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## Evaluation of mean performance studies in ridge gourd genotypes [*Luffa acutangula* L. (Roxb.)]

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### Abstract

The field experiment was conducted at Bagusala Instructional Farm, Department of Horticulture, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Paralakhemundi, Odisha, during the spring-summer 2021, to evaluate the performance of twenty-three genotypes of ridge gourd in a randomized block design with three replications. The ANOVA revealed highly significant differences among twenty-three genotypes for all the growth, flowering and yield parameters. Among the genotypes used for evaluation, the best performing genotypes for growth parameters were Challavanipeta local with the longest vine length (504.34 cm) and Chhattisgarh local with a maximum number of primary branches (4.27) at 90 days after sowing (DAS). Similarly, Lazzat and PHS-10 were the best-performing genotypes for earliness criteria, taking the least number of days (28.20 and 32.47, respectively) for first male flower and female flower appearance. PHS-10 was the earliest fruiting genotype (40.47 days), and Munagapaka local took the longest time to reach harvest (120.60 days). In the case of yield and yield attributing parameters, Vijayawada local had the longest fruits (27.69 cm) and maximum average fruit weight (177.73 g), Chennai local had the maximum fruit diameter (48.55 cm). However, Kashi Khushi gave maximum number of fruits (25.32), fruit yield per plot (10.08 kg) and fruit yield per hectare (12.43 t). From this study kashi khushi is reported as the highest yielder making it suitable for commercial cultivation. Thus, identifying the best-performing genotypes for commercial cultivation for good yield and quality would help improve the farmers' economic status.

**Keywords:** Evaluation, genotypes, performance, ridge gourd, yield

### Introduction

Ridge gourd (*Luffa acutangula* (L.) Roxb), commonly known as angled loofah, Chinese okra, ribbed gourd, silk gourd and dishcloth, is one of the most widely consumed fruit vegetables from the Cucurbitaceae family, with diploid chromosome number  $2n=26$  (Jeffrey, 1980) [3]. It is a climber with a tap root having 5-7 lobes palmate leaves. The pepo-type fruits are cylindrical and tapering towards the lower distal end. The sex forms observed in ridge gourd are monoecious, andromonoecious, trimonoecious, gynoeious, hermaphrodite (Choudhury *et al.*, 1965) [1]. According to Kalloo (1993) [4], Asian subtropical areas, especially India, is the center of origin. In commercial agriculture and research and development, the ridge gourd is generally disregarded. As the principal source of origin, India offers a large range of diversity, allowing for significant yield and other character enhancement through selection.

### Materials and Methods

The present investigation was carried out at Bagusala Instructional Farm, Department of Horticulture, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Paralakhemundi, Odisha, during the spring-summer of 2021. The design of the experiment was a randomized block design (RBD) with twenty-three genotypes *viz.* Lazzat, Pusa Nutan, Jivan Dhara, SC-18 (DEB 2404), Kashi Shivani, Saloni, Reva Spl, PHS-10, 16 Pata, Kashi Khushi (Satputia), Jaipur long, Chittradi Beera, Eluru local, Tallapalem local, Munagapaka local, Nizamabad local, Vijayawada local, Chhattisgarh local, Anakapalli local, Budithi local, Challavanipeta local, Chennai local and Pathapatnam local studied for twelve traits *viz.* vine length at 90 DAS (cm), number of primary branches at 90 DAS, days to first male flower appearance, days to first female flower appearance, days to first fruit harvest, days to last fruit harvest fruit length (cm), fruit diameter (mm), average fruit weight (g), number of fruits per plant, fruit yield per plot (kg) and fruit yield per hectare (t).

The observation on various growth, earliness, yield attributing and yield parameters were recorded from five randomly selected tagged plants of each genotype in an individual plot size of 4.2 m × 2.7m.

## Results and Discussion

**1. Analysis of variance:** In twenty-three genotypes, the

analysis of variance revealed highly significant variation for the traits (Table 1). This implies that all growth, earliness, yield and yield attributing traits have the maximum diversity among genotypes. The results were similar to the studies conducted by, Koppad *et al.* (2015) [6], Ramesh *et al.* (2018) [10], Harshitha *et al.* (2019) [2] and Methela *et al.* (2019) [9] in ridge gourd and Kumar *et al.* (2013) [7] in sponge gourd.

**Table 1:** Analysis of variance for 12 characters in 23 genotypes of ridge Gourd

Parameters	Replication	Treatment	Error
Vine length at 90DAS (cm)	242.3640	11374.352**	80.940
Number of Primary branches (90DAS)	0.0520	0.400**	0.062
Days to first male flower appearance	10.3050	77.215**	4.139
Days to first female flower appearance	16.9780	280.292**	10.186
Days to first harvest	8.0820	282.256**	8.317
Days to last fruit harvest	46.4580	288.367**	31.142
Fruit length (cm)	0.1360	51.284**	2.191
Fruit Diameter (mm)	14.2830	38.465**	8.028
Average fruit weight (g)	51.1350	2744.449**	56.926
Number of fruits per plant	0.0610	51.316**	0.423
Fruit yield per plot (Kg)	0.0160	10.970**	0.232
Fruit yield per hectare (t)	0.3030	16.716**	0.347

## 2. Comparative mean performance of the ridge gourd genotypes for different traits

The mean performance of different genotypes evaluated for growth, yield attributing and yield characters are mentioned in table 2.

The growth parameters vine length at 90 DAS varied from 320.58 cm (Budithi local) to 504.34 cm (Challavanipeta local), with a mean value of 394.25 cm. The genotype Challavanipeta local has the longest vine length (504.34 cm), which is *statistically at par with* Taalapalem local (493.05 cm). On the contrary, Budithi local has the shortest vine length (320.58 cm) and the primary branches at 90 DAS ranged from 2.93 (Taalapalem local) to 4.27 (Chhattisgarh local), with a grand mean of 3.54. A significantly maximum number of primary branches (4.27) was reported in Chhattisgarh local, closely followed by Eluru local (3.93), Nizamabad local (3.87) and Pusa Nutan (3.87), which were *statistically at par*. On the contrary, a minimum number of primary branches (2.93) was observed in Taalapalem local.

The earliness is one of the crucial parameters in a good variety which is measured in terms of days to first male flower appearance, days to first female flower appearance, days to first fruit harvest, days to last fruit harvest. The trait days to first male flower appearance showed a remarkable variation from 28.20 days (Lazzat) to 51.60 days (Pathapatnam local) and a total mean of 32.93 days. The genotype Lazzat took the least number of days to first male flower appearance (28.20days). Similarly, Nizamabad local (28.27days), Budithi local (28.33 days), Eluru local (28.93days), Anakapalli local (29.00days), Pusa Nutan (29.20days), Challavanipeta local (30.27days), Chittradi beera (31.13days), 16 Pata (31.27days) and Taalapalem local (31.47days) reported *statistical parity*. Pathapatnam local took a maximum number of days to first male flower appearance (51.60 days). The trait days to first female flower appearance exhibited significant variation from 32.47 days (PHS -10) being the earliest to 76.03days (Munagapaka local) being the last. The grand mean value for this parameter is 38.24days.

Therefore, PHS-10 took the least number of days (32.47days). Similarly, Nizamabad local (32.53days), Lazzat (33.27days), Anakapalli local (33.27days), Kashi Khushi (33.53days), Challavanipeta local (33.60days), Chennai local(33.67days), Chittradi Beera (33.87days), Budithi local (33.87days), Chhattisgarh local (34.33days), Pusa Nutan (34.67days) and Taalapalem local (34.67days) were *statistically at par* with PHS-10 and earliest than the rest of the genotypes. On the contrary, Munagapaka local took the maximum number of days (76.03). The variation for days to first fruit harvest was 40.47days (PHS-10) to 84.03 days (Munagapaka local), with an average mean of 46.35days. The genotype PHS-10 was the earliest fruiting genotype (40.47days). Similarly, Nizamabad local (32.53days), Lazzat (33.27days), Anakapalli local (33.27days), Kashi Khushi (33.53days), Challavanipeta local (33.60days), Chennai local (33.67days), Chittradi beera (33.87days), Budithi local (33.87days), Chhattisgarh local (34.33days), Pusa Nutan (34.67days) and Taalapalem local (34.67days) were *statistically at par* with PHS-10 and earliest than the rest of the genotypes. On the contrary, Munagapaka local took the maximum number of days (76.03) for the first female flower appearance. There was a remarkable variation among the genotypes for days to the last harvest from 88.87days (Nizamabad local) to 120.60days (Munagapaka local) with a grand mean value of 101.36days for the trait days to last fruit harvest. Munagapaka local took a maximum number of days to last harvest (120.60days). Similarly, SC-18(116.20days) and Jivan Dhara (111.87days) showed *parity* with the superior genotype (Munagapaka local). Contrarily, Nizamabad local took a minimum number of days to last harvest (88.87days).

The yield attributing parameter fruit length showed a great range of variation from 27.69 cm (Vijayawada local) to 12.23 cm (Jivan Dhara), with an average mean of 19.58 cm (Table 2). The genotype Vijayawada local has the longest fruits (27.69 cm). On the contrary, Jivan Dhara genotype has the smallest fruits (12.23 cm). The range for fruit diameter varied from 33.46 mm

**Table 2:** Mean performance of 23 genotypes of ridge gourd for growth, earliness, yield attributing and yield parameters

Genotypes	Vine length 90 DAS (cm)	Number of primary branches at 90 DAS	Days to first male flower appearance	Days to first female flower appearance	Days to first fruit harvest	Days to last fruit harvest	Fruit length (cm)	Fruit diameter (mm)	Average fruit weight (g)	Number of fruits per plant	Fruit yield per plot (kg)	Fruit yield per hectare (t)
Lazzat	347.63	2.47	28.20	33.27	41.27	98.20	15.69	46.79	114.29	7.40	4.12	5.08
Pusa Nutan	321.80	1.73	29.20	34.67	42.67	95.73	16.73	47.22	116.97	8.64	6.02	7.43
Jivan Dhara	342.02	0.60	37.93	41.60	49.60	111.87	12.23	33.46	47.67	14.12	4.92	6.07
SC-18	462.56	0.60	38.07	39.67	50.33	116.20	24.79	45.16	117.91	9.14	4.84	5.97
Kashi Shivani	350.00	1.87	33.73	38.33	46.33	94.87	22.99	41.81	126.65	10.39	7.59	9.37
Saloni	408.11	1.73	35.77	38.00	46.00	94.80	21.79	43.82	136.21	7.90	7.30	9.01
Reva SPL	322.61	1.40	32.27	38.00	46.00	103.80	21.85	42.56	133.10	8.89	7.21	8.90
PHS-10	373.02	0.80	29.50	32.47	40.47	89.77	24.91	45.91	175.59	7.40	7.67	9.46
16 pata	325.88	0.60	31.27	38.13	46.13	95.90	18.91	39.56	112.90	8.64	5.90	7.29
Kashi Khushi	379.84	1.93	33.53	33.53	41.53	91.13	13.12	35.57	66.23	25.32	10.08	12.43
Jaipur long	323.50	1.27	34.97	38.27	46.27	110.87	24.39	47.22	141.31	8.40	7.67	9.47
Chittradi beera	326.21	1.67	31.13	33.87	41.87	93.20	16.97	44.14	77.91	10.64	5.38	6.63
Eluru local	401.25	1.33	28.93	32.80	40.80	91.83	19.42	42.51	128.85	6.65	3.78	4.67
Taalapalem local	493.05	1.20	31.47	34.67	42.67	97.53	20.05	42.87	97.76	6.40	3.41	4.21
Munagapaka local	479.91	0.87	34.87	76.03	84.03	120.60	13.80	40.44	110.89	4.66	1.10	1.36
Nizamabad local	398.13	1.00	28.27	32.53	40.53	88.87	18.86	42.41	125.48	7.15	5.89	7.27
Vijayawada local	411.32	1.13	35.80	38.60	46.60	94.80	27.69	44.78	177.73	8.89	7.11	8.77
Chhattisgarh local	461.03	1.73	31.60	34.33	42.33	105.87	19.57	44.61	131.60	7.90	5.13	6.32
Anakapalli local	456.69	1.40	29.00	33.27	41.27	108.33	18.21	46.23	138.17	6.40	6.86	8.47
Budithi local	320.58	1.07	28.33	33.87	41.87	93.13	18.55	45.43	132.77	6.90	6.06	7.48
Challavanipeta local	504.34	0.73	30.27	33.60	41.60	106.47	15.71	42.82	107.67	7.15	4.48	5.52
Chennai local	412.74	0.53	31.80	33.67	41.67	107.33	18.96	48.55	134.18	7.40	6.30	7.77
Pathapatnam local	445.66	1.80	51.60	56.27	64.27	120.13	25.16	43.27	154.73	4.41	3.40	4.19
Mean	394.25	1.28	32.93	38.24	46.35	101.36	19.58	43.35	122.02	8.73	5.75	7.09
SE (m) ±	5.19	0.06	1.17	1.84	1.67	3.22	0.85	1.64	4.36	0.38	0.28	0.34
CD at 5%	14.80	0.16	3.35	5.25	4.75	9.18	2.44	4.66	12.42	1.07	0.79	0.97
CV	2.28	7.78	6.18	8.35	6.22	5.51	7.56	6.54	6.18	7.45	8.37	8.30

(Jivan Dhara) to 48.55 mm (Chennai local), with a mean of 43.35 mm. The genotype Chennai local has a maximum diameter (48.55 mm). Similarly, Pusa Nutan (47.22 mm), Jaipur long (47.22 mm), Lazzat (46.79 mm), Anakapalli local (46.23 mm), PHS-10 (45.91 mm), Budithi local (45.43 mm), SC-18 (45.16 mm), Vijayawada local (44.78 mm), Chhattisgarh local (44.61 mm) and Chittradi beera (44.14 mm), exhibited *statistical parity*. In comparison, Jivan Dhara genotype has shown a minimum fruit diameter (33.46 mm). The average fruit weight was minimum for Lazzat (47.67 g) to a maximum for Vijayawada local (177.73 g) with a grand mean value of 122.02 g. The genotype PHS-10 (175.59 g) showed *statistical parity* with Vijayawada local. The number of fruits per plant recorded a remarkable variation from 4.41 (Pathapatnam local) to 25.32 (Kashi Khushi), with an average mean value of 8.73. Kashi Khushi recorded a maximum number of fruits per plant (25.32) and Pathapatnam local recorded a minimum number of fruits (4.41). This implies that the traits reporting wide variation provide good scope for selecting desired genotypes for further crop improvement programmes.

The yield parameter fruit yield per plot revealed a significant difference from 10.08 kg (Kashi Khushi) with a maximum yield to 1.10 kg (Munagapaka local) with a minimum yield. The mean value for fruit yield per plot is 5.75 kg. The fruit yield per hectare revealed a significant difference from 12.43 t (Kashi Khushi), a maximum yield, to 1.36 t (Munagapaka local), a minimum yield. The mean value for fruit yield per hectare is 7.09 t.

### Conclusion

On studying the mean performance, it was concluded that the genotype Kashi Khushi was superior to the other 23 genotypes for the traits number of fruits per plant, fruit yield

per plant, fruit yield per hectare. The selection of genotypes with the highest fruit yield is the primary objective in any crop improvement programme, indicating that varieties or hybrids could be developed using Kashi Khushi genotype as one of the parents.

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