reported increase in plant height under protected conditions in tomato. Higher temperature, higher CO_2 concentration and favourable microclimate in polyhouse, compared to open condition in the cropping season, is responsible for faster photosynthate accumulation which may play a major role for increasing plant height [15].

In field conditions, BRCT-29, BRCT-32 and BRCT-33 were with maximum polar diameter (5.43, 3.94 and 3.02 cm, respectively), whereas in protected conditions, maximum value for polar diameter was recorded in genotype BRCT-29 (4.64 cm), BRCT-32 (4.42 cm), BRCT-34 (3.12 cm), BRCT-31 (2.96 cm) and BRCT-30 (2.80 cm). About equatorial diameter, genotype BRCT-35 (2.59 cm), BRCT-23 (2.31 cm), BRCT-28 (2.30 cm), BRCT-37 (2.27 cm) had maximum values, whereas in protected conditions BRCT-31 (2.64 cm), BRCT 34 (2.56 cm), BRCT-22 (2.47 cm) and BRCT-35 (2.45 cm) exhibited the most values. BRCT-24 (1.48 cm) in field and BRCT-33 (1.64 cm) in polyhouse were with minimum equatorial diameter (Table 3). In the both condition, polar diameter was almost similar, that under polyhouse being only 0.48% higher, while equatorial diameter was more by 5.88% in polyhouse (Fig. 2). This might be due to high number of bigger fruits per truss where distribution of photosynthate might have been mostly for enhancement of size leading to thinner pericarp. The finding was same as that of [6].

![Fig. 1. Reproductive attributes of cherry tomato under open field and polyhouse condition](image-url)
Under field conditions, BRCT-26 (2.91 mm) and in protected condition BRCT-31 (2.47 mm) showed maximum pericarp thickness. Varieties with minimum pericarp thickness in open field were BRCT-35 (1.28 mm), BRCT-28 (1.47 mm), BRCT-27 (1.98 mm) and BRCT-21 (2.06 mm), whereas under protected conditions, BRCT-35 (1.56 mm), BRCT-33 (1.73 mm), BRCT-23 (1.86 mm) and BRCT-24 (2.00 mm) were with minimum pericarp thickness (Table 3). In polyhouse condition pericarp thickness was 4.62% less [16]. (Fig. 2)

For total yield (quintal per hectare), BRCT-30, BRCT-32 and BRCT-26 showed with maximum total yield with 415.98, 408.75 and 404.47 quintal per hectare, whereas under protected condition, BRCT 20 yielded maximum (701.21 q/ha) BRCT 35 (611.21 q/ha) and BRCT-31 (520.17 q/ha) (Table 4). The total yield (per hectare) was increased by 31.12% in (Fig. 3).

Under field conditions, BRCT 32 had the maximum average fruit weight (7.02 g) followed by BRCT 24 (6.17 g), BRCT 20 (6.10 g) and BRCT 30 (5.88 g), whereas genotype BRCT 34 (7.96 g cm) followed by BRCT 28 (7.87 g) and BRCT 33 (7.05 g) showed highest average fruit weight under protected conditions (Fig. 4). Average fruit weight was enhanced by 19.09% under protected condition with compared to open condition (Fig. 4). This may be due to higher level photosynthetic and respiratory activity leading to higher production of photosynthetic and its utilization by the plants under protected condition where the plant was exposed to its desirable microclimate. The finding was in accordance with that of [15].

Highest yield per plant was obtained in BRCT-30 (1.051 kg) BRCT-26 (1.030 kg), BRCT-32 (1.029 kg) and BRCT-32 (1.001 kg) while under protected conditions; the highest yield per plant was in genotype BRCT- 20 (2.988 kg), BRCT 30 (1.976 kg), BRCT-26 (1.858 kg) and BRCT-37 (1.855 kg) (Table 4). The yield per plant was increased by 78.31% (Fig. 4). The higher temperature inside the polyhouse, higher humidity, higher carbon dioxide concentration and favourable microclimate produced more number of leaves that increased the photosynthetic activity [15].
Table 2. ANOVA for growth and yield traits under open field and polyhouse condition

| Characters                      | Genotypes (df=14) | Mean sum of square |
|---------------------------------|-------------------|--------------------|
|                                 | Field             | Polyhouse          | Field             | Polyhouse          | Field             | Polyhouse          |
| Pericarp thickness (mm)         | 764.46**          | 1731.66**          | 422.98            | 2500.06            | 350.22            | 1505.54            |
| Days To 50% Flowering          | 8.19**            | 13.57**            | 2.57              | 2.72               | 0.93              | 3.00               |
| Days To 1st Fruiting           | 8.94**            | 14.03*             | 2.72              | 23.13              | 0.84              | 13.33              |
| Flower per truss               | 8.71**            | 3.99**             | 1.07              | 6.23               | 1.68              | 2.14               |
| Fruit per truss                | 4.19**            | 2.35**             | 0.54              | 0.13               | 0.42              | 0.52               |
| Polar diameter (cm)            | 1.88**            | 1.32**             | 0.04              | 0.001              | 0.02              | 0.001              |
| Equatorial diameter (cm)       | 0.23**            | 0.29**             | 0.01              | 0.003              | 0.01              | 0.001              |
| Pericarp thickness (mm)        | 0.45**            | 0.14**             | 0.02              | 0.01               | 0.01              | 0.004              |
| Average fruit weight (g)       | 1.21**            | 1.20**             | 0.09              | 0.88               | 0.23              | 0.46               |
| Number of fruits/plant         | 1266.53**         | 12183.68**         | 61.17             | 226.01             | 311.69            | 347.34             |
| Yield/plant(kg)                | 0.04**            | 0.78**             | 0.001             | 0.01               | 0.01              | 0.06               |
| Total yield (q/ha)             | 6259.91**         | 36118.48**         | 121.51            | 5042.79            | 1383.29           | 886.16             |

* ** Significant at 5 % and 1 % level of significance, respectively

Table 3. Growth and reproductive attributes of cherry tomato genotypes

| Genotype | Plant height (cm) | Days to 50% flowering | Days to 1st fruiting | No. of flowers per truss | No. of fruits per truss | Number of fruits/plant |
|----------|-------------------|------------------------|----------------------|--------------------------|------------------------|------------------------|
|          | Field             | Field                  | Field                | Field                    | Field                  | Field                  |
| BRCT-33  | 171.67**          | 170.17**               | 22.33**              | 27.00**                  | 37.67**                | 39.33**                |
| BRCT-21  | 191.56**          | 452.17**               | 24.67*               | 28.00**                  | 41.33*                 | 41.00**                |
| BRCT-22  | 167.89**          | 378.83**               | 22.33**              | 26.00**                  | 38.33**                | 39.00**                |
| BRCT-23  | 157.67**          | 345.50**               | 22.33**              | 25.33**                  | 38.00**                | 36.33**                |
| BRCT-24  | 181.89**          | 358.33**               | 22.33**              | 26.67**                  | 38.33**                | 37.67**                |
| BRCT-25  | 178.67**          | 432.67**               | 21.67**              | 21.00**                  | 38.00**                | 40.67**                |
| BRCT-26  | 176.56**          | 394.50**               | 25.67*               | 27.33**                  | 42.00**                | 45.67**                |
| BRCT-34  | 174.22**          | 438.50**               | 22.33**              | 29.00**                  | 38.00**                | 41.00**                |
| BRCT-27  | 159.44**          | 314.17**               | 22.67**              | 25.00**                  | 39.33**                | 39.67**                |
| BRCT-35  | 188.89**          | 452.17**               | 24.33**              | 25.67**                  | 40.00**                | 37.67**                |
| BRCT-28  | 189.33**          | 453.67**               | 25.33*               | 27.00**                  | 41.00**                | 41.67**                |
| BRCT-36  | 173.00**          | 393.67**               | 24.33**              | 27.00**                  | 40.00**                | 39.00**                |
| BRCT-29  | 179.11**          | 457.67**               | 22.00**              | 25.33**                  | 38.33**                | 37.00**                |
| BRCT-30  | 171.78**          | 437.67**               | 22.00**              | 27.00**                  | 38.33**                | 38.33**                |

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| Genotype | Plant height (cm) | Days to 50% flowering | Days to 1st fruiting | No. of flowers per truss | No. of fruits per truss | Number of fruits/plant |
|----------|------------------|------------------------|---------------------|--------------------------|------------------------|------------------------|
|          | Field (cm) | poly | Field (cm) | poly | Field (cm) | poly | Field (cm) | poly | Field (cm) | poly |
| BRCT-31 | 168.56 | bcd | 433.33 | d | 21.00 | ab | 28.33 | de | 36.67 | ab | 48.00 | cd |
|          | S.Em (±) | 10.80 | 22.40 | a | 0.56 | 1.00 | 0.53 | 2.11 | 0.75 | 0.84 | 0.38 | 0.42 |
| BRCT-32 | 120.78 | a | 152.17 | a | 20.00 | a | 22.67 | ab | 36.00 | a | 33.33 | a |
|          | S.Em (±) | 10.80 | 22.40 | a | 0.56 | 1.00 | 0.53 | 2.11 | 0.75 | 0.84 | 0.38 | 0.42 |
| CV (%)   | 10.82 | 9.53 | 4.18 | 6.57 | 2.35 | 9.16 | 10.70 | 10.29 | 9.71 | 9.45 | 11.28 | 9.82 |

Table 4. Mean and standard error of fruit morphological and yield attributes of cherry tomato genotypes in field and polyhouse conditions.

| Genotype | Polar diameter (cm) | Equatorial diameter (cm) | Pericarp thickness (mm) | Average fruit weight (g) | Yield/plant (kg) | Total yield (q/ha) |
|----------|----------------------|--------------------------|-------------------------|--------------------------|-----------------|-------------------|
|          | Field (cm) | Poly | Field (cm) | Poly | Field (cm) | Poly | Field (cm) | Poly | Field (cm) | Poly |
| BRCT-33 | 3.02 | a | 2.36 | a | 1.77 | bc | 1.64 | a | 2.11 | d | 1.73 | a |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-21 | 2.26 | a | 2.55 | b | 1.83 | bc | 2.42 | b | 2.06 | d | 2.15 | efg |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-22 | 2.54 | d | 2.74 | a | 2.26 | gh | 2.47 | ab | 2.10 | d | 2.37 | fgh |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-23 | 2.80 | d | 2.70 | a | 2.31 | gh | 2.34 | a | 2.33 | a | 1.86 | fgh |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-24 | 1.88 | ab | 2.34 | a | 1.48 | a | 2.12 | a | 2.37 | a | 2.00 | fgh |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-25 | 2.41 | d | 2.38 | ab | 2.10 | ef | 2.26 | a | 2.14 | d | 2.11 | defg |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-26 | 2.54 | a | 2.33 | a | 2.20 | gh | 2.19 | a | 2.91 | ef | 2.17 | gh |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-34 | 2.17 | a | 3.12 | e | 1.88 | bc | 2.56 | a | 2.16 | f | 2.21 | gh |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-27 | 2.58 | ef | 2.58 | a | 2.17 | ef | 2.37 | h | 1.98 | ef | 2.12 | defg |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-35 | 2.88 | a | 2.74 | ab | 2.59 | ab | 2.45 | b | 1.28 | a | 1.56 | ab |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-28 | 2.82 | a | 2.53 | a | 2.30 | gh | 1.89 | ab | 1.47 | a | 2.07 | def |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-36 | 2.92 | a | 2.43 | a | 2.36 | ab | 1.76 | ef | 2.36 | ef | 2.19 | defg |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-29 | 5.43 | a | 4.64 | a | 2.04 | de | 1.74 | a | 2.31 | a | 2.28 | ab |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-30 | 2.31 | abc | 2.80 | e | 1.91 | f | 2.43 | b | 2.09 | d | 2.08 | defg |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-31 | 2.45 | d | 2.96 | b | 2.08 | ef | 2.64 | a | 2.61 | f | 2.47 | gh |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-37 | 3.05 | d | 2.35 | a | 2.27 | gh | 1.82 | a | 2.34 | ef | 2.05 | defg |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| BRCT-32 | 3.94 | c | 4.42 | h | 1.69 | e | 2.14 | ef | 2.72 | d | 2.03 | defg |
|          | S.Em (±) | 0.38 | 9.63 | a | 10.71 | 0.86 | 4.00 | 2.03 | 0.78 | 0.77 | 0.85 |
| CD (p=0.05) | 0.23 | 0.06 | 0.14 | 0.06 | 0.14 | 0.11 | 0.79 | 1.13 | 0.151 | 0.249 | 0.61 | 71.61 | 46.02 |
| CV (%)   | 4.93 | 1.27 | 3.96 | 1.53 | 3.73 | 3.17 | 8.67 | 10.36 | 10.71 | 9.88 | 10.94 | 6.22 |

Note: Different letters indicate significant difference at P < 0.05
thus enhancing the plant height which produced more nodes for flowering and more truss per plant were produced which produced higher number of fruits per plant and the span of harvest was also increased inside polyhouse which led to more number of fruits per plant. The fruits were also of bigger dimension and high average weight. These factors ultimately attributed to the higher yield per plant resulting in higher total yield. Up to 188.93% increment in fruit number/plant and 136.12% increment in yield have been previously reported by [13] in tomato, while [17] had recorded 40-45 % enhancement in marketable yield.

4. CONCLUSION

Genotype BRCT-30 and BRCT-32 were good morphologically and had high yield among all the genotypes in open field condition, whereas genotype BRCT 20 and BRCT-35 performed well under polyhouse condition. These genotypes could be specifically utilized for future breeding programmes in open and protected conditions.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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| Yield/plant(kg) | Average fruit weight (g) |
|-----------------|--------------------------|
| field           | 0.852                    | 5.52                     |
| polyhouse       | 1.5                      | 6.57                     |
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