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Performance of ridge gourd (*Luffa acutangula* L.) hybrid on growth, yield and quality

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Abstract

An experiment on “Performance of Ridge gourd (*Luffa acutangula* L.) Hybrid genotypes on growth, yield and quality” was conducted during March-May, 2024 in Horticulture Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, UP, India. The result of the investigation regarding the performance of the 12 genotypes of Ridge gourd i.e, AVT-I-2022/RIGHYBD-1, AVT-I-2022/RIGHYBD-3, AVT-I-2022/RIGHYBD-4, AVT-I-2022/RIGHYBD-5, AVT-II-2021/RIGHYBD-6, AVT-II-2021/RIGHYBD-7, AVT-II-2021/RIGHYBD-8, AVT-II-2021/RIGHYBD-9, AVT-II-2021/RIGHYBD-10, AVT-II-2021/RIGHYBD-11, AVT-II-2021/RIGHYBD-12, obtained from IIVR, Varanasi & G-12 KAREENA (Check variety) obtained from Japan Bio seeds Company to find out the best performance in terms of growth and yield and quality in Prayagraj conditions. The experiment was conducted in Randomized Block Design (RBD) with 3 replications. From the present investigation it had concluded that Ridge gourd genotype AVT II/2021/RGHYBD-12 was recorded maximum Average yield/plant (4.33kg/plant), average fruit/hectare (177.13q/ha), average fruit/hectare (38.43t/ha), average fruit length (23.26cm), average fruit weight (186.93g) and the highest B:C with 5:0 which was found to be productive and economically viable.

Keywords: Ridge gourd, genotypes

1. Introduction

Ridge gourd (*Luffa acutangula* L.), also known as kalitori, angled gourd, angled loofah, Chinese okra, silky gourd, and ribbed gourd *Luffa* is a multi-harvest vegetable crop grown in the South Asian region. It is commonly called “Torai” in rural areas of India. The name “Luffa” or “Loofah” is an Arabic origin and refers to the spongy characteristic of the mature fruit. It contains a gummy compound called “Luffein”, which has medicinal importance. Hybrid ridge gourds offer several advantages, including higher yields, uniform fruit size and shape, early maturity, improved resistance to biotic and abiotic stresses, and enhanced shelf life. These traits make hybrids particularly suitable for intensive cultivation and commercial farming. Fresh ridge gourd contains approximately 10-15 mg of vitamin C per 100 grams of edible portion, which contributes meaningfully to the daily recommended intake. It is a warm season crop that cannot tolerate frost and thrives in temperatures between 18°C and 28°C. This aimed to evaluate between the genotypes with the local variety and making it a promising crop for cultivation for the farmers. This focuses on the evaluation and performance analysis of hybrid ridge gourd cultivars with respect to growth, yield, and quality parameters. The study aims to provide insights into the suitability of specific hybrids under local cultivation conditions and contribute to the advancement of high-efficiency vegetable production systems.

2. Materials and Methods

The present investigation “Performance of Ridge gourd (*Luffa acutangula* L.) Hybrid on growth, yield and quality” was carried out during the period between March-May, 2024. The experiment was carried out at a Research field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.). The experiment was laid out in RBD with 3 replications. 11 varieties from Indian Institute of Vegetable Research (IIVR), Varanasi and 1 check variety (KAREENA) with a parameter of

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1.5m ×0.75m spacing.

2.1 Treatments Details

Table 1: List of genotypes

Symbols	Name of Genotypes	Source
G1	AVT-I-2021/RIGHYBD-1	IIVR, Varanasi
G2	AVT-I-2021/RIGHYBD-3	IIVR, Varanasi
G3	AVT-I-2021/RIGHYBD-4	IIVR, Varanasi
G4	AVT-I-2021/RIGHYBD-5	IIVR, Varanasi
G5	AVT-II-2022/RIGHYBD-6	IIVR, Varanasi
G6	AVT-II-2022/RIGHYBD-7	IIVR, Varanasi
G7	AVT-II-2022/RIGHYBD-8	IIVR, Varanasi
G8	AVT-II-2022/RIGHYBD-9	IIVR, Varanasi
G9	AVT-II-2022/RIGHYBD-10	IIVR, Varanasi
G10	AVT-II-2022/RIGHYBD-11	IIVR, Varanasi
G11	AVT-II-2022/RIGHYBD-12	IIVR, Varanasi
G12	KAREENA (CHECK VARIETY)	Japan Bio seeds Company

3. Results and Discussion

The investigation titled “Performance of Ridge gourd (*Luffa acutangula* L.) Hybrid on growth, yield and quality” was conducted at the experimental station of the Department of Horticulture, Sam Higginbottom University of Agriculture, Technology, and Sciences, Allahabad, Uttar Pradesh. The study involved twelve distinct genotypes of ridge gourd, assessing their growth, yield, and quality attributes under local conditions. The data collected throughout the experiment are detailed in this section, with tables and illustrations provided to enhance the clarity and understanding of the results.

3.1 Growth parameters

This study revealed the various growth parameters viz, Days to germination, Germination percentage, Days to 1st male &female flower appearance, Node to 1st male &female flower emergence, Days to 1st picking &Chlorophyll content was analyzed and tabulated in Table 1.

Days to Germination, Germination percentage, Days to male & female flower emergence

In terms of Days to Germination, the minimum day AVT-II-2021/RIGHYBD-12 with (5.87days) and the maximum day was observed in AVT-II-2021/RIGHYBD-8with (6.83days). Germination at the earliest benefits for market price. The view was supported by Kurre *et al.* (2022) [8] in Ridge gourd. In terms of Germination percentage the highest germination percentage was observed in AVT-I-2022/RIGHYBD-1with 100%, followed by AVT-II-2021/RIGHYBD-6 with100%, and the minimum germination percentage with 80% was being observed in Check Variety (KAREENA).

In terms of Days to first male appearance to minimum days was observed in AVT-II-2021/RIGHYBD-12 with (29.8days) and the maximum days was observed in Check Var. (KAREENA) with (35.87days).In terms of Days to first female appearance to minimum days was observed in AVT-II-2021/RIGHYBD-12 with (39.3days), and the maximum days was observed in Check Var. (KAREENA) with (51.13days).This findings were reported by Kurre *et al.* (2022) [8] in Ridge gourd Ramya *et al.* (2020) [10] in bitter gourd.

Node to first male &female flower emergence, Days to 1st picking, Chlorophyll content

In terms of node to first male appearance the earliest was

observed in, AVT-I-2022/RIGHYBD-1 with (1.2) and the maximum node was observed in AVT-II-2021/RIGHYBD-12 with (3.43). This view was supported by Deepthi *et al.* (2016), Vaishali (2016). In terms of nodes to first female appearance the earliest node appearance was observed in AVT-I-2022/RIGHYBD-1 with (4.13) and the latest was observed in AVT-II-2021/RIGHYBD-12 with (6.63). The view was supported by Khatoon *et al.* (2016) [6], Karthik *et al.* (2017) [5] in Ridge gourd. In terms of Days to first harvesting the earliest days was observed in AVT-II-2021/RIGHYBD-12 with (37.06 days) and the latest days was observed in AVT-II-2021/RIGHYBD-8 with (49.26days). The view was reported by Demove *et al.* (2010) [4] in bitter gourd. In terms of Chlorophyll content the minimum was observed in AVT-II-2021/RIGHYBD-9 with (46.03) and the maximum was observed in AVT-I-2022/RIGHYBD-1 with (55.3).

3.2 Yield parameters

Different Ridge gourd genotypes was analyzed and tabulated in Table:2 on the basis of yield parameters viz. No. of fruits per plant, Average fruit weight(g), Average fruit length(cm), Average yield per plant(kg), Average yield/hectare (q/ha), Average yield /hectare(t/ha)

Number of fruits per plant, Fruit length (cm), Fruit diameter(mm), Fruit weight(g)

In terms of Number of fruit per plant the minimum was observed in AVT-I-2022/RIGHYBD-1 with (12.33) and the maximum was observed in AVT-II-2021/RIGHYBD-12 with (19.06). These findings are in agreement with the results reported by Triveni *et al.* (2021) [13] in ridge gourd.

The highest fruit length was recorded in AVT-II-20221RIGHYBD-12 with (23.26cm) followed by AVT-II-2021/RIGHYBD-11 with (21.33cm) and the shortest fruit length was observed in AVT-I-2022/RIGHYBD-1 with (11.83cm) followed by AVT-II-2021/RIGHYBD-7 with (16.96cm). The view was reported by Murthy *et al.* (2020) [9], Rathore *et al.* (2017) [12]; Chauhan *et al.* (2023) [3] in Ridge gourd. In terms of fruit diameter the minimum was observed in AVT-II-2021/RIGHYBD-12 with (16.03mm) and the maximum was observed in AVT-I-2022/RIGHYBD-1 with (23.24mm).In terms of fruit weight the minimum was observed in AVT-II-2021/RIGHYBD-9 with (114.83g) and the maximum was observed in AVT-II-2021/RIGHYBD-12 with (186.93g) and tabulated in Table:1 The findings were supported by Rathore *et al.* (2017) [12] in Ridge gourd.

Fruit yield per plant(kg), Fruit yield per hectare (q/ha), Fruit yield per hectare(t/ha)

In terms of average yield/plant(kg) the minimum was observed in AVT-I-2022/RIGHYBD-1 with (1.38kg/plant) and the maximum yield/plant AVT-II-2021/RIGHYBD-12 with (4.33 kg/plant).In terms of average yield/hectare (q/ha) the minimum was observed in AVT-I-2022/RIGHYBD-3 with (110.96q/ha) and the maximum yield was observed in AVT-II-2021/RIGHYBD-12 with (177.13 q/ha). The results are in agreement with the findings of Kurre *et al.* (2022) [8] in Ridge gourd. In terms of average yield/hectare (t/ha) the minimum was observed in AVT-I-2022/RIGHYBD-1 with (12.06 t/ha) and the maximum yield (t/ha) was observed in AVT-II-2021/RIGHYBD-12with (38.43 t/ha). This investigation was supported by the findings of Rathore *et al.* (2017) [12]; Murthy *et al.* (2020) [9] in Ridge gourd.

3.3 Quality parameters

Quality parameters decide the Vitamin C content, TSS content, Fruit color and Fruit shape of different genotypes which was tabulated in Table:3.

Vitamin C content, TSS content, Fruit color, Fruit shape

In terms of Vit C content the minimum was observed in AVT-I-2022/RIGHYBD-5 with (1.16mg/100g) and the maximum was

observed in AVT-II-2021/RIGHYBD-7 with (1.46mg/100g). In terms of TSS content the minimum was observed in AVT-I-2022/RIGHYBD-1 with (3.2°Brix) and maximum TSS content was observed in AVT-II-2021/RIGHYBD-10 & Check Variety (KAREENA) with (4°Brix). This investigation was carried by Rathore *et al.*, (2017)^[12] in Ridge gourd and Ramya *et al.* (2020)^[10] in Bitter gourd; Ara *et al.* (2018)^[11] in pointed gourd.

Table 1: Performance of Ridge gourd hybrid on growth parameters

Symbol	Genotypes	Days to Germination	Germination percentage	Days to 1 st male flower emergence	Days to 1 st female flower emergence	Node to 1 st male flower emergence	Node to 1 st female flower emergence	Days to first harvesting	Chlorophyll content
G1	AVT-I-2022/RIGHYBD-1	6.73	100%	34.26	50.7	1.2	4.13	46.33	55.3
G3	AVT-I-2022/RIGHYBD-3	6.6	93%	32.53	48.93	2.43	5.00	45.00	54.06
G4	AVT-I-2022/RIGHYBD-4	6.73	97%	33.66	49.43	2.2	4.86	42.70	42.56
G5	AVT-I-2022/RIGHYBD-5	6.66	90%	33.33	47.9	1.93	5.26	42.70	49.10
G6	AVT-II-2021/RIGHYBD-6	6.73	100%	33.6	49.15	2.13	6.23	43.00	51.63
G7	AVT-II-2021/RIGHYBD-7	6.66	97%	33.93	47.3	2.03	5.10	47.73	49.50
G8	AVT-II-2021/RIGHYBD-8	6.83	100%	31.93	49.23	2.56	5.13	49.26	45.13
G9	AVT-II-2021/RIGHYBD-9	6.53	97%	33.06	49.9	1.53	5.03	48.13	46.03
G10	AVT-II-2021/RIGHYBD-10	6.73	93%	31.93	48.55	1.7	5.36	43.33	46.33
G11	AVT-II-2021/RIGHYBD-11	6.6	90%	33.73	44.43	2.5	5.50	39.00	46.70
G12	AVT-II-2021/RIGHYBD-12	5.86	100%	29.8	39.3	3.4	6.63	37.06	48.63
G13	KAREENA (Check variety)	6.63	80%	35.86	51.13	2.53	5.73	48.13	46.30
F-test		NS	S	NS	S	S	S	S	S
SE. d		0.27	0.03	1.52	2.08	0.44	0.84	3.06	3.97
CD (5%)		0.57	0.07	3.16	4.31	0.91	1.74	6.35	8.23
CV		5.17	0.07	5.63	5.30	24.76	19.36	8.45	10.04

In terms of fruit colour AVT-I-2022/RIGHYBD-1, AVT-I-2022/RIGHYBD-4, AVT-II-2021/RIGHYBD-7, AVT-II-2021/RIGHYBD-8, AVT-II-2021/RIGHYBD-13 had light green colour while, AVT-I-2022/RIGHYBD- had green colour, and AVT-I-2022/RIGHYBD-5, AVT-II-2021/RIGHYBD-6, AVT-II-2021/RIGHYBD-9, AVT-II-2021/RIGHYBD-10, AVT-II-2021/RIGHYBD-11, AVT-II-2021/RIGHYBD-12 had dark green colour and Check variety (KAREENA) had light greenish colour. Similar results were also reported by Chauhan *et al.* (2019)^[2] in Ridge gourd.

In terms of fruit shape AVT-I-2021/RIGHYBD-1 had Short elliptical tapered, AVT-I-2021/RIGHYBD-3 & AVT-II-2022/RIGHYBD-11 had Elongated elliptical tapered, AVT-I-2021/RIGHYBD-4, AVT-II-2022/RIGHYBD-8, AVT-II-2022/RIGHYBD-9, AVT-II-2022/RIGHYBD-10 had Elongated tapered, AVT-I-2021/RIGHYBD-5 had Cylindrical shape, AVT-II-2022/RIGHYBD-6 had Spindle shape, AVT-II-2022/RIGHYBD-7 had Oblong shape, Check Variety (KAREENA) had Elongated slim. The difference in fruit shape findings was done by Rao *et al.*, (2021)^[11] in Ridge gourd.

Table 2: Performance of Ridge gourd hybrid on yield parameters

Symbol	Genotypes	Average Fruit Length (cm)	Average Fruit Diameter (mm)	Average Fruit Weight (g)	Average yield per plant (kg)	Average Fruit yield (q/ha)	Average Fruit yield (t/ha)
G1	AVT-I-2022/RIGHYBD-1	11.83	23.24	120.85	1.38	135.96	12.06
G3	AVT-I-2022/RIGHYBD-3	20.40	17.30	126.50	1.73	110.96	15.33
G4	AVT-I-2022/RIGHYBD-4	21.00	17.56	120.33	1.80	130.31	15.96
G5	AVT-I-2022/RIGHYBD-5	18.33	18.90	163.46	2.10	126.77	18.63
G6	AVT-II-2021/RIGHYBD-6	21.83	19.00	156.91	2.26	136.25	20.06
G7	AVT-II-2021/RIGHYBD-7	16.96	18.56	137.56	1.86	125.89	16.53
G8	AVT-II-2021/RIGHYBD-8	18.43	19.20	153.43	2.13	112.92	18.90
G9	AVT-II-2021/RIGHYBD-9	22.00	21.14	114.83	1.43	117.16	12.70
G10	AVT-II-2021/RIGHYBD-10	22.00	18.32	131.90	1.76	130.35	15.63
G11	AVT-II-2021/RIGHYBD-11	21.33	20.93	135.90	2.36	145.13	23.36
G12	AVT-II-2021/RIGHYBD-12	23.26	16.03	186.93	4.33	177.13	38.43
G13	KAREENA (Check variety)	20.00	18.92	123.83	1.66	124.41	14.76
F-test		S	S	S	S	S	S
SE. d		1.98	1.79	23.66	0.42	13.46	4.03
CD (5%)		4.11	3.71	49.08	0.88	27.92	8.36
CV		12.29	11.48	20.79	25.26	12.57	26.64

Table 3: Performance of Ridge gourd hybrid on quality parameters

Symbol	Genotypes	Vit C	TSS content	fruit colour	fruit shape
G1	AVT-I-2022/RIGHYBD-1	1.26	3.2	Light green	Short elliptical tapered
G3	AVT-I-2022/RIGHYBD-3	1.30	3.23	Green	Elongated elliptical tapered
G4	AVT-I-2022/RIGHYBD-4	1.33	3.33	Light green	Elongated tapered
G5	AVT-I-2022/RIGHYBD-5	1.16	3.3	Dark green	Cylindrical shape
G6	AVT-II-2021/RIGHYBD-6	1.23	3.5	Dark green	Spindle shape
G7	AVT-II-2021/RIGHYBD-7	1.46	3.46	Light green	Oblong shape
G8	AVT-II-2021/RIGHYBD-8	1.30	3.46	Light green	Elongated tapered
G9	AVT-II-2021/RIGHYBD-9	1.43	3.5	Dark green	Elongated tapered
G10	AVT-II-2021/RIGHYBD-10	1.36	4.0	Dark green	Elongated tapered
G11	AVT-II-2021/RIGHYBD-11	1.43	3.93	Dark green	Elongated elliptical tapered
G12	AVT-II-2021/RIGHYBD-12	1.40	3.46	Dark green	Long elongated slim
G13	KAREENA (Check variety)	1.26	4.0	Light greenish	Elongated slim
F-test		S	S		
SE. d		0.07	0.27		
CD (5%)		0.15	0.57		
CV		7.00	9.67		

3.4 Economic analysis

Economic analysis revealed the highest gross return, net return and the benefit cost ratio of the different hybrid genotypes of Ridge gourd crop which is tabulated in Table:4.

Maximum Gross Return was observed in AVT-II-2021/RIGHYBD-12 with (5,76,000 Rs/ha) and the minimum was observed in AVT-I-2022/RIGHYBD-1 with (1,80,900

Rs/ha). Maximum Net Return was observed in AVT-II-2021/RIGHYBD-12 (4,62,257 Rs/ha), and the minimum was observed in AVT-I-2022/RIGHYBD-1 with (67,157 Rs/ha). Maximum Benefit Cost Ratio was observed in AVT-II-2021/RIGHYBD-12 with (5:00), and the minimum was observed in AVT-I-2022/RIGHYBD-1 with (1:05).

Table 4: Economic Analysis of different genotypes

Symbols	Treatments	Total Cost (Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs/ha)	B:C
G1	AVT-I-2022/RIGHYBD-1	110143	180900	6715	1:05
G2	AVT-I-2022/RIGHYBD-3	110143	229950	116207	2:00
G3	AVT-I-2022/RIGHYBD-4	110143	239400	123657	2:01
G4	AVT-I-2022/RIGHYBD-5	110143	279450	165707	2:45
G5	AVT-II-2021/RIGHYBD-6	110143	300900	187157	2:06
G6	AVT-II-2021/RIGHYBD-7	110143	247950	134207	2:17
G7	AVT-II-2021/RIGHYBD-8	110143	283500	169757	2:49
G8	AVT-II-2021/RIGHYBD-9	110143	190500	76757	1:67
G9	AVT-II-2021/RIGHYBD-10	110143	234450	120707	2:06
G10	AVT-II-2021/RIGHYBD-11	110143	413250	236657	3:06
G11	AVT-II-2021/RIGHYBD-12	110143	576000	462257	5:00
G12	KAREENA (Check variety)	110143	220500	106757	1:93

Conclusion

From the present investigation it is concluded that among 12 varieties of ridge gourd on the basis of mean performance the hybrid AVT-II-2021/RIGHYBD-12 had substantially higher yield and performed better for other desirable traits as compared to KAREENA (check variety) in terms of days to germination with (5.87 days), germination percentage (100%), earliest day to first male & female flower was observed in (29.8 days) & (39.3 days), number of fruits per plant (19.06), early harvesting (37.06), yield/plant (4.33 kg), yield (177.13 q/ha), and maximum average fruit yield (38.43 t/ha) and highest gross return with (5,76,000 Rs/ha), maximum net return (Rs 4,62,257) and the highest Benefit cost ratio with (5:00).

So, from the above results it can be concluded that the hybrid variety AVT-II-2021/RIGHYBD-12 is the most suitable genotype that can be grown by the farmers for more production of ridge gourd.

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