Plant Archives Vol. 25, No. 2, 2025 pp. 2142-2146 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.no.2.307

UNLOCKING SUMMER SEASON POTENTIAL OF SPONGE GOURD GENOTYPES

Vidya[1]*, Shashikanth Evoor[1], Raveendra S. Jawadagi[1], M. P. Basavarajappa[2], Sarvamangala S. Cholin[3], Ramanagouda S.H.[4] and D.O. Kavya[1]

[1]Department of Vegetable Science, University of Horticultural Sciences, Bagalkot 587104, Karnataka, India
[2]Department of Plant Pathology, University of Horticultural Sciences, Bagalkot 587104, Karnataka, India
[3]Department of Biotechnology and Crop Improvement, University of Horticultural Sciences, Bagalkot 587104, Karnataka, India
[4]Department Entomology, University of Horticultural Sciences, Bagalkot 587104, Karnataka, India
*Corresponding author E-mail: vidyapatil2701@gmail.com
(Date of Receiving : 12-07-2025; Date of Acceptance : 23-09-2025)

ABSTRACT

Sponge gourd (*Luffa cylindrica* L. Roem.) is an important cucurbit grown for its nutritional and economic value. The present study evaluated twenty inbred lines during the summer season to assess growth, earliness, flowering, fruit traits and yield performance. Significant variation was observed among genotypes. G15 recorded the longest vine length, while G2 and G20 were earliest for female and male flower initiation, respectively. High temperature and moisture stress influenced reduced internodal elongation, flowering and harvest duration. Genotype G6 showed the longest fruits, while G2 had the highest average fruit weight. Yield performance was superior in G3 (10.22 t/ha) followed by G1 (7.61 t/ha). Overall, G1 (SG-1) and G12 (HUB-3) exhibited better performance across multiple traits, making them promising genotypes for summer cultivation. The results highlight the importance of selecting temperature-tolerant genotypes for stable yield and quality improvement in sponge gourd.
***Keywords*:** Sponge gourd (*Luffa cylindrica* L. Roem.), genotypes, growth parameters.

Introduction

Sponge gourd (*Luffa cylindrica* L. Roem.), a member of the family Cucurbitaceae, is an important vegetable crop cultivated widely in tropical and subtropical regions of the world (Oboh and Aluyor, 2009; Rabei *et al*., 2013; Wu *et al*., 2014). It is valued both as a nutritious food and as a crop of economic significance. The tender green fruits are consumed as a vegetable, providing a good source of carbohydrates, minerals, dietary fiber and antioxidants (Kumar *et al*., 2013). The crop is of short duration, highly yielding and well suited to marginal land and intensive cropping systems, making it a popular choice among farmers for both commercial cultivation and kitchen gardens (Silva *et al*., 2015; Rai *et al*., 2025).

In India, sponge gourd is cultivated throughout the year under different agro-climatic conditions. However, its growth and yield are greatly influenced by seasonal variations. The summer season, characterized by high temperatures and limited soil moisture, often exerts adverse effects on plant growth, flowering, fruit set and yield. As a result, productivity during this season is generally low and farmers face challenges in maintaining consistent harvests. As such there are no recommended varieties for summer cultivation. Identifying genotypes that can withstand such stressful conditions while maintaining desirable yield and quality traits is therefore of significant importance (Mashilo *et al*., 2025).

Genotypic evaluation is a vital step in crop improvement programs, as it enables the identification of promising lines with superior agro-morphological and quality traits. By assessing the performance of diverse genotypes, researchers can gain insights into their adaptability and stability under specific environmental conditions. Evaluation during the summer season is particularly relevant, as it helps to identify genotypes capable of tolerating heat and moisture stress while still performing satisfactorily in terms of yield and fruit quality (Phan *et al*., 2015; Abhijeet *et al*., 2018). This information is also valuable for selecting parents in breeding programs aimed at developing climate-resilient cultivars.

Sponge gourd is known to be a short-day crop and it generally performs better under shorter day lengths and relatively cooler temperatures. As a result, the crop thrives well during the *kharif* season. However, only a few inbred lines are able to produce sufficient flowers and fruits during the summer months (Joshi *et al*., 2004). This limitation results in the reduced availability of sponge gourd fruits in markets during summer, creating a supply gap at a time when vegetable demand remains high. Developing or identifying sponge gourd genotypes that can adapt to summer conditions would not only improve productivity but also helps to stabilize market supply throughout the year.

Considering the importance of seasonal adaptability and the demand for consistent vegetable supply, the present investigation was carried out to evaluate diverse sponge gourd genotypes during the summer season. The major objectives were to assess the performance of these genotypes for growth and yield parameters and to identify superior lines with the potential to withstand summer stress. The findings of this study are expected to provide useful information for farmers in selecting suitable genotypes for summer cultivation and for breeders in developing improved sponge gourd cultivars adapted to summer conditions.

Material and Methods

The experiment was conducted during the summer season of 2024 at the research field of the department of vegetable science, College of Horticulture, Bagalkot, Karnataka. The trial was laid out in a Randomized Block Design (RBD) with two replications. During the cropping period, the maximum temperature of the location rose up to 41 °C, while the minimum temperature was recorded at 19 °C. The relative humidity fluctuated between 25 to 86.87 per cent, indicating considerable variation in microclimatic conditions during the experiment. The twenty sponge gourd inbred lines were selected for the evaluation and the observations for various growth and yield parameters were recorded at different stage of the plant growth and the Pusa Chikni variety released from IARI, New Delhi for throughout the year cultivation was used as check for the evaluation.

Results and Discussion

Growth and earliness parameters

Considering the growth parameters, the genotype G15 (3.43 m) recorded longest vine and the number of branches were significantly higher in G1 and G8 (2.83), the shorter vine length and a smaller number of primary branches than the crop grown in other cropping seasons is due to the higher temperatures, lower humidity and moisture stress, which adversely affect cell expansion and internodal elongation as reported by Kumar *et al*. (2013) and Krishnamoorthy (2019). The lowest internodal length in G14 (5.28 cm) in comparison with check G16 (8.88 cm) leads to reduced vine elongation due to inhibited cell expansion and reduced hormonal activity, such as lower gibberellin levels (Samadia, 2011; Wehner *et al*., 2020). The node at which first female flower appearance in sponge gourd genotypes early in the genotypes G17 (6.87) followed by G5 (7.10).

Considering the earliness traits, genotypes G2 (51.25 days) and G20 (38.50 days) had taken least number of days for first female and male flower production respectively. The sex expression in cucurbits is a highly plastic and environmentally responsive trait, where summer season favors the early development of male flowers mainly due to the long days and high temperatures, which is associated with increased gibberellins activity, in turn promotes maleness (Whitaker, 1931; Nitsch *et al*., 1952; Grumet and Taft, 2011). The duration of harvest in sponge gourd is influenced by the number of days between the first and last harvest wherein, G20 was significantly earlier for days first harvest (60.30 days) followed by G2 (60.50 days), G1 (61.85 days) and G17 (62.65 days). The G16 recorded highest number of days for last harvest upto 117.10 days exhibiting the maximum harvest period which was approximately around 55-60 days which is much lesser as compared to remaining cropping season. The high temperature and moisture stress during flowering and fruit development in summer season may be often led to rapid plant senescence thereby reducing harvest interval (Mostafa *et al*., 2021; Jalindar, 2023).

Table 1 : *Per se* performance of sponge gourd genotypes for growth and earliness parameters during summer months

Sl. No.	Code	Genotype	VL @ 90 DAS	NPB @ 90 DAS	IL (cm)	NFF	DFF	DFM	DFH	DLH
1	G1	SG-1	3.05	2.83	8.71	9.50	57.05	41.75	61.85	103.90
2	G2	SG-3	2.04	2.50	7.71	12.75	51.25	45.25	60.50	96.50
3	G3	SG-4	2.25	2.00	10.52	7.95	55.55	42.85	63.95	112.05
4	G4	SG-6	3.04	2.67	9.52	8.85	58.65	42.20	68.95	106.00
5	G5	KSG-2	3.02	2.33	8.90	7.10	62.45	40.40	72.65	111.60
6	G6	KSG-12	2.51	2.00	8.30	11.55	62.30	42.00	68.60	104.65
7	G7	KSG-14	2.93	2.33	8.17	11.90	65.65	40.85	70.15	112.20
8	G8	KSG-32	2.35	2.83	8.04	9.50	60.25	40.70	68.90	107.70
9	G9	KSG-36	2.88	2.17	7.38	10.05	54.90	42.05	63.95	109.00
10	G10	KSG-44	3.28	2.50	9.70	8.05	56.25	39.85	66.15	114.50
11	G11	KSG-63	2.67	2.17	8.48	9.95	58.25	42.30	71.45	107.55
12	G12	HUB-3	2.91	2.50	8.63	8.85	56.10	42.75	68.90	98.00
13	G13	Bagalkot Local-2	2.63	2.50	8.61	9.80	60.05	45.75	71.40	107.00
14	G14	COH Mandsaur-2	1.09	2.67	5.28	10.00	54.00	41.00	64.30	104.00
15	G15	Bagalkot local-3	3.43	2.50	7.10	9.00	57.80	42.85	69.45	111.40
16	**G16**	**Pusa Chikni (check)**	**2.99**	**2.17**	**8.88**	**8.80**	**55.20**	**41.70**	**64.40**	**117.10**
17	G17	Kashi Divya	2.77	2.17	7.15	6.87	53.90	44.00	62.65	105.60
18	G18	Kashi Shreya	2.96	2.50	8.10	11.05	55.20	43.75	69.20	114.90
19	G19	Konkan Ghoshali	3.39	2.50	8.39	9.75	52.40	42.25	69.00	111.40
20	G20	Pusa Sneha	2.68	2.17	8.86	9.30	52.60	38.50	60.30	101.80
		SEm ±	**0.14**	**0.22**	**0.97**	**0.49**	**1.23**	**1.20**	**1.17**	**1.73**
		CD at 5%	**0.42**	**0.64**	**2.86**	**1.45**	**3.65**	**3.56**	**3.48**	**5.13**

VL @ 90 DAS – Vine length at 90 days after sowing
NPB @ 90 DAS – No. of primary branches at 90 days after sowing
IL – Internodal length (cm)
NFF – Mode at first female flower appearance
DFF – Days to first female flower appearance
DFM - Days to first male flower appearance
DFH – Days to first harvest
DLH – Days to last harvest

Yield parameters

In regard to flowering traits, the number of female flowers per vine at peak flowering stage was found highest in G12 (5.75) then in line with G4 (5.40) and G1 (4.54) significantly higher than the check G16 (1.25) whereas minimum number of male flowers per vine at peak flowering stage was observed in G11 (35.21), the elevated temperature primarily leads to fewer male flowers and a higher number of female flowers as reported by Jalindar (2023).

With respect to fruit traits, genotype G6 exhibited the maximum fruit length (22.98 cm), which was closely followed by G1 (22.75 cm). In contrast, the lowest fruit diameter was noted in G14 (26.32 mm). The fruit length was found shorter than the earlier reports (Chitra, 2023), may be due to increased respiratory losses, moisture stress and hastened plant metabolism (Behera *et al*., 2012; Islam *et al*., 2024). The genotype G3 (10.05) produced significantly a higher number of fruits per vine then followed by G12 (9.30) and G1 (7.00) and the genotype G2 recorded the highest average fruit weight (188.33 g) followed by G9 (172.49 g), G17 (151.63 g), G14 (150.06 g) and G10 (145.05 g) which were significantly higher than the Pusa Chikni (108.04 g). The summer season significantly affect the flowering, pollination, fruit set and fruit retention thereby influencing the final fruit count (Celine *et al*., 2010). In regard to yield, fruit yield per vine and hectare was observed maximum in G3 (1.35 kg & 10.22 t/ha) and it is followed by the genotype G1 (0.98 kg & 7.61 t/ha).

Table 2 : *Per se* performance of sponge gourd genotypes for yield parameters during summer months

Sl. No.	Code	Genotype	NoFF#	NoMF#	FL (cm)	FD (mm)	NFV	AFW (g)	FYP (kg)	FYHa (t)
1	G1	SG-1	4.54	82.20	22.75	38.54	7.00	135.94	0.98	7.61
2	G2	SG-3	1.90	57.79	9.90	32.38	3.90	188.33	0.82	6.59
3	G3	SG-4	5.40	90.77	18.55	33.89	10.05	124.74	1.35	10.22
4	G4	SG-6	3.25	58.75	21.28	27.22	6.00	110.25	0.77	6.82
5	G5	KSG-2	3.75	64.54	14.10	29.13	6.50	77.37	0.57	4.56

6	G6	KSG-12	2.20	48.40	22.98	34.67	3.00	143.50	0.55	3.88
7	G7	KSG-14	3.25	65.75	11.95	29.35	6.00	114.95	0.75	6.28
8	G8	KSG-32	1.80	48.40	11.50	46.89	2.85	114.15	0.25	2.38
9	G9	KSG-36	1.30	45.25	10.83	41.79	3.00	172.49	0.59	4.39
10	G10	KSG-44	1.30	41.78	17.53	45.63	4.00	145.05	0.55	5.01
11	G11	KSG-63	1.15	35.21	11.18	34.10	1.90	126.32	0.24	2.24
12	G12	HUB-3	5.75	97.23	12.45	38.54	9.30	94.51	0.84	6.91
13	G13	Bagalkot Local-2	1.15	43.83	11.05	27.37	2.00	118.39	0.27	1.98
14	G14	COH Mandsaur-2	3.35	68.26	11.48	26.32	6.80	150.06	1.11	1.67
15	G15	Bagalkot local-3	2.25	57.41	18.68	36.52	5.40	74.06	0.39	3.53
16	**G16**	**Pusa Chikni (check)**	**1.25**	**41.37**	**16.58**	**34.58**	**2.85**	**108.04**	**0.32**	**2.53**
17	G17	Kashi Divya	1.75	45.75	15.38	45.25	3.70	151.63	0.53	4.34
18	G18	Kashi Shreya	1.18	40.20	17.70	36.68	2.50	122.59	0.32	2.79
19	G19	Konkan Ghoshali	1.25	41.70	14.88	41.83	2.80	103.65	0.31	2.43
20	G20	Pusa Sneha	1.15	40.68	20.05	33.15	2.80	117.77	0.32	2.91
		SEm ±	**0.53**	**0.99**	**1.60**	**2.87**	**0.51**	**11.91**	**0.08**	**0.50**
		CD at 5%	**1.57**	**2.92**	**4.74**	**8.49**	**1.51**	**35.25**	**0.23**	**1.48**

#- Observations were recorded during peak flowering stage for 15 days

NoFF – No. of female flowers per vine
NoMF – No. of male flowers per vine
FL – Fruit length (cm)
FD – Fruit diameter (mm)
NFV – No. of fruits per vine
AFW – Average fruit weight (g)
FYP- Fruit yield per vine (kg)
FYHa – Fruit yield per hectare

Over all analysis of the genotypes under evaluation indicated that the genotype G1 (SG-1) exhibited superior performance with the highest number of primary branches (2.83), female flowers at peak flowering stage (4.54), longest fruit length (22.75 cm), highest fruit yield per vine (0.98 kg) and plot (8.22 kg). Additionally, genotype G12 (HUB-3) showed excellence in terms of number of female flowers at peak flowering stage (5.75), number of fruits per vine (9.30), fruit yield per vine (0.84 kg) and fruit yield per plot (7.47 kg). Therefore, both G1 (SG-1) and G12 (HUB-3) were identified as the most suitable genotypes for cultivation during the summer months.

Conclusion

The present investigation on the evaluation of sponge gourd genotypes during the summer season revealed considerable variability among the tested genotypes with respect to growth, flowering, yield and quality attributes. Genotypes such as G1 (SG-1) and G12 (HUB-3) exhibited superior performance for the traits observed. These findings emphasize the importance of genotype selection for targeted traits under summer conditions, where high temperature significantly influenced sex expression and yield performance. The identified promising genotypes can serve as potential candidates for commercial cultivation as well as for further breeding programmes aimed at yield improvement and quality enhancement in sponge gourd.

References

Abhijeet, S. K., Yadav, N. P., Singh, V. B. and Mishra, S. K. (2018). Genetic variability studies on sponge gourd [*Luffa cylindrica* (L.) Roem.]. *Int. J. Agric. Environ. Biotech.*, **11**, 941-45.

Behera, T. K., Gaikwad, A.B., Saxena, S., Bharadwaj, C. and Munshi, A.D. (2012). Morphological and molecular analyses define the genetic diversity of Asian bitter gourd (*Momordica charantia* L.). *Australian J. Crop Sci*., **6**(2), 261-267.

Celine, V.A., Seeja, G. and Gokulapalan, C. (2010). Evaluation of snake gourd genotypes for different seasons in the humid tropics. *Indian J. Hortic.*, **67**(4), 185-188.

Chithra, K. (2023). Molecular diversity assessment and manifestation of heterosis for growth and yield in sponge gourd [*Luffa cylindrica* (L.) Roem.]. *Ph.D. (Veg.) Thesis*, Univ. Hort. Sci., Bagalkot (India).

Grumet, R. and Taft, J. (2011). Sex expression in cucurbits. *Genetics, Genomics and Breeding in Crop Plants.* Science Publishers, Enfield, New Hampshire, pp, 353-375.

Islam, S., Era, F. M., Biswas, M. S. and Islam, A.A. (2024). Parental diversity and hybrids performance for yield related traits in ridge gourd [*Luffa acutangula* (L.) Roxb.]. *Vegetos*, 1-11.

Jalindar, K.P. (2023). Characterization and variability studies in ridge gourd genotypes. *Ph. D. (Veg.) Thesis,* Haryana Agric. Univ., Hisar (India).

Joshi, B. K., KC, H. B., Tiwari, R. K., Ghale, M. and Sthapit, B.R. (2004). Descriptors for sponge gourd [*Luffa cylindrica* (L.) Roem.].

Krishnamoorthy, V. (2019). Evaluation of ridge gourd (*Luffa acutangula* Roxb.) hybrids during summer season for growth, yield and quality traits. *Asian J. Hort*., **14**(2), 17-22.

Kumar, R., Ameta, K.D., Dubey, R.B. and Pareek, S. (2013). Genetic variability, correlation and path analysis in sponge gourd (*Luffa cylindrica* Roem.). *African J. Biotechnol.*, **12**(6), 539-543.

Mashilo, J., Shimelis, H. and Ngwepe, M.R. (2025). Genetic improvement and innovations of sponge gourd (*Luffa cylindrica* L.), An opportunity crop. *Industrial Crops and Products*, **225**, p.120430.

Mostafa, A. A., Mahmoud, E. A. and Younes, N. A. (2021). Genetic diversity analysis for nine F_1 hybrids of cucumber (*Cucumis sativus* L.) under Assuit conditions, Egyptian *Arch. Agri. Sci. J*., **4**(1), 102-114.

Nitsch, J. P., Kurtz, Jr, E. B., Liverman, J. L. and Went, F.W. (1952). The development of sex expression in cucurbit flowers. *American J. Bot.*, 32-43.

Oboh, I.O. and Aluyor, E.O. (2009). *Luffa cylindrica*-an emerging cash crop. *African J. Agric. Res.*, **4**(8), 684-688.

Phan, T.T., Truong, H.T.H., Nguyen, S.C.H., Nguyen, T.T.T. and Tran, T.V. (2015). Evaluation of promising sponge gourd (*Luffa cylindrica*) accessions in summer-autumn season 2014 in Thua Thien Hue. *J. Agric. Sci. Tech., A and B & Hue University Journal of Science*, **5**, 508-514.

Rabei, S., Rizk, R.M. and Khedr, A.H.A. (2013). Keys for and morphological character variation in some Egyptian cultivars of Cucurbitaceae. *Genet. Resour. Crop Evol.*, **60**(4), 1353-1364.

Rai, S., Bahadur, V. and Topno, S.E. (2025). Performance of different hybrids of sponge gourd (*Luffa cylindrica* L.) for growth, yield and quality. *J. Adv. Biol. Biotechnol*, **28**(6), 135-144.

Samadia, D.K. (2011). Genetic variability studies in ridge gourd under arid environment. *Indian J. Hort.*, **68**(2), 275-277.

Silva, M.W.K.P., Ranil, R.H.G. and Fonseka, R.M. (2015). *Luffa cylindrica* (L.) M. Roemer (Sponge Gourd-Niyan wetakolu), An emerging high potential underutilized cucurbit. *Trop. Agric. Res.*, **24**(2).

Wehner, T. C., Naegele, R. P., Myers, J.R., Narinder, P.S. and Crosby, K. (2020). Cucurbits 2nd Edition (Vol. 32). CABI.

Whitaker, T.W. (1931). Sex ratio and sex expression in the cultivated cucurbits. *American J. Bot.*, 359-366.

Wu, H.B., Gong, H., Liu, P., He, X. L., Luo, S. B., Zheng, X. M., Zhang, C. Y., He, X. M. and Luo, J. (2014). Large-scale development of EST-SSR markers in sponge gourd via transcriptome sequencing. *Mol. Breed.,* **34**(4), 1903-1915.