International Journal of Environment and Climate Change

Volume 13, Issue 10, Page 1194-1199, 2023; Article no.IJECC.105127
ISSN: 2581-8627
(Past name: British Journal of Environment & Climate Change, Past ISSN: 2231–4784)

Evaluation of Different Varieties of Sponge Gourd under Prayagraj Agro Climatic Conditions

Jajali Akhila [a++*], Samir E. Topno [a#] and Vijay Bahadur [a†]

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

Authors' contributions

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

Article Information

DOI: 10.9734/IJECC/2023/v13i102770

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/105127

Original Research Article

Received: 14/06/2023
Accepted: 22/08/2023
Published: 25/08/2023

ABSTRACT

The present investigation was carried out at the department of horticulture, Naini Agricultural institute Sam Higginbottom university of Agricultural Technology and Sciences, Prayagraj Uttar Pradesh during Zaid season-2021-2022 with a view to check Evaluation of different varieties of sponge gourd under Prayagraj Agro climatic conditions The experiment was laid in Randomized block design with 9 varieties and 3 replications for sponge gourd varietal evaluation. Varieties comprised of V_1 (AVT2020/SPGVAR-1), V_2 (AVT2020/SPGVAR-2), V_3 (AVT2020/SPGVAR-3), V_4 (AVT2020/SPGVAR-4), V_5 (AVT2020/SPGVAR -5), V_6 (AVT2020/SPGVAR -6), V_7 (AVT2020 /SPGVAR-7), V_8 (SUMAN) and V_9 (PUSA CHAKNI). Among the various vartieties it was concluded that the variety AVT2020/SPGVAR-6 performed best in terms of growth parameters like vine length (396.86 cm), earliness in maturity (55.95 days for first fruit picking) and yield parameters like fruit

[++] *P.G. Scholar;*
[#] *Assistant Professor;*
[†] *Associate Professor;*
**Corresponding author: E-mail: jajaliakhila@gmail.com;*

length (28.56 cm), fruit diameter (3.71 cm), and fruit yield per hectare (12.64 t/ha). AVT2020/ SPGVAR-6 showed best performance for quality parameters also TSS (4.23°Brix) and Ascorbic acid content (10.66 mg/100g).

Keywords: Sponge gourd; ascorbic acid; TSS.

1. INTRODUCTION

Luffa is a genus of tropical and subtropical vines in the cucumber family (Cucurbitaceae). In everyday non-technical usage, the *Luffa*, usually refers to the fruits of the species *Luffa aegyptiaca, Luffa cylindrica* (Roem.) and *Luffa acutangula* (Roxb.). It is cultivated and eaten as a vegetable but must be harvested at a young stage of development to be edible. The vegetable is popular in India, China, and Vietnam. When the fruit is fully ripened, it is very fibrous. The fully developed fruit is the source of the scrubbing sponge which is used in bathrooms and kitchens. The botanical name of sponge gourd is *Luffa aegyptiaca* (Mill.). It is also commonly known by other names such as Egyptian cucumber, dishcloth gourd, or vegetable sponge. The mature fruit of the sponge gourd develops a fibrous network inside, which is used as a natural sponge for cleaning and scrubbing purposes.

Sponge gourd cultivation is widespread across India, and specific local varieties have gained significance, especially in the climatic conditions of Uttar Pradesh. Growing sponge gourd in Prayagraj faces challenges like adapting to the region's climate, ensuring well-drained and fertile soil, managing water supply, addressing pests and diseases, and maintaining proper pollination. Effective support structures, nutrient management, and weed control are vital. Localized solutions and proper harvesting timing are essential for a successful yield. Before initiating a successful breeding program, it is crucial to assess various cultivars within the group.

As a result, this study was conducted to compare the performance of the best hybrid varieties with the local ones. Notably, numerous high-performing varieties are readily available in the market. According to the agricultural and climatic conditions in Prayagraj, growing sponge gourd can be highly successful, leading to higher yields. Taking into consideration the information mentioned above, this present study focuses on evaluating different sponge gourd varieties specifically suited for the agro-climatic conditions in Prayagraj.

2. MATERIALS AND METHODS

The present investigation entitled was done to understand the plant growth, fruit yield and quality of fruit of different varieties of sponge gourd. The investigation was 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 *Kharif* season of 2022. The experiment was laid in Randomized block design with 9 varieties and 3 replications. Varieties comprised of V_1 (AVT2020/SPGVAR-1), V_2 (AVT2020/SPGVAR-2), V_3 (AVT2020/SP GVAR-3), V_4 (AVT2020/SPGVAR-4), V_5 (AVT2020/ SPGVAR -5), V_6 (AVT2020/SPGVAR -6), V_7 (AVT2020/ SPGVAR-7), V_8 (SUMAN) and V_9 (PUSA CHAKNI). Observations were recorded at different stages of growth for parameters like vine length, days to flower emergence, fruit length, fruit girth and yield per plot and quality parameters like TSS and vitamin C content. The data were statistically analysed by the method suggested by Fisher and Yates, [1].

3. RESULTS AND DISCUSSION

3.1 Vine Length (cm) and Number of Nodes

Among the different varieties maximum vine length (396.86 cm) was observed with AVT2020/ SPGVAR-6 followed AVT2020/ SPGVAR-5 with 376.47 cm. Minimum vine length (289.70) was observed AVT2020/SPGVAR-7. The difference in vine length among varieties can be explained by a blend of genetic elements and the surrounding environment. Varieties possessing genetic traits that encourage longer vines, like improved internode elongation or increased branching, tend to display greater vine length. Additionally, external factors such as sunlight exposure, temperature, and soil fertility play a role in vine growth. Varieties that are genetically

suited to specific environmental conditions or have been selectively bred for longer vine length are likely to exhibit superior vine elongation performance. Similar findings were reported by Rathore et al., [2]; Pongen et al., [3]; in sponge gourd; Quamruzzaman et al., [4] in bottle gourd; Ara et al., [5] in pointed gourd; Ramya et al., [6] in Bitter gourd.

Among the different varieties maximum number of nodes (46.00 nodes) was observed with AVT2020/SPGVAR-6 followed AVT2020/ SPGVAR-5 with 45.58. Minimum number of nodes (39.08 nodes) was observed AVT2020/ SPGVAR-7. The higher number of nodes in one variety of sponge gourd, compared to other varieties, can be attributed to a combination of genetic and environmental factors. This specific variety may possess genetic traits that promote enhanced branching and internode elongation, leading to more nodes. Additionally, favourable environmental conditions, such as ample sunlight, optimal temperature, and nutrient-rich soil, may further stimulate robust growth and node development. The cumulative effect of these genetic and environmental advantages results in the observed increase in the number of nodes, contributing to the overall superior performance of this particular sponge gourd variety. Similar findings were reported by Haque et al., [7] in snake gourd; Sangma et al., [8] in sponge gourd; Ara et al., [5] in pointed gourd; Ramya et al., [6] in Bitter gourd.

3.2 Days to Emergence of First Male Flower, Days to Emergence of First Female Flower and Days to First Fruit Picking

Among the different varieties minimum days to emergence of first male flower (30.89 days) was observed with AVT2020/SPGVAR-6 followed AVT2020/SPGVAR-1 with 33.15 days. Maximum days to emergence of first male flower (38.82 days) was observed AVT2020/SPGVAR-7. Among the different varieties minimum days to emergence of first female flower (36.84 days) was observed with AVT2020/SPGVAR-6 followed AVT2020/SPGVAR-3 with 37.29 days. Maximum days to emergence of first female flower (45.07 days) was observed AVT2020/SPGVAR-7. Among the different varieties minimum days to first fruit picking (55.95 days) was observed with AVT2020/ SPGVAR-6 followed AVT2020 /SPGVAR-5 with 57.33 days. Maximum days to first fruit picking (71.19 days) was observed AVT2020/SPGVAR-7. The better performance of one variety over another in terms of earliness in flowering and maturing can be attributed to genetic factors and environmental conditions. Varieties with genetic traits that promote early flowering, such as early maturation genes or shorter vegetative growth phases, can exhibit faster initiation of flowering and so maturing. Additionally, environmental factors such as temperature, photoperiod, and nutrient availability can influence flowering time. Varieties that are genetically predisposed to respond more favourably to the prevailing environmental conditions, or those that have been selectively bred for early flowering, may show superior performance in terms of early initiation of flowering and thus maturing too. The findings were reported similarly earlier by Quamruzzaman et al., [4] in bottle gourd and Phan et al., [9]; Reddy et al., [10] in sponge gourd; Ramya et al., [6] in Bitter gourd.

3.3 Number Fruits per Plant, Fruit Length, Fruit Diameter and Fruit Weight

Among the different varieties maximum number of fruits per plant (45.48 fruits) was observed with AVT2020/SPGVAR-6 followed AVT2020/ SPGVAR-5 with 44.44 fruits. Minimum number of fruits per plant (45.48 fruits) was observed AVT2020/SPGVAR-7. The better performance of one variety over another in terms of producing a higher number of fruits per plant can be attributed to genetic factors and environmental conditions [11-15]. Varieties with genetic traits that promote increased fruit set, such as higher flower-to-fruit conversion rates or enhanced reproductive capacity, can result in a greater number of fruits per plant. Additionally, environmental factors such as pollination efficiency, availability of nutrients and water, and optimal growing conditions can influence fruit production. Varieties that are genetically predisposed or have been selectively bred for higher fruit yield can demonstrate superior performance in terms of fruit quantity per plant. Similar conclusions were drawn earlier by Phan et al., [9]; Pongen et al., [3] in sponge gourd; Ara et al., [5] in pointed gourd; Ramya et al., [6] in Bitter gourd.

Among the different varieties maximum fruit length (28.56 cm) was observed with AVT2020/ SPGVAR-6 followed AVT2020/ SPGVAR-2 with 25.00 cm. Minimum fruit length (15.67 cm) was observed AVT2020/SPGVAR-7. Among the different varieties maximum fruit

Table 1. Performance of different varieties of sponge gourd for various growth and earliness parameters studied

Varieties Notation	Varieties details	Vine length (cm)	N of nodes	Days to emergence of first male flower	Days to emergence of first female flower	Days to first fruit picking	Number of fruits per plant
V_1	AVT2020/SPGVAR-1	320.26	41.21	33.15	40.99	66.56	32.00
V_2	AVT2020/SPGVAR-2	360.29	44.25	36.43	38.55	59.33	42.50
V_3	AVT2020/SPGVAR-3	341.25	43.41	34.46	37.29	64.52	41.50
V_4	AVT2020/SPGVAR-4	333.19	43.83	34.67	37.73	60.92	44.33
V_5	AVT2020/SPGVAR-5	376.47	45.58	35.32	38.14	57.33	44.44
V_6	AVT2020/SPGVAR-6	396.86	46.00	30.89	36.84	55.95	45.48
V_7	AVT2020/SPGVAR-7	289.70	39.08	38.82	45.07	71.19	33.75
V_8	SUMAN-8	333.19	44.41	34.28	43.47	70.81	37.20
V_9	PUSA CHAIKINI-9	326.52	43.42	34.12	44.10	71.19	35.00
'F' Test		S	S	S	S	S	S
SE (d)		1.41	1.41	1.08	0.87	2.60	0.84
C.D. at 5%		1.47	2.98	3.83	3.47	9.04	0.02
C. V.		2.77	3.19	2.33	0.87	5.34	0.12

Table 2. Performance of different varieties of sponge gourd for various yield and quality parameters studied

Varieties Notation	Varieties details	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Fruit yield per hectare (t/ha)	TSS [°Brix]	Vitamin C content (mg/100g)
V_1	AVT2020/SPGVAR-1	16.67	3.20	51.01	7.86	3.66	8.00
V_2	AVT2020/SPGVAR-2	25.00	3.50	52.22	10.38	4.15	11.00
V_3	AVT2020/SPGVAR-3	20.26	3.69	52.33	8.84	3.69	10.66
V_4	AVT2020/SPGVAR-4	20.63	3.43	52.36	9.38	4.02	9.00
V_5	AVT2020/SPGVAR-5	22.90	3.40	51.47	9.65	4.03	9.66
V_6	AVT2020/SPGVAR-6	28.56	3.71	52.81	12.64	4.23	11.66
V_7	AVT2020/SPGVAR-7	15.67	3.10	50.38	6.04	3.14	7.36
V_8	SUMAN-8	20.90	3.54	51.07	8.12	4.20	9.00
V_9	PUSA CHAIKINI-9	20.40	3.14	52.12	7.87	4.10	10.00
'F' Test		S	S	S	S	S	S
SE (d)		0.20	0.01	0.34	0.14	0.24	1.00
C.D. at 5%		0.43	0.01	12.39	0.30	0.50	12.90
C. V.		1.13	0.09	0.70	1.96	7.45	2.12

diameter (3.71 cm) was observed with AVT 2020/ SPGVAR-6 followed AVT 2020/SPGVAR-3 with 3.69 cm. Minimum fruit diameter (3.10 cm) was observed AVT 2020/SPGVAR-7. Among the different varieties maximum average fruit weight (52.81 g) was observed with AVT2020/SPGVAR-6 followed AVT2020/SPGVAR-4 with 52.26 g. Minimum average fruit weight (50.38 g) was observed AVT2020/SPGVAR-7. The better performance of one variety over another in terms of enhanced fruit length, diameter and weight can be attributed to genetic factors and environmental conditions [16-20]. Varieties with genetic traits that promote increased cell division and elongation in fruits can result in longer and larger fruits. Environmental factors such as optimal temperature, sunlight exposure, and nutrient availability can also influence fruit growth and development. Varieties that are genetically predisposed or have been selectively bred for longer and thicker fruits may demonstrate superior performance in terms of fruit length, diameter and weight. Similar conclusions were drawn earlier by Pongen et al*.,* [3] in sponge gourd; Ramya et al*.,* [6] in Bitter gourd.

3.4 Fruit Yield per Hectare (t/ha)

Among the different varieties maximum average fruit yield per hectare (12.64 t/ha) was observed with AVT2020/SPGVAR-6 followed AVT2020/ SPGVAR-2 with 10.38 t/ha. Minimum average fruit yield per hectare (6.04 t/ha) was observed AVT2020/SPGVAR-7. The better performance of one variety over another in terms of enhanced fruit yield can be attributed to genetic factors and environmental conditions. Varieties with genetic traits that promote higher flower-to-fruit conversion rates, increased branching, or enhanced reproductive capacity can result in a greater yield of fruits. Additionally, environmental factors such as pollination efficiency, availability of nutrients and water, and optimal growing conditions can significantly influence fruit production. Varieties that are genetically predisposed or have been selectively bred for higher fruit yield can demonstrate superior performance in terms of overall fruit production per plant. The findings were in accordance with earlier reports of Sangma et al*.,* [8]; Pongen et al*.,* [3] in sponge gourd; Ara et al*.,* [5] in pointed gourd.

3.5 T.S.S. [°Brix] and Ascorbic Acid Content (mg/100gm)

Among the different varieties maximum Total Soluble Solid (4.23°Brix) was observed with AVT2020/SPGVAR-6 followed Suman with 4.20°Brix. Minimum Total Soluble Solid (3.66°Brix) was observed AVT2020/SPGVAR-1. Among the different varieties maximum Ascorbic acid content (11.66 mg/100g) was observed with AVT2020/SPGVAR-6 followed AVT2020/ SPGVAR-3 with 10.66 mg/100g. Minimum Ascorbic acid content (7.36 mg/100g) was observed AVT2020/SPGVAR-7. The better performance of one variety over another in terms of better Ascorbic acid content can be attributed to genetic factors and environmental conditions. Varieties with genetic traits that promote higher Vitamin C synthesis and accumulation in fruits can result in increased Ascorbic acid content. Additionally, environmental factors such as sunlight exposure, temperature, and nutrient availability can influence the production of Vitamin C in fruits. Varieties that are genetically predisposed or have been selectively bred for higher Ascorbic acid content may demonstrate superior performance in terms of producing fruits with a better concentration of this essential nutrient. The findings were in accordance with earlier reports of Pongen et al*.,* [3] in sponge gourd; Ramya et al*.,* [6] in Bitter gourd.

4. CONCLUSION

From the above experimental finding it was concluded that the varieties AVT2020/SPGVAR-6 performed best in terms of growth parameters like vine length (396.86 cm), earliness in maturity (55.95 days for first fruit picking) and yield parameters like fruit length (28.56 cm), fruit diameter (3.71 cm), and fruit yield per hectare (12.64 t/ha). AVT2020/SPGVAR-6 showed best performance for quality parameters also TSS (4.23°Brix) and Ascorbic acid content (10.66 mg/100g).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Fisher RA, Yates F. Statistical tables for biological, agricultural and medical research. Oliver and Boyd, London. 1936;143.
2. Rathore JS, Collis JP, Singh G, Singh KR, Jat BL. Studies on genetic variability in sponge gourd (*Luffa acutangula* L. (Roxb.)) varietiess in allahabad agro-climate condition. International Journal of Current

Microbiology and Applied Sciences. 2017;6(2):317-338.
3. Pongen S, Kerketta A, Bahadur V. Evaluation of different hybrids for growth, yield and fruit quality in sponge gourd (*Luffa cylindrical* M. Roem). The Pharma Innovation Journal. 2021;10(11):1470-1472.
4. Quamruzzaman AKM, Rahman MM, Akter L. Performance of bottle gourd lines in Bangladesh condition. Annals of Biological Sciences. 2017;5(1):5-7.
5. Ara N, Moniruzzaman M, Rahman KS. Performance of hybrid lines of pointed gourd (*Trichosanthes dioica* Roxb) for yield and yield attributes. Bangladesh Journal Agricultural Research. 2018;43(3):383-393.
6. Ramya B, Kerketta A, Topno SE. 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. 2020;9(12):1008-1012.
7. Haque MM, Uddin MS, Mehraj H, Uddin JAFM. Evaluation of snake gourd (*Trichasanthes anguina* L.) test hybrids comparing with four popular checks. International Journal of Applied Science Biotechnology. 2014;2(4):525-528.
8. Sangma DA, Prasad VM, Wamiq M. Evaluation of sponge gourd (*Luffa cylindrica* L.) for fruit yield in Prayagraj Agro-climatic conditions. Journal of Pharmacognosy and Phytochemistry. 2021;9(6):1954-1956.
9. Phan TT, Truong HTH, Nguyen SCH, Nguyen TTT, Tran TV. Evaluation of promising sponge gourd (*Luffa cylindrical*) accessions in summer-autumn season 2014 in Thua Thien Hue. Journal of Agricultural Science and Technology A and B & Hue University Journal of Science. 2015;5:508-514.
10. Reddy MV, Patil MG, Suneetha C, Kandpal K. Evaluation of sponge gourd varieties and hybrids for yield and related traits. International Journal of Current Microbiology and Applied Sciences. 2019; 9:108-115.
11. Bagchi I. Food for thought Green 'Karela for Red china''The Times of India Archived from the orginal on 24 May 2013.
12. Bhavanasi S, Bahadur V, Kerketta A, Prasad VM. Performance of bottle gourd (*Lagenaria siceraria* L) varieties for growth, yield and quality. International Journal of Plant and soil science; 2022.
13. Bouyoucos GJ. Hydrometer method Improved for making particle size analysis of soils Agronomy Journal. 1962;54;464-465.
14. De Candolle A. Origin of cultivated plants. Hafner Publication Co., New York, (Reprint of 2nd edition; 1959.
15. Dangi SS, Bara BM, Chaurasia AK, Pal KA. Evaluation and characterization of cowpea (*Vigna unguiculata* L.Walp) Varieties for growth, yield and quality parameters in Prayagraj agro climatic region. International journal of current Microbiology and Applied Sciences. 2020; 9(10):3069-3079.
16. Directorate of Economics and statistics (2020-2021) Ministry of Agriculture &Farmers welfare (DAC&FW), Government of India 2020-2021.
17. McKay JW. Chromosome numbers in the Cucurbitaceae. Botanical Gazette. 1930; 89:416–417.
18. NHB. nhb.gov.in/statistics/2020-21. Area and Production of Horticulture Crops- All India. Visited on 08/12/2022.
19. Uddin AFMJ, Tahidul MI, Chowdhury MHN, Shiam IH, Mehraj H. Evaluation of bottle gourd (*Lagenaria siceraria*) to growth and yield. International Journal of Biosciences. 2014;5(12):7-11.
20. Vavilov NI. Origin and geography of cultivated plants. Archives of Natural History. 1935;21(1):142.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/105127