



Evaluation of Sponge Gourd (*Luffa cylindrica*) Hybrids in Prayagraj Agro-Climatic Condition

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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 study the Evaluation of Sponge gourd (*Luffa cylindrica*) Hybrids in Prayagraj agro-climatic condition. at Sam Higginbottom. University of Agriculture Technology and Sciences, Prayagraj during summer 2023. From the present investigation it is concluded that the H10 Performed best in terms of growth (vine length (170.67 cm). The H9 is best performed in terms of Number of Primary branches (15.25) and The H10 is best performed in terms of maximum Number of node/plant (34.42).The treatment H4 is best performed in terms of Days to emergence of 1st male flower (42.83 days) and H11 is best performed in terms of days to emergence of 1st female flower/plant (46.8 days).The treatment H7 is best performed in terms of first appearance of male flower (2.17). The treatment H7 is best performed in terms of first appearance of female

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flower (2.17).The H3 and H5 is best performed in terms of Days to 50% female flower/plant (45.67).the treatment H12 performed best in term of days to 1st fruit setting/plant (48.00 Days) and the T12 best performed in terms of Number of days to first Fruit picking (51.58 Days).). The H1 is best performed in terms of maximum number of Number of fruit/plant (28.48 Fruit),Fruit yield /plant (kg) (2.70 Kg), Fruit yield /ha (Q) (270 Q) and average weight of fruit (95.00g).The H4,H5 and H6 performed best in term of Fruit length (30.00cm). The treatment H11 is best performed in terms of fruit diameter (22.00mm). Whereas, the H1 recorded highest benefit cost ratio (2.79).

Keywords: *Sponge gourd; agro climatic condition; hybrids; vegetable crop.*

1. INTRODUCTION

Vegetables are consumed worldwide because of their high nutritional value and because of their biodegradability; they donate to a healthier ecosystem. Beyond this their low cost and practical performance fulfill the economic interests of various industries. Sponge gourd belongs to the cucurbitaceae family with several species out of which only 2 species are domesticated namely *L. cylindrica* and *L. acutangula*. Luffa consists of fibers and has 60 % cellulose, 30 % hemicellulose, and 10 % lignin [1,2] The sponge gourd is composed of 117 genera and about 825 species in warmer parts of the world. Sponge gourds occupy an area of 73273 ha and have an annual production of 685224 tonnes worldwide [3,4]. In India, the states that have sponge gourd production are Karnataka, Kerala, Andhra Pradesh, and Tamil Nadu, Maharashtra, and Madhya Pradesh states. About 25-50 % losses are identified in sponge gourd vegetables during post-harvest in 2018. About 40-50 % of sponge gourd is utilized for processing purposes and the production of different dried byproducts [5-7]. Luffa is a sub-tropical plant that requires summer temperature for production. It is known as a summer season vegetable with its cultivation in the tropical countries of Asia and Africa. For proper growth, it requires well drained sandy loam soil with a pH of 6 to 6.8 and also needs a high level of potassium & phosphorus [8]. It also improves brain function, and immune system, and prevents diabetes, eye problems, and muscle pain. Luffa has applications in shoe mats, bath sponges, proof linings, packing medium, and utensil cleaning sponges, adsorbent for removal of heavy metal [9] and [10]. The peel of sponge gourd is a major waste that has good utilization for the production of healthy foods. Luffa peels area promising raw material for possible future production [11,12]. Luffa seeds and peels have a large amount of phenolic, flavonoids present which have the potency to treat many diseases. Fresh sponge gourd pulp has a high amount of

vitamin C, considered good for health. Luffa has been rewarded with a bundle of polyphenols and has great applications in the food, agriculture, and cosmetics industries However, sponge gourd is very perishable after harvest and easily gets deteriorated [13-15]. Mainly the deterioration starts with wilting and yellowing appearance causes loss of texture [16-18].

2. MATERIALS AND METHODS

This experiment was carried out during in 2023 at Horticulture Research Farm, SHUATS, Prayagraj, Uttar Pradesh, India which is located at 25.28 °N latitude, 81.54 °E longitude and 98 m altitude above the mean sea level. This area is situated on the right side of the river Yamuna by the side of Prayagraj Rewa Road about 5 km away from Prayagraj, city. The experiment was done Evaluation of Sponge gourd (*Luffa cylindrica*) Hybrids in Prayagraj agro climatic condition.

The temperature reached up to 48°C in summer and in winter it goes down to as low as 2-3 °C. The experiment was laid out in a randomized block design with 14 treatments and three replications.

Sponge gourd seed soaked overnight in water prior to sowing. Later, three to four seeds were sown in holes of raised beds at a depth of 2 cm. These holes are spaced at 90 cm in rows spaced at 45cm.

2.1 Statistical Analysis

The data recorded during the course of the investigation were subjected to statistical analysis as per the method of analysis of variance. This investigation was done in the RBD statistical method. The significance and non-significance of the treatment effect were judged with the help of 'f' value (variance ratio) and compared with the table value at a 5% level of significance. If the calculated value exceeds then

the value, the effect of considered to be significant. The significant difference between the means was tested against the critical difference at a 5% level of significance.

3. RESULTS AND DISCUSSION

3.1 Growth Parameter

3.1.1 Evaluation of sponge gourd on vine length

The Vine length in different Hybrids of sponge gourd was recorded, statistically analysed and presented in (Table 1). The results showed that maximum vine length was recorded in H6 treatment (54.42 cm) which is receiving from USM–MEERA at 30 DAS and (80.40 cm) at 60 DAS, where H10 Treatment maximum vine length (170.67 cm) at 90 DAS which is receiving Yash. The minimum vine length was recorded in H3 treatment (103 cm) at 90 DAS.

3.2 Evaluation of Sponge Gourd Number of Primary Branches / Plant

The Number of primary branches in different Hybrids of sponge gourd was recorded,

statistically analysed and presented in in (Table 1). Significantly the results showed that maximum number of Primary branches was recorded in H12 treatment (1.73) which is receiving KOMAL at 30 DAS, where H1 and H9 (5.50) at 60 DAS which is receiving from alok and zinnat, where H9 Treatment maximum Primary branches (15.25) at 90 DAS which is receiving zinnat. The minimum Primary branches was recorded in H3 treatment (5.72) at 90 DAS.

3.3 Evaluation of Sponge Gourd Number of Node/Plant

The Number of Number of node/plant in different Hybrids of sponge gourd was recorded, statistically analysed and presented in (Table 1). Significantly the results showed that maximum Number of node/plant was recorded in H6 treatment (5.67) which is receiving DHANSHREE at 30 DAS, where H9 (17.80) at 60 DAS which is receiving from zinnat, where H10 Treatment maximum Primary branches (34.42) at 90 DAS which is receiving Yash. The minimum Number of node/plant was recorded in H1 treatment (23.84) at 90 DAS.

Table 1. Evaluation of sponge gourd on vine length, evaluation of sponge gourd Number of primary branches per plant, evaluation of sponge gourd number of node/plant in Prayagraj agro-climatic condition

Vine Length (cm)		Number of Primary Branch			Number of Node/Plant					
SN	Treatments	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
1	ALOK	49.00	71.33	128.50	1.75	5.50	11.83	5.00	12.83	23.84
2	LATIKA	27.17	71.13	139.50	1.75	3.75	10.96	4.67	15.17	29.17
3	ALIA	40.25	73.40	103.42	1.67	3.58	8.08	5.08	12.17	25.13
4	EZSC-33	38.00	67.17	111.33	1.27	3.50	9.17	3.58	12.67	26.05
5	DHANSHREE	43.25	77.50	143.42	1.67	5.00	12.50	5.67	15.25	28.25
6	USM – MEERA	54.42	80.40	144.97	1.67	3.67	9.38	6.50	14.30	33.75
7	ANMOL	26.05	73.92	137.28	1.42	4.00	10.58	4.08	13.72	26.50
8	LHS-LUCKY	38.63	67.08	125.67	1.42	4.58	13.33	3.73	12.05	25.17
9	ZINNAT	27.68	79.33	161.30	1.42	5.50	15.25	4.83	17.80	30.42
10	YASH	51.33	80.30	170.67	1.42	3.75	11.83	5.50	17.26	34.42
11	ATIKA	27.29	73.58	135.67	1.67	3.00	6.58	3.83	15.22	27.75
12	SBS-CHNTU	34.64	69.92	133.25	1.58	2.83	8.17	5.50	16.05	30.50
13	BHAVNA	27.00	72.17	135.50	1.50	3.33	5.72	4.83	13.17	29.73
14	KOMAL	26.40	70.08	140.92	1.73	3.25	8.92	4.25	13.83	26.55
F test		S	S	S	S	S	S	S	S	S
SE(d) ±		2.52	1.90	3.00	0.10	0.25	0.43	0.35	0.67	1.20
C.D. at 5%		5.20	3.92	6.20	0.20	0.52	0.88	0.72	1.38	2.48
C.V. (%)		8.44	3.17	2.69	7.73	7.77	5.12	8.92	5.68	5.19

3.4 Earliness Parameter

3.4.1 Evaluation of Sponge gourd Days to emergence of 1st male flower and days to emergence of 1st female flower

The emergence of 1st male flower and days to emergence of 1st female flower in different Hybrids of sponge gourd was recorded, statistically analysed and presented in (Table 2). Significantly The maximum days were recorded for the first appearance of male flower in Treatment H13 (46.92 Days) which is receiving from Bhavna, while it was minimum in (42.83 days) which is receiving from H4.

The maximum days recorded for the first appearance of female flower in Treatment H14 (48.83 days) which is receiving from Komal. while it was minimum in Treatment H11 (46.8 days) which is receiving from Atika.

3.4.2 Evaluation of Sponge gourd Node no. At which male flower appear Node no.at which female flower appear

The Node no. At which male flower appear and Node no.at which female flower appear in different Hybrids of sponge gourd was recorded, statistically analysed and presented in (Table 2).

Significantly The nodes number to where maximum number first appearance of male flower was recorded in (H1, H10) Alok and Yash (4.42) , while it was minimum in (H7) Anmol (2.17). The nodes number to where maximum number first appearance of female flower was recorded in (H5) Dhanshree (10.17), while it was minimum in (H7) Anmol (6.25).

3.4.3 Evaluation of Sponge gourd Days to 50% flowering, Days to first fruit setting and Days to first fruit picking

Days to 50% flowering, Days to first fruit setting and Days to first fruit picking in different Hybrids of sponge gourd were recorded, statistically analysed and presented in (Table 3). The maximum number of Days to 50% flowering were founded in (H8) LHS- Lucky (49.00 Days), while it was minimum in (H3 and H5) Alia and Dhanshree (45.67).

The maximum number of Days to Days to fruit setting were found in (H10) Yash (51.33 Days), while it was minimum in (H12) SBS-CHNTU (48.00 Days).

The maximum number of Days to first fruit picking were found in (H9) Zinnat (55.08 Days), while it was minimum in (H12) SBS-CHNTU (51.58 Days).

Table 2. Evaluation of Sponge gourd for flowering parameter in Prayagraj-agro climatic condition

SN	Treatments	Days to Emergence of 1st Male Flower	Days to Emergence of 1st Female Flower	Node no. At which Male Flower Appear	Node no.at which Female Flower Appear
1	ALOK	5.00	12.83	4.42	7.33
2	LATIKA	4.67	15.17	3.33	8.33
3	ALIA	5.08	12.17	2.75	8.17
4	EZSC-33	3.58	12.67	2.58	7.75
5	DHANSHREE	5.67	15.25	3.42	10.17
6	USM –MEERA	6.50	14.30	3.17	6.67
7	ANMOL	4.08	13.72	2.17	6.25
8	LHS-LUCKY	3.73	12.05	2.92	7.58
9	ZINNAT	4.83	17.80	3.42	9.08
10	YASH	5.50	17.26	4.42	10.00
11	ATIKA	3.83	15.22	3.25	7.83
12	SBS-CHNTU	5.50	16.05	3.50	7.58
13	BHAVNA	4.83	13.17	3.08	7.92
14	KOMAL	4.25	13.83	3.83	9.50
	F test	S	S	S	S
	SE(d) ±	0.35	0.67	0.15	0.36
	C.D. at 5%	0.72	1.38	0.32	0.74
	C.V. (%)	8.92	5.68	5.68	5.39

Table 3. Evaluation of sponge gourd fruit parameter Prayagraj-agro climatic condition

SN	Treatments	Days to 50% Flowering	Days to first Fruit Setting	Days to First Fruit Picking
1	ALOK	46.00	49.25	52.75
2	LATIKA	46.33	48.58	53.08
3	ALIA	45.67	49.17	52.58
4	EZSC-33	47.33	51.00	54.16
5	DHANSHREE	45.67	49.92	52.83
6	USM –MEERA	47.33	49.58	53.42
7	ANMOL	47.00	50.08	54.17
8	LHS-LUCKY	49.00	49.02	54.25
9	ZINNAT	46.50	50.58	55.08
10	YASH	48.00	51.33	54.83
11	ATIKA	46.33	48.25	51.75
12	SBS-CHNTU	46.17	48.00	51.58
13	BHAVNA	47.00	49.58	52.67
14	KOMAL	47.67	51.17	54.50
F test		S	S	S
SE(d) ±		0.67	0.46	0.33
C.D. at 5%		1.38	0.96	0.69
C.V. (%)		1.74	1.14	0.77

Table 4. Evaluation of sponge gourd for fruits in Prayagraj agro-climatic condition

SN	Treatments	Number of Fruit / Plant	Fruit Yield /Plant (kg)	Fruit Yield / ha
1	ALOK	28.48	2.70	270.00
2	LATIKA	26.25	2.36	236.00
3	ALIA	24.30	1.96	196.00
4	EZSC-33	25.12	2.00	200.00
5	DHANSHREE	24.32	2.04	204.00
6	USM –MEERA	23.41	1.89	189.00
7	ANMOL	24.36	1.92	192.00
8	LHS-LUCKY	25.19	1.96	196.00
9	ZINNAT	20.38	1.75	175.00
10	YASH	21.25	1.84	184.00
11	ATIKA	21.15	1.73	173.00
12	SBS-CHNTU	22.25	1.80	180.00
13	BHAVNA	18.40	1.43	143.00
14	KOMAL	18.35	1.41	141.00
F test		S	S	S
SE(d) ±		0.77	0.07	6.82
C.D. at 5%		1.60	0.15	14.10
C.V. (%)		4.11	4.55	4.37

3.4.4 Evaluation of sponge gourd number of fruit / plant

Number of fruit / plant in different Hybrids of sponge gourd was recorded, statistically analysed and presented in (Table 4). The maximum number of Number of fruit / plant were founded in (H1) Alok (28.48 Fruit), while it was minimum in (H14) Komal (18.35 Fruit). This improvement might be due to local conditions,

genetic characters, higher nutrients utilization efficiency, enhanced photosynthetic and other metabolic activities which lead to increase in various plant metabolites responsible for cell division and cell elongation.

3.4.5 Evaluation of sponge gourd fruit yield /plant (kg)

Fruit yield /plant (kg) in different Hybrids of sponge gourd was recorded, statistically

analysed and presented in (Table 4). The maximum Fruit yield /plant (kg) were founded in (H1) Alok (2.70 Kg), while it was minimum in (H14) Komal (1.41Kg). This improvement might be due to local conditions, genetic characters, higher nutrients utilization efficiency, enhanced photosynthetic and other metabolic activities which lead to increase in various plant metabolites responsible for cell division and cell elongation.

3.4.6 Evaluation of sponge gourd fruit yield / ha

Fruit yield / ha in different Hybrids of sponge gourd was recorded, statistically analysed and presented in (Table 4). The maximum Fruit yield q/ha was found in (H1) Alok (270 Q), while it was minimum in (H14) Komal (141 Q). This improvement might be due to local conditions, genetic characters, higher nutrients utilization efficiency.

3.4.7 Evaluation of sponge gourd Avg. weight/fruit (g)

Avg. weight/fruit (g) in different Hybrids of sponge gourd was recorded, statistically analysed and presented in (Table 5). The maximum weight/fruit was found in (H1) Alok (95.00g), while it was minimum in (H14) Komal (77.00 g). This improvement might be due to

local conditions, genetic characters, higher nutrients utilization efficiency, enhanced photosynthetic and other metabolic activities which lead to an increase in various plant metabolites responsible for cell division and cell elongation.

3.4.8 Evaluation of sponge gourd fruit length (cm)

Fruit length (cm) in different Hybrids of sponge gourd was recorded, statistically analysed and presented in (Table 5). The highest fruit length was recorded in (H4, H5 and H6) EZSC-33, DHANSHREE and USM -MEERA (30.00cm),while it was minimum in (H2) Latika (18.00 cm).

3.4.9 Evaluation of sponge gourd fruit girth (mm)

Fruit girth (mm) in different Hybrids of sponge gourd was recorded, statistically analysed and presented in (Table 5). The maximum fruit diameter was found (H11) atika (29.00mm), while it was minimum in (H14) Komal (22.00mm). This improvement might be due to local conditions, genetic characters, higher nutrients utilization efficiency, enhanced photosynthetic and other metabolic activities which lead to an increase in various plant metabolites responsible for cell division and cell elongation.

Table 5. Evaluation of sponge gourd Avg. weight/fruit (g), Evaluation of Sponge gourd Fruit length(cm) and evaluation of sponge gourd Fruit girth (mm)

SN	Treatments	Avg.Weight /Fruit (g)	Fruit Length(cm)	Fruit Girth (mm)
1	ALOK	95.00	28.00	25.00
2	LATIKA	90.00	18.00	25.00
3	ALIA	81.00	25.00	27.00
4	EZSC-33	80.00	30.00	24.00
5	DHANSHREE	84.00	30.00	26.00
6	USM –MEERA	81.00	30.00	25.00
7	ANMOL	79.00	28.00	27.00
8	LHS-LUCKY	78.00	29.00	25.00
9	ZINNAT	86.00	25.00	26.00
10	YASH	87.00	22.00	28.00
11	ATIKA	82.00	25.00	29.00
12	SBS-CHNTU	81.00	22.00	25.00
13	BHAVNA	78.00	25.00	23.00
14	KOMAL	77.00	22.00	22.00
	F test	S	S	S
	SE(d) ±	2.02	0.63	0.66
	C.D. at 5%	4.18	1.31	1.37
	C.V. (%)	2.99	3.03	3.18

4. CONCLUSION

From the present investigation it is concluded that The H1 is best performed in terms of maximum number of Number of fruit/plant (28.48 Fruit), Fruit yield /plant (kg) (2.70 Kg), Fruit yield /plant (Q) (270 Q) and an average weight of fruit (95.00g). Whereas, the H1 recorded highest benefit cost ratio (2.79).

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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