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Evaluation of bottle gourd (*Lagenaria siceraria*) genotypes for growth, yield and quality under Bundelkhand agroclimatic conditions

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Abstract

The experiment was conducted to evaluate 30 bottle gourd (*Lagenaria siceraria* L.) genotypes for their morphological, yield, and quality character at RLBCAU, Jhansi, Uttar Pradesh, during *kharif* 2022. The genotypes were sown in a randomised block design with three replications, and observations were taken on 15 characters. There was a wide range of mean values among genotypes. Hybrid Green Gold (8.0, 6.60kg) and MAHY 8 (7.6, 6.40kg) were statistically superior for maximum number of fruits/plant as well as fruit yield/plant, respectively. The maximum vine length (800cm), total soluble solids (2.93 °Brix) and ascorbic acid content (16.97mg) were recorded in RBG 9 genotype. The minimum day to first flowering bud (26.0 days) and earliest node of first appearance of female flower (10.6) was observed on Pusa Samrudhi. Genotype MAHY 8 was earliest for days to first fruit set (37.3), followed by minimum days to fruit picking (46.0). However, maximum fruit length was recorded in Muskan (46.6 cm), followed by MAHY 8 (45.0cm). The highest fruit width was recorded in Narendra Shishir (12.6cm), and highest fruit weight in Pusa Santushti (0.867g).

Key words: Cucurbits, Evaluation, Germplasm, Productivity, Semi-arid, Bundelkhand

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Bottle gourd (*Lagenaria siceraria*) fruits are valued for their culinary versatility, digestibility, and nutritional benefits, particularly in traditional diets. The yield potential of bottle gourd remains comparatively low in such climates, indicating considerable scope for genetic improvement and selection of climate-resilient genotypes (Samadia, 2011). Improving yield and fruit quality under stress-prone conditions is therefore a key breeding objective (Rathore *et al.,* 2025). Given the wide variability inherent in this cross-pollinated crop, systematic evaluation of genotypes is essential to identify promising lines for yield enhancement and quality improvement (Suma *et al.,* 2025). Therefore, study was undertaken to evaluate diverse genotypes for growth, yield, and fruit quality traits.

MATERIALS AND METHODS

The study was carried out from July to November during *kharif* 2022, at Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh. The experimental site is situated at 25.30° N latitude and 78.32° E longitude at an altitude of 227 m above mean sea-level. The experimental material comprised 30 genotypes collected from different sources, CAUs, SAUs, ICAR-Institutions, local collections and private companies. The experiment was laid out in 3m × 3m plot size with a spacing of 0.6 m from plant to plant. The observations were recorded from five randomly selected plants from each genotype for 15 different characters. The statistical analysis of data was done using the analysis of variance approach (Fisher, 1950). The "f" value, or variance ratio, was used to evaluate the treatment effect's significance and non-significance to table value at 5% significance level. If the calculated value is more than the value, the effect is considered to be significant (Panse and Shukhatme, 1967).

RESULTS AND DISCUSSION

Significant variation was observed among the genotypes for vine length and other associated traits, indicating the presence of considerable genetic variability. The maximum vine length (800 cm) was recorded in RBG 9, followed by IC-594545 (786.7 cm) and RBG 4 (786.7 cm). Whereas, minimum vine length was observed in Pusa Santushti (570 cm), followed by Sharada (593.3cm) and Surag (613.3cm). Vine length may have increased as a result of improved photosynthetic and other metabolic activities, local circumstances, genetic traits, increased nutrient utilization efficiency and an increase in numerous plant compounds that cause cell division and elongation. The genetic make-up of genotypes, as well as intrinsic qualities and vigour of crop may be the cause of variance in vine length. Similar results have been reported by Kritika and Bahadur (2024).

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Days to first flowering bud ranged from 26.0 to 39.3 days with mean of 32.2 days. Out of 30 genotypes, the earlier flower bud appeared in Pusa Samrudhi (26.0 days), followed by Pusa Naveen (27.0 days), MAHY 8 (27.0 days) and Mahi (27.0 days). However, maximum days to first flower was taken by both Narendra Shishir (39.3 days) and RBG 10 (39.3 days), followed by RBG 2 (36.6 days) and Narendra Madhuri (36.0 days). Kumar (2021) and (Sharma *et al.,* 2025) also supported these results .

The node number to first male flower appearance ranged from 8.67 to 13.0 with a mean of 10.9. The lowest node number to first staminate flower appearance was observed in IC-594545 (8.67), followed by RBG 5 (9.0) and RBG 12 (9.0). While, highest was recorded in RBG 1 (13.0) and RBG 6 (13.0), followed by Narendra Madhuri (12.6) and Pusa Samrudhi (12.3). The node number in first pistillate flower appearance ranged from 10.6 to 15.3 with a mean of 12.9. The earliest node number to first female flower appearance was observed in Pusa Samrudhi (10.6), followed by IC-594545 (11.0), RBG 3 (11.0) and RBG 13 (11.0) (Tables 1 and 2). Whereas, maximum was recorded for RBG 6 (15.3) and Mahi (15.0),

Table 1: Performance of bottle gourd genotypes for plant traits

Genotype	Days to first flowering bud	First male flower at node	First female flower at node	Days to first fruit setting	Days to first fruit picking	Number of fruits plant	Vine length (cm)
Sharada	27.67	12.00	13.67	43.00	51.67	6.67	593.3
Pusa Santushti	31.00	9.33	10.67	46.33	55.00	6.00	570.0
Amrit F_1	34.00	10.33	13.33	48.00	56.67	7.67	696.7
Narendra Shishir	39.33	11.67	14.00	57.33	65.67	6.33	706.7
Surag	33.33	10.33	12.67	47.00	55.00	7.00	613.3
Madhu Sree	33.33	12.00	13.33	47.00	56.00	7.00	676.7
Pusa Samrudhi	26.00	12.33	13.67	42.00	51.00	7.33	620.0
IC-594545	31.67	8.67	11.00	45.33	54.00	6.67	786.7
RBG-1	31.33	13.00	14.33	45.67	53.67	5.00	680.0
RBG-2	36.67	9.67	11.67	54.33	65.33	5.33	733.3
RBG-3	30.67	9.33	11.00	46.67	55.33	5.33	730.0
RBG-4	30.00	9.33	11.33	46.00	54.00	6.67	786.7
RBG-5	32.67	9.00	11.33	45.33	50.67	4.67	623.3
RBG-6	32.33	13.00	15.33	43.67	52.00	7.00	706.7
RBG-7	27.33	10.67	13.00	45.67	52.33	6.67	650.0
Pusa Naveen	27.00	11.67	13.67	44.00	51.00	5.67	673.3
Hybrid Green Gold	27.33	11.67	13.67	45.67	53.00	8.00	723.3
MAHY 8	27.00	10.33	11.33	37.33	46.00	7.67	736.7
Muskan	30.00	10.00	11.33	44.67	52.33	6.33	776.7
Mahi	27.00	12.67	15.00	40.00	48.00	6.67	640.0
Narendra Madhuri	36.00	12.67	14.67	47.00	60.67	5.33	686.7
Arka Bahar	35.00	10.00	12.00	49.00	64.00	6.00	650.0
RBG-8	30.67	12.00	13.67	43.33	56.67	5.67	683.3
RBG-9	33.67	12.00	14.67	49.33	56.67	5.33	800.0
RBG-10	39.33	10.33	13.00	57.33	66.33	7.67	740.0
RBG-11	36.00	12.33	14.33	48.00	55.67	6.33	716.7
RBG-12	33.33	9.00	11.67	49.67	56.67	6.67	773.3
RBG-13	35.00	9.67	11.00	46.67	54.33	7.33	693.3
RBG-14	36.67	10.00	13.00	50.67	58.67	6.67	750.0
RBG-16	35.00	12.00	14.67	51.67	60.33	6.00	706.7
Mean	32.21	10.90	12.93	46.92	55.62	6.42	697.44
C.V.	3.73	8.58	8.93	3.56	3.59	8.18	5.00
S.E.(m)	0.69	0.54	0.66	0.96	1.14	0.31	20.70
C.D. at 5%	1.96	1.53	1.88	2.73	3.25	0.89	58.61
Maximum	39.33	13.00	15.33	57.33	66.33	8.00	800.00
Minimum	26.00	8.67	10.67	37.33	46.00	4.67	570.00

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Table 2: Performance of bottle gourd genotypes for yield and fruits physico-chemical traits

Genotypes	Fruit length (cm)	Fruit width (cm)	Fruit weight (g)	Yield (kg. plant)	Yield (q/ha)	TSS (°Brix)	Protein content (mg)	Ascorbic acid (mg/100g)
Sharada	37.67	6.23	0.800	5.33	281.43	2.03	203.93	13.33
Pusa Santushti	19.33	9.90	0.867	5.17	293.70	2.17	155.13	13.83
Amrit F_1	38.33	6.20	0.767	5.87	325.13	2.20	170.50	15.63
Narendra Shishir	20.00	12.67	0.833	5.30	281.43	2.07	159.33	16.40
Surag	38.33	6.00	0.867	6.07	327.73	2.53	196.33	11.90
Madhu Sree	19.00	10.80	0.767	5.37	326.23	2.47	200.33	12.60
Pusa Samrudhi	37.00	6.87	0.867	6.30	333.67	2.73	218.67	15.17
IC-594545	10.00	12.07	0.867	5.83	287.00	2.37	165.13	16.67
RBG-1	33.33	6.13	0.800	3.93	207.03	2.53	195.33	11.23
RBG-2	42.33	5.33	0.700	3.70	201.07	1.83	182.67	16.40
RBG-3	32.33	5.77	0.700	3.73	199.20	2.03	145.93	16.60
RBG-4	12.33	11.70	0.667	4.57	241.43	2.83	182.33	12.37
RBG-5	19.00	6.50	0.733	3.43	193.67	2.33	173.67	14.23
RBG-6	20.00	11.10	0.633	4.33	244.03	2.13	178.40	13.87
RBG-7	31.67	5.20	0.767	5.10	285.13	1.80	181.30	13.50
Pusa Naveen	30.67	5.80	0.733	4.13	218.47	1.70	185.77	14.33
Hybrid Green Gold	38.33	6.43	0.833	6.60	344.80	2.33	181.65	14.03
MAHY 8	45.00	5.27	0.833	6.40	339.97	2.20	219.67	14.10
Muskan	46.67	4.37	0.733	4.63	246.97	2.40	138.13	16.00
Mahi	41.67	6.40	0.667	4.43	228.87	2.63	184.20	14.57
Narendra Madhuri	15.00	11.70	0.767	4.10	219.20	2.37	213.33	14.60
Arka Bahar	34.00	5.67	0.800	4.77	238.87	2.73	176.20	16.00
RBG-8	30.67	5.67	0.740	4.18	212.93	2.23	174.33	15.17
RBG-9	35.67	5.00	0.667	3.67	221.80	2.93	208.67	16.97
RBG-10	30.67	4.83	0.767	5.90	321.03	2.03	182.67	16.13
RBG-11	34.00	5.40	0.633	4.07	224.80	1.67	156.67	14.33
RBG-12	33.00	4.30	0.633	4.20	229.23	2.10	202.67	16.97
RBG-13	36.67	5.50	0.667	4.93	262.90	2.07	185.00	13.93
RBG-14	33.33	5.53	0.700	4.70	247.37	2.60	182.67	14.40
RBG-16	26.67	5.37	0.667	4.00	214.80	2.77	160.70	13.03
Mean	30.76	6.99	0.75	4.82	260.00	2.29	182.04	14.61
C.V.	7.35	12.24	11.75	14.32	14.32	3.80	4.35	2.5666
S.E.(m)	1.30	0.49	0.05	0.46	25.98	0.05	5.07	0.2132
C.D. at 5%	3.69	1.39	0.16	1.32	73.55	0.15	14.37	0.6034
Maximum	46.67	12.67	0.87	6.60	344.80	2.93	219.67	16.97
Minimum	10.00	4.30	0.63	3.43	193.67	1.67	138.13	11.23

followed by Narendra Madhuri (14.6), RBG 9 (14.6) and RBG 16 (14.6). The difference in flowering time in bottle gourd is also reported by Kappal *et al.* (2015).

Days to fruit set ranged from 37.3 to 57.3 days with a mean of 46.9 days. The minimum days to first fruit setting were recorded for MAHY 8 (37.3 days), followed by Mahi (40.0 days) and Pusa Samrudhi (42.0 days) (Table 1). However, the maximum number of days to first fruit setting was observed in Narendra Shishir (57.3 days) and RBG 10 (57.3 days), followed by RBG 2 (54.3 days). Days to first fruit picking ranged from 46.0 to 66.3 days with a mean of 55.6 days. The minimum number of days to fruit picking was recorded for MAHY 8 (46.0 days), followed by Mahi (48.0 days) and RBG 5 (50.6 days). However, maximum days to first fruit picking were observed in RBG 10 (66.3 days), followed by Narendra Shishir (65.6 days) and RBG 2 (65.3 days).

The number of fruits/plants ranged from 4.6 to 8.0,

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with a mean of 6.4. The maximum number of fruits/plant observed in Hybrid Green Gold (8.0), followed by MAHY 8 (7.6), and Amrit F_1 (7.6). Whereas, minimum number of fruits/plant recorded in RBG 5 (4.6), followed by RBG 1(5.0), RBG 2 (5.3) and RBG 3(5.3). The average fruit length per plant ranged from 10.0 cm to 46.6 cm, with a mean of 30.7 cm. The maximum fruit length was recorded in Muskan (46.6 cm), followed by MAHY 8 (45.0 cm) and RBG 2 (42.3 cm). Whereas, minimum fruit length was observed in IC-594545 (10.0 cm), followed by RBG 4 (12.3 cm) and Narendra Madhuri (15.0 cm). The average fruit width/plant ranged from 4.3 cm to 12.6 cm, with a mean of 6.9 cm.

The highest fruit width was recorded in Narendra Shishir (12.6 cm), followed by IC-594545 (12.0 cm), RBG 4 (11.7 cm) and Narendra Madhuri (11.7 cm). Whereas, minimum fruit width was recorded in Muskan (4.3 cm), followed by RBG 12 (4.3 cm) and RBG 10 (4.8 cm). The average fruit weight/plant ranged from 0.633 to 0.867 g with a mean of 0.750 g. The highest fruit weight was recorded in Pusa Santushti (0.867 g), IC-594545 (0.867 g) and Pusa Samrudhi (0.867 g). Whereas, lowest fruit weight was recorded in RBG 4 (0.667g), followed by RBG 9 (0.667 g) and RBG 13 (0.667 g).

Fruit yield ranged from 3.43 to 6.60 kg/plant with a mean of 4.82. The highest fruit yield was recorded in Hybrid Green Gold (6.60 kg), followed by MAHY 8 (6.40 kg) and Pusa Samrudhi (6.30 kg) (Table 2). Whereas, minimum fruit yield per plant was recorded in RBG 5 (3.43 kg), followed by RBG 9 (3.6 kg), RBG 2(3.7 kg) and RBG 3 (3.7 kg). Fruit yield ranged from 193.6 to 344.8 q/ha with a mean of 260.0 q. The maximum fruit yield was recorded in Hybrid Green Gold (344.8 q), followed by MAHY 8 (339.9 q) and Pusa Samrudhi (333.6 q). Whereas, minimum fruit yield was recorded in RBG 5 (193.6 q), followed by RBG 3 (199.2 q) and RBG 2 (201.0 q). Differences in fruit yield among genotypes might be due to their genetic makeup and their responses to soil macro- and microclimates. Similar findings were reported by Iqbal *et al.* (2019).

Protein content ranged from 138.1 mg to 219.6 mg with a mean of 182.0 mg. The high protein content was observed in MAHY 8 (219.6 mg), followed by Pusa Samrudhi (218.6 mg) and Narendra Madhuri (213.3 mg). The lowest protein content was observed in Muskan (138.1 mg), followed by RBG 3 (145.9 mg) and Pusa Santushti (155.1 mg). The TSS ranged from 1.67 °Brix to 2.93 °Brix with a general mean of 2.29 °Brix. The highest TSS was in RBG 9 (2.93 °Brix), followed by RBG 4 (2.8 °Brix) and RBG 16 (2.7 °Brix). The lowest value was observed in RBG 11 (1.67 °Brix), followed by Pusa Naveen (1.70 °Brix) and RBG 2 (1.83 °Brix). The ascorbic acid content (mg/100 g) ranged from 11.23 mg to 16.97 mg with a mean of 14.61 mg. The highest value for ascorbic acid content was observed in RBG 9 (16.97 mg) and RBG 12 (16.97 mg), followed by IC-594545 (16.67 mg). However, the lowest value was recorded in RBG 1(11.23 mg), followed by Surag (11.90 mg) and RBG 4 (12.37 mg). The similar findings were recorded by Bhatt *et al.,* (2022), Dubey *et al.,* (2022), Kumar *et al.* (2021), Venkatraman, (2021), Ahmad *et al.,* (2019), Chikkeri *et al. (2018)* and Shree *et al.* (2018) to most of the characters .

CONCLUSION

Thus, Hybrid Green Gold, MAHY 8 and Pusa Samrudhi are recommended for cultivation in the Bundelkhand region and may serve as valuable genetic resources for improvement programmes.

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Conflict of interest

The authors declare no conflict of interest

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