Performance studies of ridge gourd (*Luffa acutangula* (L.) Roxb.) Genotypes for growth and yield parameters

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 tofirstharvest (55.18) and yield parameters with highest yield of 3.86kg/vine.

Key words: Ridge gourd, Genotypes, Fruit,Vine

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) [1].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 themature 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)[2]. 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) [3].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 thedisparity 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.

Material 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 ofregion-2 in the agro-climatic zones of the state, with coordinates of 16.16350° N latitude and75.6172°Elongitude,atanelevationof563metersabovesealevel. During the experiment the maximum and minimum temperature of 40.9 and 17.25°Cwas recorded with rainfall of 31.33mm 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).

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 vineat 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 cm). Whereas maximum number of primary branches per vineat 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)[4], Khatoon *et al*. (2016)[5], Bhargava *et al*. (2017)[6], Karthik *et al.* (2017)[7],Ramesh *et al.* (2018)[8], Madhuri *et al*.(2022)[9] and Panda *et al.* (2022)[10].

The earliness 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 femaleflower in 38 genotypes. The minimum period of 46.46 days to appearance of first female flowerwas 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 firstfemaleflower. The variation in first female flower emergence might have been due to internodal length, number of internodal 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 wasappearedin thegenotypeG-23 (10.51). These parameters play an important role in deciding the earliness or lateness general. Similar findings were reported by Khatoon *et al.* (2016)[5], Karthik *et al.* (2017)[7], Bhargava *et al.* (2017)[6], Durga *et al.* (2021)[11] and Thulasiram *etal.* (2022)[12].The data presented in Table 1, indicated the days taken to first harvest in 38 genotypes.Amongthemthe

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	Madurailong	343.93	3.33	50.00	7.33	58.56	21.75	11.50	220.50	35.16	2.52
G-29	Maduraishort	452.76	3.23	48.19	8.33	57.60	19.44	22.17	175.46	18.98	3.68

G-30	Tarlagattalocal	407.56	2.83	51.06	8.83	60.72	24.64	13.33	188.59	28.39	2.52
G-31	Maduraicluster	417.12	2.17	50.00	8.00	58.59	24.54	24.73	126.21	15.66	3.19
G-32	Rajanukuntelocal	456.23	3.29	48.00	8.38	58.30	20.76	18.05	199.87	21.54	3.60
G-33	Budihallocal	415.62	2.83	49.83	8.50	58.41	24.14	20.33	174.39	21.17	3.54
G-34	Thenkanikottailocal	355.82	2.50	50.17	7.83	57.61	28.42	14.50	131.23	20.86	1.91
G-35	Hireharukunilocal	501.25	4.08	46.60	7.17	55.18	18.83	14.75	261.79	27.05	3.86
G-36	ArkaSujat	463.88	3.34	46.46	7.77	56.63	18.54	15.72	236.08	35.31	3.78
G-37	ArkaSumeet	407.00	3.17	48.78	8.17	58.11	24.56	13.68	245.39	50.75	3.37
G-38	ArkaPrasan(check)	469.50	3.67	49.91	8.67	59.43	22.69	14.46	240.70	44.62	3.50
G-39	Malapurlocal(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
	CDat 5%	20.68	0.52	1.54	0.57	1.99	1.99	2.01	24.84	3.47	0.54

VL-Vinelengthatfinalharvest(cm), **NPB-**Number ofprimarybranches pervine at final harvest, **DFF-**Daystoappearanceoffirstfemaleflower, **NFF-**Nodeatfirstfemale flower, **DFH-**Daystakentofirstharvest, **SR-**Sexratio(M:F), **NFV-**Number of fruitspervine, **AFW-**Average fruitweight (g), **FL-**Fruitlength(cm), **FYV-**Fruityieldpervine(kg) genotypeG-35showedminimumdaysof55.18tofirstharvestwhichwas on parwithG-5(55.56),G-36(56.63)andG-9(56.74).ThegenotypeG-23showedmaximumdaysof 67.98tofirstharvest. The days to first harvesting from sowing plays an important role in deciding the earliness and lateness of fruiting 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)[5], Bhargava *et al*. (2017)[6], Rathore *et al*. (2017)[13], Akhila and Devi Singh (2020)[14] and Panda *et al*. (2022)[10].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 bythegenotypeG-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 minimumnumberof fruits pervinewere found in G-18 (8.34). Similar results were reported by Hanumegowda K. (2011)[16], Saklesh (2016)[17] and Yadav *et al*. (2017)[18]. The result on average fruit weight was found significantlyhigher in the genotype G-35 (261.79 g) which was on par with G-37 (245.39 g) and check G-38(240.70g).Significantlylowestfruit weightwasrecordedin the genotype G-7(48.43g). 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 thegenotypeG-37(50.75cm)andminimumfruitlengthwasfoundinthegenotypeG-7(12.92cm). 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)[4], Karthik *et al*. (2017)[7], Bhargava *et al*. (2017)[6] and Sravani *et al*. (2021)[15]. The maximum fruityield 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(3.78kg),G-8(3.72 kg),G-29(3.68kg),G-32(3.60kg),G-33(3.54kg),checkG-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 and its attributes can be attributed to improved photosynthesis, greater carbohydrate accumulation, and 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)[19], Chen *etal*. (1996)[20], Luo *et al*. (2000)[21],Hedau and Sirohi (2004)[22],Akhila and Devi Singh (2020)[14], Sravani *et al*.(2021)[15], Panda*et al*.(2022)[10] andYadav andSingh (2022)[23].

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 canachieve homozygosity and promising genotypes with high yield component can beutilized as parents in further improvement studies of different quantitative characters through various breeding strategies.Aftermulti location trails,mayberecommended forcommercialcultivation.

Acknowledgement

The author extends sincere gratitude to Department of Vegetable science, College of Horticulture, Bagalkot, University of Horticultural sciences, Bagalkot, for providing financial support and necessary facilities during the research period.

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