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Performance Studies of Ridge Gourd (*Luffa acutangula* (L.) Roxb.) Genotypes for Growth and Yield Parameters

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Ridge gourd [*Luffa acutangula* (L.)] commonly known as kalitori, angled gourd, angled loofah, silky gourd and ribbed gourd, belongs to Cucurbitaceae family with chromosome number 2n = 26. The current experiment was conducted at the College of Horticulture, Bagalkot, Karnataka during the Rabi- Summer season of 2023–2024 to evaluate thirty-eight different genotypes of ridge gourd. The experiment had two replications and was set up using a randomized complete block design. Analysis of variance showed that existence of high degree of variability among the genotypes. On the basis of mean performance, Hireharukuni local performed better for parameters like vine length (501.25 cm), number of primary branches per vine (4.08), node at first female flower (7.17), days to first harvest (55.18) and yield parameters with highest yield of 3.86kg/vine.

Keywords: Ridge gourd; genotypes; fruit; vine.

1. INTRODUCTION

Ridge gourd [*Luffa acutangula* (Roxb.) L.] is a significant warm-season vegetable crop from the cucurbit family, cultivated in various regions of India as well as in tropical countries across Asia and Africa. Its immature fruits are commonly used in dishes such as chutneys and curries and they are rich in nutrients, providing a good source of calcium, phosphorus, ascorbic acid, iron and fiber (Aykroyd, 1963). It is known by various names such as kalitori and angled gourd, its juice serves as a natural remedy for jaundice, promoting liver purification and detoxification, especially after alcohol consumption. The fibre extracted from the mature dry fruit finds application in industries for manufacturing different types of filters, reliable pot holders, durable table mats, bathroom mats, as well as slipper and shoe soles (Narasannavar *et al*., 2014). As a warm-season crop, ridge gourd can thrive in hotter climates, making it well-suited for widespread cultivation in tropical areas. Its monoecious nature promotes considerable cross-pollination, leading to a diverse range of growth and fruit characteristics (Chandra, 1995). Ridge gourd's productivity varies by season and region, highlighting the importance of identifying stable varieties that are appropriate for specific times and locations. As a high volume crop, it presents a significant opportunity for enhancement through the development of high yielding varieties and hybrids to address the disparity between supply and demand. Therefore, the collection and evaluation of germplasm are vital for improving yield and developing new varieties in crop improvement initiatives. Consequently, efforts have been made to identify promising cultivars with desirable growth and yield attributes.

2. MATERIALS AND METHODS

The experiment was carried out at the field of Vegetable Farm, College of Horticulture, Bagalkot, during the rabi-summer season of the year 2023-24. Bagalkot district is located in the northern region of Karnataka, falls under zone-3 of region-2 in the agro-climatic zones of the state, with coordinates of 16.16350° N latitude and 75.6172° E longitude, at an elevation of 563 meters above sea level. During the experiment the maximum and minimum temperature of 40.9 and 17.25°C was recorded with rainfall of 31.33 mm during the month of April. The experiment was laid out in Randomized Block Design, with 38 genotypes in two replications. Ten plants per replication were raised. Two-week-old seedlings were planted at 2m x 1m spacing. Recommended agronomic practices were applied to the crop. Observations were recorded on five randomly-selected plants in each replication on vine length at final harvest (cm), number of primary branches per vine at final harvest, days to appearance of first female flower, node to first female flower, days taken to first harvest, sex ratio, number of fruits per vine, average fruit weight (g), fruit length (cm) and fruit yield per vine (kg).

3. RESULTS AND DISCUSSION

The mean performance of different genotypes evaluated for growth, yield attributing and yield characters are mentioned in Table 1.

Vine length and number of primary branches per vine at final harvest are important growth contributing characters. Among the 38 genotypes the maximum vine length at final harvest was recorded in G-35 (501.25 cm) which in turn resulted in increased yield and minimum vine length at final harvest was seen in G-23 (320.39

Table 1. Mean performance of 38 genotypes of Ridge gourd for different quantitative characters

Genotype		VL (cm)	NPB	DFF	NFF	DFH	SR	NFV	AFW (g)	FL (cm)	FYV (kg)
G-1	IC-385911	339.57	2.25	54.23	9.82	64.50	32.45	13.62	118.50	15.17	1.57
G-2	IC-93393	352.17	3.17	51.83	8.17	61.17	24.95	12.08	162.07	16.30	1.81
G-3	IC-0648080	399.38	2.50	52.41	9.07	61.41	30.69	14.00	126.52	20.78	1.76
G-4	IC-0648097	403.67	3.17	49.43	7.33	57.46	22.43	15.00	132.35	16.49	1.99
G-5	IC-392334	428.24	2.83	47.33	8.67	55.56	26.23	16.00	134.38	19.45	2.15
G-6	IC-395846	344.00	3.50	49.70	8.00	58.36	21.18	17.38	80.73	15.30	1.48
G-7	IC-92685	424.83	2.67	48.17	8.00	59.45	21.56	11.67	48.43	12.92	0.59
G-8	IC-92700	417.54	3.17	52.10	7.67	60.88	31.63	20.83	178.24	24.50	3.72
G-9	IC-201145	409.68	3.33	47.50	7.50	56.74	25.85	23.50	138.10	17.00	3.21
G-10	IC-110893	376.00	3.17	50.17	7.67	58.62	29.02	18.17	162.28	16.60	2.77
G-11	IC-92624	380.57	2.83	48.90	8.33	58.22	24.24	14.00	134.77	18.09	1.91
G-12	IC-146606	336.92	2.83	51.01	8.33	59.38	30.34	13.67	109.88	18.16	1.54
G-14	IC-0648078	343.21	3.17	51.80	9.17	60.99	28.32	26.93	126.14	15.57	3.41
G-15	IC-0648096	398.07	3.50	48.61	8.33	58.07	29.59	13.50	213.13	27.76	3.13
G-16	IC-339224	427.00	2.83	49.95	8.83	59.22	22.98	15.64	196.12	22.81	3.16
G-17	IC-0648094	433.74	3.33	49.99	8.17	58.75	27.88	14.50	211.57	30.00	3.10
G-18	IC- 23255	340.46	2.50	49.69	7.50	57.82	28.47	8.34	202.54	29.67	1.70
G-19	IC- 0648090	362.50	3.00	48.17	8.67	58.24	26.53	14.00	194.19	20.60	2.92
G-20	IC-0648092	410.15	3.33	50.33	8.67	59.42	26.38	16.70	197.49	25.43	3.33
G-21	IC-0648089	346.87	3.67	49.23	7.67	58.62	26.97	20.83	182.43	25.75	3.79
G-22	IC-0648095	450.67	2.50	51.96	7.50	60.30	26.05	20.50	106.37	20.67	2.25
G-23	IC-0648081	320.39	2.19	57.26	10.51	67.98	31.96	13.50	115.34	18.54	1.55
G-24	IC-0648091	428.24	3.33	50.19	8.83	59.72	25.58	13.17	199.98	22.72	2.64
G-25	IC-0648082	351.83	3.17	49.33	8.33	58.00	19.66	13.33	185.06	25.54	2.47
G-26	IC-0648085	429.00	2.50	50.31	7.17	59.67	27.07	14.17	131.23	24.33	1.69
G-27	IC-369441	371.50	2.83	49.10	9.50	59.00	19.86	14.84	176.18	20.90	2.63
G-28	Madurai long	343.93	3.33	50.00	7.33	58.56	21.75	11.50	220.50	35.16	2.52
G-29	Madurai short	452.76	3.23	48.19	8.33	57.60	19.44	22.17	175.46	18.98	3.68
G-30	Tarlagatta local	407.56	2.83	51.06	8.83	60.72	24.64	13.33	188.59	28.39	2.52
G-31	Madurai cluster	417.12	2.17	50.00	8.00	58.59	24.54	24.73	126.21	15.66	3.19
G-32	Rajanukunte local	456.23	3.29	48.00	8.38	58.30	20.76	18.05	199.87	21.54	3.60
G-33	Budihal local	415.62	2.83	49.83	8.50	58.41	24.14	20.33	174.39	21.17	3.54

	Genotype	VL (cm)	NPB	DFF	NFF	DFH	SR	NFV	AFW (g)	FL (cm)	FYV (kg)
G-34	Thenkanikottai local	355.82	2.50	50.17	7.83	57.61	28.42	14.50	131.23	20.86	1.91
G-35	Hireharukuni local	501.25	4.08	46.60	7.17	55.18	18.83	14.75	261.79	27.05	3.86
G-36	Arka Sujat	463.88	3.34	46.46	7.77	56.63	18.54	15.72	236.08	35.31	3.78
G-37	Arka Sumeet	407.00	3.17	48.78	8.17	58.11	24.56	13.68	245.39	50.75	3.37
G-38	Arka Prasan(check)	469.50	3.67	49.91	8.67	59.43	22.69	14.46	240.70	44.62	3.50
G-39	Malapur local(check)	388.67	3.00	47.50	7.33	57.99	23.00	17.17	96.62	14.54	1.77
	S. Em ±	7.22	0.18	0.54	0.20	0.69	0.69	0.70	8.67	1.21	0.19
	CD at 5%	20.68	0.52	1.54	0.57	1.99	1.99	2.01	24.84	3.47	0.54

VL-Vine length at final harvest(cm), NPB-Number of primary branches per vine at final harvest, DFF-Days to appearance of first female flower, NFF- Node at first female flower, DFH- Days taken to first harvest, SR- Sex ratio (M: F), NFV- Number of fruits per vine, AFW- Average fruit weight (g), FL- Fruit length (cm), FYV- Fruit yield per vine (kg) cm). Whereas maximum number of primary branches per vine at final harvest was obtained in G-35 (4.08) which was on par with check G-38 (3.67) and G-21 (3.67). The genotype having longer vine length resulted in higher yield per vine and these results are in confirmation with Rabbani *et al*. (2012), Khatoon *et al*. (2016), Bhargava *et al*. (2017), Karthik *et al*. (2017), Ramesh *et al*. (2018), Madhuri *et al*. (2022) and Panda *et al*. (2022).

The earliness trait is one of the crucial parameters in a good variety which is measured in terms of days to first female flower appearance, node at first female flowering and days to first fruit harvest. The data presented in Table 1, indicated the days taken to appearance of first female flower in 38 genotypes. The minimum period of 46.46 days to appearance of first female flower was recorded by G-36 which was on par with G-35 (46.60), G-5 (47.33), G-9 (47.50), check G-39 (47.50) and G-32 (48.00). The genotype G-23 recorded the longest period of 57.26 days to first female flower. The variation in first female flower emergence might have been due to internodal length, number of internodes and vigour of the crop. Early appearance of male and female flowers on the vine is an indication of higher yield per vine. Whereas the lowest node at first female flower was appeared in genotype G-35 (7.17) and G-26 (7.17) which was on par with G-4 (7.33), G-28 (7.33), check G-39 (7.33), G-9 (7.50), G-18 (7.50), G-22 (7.50), G-8 (7.67), G-10 (7.67) and G-21 (7.67). The highest node at first female flower was appeared in the genotype G-23 (10.51). These parameters play an important role in deciding the earliness or lateness in general. Similar findings were reported by Khatoon *et al*. (2016), Karthik *et al*. (2017), Bhargava *et al*. (2017), Durga *et al.* (2021) and Thulasiram *et al.* (2022).

The data presented in Table 1, indicated the days taken to first harvest in 38 genotypes. Among them the genotype G-35 showed minimum days of 55.18 to first harvest which was on par with G-5 (55.56), G-36 (56.63) and G-9 (56.74). The genotype G-23 showed maximum days of 67.98 to first harvest. The days to first harvesting from sowing plays an important role in deciding the earliness and lateness of fruiting among the different genotypes of ridge gourd. It may be due to mobilization of food materials from source to sink. Minimum days taken to first harvest indicates earliness and earliness contributes to increased yield in return. Similar findings were reported by Khatoon *et al*. (2016), Bhargava *et al*. (2017), Rathore *et al*. (2017), Akhila and Devi Singh (2020) and Panda *et al*. (2022). The lowest sex ratio was noticed in the genotype G-36 (18.54) which was on par with G-35 (18.83), G-29 (19.44), G-25 (19.66) and G-27 (19.86) and highest was displayed by the genotype G-1 (32.45).

The data on number of fruits per vine of different genotypes are presented in the Table 1. The maximum number of fruits per vine were found in the genotype G-14 (26.93). The minimum number of fruits per vine were found in G-18 (8.34). Similar results were reported by Hanumegowda K. (2011), Saklesh (2016) and Yadav *et al*. (2017). The result on average fruit weight was found significantly higher in the genotype G-35 (261.79 g) which was on par with G-37 (245.39 g) and check G-38 (240.70 g). Significantly lowest fruit weight was recorded in the genotype G-7 (48.43 g). The yield attributing parameter fruit length showed a great range of variation. According to the results depicted in Table 1, the maximum fruit length was found in the genotype G-37 (50.75 cm) and minimum fruit length was found in the genotype G-7 (12.92 cm). This implies that the traits reporting wide variation provide good scope for selecting desired genotypes for further crop improvement programmes. The increase in fruit length and average fruit weight contributes directly to fruit yield. Similar results were obtained by Rabbani *et al*. (2012), Karthik *et al*. (2017), Bhargava *et al.* (2017) and Sravani *et al.* (2021). The maximum fruit yield per vine was recorded in the genotype G-35 (3.86 kg) which was on par with genotype G-21 (3.79 kg), G-36 (3.78 kg), G-8 (3.72 kg), G-29 (3.68 kg), G-32 (3.60 kg), G-33 (3.54 kg), check G-38 (3.50 kg), G-14 (3.41 kg), G-37 (3.37 kg) and G-20 (3.33 kg). The high yield in this genotype has been attributed due to early maturity, increased number of fruits per vine and increase in fruit weight. The increase in yield can be attributed to improved photosynthesis, greater carbohydrate accumulation, enhanced cell wall development and differentiation. These factors contribute to overall vegetative growth, increased biological activity in plants and better retention of flowers and fruits, resulting in a higher quantity and size of fruits, ultimately boosting the overall yield. These results were in confirmation Kadam *et al*. (1995), Chen *et al*. (1996), Luo *et al*. (2000), Hedau and Sirohi (2004), Akhila and Devi Singh (2020), Sravani *et al.* (2021), Panda *et al*. (2022) and Yadav and Singh (2022).

4. CONCLUSION

From the present study it can be concluded that, the genotypes G-35 (Hireharukuni local), G-21(IC-0648089), G-36 (Arka Sujat), G-8 (IC-92700) and G-29 (Madurai short) recorded higher yield and found superior over all other genotypes and genotypes G-37 (Arka Sumeet) and G-14 (IC-0648078) recorded better performance with respect to fruit length and number of fruits per vine. Based on these results, evaluation of promising genotypes over generations should be done, so that they can achieve homozygosity and promising genotypes with high yield component can be utilized as parents in further improvement studies of different quantitative characters through various breeding strategies. After multi location trails, may be recommended for commercial cultivation.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

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

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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