

Hybrids Evaluation of Bottle Gourd [*Lagenaria siceraria* (Molina) Standl.] for Fruit Growth Yield Quality and Morphological Traits in Prayagraj Agro-Climatic Conditions

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ABSTRACT: During the month of February 13 to May 15 in the year 2020 a research experiment was conducted at Vegetable Research Farm, Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, (U.P.). The research experiment consists 17 hybrids of bottle gourd which are studied and replicated three times in a Randomized Block Design in 7.5 × 3 m² plot size. It was found that the hybrid BG-HYB-18-2 gives best performance in terms of growth, quality and morphology of the experiment. The minimum days required to appearance of first male flower (47.33). The minimum days required to appearance of first female flower (56.66). The maximum number of branches vine⁻¹ (17.88), the maximum vine length (5.64 m). The maximum fruit weight (829.44 gm), the maximum number of fruits vine⁻¹ (9.77). The maximum yield plant⁻¹ (8.10 kg), the maximum yield hectare⁻¹ (360.15 quintal). The maximum Ascorbic Acid content (34.11 mg/gm of fruit pulp). The Maximum TSS (4.17°Brix). The morphological identity was recorded by color (Light green and Creamy) and shape (Cylindrical and Oblong) of the fruit.

Keywords: Growth, Quality, Morphology Bottle gourd.

INTRODUCTION

Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] is an important gourd crop having wide range of users and is largely cultivated in the tropics and subtropics for its edible fruits. It is commonly known as Lauki and white flowered gourd. It is climbing or prostrate plant, and has solitary flowers. It is cross pollinated due to its monoecious nature, the plants bear more male flowers and less female flowers separately on the same plant (Sahu, 2016). The fruits are fleshy and multi seeded berry and also fruits are either sweet or bitter in taste due to compound present in it as cucurbitacin. The sweet fruits are edible and also useful for medicinal purposes.. The names “lagenaria” and “siceraria” are derived from Latin words “lagenā” for bottle and “sicera” for drinking utensil (Deepti, 2013). Tender fruits used as vegetable and for preparing sweet dishes, rayta and pickles. It is anti- cancerous, cardio protective, diuretic, aphrodisiac and also antidote to certain poisons and scorpion stings, alternative purgative and also have cooling effects (Badmanaban and Patel, 2010). It can also be used to cure pain, ulcers and fever and is used for pectoral cough, asthma and other bronchial disorders using prepared syrup from the tender fruits (Upananlawar and Balaraman, 2010).

The total area under bottle gourd in India is 116939 ha and total production is 1428296 tonnes and productivity being 12.21 t ha. Productivity of bottle gourd is very

low which needs immediate attention to increase (Indian Horticulture Database, 2019).

In spite of being in cultivation since ancient times and the presence of the wide germplasm, conscious evaluation and exploitation of germplasm has not been attended to until recently. Even though the first public sector F1 hybrid was developed in this crop, the importance is not given to this crop because of consumers unknown about its nutrients rich value compared to other cucurbits.

Now a day's farmers are demanding for early maturing, high yielding and better quality variety of bottle gourd. To meet out the need of farmers, preliminary work should be initiated from identification of high yielding and better quality hybrids which can be utilize as variety or for further varietal development programme.

MATERIALS AND METHODS

The present investigation was carried out in Randomized Block Design (RBD) with three replications in which 17 bottle gourd hybrids were used. Seeds were sown in 3 m × 0.75 m spacing and 7.5 m × 3 m of plot size. Three plants were randomly selected from each genotype from each replication and evaluated for quantitative and qualitative characters and the mean values of data recorded were analyzed statistically by adopting the method suggested by (Panse and Sukhatme, 1985). The data was collected on days

to appearance of first male and female flower, number of branches vine⁻¹, vine length (m), fruit weight (gm), number of fruits vine⁻¹, fruit yield plant⁻¹(kg), fruit yield

hybrid⁻¹(q/ha), Ascorbic acid content (mg/100 gm), TSS (°Brix), shape of fruit, color of fruit.

Table 1: List of Hybrids.

| S.No. | Hybrids | Symbols | Sources |
|-------|-------------|-----------------|----------------|
| 1. | BG HYB 18-1 | T ₁ | IIVR, Varanasi |
| 2. | BG HYB 18-2 | T ₂ | IIVR, Varanasi |
| 3. | BG HYB 18-3 | T ₃ | IIVR, Varanasi |
| 4. | BG HYB 18-4 | T ₄ | IIVR, Varanasi |
| 5. | BG HYB 18-5 | T ₅ | IIVR, Varanasi |
| 6. | BG HYB 18-6 | T ₆ | IIVR, Varanasi |
| 7. | BG HYB 18-7 | T ₇ | IIVR, Varanasi |
| 8. | BG HYB 19-1 | T ₈ | IIVR, Varanasi |
| 9. | BG HYB 19-2 | T ₉ | IIVR, Varanasi |
| 10. | BG HYB 19-3 | T ₁₀ | IIVR, Varanasi |
| 11. | BG HYB 19-4 | T ₁₁ | IIVR, Varanasi |
| 12. | BG HYB 19-5 | T ₁₂ | IIVR, Varanasi |
| 13. | BG HYB 19-6 | T ₁₃ | IIVR, Varanasi |
| 14. | BG HYB 19-7 | T ₁₄ | IIVR, Varanasi |
| 15. | Chandan | T ₁₅ | Local Market |
| 16. | Queen hyb | T ₁₆ | Local Market |
| 17. | Varun | T ₁₇ | Local Market |

RESULTS AND DISCUSSION

A. Growth and Yield Parameters

It was found that the hybrid T₂ is significantly shows higher results than other hybrids. The minimum days needed to first appearance of male flower T₂ (47.33), minimum days needed to first appearance of female flower T₂ (56.66). The maximum number of branches vine⁻¹ T₂ (17.88), Vine length (5.64 m).

The maximum fruit weight T₂ (829.44 gm). The maximum number of fruits vine⁻¹ T₂ (9.77). The maximum yield plant⁻¹ (kg) T₂ (8.10). The maximum yield hectare⁻¹ T₂ (360.15 quintal) as shown in Table 2. The results are in agreement with the finding of, (Husna *et al.*, 2011, Ara *et al.*, 2012, Aruna and Swaminathan 2012, Harika *et al.*, 2012, Bawkar *et al.*, 2015) and Adarsh *et al.*, 2017; Ilyas *et al.*, 2017) in Bottle gourd.

Table 2: Growth and Yield parameters of bottle gourd hybrid.

| Treatment No. | Hybrids | Days to first male flower appearance | Days to first female flower appearance | Number of branches vine ⁻¹ | Vine length (m) | Fruit weight (gm) | Number of fruits vine ⁻¹ | Fruit yield plant ⁻¹ (Kg) | Fruit yield hybrid ⁻¹ (q/ha) |
|-----------------|-------------|--------------------------------------|--|---------------------------------------|-----------------|-------------------|-------------------------------------|--------------------------------------|---|
| T ₁ | BG HYB 18-1 | 48.66 | 57.00 | 16.77 | 4.77 | 717.66 | 8.44 | 6.10 | 271.20 |
| T ₂ | BG HYB 18-2 | 47.33 | 56.66 | 17.88 | 5.64 | 829.44 | 9.77 | 8.10 | 360.15 |
| T ₃ | BG HYB 18-3 | 49.55 | 57.44 | 14.77 | 4.55 | 573.44 | 7.11 | 4.08 | 181.15 |
| T ₄ | BG HYB 18-4 | 50.00 | 58.11 | 14.55 | 3.35 | 602.77 | 8.22 | 4.97 | 220.85 |
| T ₅ | BG HYB 18-5 | 49.88 | 57.88 | 15.33 | 3.25 | 561.33 | 7.33 | 4.13 | 183.57 |
| T ₆ | BG HYB 18-6 | 49.44 | 57.55 | 15.44 | 4.22 | 654.22 | 7.22 | 4.72 | 209.87 |
| T ₇ | BG HYB 18-7 | 51.44 | 58.55 | 15.11 | 3.65 | 709.77 | 6.55 | 4.68 | 208.11 |
| T ₈ | BG HYB 19-1 | 49.77 | 58.88 | 14.88 | 3.15 | 720.66 | 6.88 | 4.97 | 220.74 |
| T ₉ | BG HYB 19-2 | 49.88 | 59.00 | 15.77 | 4.35 | 574.11 | 6.33 | 3.66 | 162.49 |
| T ₁₀ | BG HYB 19-3 | 50.11 | 59.22 | 15.55 | 4.11 | 704.88 | 5.66 | 4.00 | 177.58 |
| T ₁₁ | BG HYB 19-4 | 49.88 | 58.55 | 15.66 | 3.65 | 722.55 | 5.22 | 3.78 | 167.84 |
| T ₁₂ | BG HYB 19-5 | 49.77 | 58.44 | 15.77 | 3.77 | 655.55 | 5.77 | 3.78 | 168.00 |
| T ₁₃ | BG HYB 19-6 | 49.66 | 58.44 | 15.11 | 3.50 | 584.44 | 5.44 | 3.18 | 141.51 |
| T ₁₄ | BG HYB 19-7 | 50.33 | 59.33 | 15.77 | 4.23 | 687.77 | 5.11 | 3.51 | 156.07 |
| T ₁₅ | Chandan | 47.66 | 57.00 | 17.55 | 5.28 | 820.33 | 9.22 | 7.57 | 336.62 |
| T ₁₆ | Queen hyb | 50.11 | 59.00 | 15.55 | 3.98 | 786.88 | 8.33 | 6.56 | 291.51 |
| T ₁₇ | Varun | 49.11 | 58.88 | 15.88 | 4.38 | 713.55 | 7.77 | 5.54 | 246.27 |
| S.Ed (±) | | 0.45 | 0.67 | 0.86 | 0.42 | 28.60 | 0.65 | 0.52 | 23.20 |
| C.D. (P = 0.05) | | 0.92 | 1.37 | 1.76 | 0.86 | 58.26 | 1.32 | 1.06 | 47.26 |

B. Morphological characters

The morphological characters are based on the shape and color of fruit. The shape of fruit was observed as

cylindrical and oblong. The color of fruit was observed as light green and creamy as shown in Table 3.

Table 3: Morphological characters.

| Treatment Symbol | Hybrids | Colour | Shape | Source |
|------------------|-------------|-------------|-------------|----------------|
| T ₁ | BG HYB 18-1 | Light green | Cylindrical | IIVR, Varanasi |
| T ₂ | BG HYB 18-2 | Creamy | Cylindrical | IIVR, Varanasi |
| T ₃ | BG HYB 18-3 | Light green | Cylindrical | IIVR, Varanasi |
| T ₄ | BG HYB 18-4 | Light green | Cylindrical | IIVR, Varanasi |
| T ₅ | BG HYB 18-5 | Light green | Cylindrical | IIVR, Varanasi |
| T ₆ | BG HYB 18-6 | Creamy | Cylindrical | IIVR, Varanasi |
| T ₇ | BG HYB 18-7 | Light green | Cylindrical | IIVR, Varanasi |
| T ₈ | BG HYB 19-1 | Light green | Cylindrical | IIVR, Varanasi |
| T ₉ | BG HYB 19-2 | Creamy | Cylindrical | IIVR, Varanasi |
| T ₁₀ | BG HYB 19-3 | Light green | Cylindrical | IIVR, Varanasi |
| T ₁₁ | BG HYB 19-4 | Light green | Cylindrical | IIVR, Varanasi |
| T ₁₂ | BG HYB 19-5 | Light green | Oblong | IIVR, Varanasi |
| T ₁₃ | BG HYB 19-6 | Creamy | Cylindrical | IIVR, Varanasi |
| T ₁₄ | BG HYB 19-7 | Light green | Cylindrical | IIVR, Varanasi |
| T ₁₅ | Chandan | Light green | Cylindrical | Local Market |
| T ₁₆ | Queen hyb | Light green | Cylindrical | Local Market |
| T ₁₇ | Varun | Light green | Cylindrical | Local Market |

(a) Shape of fruits: The fruit shape of hybrids BG HYB 18-1, BG HYB 18-2, BG HYB 18-3, BG HYB 18-4, BG HYB 18-5, BG HYB 18-6, BG HYB 18-7, BG HYB 19-1, BG HYB 19-2, BG HYB 19-3, BG HYB 19-4, BG HYB 19-6, BG HYB 19-7, Chandan, Queen hyb and Varun, observed cylindrical in shape. Whereas the hybrids BG HYB 19-5, are found in oblong shape. Similar results were also reported by (Aruna and Swaminathan 2012 ; Harika *et al.*, 2012).

(b) Color of fruits: The fruit colour of hybrids. BG HYB 18-1, BG HYB 18-3, BG HYB 18-4, BG HYB 18-5, BG HYB 18-7, BG HYB 19-1, BG HYB 19-3, BG HYB 19-4, BG HYB 19-5, BG HYB 19-7, Chandan, Queen hyb, and Varun, were observed in Light green in colour, while the hybrids BG HYB 18-2, BG HYB 18-6, BG HYB 19-2, and BG HYB 19-6, observed in Creamy

in colour. Similar results were also reported by (Bawkar *et al.*, 2015).

C. Quality parameters

The quality parameters of bottle gourd is Ascorbic Acid content (mg/100gm), TSS (°Brix). The maximum Ascorbic Acid content at maturity time was associated with T₂ (BG HYB 18-2) i.e. (34.11) followed by T₁₅ (Chandan) i.e. (33.77). The maximum TSS (°Brix) after harvesting was associated with T₂ (BG HYB 18-2) i.e. (4.17 °Brix) followed by T₁₅ (Chandan) i.e. (3.84 °Brix) as shown in Table 4.

The results are in agreement with the finding of (Mahato *et al.*, 2010, Yadav *et al.*, 2010, Kumar *et al.*, 2011 and Sahu *et al.*, 2016).

Table 4: Quality parameters of different hybrids of bottle gourd.

| Treatment | Hybrids | Ascorbic Acid (100mg/gm) | TSS (°Brix) |
|-----------------|-------------|--------------------------|-------------|
| T ₁ | BG HYB 18-1 | 32.33 | 3.41 |
| T ₂ | BG HYB 18-2 | 34.11 | 4.17 |
| T ₃ | BG HYB 18-3 | 28.66 | 2.67 |
| T ₄ | BG HYB 18-4 | 30.66 | 2.93 |
| T ₅ | BG HYB 18-5 | 29.88 | 2.90 |
| T ₆ | BG HYB 18-6 | 31.33 | 2.96 |
| T ₇ | BG HYB 18-7 | 31.88 | 3.15 |
| T ₈ | BG HYB 19-1 | 32.11 | 3.25 |
| T ₉ | BG HYB 19-2 | 30.55 | 2.96 |
| T ₁₀ | BG HYB 19-3 | 29.66 | 3.26 |
| T ₁₁ | BG HYB 19-4 | 28.55 | 3.11 |
| T ₁₂ | BG HYB 19-5 | 28.22 | 2.85 |
| T ₁₃ | BG HYB 19-6 | 29.11 | 3.07 |
| T ₁₄ | BG HYB 19-7 | 30.22 | 3.20 |
| T ₁₅ | Chandan | 33.77 | 3.84 |
| T ₁₆ | Queen hyb | 32.44 | 3.64 |
| T ₁₇ | Varun | 31.55 | 3.25 |
| S.Ed (±) | | 0.45 | 0.15 |
| C.D. (P = 0.05) | | 0.92 | 0.31 |

CONCLUSION

It is concluded from the investigation that the treatment T₂ (BG HYB 18-2) was found superior followed by T₁₅ (Chandan) in growth and higher yield with Quality factors. In this investigation the treatment T₂ (2018/BOGHYB-2) was found suitable for cultivation in Zaid season for better Quality (Ascorbic acid : 34.11 gm/mg of fruit pulp) and (TSS : 4.17°Brix).

Conflict of Interest. Nil.

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