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Performance of different hybrids of bitter gourd (*Momordica charantia* L.) under Prayagraj agroclimatic condition

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Abstract
The present investigation entitled ''Performance of different hybrids of bitter gourd (*Momordica charantia* L.) under Prayagraj Agroclimatic condition." The experiment was laid out in Randomized Block Design consisting of 9 Varieties and 3 replications. The results concluded that growth parameters *viz*. Vine length 30 days (74.92) 60 days (112.80) 90 days (161.25 cm), Number of branches per plant (18.65), and yield attributes *viz*. individual fruit weight (70.48) was highest in AVT-3 fruit diameter (4.03) was highest in AVT-1 and fruit length (12.22) was highest in AVT-3 No. of fruits per plant (29.67) and Number of fruits per plot (118.67) and weight of fruit per plant(kg) (1.65) and weight of fruit per plot(kg) (6.61) yield of frits per hectare(t/h) (16.5) was recorded highest in AVT-6. Growth Parameters *viz*. TSS brix (7.93) was recorded highest in AVT-6 and Ascorbic acid (%) (2.07). Highest gross returns (1,68,892 Rs/ha), net return (1,20,192 Rs/ha) and Benefit cost ratio (2.46) was also recorded in highest in AVT-6.

Keywords: Bitter gourd, hybrid, agro-climatic conditions

Introduction
Bitter gourd (*Momordica charantia* L.) is an important commercial cucurbitaceous vegetable belonging to the family Cucurbitaceae, with a diploid chromosome number, 2n=22. It is variously known as balsam pear, bitter melon, bitter cucumber and African cucumber (Heiser, 1979) [8]. *Momordica* is a large genus with many species of annual and perennial climbers of which *Momordica charantia* L. is widely cultivated. The other species grown for their edible fruits are M. *dioica* (kakrol), *M. cochinchinensis* (sweet gourd), *M. tuberosa and M. balsamina* L (Balsam apple). Bitter gourd is highly cross pollinated due to monoecious.

The origin of bitter gourd is obscure. The centre of domestication likely lies in eastern Asia, possibly eastern India or southern China (Miniraj *et al*., 1993) [14]. However, there have been no archaeological reports of bitter gourd remains in China. Wild or small-fruited cultivated forms are mentioned in Ayurvedic texts written in Indian Sanskrit from 2000-200 BC by members of the Indo Aryan culture, indicating early cultivation of bitter gourd in India. It is believed to be native of Tropical Asia particularly East India and South China *i.e.*, Indo Burma centre of origin. Bitter gourd is widely distributed in China, Malaysia, India, Tropical Africa and North and South America.

F1 hybrids are popular in bitter gourd. Hybrids in most of the vegetable crops offer the opportunity of earliness, high yield, and quality improvement besides the better capacity to face biotic and abiotic stresses. Being a cross pollinated crop, it is easier to realize the heterosis as practically feasible phenomena in bitter gourd. F1 hybrids from the private sector are popular among farmers and white, long fruited types are ruling the market. The present investigation was undertaken to evaluate popular high yielding F1 hybrids of bitter gourd from public and private sectors. An investigation on the evaluation of popular high yielding F1 hybrids in bitter gourd from public (IARI, New Delhi) and private sector.

Varietal analysis techniques have been found to be the useful tools to obtain precise information about the types of gene actions involved in the expression of various traits and to predict the performance of the progenies in later segregating generations. Each variety has its own significant effect on yield and yield components as well as quality parameters of the crop *viz*., shape, size, colour, taste and pungency. The most important traits among others include, number of branches per plant (count), plant height, number of fruits per plant, days to maturity, fruit yield per plant, fruit length and single fruit weight (Lemma *et al*., 2008) [13].

Yield is dependent on varieties and varieties themselves are considerably depend on a number of factors. The factors accounting for variation in growth and yield of crop plants are very complex in nature. The performance of a cultivar in respect of growth and yield was known to be greatly influenced by the environmental conditions and the genetic potential.

Materials and Methods

An Experiment on Bitter gourd was conducted during February to May 2021, in Horticulture Research field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, and Technology & Sciences Prayagraj (U.P) India. The results of the investigation, regarding the performance of the 9 hybrids of Bitter gourd *i.e.* AVT-I 2019/BIGHYB-1, AVT-I 2019/BIGHYB-2, AVT-I 2019/BIGHYB-3, AVT-I 2019/BIGHYB-4, AVT-I 2019/BIGHYB-5, AVT-I 2019/BIGHYB-6, AVT-I 2019/BIGHYB-7, AVT-I 2019/BIGHYB-8, AVT-I 2019/BIGHYB-9, SHREE -151 (RICH GROW) obtained from different sources to find out the best performance in terms of growth and yield in Prayagraj agro climatic conditions. The experiment was conducted in Randomized Block design, were each hybrid replicated thrice. The mean (maximum and minimum) temperature was 37.98 ^{o}C and 24.21 ^{o}C respectively, mean (maximum and minimum) relative humidity was 82.16 percent and 45.26 percent during the crop growing season. The experimental soil was sandy loam in texture, nearly neutral in soil reaction (pH 7.1), low in organic carbon (0.318%), medium in available N (70 Kg/ha), medium available P (12.50 Kg/ha) and medium available K (216.10 Kg/ha). Fertilizers were applied in the form of urea, single super phosphate and murate of potash, respectively. The field beds were prepared and the seeds have been directly sown with respective spacing and covered by soil. The observation regarding yield were recorded after harvesting of crop.

Results and Discussions

Growth Parameters

Plant vine length (cm)

At 30 DAS, maximum vine length (74.92 cm) was recorded with hybrid of AVT-2, minimum vine length (41.63 cm) was recorded with local hybrid (check).

At 60 DAS, maximum vine length (112.80 cm) was recorded with hybrid of AVT-2, minimum vine length (78.60 cm) was recorded with local hybrid (check).

At 90 DAS, maximum vine length (161.25 cm) was recorded with hybrid of AVT-2, and Whereas, hybrid AVT-3 (153.83 cm) were at par with highest treatment. minimum vine length (124.23) was recorded with local hybrid (check).

Number of branches per plant

It is evident form the data that the differences Number of branches per plant were found to be significant. Maximum Number of branches per plant was recorded in hybrid AVT-6 (18.65).

Table 1: The minimum Number of branches per plant was recorded in hybrid AVT-2 (9.82)

Variety	Hybrid	Vine Length			Number of branches per plant
		(30DAS)	(60DAS)	(90DAS)	
V1	AVT -1	57.90	105.33	140.00	16.55
V2	AVT-2	74.92	112.80	161.25	9.82
V3	AVT-3	51.42	98.77	153.83	16.10
V4	AVT-4	62.00	104.91	151.83	14.63
V5	AVT-5	46.75	96.02	125.58	16.55
V6	AVT-6	58.99	106.26	151.67	18.65
V7	AVT-7	69.16	106.13	149.00	13.33
V8	AVT-8	46.03	89.20	139.25	11.10
V9	AVT-9	48.55	87.65	127.33	16.22
V10	Local hybrid(check-1)	41.63	78.60	124.23	7.32

Quality Parameters

Number of fruits per plant

It is evident form the data that the differences Number of fruits per plant were found to be significant. Maximum Number of fruits per plant was recorded in hybrid AVT-6 (29.67). hybrid AVT-9 were statistically at par with highest treatment.

The minimum Number of fruits per plant was recorded in hybrid AVT-1 (21.17).

Fruit length (cm)

It is evident form the data that the maximum fruit length were found to be Non-significant. maximum fruit length was recorded in hybrid AVT-5 (12.22 cm).

The minimum fruit length was recorded in hybrid AVT-1 (9.17 cm).

Fruit Diameter (cm)

It is evident form the data that the maximum fruit diameter were found to be significant. Maximum fruit diameter was recorded in hybrid AVT-1 (4.03). hybrid AVT-3 and AVT-6 and AVT-9 were statistically at par with highest treatment.

The minimum fruit diameter was recorded in hybrid local hybrid check (3.28 cm).

Individual fruit weight (g)

It is evident form the data that the maximum Individual fruit weight were found to be significant. Maximum Individual fruit weight was recorded in hybrid AVT-3 (70.48). hybrid AVT-1 were statistically at par with highest treatment.

The minimum Individual fruit weight was recorded in hybrid local hybrid check (36.83 cm).

Number of fruits per plot

It is evident form the data that the differences Number of fruits per plot were found to be significant. Maximum Number of fruits per plot was recorded in hybrid AVT-6 (118.67). hybrid AVT-9 and AVT-7 were statistically at par with highest treatment.

The minimum Number of fruits per plot was recorded in

hybrid AVT-1 (84.67).

Weight of fruit per plant (kg)

It is evident form the data that the differences weight of fruit per plant were found to be significant. Maximum weight of fruit per plant was recorded in hybrid AVT-6 (1.65). hybrid AVT-1, AVT-3, AVT-4, AVT-5, AVT-7 and AVT-9 were statistically at par with highest treatment.

The minimum weight of fruit per plant was recorded in local hybrid check (0.82).

Weight of fruit per plot (kg)

It is evident form the data that the differences weight of fruit per plot were found to be significant. Maximum weight of fruit per plot was recorded in hybrid AVT-6 (6.61). hybrid AVT-1, AVT-3, AVT-4, AVT-5, AVT-7 and AVT-9 were statistically at par with highest treatment.

The minimum weight of fruit per plant was recorded in hybrid AVT-8 (3.66).

Yield of fruits per hectare (t/h)

It is evident form the data that the Yield of fruits per hectare (t/h) were found to be significant. Maximum Yield of fruits per hectare (t/h) was recorded in hybrid AVT-6 (16.5). hybrid AVT-9 and AVT-7 were statistically at par with highest treatment.

Table 2: The minimum Number of fruits per plot was recorded in hybrid AVT-8 (9.14)

Variety	Hybrid	Number of fruits per plant	Fruit length (cm)	Fruit diameter(cm)	Individual fruit weight (g)	Number of fruits per plot	Weight of fruit per plant (kg)	Weight of fruit per plot (kg)	Yield of fruits per hectare (t/h)
V1	AVT -1	21.17	11.35	4.03	68.00	84.67	1.45	5.81	15.0
V2	AVT-2	22.25	11.78	3.73	46.06	89.00	1.04	4.16	10.3
V3	AVT-3	22.67	9.51	3.87	70.48	90.67	1.63	6.51	16.3
V4	AVT-4	25.33	9.64	3.50	60.16	101.33	1.53	6.11	15.2
V5	AVT-5	23.50	12.22	3.47	61.78	94.00	1.44	5.77	14.4
V6	AVT-6	29.67	9.22	3.82	55.28	118.67	1.65	6.61	16.5
V7	AVT-7	27.25	9.60	3.71	59.51	109.00	1.63	6.52	16.3
V8	AVT-8	24.33	11.50	3.61	36.74	97.33	0.92	3.66	9.14
V9	AVT-9	27.33	9.59	3.79	46.17	109.33	1.27	5.08	12.7
V10	Local Hybrid (check-1)	22.92	9.17	3.28	36.83	88.00	0.82	3.89	12.7

Summary and Conclusion

It is concluded that AVT-6 recorded highest in terms of growth, yield (16.5q/h), and quality fruit characteristics. Net returns and benefit cost ratio was best in the genotype AVT-6.

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