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Mean performance of parents and hybrid for fruit yield and yield contributing traits in bottle gourd (*Lagenaria siceraria* (Mol.) Standl.)

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Abstract

The present investigations entitled “Mean performance of parents and hybrid for fruit yield and yield contributing traits in bottle gourd (*Lagenaria siceraria* (Mol.) Standl.)” were conducted during the zaid seasons of 2022-23 and 2023-24 at the Main Experiment Station (MES) of the Department of Vegetable Science, A.N.D. University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.), India. Evaluation was done for different yield and quality traits. The parent NDBG-65-2-1 (5.70 kg) exhibited highest fruit yield per plant followed by Narendra Rashmi (5.59 kg), Kashi Ganga (5.25 kg), NDBG-0-1-1 (4.93 kg) and Pant Lauki-3 (4.72 kg). Among the hybrids, the highest fruit yield per plant exhibited by Narendra Rashmi×Narendra Prabha (6.78 kg) followed by Narendra Rashmi×NDBG-18 (6.56 kg), Pant Lauki-3×Narendra Prabha (6.42), Narendra Rashmi×Narendra Kamna (6.10 kg), Solan Selection-2×NDBG-18 (5.90 kg) in descending order. The above mentioned genotypes may be used as donor parents in hybridization programme for developing high yielding varieties of bottle gourd.

Keywords: Mean performance, genotypes, yield traits, qualitative parameters

Introduction

Bottle gourd (*Lagenaria siceraria* (Mol.) Standl.) is cucurbitaceous vegetable crop having chromosome number $2n=22$. It is one of the important cucurbits in India, both as rainy and summer season vegetable. The fresh fruit has light green smooth skin and white flesh. The genus *Lagenaria* included six species that are distributed in Africa, Madagascar, Indo-Malaysia and the neotropics. There is only one cultivated species, *Lagenaria siceraria*, which is an annual and monoecious. Wild species produce small round fruits with strong bitter taste (Morimoto *et al.* 2005) [6]. Bottle gourd is predominately cross-pollinated crop due to its monoecious nature. The amount of cross pollination ranges from 60-80%. In India, the total area covered under bottle gourd is 0.223 million ha with production of 3.72 million tonnes and its productivity is 16.68 tonnes per ha. (Anonymous, 2023-24) [1]. Bottle gourd commonly known as white-flowered gourd, Doodhi, Lauki (Hindi), Kadoo (Marathi) which is official in Ayurvedic Pharmacopoeia. It is one of the excellent fruit crops for human being gifted by the nature that have all of the essential constituents that are required for normal and good health (Habibur, 2003) [3].

The tender fruits of bottle gourd can be used as a vegetable or for making sweets (e.g. Halva, kheer, petha and burfi), kofta and pickles. The fruit is rich in pectin also, which showed good prospects for jelly preparation, and the dried shells of mature fruits are hard and are used as containers, utensils, musical instruments or ornamental items. The tender fruit is good source of ascorbic acid, beta carotene, Vitamin B complex, pectin dietary soluble fibers and contain highest source of choline level-a lipotropic factor, a healer of mental disorders, along with required metabolic and metabolite precursors for brain function, amongst any other vegetable known till date. Bottle gourd fruits are traditionally used for its cardio protective, cardiotoxic, general tonic, diuretic, aphrodisiac, antidote to certain poisons and scorpion strings, alternative purgative and cooling effects. A decoction made from the leaf is a very good medicine for curing jaundice. As a vegetable it is easily digestible therefore, used even by patients. Pulp is used for overcoming constipation, cough and night blindness.

It is good for people suffering from biliousness and indigestion.

The bottle gourd fruit is also known to have a good source of essential amino acids as leucine, phenyl alanine, threonine cystine, valine, aspartic acid and proline, along with fair amount of vitamin B complex, especially thiamine, riboflavin and niacin. The edible portion of fruit contains 96.3 per cent moisture, 2.9 per cent carbohydrates, 0.2 per cent protein, 0.1 per cent fat, 0.5 per cent mineral matter and 11 mg of vitamin C per 100 g fresh weight (Thamburaj and Singh, 2005). The mineral matter reported to be present are fair amount of calcium (20 mg), phosphorus (10 mg), iron (0.7 mg) and manganese (0.08 mg).

Materials and Methods

The experimental plant material comprised of 30 F₁ hybrids and their 13 parents (10 lines and 3 testers) of bottle gourd. These lines were evaluated in a Randomized Block Design (RBD) with three replications during Zaid seasons of 2022-23 (Y1) and 2023-24 (Y2). The crop was sown in rows spaced at 3.0 m×0.50 m with plot size of 3.0 m×3.0 m. Sowing was done on 24 February, 2022-23 and 22 February, 2023-24. All the recommended agronomic package of practices and protection measures were followed to raise good crops by Main Experiment Station (MES) of the Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Narendra Nagar, Kumarganj, Ayodhya (U.P.) India. The data were collected for Twenty characters viz., Days to first staminate flower anthesis, Days to first pistillate flower anthesis, Node number to first staminate flower appearance, Node number to first pistillate flower appearance, Days to first fruit harvest, Vine length (m), Number of nodes per main vine, Internodal length (cm), Number of primary branches per plant, Fruit length (cm), Fruit circumference (cm), Average fruit weight (kg), Number of fruits per plant, Total soluble solids (°B), Ascorbic acid (mg/100 g), Reducing sugars (%), Non-reducing sugar (%), Total sugars (%), Dry matter content in fruit (g/100 g), Fruit yield per plant (kg).

Results and Discussion

Analysis of variance revealed that the differences among treatments were highly significant for all the characters in both the years and pooled. Narendra Rashmi (47.28 days) found earliest for days to first staminate flower anthesis among the parents which was followed by Pant Lauki-3 (47.85 days), Narendra Pooja (48.17 days), HAU-22 (48.75 days) and NDBG-0-1-1 (48.77 days). The best F₁ hybrid for days to first staminate flower anthesis was Narendra Rashmi×NDBG-18 (46.71 days) followed by Pant Lauki-3×Narendra Prabha (47.22 days), Solan Selection-2×Narendra Kamna (47.41 days), NDBG-63-1-1×NDBG-18 (47.53 days) Narendra Rashmi×Narendra Prabha (47.82 days).

Parent Narendra Rashmi (51.05 days) found earliest for days to first pistillate flower anthesis among the parents which was followed by Pant Lauki-3 (52.90 days), HAU-22 (53.00 days), NDBG-0-1-1 (53.71 days) and NDBG-63-1-1 (53.89 days). The best F₁ hybrids for days to first pistillate flower anthesis were Narendra Rashmi x NDBG-18 (49.88 days) followed by Pant Lauki-3×Narendra Prabha (49.93 days), Narendra Rashmi×Narendra Prabha (50.33 days), Solan Selection-2×NDBG-18 (50.95 days) and NDBG-65-2-1×NDBG-18 (51.03 days).

Kritika and bahadur *et al.* (2024) ^[5] found that the similar results, days to first male flower emergence were measured, with FAIZABADI LONG (S-1) showing the highest growth and 2021/BOGVAR-02 showing the lowest. Days to initial female flower emergence showed highest growth in 2021/BOGVAR-07 and smallest growth in 2021/BOGVAR-01.

Parent Pant Lauki-3 (10.71 nodes) showed earliest for node number to first staminate flower appearance which was followed by Narendra Rashmi (11.38 nodes), Narendra Pooja (12.26 nodes), NDBG-65-2-1 (12.40 nodes) and Kashi Ganga (13.11 nodes). The best F₁ hybrids for node number to first male flower appearance were Narendra Rashmi×NDBG-18 and Pant Lauki-3 x Narendra Prabha (9.57 nodes) followed by Solan Selection-2×NDBG-18 (10.01 nodes), Narendra Rashmi×Narendra Prabha (10.34 nodes), Narendra Rashmi×Narendra Kamna (10.98 nodes) and NDBG-63-1-1×NDBG-18 (11.28 nodes).

Gaddam *et al.* (2022) ^[2] found that the minimum node at which 1st male flower appeared was recorded in BOGVAR 10 (4.13), followed by BOGVAR 11 (5.27), and BOGVAR 6 (5.27). The maximum node at which 1st male flower appeared was BOGVAR 4 (7.80).

Parent Narendra Rashmi (14.93 nodes) showed earliest for node number to first pistillate flower appearance which was followed by Pant Lauki-3 (15.02 nodes), Kashi Ganga (16.51 nodes), NDBG-0-1-1 (17.06) and HAU-22 (17.37 nodes). The best F₁ hybrid for node number to first female flower appearance was Solan Selection-2×NDBG-18 (13.45 nodes) followed by Narendra Rashmi×NDBG-18 (13.55 nodes), NDBG-63-1-1×NDBG-18 (13.66 nodes), Narendra Rashmi×Narendra Prabha (13.73 nodes) and Pant Lauki-3×Narendra Prabha (13.75 nodes).

Gaddam *et al.* (2022) ^[2] found that the minimum node at which 1st female flower appeared was recorded in BOGVAR 10 (6.33), followed by KOMAL S-2 (6.93), BOGVAR 5 (7.73) and BOGVAR 3 (7.93). The maximum node at which 1st female flower appeared was BOGVAR 4 (15.33).

Parent Narendra Rashmi (59.34 days) found earliest for days to first fruit harvest among the parents which was followed by HAU-22 (59.52 days), NDBG-65-2-1 (59.59 days), Pant Lauki-3 (59.98 days) and Narendra Prabha (61.24 days). The best F₁ hybrid for days to first fruit harvest was Solan Selection-2×NDBG-18 (55.53 days) followed by Narendra Rashmi×NDBG-18 (55.58 days), Pant Lauki-3×Narendra Prabha (55.93 days), NDBG-63-1-1×NDBG-18 (56.07 days) and Pant Lauki-3×NDBG-18 (57.23 days).

Gaddam *et al.* (2022) ^[2] found that the least number of days to 1st picking was observed in the variety BOGVAR 7 (81.27). The maximum number of days to 1st picking was seen in BOGVAR 5 (71.80).

Parent Pant Lauki-3 (6.45 m) found maximum vine length among the parents which was followed by NDBG-65-2-1 (6.12 m), Narendra Kamana (6.03 m), NDBG-63-1-1 (5.82 m) and HAU-22 (5.76 m). The best F₁ hybrid for vine length (m) was Pant Lauki-3×NDBG-18 (7.43 m) followed by Kashi Ganga×NDBG-18 (6.17 m), Narendra Pooja×NDBG-18 (6.11 m), Pant Lauki-3×Narendra Kamna (7.10 m) and NDBG-0-1-1×NDBG-18 (6.98 m).

Kritika and bahadur *et al.* (2024) ^[5] the T11 treatment (5.32 m) recording the longest vine length and getting Mahashakti.

Parent Narendra Rashmi (64.28 nodes) found earliest for node number to first staminate flower appearance among the parents which was followed by Pant Lauki-3 (61.86 nodes), Kashi Ganga (59.89 nodes), Solan Selection-2 (59.86 nodes) and NDBG-63-1-1 (58.39 nodes). The best F1 hybrids for node number to first staminate flower appearance were Narendra Rashmi×NDBH-18 (64.70 nodes) followed by Pant Lauki-3×Narendra Prabha (63.87 nodes), Narendra Rashmi x Narendra Kamna (62.99 nodes), Narendra Rashmi×Narendra Prabha (62.86 nodes) and Solan Selection-2×NDBG-18S (62.47 nodes).

Parent NDBG-18 (9.52 cm) found maximum internodal length among the parents which was followed by Narendra Kamna (9.50 cm), Pant Lauki-3 (9.24 cm), HAU-22 (9.05 cm) and Narendra Prabha (9.05 cm). The best F1 hybrid for vine length (m) was Pant Lauki-3×NDBG-18 (11.15 cm) followed by NDBG-65-2-1×NDBG-18 (11.05 m), NDBG-0-1-1×NDBG-18 (10.92 cm), NDBG-65-2-1×Narendra Kamna (10.89 cm) and NDBG-83-1×Narendra Kamna (10.75 cm).

NDBG-83-1 (9.98 branches) found highest primary branches per plant among the parents which was followed by Kashi Ganga (9.73 branches), Pant Lauki-3 (9.61 branches), Narendra Kamna (9.31 branches) and NDBG-63-1-1 (9.25 branches). The best F1 hybrid for number primary branches per plant was Narendra Pooja×NDBG-18 (11.38 branches) followed by NDBG-0-1-1×Narendra Prabha (11.36 branches), Kashi Ganga×Narendra Kamna (11.20 branches), NDBG-63-1-1×Narendra Prabha (11.16 branches) and NDBG-65-2-1×Narendra Kamna (10.87 branches).

Narendra Rashmi (39.82 cm) exhibited maximum fruit length among the parents which was followed by NDBG-65-2-1 (38.64 cm), NDBG-83-1 (38.10 cm), Pant Lauki-3 (37.96 cm) and Narendra Pooja (37.92 cm). The best F1 hybrid for fruit length was NDBG-65-2-1×Narendra Kamna (49.34 cm) followed by Narendra Rashmi×NDBG-18 (49.03 cm), Kashi Ganga×Narendra Prabha (48.88 cm), Kashi Ganga×NDBG-18 (48.75 cm) and Narendra Pooja×Narendra Kamna (48.29 cm).

Kritika and bahadur *et al.* (2024) [5] found that the fruit length was found to be at its highest in 2021/BOGVAR-09 (52 cm) and at its lowest in 2021/BOGVAR-01 (28 cm).

Parent NDBG-0-1-1 (22.87 cm) found maximum fruit circumference among the parents which was followed by NDBG-18 (22.81 cm), Narendra Rashmi (21.93 cm), Narendra Prabha (21.59) and Narendra Pooja (20.81 cm). The best F1 hybrids for fruit circumference were Kashi Ganga×Narendra Prabha (26.49 cm) followed by Narendra Pooja×Narendra Prabha (26.04 cm), Pant Lauki-3×Narendra Prabha (26.03 cm), NDBG-0-1-1×Narendra Prabha (25.96 cm) and Pant Lauki-3×NDBG-18 (25.95 cm).

The parent NDBG-65-2-1 (1.19 kg) produced heaviest average fruit weight among the parents which was followed by Narendra Rashmi (1.12), NDBG-0-1-1 (1.08 kg), Narendra Kamna (1.00 kg) and NDBG-83-1 (0.97 kg). Among the hybrids, the highest fruit weight was exhibited by Pant Lauki-3×Narendra Prabha (1.28 kg) followed by Narendra Rashmi×NDBG-18 (1.26 kg), NDBG-83-1×Narendra Kamna (1.21 kg), Pant Lauki-3×NDBG-18 (1.20 kg) and Kashi Ganga×NDBG-18 (1.16 kg), in descending order.

Uddin *et al.* (2014) [4] found that the maximum single fruit weight was found from L11 (1.43 kg) followed by L10 (1.35 kg) and L1 (1.32 kg) whereas minimum from L3 (0.89 kg). The parent Kashi Ganga (6.06 fruits) produced maximum number of fruits per plant among the parents which was followed by Solan Selection- 2 (5.88 fruits), Pant Lauki-3 (5.10 fruits), Narendra Rashmi (4.99 fruits) and Narendra Prabha (4.93 fruits). Among the hybrids, the maximum number of fruits was exhibited by NDBG-63-1-1×Narendra Prabha (6.18 fruits) followed by NDBG-63-1-1×NDBG-18 (6.18 fruits), Narendra Rashmi×Narendra Prabha (6.00 fruits), Narendra Rashmi×Narendra Kamna (5.86 fruits) and Narendra Pooja×NDBG-18 (5.84 fruits) in descending order.

Uddin *et al.* (2014) [4] found that the maximum number of fruit/plant was found from L11 (14.3) which was statistically identical with L10 (13.7) and L1 (13.3) followed by L2, L4 and L8 (12.3) but minimum from L3 (9.3) in bottle gourd.

Among the parent maximum total soluble solid was exhibited by NDBG-65-2-1 (3.01 ob) followed by NDBG-18 (2.98 ob), HAU-22 (2.77 ob), Pant Lauki-3 (2.76 ob), Narendra Prabha (2.67 ob). Among the hybrids, the maximum total soluble solid was exhibited by NDBG-63-1-1×Narendra Prabha (3.11 ob), followed by NDBG-83-1×Narendra Prabha (3.10 ob), Solan Selection-2×Narendra Prabha (3.08 ob) and Kashi Ganga×NDBG-18 (3.04 ob), Narendra Rashmi×Narendra Kamna (3.03 ob) in descending order.

Tiwari *et al.* (2024) [8] reported similar results, the TSS (⁰B) (1.23) was recorded in the hybrids ARISE SEED (NEERAV) followed by the hybrids 2021/BOGHYB-2 (1.4), 2021/BOGHYB-1 (1.43), which were on par with each other and the TSS (⁰B) (3.03) reported in the hybrids 2021/BOGHYB-3.

Among the parent ascorbic acid content was maximum in NDBG-0-1-1 (9.28 mg/100 g) followed by HAU-22 (9.00 mg/100 g), NDBG-63-1-1 (8.62 mg/100 g), NDBG-83-1 (8.28 mg/100 g) and Narendra Prabha (8.15 mg/100 g). Among the hybrids, NDBG-63-1-1×Narendra Prabha (8.76 mg/100 g), followed by NDBG-0-1-1×t1 (8.60 mg/100 g), Narendra Pooja×Narendra Prabha (8.45 mg/100 g), NDBG-63-1-1×Narendra Kamna (8.38 mg/100 g) and HAU-22×NDBG-18 (8.37 mg/100 g) exhibited maximum ascorbic acid content in descending order.

Tiwari *et al.* (2024) [8] reported similar results, the minimum Vitamin C (mg/100 g) (24) was recorded in the hybrids ARISE SEED (NEERAV) followed by the hybrids 2021/BOGHYB-2 (25.3), 2021/BOGHYB1 (26), which were on par with each other and the Vitamin C (mg/100 g) (31.7) reported in the hybrids 2021/BOGHYB-3.

The parent NDBG-65-2-1 (2.58%) followed by Pant Lauki-3 (2.54%), NDBG-83-1 (2.26%), Kashi Ganga (2.24%) and Solan Selection-2 (2.16%) exhibited maximum reducing sugar content (%) in descending order. Among the hybrids, maximum reducing sugars content was exhibited by NDBG-0-1-1×Narendra Prabha (2.57%) followed by NDBG-83-1×Narendra Kamna (2.40%), NDBG-65-2-1×Narendra Prabha (2.38%), Narendra Rashmi×Narendra Prabha (2.27%) and NDBG-65-2-1×NDBG-18 (2.23%) in descending order.

The parents Narendra Pooja (0.85%) followed by NDBG-18 (0.83%), Narendra Rashmi (0.82%), NDBG-63-1-1 (0.81%) and NDBG-0-1-1 (0.80%) exhibited maximum non-

reducing sugar content (%) in descending order. Among the hybrids, maximum non-reducing sugar was exhibited by NDBG-83-1×Narendra Kamna (0.94%), followed by Narendra Pooja×NDBG-18 (0.92%), NDBG-83-1×Narendra Kamna (0.89%), NDBG-63-1-1×Narendra Kamna (0.89%) and Narendra Pooja×Narendra Kamna (0.86%).

The parent NDBG-65-2-1 (2.95%) recorded highest total sugars followed by Pant Lauki-3 (2.83%), Kashi Ganga (2.65%), NDBG-83-1 (2.57%) and Narendra Rashmi (2.49%). Among the hybrids, highest total sugars content was exhibited by NDBG-0-1-1×Narendra Prabha (2.93%) followed by NDBG-83-1×Narendra Kamna (2.88%), NDBG-65-2-1×Narendra Prabha (2.73%), NDBG-65-2-1×NDBG-18 (2.65%), and Narendra Rashmi×Narendra Prabha (2.62%).

The parent Narendra Prabha (5.08 g/100 g) recorded highest dry matter followed by Solan Selection-2 (4.97 g/100 g), Narendra Pooja (4.38 g/100 g), Pant Lauki-3 (4.29 g/100 g) and NDBG-18 (4.22 g/100 g). Among the hybrids, highest dry matter was exhibited by Solan Selection-2×Narendra

Prabha (5.67 g/100 g) followed by Narendra Pooja×Narendra Kamna (5.37 g/100 g), Narendra Rashmi×NDBG-18 (5.28 g/100 g), Narendra Pooja×Narendra Prabha (5.01 g/100 g) and Narendra Rashmi×Narendra Kamna (5.01 g/100 g).

The parent NDBG-65-2-1 (5.70 kg) exhibited highest fruit yield per plant followed by Narendra Rashmi (5.59 kg), Kashi Ganga (5.25 kg), NDBG-0-1-1 (4.93 kg) and Pant Lauki-3 (4.72 kg). Among the hybrids, the highest fruit yield per plant exhibited by Narendra Rashmi×Narendra Prabha (6.78 kg) followed by Narendra Rashmi×NDBG-18 (6.56 kg), Pant Lauki-3×Narendra Prabha (6.42), Narendra Rashmi×Narendra Kamna (6.10 kg), Solan Selection-2×NDBG-18 (5.90 kg) in descending order.

Uddin *et al.* (2014) [4] However, maximum yield/plant was found from L11 (20.6 kg) followed by L10 (18.4 kg) and L1 (17.6 kg) whereas minimum from L3 (8.3 kg). Weight per fruit is an important yield contributing attribute which affects the yield decisively as studied by Yadav and Kumar (2011). [9]

Table 2: Mean performance, general mean, range, coefficient of variation, critical difference and standard error for twenty characters of line x tester set of 30 F1's and their 13 parents in bottle gourd pooled.

S. No.	Genotypes	Days to first staminate flower anthesis	Days to first pistillate flower anthesis	Node number to first staminate flower appearance	Node number to first pistillate flower appearance	Days to first fruit harvest	Vine length (m)	No. of node per main vine	Internodal length (cm)	Number of primary branches per plant	Fruit length
Crosses		Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled
1.	HAU-22 x NDBG-18	48.66	53.88	12.19	17.94	60.24	6.28	55.07	10.54	9.44	35.06
2.	HAU-22 x Narendra Kamna	47.95	52.88	13.24	18.07	61.84	6.68	55.74	10.72	7.61	32.42
3.	HAU-22 x Narendra Prabha	49.07	51.83	14.06	14.90	59.00	6.41	55.70	10.49	8.77	29.79
4.	Pant Lauki -3 x NDBG-18	48.3	52.03	12.18	17.27	57.24	7.43	60.87	11.15	8.22	43.56
5.	Pant Lauki -3 x Narendra Kamna	48.00	51.09	13.16	18.44	61.23	7.10	59.97	10.60	8.66	44.42
6.	Pant Lauki -3 x Narendra Prabha	47.22	49.93	9.57	13.75	55.94	6.26	63.88	8.93	10.11	46.29
7.	Solan Selection -2 x NDBG-18	47.41	50.95	10.00	13.45	55.53	6.08	62.47	8.80	9.03	39.44
8.	Solan Selection -2 x Narendra Kamna	48.88	52.55	13.97	18.07	60.57	6.25	59.16	10.12	7.95	45.37
9.	Solan Selection -2 x Narendra Prabha	49.96	53.96	14.36	14.45	61.53	6.58	59.20	10.27	9.38	40.51
10.	NDBG-63-1-1 x NDBG-18	47.53	51.39	11.28	13.66	56.07	6.36	62.06	9.27	9.84	44.67
11.	NDBG-63-1-1 x Narendra Kamna	49.00	52.67	13.45	17.71	61.28	6.94	60.05	10.51	9.44	42.25
12.	NDBG-63-1-1 x Narendra Prabha	50.06	53.54	12.96	16.38	62.19	6.73	60.04	10.54	11.16	45.37
13.	NDBG-65-2-1 x NDBG-18	48.38	51.03	13.01	17.23	60.87	6.95	59.32	11.06	10.20	44.22
14.	NDBG-65-2-1 x Narendra Kamna	49.01	52.78	12.78	16.38	60.26	6.77	58.86	10.90	10.87	49.34
15.	NDBG-65-2-1 x Narendra Prabha	50.43	53.72	13.44	17.88	59.32	6.89	58.05	10.35	8.61	40.80
16.	NDBG-83-1 x NDBG-18	49.57	52.76	13.51	18.08	60.91	7.12	56.93	10.68	7.73	42.66
17.	NDBG-83-1 x Narendra Kamna	49.52	52.29	12.64	17.48	61.14	6.75	58.11	10.76	10.48	47.94
18.	NDBG-83-1 x Narendra Prabha	49.87	54.28	13.68	18.36	61.47	6.77	59.29	10.52	8.76	40.69
19.	NDBG-0-1-1 x NDBG-18	48.22	52.71	14.07	18.97	60.96	6.98	59.43	10.92	10.51	40.50
20.	NDBG-0-1-1 x Narendra Kamna	48.12	51.86	13.62	18.72	60.13	6.74	60.58	10.34	8.38	46.32
21.	NDBG-0-1-1 x Narendra Prabha	51.66	54.35	13.45	19.08	59.29	6.94	59.31	10.69	11.36	38.44
22.	Kashi Ganga x NDBG-18	49.23	53.04	12.89	17.37	61.04	7.18	61.47	10.62	8.62	48.75
23.	Kashi Ganga x Narendra Kamna	49.69	52.55	13.66	17.06	61.61	6.80	61.34	10.36	11.20	47.70
24.	Kashi Ganga x Narendra Prabha	51.32	54.15	13.10	17.06	60.97	6.92	60.16	10.34	9.22	48.88
25.	Narendra Pooja x NDBG-18	48.72	52.42	12.97	16.87	61.00	6.11	58.49	9.96	11.38	42.65
26.	Narendra Pooja x Narendra Kamna	48.39	51.98	13.02	17.40	60.72	6.28	57.53	10.15	10.50	48.29
27.	Narendra Pooja x Narendra Prabha	50.50	53.99	12.79	16.97	60.43	6.35	58.66	10.38	9.49	44.59
28.	Narendra Rashmi x NDBG-18	46.71	49.88	9.57	13.55	55.59	6.22	64.71	8.86	10.27	49.03
29.	Narendra Rashmi x Narendra Kamna	49.7	53.02	10.98	15.47	58.88	6.72	62.99	9.44	9.54	44.66
30.	Narendra Rashmi x Narendra Prabha	47.82	50.33	10.34	13.73	57.34	6.26	62.86	9.48	9.47	46.25
	F1 Hybrid mean	48.97	52.47	12.67	16.73	60.04	6.63	58.26	10.32	9.54	43.37

Genotypes		Days to first staminate flower anthesis	Days to first pistillate flower anthesis	Node number to first staminate flower appearance	Node number to first pistillate flower appearance	Days to first fruit harvest	Vine length (m)	No. of node per main vine	Internodal length (cm)	Number of primary branches per plant	Fruit length
Lines		Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled
31.	HAU-22	48.75	53.00	13.12	17.37	59.52	5.76	55.38	9.05	7.72	27.88
32.	Pant Lauki -3	47.85	52.90	10.71	15.02	59.98	6.45	61.86	9.24	9.61	37.96
33.	Solan Selection -2	49.10	54.02	13.88	18.08	64.46	5.66	59.86	8.71	8.70	31.34
34.	NDBG-63-1-1	49.67	53.89	13.21	17.93	63.36	5.82	58.39	9.02	9.25	37.00
35.	NDBG-65-2-1	49.11	55.29	12.40	17.75	59.59	6.12	56.17	9.40	8.78	38.64
36.	NDBG-83-1	50.79	54.23	14.21	18.04	63.61	5.67	55.41	8.79	9.98	38.10
37.	NDBG-0-1-1	48.77	53.71	13.22	17.06	61.35	5.52	58.06	8.82	8.77	37.07
38.	Kashi Ganga	49.15	54.12	13.11	16.51	61.62	5.52	59.89	8.41	9.73	30.40
39.	Narendra Pooja	48.17	54.20	12.26	18.05	62.51	5.64	56.23	8.43	6.87	37.92
40.	Narendra Rashmi	47.28	51.05	11.38	14.93	59.34	5.70	64.28	7.32	8.31	39.82
Testers											
41.	NDBG-18	50.44	54.94	15.43	18.78	63.85	5.54	53.59	9.52	7.93	36.81
42.	Narendra Kamna	49.45	54.89	14.21	17.84	64.09	6.03	55.80	9.50	9.31	37.31
43.	Narendra Prabha	52.16	55.18	14.68	19.05	61.24	5.59	55.00	9.05	8.60	37.84
Parental mean		49.29	53.96	13.22	17.42	61.88	5.77	57.68	8.86	8.73	36.01
Grand mean		49.10	52.97	12.85	16.92	60.51	6.38	59.13	9.85	9.30	41.07
C.V.		2.39	2.18	4.08	4.21	3.57	3.44	3.89	3.66	4.07	4.24
S.E. m±		0.68	0.67	0.30	0.41	1.25	0.13	1.33	0.21	0.22	1.01
C.D @ 5%		1.91	1.87	0.85	1.16	3.51	0.36	3.73	0.58	0.61	2.83
Range	Lowest	46.71	49.89	9.57	13.45	55.53	5.52	53.6	7.32	6.88	27.88
	Highest	52.16	55.29	15.44	19.08	64.47	7.43	64.71	11.15	11.39	49.35

S. No.	Genotypes	Fruit circumference (cm)	Fruit weight (kg)	Fruit per plant	Total soluble solids (%)	Ascorbic acid	Reducing sugar	Non-Reducing sugar (%)	Total sugar (%)	Dry matter content (%)	Fruit yield per plant (kg)
Crosses		Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled
1.	HAU-22 x NDBG-18	24.66	0.90	4.79	2.43	8.38	1.67	0.79	2.07	3.45	4.33
2.	HAU-22 x Narendra Kamna	22.95	0.86	5.03	2.96	7.96	1.74	0.69	2.11	2.97	4.33
3.	HAU-22 x Narendra Prabha	21.37	0.81	4.63	2.75	8.32	1.63	0.66	1.94	3.35	3.76
4.	Pant Lauki -3 x NDBG-18	25.95	1.20	4.19	3.03	7.31	2.08	0.81	2.51	4.37	5.02
5.	Pant Lauki -3 x Narendra Kamna	24.12	1.00	4.48	2.80	7.63	1.96	0.70	2.34	4.07	4.51
6.	Pant Lauki -3 x Narendra Prabha	26.03	1.28	5.00	2.99	7.59	2.13	0.71	2.47	4.43	6.42
7.	Solan Selection -2 x NDBG-18	21.80	1.12	5.23	2.92	7.89	1.76	0.76	2.16	4.97	5.91
8.	Solan Selection -2 x Narendra Kamna	21.47	0.91	5.46	2.72	8.25	2.00	0.70	2.35	4.49	5.01
9.	Solan Selection -2 x Narendra Prabha	23.27	0.89	5.04	3.09	8.25	2.10	0.73	2.49	5.68	4.51
10.	NDBG-63-1-1 x NDBG-18	25.58	0.90	6.18	2.46	8.00	1.67	0.81	2.15	4.48	5.59
11.	NDBG-63-1-1 x Narendra Kamna	23.16	0.83	5.36	2.77	8.39	1.90	0.90	2.37	4.34	4.50
12.	NDBG-63-1-1 x Narendra Prabha	24.00	0.93	6.19	3.12	8.76	1.98	0.75	2.33	4.40	5.75
13.	NDBG-65-2-1 x NDBG-18	23.39	0.86	5.42	2.92	7.81	2.23	0.77	2.66	4.54	4.66
14.	NDBG-65-2-1 x Narendra Kamna	25.47	1.13	4.93	2.41	7.12	1.88	0.81	2.28	4.29	5.58
15.	NDBG-65-2-1 x Narendra Prabha	21.92	0.86	5.26	2.65	8.18	2.39	0.73	2.74	3.82	4.55
16.	NDBG-83-1 x NDBG-18	24.08	0.92	5.49	2.50	7.81	2.07	0.90	2.51	3.55	5.07
17.	NDBG-83-1 x Narendra Kamna	25.23	1.21	4.85	2.94	7.95	2.40	0.94	2.89	4.47	5.85
18.	NDBG-83-1 x Narendra Prabha	21.40	0.84	5.34	3.11	8.25	2.04	0.60	2.32	4.28	4.51
19.	NDBG-0-1-1 x NDBG-18	24.50	0.91	5.39	2.12	8.60	1.62	0.81	2.01	4.61	4.93
20.	NDBG-0-1-1 x Narendra Kamna	25.43	0.99	5.20	2.74	7.45	1.69	0.70	2.03	4.66	5.20
21.	NDBG-0-1-1 x Narendra Prabha	25.96	0.95	5.51	2.99	8.00	2.57	0.75	2.93	4.07	5.24
22.	Kashi Ganga x NDBG-18	22.62	1.16	4.98	3.04	7.04	2.12	0.78	2.49	4.35	5.79
23.	Kashi Ganga x Narendra Kamna	24.85	1.12	4.97	2.63	7.51	2.20	0.72	2.54	4.04	5.59
24.	Kashi Ganga x Narendra Prabha	26.49	1.01	4.73	2.22	8.18	2.01	0.63	2.30	3.58	4.80
25.	Narendra Pooja x NDBG-18	23.09	0.86	5.84	2.28	8.20	1.81	0.93	2.27	4.03	5.06
26.	Narendra Pooja x Narendra Kamna	24.75	0.96	4.74	2.96	7.28	1.80	0.86	2.23	5.38	4.55
27.	Narendra Pooja x Narendra Prabha	26.04	0.90	5.55	2.64	8.46	2.23	0.71	2.57	5.01	4.99
28.	Narendra Rashmi x NDBG-18	25.63	1.26	5.58	2.39	7.94	2.01	0.84	2.42	5.28	6.56
29.	Narendra Rashmi x Narendra Kamna	22.32	1.04	5.86	3.04	8.08	1.89	0.79	2.27	5.02	6.10
30.	Narendra Rashmi x Narendra Prabha	25.25	1.12	6.00	2.63	8.22	2.28	0.66	2.62	4.67	6.78
F1 Hybrid mean		24.10	0.99	5.24	2.74	7.96	1.99	0.76	2.38	4.35	5.18

S. No.	Genotypes	Fruit circumference (cm)	Fruit weight (kg)	Fruit per plant	Total soluble solids (%)	Ascorbic acid	Reducing sugar	Non-Reducing sugar (%)	Total sugar (%)	Dry matter content (%)	Fruit yield per plant (kg)
Lines		Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled
31.	HAU-22	19.78	0.85	4.30	2.78	9.01	1.44	0.65	1.74	3.55	3.67
32.	Pant Lauki -3	20.13	0.92	5.11	2.76	7.67	2.54	0.62	2.83	4.29	4.72
33.	Solan Selection -2	17.24	0.77	5.88	2.58	6.92	2.17	0.61	2.46	4.97	4.61
34.	NDBG-63-1-1	19.34	0.96	4.39	2.36	8.63	1.43	0.81	1.81	3.98	4.21
35.	NDBG-65-2-1	19.72	1.19	4.78	3.02	7.64	2.59	0.76	2.95	2.58	5.70
36.	NDBG-83-1	19.17	0.97	4.48	2.29	8.28	2.27	0.65	2.57	4.11	4.27
37.	NDBG-0-1-1	22.87	1.08	4.50	2.13	9.28	1.45	0.80	1.84	3.96	4.93
38.	Kashi Ganga	18.14	0.86	6.06	2.66	7.01	2.25	0.77	2.65	2.70	5.25
39.	Narendra Pooja	20.81	0.95	4.02	2.41	8.13	1.82	0.85	2.22	4.38	3.83
40.	Narendra Rashmi	21.93	1.12	5.00	2.28	8.04	2.10	0.82	2.49	3.68	5.59
Tester											
41.	NDBG-18	22.81	0.90	4.3	2.98	7.59	1.76	0.83	2.17	4.22	3.89
42.	Narendra Kamna	20.02	1.00	4.27	2.45	6.98	1.99	0.70	2.35	3.93	4.31
43.	Narendra Prabha	21.59	0.95	4.935	2.67	8.155	1.93	0.76	2.32	5.08	4.71
Parental mean		20.27	0.96	4.76	2.56	7.94	1.98	0.74	2.34	3.96	4.59
Grand mean		22.94	0.99	5.09	2.68	7.96	1.99	0.76	2.37	4.25	5.00
C.V.		4.12	5.75	5.44	2.39	2.85	2.95	2.51	3.24	3.19	6.88
S.E. m±		0.55	0.03	0.16	0.04	0.13	0.03	0.01	0.04	0.08	0.20
C.D @ 5%		1.53	0.09	0.45	0.10	0.37	0.10	0.03	0.12	0.22	0.56
Range	Lowest	17.24	0.78	4.02	2.12	6.92	1.43	0.6	1.75	2.58	3.67
	Highest	26.50	1.29	6.19	3.12	9.28	2.59	0.94	2.95	5.68	6.78

Conclusion

The study found significant differences in traits among treatments, with certain genotypes NDBG-65-2-1 exhibited highest fruit yield per plant followed by Narendra Rashmi, Kashi Ganga, NDBG-0-1-1 and Pant Lauki-3. Among the hybrids, the highest fruit yield per plant exhibited by Narendra Rashmi×Narendra Prabha followed by Narendra Rashmi×NDBG-18, Pant Lauki-3×Narendra Prabha, Narendra Rashmi×Narendra Kamna, Solan Selection-2×NDBG-18. The above mentioned genotypes may be used as donor parents in hybridization programme for developing high yielding varieties of bottle gourd.

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