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Performance of sponge gourd [*Luffa cylindrica* (Roem.) L.] genotypes for growth, yield and quality traits

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Abstract

In order to evaluate the performance of thirty genotypes of sponge gourd for growth, yield and quality traits, the present investigation was laid under randomized block design (RBD) with two replications at Department of Horticulture, MARS, University of Agricultural Sciences, Dharwad (Karnataka) during *Rabi* season of 2020. Among the sponge gourd genotypes, genotype HUB-1 recorded highest vine length (5.09 m), days to last harvest (110.28), fruiting period (63.39), number of fruits per vine (18.00), fruit yield per vine (2.20 kg/plant), total fruit yield per hectare (13.55 t/ha) and fruit length (24.07 cm) and recorded desirable lowest values for days to first female flower appearance (38.84), node at which first female flower appeared (11.82), days to first male flower appearance (36.00), days to first harvest (46.90) and rind thickness (1.38 mm). HUB-8 recorded higher fruit set per cent (87.20%) and lower node at which first male flower appeared (5.53). Kashi Shreya recorded higher number of branches (5.30) and lower physiological loss in weight (21.62%). Among the thirty four genotypes, the genotypes HUB-1, HUB-8, Kashi Shreya, HUB-3 and KRCC-1 were found promising for growth, yield attributes and quality traits. These genotypes could be utilized for further breeding programme and recommended to the farmers for commercial cultivation.

Keywords: Sponge gourd, genotypes, growth, yield and quality

Introduction

Sponge gourd [*Luffa cylindrica* (Roem.) L.] ($2n=2x=26$) is one of the minor cucurbitaceous vegetable crops with old world origin in subtropical Asian region particularly India (Swarup, 2006) [18]. It is also known as smooth luffa, Chinese okra, climbing okra and dishcloth gourd. Some local names of sponge gourd in India are tuppada heeray kayi (Kannada), chikni turai (Hindi), bhol (Assamese), jhinga (Bengali), janhi (Oriya), gisoda (Gujarati), neti beerakaya (Telugu), peechinga (Malayalam) and pirkanga (Tamil) (Bal *et al.*, 2004) [4]. Most of the cucurbitaceous vegetables, including sponge gourd are usually grown in relatively small area for local consumption and hence exact area and production are unknown. Cucurbits share about 5.6 per cent of the total vegetable production of India (Rai and Rai, 2006) [14]. In India, it occupies an area of about 7.21 lakh ha with production of 12.87 lakh tonnes. The productivity of this crop is 10.52 tonnes per hectare (Anon., 2022) [3]. China, Korea, India, Japan, Nepal and Central America are the top cucurbits producing countries. In India, top cucurbits growing states are Uttar Pradesh, Punjab, Bihar, Gujarat, Rajasthan, Jharkhand, Haryana and Karnataka.

Sponge gourd is commonly grown for its tender fruits for vegetable purpose. It is a highly nutritive vegetable and it contains moisture of 93.2 g, protein 1.2 g, fat 0.20 g, carbohydrate 2.9 g, vitamins (carotene 120 mg, thiamin 0.02 mg, riboflavin 0.06 mg and niacin 0.4 mg), minerals (calcium 36 mg, ferrous 1.1 mg and phosphorus 19 mg) and fibers (0.20 g) per 100 g of edible portion. Sponge gourd fruits contain more protein and carotene than ridge gourd (Gopalan *et al.*, 1999) [6]. The mature fruit eases blood circulation and provides relief for rheumatic and arthritic sufferers. It has been found that the consumption of sponge gourd supplies antioxidants like luffin A and luffin B, which are important to human health. Though sponge gourd is one of the nutritious cucurbit in the country it has been neglected by the breeder so far. Serious attention towards genetic improvements are lacking in this crop, even though there is a large genetic variation exists in country. There is no systematic germplasm collection, evaluation and conservation programme at national level and international level. Consequently, there is no systematic approach to *Luffa* crop improvement. Considering the nutritional importance of sponge gourd, there is a prime need for its improvement.

Identification of an improved variety with higher yield and good quality characters with wider adaptability would be a great benefit to the farmers. Therefore, the present investigation was carried out with a view to evaluate the sponge gourd genotypes for growth, yield and quality traits.

Materials and Method

The present investigation was conducted at olericulture unit, Department of Horticulture, MARS, University of Agricultural Sciences, Dharwad (Karnataka) during *Rabi*, 2020. Thirty-four genotypes were evaluated in a randomized block design with two replications. These genotypes were collected from Kittur Rani Channamma College of

Horticulture (KRCCH), Arabhavi, Hidakal Research Station (HRES), Hidakal, College of Horticulture (CoH), Mandsur, Indian Institute of Vegetable Research (IIVR), Varanasi, Indian Agricultural Research Institute (IARI), New Delhi, local cultivar (Karnataka) and some private varieties. All the recommended package of practices were followed for crop raising. Observations on growth, yield and quality parameters were recorded at different stages of crop growth.

Results and Discussion

The analysis of variance showed highly significant differences among all the genotypes indicating presence of sufficient variability for all the characters studied (Table 1).

Table 1: Analysis of variance for various characters in sponge gourd genotypes

Sl. No.	Source	Replication	Treatment	Error
	Degrees of freedom	1	33	33
1.	Vine length	0.063	1.410**	0.061
2.	Number of leaves per vine	0.849	266.161**	11.859
3.	Number of branches per vine	0.191	1.679**	0.081
4.	Internodal length	0.519	9.118**	0.935
5.	Days to first female flower appearance	9.287	23.807**	5.282
6.	Node at which first female flower appeared	0.009	4.562**	0.606
7.	Days to first male flower appearance	0.018	19.957**	4.499
8.	Node at which first male flower appeared	0.017	1.568**	0.158
9.	Number of female flowers per vine	0.404	35.898**	0.924
10.	Number of male flowers per vine	9.089	5018.695**	141.654
11.	Sex ratio	6.018	63.860**	2.354
12.	Days to first harvest	13.978	65.408**	9.129
13.	Days to last harvest	0.162	83.114**	25.203
14.	Fruiting period	11.13	254.22****	27.67
15.	Number of fruits per vine	1.725	28.662**	0.463
16.	Fruit set per cent	6.810	183.459**	34.026
17.	Fruit yield per vine	0.037	0.599**	0.010
18.	Total fruit yield per hectare	1.389	22.833**	0.377
19.	Average fruit weight	4.468	1207.595**	48.718
20.	Number of seeds per fruit	0.239	5170.857**	148.059
21.	Hundred seed weight	0.192	0.340**	0.070
22.	Fruit length	0.706	14.839**	0.418
23.	Fruit diameter	0.004	0.313**	0.008
24.	Pulp thickness	0.036	0.941**	0.029
25.	Rind thickness	0.001	0.140**	0.005
26.	Total Soluble Solids (TSS)	0.021	0.725**	0.026
27.	Physiological loss in weight	3.704	99.212**	1.242
28.	Downy mildew incidence	2.120	150.780**	4.770

*Significant at 5% level; **Significant at 1% level

Growth parameters

Vine length is considered as an important yield contributing trait, because it leads to more number of nodes, branches and flowers, ultimately results in increased productivity. Vine length ranges from 1.80 to 5.09 m with a general mean of 3.56 m. Highest vine length (5.09 m) was recorded in genotype HUB-1 and was on par with HUB-3 (5.01 m), KRCCH-1 (4.81 m), Kashi Shreya (4.63 m) and HUB-8 (4.61 m). Whereas, genotype SRO-3 produced lowest vine length (1.80 m). Number of leaves per vine varied from 25.39 to 74.31 with a general mean of 46.87. Among the genotypes studied, genotype HUB-3 was found to be the highest (74.31) and was statistically on par with HUB-1 (72.28). Whereas, genotype Hunasi Local was recorded lowest number of leaves per vine (25.39). Number of branches per vine ranges from 2.00 (Sirsi Local) to 5.30 (Kashi Shreya) with a general mean of 4.38. Internodal length differs from 14.30 (KRCCH-1) to 22.03 (HUB-14) cm with a general mean of 17.04 cm (Table

2). These results were in accordance with earlier works of Alli Rani and Jansirani (2014) [2], Bhagat *et al.* (2017) [5], Sharma *et al.* (2017) [16], Saikia and Phookan (2018) [15], Vandana *et al.* (2018) [22] and Mounica *et al.* (2019) [11].

Earliness is an important consideration in vegetable crops for realizing the potential economic yield as soon as possible. Farmers prefer to grow early and high yielding varieties in order to catch early market, to get higher prices and to avoid market glut. The traits like days to first female appearance, node at which first female flower appeared, days to first male appearance, node at which first male flower appeared and days to first fruit harvest are very much helpful in determining earliness. Days to first female flower appearance ranges from 38.84 to 59.05 days with a general mean of 45.97 days. Among the genotypes, HUB-1 took less days to first female flower appearance (38.84 days) and genotypes KRCCH-1 (39.05), Pusa Sneha (42.45), HUB-3 (43.66) and other two genotypes are statistically on par with each other. While,

genotype Sirsi Local took more days to first female flower appearance (59.05 days). Node at which first female flower appeared varies from 11.82 to 17.53 with overall mean of 14.56. Among the genotypes, HUB-1 recorded lowest node at which first female flower appeared (11.82) and was statistically on par with HUB-13 (12.28), HUB-3 (13.00), SG-2 (13.02), SG-1 (13.28) and Pusa Chikni (13.39). While, genotype HUB-4 recorded highest node number at which first female flower appeared (17.53). From the genotypes evaluated, days to first male flower appearance ranged from 36.00 (HUB-1) to 55.23 (Sirsi Local) days with general mean of 41.49 days. The character node at which first male flower appeared ranges from 5.53 (HUB-8) to 10.52 (SRO-3) with average mean of 6.73 (Table 3).

Significant differences were observed among all the genotypes for number of female flowers per vine. It varies from 5.38 to 23.41 with overall mean of 15.64. Among the genotypes, KRCCH-1 recorded maximum number of female flowers per vine (23.41) followed by HUB-1 (23.14), HUB-3 (21.12) and Pusa Chikni (18.85). While, genotype Sirsi Local recorded minimum number of female flowers per vine (5.38).

Number of male flowers per vine differed from 81.59 (Vijayapur Local) to 319.94 (HUB-15) with a general mean of 227.59. Among the genotypes assessed, HUB-4 was recorded narrow sex ratio (8.36) and HUB-11 recorded wider sex ratio (34.53) (Table 3). The outcomes are in correspondence with earlier works of Pandiyan *et al.* (2019) [12], Venugopala Reddy *et al.* (2019) [23], Madhavi *et al.* (2021) [9] and Sohi *et al.* (2021) [17].

Early picking is desirable to fetch high remunerative market price and also provides ample scope for crop rotation in the field. Among the genotypes studied, HUB-1 took less days to first harvest (46.90 days) and was statistically on par KRCCH-1 (48.18), HUB-3 (51.45) and other four genotypes. While, genotype SRO-3 took more days to first harvest (70.74 days). Days to last harvest varied from 85.04 (Sirsi Local) to 110.28 (HUB-1) with a general mean of 100.27 days. The character fruiting period differs from 15.80 (Sirsi Local) to 63.39 (HUB-1) days with a general mean of 43.75 days (Table 4). The outcomes are in association with Pandiyan *et al.* (2019) [12] and Sohi *et al.* (2021) [17].

Table 2: Mean performance of sponge gourd genotypes for growth parameters

Sl. No.	Genotype	Vine length (m)	Number of leaves per vine	Number of branches per vine	Internodal length (cm)
1.	Arabhavi Local	3.87	50.25	4.94	15.45
2.	COHM-1	3.54	44.77	4.47	18.33
3.	COHM-2	3.16	42.85	4.44	18.24
4.	Dharwad Local	3.94	51.95	5.06	17.10
5.	HUB-1	5.09	72.28	5.23	14.67
6.	HUB-2	3.52	44.08	4.46	20.54
7.	HUB-3	5.01	74.31	5.11	14.84
8.	HUB-4	3.77	47.50	4.58	17.64
9.	HUB-5	3.90	50.31	4.95	16.35
10.	HUB-6	3.74	46.23	4.89	16.20
11.	HUB-8	4.61	54.50	5.19	15.66
12.	HUB-9	2.94	37.81	3.46	19.94
13.	HUB-10	3.12	41.76	4.43	19.50
14.	HUB-11	2.33	35.50	3.12	21.50
15.	HUB-13	3.51	43.92	4.93	17.37
16.	HUB-14	2.89	37.51	3.80	22.03
17.	HUB-15	3.00	40.73	3.33	20.04
18.	Hunasi Local	2.00	25.39	2.50	16.86
19.	Kashi Divya	3.91	50.50	5.00	16.11
20.	Kashi Shreya	4.63	56.50	5.30	14.82
21.	KRCCH-1	4.81	66.56	5.21	14.30
22.	KRCCH-2	3.38	43.97	4.46	19.00
23.	PSK-1	3.82	51.36	4.95	15.98
24.	PSK-2	3.70	46.00	4.56	15.96
25.	Pusa Chikni	4.12	53.16	5.08	15.93
26.	Pusa Sneha	4.03	53.01	5.05	15.14
27.	SG-1	4.01	52.26	4.83	14.32
28.	SG-2	4.18	58.76	5.08	14.82
29.	SG-4	3.94	53.48	5.01	15.81
30.	SG-5	3.69	45.80	4.57	16.30
31.	SG-6	3.00	38.22	4.00	19.58
32.	Sirsi Local	2.01	29.59	2.00	15.34
33.	SRO-3	1.80	25.45	2.50	15.80
34.	Vijaypur Local	2.23	27.48	2.65	17.84
	Mean	3.56	46.87	4.38	17.04
	S.Em. \pm	0.18	2.44	0.20	0.68
	C.D. @ 5%	0.50	7.01	0.58	1.97

Table 3: Mean performance of sponge gourd genotypes for flowering parameters

Sl. No.	Genotype	Days to first female flower appearance	Node at which first female flower appeared	Days to first male flower appearance	Node at which first male flower appeared	Number of female flowers per vine	Number of male flowers per vine	Sex ratio
1.	Arabhavi Local	46.50	13.83	42.00	6.43	16.77	226.45	13.62
2.	COHM-1	44.70	14.75	41.03	6.89	15.67	222.45	14.20
3.	COHM-2	44.89	13.78	40.39	6.88	12.50	221.00	17.77
4.	Dharwad Local	44.50	13.97	39.94	5.96	17.95	248.47	13.85
5.	HUB-1	38.84	11.82	36.00	5.73	23.14	270.84	11.71
6.	HUB-2	46.14	14.03	42.59	6.82	14.00	217.30	15.54
7.	HUB-3	43.66	13.00	39.75	5.72	21.12	256.40	12.14
8.	HUB-4	45.77	17.53	41.66	7.90	16.17	134.78	8.36
9.	HUB-5	44.42	13.72	39.99	6.02	16.72	222.35	13.30
10.	HUB-6	44.62	14.15	40.95	6.71	15.53	216.01	13.91
11.	HUB-8	45.89	13.64	39.39	5.53	18.00	215.89	12.01
12.	HUB-9	51.05	15.15	46.50	7.02	12.72	236.50	18.60
13.	HUB-10	46.16	13.93	41.68	7.03	18.03	247.34	13.72
14.	HUB-11	45.05	15.58	41.49	6.97	8.96	304.79	34.53
15.	HUB-13	44.64	12.28	39.97	6.45	17.42	231.40	13.30
16.	HUB-14	45.71	16.73	41.59	7.48	16.10	240.00	14.91
17.	HUB-15	49.05	15.77	41.95	6.88	14.55	319.94	22.05
18.	Hunasi Local	48.50	17.10	42.50	7.37	7.22	225.54	31.26
19.	Kashi Divya	46.44	14.07	41.83	6.43	18.03	223.34	12.45
20.	Kashi Shreya	45.50	13.44	41.90	5.91	18.70	248.89	13.34
21.	KRCCH-1	39.05	13.40	36.34	6.50	23.41	280.95	12.01
22.	KRCCH-2	45.00	15.45	40.88	7.00	16.82	225.84	13.44
23.	PSK-1	45.33	13.80	41.21	6.60	16.28	224.95	13.90
24.	PSK-2	43.95	15.09	40.23	6.58	15.47	228.34	14.76
25.	Pusa Chikni	44.92	13.39	41.30	6.12	18.85	242.50	12.87
26.	Pusa Sneha	42.45	13.43	38.45	6.20	17.93	228.54	12.79
27.	SG-1	46.95	13.28	41.86	6.14	17.50	252.89	14.45
28.	SG-2	46.45	13.02	42.34	5.97	18.25	252.95	13.86
29.	SG-4	43.84	14.56	39.95	6.50	17.44	286.03	16.41
30.	SG-5	45.94	14.50	39.84	6.46	15.39	220.43	14.33
31.	SG-6	48.00	16.95	41.89	7.13	14.87	244.00	16.43
32.	Sirsi Local	59.05	17.43	55.23	7.27	5.38	153.83	28.92
33.	SRO-3	50.67	15.24	46.17	10.52	7.00	85.73	12.27
34.	Vijaypur Local	49.50	17.35	42.00	7.77	7.99	81.59	10.22
	Mean	45.97	14.56	41.49	6.73	15.64	227.59	15.50
	S.Em. \pm	1.63	0.55	1.50	0.44	0.68	8.42	1.08
	C.D. @ 5%	4.68	1.58	4.32	1.28	1.96	24.21	3.12

Table 4: Mean performance of sponge gourd genotypes for yield parameters

Sl. No.	Genotype	Days to first harvest	Days to last harvest	Fruiting period
1.	Arabhavi Local	55.33	85.97	30.64
2.	COHM-1	53.82	104.39	50.58
3.	COHM-2	57.97	93.19	35.22
4.	Dharwad Local	53.39	105.95	52.56
5.	HUB-1	46.90	110.28	63.39
6.	HUB-2	57.51	97.05	39.54
7.	HUB-3	51.45	109.84	58.39
8.	HUB-4	53.91	103.20	49.29
9.	HUB-5	53.14	104.45	51.31
10.	HUB-6	52.78	104.39	51.62
11.	HUB-8	53.70	107.34	53.64
12.	HUB-9	60.34	94.84	34.50
13.	HUB-10	56.58	99.04	42.46
14.	HUB-11	64.55	94.45	29.90
15.	HUB-13	55.49	104.71	49.22
16.	HUB-14	63.74	97.86	34.12

17.	HUB-15	58.72	92.51	33.79
18.	Hunasi Local	70.04	88.45	18.41
19.	Kashi Divya	54.56	98.35	43.79
20.	Kashi Shreya	52.39	104.89	52.50
21.	KRCCH-1	48.18	99.00	50.83
22.	KRCCH-2	55.37	97.55	42.18
23.	PSK-1	53.34	107.29	53.95
24.	PSK-2	53.39	102.86	49.47
25.	Pusa Chikni	53.99	103.00	49.01
26.	Pusa Sneha	51.90	108.00	56.11
27.	SG-1	54.95	106.28	51.34
28.	SG-2	55.00	103.24	48.25
29.	SG-4	51.83	102.34	50.51
30.	SG-5	54.95	101.00	46.06
31.	SG-6	60.19	96.48	36.30
32.	Sirsi Local	69.24	85.04	15.80
33.	SRO-3	70.74	94.97	24.23
34.	Vijaypur Local	62.24	101.03	38.79
	Mean	56.52	100.27	43.75
	S.Em. \pm	2.14	3.55	3.72
	C.D. @ 5%	6.15	10.21	10.70

Yield parameters

Significant differences were noticed among the genotypes for number of fruits per vine (Table 5). The number of fruits per vine varies from 2.98 to 18.00 with a general mean of 10.87. Among the genotypes studied, HUB-1 was found to be having highest number of fruits per vine (18.00) and was statistically on par with genotypes HUB-3 (17.50) and KRCCH-1 (17.00). While, genotype SRO-3 recorded lowest number of fruits per vine (2.98). Fruit set per cent ranges from 42.99 to 87.20% with a general mean of 68.02%. Among the genotypes evaluated, HUB-8 was recorded the highest fruit set per cent (87.20%) and genotype SRO-3 recorded lowest fruit set per cent (42.99%). The fruit yield per vine varied from 0.23 to 2.20 kg/plant with the mean of 1.38 kg/plant. The genotype HUB-1 reported maximum fruit yield per plant (2.20 kg/plant) and was statistically on par with genotypes HUB-3 (2.15 kg/plant), KRCCH-1 (2.06 kg/plant) and HUB-8 (2.00 kg/plant). The minimum fruit yield per vine was recorded in SRO-3 (0.23 kg/plant). Total fruit yield per hectare recorded significant differences between all the genotypes and it differs from 1.39 to 13.55 t/ha with a general mean of 8.53 t/ha. Among the genotypes studied, the genotype HUB-1 recorded the highest total fruit yield per

hectare (13.55 t/ha) and was statistically on par with genotypes HUB-3 (13.27 t/ha), KRCCH-1 (12.69 t/ha) and HUB-8 (12.34 t/ha). Whereas, genotype SRO-3 was the lowest for total fruit yield per hectare (1.39 t/ha).

Average fruit weight observed significant differences among genotypes and it varies from 65.08 (HUB-11) to 143.25 g (Sirsi Local) with a general mean of 114.40 g. The number of seeds per fruit of different genotypes ranged from 157.29 (HUB-11) to 305.39 (KRCCH-1) with general mean of 226.87. Hundred seed weight varied from 11.87 (SG-4) to 13.10 g (Vijaypur Local) with a general mean of 12.25 g. The character downy mildew incidence ranges from 22.00 to 62.60% with average mean of 36.46%. The genotype HUB-3 recorded lowest downy mildew incidence (22.00%). While, Hunasi Local (62.60%) recorded highest downy mildew incidence. Among the 34 genotypes, 3 genotypes were moderately resistant, 30 genotypes were moderately susceptible and 1 genotype was susceptible for downy mildew incidence (Table 5). These results are in accordance with the findings of Radha Rani (2014) ^[13], Uddin *et al.* (2014) ^[21], Thakur *et al.* (2015) ^[20], Krishnamoorthy and Ananthan (2017) ^[17], Abhijeet *et al.* (2018) ^[11], Kumar *et al.* (2018) ^[18] and Tadkal *et al.* (2019) ^[19].

Table 5: Mean performance of sponge gourd genotypes for yield parameters

Sl. No.	Genotype	Number of fruits per vine	Fruit set per cent (%)	Fruit yield per vine (kg/plant)	Total fruit yield per hectare (t/ha)	Average fruit weight (g)	Number of seeds per fruit	Hundred seed weight (g)	Downy mildew incidence (%)	Resistant Category
1.	Arabhazi Local	11.31	67.91	1.65	10.19	134.30	289.29	12.00	29.42	MS
2.	COHM-1	10.44	66.70	1.35	8.30	126.88	193.00	12.08	35.77	MS
3.	COHM-2	9.75	77.94	1.20	7.38	124.94	303.28	12.01	34.25	MS
4.	Dharwad Local	13.21	73.59	1.78	10.96	129.90	295.84	12.00	27.23	MS
5.	HUB-1	18.00	77.92	2.20	13.55	140.78	184.73	12.00	23.39	MR
6.	HUB-2	10.44	74.85	1.30	8.02	126.29	175.26	12.00	37.15	MS
7.	HUB-3	17.50	82.86	2.15	13.27	140.39	201.23	12.49	22.00	MR
8.	HUB-4	11.03	68.49	1.56	9.63	75.39	193.18	12.07	42.73	MS
9.	HUB-5	12.10	72.64	1.66	10.25	129.77	302.85	12.02	27.52	MS
10.	HUB-6	11.18	72.03	1.59	9.79	129.39	235.74	12.00	24.60	MR
11.	HUB-8	15.70	87.20	2.00	12.34	81.35	180.96	12.00	29.50	MS
12.	HUB-9	8.69	68.23	0.77	4.76	66.19	303.89	12.00	38.88	MS
13.	HUB-10	9.71	53.82	1.10	6.79	121.30	177.40	12.00	35.76	MS

14.	HUB-11	6.00	67.69	0.69	4.26	65.08	157.29	12.84	55.40	MS
15.	HUB-13	11.21	64.41	1.62	9.97	124.45	180.17	12.73	37.00	MS
16.	HUB-14	9.60	59.66	0.92	5.68	80.80	159.40	11.90	35.50	MS
17.	HUB-15	7.95	54.46	0.77	4.75	71.53	162.01	12.01	43.49	MS
18.	Hunasi Local	3.94	54.60	0.40	2.47	93.03	284.95	13.00	62.60	S
19.	Kashi Divya	12.12	67.45	1.68	10.37	127.68	191.84	12.92	30.89	MS
20.	Kashi Shreya	14.91	79.86	1.94	11.98	133.73	260.84	12.45	27.00	MS
21.	KRCCH-1	17.00	72.67	2.06	12.69	129.97	305.39	12.00	31.00	MS
22.	KRCCH-2	10.23	60.78	1.27	7.81	130.72	296.81	13.00	47.67	MS
23.	PSK-1	11.24	68.70	1.65	10.19	82.30	200.69	12.00	37.78	MS
24.	PSK-2	10.99	71.15	1.55	9.57	126.62	193.89	12.00	38.50	MS
25.	Pusa Chikni	13.93	74.28	1.79	11.05	132.55	254.75	12.05	30.73	MS
26.	Pusa Sneha	12.72	70.97	1.76	10.83	130.40	175.39	12.00	33.50	MS
27.	SG-1	12.65	72.24	1.75	10.81	130.84	254.24	12.00	35.89	MS
28.	SG-2	13.98	76.62	1.87	11.54	115.28	225.24	12.03	36.50	MS
29.	SG-4	12.30	70.63	1.71	10.53	129.32	257.39	11.87	45.89	MS
30.	SG-5	10.75	70.10	1.41	8.71	129.29	220.78	12.02	36.80	MS
31.	SG-6	9.30	62.40	0.84	5.15	107.79	176.45	12.97	43.78	MS
32.	Sirsi Local	3.00	56.62	0.40	2.47	143.25	244.56	13.04	44.39	MS
33.	SRO-3	2.98	42.99	0.23	1.39	74.80	189.90	12.02	41.87	MS
34.	Vijaypur Local	3.99	50.34	0.41	2.53	103.30	284.96	13.10	35.24	MS
	Mean	10.87	68.02	1.38	8.53	114.40	226.87	12.25	36.46	
	S.Em. \pm	0.48	4.12	0.07	0.43	4.94	16.29	0.19	1.54	
	C.D. @ 5%	1.38	11.87	0.20	1.25	14.20	46.88	0.54	4.44	

Note: MR: Moderately resistant, MS: Moderately susceptible and S: Susceptible

Quality parameters

Higher fruit length, diameter, pulp thickness, lower rind thickness, Total Soluble Solids and physiological loss in weight are desirable quality attributes in sponge gourd. The values of fruit length varied from 15.09 to 24.07 cm with a general mean of 19.82 cm. Among the 34 sponge gourd genotypes studied, HUB-1 registered highest fruit length (24.07 cm) and was statistically on par with HUB-3 (24.05 cm) and Sirsi Local (23.68 cm). While, genotype Hunasi Local had lowest fruit length (15.09 cm). Fruit diameter ranges from 3.02 (HUB-15) to 4.86 cm (Sirsi Local) with a general mean of 3.52 cm. The pulp thickness ranged from 5.86 to 9.70 cm with the mean of 6.70 cm. The genotype Sirsi Local recorded maximum pulp thickness (9.70 cm) and minimum pulp thickness was recorded in Pusa Sneha (5.86 cm). Among the genotypes evaluated, HUB-1 and HUB-3 recorded minimal rind thickness (1.38 mm). While genotype HUB-4 recorded maximal rind thickness (2.43 mm). The TSS of the sponge gourd genotypes showed significant differences

and it varies from 4.39 (HUB-13) to 7.05 ° Brix (HUB-11) with a general mean of 5.20 ° Brix. Physiological loss in weight is one of the major traits in sponge gourd as it is highly perishable vegetable. Lower the physiological loss in weight, higher will be the shelf life of the sponge gourd. Physiological loss in weight noticed significant differences among the genotypes and it ranges from 21.62 to 46.95% with a general mean of 32.45%. Among the genotypes evaluated, Kashi Shreya recorded the minimum physiological loss in weight (21.62%) and was statistically on par with genotypes SG-1 (21.90%), Pusa Sneha (22.46%) and HUB-3 (22.78%). While, genotype Vijaypur Local recorded maximum physiological loss in weight (46.95%) (Table 6). The findings are in line with earlier findings of Alli Rani and Jansirani (2014) [2] for fruit length and average fruit weight; Mallikarjunarao *et al.* (2020) [10] for average fruit weight; Krishnamoorthy and Ananthan (2017) [17] for fruit length and Venugopala Reddy *et al.* (2019) [23] for rind thickness and physiological loss in weight.

Table 6: Mean performance of sponge gourd genotypes for quality parameters

Sl. No.	Genotype	Fruit length (cm)	Fruit diameter (cm)	Pulp thickness (cm)	Rind thickness (mm)	Total Soluble Solids (TSS) (° Brix)	Physiological loss in weight (%)
1.	Arabhavi Local	21.63	3.67	6.26	1.55	4.85	29.03
2.	COHM-1	20.47	3.48	5.92	1.79	5.26	41.20
3.	COHM-2	15.51	3.79	7.07	1.97	5.05	41.05
4.	Dharwad Local	22.11	3.91	6.35	1.51	4.60	26.45
5.	HUB-1	24.07	3.26	6.97	1.38	4.62	26.45
6.	HUB-2	18.19	3.23	6.26	1.71	5.23	39.52
7.	HUB-3	24.05	3.62	7.25	1.38	5.10	22.78
8.	HUB-4	17.12	3.30	6.68	2.43	5.55	25.46
9.	HUB-5	19.73	3.71	7.01	1.51	4.82	25.93
10.	HUB-6	19.45	3.71	6.84	1.51	4.63	26.72
11.	HUB-8	18.73	3.08	6.20	1.73	4.76	35.45
12.	HUB-9	15.55	3.06	6.77	1.71	5.28	35.89
13.	HUB-10	19.96	3.09	6.46	1.65	5.37	38.40
14.	HUB-11	15.43	3.10	6.57	1.74	7.05	34.93
15.	HUB-13	20.33	3.73	6.45	1.64	4.39	24.62

16.	HUB-14	15.47	3.08	7.10	2.00	5.03	38.30
17.	HUB-15	18.23	3.02	6.45	2.10	5.15	38.39
18.	Hunasi Local	15.09	3.76	6.98	2.00	5.11	39.66
19.	Kashi Divya	21.43	3.69	6.39	1.76	4.93	27.32
20.	Kashi Shreya	22.23	3.20	6.65	1.42	4.83	21.62
21.	KRCCH-1	21.99	3.37	8.02	1.45	4.62	30.12
22.	KRCCH-2	19.47	3.77	6.91	2.20	5.61	38.74
23.	PSK-1	16.33	3.35	6.95	1.81	4.73	33.28
24.	PSK-2	21.03	3.74	5.98	1.84	4.64	42.78
25.	Pusa Chikni	21.22	3.12	6.50	1.71	4.79	24.05
26.	Pusa Sneha	21.51	3.55	5.86	1.56	4.96	22.46
27.	SG-1	22.60	3.78	6.73	1.67	6.26	21.90
28.	SG-2	22.04	3.94	6.72	1.47	5.73	28.78
29.	SG-4	21.65	3.63	6.24	1.55	5.45	33.95
30.	SG-5	21.58	3.63	6.66	1.53	4.72	30.55
31.	SG-6	21.01	4.25	6.81	2.00	6.26	36.45
32.	Sirsi Local	23.68	4.86	9.70	2.33	5.15	40.56
33.	SRO-3	15.19	3.14	6.00	1.61	6.34	33.49
34.	Vijaypur Local	20.01	3.18	6.30	1.65	5.96	46.95
	Mean	19.82	3.52	6.70	1.73	5.20	32.45
	S.Em. \pm	0.46	0.06	0.23	0.05	0.11	0.79
	C.D. @ 5%	1.32	0.19	0.67	0.15	0.33	2.27

Conclusion

For all the characters studied, the analysis variance observed highly significant differences among the genotypes, which suggests that there is a considerable variation in the germplasm. Among the sponge gourd genotypes, genotype HUB-1 recorded highest vine length (5.09 m), days to last harvest (110.28), fruiting period (63.39), number of fruits per vine (18.00), fruit yield per vine (2.20 kg/plant), total fruit yield per hectare (13.55 t/ha) and fruit length (24.07 cm) and recorded desirable lowest values for days to first female flower appearance (38.84), node at which first female flower appeared (11.82), days to first male flower appearance (36.00), days to first harvest (46.90) and rind thickness (1.38 mm). HUB-8 recorded higher fruit set per cent (87.20%) and lower node at which first male flower appeared (5.53). Kashi Shreya recorded higher number of branches (5.30) and lower physiological loss in weight (21.62%).

Among the thirty four genotypes, genotypes HUB-1, HUB-8, Kashi Shreya, HUB-3 and KRCCH-1 were found promising for growth and yield attributes. Higher yield in these genotypes may be attributed to higher vine length, number of leaves per vine, number of branches per vine, number of female flowers per vine, days to last harvest, fruiting period, number of fruits per vine, fruit set per cent, average fruit weight and fruit diameter and minimum internodal length, days to female flower appearance, node at which first female flower appeared, days to male flower appearance, node at which first male flower appeared, days to first harvest, sex ratio and downy mildew incidence. Further evaluation of promising genotypes needs to be assessed at different agro climatic conditions.

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