Performance of Ridge gourd genotype under Prayagraj Agro-climatic conditions

ABSTRACT

Ridge gourd, scientifically known as *Luffa acutangula*, is a tropical vine that belongs to the Cucurbitaceae family. It is widely cultivated for its young tender fruits, which are consumed as a vegetable. Ridge gourd is a versatile vegetable that can be used in various culinary preparations, including stir-fries, curries, soups, and stews. It has a mild, slightly sweet flavour. Therefore, the present investigation was carried out at the Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, Uttar Pradesh during the *Kharif* season 2022 to check the performance of different genotypes of ridge gourd under Prayagraj agro climatic conditions. The experiment was laid out in a Randomized block design with 9 genotypes and 3 replications. Genotypes comprised of H_1 (AVT-II 2019/RIGHYB-1), H_2 (AVT-II 2019/RIGHYB-2), H_3 (AVT-II 2019/RIGHYB-3), H_4 (AVT-II 2019/RIGHYB-4), H_5 (AVT-II 2019/RIGHYB-5), H_6 (AVT-II 2019/RIGHYB-6), H_7 (AVT-II 2019/RIGHYB-7), H_8 (GREEN INDIA-8) and H_9 (JAIPURI LONG-9). From the above experimental finding, it was concluded that the genotype AVT-II 2019/RIGHYB-7 performed best in terms of growth parameters like vine length (269.93 cm), earliness in maturity (59.33 days for first fruit picking) and yield parameters like fruit length (25.23 cm), fruit girth (6.56 cm), and fruit yield per plot (1422.21 g/plot). AVT-II 2019/RIGHYB-7 showed the best performance for quality parameters also TSS (4.23°Brix) and Vitamin C content (2.05 mg/100g).

Keywords: *germplasm, T.S.S., Ridge gourd, genotypes.*

INTRODUCTION

Ridge Gourd is a creeping vine plant that bears usually cylindrical fruits, which are used as vegetables. Ridge gourd is a cross-pollinated diploid crop which is grown in all parts of India. A gelatinous compound in ridge gourd is 'Luffein'. The most favourable temperature for Ridge gourd is 18°C-28°C. The flower colour is pale yellow and the anthesis time is morning hours. Botanically, Ridge gourd is known as *Luffa acutangula* Roxb. belongs to the family *Cucurbitaceae*. It is a diploid cross-pollinated species with chromosome number 2n=2x=26. Ridge gourd probably originated from India and Tropical Asia region of origin. It is mainly cultivated in China, India, Turkey, Iran and other parts of southeast Asia. Progenitor of Ridge gourd is "*Luffa graveolens*". The area under Ridge gourd production in India accounts for 10.03 thousand ha with a production of 3.16 million tonnes in the year 2020-21. (*Source:* ***NHB*, Ministry of Agriculture & Farmers Welfare, Government of India, 2020-21**). Bihar ranks first in area and production of Ridge gourd in the year 2020-21 followed by Uttar Pradesh and Haryana. The production of Ridge gourd in Uttar Pradesh is 427.81 tonnes for the year 2020-21. The ridge gourd is used as a cooked vegetable. It has many uses in Ayurvedic medicines. According to 'Ayurvedic medicines, the oil from its seed is good for the liver and the body. Ridge gourd has moisture 95.2 g, magnesium 11 mg, sodium 2.9 mg, Vitamin C 5 mg, 3.5g Carbohydrates, Oxalic acid 27 mg, Calcium 40 mg, Phosphorous 40 mg, Potassium 50 mg, Chlorine 7 mg and many other nutrients out of 100 g of edible portion. The ridge gourd is well-adapted crop for the warm season crop, and it does not withstand even

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light frost. The crop performs well in temperature ranges between 18°C- 28°C and soil having pH ranging between 6.0-7.0irrespective of its kind from sandy to heavy clay soil. It is grown as the sole crop in India in *Kharif* and *Kharif* seasons. It is well suited to hot and warm climates with annual rainfall of 65-85 cm. Ridge gourd is widely grown in India. Few local varieties have gained importance in Uttar Pradesh climatic conditions. Varietal evaluation in a group of cultivars is a prerequisite for a successful breeding program. Thus, the study was done to evaluate the best-performing hybrid varieties compared to local varieties. There are many good performing varieties which are available in the market also. According to Prayagraj agro-climatic conditions Ridge gourd can be grown successfully with higher yield. Because of the above-mentioned facts, the present study on the varietal evaluation of Ridge gourd varieties under Prayagraj agro-climatic conditions.

MATERIAL AND METHODS

The present investigation entitled was done to understand the plant growth, fruit yield and quality of the fruit of different genotypes of ridge gourd. The investigation was carried out at Horticultural Research Farm (HRF), Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj during the *Kharif* season of 2022. The experiment was laid out in a Randomized block design with 9 genotypes and 3 replications. Genotypes comprised of H_1 (AVT-II 2019/RIGHYB-1), H_2 (AVT-II 2019/RIGHYB-2), H_3 (AVT-II 2019/RIGHYB-3), H_4 (AVT-II 2019/RIGHYB-4), H_5 (AVT-II 2019/RIGHYB-5), H_6 (AVT-II 2019/RIGHYB-6), H_7 (AVT-II 2019/RIGHYB-7), H_8 (GREEN INDIA-8) and H_9 (JAIPURI LONG-9). Observations were recorded at different stages of growth for parameters like vine length, days to flower emergence, fruit length, fruit girth and yield per plot and quality parameters like TSS and vitamin C content. The data were statistically analysed by the method suggested by Fisher and Yates, 1936.

RESULTS AND DISCUSSION

1. Days to germination and Vine length (m)

The data about days to germination non-significantly varied among different genotypes. Among the different genotypes minimum days to germination (4.30 days) were observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-3 with 4.83 days. Maximum days to germination (5.73 days) were observed AVT-II 2019/RIGHYB-1.

The data about Vine length significantly varied among different genotypes. Among the different genotypes maximum Vine length (269.93 cm) was observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-4 with 208.36 cm. Minimum Vine length (202.13 cm) was observed AVT-II 2019/RIGHYB-1. The superior performance of one genotype over another in terms of vine length can be attributed to a combination of genetic factors and environmental conditions. Genotypes with genetic traits that promote longer vines, such as enhanced internode elongation or increased branching, can exhibit greater vine length. Environmental factors such as sunlight exposure, temperature, and soil fertility can also influence vine growth. Genotypes that are well-suited to the specific environmental conditions of a particular region or have been selectively bred for longer vine length may demonstrate better performance in terms of vine elongation. Similar findings were reported by **Haque *et al.*, (2012)**; **Uddin *et al.*, (2014)**; **Quamruzzaman *et al.*, (2017)**.

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2. Days to emergence of first male flower, Days to emergence of first female flower and Days to first fruit picking

The data about the days to the emergence of the first male flower and female flower along with the first fruit harvest significantly varied among different genotypes. Among the different genotypes minimum days to emergence of the first male flower (41.22 days) was observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-4 with 41.44 days. Maximum days to emergence of the first male flower (45.66 days) was observed AVT-II 2019/RIGHYB-1. Among the different genotypes minimum days to emergence of the first female flower (45.55 days) was observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-4 with 45.66 days. Maximum days to emergence of the first female flower (51.63 days) were observed AVT-II 2019/RIGHYB-1. Among the different genotypes minimum days to first fruit picking (59.33 days) was observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-4 with 59.66 days. Maximum days to first fruit picking (65.66 days) was observed AVT-II 2019/RIGHYB-1. The better performance of one genotype over another in terms of earliness in flowering and maturing can be attributed to genetic factors and environmental conditions. Genotypes with genetic traits that promote early flowering, such as early maturation genes or shorter vegetative growth phases, can exhibit faster initiation of flowering. Additionally, environmental factors such as temperature, photoperiod, and nutrient availability can influence flowering and maturing time. Genotypes that are genetically predisposed to respond more favourably to the prevailing environmental conditions, or those that have been selectively bred for early flowering, may show superior performance in terms of early initiation of flowering and maturing. The findings were reported similarly earlier by **Ara *et al.*, (2018)**; **Ramya *et al.*, (2020)**.

3. Number of fruits per plant, fruit length, fruit girth and fruit weight

Among the different genotypes maximum number of fruits per plant (14.43 fruits) was observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-4 with 13.50 fruits. A minimum Number of fruits per plant (11.32 fruits) was observed AVT-II 2019/RIGHYB-1. Among the different genotypes maximum fruit length (25.23 cm) was observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-4 with 24.63 cm. Minimum fruit length (19.50 cm) was observed AVT-II 2019/RIGHYB-1. Among the different genotypes maximum fruit girth (6.56 cm) was observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-4 with 6.16 cm. Minimum fruit girth (4.21 cm) was observed AVT-II 2019/RIGHYB-1. Among the different genotypes maximum average fruit weight (98.53 g) was observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-4 with 86.53 g. Minimum average fruit weight (74.16 g) was observed AVT-II 2019/RIGHYB-1. The better performance of one genotype over another in terms of enhanced number of fruits per plant, fruit length and girth, and fruit weight can be attributed to genetic factors and environmental conditions. Genotypes with genetic traits that promote increased fruit sets, such as higher flower-to-fruit conversion rates or enhanced reproductive capacity, can result in a greater number of fruits per plant. Additionally, environmental factors such as pollination efficiency, availability of nutrients and water, and optimal growing conditions can influence fruit production. Genotypes with genetic traits that promote larger fruit size, such as genes associated with increased cell division, fruit development, or enhanced nutrient uptake, can result in

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heavier fruits. Additionally, environmental factors such as optimal temperature, sunlight exposure, and nutrient availability can play a significant role in determining fruit weight. Genotypes that are genetically predisposed or have been selectively bred for higher fruit weight may demonstrate superior performance in terms of producing heavier fruits. The findings were following earlier reports of **Haque *et al.*, (2012)**; **Ramya *et al.*, (2020)**.

4. Fruit Yield per plot (g/plot)

Among the different genotypes maximum average fruit yield per plot (1422.21 g/plot) was observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-4 with 1168.24 g/plot. Minimum average fruit yield per plot (679.65 g/plot) was observed AVT-II 2019/RIGHYB-1. The better performance of one genotype over another in terms of enhanced fruit yield can be attributed to genetic factors and environmental conditions. Genotypes with genetic traits that promote higher flower-to-fruit conversion rates, increased branching, or enhanced reproductive capacity can result in a greater yield of fruits. Additionally, environmental factors such as pollination efficiency, availability of nutrients and water, and optimal growing conditions can significantly influence fruit production. Genotypes that are genetically predisposed or have been selectively bred for higher fruit yield can demonstrate superior performance in terms of overall fruit production per plant. The findings were following earlier reports of **Ramya *et al.*, (2020)**.

5. T.S.S. [°Brix] and Ascorbic acid content (mg/100gm

Among the different genotypes maximum Total Soluble Solid (4.23 °Brix) was observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-4 with 4.20 °Brix. Minimum Total Soluble Solid (3.41 °Brix) was observed AVT-II 2019/RIGHYB-1. Among the different genotypes maximum Vitamin C content (2.05 mg/100g) was observed with AVT-II 2019/RIGHYB-7 followed by AVT-II 2019/RIGHYB-4 with 1.82 mg/100g. Minimum Vitamin C content (1.42 mg/100g) was observed AVT-II 2019/RIGHYB-1. The better performance of one genotype over another in terms of better Total Soluble Solids (TSS) and vitamin C content can be attributed to genetic factors and environmental conditions. Genotypes with genetic traits that promote higher sugar accumulation and improved fruit quality can result in increased TSS and vitamin C content. Additionally, environmental factors such as sunlight exposure, temperature, and nutrient availability can influence the synthesis and accumulation of sugars in fruits. Genotypes that are genetically predisposed or have been selectively bred for higher TSS and vitamin C content may demonstrate superior performance in terms of producing fruits with a better sugar concentration and overall quality. The findings were following earlier reports of **Haque *et al.*, (2012)** in snake gourds; **Uddin *et al.*, (2014)**; **Ara *et al.*, (2018)**; **Ramya *et al.*, (2020)**.

Summary and Conclusion

From the above experimental finding, it was concluded that the genotype AVT-II 2019/RIGHYB-7 performed best in terms of growth parameters like vine length (269.93 cm), earliness in maturity (59.33 days for first fruit picking) and yield parameters like fruit length (25.23 cm), fruit girth (6.56 cm), and fruit yield per plot (1422.21 g/plot). AVT-II 2019/RIGHYB-7 showed the best performance for quality parameters also TSS (4.23°Brix) and Vitamin C content (2.05 mg/100g).

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References

1. **Ara, N., Moniruzzaman, M. and Rahman, K. S. (2018).** Performance of hybrid lines of pointed gourd (*Trichosanthes dioica* Roxb) for yield and yield attributes. *Bangladesh Journal Agricultural Research.* **43**(3): 383-393.
2. **Haque, M. M., Uddin, M. S., Mehraj, H. and Uddin, J. A. F. M. (2014).** Evaluation of snake gourd (*Trichasanthes anguina* L.) test hybrids comparing with four popular checks. *International Journal of Applied Science Biotechnology*. **2**(4): 525-528.
3. **NHB, (2021)**. nhb.gov.in/statistics/2020-21. Area and Production of Horticulture Crops- All India. Visited on 08/12/2022.
4. **Quamruzzaman, A. K. M., Rahman, M. M. and Akter, L. (2017).** Performance of Bottle Gourd Lines in Bangladesh Condition. *Annals of Biological Sciences.* **5**(1): 5-7.
5. **Rathore, J. S., Collis, J. P., Singh, G., Singh, K. R. and Jat, B. L. (2017).** Studies on Genetic Variability in Ridge Gourd (*Luffa acutangula* L. (Roxb.)) Genotypes in Allahabad Agro-Climate Condition. *International Journal of Current Microbiology and Applied Sciences* **6**(2): 317-338.
6. **Ramya, B., Kerketta, A. and Topno, S. E. (2020).** Evaluation of Different Hybrids for Growth and Yield Attributes of Bitter Gourd (*Momordica charantia* L.) in Prayagraj Region. *International Journal of Current Microbiology and Applied Sciences.* **9**(12): 1008-1012.
7. **Uddin, A. F. M. J., Tahidul, M. I., Chowdhury, M. H. N., Shiam, I. H., Mehraj, H. (2014).** Evaluation of bottle gourd (*Lagenaria siceraria*) to growth and yield. *International Journal of Biosciences*. **5**(12): 7-11.

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Table 1 Performance of different genotypes of ridge gourd for various growth and earliness parameters studied

Genotype Notation	Genotype details	Days to germination (DAS)	Vine length (cm)	Days to emergence of first male flower	Days to emergence of first female flower	Days to first fruit harvest	Number of fruits per plant
H_1	AVT II 2019/RIGHYB-1	5.73	202.13	45.66	51.63	65.66	11.32
H_2	AVT II 2019/RIGHYB-2	5.30	207.50	41.77	46.88	60.99	13.46
H_3	AVT II 2019/RIGHYB-3	4.83	203.33	42.99	49.33	63.33	11.56
H_4	AVT II 2019/RIGHYB-4	5.60	208.36	41.44	45.66	59.66	13.50
H_5	AVT II 2019/RIGHYB-5	5.20	206.36	41.88	47.66	61.99	13.43
H_6	AVT II 2019/RIGHYB-6	5.06	205.70	42.55	48.44	62.44	12.60
H_7	AVT II 2019/RIGHYB-7	4.30	269.93	41.22	45.55	59.33	14.43
H_8	GREEN INDIA-8	4.63	202.76	43.55	49.88	63.88	12.33
H_9	JAIPURI LONG-9	4.86	204.80	42.88	48.99	62.99	8.63
'F' Test		**NS**	**S**	**S**	**S**	**S**	**S**
SE (d)		**0.23**	**14.39**	**0.63**	**0.58**	**0.53**	**0.19**
C.D. at 5%		**-**	**30.51**	**1.34**	**1.22**	**1.11**	**0.39**
C. V.		**5.48**	**8.30**	**1.82**	**1.46**	**1.03**	**1.84**

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Table 2 Performance of different genotypes of ridge gourd for various yield and quality parameters studied

Genotype Notation	Genotype details	Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)	Fruit yield per plot (g/plot)	TSS [°Brix]	Vitamin C content (mg/100g)
H_1	AVT II 2019/RIGHYB-1	19.50	4.21	74.16	679.65	3.41	1.42
H_2	AVT II 2019/RIGHYB-2	23.88	5.83	80.63	1085.93	4.13	1.81
H_3	AVT II 2019/RIGHYB-3	21.70	4.74	76.56	885.43	3.66	1.60
H_4	AVT II 2019/RIGHYB-4	24.63	6.16	86.53	1168.24	4.20	1.82
H_5	AVT II 2019/RIGHYB-5	23.08	5.24	79.86	1072.89	4.15	1.73
H_6	AVT II 2019/RIGHYB-6	22.30	5.20	79.00	995.40	4.02	1.63
H_7	AVT II 2019/RIGHYB-7	25.23	6.56	98.53	1422.21	4.23	2.05
H_8	GREEN INDIA-8	20.73	4.56	75.96	860.21	3.48	1.49
H_9	JAIPURI LONG-9	21.94	4.96	78.73	914.59	3.69	1.65
'F' Test		**S**	**S**	**S**	**S**	**S**	**S**
SE (d)		**0.56**	**0.18**	**0.54**	**16.14**	**0.24**	**0.02**
C.D. at 5%		**1.20**	**0.39**	**1.14**	**34.22**	**0.50**	**0.05**
C. V.		**3.06**	**4.22**	**0.81**	**1.96**	**7.45**	**1.72**

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