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## Performance of bottle gourd [*Lagenaria siceraria* L.] Varieties in Prayagraj agro-climatic conditions

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### Abstract

The present investigation entitled, "Performance of Bottle Gourd Varieties in Prayagraj Agro-climatic Conditions (*Lagenaria siceraria* L.)" was conducted at the Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences (SHUATS), Prayagraj (U.P.), during Zaid season of the year 2020-21. Fourteen genotypes including two check varieties are evaluated to ascertain the performance of genotypes under Prayagraj agro-climatic conditions. The experiment was laid out in randomized block design with three replications. The results of the present investigation, regarding the performance of 14 varieties of Bottle Gourd i.e., (BOGVAR 1, BOGVAR 2, BOGVAR 3, BOGVAR 4, BOGVAR 5, BOGVAR 6, BOGVAR 7, BOGVAR 8, BOGVAR 9, BOGVAR 10, BOGVAR 11, BOGVAR 12, NAVEEN 2 and KOMAL S 1, from different sources evaluated for plant growth, yield and quality have been discussed and interpreted in the light of previous research work done in India. From the present experimental findings it is found that in terms of germination minimum days to germination was seen in the variety BOGVAR 6 (10.53). In terms of vine length maximum vine length was recorded in the variety NAVEEN-2. In terms of no. of fruits per plant maximum no. of fruits per plant were recorded in the variety BOGVAR 9 (10.27) and in terms of yield maximum yield per plot and ha were recorded in the variety BOGVAR 12 (64.16kg & 445.53q).

**Keywords:** Performance, agro-climatic, bottle gourd, *Lagenaria siceraria* L.

### Introduction

The bottle gourd [*Lagenaria siceraria* L.], often known as Lauki or calabash gourd, is a diploid Cucurbitaceae plant with chromosomal number 2n=22. Due to its monoecious and andromonoecious nature, it is a highly cross-pollinated crop. The Latin terms "lagena" for bottle and "sicera" for drinking utensil are used to create the names "Lagenaria" and "siceraria." Cucurbitaceae is the most commercially important family, providing humanity with edible and healthy fruits. Although it is native to Africa, it has adapted successfully to India's widely diverse agroecosystems. It is distinguished by the low agrotechnical and input requirements. The bottle gourd has been included in the National Research Program on Vegetables, owing to its growing popularity as a health food. Because of its nutritional richness and ability to thrive in a wide range of climatic conditions, bottle gourd can be a useful instrument in research aimed at increasing the amount and quality of protective foods (vegetables). The importance of the bottle gourd (also known as the poor man's vegetable) is supported by its qualities and the fact that it has a lot of variety in many economically essential traits. It is known for having a wide hemispheric dispersion and thus may be used to produce high-quality cultivars.

Vitamin C (11 mg), thiamine (0.044 mg), and riboflavin are all present in the fruits (0.023 mg). One of the most essential issues in cucurbits is sex expression, sex ratio, and fruit set. Most cucurbitaceous crops are monoecious, meaning they produce more male flowers and fewer female blossoms on the same plant. Only male flowers arise first in cucurbitaceous vegetables, and female flowers appear later, while their genetic makeup determines growth, flowering, and sex expression (Sharma and Sengupta, 2013) [30]. 2011). Inside the bottle gourd fruit are spongy flesh tissues, white pulp, and embedded seeds. There are a lot of bottle gourd seeds, and they're all covered in a protective layer called tests. The oil extracted from the seed is pure and pale yellow, and it can be used as a cooking and hair oil. The oil extracted from the seed is pure and pale yellow, and it is used as a cooking and hair oil (Pradhan *et al.*, 2013) [26].

## Materials and Methods

### Experimental Site

The experiment will be conducted in the Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom, University of Agriculture, Technology and Sciences, Prayagraj (UP) during 2020 – 2021. All the facilities necessary for cultivation, including labour were made available in the department.

### Experimental Material

The experiment was laid out in randomized block design (R.B.D.) with 3 replications of 14 varieties. Bottle gourd varieties will be planted in the field at a spacing of 1.5m × 0.7m in plot of 7.5 m × 3 m size. Recommended dose of fertilizers i.e., 40:40:60 @ N: P<sub>2</sub>O<sub>5</sub>: K<sub>2</sub>O kg ha<sup>-1</sup>. Normal cultural practices and plant protection measures were followed during the cultivation process. Plants were selected at random from each plot of each varieties as representative sample for recording the data.

### Statistical Analysis

The mean data of each characters would be replicated three times and each character would be worked out statistically by the method of analysis of variance using RBD (Randomized block design by Panse and Sukhatme, 1989).

### Chemical Analysis

The chemical analysis was done for nitrogen, phosphorus, potash, organic matter and pH. Nitrogen was estimated by Kjeldhal's method (A.O.A.C., 1970)<sup>[1]</sup>. The phosphorus and potash was estimated by "Pemberton" and "Piper Methods". The pH was determined by pH meter.

**Table 1:** Details of genotypes

Genotypes symbols	Genotypes	Source
G <sub>1</sub>	AVT-II 2018/BOGVAR 1	IIVR, VARANASI
G <sub>2</sub>	AVT-II 2018/BOGVAR 2	IIVR, VARANASI
G <sub>3</sub>	AVT-II 2018/BOGVAR 3	IIVR, VARANASI
G <sub>4</sub>	AVT-II 2018/BOGVAR 4	IIVR, VARANASI
G <sub>5</sub>	AVT-II 2018/BOGVAR 5	IIVR, VARANASI
G <sub>6</sub>	AVT-II 2018/BOGVAR 6	IIVR, VARANASI
G <sub>7</sub>	AVT-II 2018/BOGVAR 7	IIVR, VARANASI
G <sub>8</sub>	AVT-I 2019/BOGVAR 2	IIVR, VARANASI
G <sub>9</sub>	AVT-I 2019/BOGVAR 3	IIVR, VARANASI
G <sub>10</sub>	AVT-I 2019/BOGVAR 4	IIVR, VARANASI
G <sub>11</sub>	AVT-I 2019/BOGVAR 5	IIVR, VARANASI
G <sub>12</sub>	AVT-I 2019/BOGVAR 6	IIVR, VARANASI
G <sub>13</sub>	NAVEEN-2	AKASH GANGA SEEDS
G <sub>14</sub>	KOMAL S-1	NATIONAL AGRO SEEDS

## Results and Discussion

### Days to germination

Among the bottle gourd varieties, the early germination seen in the variety BOGVAR 6 (10.53), followed by BOGVAR 4 (11.07), BOGVAR 10 (11.73), BOGVAR 1 (12.13), Naveen-2 (12.20), BOGVAR 12 (12.47), and BOGVAR 8 (12.60). The highest number of days taken for germination is in the variety BOGVAR 3 (16.03).

### Days to 1<sup>st</sup> true leaf

Among the fourteen bottle gourd varieties evaluated early 1<sup>st</sup> true leaf was observed in BOGVAR 8 (16.13), followed by BOGVAR 6 (16.40), BOGVAR 5 (16.47), BOGVAR 12

(17.07), BOGVAR 10 (17.20), BOGVAR 4 (17.40), Komal s-1 (17.73), Naveen-2 (18.00), BOGVAR 11 (18.13), BOGVAR 1 (18.73), BOGVAR 9 (18.87), BOGVAR 7 (19.07) and BOGVAR 2 (19.13). The highest number of days for 1<sup>st</sup> true leaf is in variety BOGVAR 3 (19.63).

### Days to 4<sup>th</sup> true leaf

The minimum number of days to 4<sup>th</sup> true leaf was recorded in BOGVAR 6 (30.27), followed by BOGVAR 11 (32.13), BOGVAR 10 (32.60) Naveen-2 (33.47), BOGVAR 11 (33.80), Komal s-1 (34.27), BOGVAR 12 (34.73), BOGVAR 2 (35.80), and BOGVAR 7 (36.20). The maximum number of days for 1<sup>st</sup> true leaf is in variety BOGVAR 3 (39.70).

### Days to 1<sup>st</sup> male flower emergence

Among the bottle gourd varieties, the early flowering was seen in the variety BOGVAR 10 (53.27), followed by BOGVAR 3 (53.89), BOGVAR 5 (55.78), BOGVAR 11 (56.77), BOGVAR 6 (57.77) and BOGVAR 12 (58.20). The highest number of days taken for first male flowering is in the variety BOGVAR 4 (72.53).

### Node at 1<sup>st</sup> male flower emergence

Average node at 1<sup>st</sup> male flower emergence varies from 4.13 to 7.80. The minimum node at which 1<sup>st</sup> 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 1<sup>st</sup> male flower appeared was BOGVAR 4 (7.80).

### Days to 1<sup>st</sup> female flower emergence

Significantly the minimum number of days to 1<sup>st</sup> female flower appearance was in the variety BOGVAR 10 (56.50), followed by BOGVAR 5 (61.13), and BOGVAR 3 (61.23). The highest number of days taken for first female flowering is in the variety BOGVAR 4 (78.00).

### Node at 1<sup>st</sup> female flower emergence

Average node at 1<sup>st</sup> female flower emergence varies from 6.33 to 15.33. The minimum node at which 1<sup>st</sup> 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 1<sup>st</sup> female flower appeared was BOGVAR 4 (15.33).

### Sex ratio

The maximum sex ratio was recorded in BOGVAR 9 (26.30). The minimum sex ratio was recorded in BOGVAR 5 (11.37).

### Days to 1<sup>st</sup> picking

The least number of days to 1<sup>st</sup> picking was observed in the variety BOGVAR 7 (81.27). The maximum number of days to 1<sup>st</sup> picking was seen in BOGVAR 5 (71.80).

### Vine length (m) (at last Harvesting)

The highest vine length recorded NAVEEN-2 (5.23) and followed by BOGVAR 8 (4.04), BOGVAR 1 (3.81), BOGVAR 9 (3.77) and BOGVAR 3 (3.76). The lowest vine length was recorded in BOGVAR 12 (2.49).

### Number of Fruit per plant

The highest number of fruits per plant was recorded in the variety BOGVAR 9 (10.27) followed by BOGVAR 10 (9.33). The minimum number of fruits per plant was recorded in the variety BOGVAR 5 (6.93).

**Fruit weight (g)**

The highest fruit weight in bottle gourd varieties was recorded in the variety BOGVAR 7 (892.87) followed by AVT-I 2019/BOGVAR 12 (878.23). The lowest fruit weight in bottle gourd varieties was recorded in KOMAL S-1 (420.40).

**Fruit length (cm):** The maximum fruit length was recorded in the variety BOGVAR 1 (35.50). The minimum fruit length was recorded in the variety BOGVAR 7 (19.38).

**Fruit diameter**

The maximum fruit diameter of bottle gourd varieties was recorded in the variety BOGVAR 2 (18.42). The minimum fruit diameter was recorded in the variety NAVEEN-2 (5.98).

**Fruit yield per plant (kg)**

The highest fruit yield per plant was recorded in the variety BOGVAR 12 (8.02) followed by BOGVAR 9 (7.64) and BOGVAR 7 (7.32). The lowest fruit yield per plant was recorded in variety KOMAL S-1 (3.50).

**Fruit yield per plot (kg)**

The highest fruit yield per plot was recorded in the variety

BOGVAR 12 (64.16) followed by BOGVAR 9 (61.12) and BOGVAR 7 (58.58). The lowest fruit yield per plot was recorded in variety KOMAL S-1 (28.02).

**Fruit yield per ha**

The highest fruit yield per ha was recorded in the variety BOGVAR 12 (445.53) followed by BOGVAR 9 (424.40) and BOGVAR 7 (406.74). The lowest fruit yield per ha was recorded in variety KOMAL S-1 (194.53).

**Net return per hectare-1**

The maximum net income per hectare was obtained by G12 (BOGVAR-12) i.e., 3,19,182 INR and followed by the G9 (BOGVAR 9) i.e., 2,98,059 INR and the minimum net return per hectare was obtained by G14 (KOMAL S-1) i.e., 68,189 INR

**Benefit cost Ratio**

Among the different varieties G12 (BOGVAR 12) has the highest benefit cost ratio (3.51) followed by G9 (BOGVAR-9) i.e. (3.35) and the minimum benefit cost ratio was showed by G14 (KOMAL S-1) i.e. (1.53).

**Table 2:** Varietal evaluation of Bottle gourd with respect to growth parameters

S.NO.	GENOTYPE	Germination	Days 1 <sup>st</sup> true leaf	Days to 4 <sup>th</sup> true leaf	Days to 1 <sup>st</sup> male flower	Node at 1 <sup>st</sup> male flower	Days to 1 <sup>st</sup> female flower	Node at 1 <sup>st</sup> female flower	Sex ratio
T1	BOGVAR 1	12.13	18.73	18.73	65.33	6.93	64.60	11.20	23.67
T2	BOGVAR 2	13.40	19.13	19.13	65.77	6.87	75.00	11.00	19.63
T3	BOGVAR 3	16.03	20.30	20.30	53.89	6.73	61.23	7.93	15.80
T4	BOGVAR 4	11.07	17.40	17.40	72.53	7.80	78.00	15.33	16.47
T5	BOGVAR 5	14.00	17.03	17.03	55.78	6.87	61.13	7.73	11.37
T6	BOGVAR 6	10.53	16.40	16.40	57.77	5.27	65.43	8.20	22.70
T7	BOGVAR 7	13.67	19.07	19.07	64.50	5.60	65.33	9.87	19.03
T8	BOGVAR 8	12.60	16.13	16.13	63.10	7.47	65.40	11.53	22.20
T9	BOGVAR 9	12.73	18.87	18.87	67.33	6.40	73.20	11.27	26.30
T10	BOGVAR 10	11.73	17.20	17.20	53.27	4.13	56.50	6.33	24.23
T11	BOGVAR 11	13.27	18.13	18.13	56.77	5.27	65.83	8.33	21.90
T12	BOGVAR 12	12.47	17.40	17.40	58.20	5.73	66.60	8.20	23.77
T13	NAVEEN-2	12.20	15.43	15.43	59.40	6.00	68.63	8.93	20.97
T14	KOMAL S-1	12.73	16.40	16.40	63.23	6.27	64.77	6.93	18.70
	F-Test	S	S	S	S	S	S	S	S
	Se(d)	1.08	1.10	1.10	2.79	0.61	2.97	0.86	1.03
	C.D. @ 5%	2.17	2.23	2.23	5.63	1.23	6.00	1.67	2.08
	C.V.	10.33	7.65	7.65	5.58	11.95	5.46	10.70	6.16

**Table 3:** Varietal evaluation of Bottle gourd with respect to yield parameters

S.NO.	GENOTYPE	Days to 1 <sup>st</sup> picking	Vine length	No. of fruits per plant	Fruit weight	Fruit length	Fruit diameter	Fruit yield per plant	Fruit yield per plot	Fruit yield per ha
T1	BOGVAR 1	79.73	3.81	8.87	633.80	35.50	11.95	5.62	44.95	312.11
T2	BOGVAR 2	75.27	2.91	8.40	756.73	26.35	18.42	6.36	50.86	353.13
T3	BOGVAR 3	74.93	3.76	7.79	795.60	23.23	14.03	6.20	49.61	344.51
T4	BOGVAR 4	74.80	3.72	7.80	707.63	22.29	11.67	5.52	44.18	306.76
T5	BOGVAR 5	71.80	3.60	6.93	654.81	25.93	10.87	4.54	36.32	252.23
T6	BOGVAR 6	80.60	3.34	8.73	814.03	24.80	10.30	7.11	56.89	395.05
T7	BOGVAR 7	81.27	3.37	8.20	892.87	19.38	9.29	7.32	58.58	406.74
T8	BOGVAR 8	76.60	4.04	8.60	824.17	28.11	11.49	7.07	56.53	392.52
T9	BOGVAR 9	76.60	3.77	10.27	744.70	31.09	13.15	7.64	61.12	424.40
T10	BOGVAR 10	75.67	2.66	9.33	614.40	29.53	11.65	5.73	45.82	318.18
T11	BOGVAR 11	80.67	3.07	8.60	642.77	32.01	12.02	5.53	44.27	307.38
T12	BOGVAR 12	80.47	2.49	9.13	878.23	24.89	13.48	8.02	64.16	445.53
T13	NAVEEN-2	79.60	5.23	8.57	470.43	23.48	5.98	4.03	32.27	224.10
T14	KOMAL S-1	80.30	3.75	8.33	420.40	25.43	6.71	3.50	28.02	194.53
	F-Test	S	S	S	S	S	S	S	S	S
	Se(d)	0.69	0.20	1.13	22.73	2.73	0.90	0.42	3.33	23.10

	C.D. @ 5%	1.40	0.41	7.99	1.96	6.23	4.74	0.84	6.72	46.66
	C.V.	1.09	7.05	5.56	11.26	1.35	0.45	8.47	8.47	8.47

## Conclusion

The results from the present investigation concluded that bottle gourd variety BOGVAR 12 was identified as desirable with high fruit yield per plant in terms of days to germination, length of main vine, days to first appearance of male flower, days to first appearance of female flower, no. of days of first harvest, fruit length, fruit weight, fruit diameter, first male flower appearance on node, first female flower appearance on node, no. of fruits per plants, no. of fruit yield per plant, highest benefit cost ratio and net returns.

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