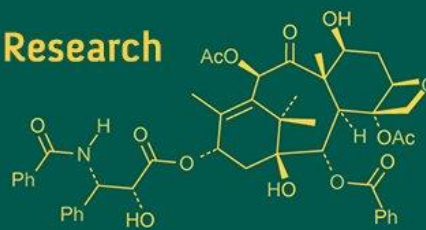


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Estimation of genetic parameters and mean performance for the selection of elite ridge gourd genotypes [*Luffa acutangula* (L.) Roxb.]

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Abstract

The current study was conducted during the 2025 Zaid season at the College of Horticulture, ANDUAT, Kumarganj, Ayodhya. Three replications of the experiment, each with 32 genotypes, were set up in a randomized block design. All of the growth, flowering, and yield characteristics showed extremely significant differences, according to the analysis of variance (ANOVA). Among the genotypes examined, days to first staminate flower appearance (33.63 days for NDRG-1), days to first pistillate flower appearance (36.63 days for NDRG-1), and node number to first pistillate flower appearance (5.03 for VRRG-13-17) were the best genotypes for earliness. Similarly, NDRG-24-1 had 6.93 primary branches per plant, VRRG-83 had a vine length of 4.53 m, and VRRG-18-17 had an internodal length of 7.37 cm. Fruit length of VRRG-83 was 38.17 cm, fruit diameter of VRRG-9-17 was 6.40 cm, average fruit weight of VRRG-83 was 217.50g, and fruit number per plant of Kashi Khushi was 28.30. The first fruit harvest of NDRG-3-24 took 51.20 days. In case of yield and yield related parameters, total soluble solids were 5.58 °Brix for VRRG-17-16, dry matter percentage was 12.34% for VRRG-12-17 and ascorbic acid was 1.73 for VRRG-37-16. VRRG-83 recorded the maximum fruit output per hectare (196.27 q/ha) and fruit yield per plant (3.42 kg).

Keywords: Ridge gourd, mean, GCV, PCV, heritability and genetic advance

Introduction

The ridge gourd is known by different names in different languages such as Hindi (Jhimani, Karvitarui, Karvitur, Sankirah and Rantorai) and English (ridge gourd, angled luffa, Chinese okra, dishcloth gourd, ribbed luffa, silk gourd, Sinkwa towel sponge, Sinqua melon and vegetable sponge) (Jyothi *et al.*, 2010) [9]. It is also often referred to as an angled loofah or angled gourd (Muthaiah *et al.*, 2017) [10]. Cucurbitaceae is a family of 8 tribes, 118 genera and 825 species. Ridge gourd belongs to the family Cucurbitaceae. It has $2n = 2x = 26$ chromosomes. Cucurbits, both major and minor are widely cultivated in India and contribute to about 5.6% of the total vegetable production of the country (Rathore *et al.*, 2017) [15]. Ridge gourd (*Luffa acutangula* (L.) Roxb.) is an important warm season annual vegetable crop commonly grown for its good taste, flavor, nutritional value and medicinal benefits. It is grown throughout the year in tropical regions, especially in Asian and African countries (Varalakshmi *et al.*, 2016). The name “Luffa” or “Loofah” is derived from the Arabic language and was known as a sponge in ancient Egyptian writings. The Chinese name “Szuka-dishcloth gourd” indicates that it was mentioned in early Chinese literature (Doijode, 2002) [3].

According to Hazra and Som (2005) [4], the edible portion has around 0.5 g of fiber, 0.5% protein, 0.35% carbohydrate, 37 mg carotene, 5 mg vitamin C, 18 mg calcium, and 0.5 mg iron per 100 g. They have been shown to be a successful natural remedy for jaundice (Panicker *et al.*, 2019) [12] and are beneficial for diabetics due to their low calorie content (Harshitha *et al.*, 2019) [5].

The effective use and improvement of plant genetic resources in crop breeding programs depend on the evaluation and identification of superior genotypes within the current germplasm. (Pidigam *et al.*, 2019; Terfa and Gurnu, 2020) [13, 19]. The success of genetic modification in any crop is largely dependent on the degree of genetic diversity and the

heritability of economically significant traits. (Saisupriya and others, 2022) ^[16]. More genetic diversity increases the likelihood of selecting better genotypes. Genetic metrics such as phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) can be used to assess the degree of heterogeneity within a genetic population. Using estimations of genetic attributes like heritability and genetic progress, plant breeders select superior genotypes from a range of genetic populations. (Harshitha *et al.*, 2025; Poornima *et al.*, 2023) ^[6, 11]. In order to harness this diversity for crop improvement, a field study was carried out on ridge gourd to assess genetic variability, heritability, and genetic advancement related to yield and associated attributes.

Materials and Methods

During the Zaid season of 2025, the study was carried out at the vegetable science main experimental station of the College of Horticulture and Forestry in Kumarganj,

Ayodhya. 32 ridge gourd genotypes that were gathered from different sources made up the experimental material; Table 1 provides a complete description of these genotypes. Using a randomized block design (RBD) with three replications, seeds were directly sowed in the field with a planting distance of 3 × 0.5 meters. In addition to the appropriate amount of fertilizer, 25 tonnes of farmyard manure were applied per hectare. During the Zaid season of 2025, the study was carried out at the vegetable science main experimental station of the College of Horticulture and Forestry in Kumarganj, Ayodhya. 32 ridge gourd genotypes that were gathered from different sources made up the experimental material; Table 1 provides a complete description of these genotypes. Using a randomized block design (RBD) with three replications, seeds were directly sowed in the field with a planting distance of 3 × 0.5 meters. In addition to the appropriate amount of fertilizer, 25 tonnes of farmyard manure were applied per hectare.

Table 1: List of ridge gourd genotypes used and their sources of collection

Sr. No.	Name of Genotypes	Sources	Sr. No.	Name of Genotypes	Sources
1	Kashi khushi	ICAR, IIVR	17	VRRG-46	ICAR, IIVR
2	Kashi nanda	ICAR, IIVR	18	VRRG-68-16	ICAR, IIVR
3	Kashi shivani	ICAR, IIVR	19	VRRG-41	ICAR, IIVR
4	Pusa Nasdar	IARI, New Delhi	20	VRRG-18-17	ICAR, IIVR
5	Nasdar	IARI, New Delhi	21	VRRG-28-16	ICAR, IIVR
6	NDRG-5-24	ANDUA&T, Ayodhya	22	VRRG-37-16	ICAR, IIVR
7	NDRG-6-24	ANDUA&T, Ayodhya	23	NDRG-24-1	ICAR, IIVR
8	VRRG-9-17	ICAR, IIVR	24	NDRG-2-24	ANDUA&T, Ayodhya
9	Jaipuri	Local collection from jaipur	25	NDRG-1	ANDUA&T, Ayodhya
10	VRRG-181	ICAR, IIVR	26	NDRG-4-24	ANDUA&T, Ayodhya
11	VRRG-83	ICAR, IIVR	27	NDRG-3-24	ANDUA&T, Ayodhya
12	VRRG-42-16	ICAR, IIVR	28	VRRG-06	ICAR, IIVR
13	VRRG-06-17	ICAR, IIVR	29	VRRG-13-17	ICAR, IIVR
14	VRRG-25-16	ICAR, IIVR	30	VRRG-46	ICAR, IIVR
15	VRRG-12-17	ICAR, IIVR	31	VRRG-68-16	ICAR, IIVR
16	VRRG-17-17	ICAR, IIVR	32	VRRG-41	ICAR, IIVR

Results and Discussion

Mean Performance of Ridge Gourd Genotypes for Flowering Traits

Observations recorded for flowering traits are displayed in Table 2. Significant variation was observed among 32 ridge gourd genotypes for days to first staminate and pistillate flower appearance and node of first pistillate flower appearance. NDRG-1 exhibited the earliest first staminate flower appearance at 33.63 days, on par with Pusa Nasdar at 39.17 days. Similarly, the earliest pistillate flower appeared in NDRG-1 at 36.63 days, which was on par with Pusa Nasdar (43.07 days). Regarding node position, NDRG-3-24 and NDRG-5-24 had the highest node numbers of first pistillate flower appearance, at 9.87 and 9.43, respectively. Conversely, VRRG-13-17 displayed the lowest number of nodes of first pistillate flower appearance (5.03). The significant variation observed in flowering traits among the 32 ridge gourd genotypes provides a strong foundation for breeding programs aimed at developing early-maturing and high-yielding varieties. A key characteristic for growers is earliness, as measured by days to first flower appearance and the number of nodes of first pistillate flower appearance, which can result in higher market prices, multiple cropping cycles, or avoidance of late-season difficulties. The wide variance between the oldest and most recent flowering genotypes highlights the substantial genetic

variability that can be controlled by selection and hybridization. The node where the first female bloom appears is a crucial indicator of earliness and yield potential. Genotypes that produce female flowers at lower nodes are crucial because they often generate more fruits per plant and begin fruit production earlier in their growth cycle. Conversely, genotypes with longer vegetative periods are usually those that produce female flowers at higher nodes. This variety allows breeders to select parental lines to produce cultivars with specific plant architecture and maturity timeframes.

Mean Performance of Genotypes for Growth Parameters

Significant variation was found among the genotypes examined for every characteristic in this study, according to analysis of variance. Ridge gourd genotypes differed significantly in terms of vine length, internodal length, and primary branches per plant (Table 2). The largest vine length (4.53 m) was displayed by VRRG-83, which was comparable to Pusa Nasdar (3.93 m). The shortest vine length (3.36 m) was shown by NDRG-24-1. Significant variation was found among the genotypes examined for every characteristic in this study, according to analysis of variance. Ridge gourd genotypes differed significantly in terms of vine length, internodal length, and primary

branches per plant (Table 2). The largest vine length (4.53 m) was displayed by VRRG-83, which was comparable to Pusa Nasdar (3.93 m). The shortest vine length (3.36 m) was shown by NDRG-24-1. This diversity is critical to crop improvement because it provides the basis for effective selection and breeding. Plant vigor, as evidenced by traits

like vine length, is necessary for the formation of a robust canopy that facilitates photosynthesis and subsequent fruit production. The number of primary branches per plant is another important feature that directly influences the amount of nodes accessible for fruit formation and blooming, hence influencing overall yield.

Table 2: Mean performance of thirty-two genotypes for sixteen characters in ridge gourd

S. N.	Genotype	Days to first staminate flower appearance	Days to first pistillate flower appearance	Node number of first pistillate flower appearance	Vine length (m)	Primary branches per plant	Internodal length (cm)	Days to first fruit harvest	Fruit length (cm)	Fruit diameter (cm)	Average fruit weight (g)	No of fruit per plant	Total soluble solids	Dry matter %	Ascorbic acid (mg/100 g)	Fruit yield per plant (kg)	Fruit yield (q/ha)
1	Kashi Khushi	44.00	46.10	8.20	4.06	4.95	7.87	53.07	13.50	4.49	43.00	28.30	4.01	8.60	1.49	1.22	73.18
2	Kashi Nanda	38.90	42.10	9.00	4.31	4.93	9.70	52.53	16.63	4.16	109.00	23.67	4.16	9.00	1.34	2.32	155.18
3	Kashi Shivani	37.77	40.73	8.00	3.91	6.20	10.60	54.83	32.37	5.30	196.50	11.83	4.55	11.25	0.97	2.58	139.09
4	Nasdar	42.93	47.40	9.30	3.92	5.97	9.47	60.63	17.60	3.66	121.07	17.40	3.69	10.11	1.41	2.11	127.63
5	NDRG-5-24	45.13	48.53	9.43	3.86	4.37	12.37	63.00	12.90	3.64	105.27	16.57	3.90	8.77	1.32	1.75	106.26
6	NDRG-6-24	42.20	44.63	9.20	3.90	4.83	8.47	57.03	18.67	4.42	111.83	17.53	3.69	7.93	1.32	1.96	114.98
7	VRRG-9-17	44.87	47.93	8.20	3.65	2.48	13.43	57.40	21.83	6.40	130.47	14.23	4.89	9.62	1.71	1.86	111.59
8	Jaipuri	39.50	43.83	6.90	3.60	2.93	12.60	57.73	28.30	2.30	139.01	11.20	4.96	9.10	1.56	1.56	94.08
9	VRRG-181	42.37	45.73	5.40	3.91	2.90	14.10	58.20	34.87	6.13	175.80	13.20	4.06	7.62	1.26	2.45	138.81
10	VRRG-83	39.23	42.77	5.27	4.53	5.80	13.50	56.50	38.17	6.20	217.50	14.90	4.67	8.50	1.50	3.24	196.27
11	VRRG-42-16	38.50	41.90	8.67	3.74	2.60	13.00	56.63	19.57	4.70	111.11	18.00	4.34	11.30	1.16	2.00	121.82
12	VRRG-06-17	39.90	43.77	8.87	3.52	2.73	12.60	58.17	29.10	5.80	157.17	11.53	3.99	9.58	1.26	1.81	105.82
13	VRRG-25-16	40.60	44.97	5.43	4.13	2.83	13.73	60.07	37.43	5.20	196.11	12.50	3.87	9.48	1.43	2.32	143.69
14	VRRG-12-17	36.33	39.20	6.40	4.17	6.57	13.57	52.03	28.47	4.17	180.94	14.00	3.64	12.34	0.91	2.53	152.25
15	VRRG-17-17	43.00	46.43	6.42	3.70	6.47	11.43	60.50	29.70	4.47	176.96	13.20	5.04	6.70	0.95	2.34	141.68
16	VRRG-4-17	39.03	41.73	6.90	3.89	3.10	13.43	57.13	28.87	4.23	128.93	14.68	3.54	9.08	1.24	1.90	113.54
17	VRRG-17-16	46.47	49.47	7.67	3.53	2.93	12.30	59.63	21.57	5.73	113.83	16.63	5.58	9.93	1.13	1.69	114.72
18	VRRG-59-16	39.40	41.27	6.63	3.69	2.73	13.20	55.73	19.40	3.83	112.60	13.50	4.89	10.37	1.45	1.89	102.84
19	VRRG-46	43.33	45.33	5.80	3.86	3.50	13.53	61.60	21.82	3.80	120.02	19.67	4.34	10.28	1.15	2.36	142.71
20	VRRG-68-16	38.07	41.23	5.90	4.37	6.40	13.50	56.53	27.87	5.13	123.36	21.54	4.92	8.00	1.03	2.70	162.43
21	VRRG-41	42.17	45.20	6.17	3.75	2.87	13.30	60.57	23.85	5.37	110.47	10.50	4.69	10.62	1.41	1.16	70.45
22	VRRG-18-17	40.33	43.90	5.62	3.38	6.47	7.37	60.23	33.57	5.90	172.97	14.45	3.42	11.43	1.32	2.47	150.56
23	VRRG-28-16	41.87	45.07	5.60	3.69	3.47	12.83	59.80	22.77	5.23	118.00	15.73	4.73	9.95	1.39	1.86	108.93
24	VRRG-37-16	39.70	41.57	6.63	3.70	3.87	12.40	59.20	26.33	4.87	126.33	11.70	5.32	5.73	1.73	1.48	87.01
25	NDRG-24-1	37.57	41.60	7.17	3.36	6.93	10.27	54.03	17.60	4.43	111.90	15.53	4.35	11.00	1.24	1.74	104.72
26	NDRG-2-24	45.17	47.63	8.73	3.77	4.20	9.50	65.53	25.20	5.93	102.37	17.67	4.94	7.50	1.40	1.81	109.20
27	NDRG-1	33.63	36.63	5.90	3.65	2.90	13.37	52.53	23.58	4.33	105.63	21.47	5.55	10.00	1.09	2.27	135.82
28	NDRG-4-24	41.93	44.33	8.00	3.72	2.46	8.30	58.43	20.53	5.00	110.04	18.00	3.48	9.00	1.46	1.98	119.93
29	NDRG-3-24	36.57	39.23	9.87	3.42	6.90	7.93	51.20	17.63	4.00	105.47	16.17	3.59	11.00	1.14	1.70	103.54
30	VRRG-06	43.40	46.20	5.87	3.88	2.87	13.80	60.50	23.88	4.23	140.70	13.10	4.77	10.60	1.30	1.85	111.65
31	VRRG-13-17	46.80	50.57	5.03	3.94	2.80	13.57	60.73	24.02	4.73	188.33	12.50	3.87	9.60	1.23	2.42	140.92
32	Pusa Nasdar	39.17	43.07	9.03	3.93	6.10	13.52	59.18	28.10	5.20	152.73	15.90	4.90	10.30	1.71	2.36	145.90
	MEAN	40.93	44.06	7.22	3.83	4.28	11.83	57.84	24.55	4.78	134.86	15.84	4.39	9.51	1.31	2.05	123.35
	MIN	33.63	36.63	5.03	3.36	2.46	7.37	51.20	12.90	2.30	43.00	10.50	3.42	5.73	0.91	1.16	70.45
	MAX	46.80	50.57	9.87	4.53	6.93	14.10	65.53	38.17	6.40	217.50	28.30	5.58	12.34	1.73	3.24	196.27
	SED +	2.20	2.09	0.46	0.27	0.16	0.80	1.99	0.91	0.37	6.46	0.85	0.08	0.28	0.03	0.15	9.55
	CD 5%	4.40	4.19	0.92	0.55	0.32	1.61	3.99	1.83	0.74	12.95	1.70	0.17	0.56	0.05	0.30	19.14
	CV%	6.57	5.80	7.78	8.76	4.53	8.32	4.21	4.56	9.46	5.87	6.57	2.34	3.58	2.46	8.96	9.49

Mean Performance of Ridge Gourd Genotypes for Fruiting Traits

Thirty-three genotypes of ridge gourds showed notable differences in a number of key fruit characteristics (Table 2). At 51.20 days, NDRG-3-24 showed an early harvest, comparable to check Pusa Nasdar (59.18 days). NDRG-2-24, on the other hand, demonstrated late harvesting at 65.53 days. VRRG-83 had the longest fruit (38.17 cm), whereas NDRG-5-24 had the shortest fruit (12.90 cm). VRRG-9-17 has the largest fruit diameter (6.40 cm). Jaipuri, on the other hand, has the smallest fruit diameter, measuring 2.30 cm. VRRG-17-16 had the highest total soluble solids (TSS) content (5.58 °B), whereas VRRG-18-17 had the lowest (3.42 °B). VRRG-12-17 had the greatest dry matter percentage (12.34%), while VRRG-37-16 had the lowest (5.73%). VRRG-37-16 had the highest ascorbic acid concentration (1.73 mg/100 gm), whereas VRRG-12-17 had the lowest (0.91 mg/100 g). The extensive genetic diversity available for breeding is highlighted by the notable difference found among the 32 ridge gourd genotypes for

important fruit attributes. With an emphasis on earliness, yield, and quality, this diversity is crucial for creating improved cultivars that satisfy the needs of growers and customers. Genotypes with superior individual and combination features were effectively discovered in this investigation. Crossing genotypes to combine desired features could be part of a planned breeding scheme. For example, combining a long-fruited, high-TSS genotype with a high-yielding genotype could result in the creation of better hybrids that combine high yield with desired market and quality traits.

Mean Performance of Ridge Gourd Genotypes for Yield and Yield-Attributing Traits

Table 2 displays yield and yield-contributing trait observations. VRRG-41 had the fewest fruits per plant (10.50), while Kashi Khushi had the most fruits per vine (28.30). The genotype VRRG-83 had the highest average fruit weight (217 g), while Kashi Khushi had the lowest average fruit weight (43 g). VRRG-83 had the highest fruit

output per plant (3.24 kg), while VRRG-41 had the lowest yield per vine (1.16). Similarly, VRRG-83 had the highest fruit output per hectare (196.27 q/ha). On the other hand, VRRG-41 had the lowest yield per hectare (70.45q/ha). In order to create high-yielding cultivars, the genotypes of ridge gourds differed greatly in terms of yield and yield-related traits. The two primary parameters that combine to create yield, a complex quantitative characteristic, are the number of fruits per vine and the average fruit weight. This study successfully demonstrated the genetic variability available for these components and identified genotypes with superior performance. The identification of superior genotypes for specific features will provide a clear path for future breeding efforts. A deliberate hybridization strategy could involve crossing genotypes with complementary features. For instance, crossing a genotype such as Kashi Khushi (high fruit number) with VRRG-83 (high average fruit weight) may break the negative correlation between these traits and produce transgressive segregants with both big fruit counts and desired weight.

Genotypic and Phenotypic Coefficients of Variation

The phenotypic coefficient of variation (PCV) captures the total observable diversity of a feature, accounting for both genetic and environmental variables. The entire spectrum of phenotypic diversity is captured by this statistic, which may vary based on weather, soil type, and agricultural methods. A higher PCV means that external factors have a greater influence on how the traits appear. However, the genotypic coefficient of variation (GCV) is used to separate the heritable component of this variance. By excluding environmental influences, the GCV illustrates the extent to which individual variances are solely due to genetic factors. This distinction shows the portion of diversity that can be passed on to future generations, making it useful for choosing superior genotypes and forecasting the possible success of breeding efforts. Because it separates genetic contributions, GCV is frequently smaller than PCV. Based on the degree of variance, GCV and PCV were divided into three categories: low (less than 10%), moderate (10 to 20%), and high (more than 20%). Table 3 displays the phenotypic

coefficient of variation (PCV) and genotypic coefficient of variation (GCV) for different traits. PCV values were consistently higher than GCV values for every characteristic evaluated, suggesting that both genetic and environmental factors contribute to phenotypic variance. With GCV = 37.25 percent and PCV = 37.53 percent, primary branches per plant showed the most diversity. Average fruit weight came in second with GCV = 27.28 percent and PCV = 27.91 percent, respectively. On the other hand, with GCV and PCV of 5.06 percent and 10.12 percent, respectively, vine length exhibited the least variability. Features like fruit yield (GCV = 21.01%, PCV = 23.05%), fruit length (GCV = 26.43%, PCV = 26.82%), number of fruits per plant (GCV = 24.45%, PCV = 25.31%), fruit yield per plant (GCV = 20.97%, PCV = 22.80%), and first pistillate node number flower appearance (GCV = 20.00%, PCV = 21.46%) demonstrated high genetic variability. High variability has been reported by earlier researchers in ridge gourd gourd (Jha *et al.*, 2026) [7] and in bitter gourd (Talukder *et al.*, 2018) [18]. Moderate variation was observed for internodal length (GCV: 17.33%, PCV: 19.22%), fruit diameter (GCV: 18.18%, PCV: 20.49%), dry matter percentage (GCV: 15.16%, PCV: 15.58%), ascorbic acid content (GCV: 16.04%, PCV: 16.23%) and TSS content (GCV: 14.18%, PCV: 14.38%). Low variability was recorded for days to first fruit harvest (GCV: 5.28%, PCV: 6.76%), days to first staminate flower appearance (GCV: 6.63%, PCV: 9.33%) and days to first pistillate flower appearance (GCV: 6.36%, PCV: 8.61%). By examining the Genotypic Coefficient of Variation (GCV) and Phenotypic Coefficient of Variation (PCV), a quantitative evaluation of the genetic and observable variability present in the ridge gourd germplasm may be produced. Since this suggests that the overall phenotypic expression is a combination of hereditary and environmental factors, it is expected that PCV values were consistently higher than GCV values for every attribute. However, the small difference between the PCV and GCV values for most traits indicates that environmental effect was negligible and that genetic variables account for most of the observed variance.

Table 3: Variability parameters for yield and yield-contributing characters among 32 genotypes of ridge gourd

Characters	Mean	Range	Genotypic variance	Phenotypic variance	Genotypic coefficient of variation (%)	Phenotypic coefficient of variation (%)	Heritability (%)	Genetic Advance % mean
Days to first staminate flower appearance	40.93	33.63-46.80	7.36	14.59	6.63	9.33	50.44	9.70
Days to first pistillate flower appearance	44.06	36.63-50.57	7.84	14.39	6.36	8.61	54.53	9.67
Node number of first pistillate flower appearance	7.22	5.03-9.87	2.09	2.40	20.00	21.46	86.86	38.39
Vine length (m)	3.83	3.36-4.53	0.04	0.15	5.06	10.12	24.98	5.21
Primary branches per plant	4.28	2.46-6.93	2.55	2.583	37.25	37.53	98.54	76.18
Internodal length (cm)	11.83	7.37-14.10	4.20	5.169	17.33	19.22	81.27	32.17
Days to first fruit harvest	57.84	51.20-65.53	9.34	15.277	5.28	6.76	61.14	8.51
Fruit length (cm)	24.55	12.90-38.17	42.12	43.38	26.43	26.82	97.11	53.66
Fruit diameter (cm)	4.78	2.30-6.40	0.76	0.96	18.18	20.49	78.68	33.21
Average fruit weight (g)	135	43-218	1353.73	1416.37	27.28	27.91	95.58	54.95
Number of fruits per plant	15.84	10.50-28.30	14.99	16.074	24.45	25.31	93.26	48.63
Total soluble solids	4.39	3.42-5.58	0.39	0.398	14.18	14.38	97.36	28.83
Dry matter%	9.51	5.73-12.34	2.08	2.194	15.16	15.58	94.71	30.39
Ascorbic acid (mg/100g)	1.31	0.91-1.73	0.04	0.045	16.04	16.23	97.69	32.66
Fruit yield per plant (kg)	2.05	1.16-3.24	0.19	0.219	20.97	22.80	84.56	39.72
Fruit yield (q/ha)	123.35	70.45-196.27	671.32	808.229	21.01	23.05	83.06	39.44

Heritability and Genetic Advance

The ratio of genetic variance to phenotypic variance is commonly used to quantify heritability, a measure of the effectiveness of selection. Finding superior genotypes using a range of genetic pools is one of its advantages. The selection of superior genotypes based on their quantitative trait markers was made easier by high heritability scales. A high heritability estimate suggests the presence of many fixed additive genes, which enables target selection to improve features. The mix of advances and heredity is necessary for effective selection. to predict the outcomes of finding genotypes that perform well.

Three levels of heritability were identified: high (above 60%), moderate (between 30 and 60%), and low (below 30%). Similarly, genetic advancement is divided into three groups: low (less than 10%), moderate (10 to 20%), and high (more than 20%).

The heritability and genetic advance estimates for the traits under study are shown in Table 3, which shows that all parameters had high heritability values. Traits demonstrating both high heritability and high genetic advance as percent of mean included primary branches per plant (98.54%, 76.18%), ascorbic acid (97.69%, 32.66%), total soluble solids (97.36%, 28.83%), fruit length (97.11%, 53.66%), average fruit weight (95.58%, 54.95%), dry matter percentage (94.71%, 30.39%), no of fruit per plant (93.26%, 48.63%), node number of first pistillate flower appearance (86.86%, 38.39%), fruit yield per plant (84.56%, 39.72%), fruit yield (83.06%, 39.44%), internodal length (81.87%, 32.17%) and fruit diameter (78.68%, 33.21%) .

The degree to which a trait is genetically influenced and the possibility of improvement through selection are revealed by the examination of heritability and genetic advancement, which is essential information for developing a successful breeding plan. A noteworthy conclusion is that all of the variables under study had high heritability, indicating that genetic factors rather than environmental influences are primarily responsible for the observed phenotypic variance. The selection process is more dependable and predictable because of this high level of genetic control. The degree to which a trait is genetically influenced and the possibility of improvement through selection are revealed by the examination of heritability and genetic advancement, which is essential information for developing a successful breeding plan. The fact that all of the variables under investigation showed high heritability is a remarkable finding, suggesting that the observed phenotypic variance is mostly caused by genetic factors rather than environmental impacts. This great degree of genetic control makes the selection process more reliable and predictable. Particularly potent is the combination of high heritability and high genetic progress as a percentage of mean. The majority of economically significant traits exhibit this pairing, which suggests that additive gene action predominates in their inheritance. Because an individual's phenotype is a reliable measure of its breeding value, traits controlled by additive gene effects are extremely responsive to selection. As a result, straightforward selection techniques like progeny selection or mass selection are anticipated to be very. These outcomes are consistent with the ridge gourd findings of Thulasiram *et al.* (2022) ^[20] and ChinthalaPudi *et al.* (2021) ^[2]. Numerous significant characteristics, such as sex ratio, fruit length, number of seeds per fruit, number of fruits per vine, yield

per vine, and yield per hectare, showed significant variation, according to the study. Fruit set, fruit diameter, average fruit weight, internodal length, and the node of the first male and female flower appearance all showed moderate variability. Vine length, sex ratio, number of fruits per vine, fruit length, fruit diameter, average fruit weight, yield per plant, and yield per hectare are traits that show both high heritability and high genetic advancement. High heritability and notable genetic advancement suggest that these characteristics are primarily

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