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Quality attributes of watery rose apple (*Syzygium aqueum* (Burm) Alston) ready-to-serve beverage

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Abstract

The watery rose apple (*Syzygium aqueum* (Burm) Alston) is an underutilized fruit mostly grown in the Western Ghats. The fruit contains 93 percent moisture and is highly perishable. The fruit is rich in protein and minerals such as calcium and potassium. The development of its processed products will enhance utility and minimize postharvest loss. Highly refreshing ready-to-serve beverage can be prepared by blending 20 percent watery rose apple fruit juice containing 0.3 percent acidity and adjusted to 15°B TSS recorded higher sensory score for colour and appearance (8.04), taste (8.16), flavour (8.20) and overall acceptability (8.39). The beverage contains carbohydrates (18.56%), protein (14.18 mg), ascorbic acid (2.35 mg), calcium (3.99 mg) and potassium (17.50 mg) per 100 mL.

Keywords: Watery rose apple, RTS beverage

Introduction

Watery rose apple (*Syzygium aqueum* (Burm) Alston) is one of the underutilized fruits indigenous to Southeast Asian countries and certain tropical parts of India. Watery rose apples are rich in important macronutrients, trace minerals and antioxidants. It is mostly grown in Kerala homesteads, and the fresh fruits are consumed. A single tree bears 21 to 85 kilograms of fruits, and the majority of output (90%) is perishable (Whistler and Elevitch, 2006) [9] due to high moisture content (93%). The development of appropriate processing and value-addition practices is essential to extend its availability. Preparing ready-to-serve (RTS) beverages would help reduce postharvest loss and add value to the fruits.

Materials and Methods

Matured pink-coloured watery rose apple fruits were collected from farmer's fields in Sirsi, Uttara Kannada district. The experiment consisted of six treatments with four replications under Completely Randomized Design (CRD). Fruits were washed and cut into pieces, and seeds were separated. The juice was extracted manually and filtered by passing through a muslin cloth. The juice was homogenized with sugar and citric acid (0.3% acidity). RTS beverage was heated to 90 °C for 15 minutes and bottled. Sealed bottles were pasteurized at 90 °C for 15 minutes and stored under ambient conditions. The details of treatments are as follows:

The details of treatments are as follows:

Treatments	Juice Concentration (%)	TSS (°Brix)
T ₁	10	12.50
T ₂	10	15
T ₃	15	12.50
T ₄	15	15
T ₅	20	12.50
T ₆	20	15

Proximate composition and sensory analysis

The different samples of water apple RTS were analyzed using different analytical methods. The total carbohydrate content of the beverage was estimated by the phenol-sulphuric acid method (AOAC, 2006) [2].

Total protein content was determined by Lowry's method (Lowry *et al.*, 1951) [4]. The ascorbic acid content in the RTS samples was analyzed by titration method using 2, 6-dichlorophenol indophenol dye and total antioxidant activity by FRAP method (mg 100g⁻¹). The diacid digestion method was followed to analyze calcium and potassium content (Ranganna, 1999) [6]. The organoleptic evaluation of the RTS beverage was carried out immediately after preparation on the 9-point hedonic scale.

The data has been analyzed statistically and reported at a 1% significance level (Panse and Sukhatme, 1985) [5].

Results and Discussion

The proximate composition of watery rose apple RTS beverage is presented in Table 1.

Table 1: Effect of different treatments on proximate composition of watery rose apple RTS beverage

Treatments	Proximate composition (Per 100 mL)					
	Carbohydrate (%)	Protein (mg)	Ascorbic acid (mg)	Antioxidant activity(mg)	Calcium (mg)	Potassium (mg)
T ₁	9.38	7.67	1.64	2.80	1.97	9.45
T ₂	9.53	7.68	1.61	2.79	1.95	9.38
T ₃	13.98	10.07	1.80	4.21	3.00	13.63
T ₄	14.19	10.09	1.79	4.18	2.98	13.28
T ₅	18.37	14.18	2.38	5.63	4.01	17.70
T ₆	18.56	14.10	2.35	5.42	3.99	17.50
S.Em±	0.020	0.160	0.020	0.03	0.03	0.117
C.D.@1%	0.080	0.48	0.060	0.10	0.09	0.352

Ascorbic acid content was significantly highest (2.38 mg 100 mL⁻¹) in beverages having 20 percent juice adjusted to 12.5°B TSS (T₅), which is at par with beverages containing 20 percent juice adjusted 15 °B TSS (T₆) (2.35 mg 100 mL⁻¹). In contrast, the lowest ascorbic acid content of 1.61 mg 100 mL⁻¹ and 1.64 mg 100 mL⁻¹ was found in the beverage with 10 percent juice adjusted to 15 °B TSS (T₂) and 10 percent juice adjusted to 15 °B TSS (T₁), respectively.

The antioxidant activity of RTS beverage (ranging from 2.79 mg 100 mL⁻¹ to 5.63 mg 100 mL⁻¹) increased with the increase in juice content from 10 to 20 percent. The beverage with 20 percent fruit juice adjusted 12.5 °B TSS had the highest antioxidant activity (5.63 mg 100 mL⁻¹).

The beverage containing 20 percent juice adjusted to 12.5°B TSS (T₅) recorded significantly the highest calcium and potassium content of 4.01 mg 100 mL⁻¹ and 17.70 mg 100 mL⁻¹, respectively. However, the beverage containing 10 percent juice adjusted to 15°B TSS (T₂) retained the least

RTS beverage containing 20 percent fruit juice adjusted to 15°B TSS (T₆) had the highest carbohydrate content of 18.56 percent, which was followed by the treatment containing 20 percent fruit juice adjusted to 12.5°B TSS (T₅) (18.37). In contrast, beverages containing 10 percent juice adjusted to 12.5°B TSS (T₁) or 15°B TSS (T₂) had the lowest carbohydrate content of 9.38 percent and 9.53 percent per 100 mL, respectively.

Treatment containing 20 percent juice adjusted to 12.5°B TSS (T₅) had a maximum protein content of 14.18 mg, which was at par with the treatment having 20 percent juice (14.10 mg) adjusted to 15°B TSS (T₆). Beverage with 10 percent juice shows the minimum protein content (7.67 mg) compared to others.

calcium and potassium content of 1.95 mg 100 mL⁻¹ and 9.38 mg 100 mL⁻¹, respectively.

The result showed that the beverage's juice concentration and TSS content are directly related to its proximate composition. The beverage with a higher juice content of 20 percent and lower TSS of 12.5°B significantly had higher levels of protein, ascorbic acid, antioxidant activity, calcium and potassium content. Similarly, higher proximate composition in beverages containing high-level juice was reported by Akubor *et al.* (2017) [1] in squash derived from pineapple and Kumar *et al.* (2020) [3] in Phalsa RTS beverage. However, the beverage with a higher juice content of 20 percent and a TSS concentration of 15°B had the highest carbohydrate content due to adding more sugar to adjust TSS.

The sensorial of watery rose apple RTS beverage is presented in Table 2.

Table 2: Effect of different treatments on sensory characteristics of watery rose apple RTS beverage (Hedonic scale 9.0)

Treatments	Colour and appearance	Taste	Flavour	Overall acceptability
T ₁	6.00	6.05	7.11	7.10
T ₂	6.28	6.35	7.18	7.50
T ₃	7.08	7.13	7.27	7.65
T ₄	7.22	7.31	7.51	7.72
T ₅	7.61	7.79	7.94	8.15
T ₆	8.04	8.16	8.20	8.39
S.Em±	0.09	0.52	0.049	0.078
C.D.@1%	0.27	0.156	0.145	0.234

Watery rose apple RTS beverage with 20 percent fruit juice and adjusted to 15°B TSS significantly had a higher sensory score for colour and appearance (8.04), taste (8.16), flavour (8.20) and overall acceptability (8.39) than others. The sensory scores increased with the increase in fruit juice content and beverages adjusted to 15°B TSS, than adjusted

to 12.5°B due to higher juice levels, contributing to its sensory quality. Similarly, Thakur *et al.* (2018) [7] and Wahab *et al.* (2018) [8] reported the influence of balanced sweetness and acidity with increased juice content on higher sensory scores in wild prickly pear and mango squash, respectively.

Conclusion

A good quality, highly palatable, ready-to-serve beverage can be obtained by blending 20 percent watery rose apple fruit juice containing 0.3 percent acidity and adjusting to 15°B TSS. The beverage enhances nutritional security and minimizes postharvest loss.

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