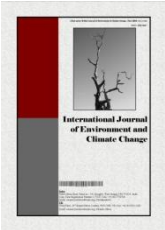

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Evaluation of Different Genotypes of Sponge Gourd (*Luffa cylindrica* M. Roem.) for Growth Yield and Fruit Quality in Prayagraj Agro-climatic Conditions

Shaik Gouse Mohiddin [aω*], Anita Kerketta [b#], Vijay Bahadur [b†], Samir E. Topno [b#], T. Sharon Priyanka [aω] and Shaik Abdul Khuddus Mohiddin [aω]

[a] Horticulture (Vegetable Science), SHUATS, Prayagraj, India.
[b] Department of Horticulture, SHUATS, Prayagraj, India.

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 was conducted to find out the best suitable genotypes of Sponge gourd in Prayagraj Agro-climatic conditions in the Vegetable Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences (SHUATS), Prayagraj (U.P.), during Zaid season of the year 2021. 22 genotypes including one check genotypes which are procured from Indian Institute of Vegetable Research center(IIVR),are evaluated and the experiment was laid out in randomized block design with three replications. The observations were recorded on growth, yield and Fruit quality. The results revealed that among all the IET/2020 SPGVAR-7 and AVT I/2019 SPGVAR-3 performed well in earliness parameters *viz.* Days to germination (6.69days),Days to first male flowering (51.533days), appearance of first male flower on node(3.6) and appearance of first female flower on node (7.81). In terms of vine Length maximum was recorded in AVT I/2019 SPGVAR 4 (4.9m). Fruit length was maximum in IET 2020 SPGVAR 3(25.7cm), Fruit Diameter was maximum in AVT I/2019 SPGVAR-5 (3.24cm). Weight of 5

[ω] Research Scholar, M.Sc.(Ag.);
[#] Assistant Professor;
[†] Associate Professor & Head;
**Corresponding author: E-mail: gousesk2022@gmail.com;*

fruits was maximum in IET/2020 SPGVAR-6 (129.4 grams). And among all the genotypes IET/2020 SPGVAR-4 performed will in yield parameters *viz.* Yield per plant (1.48kg) and yield per hectare (66.88 Quintals/hac).

Keywords: Growth; quality; yield and genotype.

1. INTRODUCTION

Sponge gourd [*Luffa cylindrica* M. Roem.] is an important vegetable crop having chromosomes (2n=26). It is an annual climbing plant and cross pollinated in nature. It is a member of the cucurbitaceous family. The main commercial production countries are China, Korea, India, Japan and Central America. In India the crop is widely grown in Uttar Pradesh, Bihar, West Bengal, Orissa, Assam, Andhra Pradesh and Kerala (Arya and Prakash, 2002). Sponge gourds are popularly cultivated for harvesting both of mature-green fruit and dry fruit because of its high nutrient value (Bor, 2006; Partap, 2012) and tough fibrous vascular system (Klemm, 2001; Mazali and Alves, 2005; Hassan, 2006). The vines of sponge gourd attain the height of 30 feet or more. The fruits of sponge gourd are cylindrical in shape and outer skin is smooth green. The fruit contains white inner flesh which is fibrous and have similar flavour to bitter melon [1,2]. The fruit attains the height of 1-2 feet. Fully ripened sponge gourd contains high fiber content which is used as cleansing agent and for making table mats, shoe-soles etc. The sponge gourd is also regarded as an important medicinal plant that needs to be conserved (Sutharshana, 2013). In the past, most of the research relating to commercial *luffa* production has been conducted in the tropical and subtropical climates of India [3-5]. Sponge gourd can be grown from tropical to subtropical climatic conditions and they thrive best in warm and humid conditions. It also grows best during the rainy season [6-8]. Only a few studies have been conducted in temperate climates. Therefore the existence of wide genetic variation in sponge gourd in hot arid areas provides ample scope for screening the best genotypes for specific traits [9-11].Therefore, an appraisal of genotypes for their variability with respect to growth and yield under different conditions is essential to improve the production [12-14]. Diversity in genotypes of vegetables and other crops developed by various research institutes is considerable importance in any crop improvement programme.

2. MATERIALS AND METHODS

The present investigation was carried out with 22 genotypes including one check variety of sponge gourd collected from Indian Institute of Vegetable Research Center. The experiment was conducted in randomized block design with three replications during zaid season of 2021, at Vegetable Research Farm, Department of Horticulture, SHUATS, Prayagraj (U.P.), India.

Table 1. List of genotypes of sponge gourd and their sources

S.No	Genotypes Symbol	Name of Genotypes	Source
1	G1	AVT II 2018 SPGVAR 1	IIVR VARANASI
2	G2	AVT II 2018 SPGVAR 2	IIVR VARANASI
3	G3	AVT II 2018 SPGVAR 3	IIVR VARANASI
4	G4	AVT II 2018 SPGVAR 4	IIVR VARANASI
5	G5	AVT II 2018 SPGVAR 5	IIVR VARANASI
6	G6	AVT II 2018 SPGVAR 6	IIVR VARANASI
7	G7	AVT II 2018 SPGVAR 8	IIVR VARANASI
8	G8	AVT I 2019 SPGVAR 1	IIVR VARANASI
9	G9	AVT I 2019 SPGVAR 3	IIVR VARANASI
10	G10	AVT I 2019 SPGVAR 4	IIVR VARANASI
11	G11	AVT I 2019 SPGVAR 5	IIVR VARANASI
12	G12	AVT I 2019 SPGVAR 6	IIVR VARANASI
13	G13	AVT I 2019 SPGVAR 7	IIVR VARANASI
14	G14	AVT I 2019 SPGVAR 8	IIVR VARANASI
15	G15	IET 2020 SPGVAR 1	IIVR VARANASI
16	G16	IET 2020 SPGVAR 2	IIVR VARANASI
17	G17	IET 2020 SPGVAR 3	IIVR VARANASI
18	G18	IET 2020 SPGVAR 4	IIVR VARANASI
19	G19	IET 2020 SPGVAR 5	IIVR VARANASI
20	G20	IET 2020 SPGVAR 6	IIVR VARANASI
21	G21	IET 2020 SPGVAR 7	IIVR VARANASI
22	G22	CHIKNI TURAI	VNR Seeds Pvt Ltd

3. RESULTS AND DISCUSSION

3.1 Days to Germination

Number of days to germination was varied from 6.69 to 10.85. The maximum days to germination was recorded in the genotype IET 2020 SPGVAR 7(10.85), followed by (10.62) in the genotype IET 2020 SPGVAR 6 and minimum days to germination (6.69) was recorded in the genotype AVT I 2019 SPGVAR 5,followed by (7.12) in AVT II 2018 SPGVAR 2. Similar findings were previously reported by Narayan [15].

3.2 Length of Main Vine (m)

The significant differences was observed in length of vine in different genotypes of sponge gourd, the maximum length of main vine was observed in AVT I 2019 SPGVAR 4 (4.9m) followed by (4.71m) in the genotype AVT I 2019 SPGVAR 6 and minimum length of main vine was observed in AVT II 2018 SPGVAR 5 (4.02m) followed by (4.20m) in the genotype AVT I 2019 SPGVAR 8. Similar findings were previously reported by Chauhan et al*.,* [16].

3.3 Days to First Appearance of Male Flower

The days to first appearance of male flower of different genotypes of sponge gourd are significantly varied from (55.46 to 51.53). The maximum days to first appearance of male flower in different genotypes sponge gourd was observed in AVT I 2019 SPGVAR 3 (55.46) followed by the genotype (55.4) AVT II 2018 SPGVAR 3 and (54.93) in genotypes IET 2020 SPGVAR 2 and minimum days to first appearance of male flower in different genotypes of sponge gourd was observed in the genotype AVT I 2019 SPGVAR 5 (51.53) followed by (52.3) in genotype CHIKNI TURAI. Similar findings were previously reported by Narayan [15].

3.4 Days to First Appearance of Female Flower

The days to first appearance of female flower in different genotypes of sponge gourd are significantly varied from (62.46 to 60.4). The maximum days to first appearance of female flower in different genotypes sponge gourd was observed in AVT I 2019 SPGVAR 3 (62.46) followed by the genotype (61.93) IET 2020 SPGVAR 2 and minimum days to first appearance of female flower in different genotypes of sponge gourd was observed in the genotypes AVT I 2019 SPGVAR 4 (60.4) followed by (60.6) in genotype AVT II 2018 SPGVAR 1.Similar findings were previously reported by Varalakshmi et al*.,* [17].

3.5 First Male Flower Appearance on Node

The first male flower appearance on node of different genotypes of sponge gourd are significantly varied from (5.8 to 3.6). The maximum node number at which first appearance of male flower in different genotypes sponge gourd was observed in IET 2020 SPGVAR 6 (5.8) followed by the genotype (5.45) IET 2020 SPGVAR 4 and minimum node number at which first appearance of male flower in different genotypes of sponge gourd was observed in the genotype AVT I 2019 SPGVAR 1 (3.6) followed by (3.7) in genotypeAVT II 2018 SPGVAR 6. Similar findings were previously reported by Narayan [18].

3.6 First Female Flower Appearance on Node

The first female flower appearance on node of different genotypes of sponge gourd are significantly varied from (10.13 to7.81). The maximum node on first appearance of female flower in different genotypes sponge gourd was observed in AVTII2019/ COPBVAR-6 (10.13) followed by the genotype (9.83) AVT I 2019 SPGVAR 7and minimum node at first appearance of female flower in different genotypes of sponge gourd was observed in the genotype AVT II 2018 SPGVAR 5 (7.81) followed by (8.15) in genotype IET 2020 SPGVAR 1. Similar findings were previously reported by Karrthick et al*.,* (2017).

3.7 Number of Days to First Harvest

Days to first harvest in different genotypes of sponge gourd varied from 70.5 to 75.6. The minimum number of days for first harvest was observed in AVT I 2019 SPGVAR 5 (70.5) followed by (71.16) AVT II 2018 SPGVAR 3 and maximum number of days for first harvest (75.6) IET 2020 SPGVAR 7 followed by AVT I 2019 SPGVAR 3(75.23). Similar findings were previously reported by Narayan (2019).

Table 2. Evaluation of different genotypes for the growth, yield and fruit quality of Sponge Gourd

S. no	Genotype	Days to germination	Length of Main vine (m)	1st Male Flower	1st Female Flower	1st Harvest	Fruit Length (cm)	Fruit Weight (g)	1st Male Flower on Node	1st Female Flower on Node	No. of Fruits/ plant	Fruit Diameter (cm)	Yield per plant in (Kg)	Yield per hectare in quintals (q)	Total Soluble Solids(°Brix)
T_1	AVT II 2018 SPGVAR 1	7.2	4.32	53.6	60.6	71.5	17.88	111.8	4.33	8.65	9.8	2.68	1.09	49.3	4.72
T_2	AVT II 2018 SPGVAR 2	7.12	4.36	54.33	61.33	71.36	18.3	112	4.23	8.73	10.6	3.09	1.18	53.42	4.65
T_3	AVT II 2018 SPGVAR 3	7.24	4.53	55.4	62.4	71.16	17.91	112	4.43	9.25	11.4	2.58	1.27	57.49	4.4
T_4	AVT II 2018 SPGVAR 4	9.95	4.42	53.53	60.53	71.27	19.27	114.46	4.5	8.25	12	2.17	1.37	61.81	4.63
T_5	AVT II 2018 SPGVAR 5	7.6	4.02	53.93	60.93	75.1	19.55	116.6	4.6	7.81	11.2	3.01	1.3	58.76	4.7
T_6	AVT II 2018 SPGVAR 6	10.54	4.5	53.53	60.53	71.65	15.68	112.6	3.7	8.36	11.26	2.67	1.26	57.08	4.53
T_7	AVT II 2018 SPGVAR 8	8.25	4.52	52.73	59.73	72.24	15.93	109.1	5.14	8.45	10.93	2.64	1.19	53.69	4.26
T_8	AVT I 2019 SPGVAR 1	8.46	4.37	51.93	58.93	74.65	22.43	115.2	3.6	8.52	11.4	2.28	1.31	59.09	4.59
T_9	AVT I 2019 SPGVAR 3	8.67	4.3	55.46	62.46	75.23	23.08	119.13	5.5	8.59	11.73	3.18	1.39	62.9	4.36
T_{10}	AVT I 2019 SPGVAR 4	8.9	4.9	53.4	60.4	72.56	22.4	128.4	4.6	8.33	11.46	2.47	1.47	66.25	4.63
T_{11}	AVT I 2019 SPGVAR 5	6.69	4.32	51.53	58.53	70.5	22.91	125.53	4.36	8.76	11.66	3.21	1.46	65.9	4.74
T_{12}	AVT I 2019 SPGVAR 6	9.12	4.71	53.5	60.5	73.15	22.42	120.53	4.73	9.74	10.8	2.81	1.3	58.57	4.46
T_{13}	AVT I 2019 SPGVAR 7	10.29	4.48	52.93	59.93	73.28	22.21	122.33	5.3	10.13	10.93	2.23	1.33	60.18	4.43
T_{14}	AVT I 2019 SPGVAR 8	9.5	4.2	53.13	60.13	73.65	22.33	114.4	4.63	9.14	11.33	3.24	1.29	58.34	4.27
T_{15}	IET 2020 SPGVAR 1	9.46	4.34	54.73	61.73	73.83	25.41	121.93	5.14	8.15	11.8	2.20	1.43	64.74	5.2
T_{16}	IET 2020 SPGVAR 2	9.75	4.38	54.93	61.93	74.26	25.35	123.33	5.27	9.32	10.84	3.12	1.33	60.19	5.22
T_{17}	IET 2020 SPGVAR 3	7.53	4.41	55.13	62.13	74.55	25.7	126.2	5.34	9.46	10.86	2.91	1.37	61.71	4.84
T_{18}	IET 2020 SPGVAR 4	10.2	4.44	54.53	61.53	72.34	23.33	126.66	5.45	9.52	11.73	2.20	1.48	66.9	4.75
T_{19}	IET 2020	9.35	4.52	53.73	60.73	74.85	21.86	126.26	3.71	9.64	9.6	2.82	1.21	54.54	4.57

S. no	Genotype	Days to germination	Length of Main vine (m)	1st Male Flower	1st Female Flower	1st Harvest	Fruit Length (cm)	Fruit Weight (g)	1st Male Flower on Node	1st Female Flower on Node	No. of Fruits/ plant	Fruit Diameter (cm)	Yield per plant in (Kg)	Yield per hectare in quintals (q)	Total Soluble Solids(°Brix)
T_{20}	SPGVAR 5 IET 2020	10.62	4.3	52.53	59.53	72.65	22.06	129.4	5.8	9.26	11.36	2.73	1.47	66.18	4.93
T_{21}	SPGVAR 6 IET 2020	10.85	4.42	53.93	60.93	75.6	22	128.26	5.36	9.83	11.13	2.75	1.42	64.26	4.65
T_{22}	SPGVAR 7 CHIKNI TURAI	8.46	4.24	52.3	59.16	71.45	23.73	127.53	5.3	9.4	11.11	3.20	1.41	63.77	4.86
	F	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	SE(d)	0.08	0.12	0.23	0.21	0.07	0.46	2.49	0.13	0.09	0.53	0.09	0.07	3.29	0.08
	CD at 5 %	0.17	0.26	0.47	0.44	0.14	0.93	5.02	0.26	0.19	1.07	0.19	0.14	6.64	0.17
	CV	1.22	3.57	0.53	0.44	0.11	2.64	2.53	3.39	1.31	5.87	4.20	6.68	6.68	2.34

3.8 Fruit Length (cm)

Length of the fruit was varied from 25.7cm to 15.68cm. Maximum fruit length (25.7cm) was recorded in the genotype IET 2020 SPGVAR 3, followed by IET 2020 SPGVAR 1 (25.41cm) and minimum fruit length (15.68cm) was recorded in the genotype AVT II 2018 SPGVAR 6. Similar findings were previously reported by Dubey et al. [19].

3.9 Fruit Weight (g)

Weight of 5 fruits was varied from 129.4 grams to 109.1 grams. Maximum weight of 5 fruits (129.4 grams) was recorded in the genotype IET 2020 SPGVAR 6, followed by AVT I 2019 SPGVAR 4 (128.4 grams), and minimum 5 fruits weight (109.1 grams) was recorded in the genotype AVT II 2018 SPGVAR 8 followed by (111.8 grams) AVT II 2018 SPGVAR 1. Similar findings were previously reported by Kannan et al., (2015).

3.10 Fruit Diameter (cm)

Fruit diameter was varied from 3.24cm to 2.1cm. Maximum fruit diameter (3.24cm) was recorded in the genotype AVT I 2019 SPGVAR 8,followed by AVT I 2019 SPGVAR 5 (3.21cm), and minimum fruit diameter (2.17cm) was recorded in the genotype AVT II 2018 SPGVAR 4 followed by (2.20cm) IET 2020 SPGVAR 1 . Similar findings were previously reported by Hanumegowda et al., (2012).

3.11 Number of Fruits per Plant

Number of fruits per plant was varied from 12.0 to 9.6.Maximum Number of fruits perplant (12.0) was recorded in the genotype AVT II 2018 SPGVAR 4, followed by AVT I 2019 SPGVAR 3 (11.73), IET 2020 SPGVAR 4(11.73) and minimum Number of fruits per plant (9.6) was recorded in IET 2020 SPGVAR 5 followed by the genotype AVT II 2018 SPGVAR 1(9.8). Similar findings were previously reported by Krishnamoorthy and Ananthan [17].

3.12 Fruit Yield per Plant (Kg/Plant)

In the genotype IET 2020 SPGVAR 4 were significantly higher than other genotypes .the maximum yield per plant is (1.48kg)was recorded in the genotype IET 2020 SPGVAR 4, followed by AVT I 2019 SPGVAR 4 (1.47kg)and minimum Yield per plant(1.09kg) was recorded. In the genotype AVT II 2018 SPGVAR 1. Similar findings were previously reported by Krishnamoorthy and Ananthan [20].

3.13 Yield (q/ha)

Maximum yield per plant (66.88) was recorded in the genotype IET 2020 SPGVAR 4, followed by AVT I 2019 SPGVAR 4 (66.25) and minimum Yield perplant (49.3) was recorded in the genotype AVT II 2018 SPGVAR 1. Similar findings were previously reported by Ara et al., (2012).

3.14 Total Soluble Solid (° Brix)

The total soluble solid of different genotypes of sponge gourd are significantly varied from (5.22 to 4.26). The maximum total soluble solid was observed genotype IET 2020 SPGVAR 2(5.22) followed by (4.93) IET 2020 SPGVAR 6 and minimum total soluble solid was recorded in genotype AVT II 2018 SPGVAR 8(4.72) followed by (4.27) AVT I 2019 SPGVAR 8.

4. CONCLUSION

The results from the present investigation concluded that the Sponge gourd genotype of (IET /2020 SPGVAR-4) was identified as the superior genotype in terms of growth, yield and fruit quality. Analysis of variance was significant for all the characters under the study “Evaluation of different genotypes of Sponge gourd for growth, yield and fruit quality in Prayagraj agro climatic conditions.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Kameswari PL, Narayanamma M. Influence of integrated nutrient management in ridge gourd (*Luffa acutangula L*.). Journal of Research. 2011;39(3):16-20.
2. Prasad PH, Mandal AR, Sarkar A, Thapa U, Maity TK. Effect of bio- fertilizers and nitrogen on growth and yield attributes of bitter gourd. International Conference on Horticulture. 2009;738-740
3. Davis JM. Luffa sponge gourd production practicesfor temperate climatesǁ. Horticulture Science. 2000;29(4):263-6.

4. Isfahani FM, Besharati H. Effect of bio-fertilizers on yield and yield components of cucumber.Journal of Biology and Earth Sciences. 2012;2(2):83- 92.
5. Jamal Uddin AF, Tahidul MI, Chowdhury M, Newaz S, Shiam IH, Mehraj H. Evaluation of bottle gourd (*Lagenaria siceraria*) to growth and yield. International Journal of Biosciences. 2014;5(12):7-11.
6. Choudhary BR, Kumar S, Sharma SK. Evaluation and correlation for growth, yield and quality traits of ridge gourd (*Luffa acutangula*) under arid conditions. Indian Journal of Agricultural Sciences. 2014; 84(4):498-502.
7. Choudhry D, Sharma KC. Studied on variability, heritability, genetic advances and correlation in ridge gourd (*Luffa acutangula* Roxb.).Indian Horticulture Journal. 2002;15(3):53-58.
8. Das R, Mandal AR, PriyaAnuj, Das SP, Kabiraj J. Evaluation of integrated nutrient management on the performance of bottle gourd (*Lagenaria siceraria*).Journal of Applied and Natural Science. 2015;7(1):18-25.
9. Agrawal DPK, Agrawal S. Characterization of Bacillus sp. strains isolated from rhizosphere of tomato plants (*Lycopersicon esculentum*) for their use as potential plant growth promoting rhizobacteria. International Journal of Current Microbiology and Applied Sciences. 2013; 2:406-417.
10. Anjanappa M, Venkatesh J, Kumara BS. Influence of organic, inorganic and bio-fertilizers on flowering, yield and yield attributes of cucumber (cv. Hassan Local) in open field condition. Karnataka Journal of Agriculture Science. 2012;25(4):493-497.
11. Bindiya Y, Prabhakhar RI, Srihari D. Response of cucumber to combined application of organic manures, bio-fertilizers and chemical fertilizers.Vegetable Science. 2016;41(1):12-15.
12. Sareedhar P, Anburani A, Samruban J. Influence of integrated nutrient management on growth of gherkin (*Cucumis sativus L*.) cv. Ajex Hybrid. Vegetable Science. 2006;33:196-197.
13. Thakur P, Sharma D, Visen VK, Dash SP. Evaluation of bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] genotypes. Plant Archives. 2013;15(2):1037-40.
14. Thriveni V, Mishra HN, Pattanayak SK, Sahoo GS and Thomson T. Effect of inorganic, organic fertilizers and bio-fertilizers on growth, flowering, yield and quality attributes of bitter gourd (*Momordica charantia* L.). International Journal of Farm Science. 2015;5(1):24-29.
15. Narayan.Genetic diversity and correlation studies in bottle gourd germplasm under baster condition. XI Chhattisgarh young scientist congress, Agriculture Science. 2013;1(5):15.
16. Chauhan.Studies of heterosis for yield and its contribution traits in sponge gourd (*Luffa cylindrica* Roma).International journal of current microbiology and applied science. 2018;7(12):223-230.
17. Varalakshmi. Stability analysis for some quantitative characters in ridge gourd (*Luffa acutangula*).Indian Journal of Horticulture. 2016;55(3):248-256.
18. Karrthick. Performance of ridge gourd (*Luffa acutangula* L. Roxb) varieties and nature of cultivation on growth and flowering attributes. International Journal of Agriculture Science. 2017;74(220): 219-42.
19. Dubey. Genetic variabilit: y and inter relationship amoung some ridge gourds (*Luffa acutangula* L) accessions underfoot hills of Arunachal Pradesh. Progessive Horticulture. 2013;45(1):191-197
20. Krishnamoorthy, Ananthan. Evaluation of ridge gourd (*Luffa acutangula* (Roxb) L.) genotypes for higher yield. Journal of Krishi vigyan. 2017;6(12):29-231.

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