



STUDIES ON QUALITY AND ORGANOLEPTIC EVALUATION OF ROSELLE SYRUP

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ABSTRACT

Roselle (*Hibiscus sabdariffa* L.) is an under-exploited vegetable crop growing all over the world has a greater acceptability in its own dietary and therapeutic qualities besides its brilliant red colour of calyces gives a major attraction to its processed products. The investigation was conducted with the objectives to access the sensory evaluations of roselle syrup under ambient storage condition. Calyces extract is a potential source of natural colorant to replace red synthetic coloring agents for soft drinks, jams, jellies, sauces and other products. The experiment was laid out in Factorial Completely Randomized Design with twelve treatment combinations with three replications of pulp (15%, 20%, 25% and 30%) and TSS (60 °B, 65°B and 70 °B) were tried to standardize proper suitability for development of syrup. Out of the twelve different treatment combinations of pulp and TSS tried, syrup with 25% pulp and 70 °B was found to be best on the basis of physio-chemical properties and sensory evaluations of the product. Processing escalates the palatability and appearance, which necessary to ensure access to keep safe, wholesome of product.

Key words : Roselle, Sensory quality, Syrup, Pulp, Total soluble solids.

Introduction

A member of the hibiscus or mallow family, Roselle (*Hibiscus sabdariffa* L.) is a very prolific plant with brilliant red large succulent edible calyces with unique tangy flavor like cranberry. The calyces are commonly used in the production of jelly, juice, jam, wine, syrup, gelatin, pudding, cake, ice-creams and flavoring. A greater acceptability in its own dietary and therapeutic qualities with anti-oxidants such as vitamin C, ascorbic acid (16.63 mg/100 g), crude protein (1.50%), carbohydrate (5.80%), crude fibre (1.60%), calcium (12.62 mg/100 g) besides its brilliant red colour (anthocyanins) of calyces gives a major attraction to its processed products (Ghodke and Mane, 2017). Roselle is a fair source of minerals like phosphorous, iron and zinc. The physico-chemical characteristics of roselle was studied and characterized as a highly acidic fruit with low sugar content. Therefore processed products from roselle in any form like syrup,

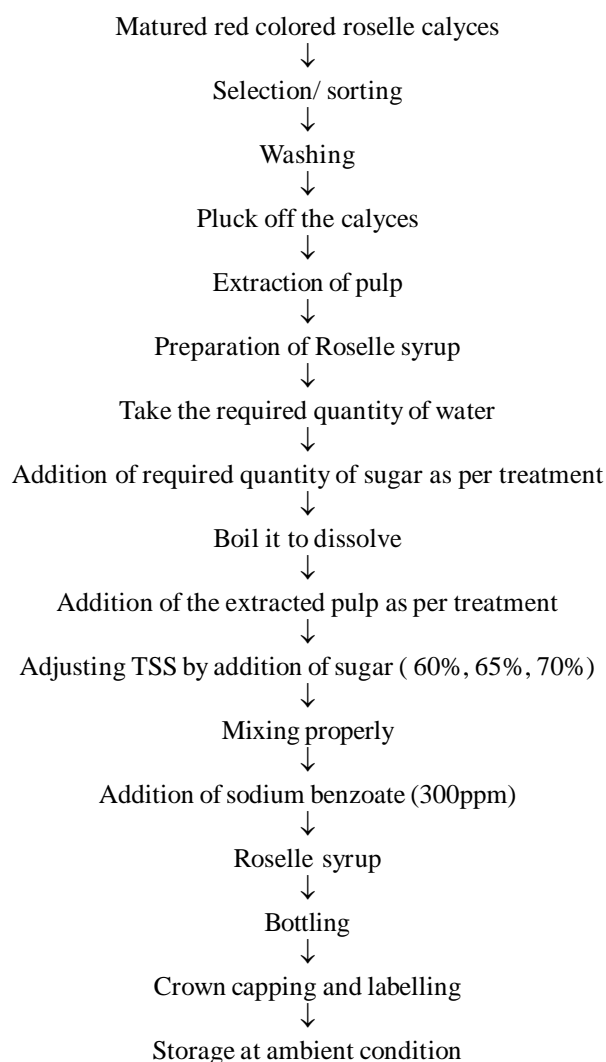
jam, jelly, juice, tea, RTS are plays a greater role as a nutritional drink from cheap source. Keeping all these views under consideration, syrup had prepared from roselle on influence of different pulp percentage and TSS concentration and focused mainly on organoleptic qualities under 120 days of storage condition.

Materials and Methods

Standardization of recipe for roselle syrup was carried out at Post Harvest Laboratory, College of Agriculture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during 2021-2022.

Freshly harvested, matured bright red roselle calyces were washed with plenty of water. They were grinded using little amount of water by grinder to obtain fine pulp. Preparation of sugar syrup and adding the pulp in accordance with treatment combinations as given in Table 1. Sodium benzoate (300 ppm) was also added as a

preservative in syrup. Mixing the syrup simultaneously to standardize the TSS concentration with respect to treatment combination. The finished syrup was immediately filled into sterilized glass bottle of 200 ml capacity. Later on replacing to plastic bottles after cooling. The experiment was laid out in Factorial Completely Randomized Design (FCRD) comprised four levels of pulp (15, 20, 25 and 30%) and three levels of TSS (60, 65 and 70°B) with twelve treatment combinations replicated thrice.



Flow sheet for preparation of roselle syrup.

Sensory evaluation of roselle syrup

Sensory quality attributes such as colour, flavor, taste and overall acceptability of syrup were evaluated at initially and thereafter at 30 days interval for four months by sensory panel consisted of five trained panelists evaluated the experimental samples as per Hedonic scale. Each attributes were given in a separate score of a point Hedonic scale according to the method reported by Amerine *et al.* (1965). The coded syrup was served to

trained panelists by diluting it in the ratio of 1:4 (roselle syrup: water). The mean values of score for sensory evaluation was calculated and accordingly.

Hedonic scale

Likely extremely - 9	Like slightly - 6	Dislike moderately - 3
Like very much - 8	Neither like nor dislike - 5	
Dislike very much - 2	Like moderately - 7	
Dislike slightly - 4	Dislike extremely - 1	

Results and Discussion

Colour score

The prepared roselle syrup were subjected for organoleptic evaluation after 120 days storage (Table 2). Minimum decrease in colour score (8.89 to 8.78) was reported in treatment combination P_3T_3 (25% pulp and 70° Brix TSS) at 120 days of storage. In treatment combination P_1T_1 (15% pulp and 60° Brix TSS) decrease in colour score was found to be maximum (8.68 to 8.09) during 120 days of storage period. The decrease in color in roselle syrup at during can be attributed to catalytic effect of light on deteriorative changes as the bottles were transparent.

Prasad and Mali (2000) reported that, colour of pomegranate squash remained better at low temperature, whereas the original colour of squash could not be obtained at room temperature after three months of storage. Kotecha and Kadam (2003) observed that, decreased in colour of tamarind syrup at ambient storage conditions. Sahoo (2014) reported that, colour of guava syrup decreased with advancement of storage period.

Taste score

As per the data exhibited that, the taste score of roselle syrup was decreased during storage period (initial to 120 days). Minimum decrease in taste score (8.91 to 8.76) was reported in treatment combination P_3T_3 (25% pulp and 70° Brix TSS) at 120 days of storage, which was followed by treatment combination P_3T_2 (25% pulp and 65° Brix TSS). However, maximum change in taste score (8.55 to 8.00) was observed in treatment combination P_1T_1 (15% pulp and 60°B TSS) during storage. The decrease in taste score of roselle syrup during storage might be due to many factors which affects storage stability of products among them temperature is the most prominent factor.

Comparable findings were made by Dalal *et al.* (2014) performed an experiment on responses of recipes and storage conditions on sugar content and sensory qualities of lime blended aonla syrup and they reported that, there was decrease in taste score of aonla syrup

Table 1 : Treatment details of roselle syrup.

Treatment combinations (PT)	P ₁ T ₁	P ₁ T ₂	P ₁ T ₃	P ₂ T ₁	P ₂ T ₂	P ₂ T ₃	P ₃ T ₁	P ₃ T ₂	P ₃ T ₃	P ₄ T ₁	P ₄ T ₂	P ₄ T ₃
Pulp (%)	15	15	15	20	20	20	25	25	25	30	30	30
TSS (°B)	60	65	70	60	65	70	60	65	70	60	65	70

Table 2 : Interaction effect of pulp and TSS on color and taste scores of roselle syrup during storage.

Treatments	Colour score		Taste score	
	Storage period (days)		Storage period (days)	
	Fresh syrup	120 th day	Fresh syrup	120 th day
P ₁ T ₁ -15% roselle pulp+ 60°B	8.68	8.09	8.55	8.00
P ₁ T ₂ -15% roselle pulp+ 65°B	8.69	8.14	8.54	8.00
P ₁ T ₃ -15% roselle pulp+ 70°B	8.71	8.22	8.65	8.19
P ₂ T ₁ -20% roselle pulp+ 60°B	8.76	8.29	8.71	8.28
P ₂ T ₂ -20% roselle pulp+ 65°B	8.89	8.60	8.85	8.62
P ₂ T ₃ -20% roselle pulp+ 70°B	8.88	8.60	8.87	8.67
P ₃ T ₁ -25% roselle pulp+ 60°B	8.84	8.47	8.75	8.39
P ₃ T ₂ -25% roselle pulp+ 65°B	8.87	8.67	8.89	8.72
P ₃ T ₃ -25% roselle pulp+ 70°B	8.89	8.78	8.91	8.76
P ₄ T ₁ -30% roselle pulp+ 60°B	8.70	8.17	8.70	8.19
P ₄ T ₂ -30% roselle pulp+ 65°B	8.86	8.52	8.79	8.46
P ₄ T ₃ -30% roselle pulp+ 70°B	8.98	8.66	8.83	8.57

Date not statistically analysed.

Table 3. Interaction effect of pulp and TSS on flavour and overall acceptability scores of roselle syrup during storage.

Treatments	Flavour score		Overall acceptability score	
	Storage period (days)		Storage period (days)	
	Fresh syrup	120 th day	Fresh syrup	120 th day
P ₁ T ₁ -15% roselle pulp+ 60°B	8.65	8.11	8.35	7.79
P ₁ T ₂ -15% roselle pulp+ 65°B	8.65	8.21	8.47	8.01
P ₁ T ₃ -15% roselle pulp+ 70°B	8.68	8.28	8.67	8.27
P ₂ T ₁ -20% roselle pulp+ 60°B	8.76	8.43	8.55	8.19
P ₂ T ₂ -20% roselle pulp+ 65°B	8.81	8.59	8.77	8.55
P ₂ T ₃ -20% roselle pulp+ 70°B	8.83	8.64	8.86	8.65
P ₃ T ₁ -25% roselle pulp+ 60°B	8.76	8.46	8.65	8.33
P ₃ T ₂ -25% roselle pulp+ 65°B	8.85	8.69	8.88	8.70
P ₃ T ₃ -25% roselle pulp+ 70°B	8.88	8.74	8.92	8.76
P ₄ T ₁ -30% roselle pulp+ 60°B	8.67	8.25	8.62	8.29
P ₄ T ₂ -30% roselle pulp+ 65°B	8.78	8.51	8.86	8.58
P ₄ T ₃ -30% roselle pulp+ 70°B	8.80	8.55	8.83	8.57

Date not statistically analysed.

during storage. Sahoo (2014) reported that, taste of guava syrup decreased with advancement of storage period. Kadge *et al.* (2020) resulted that, decreased in taste of lime blended bael syrup at ambient storage condition. Pimparkar (2022) also reported that, taste of jamun syrup

decreased with advancement of storage period.

Flavor

Flavor of roselle syrup as influenced by different combinations of pulp and TSS at ambient storage (up to 120 days) was recorded and presented in Table 3.

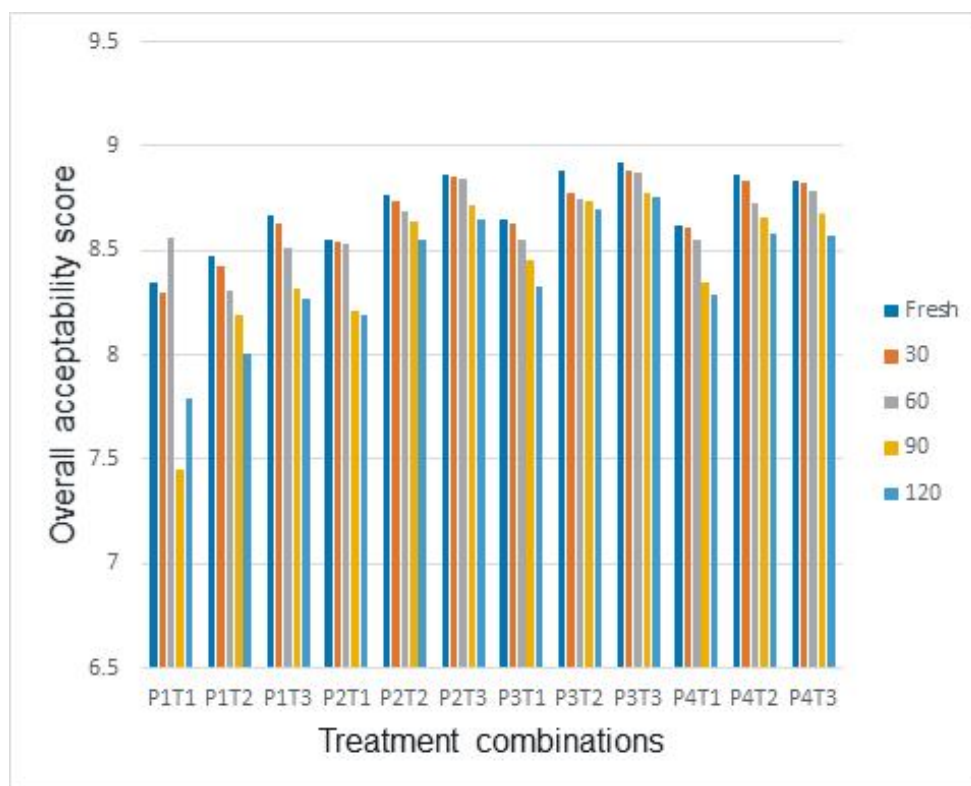


Fig. 1 : Interaction effect of different levels of pulp and TSS on overall acceptability score of roselle syrup.

Minimum decrease in flavor score (8.88 to 8.74) was observed in treatment combination P_3T_3 (25% pulp and 70°B TSS), which was followed by treatment combination P_3T_2 (25% pulp and 65°Brix TSS). However, maximum change in flavour score (8.65 to 8.11) was observed in treatment combination P_1T_1 (15% pulp and 60°Brix TSS) from fresh syrup to storage of 120 days.

The results of present findings are in agreement with the findings of Prasad and Mali (2000) reported that, flavor of the pomegranate squash remained better at low temperature and similar results found by Sahoo (2014) flavour of guava syrup decreased with advancement of storage period. Mohire *et al.* (2016) observed that, flavor score of karonda syrup was decreased during 3 months of storage period. Kadge *et al.* (2020) reported that, decreased in flavour of lime blended bael syrup at ambient storage condition.

Overall acceptability

The overall acceptability of respected syrup was getting faded at ambient storage of four month. Minimum decrease in overall acceptability score (8.92 to 8.76) was reported in treatment combination P_3T_3 (25% pulp and 70°Brix TSS) at 120 days of storage. Which was followed by treatment combination P_3T_2 (25% pulp and 65°Brix TSS). However, maximum change in overall acceptability score (8.35 to 7.79) was observed in treatment

combination P_1T_1 (15% pulp and 60°Brix TSS) during 120 days of storage.

Mandal and Nath (2013) reported the decrease in the organoleptic score of aonla squash during storage. Thakur *et al.* (2013) also found the same decreasing trend overall acceptability in pomegranate aril syrup during storage.

Conclusion

Overall evaluation of organoleptic qualities (colour, taste, flavour and overall acceptability) of roselle syrup which had been prepared in twelve different combinations, the recipe P_3T_3 (25% pulp + 70°B) was found to be best in its sensory parameters. As per the increasing duration of storage sensory potential of product was getting faded. Effect of each scores of sensory characteristics was declining during 120 days of storage. Minimum decrease in colour, taste, flavour and overall acceptability scores from 8.89 to 8.78, 8.91 to 8.76, 8.88 to 8.74 and 8.92 to 8.76, respectively. Syrup could be stored safely for a period of four months under ambient storage with minimum changes in chemical and sensory attributes.

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