

DOI No.: <http://doi.org/10.53550/EEC.2023.v29i04s.058>

Performance of different hybrids of Bittergourd (*Momordica charantia* L.) for growth, yield and quality

Bijender¹ and Anita Kerketta²

**Department of Horticulture, Naini Agricultural Institute
Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P., India**

(Received 11 February, 2023; Accepted 25 April, 2023)

ABSTRACT

The trial was conducted at the Horticultural Research Farm (HRF), Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj during the *Zaid* season of 2022, to determine the "Performance of different hybrid of Bittergourd (*Momordica charantia* L.) The hybrid comprised of IET-1/2021/BIGHYB-1, IET-1/2021/BIGHYB-2, IET-1/2021/BIGHYB-3, IET-1/2021/BIGHYB-4, IET-1/2021/BIGHYB-5, IET-1/2021/BIGHYB-6, IET-1/2021/BIGHYB-7, Sagar and KSP-120. Based on the finding's hybrid IET-1/2021/BIGHYB-5 was found to be the best in terms of plant growth, early maturing, fruit yield, and quality like T.S.S.

Key words : Bittergourd, Varieties, Yield and Quality

Introduction

Botanically speaking *Momordica charantia*, commonly called bitter melon; Goya; bitter apple; Bitter gourd; bitter squash; balsam-pear; with many more names is a tropical and subtropical vine of the family Cucurbitaceae, widely grown in Asia, Africa, and the Caribbean for its edible fruit. Its many varieties differ substantially in the shape and bitterness of the fruit. An important horticultural crop Bitter gourd has the chromosome number $2n=2X=22$ and is a member of the Cucurbitaceae family (Mckay, 1930). It is a warm season crop grown mainly in sub-tropical and hot-arid regions. They receive some protection if grown in the winter because they are vulnerable to light frost. The ideal temperature range for the growth of vines is thought to be between 24 and 27 °C. Higher than 18 °C temperatures are ideal for seed germination. In India, 11.34 million metric tons of Bitter gourd will be produced in 2021–2022, on an area of 99 000 hectares. In terms of area and produc-

tion, Madhya Pradesh leads Chhattisgarh, Tamil Nadu, and Andhra Pradesh in 2021–2022. In Uttar Pradesh, there are 6.20 thousand hectares under cultivation, and production is anticipated to be 74.20 metric tons in 2021–22. (Source: NHB, Government of India, Ministry of Agriculture & Farmers Welfare, 2021–2022). In India, Bitter gourd is a common crop. In the climatic conditions of Uttar Pradesh, a few regional varieties have become more significant. For a breeding programme to be successful, a group of cultivars must be evaluated for their varietal composition. Thus, study was done to evaluate the best performing hybrid varieties compared to local variety. There are many good performing hybrids which are available in the market also. According to Prayagraj agro-climatic conditions -Bitter gourd can be grown successfully with higher yield.

Materials and Methods

The present investigation entitled was done to un-

derstand the plant growth, fruit yield and quality of fruit of different hybrids of bitter gourd. The details of the materials used, and the methods adopted in the investigation, trial carried out at Horticultural Research Farm (HRF), Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj during the *Zaid* season of 2022 are described under the following heads. The details of varieties and hybrid used are mentioned in table 1 and replicated thrice. Observations were recorded at different stages of growth periods. The data were statistically analyzed by the method suggested by Fisher and Yates, 1936.

Table 1. Details of Hybrids of Bitter gourd

Sr. No.	Hybrid Symbol	Hybrid Details	Hybrid/Varieties Sources
1	H ₁	IET-1/2021/BIGHYB-1	IIVR, Varanasi
2	H ₂	IET-1/2021/BIGHYB-2	
3	H ₃	IET-1/2021/BIGHYB-3	
4	H ₄	IET-1/2021/BIGHYB-4	
5	H ₅	IET-1/2021/BIGHYB-5	
6	H ₆	IET-1/2021/BIGHYB-6	
7	H ₇	IET-1/2021/BIGHYB-7	
8	H ₈	Sagar	VNR Seed
9	H ₉	KSP 120	Kalash Seed

Results and Discussion

The results pertaining to the performance of different hybrids of bitter gourd for different parameters studied are presented in Table 2.

Growth Parameters

Days to germination and Vine length (m)

The maximum days to germination (6.00 days) was observed with KSP 120 followed IET-1/2021/BIGHYB-7 and Sagar with 5.33 days. Minimum days to germination (3.67 days) was observed IET-1/2021/BIGHYB-1 while the remaining hybrid were moderate in their growth habit. IET-1/2021/BIGHYB-5 had the longest vines (4.52 m) when they were harvested, followed by IET-1/2021/BIGHYB-4 (4.20 m). IET-1/2021/BIGHYB-6 had the shortest vine length (3.12 m). Improved soil physical and chemical properties that result in an adequate supply of nutrients to the seeds that may have promoted germination rate are factors that affect the germination rate and vine growth. Similar findings

were reported by Harika *et al.*, (2012); Uddin *et al.*, (2014); Iqbal *et al.*, (2021) in bottle gourd and Singh *et al.*, (2016); Ramya *et al.*, (2020); Kumar and Topno (2022); Triveni *et al.*, (2022) in Bitter gourd.

Earliness parameters

Days to first male flowering, Days to first female flowering and Days to first fruit picking

IET-1/2021/BIGHYB-5 had the shortest days to first male flowering among the varieties, followed by IET-1/2021/BIGHYB-1 with a maximum of 33.00 days, and KSP 120 had the longest days to first male flowering, 38.33 days. Early days to first female flowering was seen in IET-1/2021/BIGHYB-5 with 35.39 days, followed by IET-1/2021/BIGHYB-4 with 39.20 days whereas late days to first female flowering 42.74 days was recorded in IET-1/2021/BIGHYB-7. IET-1/2021/BIGHYB-5 had the early days to first fruit picking among the hybrids and varieties sown, at 46.08 days, followed by IET-1/2021/BIGHYB-6 at 49.52 days. KSP 120 had the late days to first fruit picking, at 58.75 days. Earliness is one of the necessities of today's market scenario along with high yields. The availability proper nutrients and sunshine boosted the photosynthates that in turn boosted early reproductive phase of plant. The conformity with Harika *et al.*, (2012); Uddin *et al.*, (2014); Pandiyan *et al.*, (2021) in bottle gourd and Singh *et al.*, (2016); Ramya *et al.*, (2020); Kumar and Topno (2022); Triveni *et al.*, (2022) in Bitter gourd.

Fruit parameters

Number of fruits per plant, fruit length (cm), fruit diameter (mm) and fruit weight (g)

IET-1/2021/BIGHYB-5 had the most fruits per plant (30.22), IET-1/2021/BIGHYB-6 came in second with 29.25, and IET-1/2021/BIGHYB-7 had the fewest fruits per plant (25.13). The data contained in the Table 2 reveals that the weight of fruit was significantly different for different varieties. The maximum fruits weight 48.05 g were recorded in hybrid IET-1/2021/BIGHYB-5 followed by IET-1/2021/BIGHYB-6 i.e., 47.53 g and the minimum fruits weight (40.49 g) were observed in IET-1/2021/BIGHYB-2. IET-1/2021/BIGHYB-5 had the maximum fruits, measuring 13.82 cm, followed by IET-1/2021/BIGHYB-4, which had the minimum fruits, measuring 12.02 cm. KSP 120 had the longest fruits, measuring 9.63 cm. IET-1/2021/BIGHYB-5 produced fruits with a maximum diameter of 40.03 cm,

Table 2. Mean performance of different characters studied for different hybrids of Bitter gourd.

Hybrid Symbol	Hybrid details	Days to germination (DAS)	Vine length (m)	Days to 1 st male flowering	Days to 1 st female flowering	Days to 1 st fruit picking	No of fruits/plant	Fruit weight (g)	Fruit length (cm)	Fruit diameter (mm)	Fruit yield/plant (kg/plant)	Ascorbic acid content (mg/100g)	TSS [°Brix]
H ₁	IET-1/2021/BIGHYB-1	3.67	3.29	33.00	39.49	51.77	25.84	41.02	10.81	30.07	1.06	91.81	6.17
H ₂	IET-1/2021/BIGHYB-2	4.67	3.40	34.33	39.29	50.03	26.65	40.49	11.24	31.23	1.08	89	6.27
H ₃	IET-1/2021/BIGHYB-3	4.67	3.94	35.33	41.59	53.63	28.04	44.73	10.68	29.09	1.25	83.31	7.07
H ₄	IET-1/2021/BIGHYB-4	4.00	4.20	35.00	39.20	54.90	25.67	41.11	12.02	30.93	1.06	82.50	6.07
H ₅	IET-1/2021/BIGHYB-5	4.33	4.52	31.33	35.39	46.08	30.22	48.05	13.82	40.03	1.45	84.00	8.10
H ₆	IET-1/2021/BIGHYB-6	5.00	3.12	34.67	42.06	49.52	29.25	47.53	11.76	34.03	1.39	78.56	6.23
H ₇	IET-1/2021/BIGHYB-7	5.33	4.13	36.67	42.74	54.59	25.13	44.91	11.68	30.49	1.13	80.38	7.17
H ₈	Sagar	5.33	3.95	37.33	37.47	55.48	26.55	42.33	11.17	27.54	1.12	84.38	6.10
H ₉	KSP 120	6.00	4.18	38.33	37.80	58.75	26.01	43.84	9.63	29.33	1.14	84.83	7.10
	'F' Test	S	S	S	S	S	S	S	S	S	S	S	S
	C.D. at 5%	2.59	0.05	1.63	1.44	1.50	2.42	4.46	2.12	1.59	0.17	0.06	0.22
	S.E.(m)	0.52	0.02	0.76	0.48	0.49	0.80	1.47	0.70	0.53	0.06	0.02	0.07
	C. V.	18.59	0.74	2.66	2.09	1.62	5.13	5.83	10.64	2.89	8.47	0.04	1.87

followed by IET-1/2021/BIGHYB-6, which produced fruits with a diameter of 34.03 cm, and Sagar, whose fruits had the minimum diameter of 27.54 cm. Fruit weight and size and shape directly contribute to yield per plants. Weight of fruit directly depends on higher photosynthates produced that is stored in fruits too. These results are in close conformity with the findings of Quamruzzaman *et al.*, (2017); Uddin *et al.*, (2014); Iqbal *et al.*, (2021) in bottle gourd and Singh *et al.*, (2016); Ramya *et al.*, (2020); Kumar and Topno (2022); Triveni *et al.*, (2022) in Bitter gourd.

Fruit Yield per plant (kg/plant)

The hybrid IET-1/2021/BIGHYB-5 produced the most fruit per plant (1.45 kg/plant), followed by IET-1/2021/BIGHYB-6 (1.39 kg/plant cm), and IET-1/2021/BIGHYB-1 (1.06 kg/plant) produced the least fruit per plant. The complex quality of yield is directly influenced by the fruit’s weight, length, diameter, and number per plant. It is influenced by the age of the plant, as well as its height and number of leaves per plant, directly or even indirectly. These results are in close conformity with the findings of Quamruzzaman *et al.*,(2017); Uddin *et al.*, (2014); Pandiyan *et al.*, (2021) in bottle gourd and Singh *et al.*, (2016); Ramya *et al.*, (2020); Kumar and Topno (2022); Triveni *et al.*, (2022) in Bitter gourd.

Quality parameters

Ascorbic acid content (mg/100gm) and T.S.S. [°Brix]

IET-1/2021/BIGHYB-1 had the highest ascorbic acid content (91.81 mg/100 g), followed by IET-1/2021/BIGHYB-2 with 89 mg/100 g. In IET-1/2021/BIGHYB-6, the lowest ascorbic acid concentration (78.56 mg/100 g) was noted. IET-1/2021/BIGHYB-5 had the highest T.S.S. (8.10 °Brix), and IET-1/2021/BIGHYB-7 had the lowest (7.17 °Brix). IET-1/2021/BIGHYB-4 had the lowest T.S.S. (6.07 °Brix). These results are in close conformity with the findings of Quamruzzaman *et al.*, (2017); Uddin *et al.*, (2014); Pandiyan *et al.*, (2021) in bottle gourd and Singh *et al.*, (2016); Ramya *et al.*, (2020); Kumar and Topno (2022); Triveni *et al.*, (2022) in Bitter gourd.

Conclusion

From the above experimental finding it may be concluded that the hybrid of bitter gourd IET-1/2021/BIGHYB-5 was found to be best in the terms of

growth, yield and quality among different hybrid of bitter gourd. As a result, this hybrid is suitable for both commercial farming.

References

- Fisher, R. A. and Yates, F. 1963. Statistical Tables for Biological, Agricultural and Medical Research. *Oliver and Boyd, London*: 143 p.
- Harika, M., Gasti, V. D., Shantappa, T., Mulge, R., Shirol, A. M., Mastiholi, A. B. and Kulkarni, M. S. 2012. Evaluation of bottle gourd genotypes [*Lagenaria siceraria* (Mol.) Standl.] for various horticultural characters. *Karnataka Journal of Agricultural Science*. **25**(2): 241-244.
- Iqbal, M., Khalid, U., Muhammad, A., Shakeel, A. J., Muhammad, M. and Imran, K. 2021. Evaluation of Bottle Gourd Genotypes for Yield and Quality Traits. *Sarhad Journal of Agriculture*. **35**(1): 27-35.
- Kumar, P. R. and Topno, S. E. 2022. Performance of Bitter gourd (*Momordica charantia* L.) hybrids under Prayagraj Agro-climatic condition. *The Pharma Innovation Journal*. **11**(5): 2181-2184.
- McKay, J. W. 1930. Chromosome numbers in the Cucurbitaceae. *Botanical Gazette*. **89**: 416-417.
- NHB, (2021). nhb.gov.in/statistics/2020-21. Area and Production of Horticulture Crops- All India. Visited on 08/12/2022.
- Pandiyan, R., Pugalenth, R. and Sathyamurthy, V. A. 2021. Performance Evaluation of Vegetative Growth, Yield and Quality of Bottle Gourds (*Lagenaria siceraria* L.) All India Co-ordinated Vegetable Improvement Project (AICVIP) Varietal Trials (AVT-I). *Recent Progress in Microbiology and Biotechnology*. **5**: 85-90.
- Quamruzzaman, A. K. M., Rahman, M. M. and Akter, L. 2017. Performance of Bottle Gourd Lines in Bangladesh Condition. *Annals of Biological Sciences*. **5**(1): 5-7.
- Ramya, B., Kerketta, A. and Topno, S. E. 2020. Evaluation of Different Hybrids for Growth and Yield Attributes of Bitter gourd (*Momordica charantia* L.) in Prayagraj Region. *International Journal of Current Microbiology and Applied Sciences*. **9**(12): 1008-1012.
- Singh, U. K., Singh, D., Prasad, V. M., Hemant, K. and Umrao, R. 2016. Performance and capital use efficiency of Bitter gourd (*Momordica charantia* L.) genotypes in their production. *Research in Environment and Life Sciences*. **9**(6): 672-675.
- Triveni, D., Priyadarshani, P. M., Pramanik, K., Mounica, N. and Rani, S. R. 2020. Mean performance study of ridge gourd (*Luffa acutangula* (L.) Genotypes based on some quantitative and qualitative characters. *Journal of Pharmacognosy and Phytochemistry*. **9**(4): 298-300.
- Triveni, D., Jyothi, K. U., Dorajee, R. A. V. D., Mamatha, K., Krishna, K. U. and Saloomi, D. R. S. 2022. Performance of genotypes for yield and its contributing traits in bitter gourd (*Momordica charantia* L.) under Godavari zone. *Vegetos*. **35**: 782-787.
- Uddin, A. F. M. J., Tahidul, M. I., Chowdhury, M. H. N., Shiam, I. H., Mehraj, H. 2014. Evaluation of bottle gourd (*Lagenaria siceraria*) to growth and yield. *International Journal of Biosciences*. **5**(12): 7-11.