

Varietal Evaluation, Calyces Yield and Jam Preparation from Roselle (*Hibiscus subdariffa* L.)

B. Sujana Avela^{1*}, Vijay Bahadur², Anita Kerketta³, Rajesh Singh⁴ and Anoorag R. Tayde⁵

¹PG. Student, ² Advisor, ³Co advisor, ⁴Member, ⁵Member

Department of Horticulture, Naini Agriculture Institute

Sam Higginbottom University Of Agriculture, Technology & Sciences Prayagraj -211007

*Corresponding Author E-mail: sujanaavela@gmail.com

Received: 11.05.2021 | Revised: 16.06.2021 | Accepted: 22.06.2021

ABSTRACT

Roselle (Hibiscus subdariffa L.) has been used in number of dishes, beverages and conventional remedy of diseases for centuries. It is popular for its edible fleshy calyces and leaves that are used for making salads, tea, juices, jams, jellies, icecreams and many other products. In many countries of the world fresh calyces of roselle are harvested to produce pro health drink due to its high vitamin C and anthocyanins contents. But in bangladesh roselle leaves and calyces are used as vegetables and its fibre is used as jute substitute. Roselle is also famous for its high nutritional and medicinal values. Nutritional analysis of calyces of roselle showed that they are high in calcium, iron, niacin, and riboflavin. It is also a source of antioxidants, anthocyanins which acts as free radical scavengers and inhibit lipid per-oxidation. Roselle is a multipurpose crop and has great potential to increase the income of farmers, producers, processors by fetching high market price both from export and local market.

Keywords: Anthocyanins, Roselle, Remedy, Diseases.

INTRODUCTION

Roselle is botanically known as *Hibiscus sabdariffa* Is native to India and Malaysia where it is commonly cultivated, and must have been carried at an early date to Africa¹. It is a popular crop in the Middle Eastern countries and it is known with different names such as Sorrel, Mesta and Karkade.

Plants have been rich medicinal sources for a very long time and have had a special status in health caring from both remedy and prevention

aspects. Even today, world health organization estimates that more than 80% of the people still reckon on traditional medication (Laila et al., 2002). Its sporofic action has a favorable effect on the functions of the stomach possession. It kills various types of bacteria and micro-organisms, and as such, decreases blood pressure and causes relaxation of the rest parts of the body (Aziz et al., 2007). The red beverage is also used in jams, tea pies, deserts and sauces.

Cite this article: Avela, B.S., Bahadur, V., Kerketta, A., Singh, R., & Tayde, A. R. (2021). Varietal Evaluation, Calyces Yield and Jam Preparation from Roselle (*Hibiscus subdariffa* L.), *Ind. J. Pure App. Biosci.* 9(3), 257-261. doi: <http://dx.doi.org/10.18782/2582-2845.8744>

This article is published under the terms of the [Creative Commons Attribution License 4.0](https://creativecommons.org/licenses/by/4.0/).

The flowers of ‘Roselle’ are suitable for use as natural food coloring agents. It is used for controlling blood pressure. Also, it has been reported that it is sexual stimulator, appetizer, restorative, cathartic, cancer-protective, anti-cough and refrigerant (Lin et al., 2007).

Roselle is being cultivated in other parts of the world which includes Central America, West Indies and Africa. It has been widely distributed in the tropics of both hemisphere and in many areas of the West Indies. In 1954 Roselle was still being grown by individuals in Midwest for its edible herbage. By 1959 and 1960 due to wide spread alarm concerning coal tar food dyes it was easy to arouse interest in Roselle as a coloring source but difficult it became difficult to obtain seeds in Florida as it had by then become nearly extinct in Puerto-Rico. Today Roselle is attracting the great attention of food, beverage and pharmaceutical industries due to rising concerns that feel it may have exploitable possibilities as natural food product; and as a colorant to replace some synthetic dyes. Roselle (*Hibiscus sabdariffa* L the family malvaceae, the pattern of growth of Roselle is an erect bushy herbaceous annual crop which can grow up to a height between 2.4m and 3.0m, with smooth or near cylindrical red or green main stem depending on landrace and distinct branches.

Roselle has a lot of potential as an industrial crop. It is now considered one of the competitive beverages in the world (Schippers, 2000). Red calyces are utilized as coloring reagent for jelly, jam, beverages, sauces and food preserves (Mahadevan et al., 2009; Tsai et al., 2002; & Abo-Baker & Mostafa, 2011). It contains higher amount of ascorbic acid and it is rich in riboflavin, niacin, calcium and iron (Babalola et al., 2000; Wong et al., 2002; Fasoyiro et al., 2005; & Qi et al., 2005). Calyx presents antimicrobial as well as antioxidant activities due to its phenolic compounds (Fasoyiro et al., 2005; & Anokwuru et al., 2011). Seeds of this plant have been found to be a good source of protein

(Halimatul et al., 2007; & Mukhtar, 2007). Roselle is one of the most important and popular medicinal plants and it has several properties such as; antiseptic, aphrodisiac, cholagogue, digestive and stomachic (Akindahunsi & Olaleye, 2003; & Azooz, 2009).

MATERIALS AND METHODS

The details of the various materials used and methods adopted in the experiment are presented below:

Experimental Site:

The experimental investigation was conducted at Department of Horticulture, Naini Agricultural Institute, Sam Higging bottom University of Agriculture, Technology and Sciences, Prayagraj (UP) in the month of July during 2019-2020. All the facilities necessary for cultivation, including labour were made available in the department.

Climate:

Prayagraj is situated at an elevation of 78 meters above sea level at 25.87° N latitudes and 81.15° E longitudes. This region has a sub-tropical climate prevailing in the South-East part of U.P. with both the extremes in temperature, *i.e.*, the winter and the summer. In cold winter months (Dec- Jan), the temperature falls 2-5°C or even low, while in summer months (May-June) it reaches as high as 49°C. Hot blowing winds are regular feature during the summer months and an occasional spell of frost during winter. Most of the rainfall is received in the middle of July to end of September after which the intensity of rain decreases. The average rainfall is about 850-1100mm. However occasional precipitation is also not uncommon during the winter months.

RESULT AND DISCUSSION

The present experiment was planned and executed in the Department of Horticulture during of 2019-2020 entitled “**Varietal evaluation, calyces yield and Jam preparation of *Hibiscus subdariffa* (Roselle)**”. The experiment comprised of 7 varieties the experiment was replicated three times under Randomized Block Design. Result

and discussion, which were presented in the preceding chapter are being summarized and concluded below. The varieties were shown 10th May 2020. The 7th varieties of *Hibiscus subdariffa* (Roselle) in observation were AMV-4, AMV-108, AMV-8, AMV-5, AMV-9, AMV-7 and Local variety.

1. The maximum plant height (352.67cm) was found AMV-5 whereas in minimum plant height (284.16cm) was found in local variety.
2. The maximum number of leaves per plant (287.67) was found local variety whereas in minimum number of leaves per plant (239.7) was found in AMV-5.
3. The maximum number of branches per plant (31.00) was found local variety whereas AMV-4, AMV-5 and AMV-7 are non branching.
4. The maximum number of calyces per plant (83.67) was found local variety whereas in minimum number of calyces per plant (56.00) was found in AMV-5.
5. The maximum Number of seed per pod (26.09) was found local variety whereas in minimum Number of seed per pod (21.32) was found in AMV-5.
6. The maximum Seed yield per plant (g) (13.69) was found local variety whereas in minimum Seed yield per plant (10.86g) was found in AMV-7.
7. The maximum Seed yield per plot (205.30g) was found local variety whereas

in minimum Seed yield per plot (162.95g) was found in AMV-7.

8. The maximum Seed yield (622.7 kg ha⁻¹) was found local variety whereas in minimum Seed yield (603.51kg ha⁻¹) was found in AMV-7.
9. The maximum CalycesPod weight (2.37g) was found local variety whereas in minimum CalycesPod weight (3.86g) was found in AMV-5.
10. The maximum CalycesPod yield plant (132.84g) was found local variety whereas in minimum CalycesPod yield plant (322.62g) was found in AMV-5.
11. The maximum Calycesper plot (4.839kg) was found local variety whereas in minimum Calycesper plot (1.993kg) was found in AMV-5.
12. The maximum Calycespod yield (179.23q ha⁻¹) was found local variety whereas in minimum Calycespod yield (73.80q ha⁻¹) was found in AMV-5.
13. The highest scale of organoleptic evaluation like colour and appearance, texture, flavor and taste and overall acceptability (8.90, 8.52, 8.55 and 8.66) was found in mixed fruit jam whereas in minimum colour and appearance, texture, flavor and taste and overall acceptability (6.67, 6.14, 6.27 and 6.56) was found in AMV-5.

Notation	Varieties	Plant height (cm)				Number of leaves per plant				Number of branches per plant			
		30 DAS	90 DAS	150 DAS	210 DAS	30DAS	90 DAS	150 DAS	210DAS	30 DAS	90 DAS	150 DAS	210 DAS
V ₁	AMV-4	53.67	186.55	254.67	316.11	29.33	124.33	187.33	251.33	0.00	0.00	0.00	0.00
V ₂	AMV-108	70.01	220.06	288.51	350.73	42.00	150.00	215.00	277.00	4.00	15.00	23.00	26.00
V ₃	AMV-8	61.07	201.23	282.67	341.13	36.00	142.00	208.00	270.00	3.67	14.67	20.67	24.67
V ₄	AMV-5	74.87	229.77	292.22	352.67	21.67	116.67	179.67	239.67	0.00	0.00	0.00	0.00
V ₅	AMV-9	62.69	205.26	286.70	345.14	33.33	133.33	195.33	258.33	3.00	13.00	19.00	21.00
V ₆	AMV-7	54.34	192.66	265.11	328.55	24.33	123.33	185.33	248.33	0.00	0.00	0.00	0.00
V ₇	Local variety	49.38	149.61	212.05	284.16	47.67	159.67	217.67	287.67	5.00	17.00	26.00	31.00
	F-Test	S	S	S	S	S	S	S	S	S	S	S	S
	S.Ed.	2.047	0.939	1.48	1.88	2.183	2.044	2.917	2.219	0.454	0.526	0.432	0.526
	C.D. at 5%	2.156	2.047	3.22	4.11	4.757	4.455	6.356	4.836	0.990	1.146	0.940	1.147

Notation	Varieties	number of calyces per plant	Number of seed per pod	Seed yield per plant (g)	Seed yield per plot (g)	Seed yield (kg ha-1)
V ₁	AMV-4	63.00	22.41	12.21	183.15	678.33
V ₂	AMV-108	77.33	24.71	13.19	197.80	732.59
V ₃	AMV-8	72.00	23.66	13.08	196.15	726.47
V ₄	AMV-5	56.00	21.32	11.21	168.15	622.77
V ₅	AMV-9	67.33	23.31	12.70	190.50	705.55
V ₆	AMV-7	62.00	22.35	10.86	162.95	603.51
V ₇	Local variety	83.67	26.09	13.69	205.30	760.36
	F-Test	S	S	S	S	S
	S.Ed.	0.243	0.112	0.378	5.676	45.804
	C.D. at 5%	3.597	0.243	0.824	12.367	21.022

Notation	Varieties	Calyces Pod weight (g)	Calyces Pod yield plant (g)	Calyces per plot (kg)	Calyces pod yield (q ha-1)	Seed yield per plant (g)
V ₁	AMV-4	3.08	194.06	2.911	107.81	12.21
V ₂	AMV-108	3.27	252.57	3.789	140.32	13.19
V ₃	AMV-8	3.25	233.98	3.510	129.99	13.08
V ₄	AMV-5	2.37	132.84	1.993	73.80	11.21
V ₅	AMV-9	2.46	165.63	2.485	92.02	12.70
V ₆	AMV-7	2.93	181.78	2.727	100.99	10.86
V ₇	Local variety	3.86	322.62	4.839	179.23	13.69
	F-Test	S	S	S	S	S
	S.Ed.	0.180	13.012	0.195	7.229	0.378
	C.D. at 5%	0.392	28.352	0.425	15.751	0.824

Varieties	Treatments combinations	Organoleptic test 9 point hedonic scale				Benefit Cost Ratio
		Colour and appearance	Texture	Flavor and taste	Overall acceptability	
T1	AMV-4	6.67	6.14	6.27	6.36	2.54
T2	AMV-108	0.00	0.00	0.00	0.00	3.18
T3	AMV-8	0.00	0.00	0.00	0.00	2.98
T4	AMV-5	0.00	0.00	0.00	0.00	1.85
T5	AMV-9	0.00	0.00	0.00	0.00	2.24
T6	AMV-7	7.01	7.09	7.21	7.11	2.34
T7	Local variety	8.54	8.28	8.20	8.34	3.95
T8	Mixed variety jam	8.90	8.52	8.55	8.66	
	F-Test	S	S	S	S	
	C.D.at0.5%	0.302	0.214	0.603	0.239	
	S.Ed.	0.141	0.100	0.281	0.111	

CONCLUSION

From the present investigation it may be concluded that local variety was resulted in highest seed and calyces yield and AMV -

5resulted in highest plant growth, Whereas organoleptic evaluation gave the best results in mixed fruit jam.

REFERENCES

- Atta, S., Seyni, H.H., Yacoubou Bakasso, Benoît Sarr, Lona, I., & Saadou, M. (2011). Yield character variability in Roselle (*Hibiscus sabdariffa* L.). *African Journal of Agricultural Research* 6(6), pp. 1371-1377.
- Ashaye, O. A., & Adeleke, T. O. (2009). Quality attributes of stored Roselle jam. *International Food Research Journal* 16, 363-371.
- Dejene, T. B., Mohamed, W. A., & Belstie, L. (2019). Growth and Yield Responses of Roselle (*Hibiscus sabdariffa* L.) Varieties to Different Common Bean (*Phaseolus vulgaris* L.) Planting Densities in Intercropping System. *Acad. Res. J. Agri. Sci. Res.* 7(1), 42-48.
- Falusi, O. A., Dangana, M. C., Daudu, O. A. Y., Oluwajobi, A. O., Abejide, D. R., & Abubakar, A. (2014). Evaluation of some Roselle (*Hibiscus sabdariffa* L.) germplasm in Nigeria *International Journal of Biotechnology and Food Science* 2(1), pp. 117-121.
- Iranshahr, S., Javadzadeh, M., Mansoor, S., & Saljooghianpour (2017). Morpho-agronomic characteristics of two Roselle varieties (*Hibiscus sabdariffa* L.) in tropical. *Int. J. Adv. Res. Biol. Sci.* 4(6), 99-104.
- Okosun, L. A., Magaji, M. D., & Yakubu, A. I. (2006). Effect of Sowing Date and Planting Distance on Growth and Yield of Two Cultivars of Roselle (*Hibiscus sabdariffa* var. *sabdariffa*). *Journal of Plant Sciences*, 1, 297-305.
- Olukayode Ashaye & Adeleke, T. O. (2009). Quality attributes of stored Roselle jam. *International Food Research Journal* 16(3), 363-371.
- Putri Istianingrum, Lita Soetopo, Damanhuri (2015). Estimation of Genetic Parameter and Genotype Selection of F5 As A Result Of Crossbred on Tomato (*Lycopersicon Esculentum* Mill) In Organic Breeding. *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*.
- Satyanarayana, N. H., Visalakshmi, V., Priya, B., Mukherjee, S., & Roy, S. K. (2016). Multivariate Analysis of Quantitative Characters for Fiber Yield in Roselle (*Hibiscus Sabdariffa* L.) Over Six Environments. *Vegetos* 29(4).
- Wong Peng-Kong, Salmah Yusof, Hasanah Mohd Ghazali & Che Man, Y. B. (2002). Physico-chemical characteristics of roselle (*Hibiscus sabdariffa* L.). *Nutrition & Food Science* 32(2), 68-73.