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**Sriom**
Research Scholar, Department of Vegetable Science, ANDUA and T, Kumarganj, Ayodhya, Uttar Pradesh, India

**GC Yadav**
Associated Professor, Department of Vegetable Science, ANDUA and T, Kumarganj, Ayodhya, Uttar Pradesh, India

**Corresponding Author:**
**Sriom**
Research Scholar, Department of Vegetable Science, ANDUA and T, Kumarganj, Ayodhya, Uttar Pradesh, India

# Studies on heritability and genetic advance for growth, yield and quality traits in bottle gourd [*Lagenaria siceraria* (Mol.) Standl.]

**Sriom and GC Yadav**

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**Abstract**
The investigation carried out during warm season of 2017-18 and 2018-19 at main experimental station vegetable science, Kumarganj, Ayodhya. The experiment laid out in Randomized Block design (RBD) with 55 treatment and replicate thrice. Observations were recorded for days to first staminate and pistillate flower anthesis, node number to first staminate and pistillate flower appearance, primary branches per plant, vine length (m), fruit circumference (cm), fruit weight (kg), and fruit yield per plant (kg). High heritability for most of the traits along with high genetic advance in per cent of mean were number of primary branches per plant, fruit length, fruit weight, and number of fruits per plant while High heritability along with moderate genetic advance were found for days to first staminate and pistillate flower anthesis, node number to first staminate and pistillate flower appearance, vine length, fruit circumference, fruit yield per plant over pooled. Thus, there exist a great scope of response to selection through improvement of these traits in bottle gourd.

**Keywords:** Heritability, genetic advance and bottle gourd

## Introduction
Bottle gourd is an important cultivated annual cucurbitaceous crop grown throughout the country. Being warm season vegetable crop it thrives well in warm and humid climate but at present it's off season cultivation has progressively stretched throughout the year in northern Indian plains.The tender fruits of bottle gourd can be used as a vegetable or for making sweets (e.g. *Halva, kheer, petha* and *burfi* etc.), kofta and pickles. The fruit is rich in pectin also, which showed good prospects for jelly preparation. A decoction made from the leaf is a very good medicine for jaundice. The fruit has cooling effect, it is a cardiotonic and diuretic, good for people suffering from biliousness, indigestion and convalescences *i.e.*, regain health after illness. The pulp is good for overcoming constipation, cough, and night blindness and as an antidote against certain poisons. The plant extract is used as a cathartic and seeds are used in dropsy. In addition, the seeds and seed oil are edible. The fruits contain 96.3 per cent moisture, 2.9 per cent carbohydrate, 0.2 per cent protein, 0.1 per cent fat, 0.5 per cent mineral matter and 11 mg of vitamin C (Ascorbic acid) per 100 g fresh weight (Thamburaj and Singh, 2005) [5].
The fruit is also known to be a good source of essential amino acids as leucine, phenyl alanine, threonine, cystine, valine, aspartic acid and proline, along with a good source of vitamin B, especially thiamine, riboflavin and niacin. The mineral matter reported to be present in fair amount which includes calcium, phosphorus, iron, potassium, sodium and iodine. At present per capita per day availability of vegetable in India is 175 g against 300 g/capita/day as recommended by ICMR. To meet out such a challenging target, there is need to develop new potential hybrids. Heritability and genetic advance are important parameters in predicting the genetic gain under selection. These estimates help the breeder in selection of genotypes from diverse genetic populations.

## Material and Methods
The present was conducted during *Zaid* 2017 ($E_1$) and 2018 ($E_2$) to study the heritability and genetic advance using diallel mating design at the Main Experiment Station (MES) of the Department of Vegetable Science, A.N.D. University of Agriculture & Technology, Narendra

Nagar (Kumarganj), Ayodhya (U.P.) India.The experimental materials for the present study comprised of ten promising and diverse inbred lines/varieties of bottle gourd selected on the basis of genetic variability from the germplasm stock maintained in the Department of Vegetable Science, A.N.D. University of Agriculture & Technology, Kumarganj, Ayodhya (U.P.) India. The selected parental lines *i.e.* NDBGH-4 ($P_1$), NDBG-601 ($P_2$), PBOG-3 ($P_3$), NDBC-517 ($P_4$), NDBG-603 ($P_5$), NDBG-624 ($P_6$), N. Pooja ($P_7$), NDBG-100 ($P_8$), Punjab Komal ($P_9$), and NDBG-11 ($P_{10}$) were crossed in the all possible combinations, excluding reciprocals. The experiments were conducted in a Randomized Complete Block Design (RBD) with three replications to assess the performance of 45 $F_1$ hybrids and their 10 parental lines. The observation were recorded on days to first staminate flower anthesis, days to first pistillate flower anthesis, node number to first staminate flower, node number to first pistillate flower, days to first fruit harvest, vine length (m), number of primary branches per plant, fruit length (cm), fruit circumference (cm), average fruit weight (kg), number of fruits per plant, fruit yield per plant (kg).

**Table 1:** Heritability and genetic advance in bottle gourd over two seasons ($E_1$, $E_2$) and pooled

| Characters | Seasons | Heritability in broad sense (%) | Heritability in narrow sense (%) | Genetic advance in percent of mean |
|---|---|---|---|---|
| Days to first staminate flower anthesis | $E_1$ | 84.14 | 80.13 | 10.96 |
| | $E_2$ | 77.07 | 49.23 | 12.15 |
| | Pooled | 80.61 | 64.68 | 11.55 |
| Days to first pistillate flower anthesis | $E_1$ | 80.77 | 34.33 | 10.29 |
| | $E_2$ | 75.72 | 32.41 | 13.75 |
| | Pooled | 78.25 | 33.37 | 12.2 |
| Node number to first staminate flower appearance | $E_1$ | 49.92 | 20.62 | 5.65 |
| | $E_2$ | 92.58 | 16.16 | 11.30 |
| | Pooled | 71.25 | 18.39 | 13.87 |
| Node number to first pistillate flower appearance | $E_1$ | 80.28 | 18.27 | 14.80 |
| | $E_2$ | 78.54 | 16.87 | 19.83 |
| | Pooled | 79.41 | 17.57 | 17.36 |
| Days to first fruit harvest | $E_1$ | 79.90 | 17.46 | 9.23 |
| | $E_2$ | 78.54 | 18.57 | 9.07 |
| | Pooled | 79.22 | 17.55 | 9.15 |
| Vine length (m) | $E_1$ | 95.43 | 10.81 | 34.20 |
| | $E_2$ | 96.40 | 7.77 | 39.02 |
| | Pooled | 95.92 | 8.79 | 26.61 |
| Number of primary branches per plant | $E_1$ | 98.56 | 14.11 | 49.32 |
| | $E_2$ | 97.50 | 19.68 | 54.05 |
| | Pooled | 98.03 | 17.39 | 51.68 |
| Fruit length (cm) | $E_1$ | 97.04 | 46.70 | 48.92 |
| | $E_2$ | 97.06 | 48.37 | 37.30 |
| | Pooled | 97.05 | 47.53 | 43.11 |
| Fruit circumference (cm) | $E_1$ | 90.45 | 10.29 | 16.77 |
| | $E_2$ | 92.67 | 9.30 | 20.11 |
| | Pooled | 91.56 | 9.79 | 19.44 |

Contd….

| Characters | Seasons | Heritability in broad sense (%) | Heritability in narrow sense (%) | Genetic advance in per cent of mean |
|---|---|---|---|---|
| Fruit weight (kg) | $E_1$ | 95.78 | 23.07 | 59.26 |
| | $E_2$ | 92.02 | 11.36 | 30.50 |
| | Pooled | 93.90 | 17.19 | 44.38 |
| Number of fruits per plant | $E_1$ | 88.32 | 3.75 | 31.22 |
| | $E_2$ | 93.41 | 2.60 | 48.39 |
| | Pooled | 90.87 | 3.17 | 39.85 |
| Fruit yield per plant (kg) | $E_1$ | 89.40 | 8.29 | 23.29 |
| | $E_2$ | 93.67 | 8.18 | 29.41 |
| | Pooled | 91.54 | 8.44 | 26.35 |

## Result and Discussion

Heritability estimates in broad sense narrow sense and genetic advance in percent of mean were presented in (Table-1). High heritability estimates in broad sense (>75%) were observed all most all the traits over pooled. High narrow sense heritability estimates (>30%) were estimated for days to first staminate and pistillate flower anthesis while >17% for node number to first staminate and pistillate flower appearance, days to first fruit harvest, Number of primary branches per plant, and fruit weight while it was very low for <10% for vine length, fruit circumference, number of fruits per plant, fruit yield per plant over pooled. High genetic advance (>30%) in per cent of mean were estimated for traits, *viz.*, number of primary branches per plant, fruit length, fruit weight and number of fruits per plant over both the environment. While it was medium (>10 and <30) for days to first staminate and pistillate flower anthesis, node number to first staminate and pistillate flower appearance, vine length, fruit circumference and fruit yield per plant over pooled**.** High heritability$_{(bs)}$ along with high genetic advance were observed for number of primary branches per plant, fruit length, fruit weight, and number of fruits per plant while High heritability along with

moderate genetic advance were found for days to first staminate and pistillate flower anthesis, node number to first staminate and pistillate flower appearance, vine length, fruit circumference, fruit yield per plant over pooled. These findings exhibits a great scope for yield improvement in bottle gourd. These findings are in close agreement with the findings of Ghevaria *et al.* (1995) [1]; Narayan *et al.* (2096) [2], Wani *et al.* (2008) [6] and Sharma *et al.* (2010) [2, 3] and Sirohi *et al.* (1986) [4]. Thus, there exist a great scope of response to selection through improvement of these traits in bottle gourd.

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