

Performance of Bottle gourd (*Lagenaria siceraria* L.) genotypes for yield and quality under climatic conditions of Prayagraj

Abstract

An experiment on the “Performance of Bottle Gourd Genotypes *i.e.* (AVT-II/2019/BOGVAR-1, AVT-II/2019/BOGVAR-2, AVT-II/2019/BOGVAR-3, AVT-II/2019/BOGVA-4, AVT-II/2019/BOGVA-5, AVT-II/2019/BOGVAR-6 RITURAJ (CHECK), GREENINDIA (CHECK), NATIONAL AGRO (CHECK), SHANKAR (CHECK) for yield and quality under climatic conditions of prayagraj” 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 experiment was conducted in Randomized block design, with three replications. The genotype AVT-II/2019/BOGVAR-6 recorded maximum number of female flowers (15.66), number of fruits/plant (8.88 fruits), average yield per plant (5.71 kg/plant), yield per hectare (342.44 q/ha).

Keywords: Performance, genotypes, bottle gourd (*Lagenaria siceraria* L.)

Introduction

“Bottle gourd [*Lagenaria siceraria* L.], also called white- flowered gourd ($2n=2x=22$) 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. Its primary centre of origin is Africa. 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, 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”. [26]

“The seeds are rich in essential amino acids, minerals, lipids and fatty acids (Essien *et al.*, 2013) and are also used for oil extraction. 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 fruit make delicious supplement to the human diet and 100 g of fruits contain nearly 96 g water, 0.2g protein, 0.1g fat, 2.5g carbohydrate, 0.6g

fiber, 0.5g minerals, 20mg calcium, 10mg phosphorus, 0.7mg iron, 0.3mg thiamine, 0.01 mg riboflavin and 0.2 mg niacin and energy 1.2 cal. The seeds are good sources of lipids and proteins and it contains 45% oil and 35 % protein.

Materials and Method

Experimental Site

A field experiment was conducted during February 2022 to May 2022. Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.).

Experimental Material

The experiment was laid out in randomized block design with 3 replications. “Bottle gourd AVT Genotypes varieties was transplanted in the field at a spacing of 250 cm x 60 cm in the plot of 7.5 m x 3 m size. Recommended dose of fertilizers *i.e.*, 250:100:100 @ N: P2O5: K2O kg /ha. Normal cultural practices and plant protection measures were followed during the cultivation process. Plants were selected at random from each plot of each variety as representative sample for recording the data”. [27]

Statistical Analysis

“The data recorded during the course of investigation were subjected to statistical analysis as per method of analysis of variance” (Fisher, 1950). The significance and non-significance of the treatment effect were judged with the help of ‘f’ value (variance ratio) was compared with the table value at 0.05% level of significance.

Table 1: List of genotypes [27]

| Genotypes | Notation | Source |
|------------------------|----------|----------------------------|
| AVT-II/2019/BOGVAR – 1 | G1 | IIVR VARANASI |
| AVT-II/2019/BOGVAR – 2 | G2 | IIVR VARANASI |
| AVT-II/2019/BOGVAR – 3 | G3 | IIVR VARANASI |
| AVT-II/2019/BOGVAR – 4 | G4 | IIVR VARANASI |
| AVT-II/2019/BOGVAR – 5 | G5 | IIVR VARANASI |
| AVT-II/2019/BOGVAR – 6 | G6 | IIVR VARANASI |
| RITURAJ (Check) | G7 | UNIQUE HYBRID SEED |
| GREEN INDIA (Check) | G8 | GREEN INDIA HYBRID SEED |
| NATIONAL AGRO (Check) | G9 | NAHS |
| SHANKAR (Check) | G10 | SHANKAR SEED COMPANY |

Results and Discussion

Number of male flowers

The maximum number of male flowers was recorded in the genotype G6 (29.66) followed by the G4 (27.66) and minimum number of male flowers was recorded in the genotype G10 (CHECK VARIETY) (20.33). The results are conformity with the findings of Daryono *et al.*, (2018), Thakur *et al.*, (2015).

Number of female flowers

The maximum number of female flowers was recorded in the genotype G6 (15.66) followed by the G5 (13.00) and minimum number of female flowers was recorded in the genotype G1 (8.33). 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.*, (2012), Thakur *et al.*, (2015), Singh, *et al.*, (2020).

Sex Ratio

The maximum male: female flowers ratio was recorded in the genotype G2 (2.78) followed by the G1 (2.76) and minimum male: female flowers ratio was recorded in the genotype G10 (CHECK VARIETY) (1.74). Similar result for ratio of male: female flower had been reported by Nalawade *et al.*, (2011), Harika *et al.*, (2012), Muralidharan *et al.*,

(2014), Uddin *et al.*, (2014), Rambabu *et al.*, (2017), Husna *et al.*, (2011) in Bottle gourd.

Number of fruits per plant

The maximum number of fruits per plant was recorded in the genotype G6 (8.88) followed by the G7 (CHECK VARIETY) (7.63) and minimum number of fruits per plant was recorded in the genotype G10 (CHECK VARIETY) (4.33). The results are conformity with the findings of (Kumar *et al.*, 2020), and similar, findings are seen in (Kumar *et al.*, 2018), Thakur *et al.*, (2015) and (Husna *et al.*, 2011).

Yield per plant (kg)

The maximum yield per plant was recorded in the genotype G6 (5.71) followed by the G8 (CHECK VARIETY) (5.29) and minimum yield per plant was recorded in the genotype G1 (1.69). The results are in agreement with the finding of Sharma *et al.* (2013), Singh *et al.* (2017), (Kumar *et al.* 2018), Thakur *et al.* (2015) and Kunjam *et al.*, (2019) in Bottle gourd.

Yield per hectare (q)

INDIA (CHECK VARIETY) (317.4) and minimum yield per hectare was recorded in the genotype G1 (101.4). The results are in agreement with the finding of Kamal *et al.*, (2012), Shinde *et al.*, (2014), (Kumar *et al.*, 2018), Thakur *et al.*, (2015) and Deepthi *et al.*, (2016) in Bottle gourd. The maximum yield per hectare was recorded in the genotype G6 (342.44).

Average Fruit weight (g):

The maximum average fruit weight was recorded in the genotype G8 (CHECK VARIETY) (1136.3) followed by the G10 (CHECK VARIETY) (1006.00) and minimum average fruit weight was recorded in the genotype G1 (364.00). The findings were supported by Husnan *et al.*, (2013), Damor *et al.*, (2016), Kumar *et al.*, (2018), and Mishra *et al.*, (2019), (Kumar *et al.*, 2018), Thakur *et al.*, (2015) reported similar results in Bottle gourd.

Fruit length (cm):

The maximum fruit length was recorded in the genotype G8 (CHECK VARIETY) (39.00) followed by the G10 (CHECK VARIETY) (38.00) and minimum fruit length was recorded in the genotype G4 (12.00). The results are in agreement with the finding of Kumar *et al.*, (2011), Kumar *et al.*, (2018), (Kumar *et al.*, 2018), Thakur *et al.*,

(2015) and Mishra *et al.*, (2019) in Bottle gourd.

Fruit diameter (cm):

The maximum fruit diameter was recorded in the genotype G4 (13.00) followed by the G5 (12.00) and minimum fruit diameter was recorded in the genotype G1 (5.02). Similar results have been reported Husnan *et al.*, (2013), Damor *et al.*, (2016), Kumar *et al.*, (2018), (Kumar *et al.*, 2018), Thakur *et al.*, (2015) and Mishra *et al.*, (2019) in Bottle gourd.

Net return

The maximum net income per hectare was obtained by G6 i.e., 403218 INR and followed by G8 (CHECK) i.e., 365658 INR and the minimum net return per hectare was obtained by G6 i.e., 41658 INR.

Net return

Among the different Bottle gourd genotypes G6 has the highest benefit cost ratio (4.6) followed by G8 (CHECK) i.e. (4.3) and the minimum benefit cost ratio was shown by G1 i.e. (1.3).

Table 2: Genotypes evaluation of bottle gourd with respect to Yield parameters

| Genotype | Number of male flowers | Number of female flowers | Sex ratio | Number of fruits per plant | Yield per plant (kg/plant) | Yield per hectare (q/ha) | Average fruit weight (g) | Fruit diameter (cm) | Fruit length (cm) |
|-----------------------|------------------------|--------------------------|-----------|----------------------------|----------------------------|--------------------------|--------------------------|---------------------|-------------------|
| AVT-II/2019/BOGVAR-1 | 23.00 | 8.33 | 2.76 | 4.66 | 1.69 | 101.4 | 364.00 | 5.02 | 24 |
| AVT-II/2019/BOGVAR-2 | 26.00 | 9.83 | 2.78 | 5.77 | 2.75 | 165.00 | 478.00 | 5.09 | 27 |
| AVT-II/2019/BOGVAR-3 | 27.66 | 11.66 | 2.37 | 5.10 | 2.76 | 165.6 | 543.00 | 6.02 | 31 |
| AVT-II/2019/BOGVAR-4 | 27.66 | 12.00 | 2.3 | 6.18 | 3.66 | 219.6 | 593.00 | 13 | 12 |
| AVT-II/2019/BOGVAR-5 | 25.66 | 13.00 | 1.97 | 6.10 | 3.89 | 233.4 | 638.0 | 12 | 12.5 |
| AVT-II/2019/BOGVAR-6 | 29.66 | 15.66 | 1.89 | 11.21 | 7.24 | 434.44 | 646.0 | 5.05 | 36 |
| RITURAJ (Check) | 26.66 | 11.66 | 2.28 | 7.62 | 4.26 | 255.6 | 565.00 | 6.03 | 30 |
| GREEN INDIA (Check) | 25.33 | 12.00 | 2.11 | 4.66 | 5.29 | 317.4 | 1136.3 | 7.05 | 39 |
| NATIONAL AGRO (Check) | 22.64 | 8.66 | 2.61 | 4.86 | 3.76 | 225.6 | 775.00 | 7.09 | 33 |
| SHANKAR (Check) | 20.33 | 11.66 | 1.74 | 6.59 | 6.62 | 397.2 | 1006.0 | 7.02 | 38 |
| F-Test | S | S | S | S | S | S | S | S | S |
| SE.d(±) | 1.82 | 1.07 | 0.16 | 0.58 | 0.28 | 1.71 | 1.06 | 0.55 | 0.92 |
| C.D at 0.05% | 3.82 | 2.25 | 0.35 | 1.22 | 0.60 | 3.60 | 2.22 | 1.15 | 1.93 |
| C.V | 8.77 | 11.49 | 8.82 | 12.10 | 9.16 | 0.92 | 0.19 | 9.17 | 3.98 |

Fig 1: Performance of different genotypes of bottle gourd in terms of Number of male flowers (DAT)

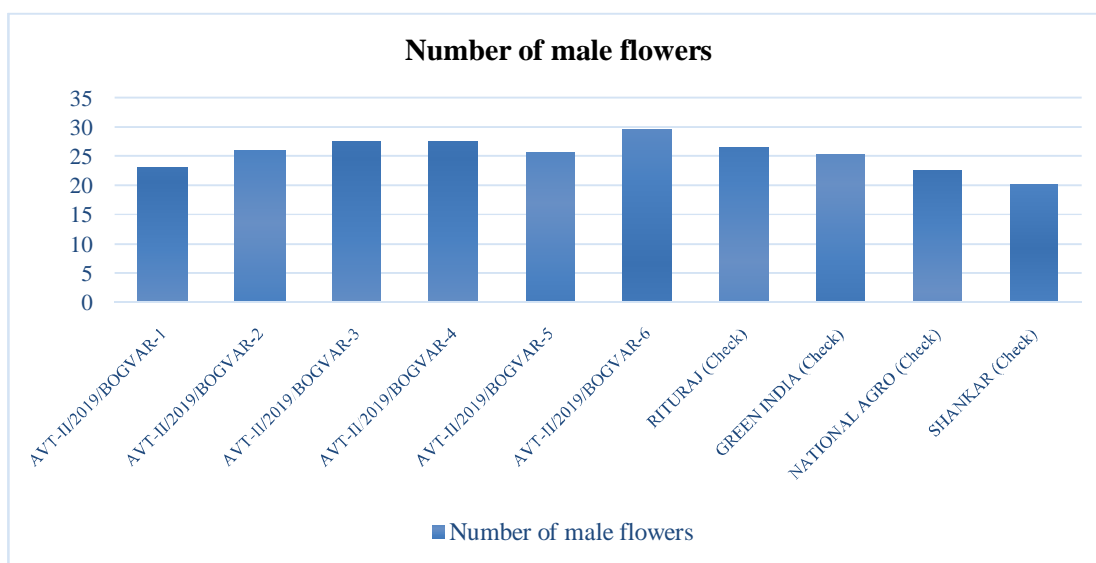


Fig 2: Performance of different genotypes of bottle gourd in terms of Number of female flowers (DAT)

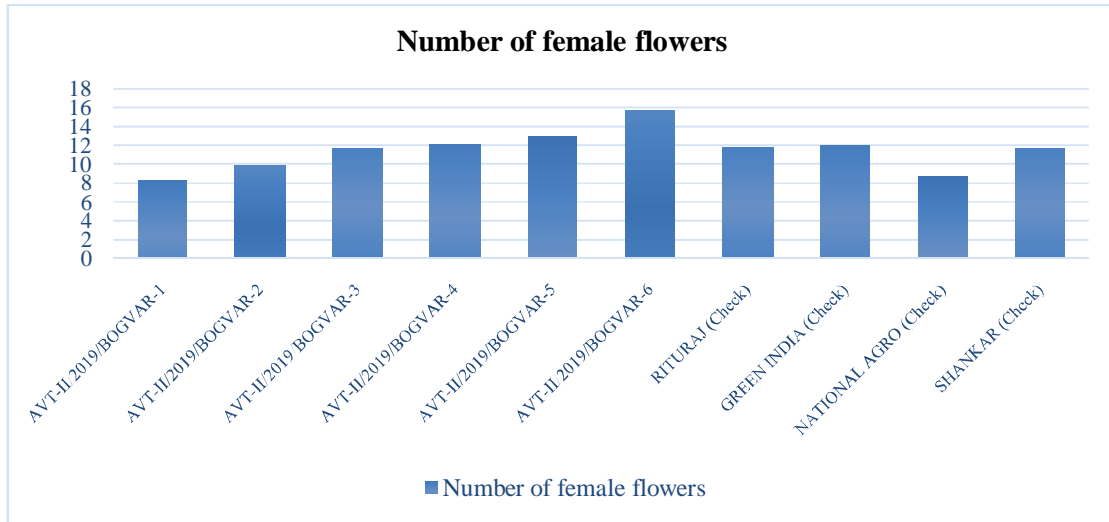


Fig 3: Performance of different genotypes of bottle gourd in terms of sex ratio

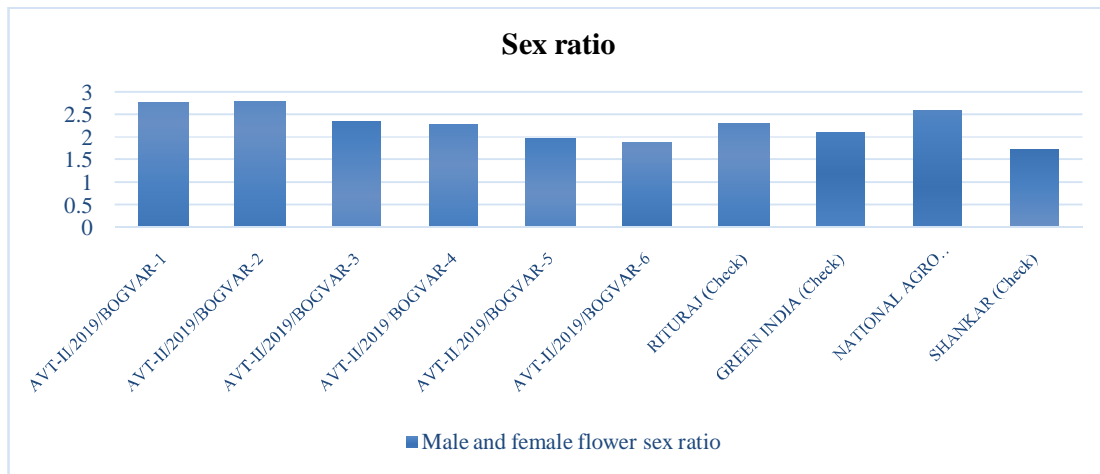


Fig 4: Performance of different genotypes of bottle gourd in terms of number of fruits per plant

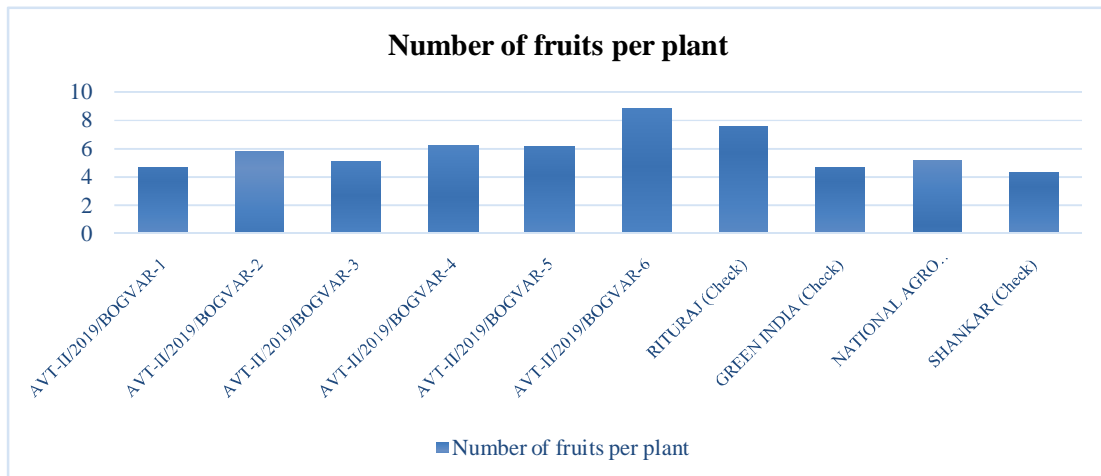


Fig 5: Performance of different genotypes of bottle gourd in terms of yield per plant (kg/ha)

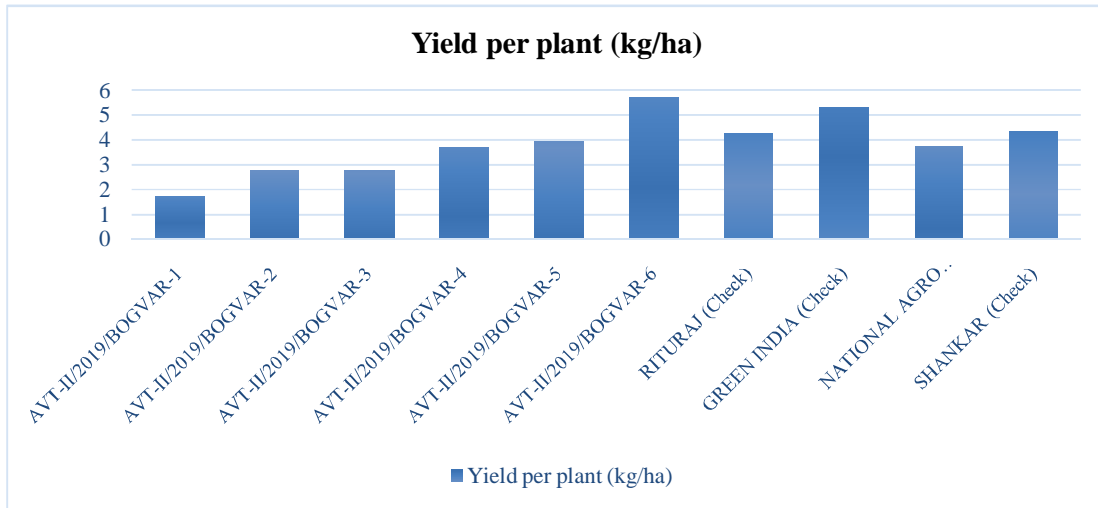


Fig 6: Performance of different genotypes of bottle gourd in terms of yield per hectare (q/ha)

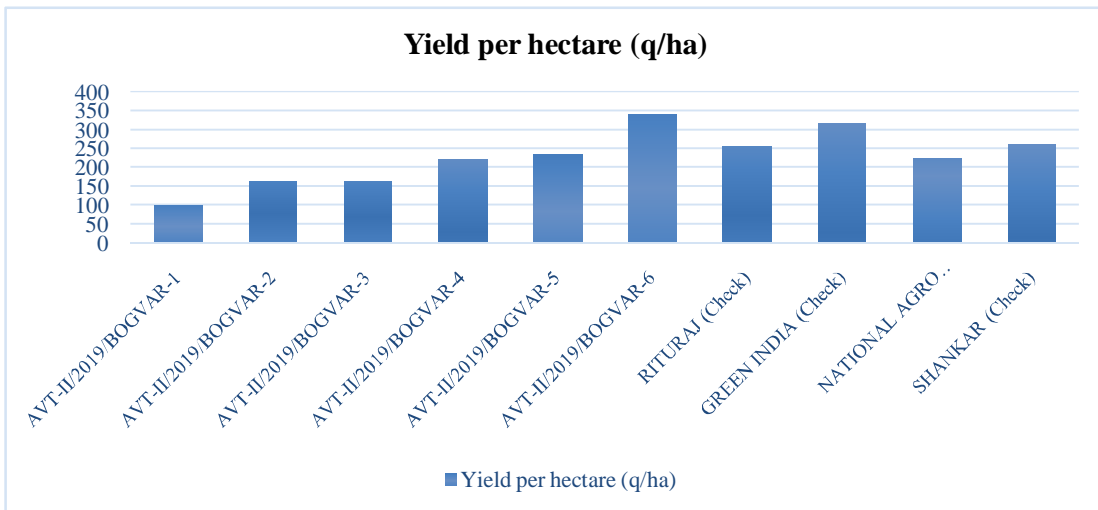


Fig 7: Performance of different genotypes of bottle gourd in terms of Fruit weight (g)

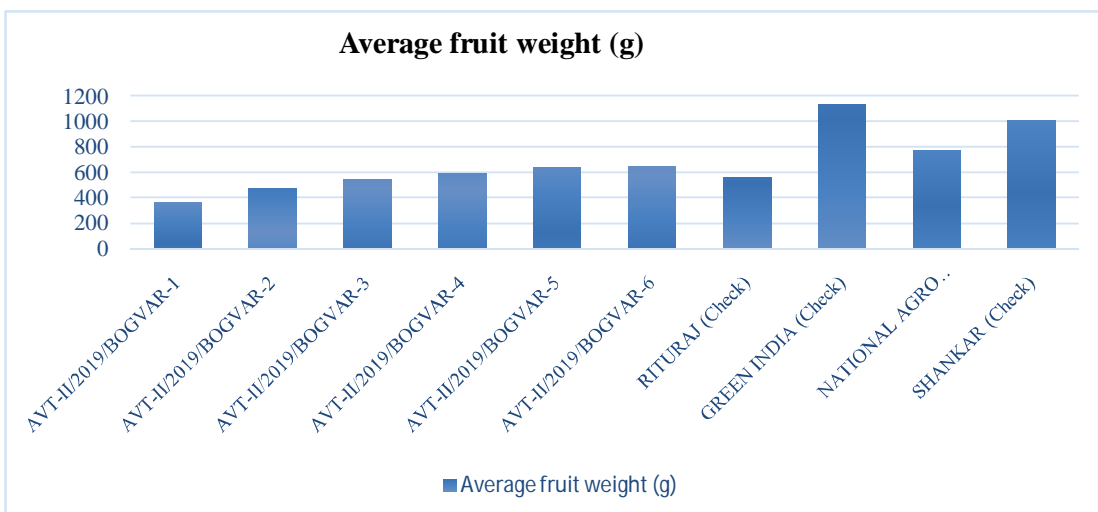


Fig 8: Performance of different genotypes of bottle gourd in terms of Fruit diameter (cm)

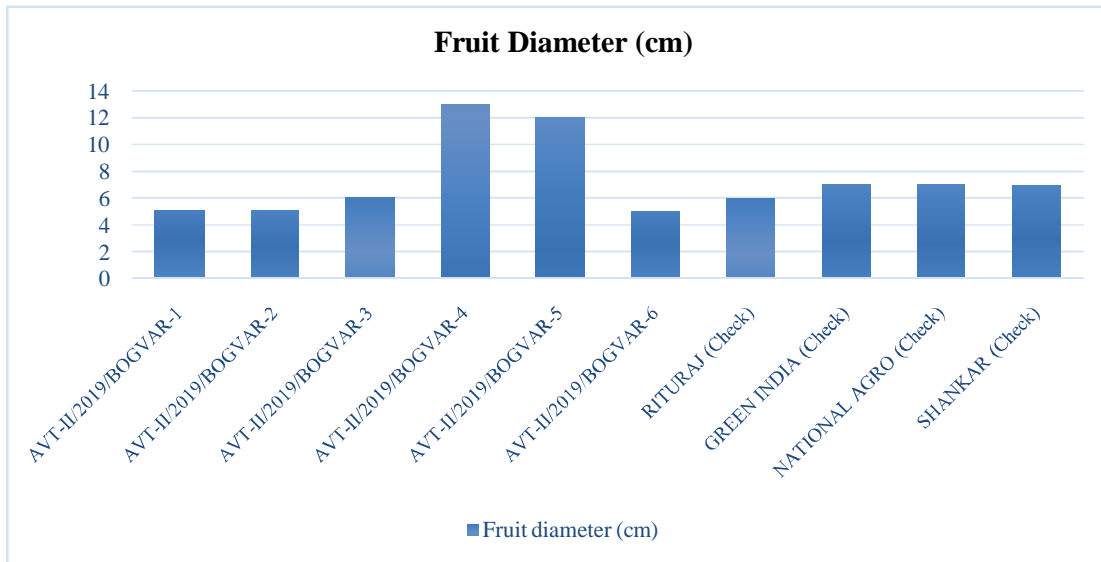
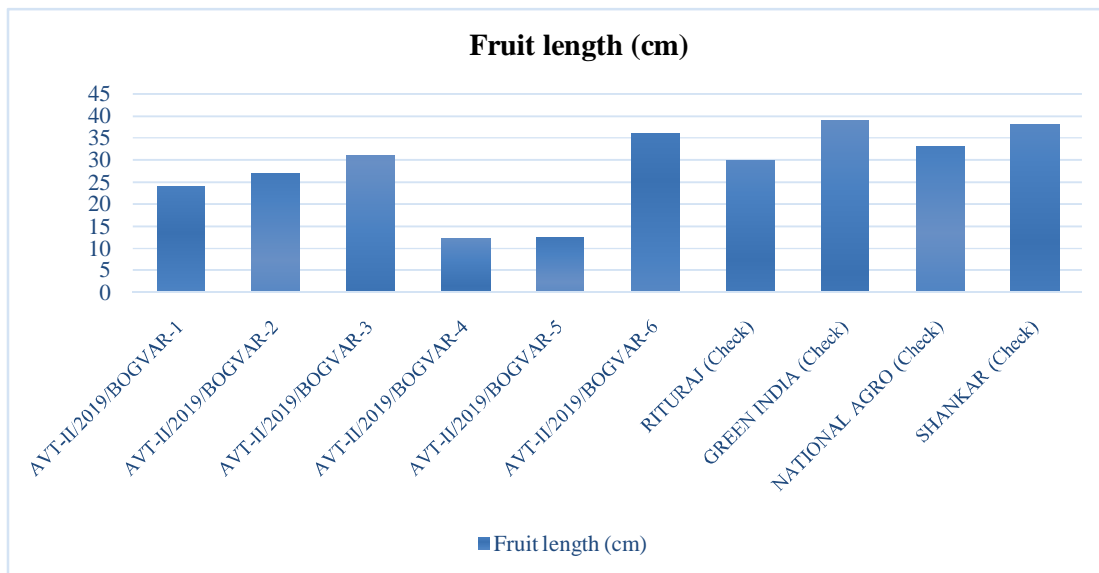


Fig 9: Performance of different genotypes of bottle gourd in terms of Fruit length (cm)



Conclusion

The current investigation determined that Bottle gourd Genotype AVT-II/2019/BOGVAR-6 was recorded maximum number of female flowers (15.66), number of fruits per plant(8.88fruits), average yield per plant (5.71kg/plant), average yield per hectare (342.44 q/ha), and maximum Benefit Cost ratio (4.6) which was found more productive and economically viable.

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