

Performance Analysis of Ridge Gourd (*Luffa acutangula* (L.) Roxb.) Genotypes for Growth, Yield and Yield Related Characters

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(Received 15 December 2021, Accepted 21 February, 2022)

(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: An experiment trail on ridge gourd (*Luffa acutangula* (L.) Roxb.) genotypes for growth, yield and yield related characters viz., vine length, number of branches per vine, days to first female flowering, days to 50 per cent flowering, node at first female flower appears, days to first fruit harvest, days to last fruit harvest, sex ratio, per cent fruit set, number of fruits per vine, average fruit weight, fruit length, fruit diameter, fruit yield per vine, number of ridges per fruit, flesh thickness and rind thickness was conducted at the Vegetable Research Block, College of Horticulture, UHS Campus, Bengaluru, India during Rabi-2019 with 55 genotypes of ridge gourd. The genotype COHBG-42 recorded maximum value for vine length (4.17m), number of branches per vine (7.83), days to last fruit harvest (106.35), per cent fruit set (49.34), number of fruits per vine (18.56), average fruit weight (205.12g), fruit length (37.38cm), fruit yield per vine (4.06kg), flesh thickness (3.71 cm) and minimum value for sex ratio (12.69) and rind thickness (1.34 mm). COHBRG-48 took minimum number of days to first female flowering (33.09), days to 50 per cent flowering (34.23) and days to first fruit harvest (44.55). The genotype COHBRG-18 took least number of nodes at first female flower appearance (8.53). The genotype COHBG-42 was found to be most promising genotype for various traits studied and hence it can be used for further crop improvement programmes like hybridization and evaluation.

Keywords: Ridge gourd, fruit yield per vine, hybridization, growth.

INTRODUCTION

Ridge gourd is an important tropical cucurbitaceous vegetable grown throughout India and South-East Asia. It has immense potential as a vegetable crop and the fruits contain 0.5 per cent protein, 3.4 per cent carbohydrate, 35µg carotene and 18 mg vitamin C/100g of edible portion. Ridge gourd fruit is used as

disinfectant, antihelmintic, anti-diarrhea, anti-syphilitic and laxative agent (Ram, 2010) and it also contains the gelatinous compound which has many other medicinal properties. Ridge gourd contains the gelatinous compound which has many other medicinal properties. Ridge gourd is a monoecious and highly cross pollinated vegetable with a large amount of variations were observed for most of the economically important

traits. The role of genetic variability in crops is of paramount importance in selecting the best genotypes for making rapid improvement in yield and related characters as well as to select the most potential parents for making the hybridization programme successful. Collection and evaluation of available germplasm is a prerequisite for their utilization while detailed evaluation determines the potential of a germplasm in specific crop improvement programme. Therefore, a trail for evaluating the available ridge gourd germplasm was carried out to identify the potential genotype with desirable growth, yield and yield related characters.

MATERIALS AND METHODS

The experiment was carried out at experimental field of Department of Vegetable Science, College of Horticulture, Bengaluru, Karnataka, during 2019-20. The experiment was laid out in a Randomized Block Design with two replications. Each replication consisted of fifty-five genotypes which were collected from different locations. The population of ten plants per genotype was maintained by the sowing of seeds at a spacing of 1.50 m to 1.00 m apart. The genotypes were evaluated for different growth, yield and yield related characters *viz.*, vine length, number of branches per vine, days to first female flowering, days to 50 per cent flowering, node at first female flower appears, days to first fruit harvest, days to last fruit harvest, sex ratio, per cent fruit set, number of fruits per vine, average fruit weight, fruit length, fruit diameter, fruit yield per vine, number of ridges per fruit, flesh thickness and rind thickness. The data collected to statistical analysis adopting standard procedures of analysis (Panse and Sukhatme 1978).

RESULTS AND DISCUSSION

The analysis of variance for different characters for fifty five ridge gourd genotypes were highly significant difference among the genotypes for most of the characters studied except number of ridges per fruit. The *per se* performance of different genotypes evaluated for growth, yield and yield related characters is presented in Table 1. The character vine length is an important yield component by which growth and vigor of vines are measured. In the present study, the genotypes showed significant differences for vine length and ranged from 1.97 m (COHBRG-2) to 4.17 m (COHBRG-42) with an average mean of 3.06 m. The genotype COHBRG-42 had maximum number of branches per vine (7.83) and minimum number of branches per vine (4.07) occurred in the genotype COHBRG-4. The maximum length of vine and more number of branches offers the possibility for setting up of flowers, thus ultimately increasing the fruit yield per vine. Similar findings were reported by Varalakshmi *et al.* (2015); Koppad *et al.* (2015); Bhargava *et al.* (2017); Rathore *et al.* (2017); Ramesh *et al.* (2018).

Earliness is one of the important attributes for good variety/hybrid which is measured in terms of days to first female flowering, days to 50 per cent flowering, node at first female flowering and days to first fruit harvest. The genotypes showed significant differences for early characters and the genotype COHBRG-48 took minimum number of days to first female flowering (33.09) and days to 50 per cent flowering (34.23) with the mean of 40.19 and 43.92, respectively. The maximum number of days to first female flowering (46.47) and days to 50 per cent flowering (54.57) was observed in the genotype COHBRG-15. The genotype COHBRG-18 took least number of nodes at first female flower appearance (8.53) and COHBRG-47 took a greater number of nodes (16.78). Among the genotypes, COHBRG-48 took minimum number of days to first fruit harvest (44.55) and maximum number of days to first fruit harvest was 53.78 (COHBRG-51) with a mean of 48.03. The genotype COHBRG-24 took minimum number of days to last fruit harvest (72.21) and COHBRG-42 took maximum days to last fruit harvest (106.35) and average was 86.05 days. Similar results were found with Ramesh *et al.* (2018); Kannan *et al.* (2019); Palghadmal *et al.* (2019); Talukder *et al.* (2019).

Low sex ratio is favorable trait in cucurbits and in the present study, the mean sex ratio among the ridge gourd genotypes was 19.96. Genotype COHBRG-42 reported less sex ratio (12.69) and genotype COHBRG-12 recorded higher sex ratio (23.77) among the different ridge gourd genotype. Per cent fruit set was significantly higher in the genotype COHBRG-42 (49.34), whereas lowest in the genotype COHBRG-11 (33.50) with an average of 41.37. Similar results were obtained by Rani and Jansirani (2014); Koppad *et al.* (2015); Rathore *et al.* (2017); Kannan *et al.* (2019); Ramesh *et al.* (2018).

In the crop improvement programme of ridge gourd, more number of female flowers is expected in genotypes than male flowers, since the yield can be maximized with high possibility of fruit set per cent. Mean number of fruits per vine was maximum in COHBRG-42 (18.56) and minimum was recorded in COHBRG-6 (7.97) with a mean of 12.15. Similar results are found with Bhargava *et al.* (2017); Karthik *et al.* (2017); Khan *et al.* (2017); Kannan *et al.* (2019). Among the different genotypes, significantly higher fruit weight was recorded in COHBRG-32 (43.14 g), whereas lowest was recorded in COHBRG-42 (205.12 g) with an average mean of 126.57 g. The significant higher fruit length was observed in COHBRG-42 (37.28cm), whereas lowest in COHBRG-5 (10.87cm) with an average mean of 19.90 cm and higher fruit diameter was observed in COHBRG-40 (15.73 cm) and least in COHBRG-49 (12.82 cm). Krishnamoorthy and Ananthan (2017); Kannan *et al.* (2019); Talukder *et al.* (2019); Palghadmal *et al.* (2019) were also obtained with similar results.

Table 1: Per se performance of different ridge gourd genotypes for growth, yield and yield related characters.

Sr. No.	Genotypes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.	COHBRG-1	2.53	4.98	37.47	43.85	12.25	48.32	87.05	20.59	46.09	8.97	163.16	12.85	13.51	1.49	8.98	2.49	1.67
2.	COHBRG-2	1.97	4.13	40.43	42.56	10.46	47.93	90.75	17.55	41.68	10.51	144.42	21.88	14.13	1.60	10.50	2.45	1.81
3.	COHBRG-3	3.34	5.43	45.65	47.79	12.57	49.38	91.64	16.45	39.72	12.52	147.67	17.42	14.94	1.82	7.45	2.31	1.98
4.	COHBRG-4	2.76	4.07	38.40	42.61	11.28	43.04	84.33	19.26	42.76	9.51	118.60	20.64	14.51	1.40	8.20	2.41	1.96
5.	COHBRG-5	2.15	4.87	35.57	40.48	9.50	48.72	86.36	19.39	42.55	10.96	119.41	10.87	14.91	1.54	9.30	2.20	1.78
6.	COHBRG-6	3.25	6.50	37.56	39.44	10.44	46.52	81.68	21.47	41.56	7.97	129.63	19.28	13.36	1.56	7.99	2.10	1.96
7.	COHBRG-7	3.12	6.05	34.53	38.27	11.73	48.47	84.93	22.57	41.00	8.97	157.28	23.29	13.91	1.94	9.30	2.36	2.09
8.	COHBRG-8	2.87	6.49	36.59	38.47	10.64	45.80	89.59	20.78	41.24	10.96	166.82	12.99	14.93	2.03	8.91	2.08	1.97
9.	COHBRG-9	2.58	4.48	38.92	43.59	12.69	48.63	94.39	19.19	37.53	11.96	138.75	18.18	14.52	1.56	7.24	2.01	1.96
10.	COHBRG-10	3.53	6.87	39.63	40.97	9.41	45.56	96.95	23.46	36.61	11.50	117.49	24.88	14.04	1.36	8.05	2.10	1.61
11.	COHBRG-11	2.99	6.81	42.53	48.37	13.64	49.27	97.84	22.12	33.50	10.37	120.75	23.17	14.29	1.91	10.18	2.25	1.95
12.	COHBRG-12	3.26	7.07	38.35	41.29	8.69	49.14	72.21	23.77	42.25	10.50	150.40	24.45	13.46	2.40	8.94	2.34	1.87
13.	COHBRG-13	3.09	7.51	44.14	45.50	14.60	49.73	90.71	17.91	40.48	13.92	158.70	18.41	13.20	2.23	10.84	2.30	1.90
14.	COHBRG-14	2.08	5.48	42.80	53.22	15.07	50.70	84.69	19.38	44.04	13.41	123.41	22.49	13.27	2.36	10.65	2.42	1.99
15.	COHBRG-15	2.57	6.50	46.47	54.57	15.68	48.46	86.55	20.31	41.82	11.52	115.85	19.62	14.43	2.27	9.67	2.38	1.87
16.	COHBRG-16	2.49	6.52	39.69	42.57	10.32	44.67	76.80	22.81	43.81	10.38	148.50	15.53	14.02	2.07	9.62	2.44	2.00
17.	COHBRG-17	3.28	6.62	41.41	44.32	12.61	48.06	72.43	23.06	43.60	12.97	123.14	10.92	13.98	2.17	9.67	2.13	1.87
18.	COHBRG-18	3.46	6.49	37.45	41.40	8.53	48.78	92.69	15.05	47.20	13.20	177.14	24.70	14.21	3.45	10.28	3.03	1.45
19.	COHBRG-19	2.90	6.20	41.80	44.47	12.56	49.27	72.41	23.29	40.26	10.50	128.12	18.47	13.44	1.56	9.77	2.52	1.69
20.	COHBRG-20	3.14	6.16	41.56	47.04	13.42	49.86	81.87	21.18	36.84	12.50	109.91	13.93	14.53	1.95	9.22	2.01	1.95
21.	COHBRG-21	3.34	6.07	42.77	48.67	14.20	51.16	88.88	17.77	38.42	11.59	123.45	16.47	13.96	1.99	8.59	2.70	1.65
22.	COHBRG-22	3.06	6.16	38.80	34.39	8.54	49.24	73.32	19.56	39.41	10.96	147.48	13.67	13.99	1.85	7.60	2.49	1.78
23.	COHBRG-23	2.97	5.75	39.08	43.51	10.34	45.77	81.87	21.93	43.68	13.36	130.08	24.12	13.87	2.32	8.44	3.00	2.19
24.	COHBRG-24	3.36	6.59	39.61	43.80	12.48	47.21	72.21	17.47	37.80	11.96	143.61	15.99	14.04	2.26	10.44	2.61	1.82
25.	COHBRG-25	3.37	6.47	40.43	42.84	11.24	49.75	96.78	17.83	45.30	15.28	169.50	27.28	14.33	3.28	8.99	3.42	1.40
26.	COHBRG-26	3.20	6.61	42.35	46.73	14.51	48.18	81.87	19.44	43.71	14.97	140.46	24.54	13.27	2.05	9.48	2.49	1.86
27.	COHBRG-27	2.56	7.07	38.41	43.51	11.86	47.33	87.93	21.78	40.09	12.96	129.53	26.09	14.03	2.26	10.31	2.86	1.96
28.	COHBRG-28	3.52	7.49	41.08	43.21	12.25	49.62	92.57	15.89	47.24	14.98	160.38	24.11	14.42	3.15	9.14	3.39	1.42
29.	COHBRG-29	3.28	7.12	41.59	45.48	15.53	48.22	99.07	20.36	39.75	12.32	64.03	16.02	13.73	2.03	10.71	2.72	1.90
30.	COHBRG-30	3.99	7.66	43.32	41.79	11.07	48.89	98.31	15.03	47.50	16.55	151.38	31.29	14.74	3.26	9.46	3.43	1.40
31.	COHBRG-31	3.15	7.54	45.52	48.37	16.43	50.14	83.54	23.15	40.61	15.13	123.75	23.54	13.65	1.96	8.41	3.00	2.07
32.	COHBRG-32	2.86	6.34	39.55	42.54	12.36	48.55	87.07	23.00	40.19	13.81	43.14	19.49	13.26	1.49	10.27	2.79	2.05

33.	COHBRG-33	2.57	6.49	36.75	41.29	10.49	46.58	90.03	22.77	40.44	11.50	91.74	13.00	13.13	1.20	8.40	2.65	1.88
34.	COHBRG-34	3.25	6.84	37.27	41.61	13.14	47.17	85.29	22.65	40.33	11.96	114.25	13.73	13.55	1.59	9.42	2.95	1.96
35.	COHBRG-35	3.27	7.44	35.32	39.59	15.18	46.71	83.35	23.14	36.18	11.35	53.70	12.25	14.44	1.67	8.73	2.86	1.67
36.	COHBRG-36	2.85	6.28	38.61	40.41	11.26	44.83	78.54	20.23	40.16	12.52	82.71	14.03	14.31	1.75	10.54	2.52	1.65
37.	COHBRG-37	3.33	6.05	40.73	46.73	12.41	49.06	83.54	20.99	40.91	10.50	121.71	16.23	13.88	1.66	9.63	2.85	2.06
38.	COHBRG-38	3.37	6.83	34.25	41.15	10.74	45.88	75.19	17.74	43.98	9.97	111.22	26.21	13.26	1.54	8.95	2.96	1.74
39.	COHBRG-39	3.06	6.16	44.51	48.64	16.59	51.47	81.87	19.96	43.20	13.97	132.04	24.58	14.95	2.09	7.89	3.07	1.90
40.	COHBRG-40	2.64	6.83	44.18	50.64	16.62	51.39	90.71	16.69	43.82	15.97	116.43	18.72	15.73	2.27	8.09	2.95	1.66
41.	COHBRG-41	3.74	7.74	41.48	46.75	12.25	48.56	102.28	14.08	46.09	15.74	147.93	25.23	14.16	3.48	9.25	3.71	1.34
42.	COHBRG-42	4.17	7.83	39.18	43.77	13.01	47.77	106.35	12.69	49.34	18.56	205.12	37.38	14.85	4.06	9.76	3.66	1.37
43.	COHBRG-43	3.39	6.56	38.42	39.47	13.41	44.95	75.56	19.59	39.64	13.97	131.04	23.56	14.77	2.11	10.30	2.52	1.97
44.	COHBRG-44	3.01	5.84	37.14	39.95	13.85	46.79	81.87	22.51	37.58	11.12	139.28	14.28	13.39	1.96	6.62	2.39	1.92
45.	COHBRG-45	3.43	6.16	39.28	48.35	12.28	47.15	92.57	23.11	36.61	14.53	133.05	15.40	13.54	2.34	8.20	2.51	1.94
46.	COHBRG-46	2.88	5.84	41.15	43.77	14.47	48.52	99.07	22.18	38.41	15.54	96.08	22.30	14.31	1.83	7.86	2.80	2.07
47.	COHBRG-47	3.29	6.76	37.86	40.67	16.78	45.61	76.68	22.97	39.22	12.50	116.86	17.01	14.16	1.81	8.31	2.81	1.75
48.	COHBRG-48	3.45	6.37	33.09	34.23	9.55	44.55	73.75	18.59	41.52	12.19	101.19	21.30	15.28	1.93	9.09	2.89	1.75
49.	COHBRG-49	2.55	5.22	43.57	46.73	14.71	48.72	85.32	19.27	39.69	10.73	143.46	16.70	12.82	1.69	10.13	3.03	1.65
50.	COHBRG-50	2.61	6.03	46.15	47.63	15.63	51.62	75.56	22.25	38.77	10.96	124.99	15.26	13.47	1.70	9.93	2.50	1.91
51.	COHBRG-51	3.36	7.05	45.58	48.58	14.47	53.78	92.94	19.31	41.60	15.52	122.51	20.15	14.16	2.34	8.68	2.37	1.96
52.	COHBRG-52	3.11	5.95	41.32	47.71	15.33	48.31	85.32	17.57	42.69	13.83	105.36	24.80	13.47	2.28	10.07	2.89	2.05
53.	COHBRG-53	2.79	5.57	42.73	45.72	13.51	49.32	99.07	18.73	43.31	10.87	97.66	23.20	14.13	1.72	9.85	2.55	1.99
54.	COHBRG-54	2.89	6.86	36.13	39.72	9.34	46.57	75.63	19.49	40.30	10.96	68.96	26.41	14.56	1.41	9.12	3.00	1.83
55.	COHBRG-55	3.34	7.05	42.44	45.89	12.21	50.98	83.02	18.69	43.68	16.55	118.26	16.52	13.95	2.21	7.07	2.45	1.93
	Mean	3.06	6.41	40.19	43.92	12.62	48.03	86.05	19.96	41.37	12.15	126.57	19.90	14.05	2.05	7.96	2.65	1.83
	Range	1.97-4.17	4.07-7.83	33.09-46.47	34.23-54.57	8.53-16.78	44.55-53.78	72.21-106.35	12.69-23.77	33.50-49.34	7.97-18.56	43.14-205.12	10.87-37.38	12.82-15.73	1.20-4.06	6.62-10.84	2.01-3.71	1.34-2.19
	SE±m	0.13	0.19	1.57	1.83	0.56	1.75	3.18	0.88	1.71	0.51	4.91	0.85	0.14	0.08	0.81	0.11	0.06
	CD @ 5%	0.37	0.56	4.50	5.24	1.62	5.01	9.10	2.52	4.91	1.48	14.05	2.44	0.41	0.31	NS	0.32	0.26
	CD @ 1%	0.50	0.75	5.99	6.98	2.16	6.68	12.12	3.36	6.54	1.97	18.72	3.25	0.55	1.20	NS	0.43	1.34
	CV	6.19	4.41	5.96	5.96	6.42	5.20	5.27	6.31	5.92	5.90	5.53	6.11	5.13	5.81	14.96	6.12	5.44

1. Vine length (m)
2. Number of branches per vine
3. Days to first female flower appears
4. Days to 50 per cent flowering

5. Node at 1st female flower appears
6. Days to first fruit harvest
7. Days to last fruit harvest
8. Sex ratio

9. Per cent fruit set
10. Number of fruits per vine
11. Average fruit weight (g)
12. Fruit length (cm)

13. Fruit diameter (cm)
14. Fruit yield per vine (kg)
15. Number of ridges per fruit
16. Flesh thickness (cm)
17. Rind thickness (mm)

The less number of ridges per fruit was noticed in the genotype COHBRG-44 (6.62) and more in COHBRG-13 (10.84). The genotypes differed significantly with regard to fruit yield per vine, the genotype COHBRG-42 (4.06 kg) recorded highest fruit yield per vine and least recorded in COHBRG-33 (1.20 kg). Karthik *et al.* (2017); Khan *et al.* (2017); Kannan *et al.* (2019) were also found similar results. The higher thickness of flesh was noticed in the genotype COHBRG-41 (3.71 cm) and lower in COHBRG-20 (2.01 cm). The least rind thickness of fruit was recorded in the genotype COHBRG-41 (1.34 mm) and higher in COHBRG-23 (2.19 mm). The similar results were found with Koppad *et al.* (2015); Ramesh *et al.* (2018); Kannan *et al.* (2019).

CONCLUSION

The present study concluded that crop improvement of ridge gourd can be done through by including the genotype COHBRG-42 in breeding programme which gives higher possible yield of 4.06 kg per vine to improve yield potential in ridge gourd.

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How to cite this article: Shilpashree N., M. Anjanappa, R.K. Ramachandra, B. Fakrudin, M. Pitchaimuthu, K.S. Shankarappa and Aravind Kumar J.S. (2022). Performance Analysis of Ridge Gourd (*Luffa acutangula* (L.) Roxb.) Genotypes for Growth, Yield and Yield Related Characters. *Biological Forum – An International Journal*, 14(1): 1788-1792.