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Evaluation of performance for the quantitative traits in bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] over seasons under salt affected soil

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Abstract

Present investigations were carried out in bottle gourd to assess the mean performance, general mean and range for twenty three quantitative characters. Twenty seven bottle gourd hybrids generated by crossing 9 lines with 3 testers cross, along with their twelve parents were evaluated salt affected in randomized complete block design with three replication at the Main Experiment Station, Department of Vegetable Science, ANDUA&T, Kumarganj, Ayodhya, during the of *Zaid* seasons of year 2020 and 2021. The pooled estimates of mean performance for total fruit yield per plant varied from 2.34 to 3.71 kg for parents and 3.35 to 7.38 kg fruit for hybrids. The mean values over the parental lines and F_1 hybrids were 3.05 and 4.66 kg, respectively. The highest mean performance for most desirable traits fruit yield per plant was exhibited by Narendra Pooja (3.71 kg) followed by NDBG-Sel-1 (3.42 kg), Narendra Prabha (3.40 kg), Narendra Rashmi (3.36 kg) and NDBG-28 (3.33 kg) for parent. Among the hybrids, the highest fruit yield per plant was exhibited by NDBG-13 \times Narendra Rashmi (7.38 kg) followed by NDBG-13 \times Narendra Prabha (6.48 kg), NDBG-Sel-1 \times Narendra Rashmi (6.17 kg), Narendra Kamna \times Narendra Rashmi (5.84 kg) and Narendra Pooja \times Pusa Naveen (4.89 kg) in descending order.

Keywords: Mean performance, bottle gourd salt affected soil

Introduction

Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] $2n = 2x = 22$, is one of humankind's first domesticated plants. It is also known as white flower gourd, Ghiakadoo or Lauki, is an important cucurbitaceous vegetable crop belonging to family *Cucurbitaceae* and subfamily *Cucurbitoidae*. Bottle gourd has greater economic importance. It is commonly grown for vegetable and it has medicinal value to human being. It can be used for making sweets (e.g. *halva*, *kheer*, *petha* and *burfi*) and pickle. A decoction made from the leaf is very good medicine for curing jaundice. The pulp is good for overcoming constipation, cough, night blindness, and as an antidote against certain poisons.

According to De Candolle (1882) ^[4], bottle gourd has been found in wild form in South Africa and India. However, Cutler and Whitaker (1961) ^[3] are of the view that probably it is indigenous to tropical Africa. On the basis of variability in seeds and fruits. In India, the total area covered under bottle gourd is 0.189 million ha with production of 3.106 million tonnes and its productivity is 16.434 tonnes per ha. (Anonymous, 2019-20) ^[1].

Bottle gourd is one of the largest produced vegetable in the world. It is widely grown in South and Southeast Asia, China and Africa Bottle gourd is highly cross-pollinated crops due to its monoecious and andromonoecious nature. The amount of cross pollination ranges from 60 to 80 per cent (Choudhary, 1987) ^[2]. Being cross-pollinated crops, it has wide range of variability for maturity, yield and fruit characters like shape and size. The fruit colour varies from dark green to cream or yellow. In India, it also demonstrated the significant regional variability (Sivaraj and Pandravada, 2005) ^[10]. The available diversity within the species for desired fruit enables a breeder in choosing the most suitable combinations to use for exploitation of hybrid vigour in a given crop. Many of the quantitative traits such as number of fruits per plant and yield per plant are highly influenced by environmental conditions.

The mean performance of genotypes may be used as donor parents in hybridization programme for developing high yielding varieties of respective groups. Some other genotypes exhibiting very high mean performance for characters other than fruit yield per plant may also be used for transferring these traits. These lines merits due consideration as promising parents for hybridization programme for bringing over all improvement in plant genetic architecture in

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a component breeding approach ultimately leading to high yielding and high quality bottle gourd genotypes even if they have moderate or low fruit yield. Keeping in view the above facts the present investigation was conducted to find out stable genotype of bottle gourd for improvement in future.

Materials and Methods

The present research work was conducted during *Zaid* seasons of 2020 (Y_1) and 2021 (Y_2) to study the mean performance, general mean and range for twenty three characters using line \times tester mating design at the 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 soil of this farm have more than 8 pH and alkaline in nature. The observations were recorded on twenty three characters.

1. The experimental materials for the present investigation comprised of nine promising and diverse inbred lines/varieties with three testers of bottle gourd selected on the basis of genetic variability from the germplasm stock maintained in the Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.) India. The selected parental lines *i.e.*; NDBG-28 (L_1), NDBG-13 (L_2), NDBG-15 (L_3), Narendra Pooja (L_4), NDBG-104 (L_5), NDBG-Sel-1 (L_6), Narendra Kamna (L_7), NDBG-21 (L_8), NDBG-22 (L_9) were crossed with three testers *viz.* Pusa Naveen (T_1), Narendra Prabha (T_2), Narendra Rashmi (T_3) to get 27 F_1 seed. Parental lines (9 lines and 3 testers) were also selfed/sibbed to get the true to type seeds. The crop was sown in rows spaced at 3 meters apart with a plant to plant spacing of 0.50 meter. Sowing was done on 20 March, 2020 and 19 March, 2021. All the recommended agronomic package of practices and protection measures were followed to raise good crops. Observations were recorded on days to first male flower anthesis, days to first female flower anthesis, node number to first male flower appearance, node number to first female flower appearance, length of pedicel of male flower (cm), length of pedicel of female flower (cm), days to first harvest, primary branches per plant, vine length (m), number of node per vine, internodal length (cm), picking duration, peduncle length (cm), fruit length (cm), average fruit circumference (cm), average fruit weight (kg), number of fruit per plant, fruit yield per plant (kg), total soluble solids (%), reducing sugars (%), non-reducing sugar (%), total sugars (%) and dry matter (g/100g). The analysis of variance were done as per the method suggested by (Panse and Sukhatme, 1987) [8].

Result and Discussion

Mean performance, general mean, range, coefficient of variation, critical difference and standard error for twenty three characters of line \times tester set of 27 F_1 's and their 12 parents ($Y_1=2020$ and $Y_2=2021$) and pooled had been presented in Table-1. The highest mean performance for most desirable traits fruit yield per plant was exhibited by Narendra Pooja (3.68 kg) followed by NDBG-Sel-1 (3.41 kg), Narendra Prabha (3.39 kg), Narendra Rashmi (3.35 kg) and NDBG-28 (3.27 kg) in Y_1 , Narendra Pooja (3.74 kg) exhibited highest fruit yield per plant followed by NDBG-Sel-1 (3.44 kg), Narendra Prabha (3.41 kg), NDBG-28 (3.38 kg) and Narendra

Rashmi (3.37kg) in Y_2 and Narendra Pooja (3.71 kg) exhibited highest fruit yield per plant followed by NDBG-Sel-1 (3.42 kg), Narendra Prabha (3.40 kg), Narendra Rashmi (3.36 kg) and NDBG-18 (3.33 kg) in pooled.

The above mentioned genotypes may be used as donor parents in hybridization programme for developing high yielding varieties of respective groups. Some other genotypes exhibiting very high mean performance for characters other than fruit yield per plant are also listed in Table-1. These lines merits due consideration as promising parents for hybridization programme for bringing over all improvement in plant genetic architecture in a component breeding approach ultimately leading to high yielding and high quality bottle gourd genotypes even if they have moderate or low fruit yield. In this context, the most desirable parents was NDBG-21(44.67 days) which showed earliness for days to first male flower anthesis among the parents which was followed by Narendra Rashmi and Narendra Prabha (45.00 days), NDBG-Sel-1 (45.33 days), NDBG-28 (45.67 days) and Narendra Kamna (47.00 days) in Y_1 , Parent NDBG-Sel-1 (43.00 days) followed by Narendra Pooja (45.67 days), NDBG-21 (46.00 days), Narendra Prabha (46.67 days) in Y_2 and Parent NDBG-Sel-1 (44.17 days) followed by NDBG-21 (45.53 days), Narendra Prabha (45.83 days) and Narendra Rashmi (45.83 days) in pooled. While, NDBG-21 (46.67 days) exhibited earliest days to first female flower anthesis among the parents which was followed by Narendra Prabha (47.33 days) Narendra Rashmi (47.67 days) and NDBG-Sel-1 (48.67 days) and NDBG-28 (49.33 days) in Y_1 , Parent Narendra Pooja (48.67 days) followed by NDBG-Sel-1 (49.00 days), NDBG-21 (50.67) NDBG-28 and NDBG-13 (52.00 days) and NDBG-15 (52.67 days) in Y_2 and Parent NDBG-21 (48.67 days) followed by NDBG-Sel-1 (48.83 days), Narendra Pooja (49.33 days) and Narendra Rashmi (49.83 days) in pooled. Among the parents maximum node number to first male flower appearance was observed in NDBG-13(12.67 nodes) followed by NDBG-28, NDBG-15 and NDBG-Sel-1 (13.00 nodes), NDBG-21 (13.67 nodes) and NDBG-104, Pusa Naveen and Narendra Prabha (14.00 nodes) in Y_1 , NDBG-13 (14.67 nodes) followed by NDBG-28 and NDBG-Sel-1 (15.00 nodes), Narendra Prabha (15.33) and NDBG-15 and NDBG-21 (15.67 nodes) in Y_2 and NDBG-13 (13.67 nodes) followed by NDBG-28 and NDBG-Sel-1 (14.00 nodes) and NDBG-15 (14.33 nodes) in pooled; for earliest node number to first female flower appearance the best parent was NDBG-13(16.00 nodes) followed by NDBG-28, NDBG-15 and NDBG-Sel-1 (17.00 nodes), NDBG-21 (17.33 nodes) and Narendra Pooja (17.67 nodes) in Y_1 , Narendra Prabha (18.00 nodes) followed by NDBG-15 and NDBG-22 (19.00 nodes), Narendra Kamna (20.00 nodes) and NDBG-104 (20.67 nodes) in Y_2 and Narendra Pooja (18.00 nodes) followed by Narendra Prabha (18.33 nodes), NDBG-13 (18.50 nodes) and NDBG-28 and Narendra Pooja (19.83 nodes) in pooled; highest length of pedicel of male flower (cm) was recorded in parent NDBG-104 and NDBG-Sel-1 (21.33 cm) followed by Pusa Naveen (20.67 cm), NDBG-21 (20.33 cm) and Narendra Prabha (19.67 cm) in Y_1 , NDBG-Sel-1 (21.33 cm) followed by Pusa Naveen (21.00 cm) and Narendra Pooja, Narendra Kamna and Narendra Prabha (20.00 cm) in Y_2 and NDBG-Sel-1 (21.83 cm) followed by Pusa Naveen (20.83 cm), NDBG-21 (20.17 cm) and NDBG-104 (20.00 cm) in pooled; highest length of pedicel of male flower (cm) was recorded in parent NDBG-104 (13.67 cm)

followed by NDBG-15 (13.00 cm), NDBG-22 (10.67 cm) and Narendra Pooja (10.33 cm) in Y₁, NDBG-15 and NDBG-105 (14.00 cm) followed by Pusa Naveen (12.67 cm), NDBG-22 (11.67 cm) and Narendra Rashmi (11.33 cm) in Y₂ and NDBG-105 (13.83 cm) followed by NDBG-104 (13.50 cm), Pusa Naveen (12.33 cm) and Narendra Rashmi (11.00 cm) in pooled; earliest days to first fruit was observed in Narendra Prabha (54.67 days) followed by NDBG-21 and Narendra Rashmi (55.00 days), NDBG-Sel-1 (56.33 days) and NDBG-28 (57.00 days) in Y₁, NDBG-21 (55.67 days) followed by Narendra Pooja and NDBG-Sel-1 (57.00 days) and Narendra Rashmi (58.00 days) in Y₂ and NDBG-21 (55.33 days) followed by Narendra Rashmi (56.50 days), NDBG-Sel-1 (56.67 days), Narendra Prabha (57.50 days) and Narendra Pooja (58.17 days) in pooled; highest primary branches per plant among the parents was recorded in Pusa Naveen (20.00 branches) followed by NDBG-Sel-1 (19.67 branches) and Narendra Pooja × Narendra Prabha (18.33 branches) in Y₁, Pusa Naveen (22.00 branches) followed by NDBG-Sel-1 (21.33 branches), Narendra Pooja (20.67 branches) and NDBG-22 and Narendra Prabha (20.00 branches) in Y₂ and Pusa Naveen (21.00 branches) followed by NDBG-Sel-1 (20.50 branches), Narendra Pooja (19.50 branches) and Narendra Prabha (19.17 branches) in pooled; maximum vine length among the parents was observed in NDBG-104 (8.93 meter) followed by Pusa Naveen (8.29 m), NDBG-28 (8.11m), NDBG-22 (7.84 m) and Narendra Kamna (7.56 m) in Y₁, NDBG-104 (11.73 m) followed by Pusa Naveen (11.23 m), NDBG-Sel-1 (9.80 m), NDBG-22 (9.73 m) and NDBG-21 (9.50 m) in Y₂ and NDBG-104 (10.33 m) followed by Pusa Naveen (9.76 m), NDBG-21 (8.81 m) and NDBG-22 (8.79 m) in pooled; maximum number of node per vine was found in Pusa Naveen (97.67 nodes) followed by NDBG-Sel-1 (89 nodes), Narendra Kamna (87.33 nodes), NDBG-21 (80.67 nodes) and Narendra Prabha (80.67 nodes) in Y₁, Pusa Naveen (102.33 nodes) followed by NDBG-Sel-1 (92.33 nodes), Narendra Kamna and NDBG-22 (91.00 nodes), Narendra Prabha (88.67 nodes) and NDBG-104 (85.00 nodes) in Y₂ and Pusa Naveen (100.00 nodes) was found for maximum number of node per vine among the parents which was followed by NDBG-Sel-1 (90.67 nodes), Narendra Kamna (89.17 nodes), NDBG-22 (88.67 nodes) and Narendra Rashmi (87.33 nodes) in pooled; maximum internodal length was observed in parent Narendra Rashmi (12.97 cm) followed by Narendra Pooja (12.76 cm), NDBG-Sel-1 (12.55 cm), NDBG-15 (12.08 cm) and Narendra Prabha (11.67 cm) in Y₁, Narendra Pooja (11.77 cm) followed by Narendra Kamna (10.51cm), Narendra Rashmi (10.25 cm), Narendra Prabha (10.12 cm) and NDBG-22 (9.35 cm) in Y₂ and Narendra Pooja (11.77 cm) followed by Narendra Rashmi (11.61 cm), Narendra Kamna (11.08 cm), NDNG-Sel-1 (10.99 cm) and Narendra Prabha (10.90 cm) in pooled; parental line NDBG-28 and Narendra Pooja (44.67 days) was found for maximum picking duration followed by NDBG-13 (43.33 days), Narendra Rashmi (42.67 days), NDBG-15 and NDBG-104 (42.00 days) and Narendra Kamna (40.00 days) in Y₁, NDBG-28 (47.33 days) followed by NDBG-13 and Narendra Pooja (46.33 days), Narendra Rashmi (45.00 days), NDBG-104 (44.67 days) and NDBG-15 (43.67 days) in Y₂ and NDBG-28 (46.00 days) exhibited maximum picking duration among the parents which was followed by NDBG-104 (45.50 days), NDBG-13 (44.83 days), Narendra Rashmi (43.83 days) and NDBG-104 (43.33 days) in pooled; parent NDBG-22

(18.67 cm) recorded maximum peduncle length followed by Pusa Naveen (16.67 cm), NDBG-22 (16.00 cm), NDBG-104 (15.33 cm) and NDBG-28 (14.67 cm) in Y₁, NDBG-21 (18.33 cm) followed by Pusa Naveen (16.00 cm), NDBG-22 (15.67 cm) and Narendra Pooja, NDBG-104 and Narendra Prabha (15.00 cm) in Y₂ and Narendra Kamna (18.50 cm) followed by Pusa Naveen (16.33 cm), NDBG-22 (15.83 cm) and Narendra Prabha and NDBG-105 (15.17 cm) in pooled; parent NDBG-28 (39.27 cm) exhibited highest fruit length followed by NDBG-22 (38.59 cm), Narendra Prabha (37.93 cm), NDBG-15 (37.64 cm) and NDBG-21 (37.57 cm) in Y₁, NDBG-Sel-1 (44.33cm) followed by NDBG-104 (43.00 cm), Narendra Kamna (40.67 cm) and NDBG-21 and NDBG-22 (39.00 cm) in Y₂ and NDBG-Sel-1 (40.63 cm) followed by NDBG-104 (40.09 cm), NDBG-28 (39.63 cm), NDBG-22 (38.80 cm) and NDBG-21 (38.29 cm) in pooled; maximum average fruit circumference was recorded in NDBG-21 (24.05 cm) followed by NDBG-13 (23.36 cm), Narendra Rashmi (23.21 cm) Narendra Kamna (23.06 cm) and NDBG-15 (23.05 cm) in Y₁, Narendra Pooja (25.00 cm) was found for maximum average fruit circumference among the parents which was followed by NDBG-22 (24.00 cm), Narendra Rashmi (23.21cm) and NDBG-15 (22.67 cm) in Y₂ and Narendra Pooja (23.52 cm) followed by NDBG-22 (23.43 cm), NDBG-21 (23.19), and NDBG-15 (22.86 cm) in pooled; parent Narendra Pooja (1.64 kg) produced heaviest average fruit weight followed by NDBG-Sel-1 (1.60 kg), NDBG-22 (1.58 kg), NDBG-104 (1.50 kg) and Narendra Prabha (1.43 kg) in Y₁, Narendra Pooja (1.66 kg) followed by NDBG-22 (1.56 kg), NDBG-104 (1.54 kg), Narendra Kamna (1.53 kg) and Narendra Prabha (1.45 kg) in Y₂ and Narendra Pooja (1.65 kg) followed by NDBG-Sel-1 and NDBG-22 (1.57 kg), NDBG-104 (1.52 kg) and Narendra Prabha (1.44 kg) in pooled; parent NDBG-13 (3.37 fruit) produced more number of fruit per plant followed by NDBG-28 (3.25 fruit), Narendra Rashmi (2.47 fruit), Narendra Prabha (2.37 fruit) in Y₁, NDBG-13 (3.50 fruit) followed by NDBG-28 (3.39 fruit), Narendra Rashmi (2.45 fruit) and NDBG-15 and Narendra Prabha (2.36 fruit) in Y₂ and NDBG-13 (3.44 fruit) produced more number of fruit per plant among the parents which was followed by NDBG-28 (3.32 fruit), Narendra Rashmi (2.46 fruit), Narendra Prabha (2.36 fruit) and NDBG-15 (2.35 fruit) in pooled; parents Pusa Naveen (2.47°B) produced highest total soluble solids followed by NDBG-13 (2.40 °B), NDBG-Sel-1, NDBG-22 and Narendra Prabha (2.33 °B) and NDBG-28 (2.27 °B) in Y₁, NDBG-22 (2.46°B), Pusa Naveen (2.42 °B), NDBG-13 (2.37 °B) and Narendra Pooja, NDBG-Sel-1 and Narendra Rashmi (2.33 °B) in Y₂ and Pusa Naveen (2.45 °B), NDBG-22 (2.40 °B), NDBG-13 (2.39 °B), NDBG-Sel-1 and Narendra Prabha (2.33 °B) and Narendra Pooja (2.28 °B) in pooled; parent NDBG-104 (2.07%) recorded highest reducing sugars followed by Narendra Kamna (1.96%), NDBG-13 (1.94%) and NDBG-21 (1.84%) in Y₁, NDBG-104 (2.12%) followed by NDBG-13 (1.98%), Narendra Kamna (1.97%) and NDBG-21 (1.88%) in Y₂ and NDBG-104 (2.10%) followed by Narendra Kamna (1.97%), NDBG-13 (1.96%), NDBG-21 (1.86%) and Pusa Naveen (1.83%) in pooled; parent NDBG-28 (0.95%) was recorded for highest non reducing sugar followed by NDBG-13 (0.91%), Narendra Pooja and NDBG-22 (0.89%) and Narendra Rashmi (0.87%) in Y₁, NDBG-28 (0.96%) followed by NDBG-15, Narendra Pooja and NDBG-22 (0.91%), Narendra Rashmi (0.88%) and NDBG-Sel-1 (0.85%) in Y₂ and NDBG-28 (0.96%) followed

by NDBG-15 (0.91%), Narendra Pooja and NDBG-21 (0.90%), Narendra Rashmi (.88%) and NDBG-Sel-1 (0.85%) in pooled; parent NDBG-28 (2.43%) recorded highest total sugars followed by NDBG-15 (2.38%), Narendra Pooja (2.33%) and Pusa Naveen (2.27%) in Y_1 , NDBG-104 (2.75%) followed by NDBG-21 (2.70%), Narendra Kamna (2.69%) and Pusa Naveen (2.68%) in Y_2 and NDBG-15 and Pusa Naveen (2.48%) recorded highest total sugars followed by Narendra Pooja (2.47%), NDBG-28 (2.46%), NDBG-21 (2.44%) and NDBG-Sel-1 (2.42%) and parent Narendra Rashmi (3.92 g/100g) recorded highest dry matter followed by NDBG-13 (3.78 g/100g), NDBG-21 (3.76 g/100g) and NDBG-15 (3.73 g/100g) in Y_1 , Narendra Rashmi (3.90 g/100g) recorded highest dry matter followed by NDBG-21 (3.79 g/100g), NDBG-13 (3.83 g/100g) and Narendra Prabha (3.68 g/100g) in Y_2 and Narendra Rashmi (3.91 g/100g)

recorded highest dry matter followed by NDBG-13 (3.81g/100g), NDBG-21 (3.78 g/100g), Narendra Pooja (3.75 g/100g) and NDBG-28 (3.65 g/100g) in pooled.

Among the hybrids, the highest fruit yield per plant was exhibited by NDBG-13 \times Narendra Rashmi (7.38 kg) followed by NDBG-13 \times Narendra Prabha (6.48 kg), NDBG-Sel-1 \times Narendra Rashmi (6.17 kg), Narendra Kamna \times Narendra Rashmi (5.84 kg) and Narendra Pooja \times Pusa Naveen (4.89 kg) in descending order.

Thus there was significant differences for all the traits over seasons and pooled among the parents and F_1 . This might be due to influence of the environment. Similar findings have been also reported by many workers (Singh and Kumar 2002; Pandit *et al.* 2009; Kamal *et al.* 2012; Panigrahi and Duhan, 2018 and Singh *et al.* (2008)^{19, 6, 5, 7]}.

Table 1: Mean performance, general mean, range, coefficient of variation, critical difference and standard error for twenty three characters of line \times tester set of 27 F_1 's and their 12 parents ($Y_1=2020$ and $Y_2=2021$) and pooled

S.No.	Genotypes	Days to first male flower anthesis			Days to first female flower anthesis			Node number to first male flower appearance			Node number to first female flower appearance			
		Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	
	Crosses	1	2	3	4	5	6	7	8	9	10	11	12	13
1	NDBG-28 \times PusaNaveen	44.67	47.67	46.17	46.67	52.67	49.67	14.00	16.00	15.00	20.00	23.00	21.50	
2	NDBG-28 \times Narendra Prabha	44.00	46.33	45.17	47.33	51.67	49.50	15.00	17.00	16.00	19.33	20.00	19.67	
3	NDBG-28 \times Narendra Rashmi	42.33	44.67	43.50	45.33	54.33	49.83	14.33	15.00	14.67	18.33	17.67	18.00	
4	NDBG-13 \times Pusa Naveen	45.00	49.00	47.00	47.67	55.33	51.50	13.67	15.33	14.50	18.67	19.67	19.17	
5	NDBG-13 \times Narendra Prabha	49.33	56.00	52.67	51.33	58.00	54.67	13.00	14.00	13.50	17.33	20.33	18.83	
6	NDBG-13 \times Narendra Rashmi	51.00	56.00	53.50	53.67	61.33	57.50	9.33	10.00	9.67	15.00	22.00	18.50	
7	NDBG-15 \times Pusa Naveen	43.67	46.00	44.83	46.00	56.33	51.17	10.67	12.00	11.33	15.33	21.00	18.17	
8	NDBG-15 \times Narendra Prabha	47.33	51.67	49.50	49.00	52.33	50.67	14.33	16.00	15.17	18.67	21.33	20.00	
9	NDBG-15 \times Narendra Rashmi	48.00	51.67	49.83	51.00	55.67	53.33	13.00	14.00	13.50	17.00	24.00	20.50	
10	Narendra Pooja \times Pusa Naveen	43.00	46.33	44.67	46.00	51.00	48.50	14.67	16.00	15.33	18.67	19.00	18.83	
11	Narendra Pooja \times Narendra Prabha	46.67	56.67	51.67	49.67	60.67	55.17	13.33	15.00	14.17	19.00	17.00	18.00	
12	Narendra Pooja \times Narendra Rashmi	47.00	50.67	48.83	49.33	58.67	54.00	14.33	15.67	15.00	18.33	18.33	18.33	
13	NDBG-104 \times Pusa Naveen	44.33	47.00	45.67	46.67	52.00	49.33	13.67	15.00	14.33	17.67	22.00	19.83	
14	NDBG-104 \times Narendra Prabha	47.33	54.67	51.00	51.33	61.00	56.17	11.67	12.00	11.83	15.67	14.00	14.83	
15	NDBG-104 \times Narendra Rashmi	54.67	56.33	55.50	58.00	63.33	60.67	13.33	15.33	14.33	18.00	19.00	18.50	
16	NDBG-Sel-1 \times Pusa Naveen	44.33	47.00	45.67	47.00	51.33	49.17	14.00	15.00	14.50	19.00	17.00	18.00	
17	NDBG-Sel-1 \times Narendra Prabha	44.00	47.00	45.50	46.00	53.00	49.50	12.67	14.00	13.33	16.67	16.67	16.67	
18	NDBG-Sel-1 \times Narendra Rashmi	46.33	49.00	47.67	48.33	55.00	51.67	9.00	10.00	9.50	13.67	16.00	14.83	
19	Narendra Kamna \times Pusa Naveen	46.00	49.67	47.83	49.00	56.33	52.67	10.33	11.33	10.83	15.00	19.00	17.00	
20	Narendra Kamna \times Narendra Prabha	50.00	53.67	51.83	52.33	60.33	56.33	12.33	14.00	13.17	17.00	20.00	18.50	
21	Narendra Kamna \times Narendra Rashmi	51.00	54.67	52.83	54.00	59.00	56.50	16.00	18.00	17.00	21.67	21.33	21.50	
22	NDBG-21 \times Pusa	50.67	55.33	53.00	53.33	60.67	57.00	15.33	17.00	16.17	21.00	19.33	20.17	

Naveen													
23	NDBG-21 × Narendra Prabha	49.33	52.67	51.00	53.33	56.67	55.00	12.67	14.00	13.33	16.67	19.67	18.17
24	NDBG-21 × Narendra Rashmi	45.00	49.33	47.17	48.00	55.67	51.83	13.00	14.33	13.67	16.33	18.00	17.17
25	NDBG-22 × Pusa Naveen	48.00	51.33	49.67	51.00	57.00	54.00	14.67	15.00	14.83	20.00	21.00	20.50
26	NDBG-22 × Narendra Prabha	48.33	52.33	50.33	51.67	59.00	55.33	13.67	16.00	14.83	18.00	21.00	19.50
27	NDBG-22 × Narendra Rashmi	50.67	55.00	52.83	53.33	59.67	56.50	11.67	13.00	12.33	17.67	16.00	16.83
F ₁ Hybrid Mean		47.11	51.03	49.07	49.86	56.59	53.00	53.23	14.44	13.77	17.77	19.38	18.57

Line													
	1	2	3	4	5	6	7	8	9	10	11	12	13
28	NDBG-28	45.67	47.33	46.50	49.33	52.00	50.67	13.00	15.00	14.00	17.00	21.67	19.33
29	NDBG-13	47.33	47.33	47.33	51.67	52.00	51.83	12.67	14.67	13.67	16.00	21.00	18.50
30	NDBG-15	52.33	49.33	50.83	52.33	52.67	52.50	13.00	15.67	14.33	17.00	19.00	18.00
31	Narendra Pooja	48.00	45.67	46.83	50.00	48.67	49.33	14.33	17.33	15.83	17.67	21.00	19.33
32	NDBG-104	49.67	52.00	50.83	52.00	57.00	54.50	14.00	16.00	15.00	18.67	20.67	19.67
33	NDBG-Sel-1	45.33	43.00	44.17	48.67	49.00	48.83	13.00	15.00	14.00	17.00	21.00	19.00
34	Narendra Kamna	47.00	48.33	47.67	50.00	54.00	52.00	16.00	18.00	17.00	19.00	20.00	19.50
35	NDBG-21	44.67	46.00	45.33	46.67	50.67	48.67	13.67	15.67	14.67	17.33	20.67	19.00
36	NDBG-22	48.00	58.00	53.00	52.67	62.00	57.33	15.00	17.00	16.00	21.33	19.00	20.17
Tester													
37	Pusa Naveen	47.33	48.00	47.67	49.67	54.67	52.17	14.00	16.00	15.00	19.67	24.00	21.83
38	Narendra Prabha	45.00	46.67	45.83	47.33	52.33	49.83	14.00	15.33	14.67	18.67	18.00	18.33
39	Narendra Rashmi	45.00	47.33	46.17	47.67	52.33	50.00	15.33	17.00	16.17	21.00	21.67	21.33
Parental Mean		47.11	48.25	47.75	49.83	53.11	51.78	51.60	16.06	14.86	15.11	20.64	19.57
Grand Mean		47.11	50.17	48.61	49.85	55.52	52.62	13.38	14.94	14.12	17.95	19.77	18.82
C.V.		3.19	2.08	5.42	3.41	2.94	5.40	5.03	3.47	8.36	5.11	6.14	9.31
S.E. m ±		0.87	0.60	1.08	0.98	0.94	1.16	0.39	0.30	0.48	0.53	0.70	0.72
C.D. 5%		2.44	1.69	3.00	2.76	2.66	3.24	1.09	0.84	1.34	1.49	1.97	2.00
Range	Lowest	42.33	43.00	44.33	45.33	48.67	47.00	9.00	10.00	10.17	13.67	14.00	15.17
	Highest	54.67	58.00	54.67	58.00	63.33	59.50	16.00	18.00	16.67	21.67	24.00	21.33

S. No.	Genotypes	Length of pedicel of male flower (cm)			Length of pedicel of female flower (cm)			Days to first harvest			Primary branches per plant		
		Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled
Crosses		2	3	4	5	6	7	8	9	10	11	12	13
1	NDBG-28 × Pusa Naveen	17.67	17.67	17.67	9.00	10.00	9.50	54.33	61.00	57.67	17.00	19.00	18.00
2	NDBG-28 × Narendra Prabha	17.33	17.00	17.17	8.67	9.00	8.83	56.00	60.00	58.00	18.67	20.33	19.50
3	NDBG-28 × Narendra Rashmi	14.67	15.33	15.00	8.33	8.00	8.17	53.00	63.00	58.00	18.33	20.00	19.17
4	NDBG-13 × Pusa Naveen	14.33	15.00	14.67	10.00	9.67	9.83	56.00	63.33	59.67	31.67	34.00	32.83
5	NDBG-13 × Narendra Prabha	14.33	13.67	14.00	9.33	10.00	9.67	58.33	65.67	62.00	14.00	16.00	15.00
6	NDBG-13 × Narendra Rashmi	12.67	13.33	13.00	9.00	9.33	9.17	61.00	68.67	64.83	27.33	29.00	28.17
7	NDBG-15 × Pusa Naveen	13.67	13.00	13.33	9.00	9.00	9.00	53.67	65.00	59.33	19.33	21.33	20.33
8	NDBG-15 × Narendra Prabha	15.33	15.67	15.50	8.33	8.00	8.17	57.67	60.67	59.17	17.00	18.67	17.83
9	NDBG-15 × Narendra Rashmi	14.33	15.33	14.83	8.00	9.00	8.50	57.67	63.67	60.67	20.00	22.00	21.00
10	Narendra Pooja × Pusa Naveen	16.33	16.67	16.50	8.67	8.67	8.67	53.67	59.67	56.67	21.67	23.67	22.67
11	Narendra Pooja × Narendra Prabha	14.00	13.00	13.50	6.67	7.67	7.17	57.33	68.67	63.00	19.33	21.33	20.33
12	Narendra Pooja × Narendra Rashmi	18.00	18.33	18.17	9.33	9.00	9.17	56.67	66.67	61.67	22.67	24.67	23.67
13	NDBG-104 × Pusa Naveen	16.33	17.00	16.67	9.67	10.00	9.83	54.67	59.67	57.17	28.67	30.33	29.50
14	NDBG-104 × Narendra Prabha	14.00	15.00	14.50	8.67	9.00	8.83	58.00	67.00	62.50	14.00	16.00	15.00
15	NDBG-104 × Narendra Rashmi	19.33	19.00	19.17	7.67	8.00	7.83	64.33	69.67	67.00	15.00	17.00	16.00
16	NDBG-Sel-1 × Pusa	17.33	16.67	17.00	9.67	10.67	10.17	54.67	58.33	56.50	16.67	18.67	17.67

Naveen													
17	NDBG-Sel-1 × Narendra Prabha	17.00	18.00	17.50	8.67	9.33	9.00	54.67	61.67	58.17	17.67	19.67	18.67
18	NDBG-Sel-1 × Narendra Rashmi	17.33	17.00	17.17	12.67	13.33	13.00	55.33	62.67	59.00	19.00	21.00	20.00
19	Narendra Kamna × Pusa Naveen	18.33	18.00	18.17	9.33	9.00	9.17	55.00	64.67	59.83	23.00	25.00	24.00
20	Narendra Kamna × Narendra Prabha	16.67	17.33	17.00	10.33	11.67	11.00	59.33	66.67	63.00	21.33	23.33	22.33
21	Narendra Kamna × Narendra Rashmi	17.33	18.00	17.67	10.33	10.67	10.50	62.00	66.67	64.33	23.33	25.00	24.17
22	NDBG-21 × Pusa Naveen	15.00	14.33	14.67	11.00	10.67	10.83	60.33	66.67	63.50	28.67	30.67	29.67
23	NDBG-21 × Narendra Prabha	16.67	17.00	16.83	8.00	8.00	8.00	59.67	63.33	61.50	19.67	21.67	20.67
24	NDBG-21 × Narendra Rashmi	22.33	20.00	21.17	9.00	9.67	9.33	56.00	62.67	59.33	19.67	21.67	20.67
25	NDBG-22 × Pusa Naveen	19.00	19.00	19.00	9.33	10.00	9.67	58.00	63.00	60.50	34.67	36.67	35.67
26	NDBG-22 × Narendra Prabha	15.33	16.00	15.67	11.33	12.67	12.00	58.67	66.00	62.33	30.00	31.33	30.67
27	NDBG-22 × Narendra Rashmi	17.33	18.00	17.67	11.67	12.67	12.17	60.33	65.00	62.67	26.00	28.00	27.00
F ₁ Hybrid Mean		16.37	16.46	16.41	16.41	9.73	9.53	57.27	64.06	60.67	21.64	23.56	22.60

Lines													
	1	2	3	4	5	6	7	8	9	10	11	12	13
28	NDBG-28	16.00	17.00	16.50	9.00	10.00	9.50	57.00	60.33	58.67	14.67	16.67	15.67
29	NDBG-13	14.33	15.00	14.67	8.33	8.33	8.33	59.67	58.67	59.17	17.00	19.00	18.00
30	NDBG-15	15.33	16.00	15.67	13.00	14.00	13.50	61.00	60.67	60.83	14.67	15.67	15.17
31	Narendra Pooja	19.00	20.00	19.50	10.33	11.33	10.83	59.33	57.00	58.17	18.33	20.67	19.50
32	NDBG-104	21.33	18.67	20.00	13.67	14.00	13.83	59.67	65.00	62.33	13.67	19.00	16.33
33	NDBG-Sel-1	21.33	22.33	21.83	9.67	9.33	9.50	56.33	57.00	56.67	19.67	21.33	20.50
34	Narendra Kamna	18.00	18.67	18.33	9.33	9.00	9.17	58.00	62.00	60.00	16.67	18.00	17.33
35	NDBG-21	20.33	20.00	20.17	8.67	9.00	8.83	55.00	55.67	55.33	16.00	18.00	17.00
36	NDBG-22	17.67	18.00	17.83	10.67	11.67	11.17	60.67	68.00	64.33	18.00	20.00	19.00
Tester													
37	Pusa Naveen	20.67	21.00	20.83	12.00	12.67	12.33	57.00	65.00	61.00	20.00	22.00	21.00
38	Narendra Prabha	19.67	20.00	19.83	9.00	10.00	9.50	54.67	60.33	57.50	18.33	20.00	19.17
39	Narendra Rashmi	16.67	16.67	16.67	10.67	11.33	11.00	55.00	58.00	56.50	17.00	19.00	18.00
Parental Mean		18.36	18.61	18.48	10.36	10.89	10.63	57.78	60.64	58.33	17.00	19.11	18.11
Grand Mean		16.98	17.12	17.09	9.64	10.09	9.83	57.43	63.01	60.18	20.21	22.19	21.19
C.V.		9.90	6.40	10.76	9.78	7.89	13.79	3.01	3.13	4.93	8.15	5.45	18.05
S.E. m ±		0.97	0.63	0.75	0.54	0.46	0.55	1.00	1.14	1.21	0.95	0.70	1.56
C.D. 5%		2.73	1.78	2.09	1.53	1.29	1.54	2.81	3.21	3.38	2.68	1.97	4.36
Range	Lowest	12.67	13.00	13.17	6.67	7.67	7.67	53.00	55.67	54.50	13.67	15.67	15.50
	Highest	22.33	22.33	20.67	13.67	14.00	12.50	64.33	69.67	65.67	34.67	36.67	33.33

S. No.	Genotypes	Vine length (m)			Number of node per vine			Internodal length (cm)			Picking duration		
		Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled
	1	2	3	4	5	6	7	8	9	10	11	12	13
1	NDBG-28 × Pusa Naveen	7.83	9.20	8.52	83.00	86.67	84.83	10.60	9.43	10.02	37.67	40.00	38.83
2	NDBG-28 × Narendra Prabha	8.41	10.60	9.50	80.33	85.00	82.67	9.55	8.02	8.78	45.67	48.00	46.83
3	NDBG-28 × Narendra Rashmi	7.86	9.63	8.75	83.33	86.67	85.00	10.64	9.01	9.82	45.00	46.67	45.83
4	NDBG-13 × Pusa Naveen	9.36	11.60	10.48	86.67	90.00	88.33	9.26	7.76	8.51	44.33	46.67	45.5
5	NDBG-13 × Narendra Prabha	9.61	12.00	10.81	116.67	122.00	119.33	12.14	10.18	11.16	34.00	35.33	34.67
6	NDBG-13 × Narendra Rashmi	8.69	10.60	9.64	100.33	105.00	102.67	11.56	9.91	10.74	36.33	38.00	37.17
7	NDBG-15 × Pusa Naveen	7.90	9.83	8.87	103.00	112.33	107.67	13.09	11.44	12.27	35.00	36.33	35.67
8	NDBG-15 × Narendra Prabha	6.89	8.53	7.71	86.33	93.33	89.83	12.59	10.94	11.77	38.33	40.00	39.17
9	NDBG-15 × Narendra Rashmi	8.45	10.30	9.38	83.33	88.33	85.83	9.86	8.58	9.22	42.33	44.00	43.17
10	Narendra Pooja × Pusa Naveen	8.56	11.03	9.80	89.33	95.00	92.17	10.44	8.62	9.53	44.00	46.33	45.17
11	Narendra Pooja × Narendra Prabha	8.47	10.30	9.39	83.33	85.00	84.17	9.84	8.25	9.05	37.33	39.00	38.17
12	Narendra Pooja × Narendra Rashmi	10.32	10.67	10.49	80.00	84.00	82.00	7.74	7.87	7.81	38.00	39.67	38.83
13	NDBG-104 × Pusa Naveen	9.15	12.17	10.66	110.00	115.00	112.50	12.04	9.46	10.75	38.33	40.00	39.17
14	NDBG-104 × Narendra Prabha	8.69	10.23	9.46	79.67	83.33	81.50	9.17	8.15	8.66	44.33	46.00	45.17
15	NDBG-104 × Narendra Rashmi	8.24	10.13	9.19	76.33	81.00	78.67	9.34	8.04	8.69	36.00	37.33	36.67
16	NDBG-Sel-1 × Pusa Naveen	8.25	9.97	9.11	71.67	75.00	73.33	8.74	7.53	8.14	34.67	36.00	35.33
17	NDBG-Sel-1 × Narendra Prabha	9.41	12.23	10.82	76.33	78.33	77.33	8.12	6.41	7.26	47.00	49.33	48.17

18	NDBG-Sel-1 × Narendra Rashmi	8.47	9.67	9.07	73.67	76.33	75.00	8.73	7.88	8.31	46.33	48.00	47.17
19	Narendra Kamna × Pusa Naveen	8.70	10.63	9.67	82.00	83.33	82.67	9.40	7.85	8.62	46.00	48.67	47.33
20	Narendra Kamna × Narendra Prabha	7.85	9.63	8.74	91.67	95.67	93.67	11.70	9.94	10.82	38.33	40.00	39.17
21	Narendra Kamna × Narendra Rashmi	8.87	10.80	9.83	88.33	92.33	90.33	9.98	8.55	9.27	43.67	46.33	45
22	NDBG-21 × Pusa Naveen	9.86	12.33	11.10	95.67	99.33	97.50	9.70	8.05	8.88	34.00	35.33	34.67
23	NDBG-21 × Narendra Prabha	7.06	8.70	7.88	110.33	115.00	112.67	15.65	13.22	14.43	44.67	47.00	45.83
24	NDBG-21 × Narendra Rashmi	6.58	8.40	7.49	89.67	93.33	91.50	13.63	11.11	12.37	43.67	45.33	44.5
25	NDBG-22 × Pusa Naveen	10.33	12.77	11.55	83.00	86.67	84.83	8.04	6.79	7.42	42.33	45.00	43.67
26	NDBG-22 × Narendra Prabha	8.90	10.67	9.78	128.00	134.67	131.33	14.40	12.67	13.53	45.00	47.67	46.33
27	NDBG-22 × Narendra Rashmi	8.66	10.43	9.55	98.33	102.67	100.50	11.40	9.86	10.63	44.00	45.33	44.67
F ₁ Hybrid Mean		8.57	10.48	9.53	90.01	94.27	92.14	10.64	9.09	9.87	40.97	42.86	41.92

Lines													
	1	2	3	4	5	6	7	8	9	10	11	12	13
28	NDBG-28	6.66	8.13	7.40	76.33	80.00	78.17	11.49	9.84	10.66	44.67	47.33	46.00
29	NDBG-13	6.86	9.23	8.05	75.33	82.00	78.67	10.99	8.91	9.95	43.33	46.33	44.83
30	NDBG-15	6.19	9.23	7.71	74.67	80.33	77.50	12.08	8.71	10.39	42.00	43.67	42.83
31	Narendra Pooja	5.81	7.60	6.70	74.00	81.67	77.83	12.76	10.77	11.77	44.67	46.33	45.50
32	NDBG-104	8.93	11.73	10.33	77.33	85.00	81.17	8.65	7.24	7.95	42.00	44.67	43.33
33	NDBG-Sel-1	7.11	9.80	8.45	89.00	92.33	90.67	12.55	9.43	10.99	35.33	37.00	36.17
34	Narendra Kamna	7.56	8.67	8.11	87.33	91.00	89.17	11.64	10.51	11.08	40.00	42.33	41.17
35	NDBG-21	8.11	9.50	8.81	80.67	85.33	83.00	9.95	8.99	9.47	39.67	42.00	40.83
36	NDBG-22	7.84	9.73	8.79	86.33	91.00	88.67	11.01	9.35	10.18	37.33	39.00	38.17
Tester													
37	Pusa Naveen	8.29	11.23	9.76	97.67	102.33	100.00	11.80	9.12	10.46	22.33	24.00	23.17
38	Narendra Prabha	7.38	8.77	8.07	86.00	88.67	87.33	11.67	10.12	10.90	34.00	36.33	35.17
39	Narendra Rashmi	6.25	8.27	7.26	81.00	84.67	82.83	12.97	10.25	11.61	42.67	45.00	43.83
Parental Mean		7.25	9.32	8.36	82.14	87.03	84.58	11.46	9.44	10.36	39.00	41.17	40.32
Grand Mean		8.16	10.13	9.13	87.59	92.04	89.83	10.90	9.20	10.07	40.37	42.34	41.21
C.V.		4.68	3.39	10.12	5.73	5.59	10.62	7.19	6.58	14.04	3.61	3.89	8.89
S.E. m ±		0.22	0.20	0.38	2.90	2.97	3.89	0.45	0.35	0.58	0.84	0.95	1.50
C.D. 5%		0.62	0.56	1.05	8.16	8.37	10.86	1.27	0.98	1.61	2.37	2.68	4.17
Range	Lowest	5.81	7.60	7.50	71.67	75.00	75.67	7.74	6.41	7.57	22.33	24.00	29.00
	Highest	10.33	12.77	10.83	128.00	134.67	116.50	15.65	13.22	13.42	47.00	49.33	47.83

S. No.	Genotypes	Peduncle length (cm)			Fruit length (cm)			Average fruit circumference (cm)			Average fruit weight (kg)		
		Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled
	1	2	3	4	5	6	7	8	9	10	11	12	13
1	NDBG-28 × Pusa Naveen	14.67	14.00	14.33	39.30	45.67	42.48	23.65	21.67	22.66	1.15	0.94	1.04
2	NDBG-28 × Narendra Prabha	11.67	12.00	11.83	41.49	44.00	42.74	22.77	19.33	21.05	0.90	0.81	0.86
3	NDBG-28 × Narendra Rashmi	13.33	13.00	13.17	40.77	45.00	42.89	22.36	22.00	22.18	1.00	1.00	1.00
4	NDBG-13 × Pusa Naveen	11.33	11.00	11.17	40.99	42.67	41.83	23.03	22.00	22.51	1.04	0.95	1.00
5	NDBG-13 × Narendra Prabha	17.00	16.00	16.50	44.39	46.00	45.20	24.59	25.00	24.79	0.94	0.96	0.95
6	NDBG-13 × Narendra Rashmi	18.67	18.33	18.50	31.95	39.33	35.64	25.21	23.67	24.44	0.88	0.93	0.91
7	NDBG-15 × Pusa Naveen	17.67	17.00	17.33	37.14	41.00	39.07	22.26	23.33	22.8	1.21	0.90	1.05
8	NDBG-15 × Narendra Prabha	15.33	16.00	15.67	40.53	47.00	43.76	23.25	24.67	23.96	1.00	0.98	0.99
9	NDBG-15 × Narendra Rashmi	14.67	15.00	14.83	38.74	38.67	38.70	22.85	25.00	23.93	1.14	0.86	1.00
10	Narendra Pooja × Pusa Naveen	17.33	17.67	17.50	46.11	46.00	46.06	25.41	23.00	24.2	0.87	0.88	0.88
11	Narendra Pooja × Narendra Prabha	11.67	11.00	11.33	42.67	43.67	43.17	24.47	21.00	22.73	1.14	0.65	0.90
12	Narendra Pooja × Narendra Rashmi	14.67	14.00	14.33	41.87	42.33	42.10	23.54	22.33	22.94	0.96	0.87	0.91
13	NDBG-104 × Pusa Naveen	11.67	11.33	11.50	40.88	44.33	42.61	20.54	22.00	21.27	1.16	0.85	1.01
14	NDBG-104 × Narendra Prabha	15.67	16.00	15.83	43.38	42.33	42.85	21.73	21.33	21.53	0.92	1.24	1.08
15	NDBG-104 × Narendra Rashmi	18.67	18.33	18.50	40.15	35.33	37.74	20.06	17.67	18.86	1.33	0.97	1.15
16	NDBG-Sel-1 × Pusa Naveen	19.00	19.33	19.17	37.69	41.00	39.34	21.71	22.33	22.02	0.71	1.46	1.09
17	NDBG-Sel-1 × Narendra Prabha	15.00	15.33	15.17	44.07	43.33	43.70	24.20	24.33	24.26	1.11	0.83	0.97
18	NDBG-Sel-1 × Narendra Rashmi	15.33	16.00	15.67	40.94	42.00	41.47	22.06	22.67	22.36	0.78	1.40	1.09
19	Narendra Kamna × Pusa Naveen	14.67	15.00	14.83	40.48	41.00	40.74	23.52	22.00	22.76	0.89	0.80	0.84
20	Narendra Kamna × Narendra Prabha	18.67	18.33	18.50	46.81	46.00	46.41	22.82	21.00	21.91	0.90	0.80	0.85
21	Narendra Kamna × Narendra Rashmi	16.33	16.00	16.17	43.13	43.67	43.40	23.24	22.00	22.62	0.78	1.46	1.12
22	NDBG-21 × Pusa Naveen	16.33	16.67	16.50	35.42	43.67	39.55	37.11	27.00	32.05	1.14	0.54	0.84
23	NDBG-21 × Narendra Prabha	17.67	18.67	18.17	50.81	51.00	50.90	22.12	20.33	21.23	0.75	1.33	1.04
24	NDBG-21 × Narendra Rashmi	12.67	12.00	12.33	44.41	26.00	35.21	21.93	25.33	23.63	0.97	1.16	1.07

25	NDBG-22 × Pusa Naveen	29.00	28.67	28.83	27.69	27.33	27.51	27.53	27.33	27.43	1.19	0.69	0.94
26	NDBG-22 × Narendra Prabha	17.33	17.00	17.17	31.62	27.67	29.64	26.10	25.67	25.88	1.22	0.66	0.94
27	NDBG-22 × Narendra Rashmi	15.33	15.00	15.17	31.23	26.33	28.78	25.04	27.67	26.35	1.12	1.15	1.14
F ₁ Hybrid Mean		15.98	15.88	15.93	40.17	40.83	40.50	23.82	23.02	23.42	1.01	0.97	0.99

Lines													
	1	2	3	4	5	6	7	8	9	10	11	12	13
28	NDBG-28	14.67	14.00	14.33	39.27	40.00	39.63	21.37	21.00	21.18	1.00	1.00	1.00
29	NDBG-13	13.00	13.00	13.00	36.65	37.33	36.99	23.36	20.00	21.68	0.96	0.94	0.95
30	NDBG-15	11.00	11.67	11.33	37.64	37.00	37.32	23.05	22.67	22.86	1.37	1.38	1.37
31	Narendra Pooja	15.33	15.00	15.17	37.26	36.00	36.63	22.04	25.00	23.52	1.64	1.66	1.65
32	NDBG-104	15.33	15.00	15.17	37.18	43.00	40.09	23.00	19.00	21.00	1.50	1.54	1.52
33	NDBG-Sel-1	11.33	11.00	11.17	36.93	44.33	40.63	22.06	22.00	22.03	1.60	1.53	1.57
34	Narendra Kamna	13.67	14.00	13.83	35.79	40.67	38.23	23.06	22.00	22.53	1.02	1.03	1.03
35	NDBG-21	18.67	18.33	18.50	37.57	39.00	38.29	24.05	22.33	23.19	1.09	1.10	1.10
36	NDBG-22	16.00	15.67	15.83	38.59	39.00	38.80	22.86	24.00	23.43	1.58	1.56	1.57
Tester													
37	Pusa Naveen	16.67	16.00	16.33	35.76	37.67	36.71	22.09	22.00	22.04	1.02	1.04	1.03
38	Narendra Prabha	14.33	15.00	14.67	37.93	37.33	37.63	23.04	23.67	23.36	1.43	1.45	1.44
39	Narendra Rashmi	14.33	14.00	14.17	36.68	38.00	37.34	23.21	21.00	22.11	1.36	1.38	1.37
Parental Mean		14.53	14.39	14.46	37.27	39.11	38.19	22.77	22.06	22.41	1.30	1.30	1.30
Grand Mean		15.53	15.42	15.48	39.28	40.30	39.79	23.49	22.73	23.14	1.10	1.07	1.08
C.V.		7.05	5.03	16.26	17.12	12.03	14.87	10.93	10.39	12.17	13.19	9.25	17.39
S.E. m ±		0.63	0.45	1.03	3.88	2.80	2.41	1.48	1.36	1.15	0.08	0.06	0.08
C.D. 5%		1.78	1.26	2.87	-	7.88	6.74	4.18	3.84	3.21	0.24	0.16	0.21
Range	Lowest	11.00	11.00	12.00	27.69	26.00	26.85	20.06	17.67	19.69	0.71	0.54	0.65
	Highest	29.00	28.67	23.00	50.81	51.00	47.71	37.11	27.67	29.55	1.64	1.66	1.58

S. No.	Genotypes	Number of fruit per plant			Fruit yield per plant (kg)			Total soluble solids (%)			Reducing sugars (%)		
		Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled
	1	2	3	4	5	6	7	8	9	10	11	12	13
1	NDBG-28 × Pusa Naveen	5.65	3.47	4.56	4.94	3.25	4.09	2.30	2.35	2.32	1.83	1.86	1.84
2	NDBG-28 × Narendra Prabha	3.96	5.93	4.95	4.38	4.82	4.6	2.17	2.23	2.20	1.86	1.86	1.86
3	NDBG-28 × Narendra Rashmi	3.27	3.42	3.35	3.29	3.41	3.35	2.23	2.35	2.29	1.73	1.76	1.75
4	NDBG-13 × Pusa Naveen	5.39	4.68	5.04	5.21	4.44	4.83	2.23	2.24	2.24	1.68	1.69	1.69
5	NDBG-13 × Narendra Prabha	6.23	6.63	6.43	6.61	6.36	6.48	2.63	2.56	2.60	1.87	1.88	1.87
6	NDBG-13 × Narendra Rashmi	6.43	8.01	7.22	7.30	7.45	7.38	2.20	2.40	2.30	1.91	1.91	1.91
7	NDBG-15 × Pusa Naveen	4.84	4.23	4.53	4.10	3.77	3.93	2.50	2.43	2.47	1.88	1.89	1.88
8	NDBG-15 × Narendra Prabha	4.65	4.64	4.64	4.69	4.55	4.62	2.20	2.21	2.20	1.59	1.59	1.59
9	NDBG-15 × Narendra Rashmi	5.16	5.43	5.3	4.53	4.68	4.61	2.20	2.18	2.19	2.20	2.22	2.21
10	Narendra Pooja × Pusa Naveen	4.77	4.80	4.79	5.53	4.24	4.89	2.17	2.37	2.27	1.83	1.83	1.83
11	Narendra Pooja × Narendra Prabha	5.04	6.82	5.93	4.42	4.45	4.43	2.10	2.13	2.12	1.70	1.70	1.7
12	Narendra Pooja × Narendra Rashmi	3.44	3.61	3.53	3.58	3.11	3.35	2.10	2.27	2.18	1.61	1.62	1.62
13	NDBG-104 × Pusa Naveen	4.69	5.48	5.08	4.08	4.64	4.36	2.27	2.34	2.30	1.86	1.86	1.86
14	NDBG-104 × Narendra Prabha	4.94	3.25	4.09	5.38	4.03	4.71	2.17	2.53	2.35	2.02	2.02	2.02
15	NDBG-104 × Narendra Rashmi	4.88	4.44	4.66	3.73	4.28	4.01	2.20	2.15	2.17	1.53	1.52	1.53
16	NDBG-Sel-1 × Pusa Naveen	4.13	3.64	3.89	5.83	5.32	5.58	2.30	2.40	2.35	1.82	1.84	1.83
17	NDBG-Sel-1 × Narendra Prabha	4.98	5.50	5.24	4.48	4.49	4.48	2.23	2.35	2.29	1.85	1.87	1.86
18	NDBG-Sel-1 × Narendra Rashmi	4.73	4.51	4.62	6.07	6.27	6.17	2.20	2.23	2.21	1.51	1.53	1.52
19	Narendra Kamna × Pusa Naveen	3.33	4.61	3.97	3.77	3.66	3.71	2.30	2.35	2.33	2.11	2.12	2.11
20	Narendra Kamna × Narendra Prabha	4.40	4.23	4.32	4.89	3.33	4.11	2.20	2.30	2.25	1.57	1.59	1.58
21	Narendra Kamna × Narendra Rashmi	4.27	4.27	4.27	5.48	6.21	5.84	2.33	2.50	2.42	1.93	1.93	1.93
22	NDBG-21 × Pusa Naveen	5.32	7.64	6.48	4.68	4.11	4.4	2.47	2.53	2.50	1.96	1.97	1.97
23	NDBG-21 × Narendra Prabha	3.60	3.53	3.57	4.77	4.69	4.73	2.20	2.15	2.17	1.53	1.54	1.54
24	NDBG-21 × Narendra Rashmi	4.39	4.14	4.27	4.65	4.78	4.71	2.17	2.21	2.19	1.54	1.55	1.54
25	NDBG-22 × Pusa Naveen	4.90	5.60	5.25	4.22	3.87	4.05	2.30	2.31	2.31	1.97	1.97	1.97
26	NDBG-22 × Narendra Prabha	5.25	5.50	5.37	4.55	3.62	4.08	2.33	2.44	2.39	2.13	2.15	2.14
27	NDBG-22 × Narendra Rashmi	4.80	3.86	4.33	4.28	4.44	4.36	2.50	2.55	2.53	2.00	2.01	2.01
F ₁ Hybrid Mean		4.72	4.88	4.80	4.79	4.53	4.66	2.27	2.34	2.30	1.82	1.83	1.82

Lines													
	1	2	3	4	5	6	7	8	9	10	11	12	13
28	NDBG-28	3.25	3.39	3.32	3.27	3.38	3.33	2.27	2.28	2.28	1.53	1.54	1.54

29	NDBG-13	3.37	3.50	3.44	3.22	3.32	3.27	2.40	2.37	2.39	1.94	1.98	1.96
30	NDBG-15	2.34	2.36	2.35	3.20	3.25	3.22	2.10	2.18	2.14	1.68	1.70	1.69
31	Narendra Pooja	2.25	2.25	2.25	3.68	3.74	3.71	2.23	2.33	2.28	1.62	1.68	1.65
32	NDBG-104	2.15	2.13	2.14	3.23	3.27	3.25	2.23	2.30	2.27	2.07	2.12	2.10
33	NDBG-Sel-1	2.13	2.25	2.19	3.41	3.44	3.42	2.33	2.33	2.33	1.69	1.74	1.72
34	Narendra Kamna	2.31	2.34	2.33	2.36	2.42	2.39	2.20	2.24	2.22	1.96	1.97	1.97
35	NDBG-21	2.16	2.19	2.17	2.36	2.41	2.38	2.27	2.27	2.27	1.84	1.88	1.86
36	NDBG-22	1.56	1.61	1.59	2.46	2.51	2.48	2.33	2.46	2.40	1.50	1.51	1.50
Tester													
37	Pusa Naveen	2.28	2.26	2.27	2.32	2.35	2.34	2.47	2.42	2.45	1.83	1.84	1.83
38	Narendra Prabha	2.37	2.36	2.36	3.39	3.41	3.40	2.33	2.32	2.33	1.69	1.73	1.71
39	Narendra Rashmi	2.47	2.45	2.46	3.35	3.37	3.36	2.17	2.33	2.25	1.45	1.44	1.44
Parental Mean		2.39	2.42	2.40	3.02	3.07	3.05	2.28	2.32	2.30	1.73	1.76	1.75
Grand Mean		4.00	4.13	4.06	4.25	4.08	4.16	2.27	2.33	2.30	1.79	1.81	1.80
C.V.		13.35	5.01	21.08	10.21	7.86	17.83	6.05	7.06	6.96	5.34	5.16	10.51
S.E. m ±		0.31	0.12	0.35	0.25	0.19	0.30	0.08	0.10	0.07	0.06	0.05	0.08
C.D. 5%		0.87	0.34	0.98	0.71	0.52	0.85	0.22	-	0.18	0.16	0.15	0.22
Range	Lowest	1.56	1.61	1.87	2.32	2.35	2.39	2.10	2.13	2.12	1.45	1.44	1.54
	Highest	6.43	8.01	6.53	7.30	7.45	6.83	2.63	2.56	2.49	2.20	2.22	2.08

S. No.	Genotypes Crosses	Non- reducing sugar (%)			Total sugars (%)			Dry matter (g/100g)		
		Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled	Y ₁	Y ₂	Pooled
	1	2	3	4	5	6	7	8	9	10
1	NDBG-28 × Pusa Naveen	0.83	0.82	0.82	2.28	2.69	2.48	3.21	3.23	3.22
2	NDBG-28 × Narendra Prabha	0.77	0.78	0.77	2.17	2.64	2.41	4.04	4.06	4.05
3	NDBG-28 × Narendra Rashmi	0.85	0.86	0.85	2.30	2.61	2.45	3.04	3.04	3.04
4	NDBG-13 × Pusa Naveen	0.92	0.92	0.92	2.40	2.62	2.51	3.12	3.15	3.13
5	NDBG-13 × Narendra Prabha	0.80	0.80	0.8	2.29	2.64	2.47	3.40	3.65	3.53
6	NDBG-13 × Narendra Rashmi	0.80	0.81	0.8	2.25	2.71	2.48	4.23	4.23	4.23
7	NDBG-15 × Pusa Naveen	0.57	0.56	0.57	1.52	2.79	2.15	3.63	3.60	3.62
8	NDBG-15 × Narendra Prabha	0.95	0.95	0.95	2.42	2.55	2.49	3.05	3.09	3.07
9	NDBG-15 × Narendra Rashmi	0.53	0.52	0.52	1.83	2.74	2.28	3.95	3.87	3.91
10	Narendra Pooja × Pusa Naveen	0.86	0.87	0.86	2.32	2.70	2.51	2.75	2.77	2.76
11	Narendra Pooja × Narendra Prabha	0.85	0.85	0.85	2.28	2.54	2.41	3.23	3.26	3.24
12	Narendra Pooja × Narendra Rashmi	0.93	0.94	0.94	2.40	2.56	2.48	2.81	2.83	2.82
13	NDBG-104 × Pusa Naveen	0.75	0.76	0.75	2.13	2.61	2.37	3.43	3.42	3.43
14	NDBG-104 × Narendra Prabha	0.72	0.73	0.73	2.11	2.75	2.43	4.36	4.31	4.33
15	NDBG-104 × Narendra Rashmi	0.95	0.95	0.95	2.38	2.48	2.43	3.56	3.57	3.56
16	NDBG-Sel-1 × Pusa Naveen	0.82	0.83	0.83	2.24	2.69	2.47	3.78	3.80	3.79
17	NDBG-Sel-1 × Narendra Prabha	0.85	0.86	0.86	2.31	2.72	2.52	3.71	3.73	3.72
18	NDBG-Sel-1 × Narendra Rashmi	0.95	0.95	0.95	2.40	2.48	2.44	4.03	3.98	4.01
19	Narendra Kamna × Pusa Naveen	0.66	0.66	0.66	2.02	2.78	2.4	2.88	2.93	2.90
20	Narendra Kamna × Narendra Prabha	0.94	0.95	0.94	2.41	2.53	2.47	3.04	3.07	3.06
21	Narendra Kamna × Narendra Rashmi	0.74	0.75	0.75	2.14	2.68	2.41	3.13	3.35	3.24
22	NDBG-21 × Pusa Naveen	0.65	0.65	0.65	1.93	2.64	2.28	2.65	2.67	2.66
23	NDBG-21 × Narendra Prabha	0.95	0.95	0.95	2.41	2.49	2.45	2.77	2.77	2.77
24	NDBG-21 × Narendra Rashmi	0.96	0.96	0.96	2.41	2.52	2.47	3.01	3.08	3.04
25	NDBG-22 × Pusa Naveen	0.72	0.73	0.73	2.10	2.70	2.4	2.84	2.82	2.83
26	NDBG-22 × Narendra Prabha	0.66	0.66	0.66	2.02	2.83	2.43	2.86	2.89	2.88
27	NDBG-22 × Narendra Rashmi	0.71	0.72	0.71	2.07	2.74	2.41	2.97	2.97	2.97
F ₁ Hybrid Mean		0.80	0.81	0.80	2.21	2.65	2.43	3.31	3.34	3.33

Lines										
	1	2	3	4	5	6	7	8	9	10
28	NDBG-28	0.95	0.96	0.96	2.43	2.50	2.46	3.61	3.68	3.65
29	NDBG-13	0.66	0.67	0.66	1.96	2.65	2.31	3.78	3.83	3.81
30	NDBG-15	0.91	0.91	0.91	2.38	2.59	2.48	2.61	2.60	2.61
31	Narendra Pooja	0.89	0.91	0.90	2.33	2.61	2.47	3.73	3.77	3.75
32	NDBG-104	0.64	0.63	0.64	1.96	2.75	2.36	3.43	3.45	3.44
33	NDBG-Sel-1	0.86	0.85	0.85	2.24	2.59	2.42	2.82	2.85	2.83
34	Narendra Kamna	0.72	0.73	0.72	2.11	2.69	2.40	3.42	3.44	3.43
35	NDBG-21	0.79	0.80	0.79	2.18	2.70	2.44	3.76	3.79	3.78
36	NDBG-22	0.89	0.91	0.90	2.26	2.41	2.34	3.22	3.24	3.23
Tester										
37	Pusa Naveen	0.83	0.84	0.84	2.27	2.68	2.48	3.58	3.58	3.58
38	Narendra Prabha	0.82	0.82	0.82	2.20	2.55	2.38	3.59	3.68	3.64

39	Narendra Rashmi	0.87	0.88	0.88	2.22	2.31	2.27	3.92	3.90	3.91
	Parental Mean	0.82	0.83	0.82	2.21	2.59	2.40	3.46	3.48	3.47
	Grand Mean	0.81	0.81	0.81	2.21	2.63	2.42	3.36	3.38	3.37
	C.V.	2.38	2.08	13.05	9.61	0.69	7.74	5.39	5.03	10.84
	S.E. m ±	0.01	0.01	0.04	0.12	0.01	0.08	0.10	0.10	0.15
	C.D. 5%	0.03	0.03	0.12	0.34	0.03	0.21	0.29	0.28	0.42
Range	Lowest	0.53	0.52	0.68	1.52	2.31	2.12	2.61	2.60	2.72
	Highest	0.96	0.96	0.96	2.43	2.83	2.61	4.36	4.31	3.94

Conclusion

There exists wide range of variability for all the twenty three traits under study. The highest mean performance for most desirable traits fruit yield per plant was exhibited by Narendra Pooja (3.71 kg) followed by NDBG-Sel-1 (3.42 kg), Narendra Prabha (3.40 kg), Narendra Rashmi (3.36 kg) and NDBG-28 (3.33 kg) for parent. Among the hybrids, the highest fruit yield per plant was exhibited by NDBG-13 × Narendra Rashmi (7.38 kg) followed by NDBG-13 × Narendra Prabha (6.48 kg), NDBG-Sel-1 × Narendra Rashmi (6.17 kg), Narendra Kamna × Narendra Rashmi (5.84 kg) and Narendra Pooja × Pusa Naveen (4.89 kg) in descending order. Iety/hybrids in future. These top yielding lines/F₁ may exploit as variety /hybrids in future. The above mentioned genotypes may be used as donor parents in hybridization programme for developing high yielding varieties of respective groups.

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