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RESEARCH ARTICLE

Mean performance, correlation and path coefficient analysis in sponge gourd under arid environment of western Rajasthan

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Abstract

During the investigation, 26 genotypes of sponge gourd were evaluated for 12 traits, revealing significant differences and substantial genetic variability. Mean values for key traits like node at first female flower appearance, internodal length, and vine length were 10.97, 10.68 cm, and 3.14 m, respectively. Yield-related traits, including fruit length (22.07 cm), fruit diameter (3.19 cm), and fruit weight (99.85 g), also showed notable variation. The Thar Tapish and Pusa Sneha cultivars and AHSG-23, AHSG-25, AHSG-28, VRSG-140, VRSG-6 and VRSG-3-13 genotypes performed best under hot arid environmental conditions. Strong phenotypic and genotypic correlations were observed among yield components, with traits like fruit length, fruit weight, and marketable fruit yield per vine showing positive associations. Path coefficient analysis revealed that marketable fruit yield per vine had the highest direct positive effect on total marketable fruit yield, followed by vine length and fruit weight. The traits like internodal length and node at first female flower appearance showed negative effects. Indirect effects were also significant for traits like fruit length, fruit diameter, and number of marketable fruits per vine.

Keywords: Correlation, Path coefficient, Fruit yield, Sponge gourd.

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Introduction

Sponge gourd (*Luffa cylindrica* L.) is considered one of the most important and remunerative crops in almost all tropical and sub-tropical regions of the country. The fruits are either sold in local markets or supplied to distant places as green vegetables. The farmers, thereby, fetch a good, lucrative return through cultivating this crop. It is widely cultivated as a popular crop during the spring, summer, and rainy seasons. It originated in the subtropical Asian region, particularly India (Kalloo, 1993). Many commercially grown varieties are popular in different regions of the country. Even though assessment of genetic variability among the available gene pool is crucial for the direct selection of promising types for different traits and the identification of suitable and genetically divergent parents for hybrid breeding programmes. The fruits of sponge gourd display considerable variation in size and shape, typically ranging from oblong to club-shaped, and are predominantly green to dark green in colour. The crop exhibits significant genetic diversity, with numerous landraces identified in North India and arid regions, showcasing a wide range of traits, including leaf shape, fruit size, shape, colour, and seed colour (Choudhary et al., 2016; Munshi et al., 2021). The development of a new variety requires a high magnitude of genetic variability in the base material for desired traits. Despite the

presence of diverse germplasm of sponge gourd in arid parts of the country, limited work has been done to the genetic improvement of sponge gourd through the collection of diverse lines, their morphological characterization, and the assessment of variability parameters such as coefficient of variation, coefficient of correlation, and path analysis. To initiate any breeding program aimed at improving fruit yield, it is essential to have a comprehensive understanding of the genetic material under study, particularly in terms of variability, correlation, and path coefficient analysis.

The studies on correlation provide valuable insights into the association between various traits in a crop. Understanding these relationships is crucial for designing an efficient breeding program. Correlation estimates enable plant breeders to evaluate the degree of association between two or more characteristics within a sample or a group of strains for a given crop, thereby aiding in the selection of desirable traits. Correlation studies alone are insufficient to clearly establish relationships among the characters; therefore, it is essential to assess the actual contribution of each individual character towards fruit yield. Path coefficient analysis provides a clearer and more realistic understanding of the complex relationships present at the correlation level. It explains the cause and effect relationship among the variables. Path coefficient is standardized partial regression coefficient and as such measures the direct influence of one variable upon another and permits the separation of the correlation coefficients into components of direct and indirect effects (Dewey and Lu, 1959). It measures both the direct and indirect effects of independent variables (characters) on the dependent variable through other traits. This method permits the breeder to identify relatively important components of a variable on the basis of their direct and indirect influences. Considering the importance of correlation and path coefficient analysis in improvement of traits, the study has been undertaken on sponge gourd under hot arid conditions of Bikaner, Rajasthan.

Materials and Methods

The experiment was carried out at ICAR-Central Institute for Arid Horticulture, Bikaner, Rajasthan, during the *kharif* season 2023. The experimental farm is located at 28°N latitude, 73°18′E longitude at an altitude of 234.84 m above sea level. It falls under the agro-climatic zone of hyper-arid partial irrigated zone I C. The experimental material consisted of 26 diverse genotypes of sponge gourd. The experimental material consisted of 26 diverse genotypes of sponge gourd. The eight lines (AHSG-18, AHSG-19, AHSG-21, AHSG-23, AHSG-25, AHSG-28, AHSG-30, Thar Tapish) were provided by ICAR-CIAH, Bikaner. The seventeen lines (VRSG-3-13, VRSG-4-17, VRSG-5-17, VRSG-6, VRSG-8, VRSG-8-17, VRSG-11, VRSG-13, VRSG-18, VRSG-21-17, VRSG-40, VRSG-50, VRSG-66, VRSG-70, VRSG-73, VRSG-140 and VRSG-154) were supplied by ICAR-IIVR, Varanasi. The Pusa Sneha cultivar was obtained from ICAR-IARI, New Delhi.

The recommended agronomic package of practices and protection measures was followed to raise a healthy crop. Data were recorded on five randomly selected plants on days to 50% female flowering, node at which first female flower appeared, ovary length (cm), days to first fruit harvest after sowing, internodal length (cm), vine length at last harvest (m), fruit length (cm), fruit diameter (cm), fruit weight (g), number of fruits per vine, marketable fruit yield per vine (kg) and total marketable fruit yield (q/ha). The data were subjected to analysis of variance as per the procedure described by Panse and Sukhatme (1985). Correlation coefficients were calculated at the genotypic and phenotypic levels using the formulae suggested by Dewey and Lu (1959). The direct and indirect effects both at genotypic and phenotypic levels were estimated by taking fruit yield as the dependent variable, using path coefficient analysis as suggested by Wright (1921) and Dewey and Lu (1959).

Results and Discussion

The mean performance of 26 genotypes of sponge gourd for all the twelve characters, along with the standard error of deviation (SEd), critical difference (CD), and coefficient of variation (CV), are given in Tables 1 & 2. The mean performance showed significant differences for all the characters, indicating the presence of wide variability in the genotypes studied. The mean values for traits such as the node at which the first female flower appeared, internodal length, and vine length at the final harvest were 10.97, 10.68 cm, and 3.14 m, respectively. For other traits like ovary length, days to 50% female flowering, and days to first fruit harvest, the mean values were recorded as 5.08 cm, 48.10, and 59.64 days, respectively. Yield-contributing traits, including fruit length, fruit diameter, and fruit weight, showed mean values of 22.07 cm, 3.19 cm, and 99.85 g, respectively. These findings are consistent with the results reported by Sharma et al. (2017), Abhijeet et al. (2018), Ramesh et al. (2018), Kumar et al. (2019), Singh et al. (2019), Som et al. (2020), Vijaykumar et al. (2020), Sidhu et al. (2023), Thulasiram et al. (2023) and Kousthuba et al. (2023) and Yadav et al. (2024).

The phenotypic and genotypic correlation coefficients between yield and other related component characters and among themselves were estimated and presented in Table 3. The magnitude of correlation coefficients at genotypic level was almost higher than the equivalent correlation coefficients at the phenotypic level and expressed a strong inherent association between different attributes. Days to 50% female flowering showed significant positive correlations with days to first fruit harvest after sowing and fruit diameter. Node at which first female flower appeared showed significant positive correlations with internodal

Table 1: Performance of sponge gourd genotypes for growth and flowering traits

Genotypes	*Days to 50% female flowering*	*Node at which first female flower appeared*	*Ovary length (cm)*	*Internodal length (cm)*	*Days to first fruit harvest after sowing*	*Vine length at last harvest (m)*
AHSG-18	49.67	12.20	6.58	10.56	62.46	3.06
AHSG-19	50.33	10.36	4.46	9.86	66.13	3.07
AHSG-21	52.67	11.10	4.72	10.23	61.93	3.30
AHSG-23	49.67	11.00	4.43	11.06	54.20	2.78
AHSG-25	54.00	11.83	3.98	11.66	69.26	3.01
AHSG-28	50.33	11.06	5.37	10.70	55.13	3.08
AHSG-30	55.00	11.00	6.40	10.80	67.73	3.09
VRSG 3-13	49.33	10.50	5.41	10.06	59.66	3.26
VRSG 4-17	46.33	11.20	5.28	11.13	60.06	3.27
VRSG 5-17	48.66	12.80	4.70	11.73	59.40	3.53
VRSG-6	46.33	10.70	3.80	9.36	60.13	2.62
VRSG-8	44.67	9.83	4.19	9.40	59.86	3.44
VRSG-8-17	46.67	11.76	6.18	10.40	59.93	2.89
VRSG -11	44.67	10.43	4.82	11.23	52.46	3.04
VRSG -13	46.67	10.16	4.80	9.70	62.00	2.87
VRSG -18	44.67	11.36	5.36	10.96	58.66	3.18
VRSG-21-17	51.67	10.76	5.18	11.23	59.06	2.30
VRSG-40	46.00	10.26	6.00	10.40	58.13	3.03
VRSG-50	46.33	9.63	6.64	10.50	57.46	2.85
VRSG-66	50.00	11.46	4.30	10.60	60.00	3.21
VRSG-70	46.00	10.67	5.57	10.23	64.13	2.60
VRSG -73	49.33	10.86	4.10	10.50	60.20	3.25
VRSG-140	48.67	10.56	5.22	11.36	61.26	3.69
VRSG -154	49.00	11.36	4.58	11.50	59.26	3.39
Thar Tapish	43.33	9.96	5.64	10.03	52.40	3.37
Pusa Sneha	41.00	12.36	4.53	12.53	49.80	3.83
Mean	48.10	10.97	5.08	10.68	59.64	3.14
CV (%)	6.53	5.46	5.49	7.59	5.35	5.45
SE(d)	1.81	0.34	0.16	0.46	1.84	0.10
CD (0.05)	5.15	0.98	0.45	1.33	5.24	0.28

length. The internodal length exhibited significant positive correlations with the node at which the first female flower appeared, total marketable fruit yield, marketable fruit yield per vine, vine length, days to 50% female flowering and number of marketable fruit per vine. Days to first fruit harvest after sowing showed a significant positive correlation with days to 50% female flowering.

The character fruit length exhibited significant positive correlation with fruit weight, total marketable fruit yield, marketable fruit yield per vine and the number of marketable fruits per vine, fruit length, fruit diameter. Fruit diameter showed a significant positive correlation with fruit length, fruit weight, marketable fruit yield per vine and total marketable fruit yield, days to 50% female flowering. Fruit weight exhibited a significant positive correlation with fruit length, marketable fruit yield per vine, total marketable fruit yield and the number of marketable fruits per vine, fruit diameter. The number of marketable fruits per vine shows a significant positive correlation with fruit length, fruit weight, marketable fruit yield per vine, total marketable fruit yield

Table 2: Performance of sponge gourd genotypes for fruit and yield traits

Genotypes	*Fruit length (cm)*	*Fruit diameter (cm)*	*Fruit weight (cm)*	*Number of marketable fruits per vine*	*Marketable fruit yield per vine (kg)*	*Total marketable fruit yield (q/ ha)*
AHSG-18	18.46	2.77	103.08	18.46	2.22	139.16
AHSG-19	21.13	3.36	96.45	20.86	1.99	124.58
AHSG-21	20.73	3.51	95.76	21.00	2.38	148.75
AHSG-23	31.40	4.02	124.03	28.73	3.42	213.33
AHSG-25	21.56	4.32	99.05	18.60	2.48	155.00
AHSG-28	26.88	3.00	114.00	24.60	3.13	195.83
AHSG-30	23.50	3.28	98.15	18.20	2.72	170.41
VRSG 3-13	22.73	4.67	102.05	20.40	2.55	160.00
VRSG 4-17	21.78	2.71	96.35	22.26	2.24	140.41
VRSG 5-17	20.60	3.33	100.09	19.73	2.53	158.33
VRSG-6	17.80	2.61	88.77	17.73	1.66	104.16
VRSG-8	21.71	3.18	98.50	22.73	2.32	145.20
VRSG-8-17	20.79	3.02	96.80	20.40	2.50	156.25
VRSG-11	19.13	2.95	96.73	20.80	1.97	123.54
VRSG-13	20.96	3.08	102.06	19.60	1.87	117.29
VRSG-18	21.93	2.94	99.54	20.13	2.48	155.41
VRSG-21-17	23.56	3.07	95.04	20.40	2.40	150.20
VRSG-40	21.96	3.26	96.42	20.46	2.07	129.58
VRSG-50	20.56	3.22	95.75	20.66	2.58	161.66
VRSG-66	21.41	3.18	95.72	20.00	2.40	150.41
VRSG-70	21.35	2.55	97.48	19.00	2.01	126.04
VRSG-73	24.56	2.66	99.26	17.93	2.56	160.00
VRSG-140	19.17	3.26	98.70	21.20	2.54	158.95
VRSG-154	22.23	3.05	90.68	21.66	2.52	157.91
Thar Tapish	25.92	2.72	107.72	23.20	3.36	210.62
Pusa Sneha	22.00	3.34	108.06	26.60	3.41	213.75
Mean	22.07	3.19	99.85	20.97	2.47	154.87
CV (%)	6.26	5.32	5.44	5.63	8.75	8.74
SE(d)	0.79	0.09	3.13	0.68	0.12	7.82
CD (0.05)	2.26	0.28	8.91	1.93	0.35	22.21

internodal length and vine length.

Vine length had a significant positive correlation with internodal length, total marketable fruit yield and marketable fruit yield per vine, number of marketable fruits per vine. The marketable fruit yield per vine showed significant positive correlation with fruit length, fruit weight, number of marketable fruits per vine, vine length and internodal length. Total marketable fruit yield q/ ha showed positive and significant association with internodal length, fruit length, fruit weight, the number of marketable fruits per vine, vine length, marketable fruit yield per vine and fruit diameter. These findings are consistent with the results of Dubey et al. (2013), Varalakshmi et al. (2015), Sharma et al. (2017), Singh et al. (2018), Kumar et al. (2019), Som et al. (2020), and Sarma et al. (2022) in sponge gourd, Hanumegouda et al. (2012) in ridge gourd, and Kumari et al. (2021), and Bashir et al. (2024) in bottle gourd.

The direct and indirect effects of various characters, along with their phenotypic correlation coefficients with total marketable fruit yield are presented in Table 4 and the path diagram at genotypic level Fig. 1. The highest direct positive effect on total marketable fruit yield was observed

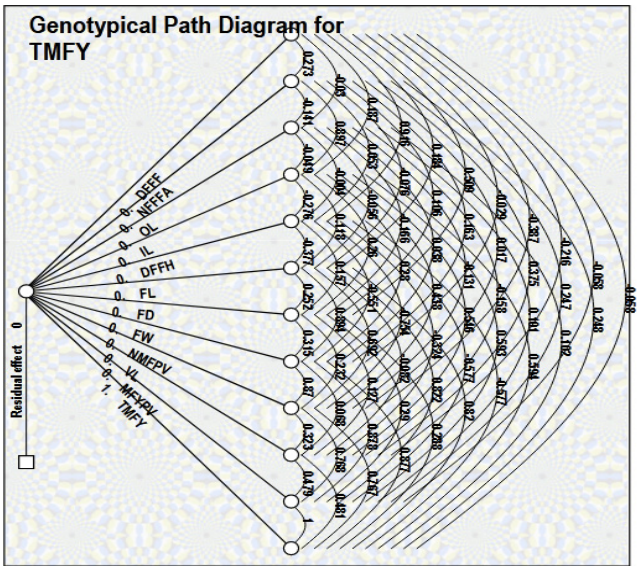
Table 3: Estimation of phenotypic (P) and genotypic (G) correlation coefficient for 12 characters in sponge gourd

Character		*Days to 50% female flowering*	*Node at which the first female flower appeared*	*Ovary length (cm)*	*Internodal length (cm)*	*Days to first fruit harvest after sowing*	*Fruit length (cm)*	*Fruit diameter (cm)*	*Fruit weight (g)*	*Number of marketable fruit per vine*	*Vine length at last harvest (m)*	*Marketable fruit yield per vine (kg)*	*Total marketable fruit yield (q/ ha)*
Days to 50% female flowering	P	**1.00**	0.067	-0.032	-0.072	0.419**	0.110	0.280	-0.080	-0.234*	-0.125	-0.036	-0.037
	G	**1.00**	0.273	-0.030	0.187	0.916**	0.185	0.509**	-0.029	-0.388	-0.216	-0.058	-0.058
Node at which first female flower appeared	P		**1.00**	-0.044	0.418**	0.048	-0.117	0.047	0.047	-0.018	0.185	0.173	0.173
	G		**1.00**	-0.141	0.897**	0.053	-0.076	0.106	0.163	0.018	0.375	0.247	0.248
Ovary length (cm)	P			1.00	-0.034	0.024	-0.061	-0.146	0.021	-0.111	-0.169	0.071	0.072
	G			**1.00**	-0.049	-0.004	-0.056	-0.166	0.038	-0.131	-0.158	0.101	0.102
Internodal length (cm)	P				**1.00**	-0.216	0.094	0.123	0.114	0.175	0.414**	0.324**	0.324**
	G				**1.00**	-0.276	0.118	0.260	0.280	0.438*	0.546**	0.593**	0.594*
Days to first fruit harvest after sowing	P					**1.00**	-0.241*	0.150	-0.301**	-0.562**	-0.209**	-0.412**	-0.412**
	G					**1.00**	-0.377	0.157	-0.551**	-0.754**	-0.3241	-0.577	-0.577
Fruit length (cm)	P						**1.00**	0.239*	0.594**	0.559**	0.017	0.573**	0.572**
	G						**1.00**	0.252	0.895**	0.692**	-0.083	0.822**	0.820**
Fruit diameter (cm)	P							**1.00**	0.270*	0.211	0.135	0.237*	0.235*
	G							**1.00**	0.315	0.232	0.127	0.290	0.289
Fruit weight (g)	P								**1.00**	0.555**	0.065	0.558**	0.556**
	G								**1.00**	0.870**	0.068	0.879**	0.877**
Number of marketable fruit per vine	P									**1.00**	0.246*	0.627**	0.626**
	G									**1.00**	0.323	0.768**	0.767**
Vine length (m)	P										1.00	0.328**	0.329**
	G										**1.00**	0.479*	0.481*
Marketable fruit yield per vine	P											**1.00**	1.00**
	G											**1.00**	1.00**
	P												1.00
	G												1.00

Table 4: Estimation of phenotypic (P) and genotypic (G) path coefficients for 12 characters in sponge gourd

Character		*Days to 50% female flowering*	*Node at which first female flower appeared*	*Ovary length (cm)*	*Internodal length (cm)*	*Days to first fruit harvest after sowing*	*Fruit length (cm)*	*Fruit diameter (cm)*	*Fruit weight (g)*	*Number of marketable fruit per vine*	*Vine length at last harvest (m)*	*Marketable fruit yield per vine (kg)*	*Total marketable fruit yield (q/ha)*
Days to 50% female flowering	P	**0.0005**	-0.0001	-0.0000	0.0001	0.0005	-0.0001	-0.0009	0.0001	0.0003	-0.0006	-0.0362	-0.037
	G	**0.0012**	-0.0002	-0.0001	0.0000	0.0000	-0.0000	-0.0007	-0.000	0.0005	-0.0010	-0.0580	-0.058
Node at which first female flower appeared	P	0.0000	**-0.0014**	-0.0000	-0.0007	0.0001	0.0002	-0.0002	-0.0001	0.0000	0.0009	0.1746	0.173
	G	0.0003	**-0.0006**	-0.0002	0.0001	0.0000	0.0000	-0.0002	0.0002	-0.0000	0.0018	0.2468	0.248
Ovary length (cm)	P	-0.0000	0.0001	**0.0009**	0.0001	0.0000	0.0001	0.0005	-0.0000	0.0001	-0.0008	0.0712	0.072
	G	-0.0000	0.0001	**0.0017**	-0.0000	0.0000	0.0000	0.0002	0.0001	0.0002	-0.0007	0.1008	0.102
Internodal length (cm)	P	-0.0000	-0.0006	-0.0000	**-0.0016**	-0.0002	-0.0001	-0.0004	-0.0002	-0.0002	0.0011	0.3257	0.324**
	G	0.0002	-0.0005	-0.0001	**0.0001**	-0.0000	-0.0000	-0.0004	0.0004	-0.0005	0.0026	0.5919	0.597**
Days to first fruit harvest after sowing	P	0.0002	-0.0001	0.0000	0.0004	**0.0010**	0.0003	-0.0005	0.0005	0.0007	-0.0010	-0.4132	-0.412**
	G	0.0010	-0.0000	-0.0000	-0.0000	**0.0000**	0.0001	-0.0002	-0.0007	0.0009	-0.0015	-0.5762	-0.577
Fruit length (cm)	P	0.0001	0.0002	-0.0001	-0.0002	-0.0003	**0.0013**	-0.0008	-0.0009	-0.0007	0.0001	0.5755	0.572**
	G	0.0002	0.0000	-0.0001	0.0000	0.0000	**0.0002**	-0.0004	0.0011	-0.0008	-0.0004	0.8202	0.820**
Fruit diameter (cm)	P	0.0002	-0.0001	-0.0001	-0.0002	0.0002	-0.0003	**0.0035**	-0.0004	-0.0003	0.0006	0.2390	0.235*
	G	0.0006	-0.0001	-0.0003	0.0000	0.0000	-0.0000	**0.0014**	0.0004	-0.0003	0.0006	0.2881	0.289
Fruit weight (g)	P	-0.0000	-0.0001	0.0000	-0.0002	-0.0003	-0.0007	-0.0009	**0.0015**	-0.0006	0.0003	0.5604	0.556**
	G	-0.0000	-0.0001	0.0001	0.0000	-0.0000	-0.0001	-0.0005	**0.0013**	-0.0010	0.0003	0.8768	0.877**
Number of marketable fruit per vine	P	-0.0001	0.0000	-0.0001	-0.0003	-0.0006	-0.0007	-0.0007	-0.0008	**0.0012**	0.0012	0.6294	0.626**
	G	-0.0005	-0.0000	-0.0002	0.0001	-0.0000	-0.0001	-0.0003	0.0011	**0.0012**	0.0015	0.7662	0.767**
Vine length at last harvest (m)	P	-0.0001	-0.0003	-0.0001	-0.0007	-0.0002	-0.0000	-0.0005	-0.0001	-0.0003	**0.0048**	0.3267	0.329**
	G	-0.0003	-0.0002	-0.0003	0.0001	-0.0000	0.0000	-0.0002	0.0001	-0.0004	**0.0047**	0.4777	0.481*
Marketable fruit yield per vine	P	-0.0000	-0.0003	0.0001	-0.0005	-0.0004	-0.0007	-0.00083	-0.0008	-0.0007	0.0016	**1.0027**	1.000**
	G	-0.0001	-0.0001	0.0002	0.0001	-0.0000	-0.0001	-0.0004	0.0011	-0.0009	0.0022	**0.9980**	1.000**

Residual effect: Phenotype = -0.0021 and Genotype = 0.0003



Where, DFFF = Days to 50% female flowering; NFFFA = Node at which first female flower appeared; OL = Ovary length; IL = Internodal length; DFFH = Days to first fruit harvest after sowing; FL = Fruit length; FD= Fruit diameter; FW= Fruit weight; NMFPV = Number of marketable fruit per vine; VL = Vine length; MFYPV = Marketable fruit yield per vine; TMFY = Total marketable fruit yield (q/ ha)

Fig. 1: Path diagram at genotypic level in sponge gourd

for marketable fruit yield per vine followed by vine length, days to first fruit harvest after sowing, ovary length, fruit diameter, fruit weight, fruit length, number of marketable fruits per vine and days to 50% female flowering. The direct negative effect was recorded for internodal length and node at which the first female flower appeared. Similar findings were also revealed by Varalakshmi et al. (2015), Singh et al. (2018), Kumar et al. (2019), Som et al. (2020), Kumari et al. (2021), Myla et al. (2022) and Bashir et al. (2024).

Days to 50% female flowering exhibited positive indirect effect on total marketable fruit yield via number of marketable fruits per vine, days to first fruit harvest after sowing, internodal length and fruit weight. Node at which first female flower appeared exhibited positive indirect effects on total marketable fruit yield via marketable fruit yield per vine, vine length, fruit length, days to first fruit harvest after sowing, days to 50% female flowering and the number of marketable fruits per vine. Days to first fruit harvest after sowing showed a positive indirect effect for total marketable fruit yield via number of marketable fruits per vine, fruit length, days to 50% female flowering, ovary length, internodal length, and fruit weight. Fruit length showed a positive indirect effect for total marketable fruit yield via marketable fruit yield per vine, the node at which the first female flower appeared, days to 50% female flowering, and vine length. Fruit diameter showed a positive indirect effect for total marketable fruit yield via marketable fruit yield per vine, vine length, days to first fruit harvest after sowing, and days to 50% female flowering. Fruit weight exhibited a positive indirect effect on total marketable fruit yield via marketable fruit yield per vine, vine length, ovary length, fruit length, and fruit diameter. A number of marketable fruits per vine exhibited a positive indirect effect on total marketable fruit yield via marketable fruit yield per vine, vine length, and the node at which the first female flower appeared. Marketable fruit yield per vine had a positive indirect effect on total marketable fruit yield via vine length and days to first fruit harvest after sowing. The similar findings were reported by Varalakshmi et al. (2015), Sharma et al. (2017), Kumari et al. (2021), Myla et al. (2022) and Sarma et al. (2022).

Conclusion

The data on the mean performance of 26 sponge gourd genotypes revealed significant variation for all 12 traits. Marketable fruit yield per vine was found to be highest in genotype AHSG-23 (3.42 kg), followed by Pusa Sneha (3.41 kg), while the lowest or minimum marketable fruit yield was observed in genotype VRSG-6 (1.67 kg). Among the investigated genotypes, AHSG-23, Pusa Sneha, and Thar Tapish were found to be better yield performers. Correlation coefficient analysis revealed that total marketable fruit yield was significantly and positively correlated with marketable fruit yield per vine, internodal length, vine length, number of marketable fruits per vine, fruit length, fruit diameter and fruit weight, which should be taken into account while selection of new cultivars. Marketable fruit yield per vine, vine length, fruit diameter, fruit weight and fruit length exhibited maximum positive direct effect towards total marketable fruit yield. The analysis concludes that there is adequate genetic variability for all the traits studied, indicating that crop improvement can be pursued based on this genetic diversity. Considering the character associations and path coefficients for yield and its contributing factors, it is recommended that breeders focus on traits such as average fruit yield per plant, average fruit weight, number of fruits per plant, node at which first female flower appeared, and days to first fruit harvest when selecting for high-yielding genotypes in sponge gourd.

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सारांश

जांच के दौरान, चिकनी तोरई के 26 जीनोटाइप्स का 12 लक्षणों के लिए मूल्यांकन किया गया, जिससे महत्वपूर्ण भिन्नता और पर्याप्त आनुवंशिक विविधता का पता चला। प्रमुख लक्षणों जैसे पहला मादा फूल आने की गाँठ की संख्या, अंतरगांठ लंबाई, और बेल की लंबाई के औसत मान क्रमशः 10.97, 10.68 सेमी और 3.14 मीटर पाए गए। उपज से संबंधित लक्षणों जैसे फल की लंबाई (22.07 सेमी), फल का व्यास (3.19 सेमी), और फल का वजन (99.85 ग्राम) में भी उल्लेखनीय विविधता देखी गई। थार तपिश और पूसा स्नेहा किस्में, तथा AHSG-23, AHSG-25, AHSG-28, VRSG-140, VRSG-6, और VRSG-3-13 जीनोटाइप्स ने गर्म शुष्क पर्यावरणीय परिस्थितियों में सर्वश्रेष्ठ प्रदर्शन किया। उपज घटकों के बीच मजबूत फेनोटाइपिक और जीनोटाइपिक सहसंबंध पाए गए, जिनमें फल की लंबाई, फल का वजन और प्रति बेल बेचने योग्य फल उपज जैसे लक्षणों का सकारात्मक संबंध रहा। पाथ कोफिशिएंट विश्लेषण से पता चला कि प्रति बेल बेचने योग्य फल उपज का कुल बेचने योग्य उपज पर सबसे अधिक प्रत्यक्ष सकारात्मक प्रभाव था, इसके बाद बेल की लंबाई और फल का वजन आता है। वहीं, अंतरगांठ लंबाई और पहला मादा फूल आने की गाँठ की संख्या जैसे लक्षणों का नकारात्मक प्रभाव पाया गया। फल की लंबाई, फल का व्यास, और प्रति बेल बेचने योग्य फलों की संख्या जैसे लक्षणों के अप्रत्यक्ष प्रभाव भी महत्वपूर्ण रहे।