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Performance of Bottle Gourd Hybrids for Growth, Yield and Quality under Prayagraj Agro-Climatic Conditions

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

An experiment entitled "Performance of Bottle Gourd Hybrids for Growth, Yield and Quality under Prayagraj Agro-climatic conditions" was conducted during February to May. 2022, in field of Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) India. The results of the present investigation, regarding the performance of 09 hybrid genotypes of Bottle Gourd i.e. (AVT-II 2019/BOGHYB-1, AVT-II 2019/BOGHYB-2, AVTII 2019/BOGHYB-3, AVT-II 2019/BOGHYB-4, AVT-II 2019/BOGHYB-5, AVT-II 2019/BOGHYB-6, AVT-II 2019/BOGHYB-7,

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SARITA (check hybrid) and ARMAN (check hybrid)) obtained 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. The experiment was conducted in Randomized block design, where each replicated thrice. From the present experimental finding it was found that hybrid SARITA is with the maximum number of female flowers (17.7), number of fruits/plant (12.70 fruits), average yield per plant (10.57 kg/plant), yield per hectare (469.88 q/ha). TSS (3.2 °B) The highest cost benefit ratio (3.7) was found for bottle gourd in hybrid SARITA under Prayagraj Agro-climatic condition.

Keywords: Bottle gourd; hybrid genotypes; growth; yield and quality.

1. INTRODUCTION

"Bottle gourd [*Lagenaria siceraria* L.] (2n=2x=22) belongs to family Cucurbitaceae and is one of the most ancient crops cultivated during summer throughout the world. The genus Lagenaria is derived from the word lagena, meaning the bottle. It is also known as Calabash, Doodhi and Lauki in different parts of India" [1]. "Its primary centre of origin is Africa" [2].

"The fossil records indicate its culture in India even before 200 B.C. It has been found wild in India, the Moluccas and Ethiopia. It has spread to western countries from India and Africa. The genus Lagenaria includes six species that are distributed in Africa, Madagascar, Indo-Malaysia and the neotropics. There is only one cultivated species, *Lagenaria siceraria*, which is annual and monoecious. The five other species are wild, perennial and dioecious, occurring in East Africa and Madagascar. In India the total area under its cultivation is 185 thousand hectares with an annual production of 3072 thousand MT" (NHB, 2018). "However, in Jammu and Kashmir it is grown over an area of 1.60 thousand hectares with a production of 36.17 thousand MT" (Anonymous, 2018). "It is a highly cross-pollinated crop due to its monoecious and andromonoecious nature and shows large amount of variation for various economic traits of which the most interesting variation is found for size, shape and colour of fruits" [3]. "On the basis of fruit shape, the cultivars of bottle gourd are broadly classified into two groups viz., long fruited and round fruited. The fruit make delicious supplement to the human diet and 100 g of fruits contain nearly 96 g water, 0.2 g protein, 0.1 g fat, 2.5 g carbohydrate, 0.6 g fibre, 0.5 g minerals, 20 mg calcium, 10 mg phosphorus, 0.7 mg iron, 0.3mg thiamine, 0.01 mg riboflavin and 0.2 mg niacin and energy 1.2 cal. Their seeds are good sources of lipids and proteins and it contains 45 percent oil and 35 percent protein" [4]. "The seeds are rich in essential amino acids, minerals, lipids and fatty acids and are also used for oil extraction" [5]. "The fatty acid profile shows linoleic acid as the most abundant (62%) as compared to oleic (16.2%), palmitic (14.4%) and stearic (5.8%) acids. The abundance of linoleic acid followed by oleic acid in bottle gourd seed makes them good oils for reducing serum cholesterol and low- density lipoprotein (LDL) and increasing high density lipoprotein (HDL) levels, hence, they could be good oils to fight against cardiovascular illnesses" [6].

"The fruit yield of bottle gourd is an economic character which is dependent on many other attributes. Other yield attributing traits like vine length, node at which first female flower appeared, number of fruits plant-1, fruit length, fruit weight etc. are inherited quantitatively and their expression is governed by polygenes which are highly influenced by environment and are less heritable. So, selection based on yield components rather than yield itself is reliable and may be accomplished through the component approach of breeding" [5]. "Louki, is cultivated on a large scale in our country that produces a lower yield compared to many exotic varieties. Several factors are responsible for this lower yield such as biotic and abiotic stresses and loss of yield potential of Louki variety with the passage of time. Lack of high yielding varieties is one of the most important factors that limit bottle gourd productivity. All the cultivars cannot be grown successfully in each region. Some cultivars are successfully adapted to a region while others show poor performance in the same region. Therefore, very high yielding exotic varieties need careful investigation before growing on a large scale for lack of knowledge of their adaptation with local conditions. The success of breeding program depends on the availability of the genetic variability present in the available germplasm. The study of biological parameters of the crop is often considered to be a useful step in the study of genetic variability. Since most of the plant characters of economic importance are polygenic in nature and are highly influenced by

environment, it is necessary to work out whether the observed variability is heritable or due to environment" [6].

"This suggests the imperative need to work out the phenotypic variation into heritable and non-heritable components. Genotypic and phenotypic coefficients of variability help to assess the divergence of the characters. Selection would be more meaningful for the characters which exhibit high genetic variability, heritability along with high genetic gain" [6]. "At present, urgent need of the farmers is to develop early maturing and high yielding varieties/hybrids. Preliminary identification of early maturing hybrids can be done based on characters like days to opening of female flowers, node number to first female flowering and days to fruit picking. Collection and evaluation of hybrids a pre-requisite for their utilization and detailed evaluation determines the potential of an accession in specific crop improvement program. Therefore, a trial for characterization and evaluation of presently available bottle gourd hybrid was carried out in order to identify the potential cultivar for different horticultural characters" [7]. Keeping all the above facts under consideration and visualizing the lack of information on these aspects, the present investigation was undertaken at Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Science, Prayagraj.

2. MATERIALS AND METHODS

The present investigation entitled "Performance of Bottle Gourd Hybrids for Growth, Yield and Quality under Prayagraj Agro-climatic conditions" was carried out during the summer season of year 2022 at Horticulture Research Farm, Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Prayagraj (UP). The experiment was laid out in randomized block design with three replications on 5th March 2022. The transplanting was was done on ridges with spacing of 250 X 60 cm adopting the recommended cultivation practices for raising a healthy crop.

Data was recorded on all the important characters pertaining to the present study. The cultural practices such as irrigation, weeding and plant protection measure were carried out uniformly as and when required.

Table 1. List of hybrids

Notation	Name of hybrids	Source
H_1	AVT II 2019/ BOGHYB - 1	IIVR, Varanasi
H_2	AVT II 2019/ BOGHYB - 2	IIVR, Varanasi
H_3	AVT II 2019/ BOGHYB - 3	IIVR, Varanasi
H_4	AVT II 2019/ BOGHYB - 4	IIVR, Varanasi
H_5	AVT II 2019/ BOGHYB - 5	IIVR, Varanasi
H_6	AVT II 2019/ BOGHYB - 6	IIVR, Varanasi
H_7	AVT II 2019/ BOGHYB - 7	IIVR, Varanasi
H_8	SARITA (CHECK HYBRID)	VNR Seeds PVT LTD
H_9	ARMAN (CHECK HYBRID)	TIERRA AGROTECH PVT LTD

3. RESULTS AND DISCUSSION

3.1 Growth Parameters

3.1.1 Days to 2nd leaf stage and 4th leaf stage (DAT) in different hybrid genotypes of bottle gourd

Significant differences in days to 2nd leaf stage in different hybrid genotypes. The minimum number of days to 2nd leaf stage was recorded in the hybrid AVT II 2019 BOGHYB-1(13.9) and maximum number of days to 2nd leaf stage was recorded in the hybrid ARMAN(19.2) followed by the hybrid SARITA (16.9).

The minimum number of days to 4th leaf stage was recorded in the hybrid AVT II 2019 BOGHYB-1(19.9) and maximum number of days to 4th leaf stage was recorded in the hybrid ARMAN (25.2) followed by the hybrid SARITA (22.9).

"Because of the capacity of genotype to intake more water and ability of the hybrid genotypes to grow fast in the conditions like sunlight, moisture and temperature and the number of days to 2nd leaf emergence indicates earliness or lateness of flower. Based on the ability of genotype and GA3 which induces both cell division and cell elongation" (Jones, 1979). similarly, it can stimulate plant tissue results in enhanced vegetative growth. "It stimulates rapid stem and root growth, induce mitotic division in the leaves

of some plants trigger transitions from meristem to shoot growth, juvenile to adult leaf stage, vegetative to flowering, along with an interaction of different environmental factors viz., light, temperature and water" (Camara et al. 2015).

3.1.2 Days to first male flower emergence (DAT) in different hybrid genotypes of bottle gourd

The various genotypes showed non-significant difference in the first appearance of male flowers. The minimum number of days to 1st male flower emergence was recorded in the hybrids AVT II 2019 BOGHYB-5 and SARITA(45.93) and maximum number of days to 1st male flower emergence was recorded in the hybrid AVT II 2019 BOGHYB-3 (52.07) followed by the hybrid AVT-II 2019/BOGHYB-6 (49.8). The Days to First Male flower emergence play an important role in deciding the earliness or lateness of a crop in general. The variation in the first male flower emergence might have been due to internodal length, number of inter nodal and vigour of the crop. Similar finding were reported by Kumar et al. [8], Sharma and Sengupta (2013), Deepthi et al. [9], Padmakshi Thakur et al. [10] and Kumar et al. [11] in Bottle gourd.

3.1.3 Days to first female flowers emergence (DAT) in different hybrid genotypes of bottle gourd

According to the data, there was a non-significant difference in the first appearances of female flowers among the various genotypes of Bottle gourd, The minimum number of days to 1st female flower emergence was recorded in the hybrid AVT II 2019 BOGHYB-1(58.47) and maximum number of days to 1st female flower emergence was recorded in the hybrid SARITA (63.33) followed by the hybrid AVT II 2019 BOGHYB-5. The Days to First Female flower emergence play an important role in deciding the earliness or lateness of crop in general. The variation in the first female flower emergence might have been due to internodal length, number of inter nodes and vigour of the crop. Similar finding were reported by Kumar et al. [8], Sharma and Sengupta (2013), Deepthi et al. [9], Padmakshi Thakur et al. [10] and Kumar et al. [11] in Bottle gourd.

3.1.4 Node at first male flower emergence in different hybrid genotypes of bottle gourd

"There was a significant difference between the genotypes in the node at which the first male flower appears. Appearance of first male at a particular node is also important for high yields. The minimum number of node at 1st male flower emergence was recorded in the hybrid AVT-II 2019/BOGHYB-3 (9.7) and maximum number of node at 1st male flower emergence was recorded in the hybrid AVT-II 2019/BOGHYB-6 (12.9) followed by the hybrid AVT II 2019 BOGHYB-1 (12.8)" [7]. The Node at which First Male flower appears is an important role deciding total number of male flowers. The difference may be due to the inherent character and genetic makeup of the genotypes. The view was supported by Deepthi et al. [9], Kunjam et al. [12] and Mishra et al. [13] in Bottle gourd.

3.1.5 Nodes number at first female flower emergence in different hybrid genotypes of bottle gourd

The Node at which first female flower emergence in different genotypes of bottle gourd was recorded and the minimum number of node at 1st female flower emergence was recorded in the hybrid AVT-II 2019/BOGHYB-7 (12.6) and maximum number of node at 1st female flower emergence was recorded in the hybrid AVT-II 2019/BOGHYB-5 (17.9) followed by the hybrid AVT II 2019 BOGHYB-3 (17.7). The Node at which First Female flower appears is an important role deciding total number of female flowers. The difference may be due to the inherent character and genetic makeup of the variety. The view was supported by Kunjam et al. [12] and Mishra et al.[13]

3.1.6 Number of male flowers in different hybrid genotypes of bottle gourd

The data showed significant differences in the number of male flowers between various genotypes of Bottle gourd. The minimum number of male flowers was recorded in the hybrid AVT-II 2019/BOGHYB-4 (32.5) and maximum number of male flowers was recorded in the hybrid AVT-II 2019/BOGHYB-2 (39.1) followed by the hybrid AVT II 2019/BOGHYB-3 (39.0). The results are conformity with the findings of (Daryono et al. 2018). Where, he concludes that "ethepon treatment affected the formation of watermelon flower by increasing the number of female or hermaphrodite flower and decreasing the number of male flowers, especially in the concentration of 75 ppm and 100 ppm. It may be also due to the inherent character and genetic makeup of the varieties and environmental conditions" [14], Thakur et al. [15].

3.1.7 Number of female flowers in different hybrid genotypes of bottle gourd

The data presented revealed a considerable variation in the quantity of female flowers on each vine. The minimum number of female flowers was recorded in the hybrid AVT-II 2019/BOGHYB-5(14.7) and maximum number of female flowers was recorded in the hybrid SAVITA (17.7) followed by the hybrid AVT II 2019/BOGHYB-7 (16.3). The results are conformity that more the female flowers get more number of fruits and it is due to the inherent character and genetic makeup of the varieties and environmental conditions it was findings of Harika et al. [16], Padmakshi Thakur et al. [10], Poornima singh et al. [14].

3.1.8 Male: Female flowers ratio in different hybrid genotypes of bottle gourd

There was a significant difference between the genotypes in Male: Female flowers ratio. The minimum male:female flower ratio was recorded in hybrids AVT-II 2019/BOGHYB-7 (2.2)and SARITA(2.2) and maximum male:female flowers ratio was recorded in the hybrids AVT-II 2019/BOGHYB-2, AVT-II 2019/BOGHYB-3 and AVT-II 2019/BOGHYB-5 (2.5) followed by the hybrids AVT II 2019/BOGHYB-1 and AVT II 2019/BOGHYB-6 (2.4). The Male: Female ratio is a significant indicator of crop earliness or lateness. It is because of the types' inherent character and genetic makeup, as well as environmental factors. Similar result for ratio of male: female flower had been reported by Nalawade et al. (2011), Harika et al. [16], Muralidharan et al. [17], Uddin et al. [18], Rambabu et al. [19], A. husna et al. [20] in Bottle gourd.

3.1.9 Days to first fruit picking in different hybrid genotypes of bottle gourd

The Days to first fruit picking in different genotypes of bottle gourd was recorded, and significantly the minimum days to first fruit picking was recorded in the hybrid AVT-II 2019/BOGHYB-4 (56.3) and maximum days to first fruit picking was recorded in the hybrid AVT-II 2019/BOGHYB-3(64.3) followed by the hybrid SARITA (60.7). It may be due to mobilization of food materials from source to sink in best treatment. Similar results were had also been obtained by D.K. Samadia et al. [21], Kumar et al. [8], Padmakshi Thakur et al. [10], Kumar et al. [22] and Mishra et al. [13], Poornima singh et al. [23] in Bottle gourd.

3.1.10 Vine length (cm) in different hybrid genotypes of bottle gourd

The Vine length in different genotypes of bottle gourd was recorded and the minimum vine length was recorded in the hybrid AVT-II 2019/BOGHYB-1 (270.9) and maximum vine length was recorded in the hybrid AVT-II 2019/BOGHYB-3(554.7) followed by the hybrid AVT II 2019/BOGHYB-7 (464.1). The improvement in vine length might be due to local conditions, genetic characters, higher nutrients utilization efficiency, enhanced photosynthetic and other metabolic activities which lead to increase in various plant metabolites responsible for cell division and cell elongation. The variation in vine length might be due to specific genetic makeup of different genotypes, inherent properties and vigour to crop. The variations of vine length in bottle gourd have also reported by Thakur et al. [15] Padmakshi Thakur et al. [10], Kunjam et al. [12] in Bottle gourd.

3.2 Yield Parameters

3.2.1 Number of fruits per plant in different hybrid genotypes of bottle gourd

The Number of fruits per plant in different genotypes of bottle gourd was recorded, and the minimum number of fruits per plant was recorded in the hybrid AVT-II 2019/BOGHYB-5 (9.7) and maximum number of fruits per plant was recorded in the hybrid SARITA (12.7) followed by the hybrid AVT-II 2019/BOGHYB-7 (11.3). The variation is due to the inherent character and genetic makeup of the varieties, higher uptake of nutrient and environmental conditions. The results are conformity with the findings of [24] and similar, findings are seen in [11], Padmakshi Thakur et al. [10] and [20].

3.2.2 Average fruit weight (g) in different hybrid genotypes of bottle gourd

A considerable variation in fruit weight was observed, according to the data shown below. The minimum average fruit weight was recorded in the hybrid AVT-II 2019/BOGHYB-5 (417.4) and maximum Average fruit weight was recorded in the hybrid ARMAN (752.2) followed by the hybrid AVT II 2019/BOGHYB-2 (440.5). The large variance in fruit weight might be attributed to fruit set %, fruit length, number of fruits per vine, and fruit width, genetic origin, environmental influence, crop vigour, and increased nutrient uptake. The findings were supported by Husnan

et al. (2013), Damor et al. [25], Kumar et al [22], and Mishra et al. [13], [11], Padmakshi Thakur et al. [10] also reported more or less similar results in Bottle gourd.

3.2.3 Fruit length (cm) in different hybrid genotypes of Bottle gourd

The Fruit length in different genotypes of bottle gourd was recorded, Significantly The minimum fruit length was recorded in the hybrid AVT II 2019 BOGHYB-4 (27.0) and maximum fruit length was recorded in the hybrid AVT II 2019/BOGHYB-3 (39.9) followed by the hybrid ARMAN (38.7). The length of fruit is one of the major factors for deciding the yield of the crop. The variation in fruits per vine might have been due to internodal length, sex ratio, fruit set percentage, genetic nature and their response to varying environmental conditions and higher uptake of nutrient. The results are in agreement with the finding of Kumar et al. [8], Kumar et al. [22], [11], Padmakshi Thakur et al. [10] and Mishra et al. [13] in Bottle gourd.

3.2.4 Fruit diameter (cm) in different hybrid genotypes of Bottle gourd

According to the data presented below, The minimum fruit diameter was recorded in the hybrid AVT-II 2019/BOGHYB-2 (8.8) and maximum fruit diameter was recorded in the hybrid AVT-II 2019/BOGHYB-4 (10.1) followed by the hybrid SARITA (9.8). The diameter of fruits may be due to its hybrid vigour and adoptability to Prayagraj agro- climatic conditions. Similar results have been reported Husnan et al. (2013), Damor et al [25], Kumar et al [22], [11], Padmakshi Thakur et al. [10] and Mishra et al [13] in Bottle gourd.

3.2.5 Yield per plant (kg/plant) in different hybrid genotypes of bottle gourd

According to the data, there was a significant difference among the genotypes with regard to yield per plant. Significantly The minimum yield per plant was recorded in the hybrid AVT-II 2019/BOGHYB-5 (4.03) and maximum yield per plant was recorded in the hybrid SARITA (10.57) followed by the hybrid AVT-II 2019/BOGHYB-6 (6.56).Increasing of number of fruits per plant is mostly influenced by genetic factor, environmental factor, hormonal factor and vigour of the crop. The Fruits per plant is one of the major factors for deciding the yield of the crop. The variation in fruit per plant have been due to sex ratio and fruit set percentage. The results are in agreement with the finding of Sharma et al. (2013), Singh et al. (2017), [11], Padmakshi Thakur et al. [10] and Kunjam et al., [12] in Bottle gourd.

3.2.6 Yield per hectare (q/ha) in different hybrid genotypes of Bottle gourd

The minimum yield per hectare was recorded in the hybrid AVT-II 2019/BOGHYB-5 (179.10) and maximum yield per hectare was recorded in the hybrid SARITA (469.88) followed by the hybrid ARMAN (329.72). The higher yield per plant (kg) is due to its inherent characteristics, better adoptability for the environmental conditions and efficiently all available factors viz. water, nutrient, light and CO_2. None of the treatments significantly influenced the plant stand. The results are in agreement with the finding of Kamal et al. (2012), Shinde et al. [26], [11], Thakur et al. [10] and Deepthi et al. [9] in Bottle gourd.

Table 2. Cost benefit ratio

Hybrids	Fruit Yield (q/ha)	Gross return (INR/ha)	Cost of cultivation (INR/ha)	Net return (INR/ha)	Benefit Cost ratio
AVT-II 2019/BOGHYB-1	250.66	375989.1	149243	226746.1	1.5
AVT-II 2019/BOGHYB-2	209.19	313782	149243	164539	1.1
AVT-II 2019/BOGHYB-3	274.70	412052.1	149243	262809.1	1.8
AVT-II 2019/BOGHYB-4	207.58	311364.4	149243	162121.4	1.1
AVT-II 2019/BOGHYB-5	179.10	268648.7	149243	119405.7	0.8
AVT-II 2019/BOGHYB-6	291.43	437151.8	149243	287908.8	1.9
AVT-II 2019/BOGHYB-7	272.88	409323.5	149243	260080.5	1.7
SARITA (CHECK HYBRID)	469.88	704818.4	149243	555575.4	3.7
ARMAN (CHECK HYBRID)	329.72	494581.6	149243	345338.6	2.3

Table 3. Mean performance of bottle gourd hybrids on growth and floral parameters

Hybrids	Days to 2nd leaf stage	Days to 4th leaf stage	Vine length (cm)	Days to 1st male flower emergence	Days to 1st female flower emergence	Node at 1st male flower emergence	Node at 1st female flower emergence	Number of male flowers	Number of female flowers	Days to fruit picking	Sex ratio
AVT-II 2019/BOGHYB-1	13.9	19.9	270.9	46.8	58.47	12.8	15.8	35.8	15	60	2.4
AVT-II 2019/BOGHYB-2	14.7	20.7	321.1	49.27	61	9.9	13.5	39.1	15.7	59	2.5
AVT-II 2019/BOGHYB-3	14.8	20.8	554.7	52.07	62.67	9.7	17.7	39	15.3	64.3	2.5
AVT-II 2019/BOGHYB-4	15.1	21.1	350	48.27	62.8	10.5	14.1	32.5	15	56.3	2.2
AVT-II 2019/BOGHYB-5	15.3	21.3	436.3	45.93	61.2	9.9	17.9	36.5	14.7	57	2.5
AVT-II 2019/BOGHYB-6	14.7	20.7	372.3	49.8	59.33	12.9	16.9	35.1	15	59	2.4
AVT-II 2019/BOGHYB-7	14.9	20.9	464.1	48.6	61.07	9.9	12.6	35.5	16.3	59.3	2.2
SARITA (Check Hybrid)	16.9	22.9	363.6	45.93	63.33	10.5	17.4	35.1	17.7	60.7	2.2
ARMAN (Check Hybrid)	19.2	25.2	380.4	47	62.13	10.8	16.7	34.7	15	59.3	2.4
F TEST	**S**	**S**	**S**	**NS**	**NS**	**S**	**S**	**NS**	**NS**	**NS**	**NS**
SE.d (±)	**0.55**	**0.55**	**37.4**	**1.79**	**2.65**	**0.7**	**0.86**	**3.17**	**1.43**	**3.48**	**0.34**
CD @5%	**1.17**	**1.17**	**79.28**	**3.8**	**5.61**	**1.49**	**1.82**	**6.73**	**3.03**	**7.38**	**0.72**
CV	**4.38**	**3.16**	**11.73**	**4.56**	**5.29**	**8.01**	**6.65**	**10.81**	**11.28**	**7.18**	**17.55**

Table 4. Mean performance of bottle gourd hybrids on yield and quality parameter

Hybrids	Number of fruits per plant	Average Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Yield per plant (kg/plant)	Yield per hectare (q/ha)	TSS (° B)	Vitamin C (mg/100 g)
AVT-II 2019/BOGHYB-1	10	563.1	29.7	9.4	5.64	250.66	2.4	24
AVT-II 2019/BOGHYB-2	10.7	440.5	29.6	8.8	4.71	209.19	2.73	27.3
AVT-II 2019/BOGHYB-3	10.3	607.7	39.9	9.6	6.18	274.7	2.33	26
AVT-II 2019/BOGHYB-4	10	468.1	27	10.1	4.67	207.58	2.83	28
AVT-II 2019/BOGHYB-5	9.7	417.4	23.1	9.1	4.03	179.1	3.1	28.7
AVT-II 2019/BOGHYB-6	10	661.3	27.1	8.9	6.56	291.43	2.6	31.7
AVT-II 2019/BOGHYB-7	11.3	540.4	31.9	8.6	6.14	272.88	2.8	27.7
SARITA (Check Hybrid)	12.7	825.5	38.2	9.8	10.57	469.88	3.2	26.7
ARMAN (Check Hybrid)	10	752.2	38.7	9.1	7.42	329.72	2.6	29.7
F TEST	**NS**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
SE.d (±)	**1.43**	**87.51**	**2.63**	**0.32**	**1.6**	**71.1**	**0.14**	**0.72**
CD @5%	**3.03**	**185.51**	**5.58**	**0.68**	**3.39**	**150.73**	**0.3**	**1.54**
CV	**16.64**	**18.28**	**10.18**	**4.23**	**31.54**	**31.54**	**6.42**	**3.2**

3.2.7 TSS (^{O} B) in different hybrid genotypes of bottle gourd

The TSS (°B) in different genotypes of bottle gourd was recorded, significantly the minimum TSS was recorded in the hybrid AVT-II 2019/BOGHYB-3 (2.33) and maximum TSS was recorded in the hybrid SARITA (3.20) followed by the hybrid AVT-II 2019/BOGHYB-5 (3.10). The difference may be due to the inherent character and genetic makeup of the varieties and environmental conditions and the results are conformity with the finding of (Chaurasiya et al. 2016), [16] and [27].

3.2.8 Vitamin C (mg/100 g) in different hybrid genotypes of bottle gourd

The Vitamin C (mg/100 g) in different genotypes of bottle gourd was recorded, significantly The minimum Vitamin C content was recorded in the hybrid AVT-II 2019/BOGHYB-1 (24.0) and maximum Vitamin C content was recorded in the hybrid AVT-II 2019/BOGHYB-6 (31.7) followed by the hybrid ARMAN (29.7). The variation may be due to the inherent character and genetic makeup of the varieties and environmental conditions and the results are conformity with the finding of [16] and [27].

3.2.9 TSS (^{O} B) in different hybrid genotypes of bottle gourd

The TSS (°B) in different genotypes of bottle gourd was recorded, statistically analysed and presented in Table 4. Significantly the minimum TSS was recorded in the hybrid AVT-II 2019/BOGHYB-3 (2.33) and maximum TSS was recorded in the hybrid SARITA (3.20) followed by the hybrid AVT-II 2019/BOGHYB-5 (3.10). The difference may be due to the inherent character and genetic makeup of the varieties and environmental conditions and the results are conformity with the finding of [16] and [27].

3.3 Economic Analysis in Various Hybrid Genotypes of Bottle Gourd

The maximum gross return hectare was obtained by hybrid SARITA i.e., 704818.4 INR and followed by hybrid ARMAN i.e., 494581.6 INR and the minimum gross return hectare was obtained by AVT-II 2019/BOGHYB-5 i.e., 264648.7 INR. The maximum net income per hectare was obtained by hybrid SARITA i.e., 555575.4 INR and followed by hybrid ARMAN i.e., 345338.6 INR and the minimum gross return hectare was obtained by AVT-II 2019/BOGHYB-5 i.e., 119405.7 INR. Among the different bottle gourd hybrid genotypes, hybrid SARITA has the highest cost benefit ratio (3.7) followed by hybrid ARMAN i.e. (2.3) and the minimum cost benefit ratio was showed by AVT-II 2019/BOGHYB-5 i.e. (0.8).

4. CONCLUSION

The study concluded that the Bottle gourd hybrid SARITA was found to be superior to other hybrid genotypes, and recorded maximum number of female flowers (17.7) and number of fruits per plant (12.7 fruits), average yield per plant (10.57 kg/plant), average yield per hectare (469.88 q/ha) and TSS (3.2 ^{o}B) and also was found more productive and economically viable, yielding a benefit - cost ratio of 3.7.

Therefore, from the results of research, bottle gourd hybrid SARITA was found superior from various other hybrid genotypes used in the research and therefore it can be recommended for the cultivation in Prayagraj agro-climatic condition for growth, quality and yield of bottle gourd.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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