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Development and standardization of blended ready-to-serve beverage from Singapore cherry (*Muntingia calabura*)

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Abstract

The study on development of blended beverages from Singapore cherry fruits were carried out at Dept. of Food Science and Nutrition during 2015- 16. The physical and biochemical properties of Singapore cherry fruit were determined and results revealed that the average weight, length and width were 1.80 g, 1.00 cm and 1.20 cm respectively. Ready-To-Serve (RTS) beverage was developed by using three different fruits by blending with Rose apple and Passion fruit in different combinations (100 %, 50:50:00, 50:25:25 and 50:00:50). The prepared products were subjected for biochemical and sensory analysis. The results revealed that the products prepared in the combination of 50:25:25 showed very good with respect to colour (7.81), appearance (7.81), texture (7.75), flavor (7.68) and overall acceptability (7.93) with a pH (1.8) and TSS (31.50°Brix). The product was subjected for nutrient analysis and results showed that all the products contained high moisture, vitamin C and calcium.

Keywords: Physical and biochemical properties of fruit, nutritive value, ready-to-serve beverage

1. Introduction

The Singapore cherry fruits are botanically berries. Berries are the fruits with layers of pericarp (fruit coat) which are often homogeneous, except for the skin on the outside. The pericarp layers are pulpous and juicy, and contain seeds embedded in the pulp mass. The fruits have a fragile cell structure that is damaged by rough handling or freezing. (Manay and Shadaksharaswami, 2001) [5].

Singapore cherry (*Muntingia calabura*) fruit belongs to the family Muntingiaceae and is often called as “Japanese cherry” or “Chinese cherry” or “Jamaican cherry and in Kannada it is called as Gasagase Hannu”. The tree bears small, red, found fruiting all over the year. These cherries are very sweet, musky with a fig like flavor, and filled with exceedingly minute seeds. Fully ripened fruits taste like cotton candy and are often cooked in tarts and made into jams. These fruits are unavailable in markets; they are widely eaten by women and young children of rural India. (Gomathi, *et al.* 2013) [4].

Singapore cherry is non climacteric fruit and is very fast growing tree of slender proportions, reaching 25 to 40 feet in height with spreading nearly horizontal branches. Singapore cherry grows best up to an elevation of 1,300M above sea level. It is also tolerant to low winter temperature. The plant thrives well in both acid and alkaline conditions. It is drought resistant crop but not a salt tolerant. The leaves are evergreen, long pointed at the apex, 5-12 cm long, dark green and minute hairs are present on the upper surface of the leaves. The flowers are solitary born single in the leaf axils. The flowers are small, white, with 1.25 to 2cm width. Singapore cherry fruits are smooth, soft, with very minute yellowish seeds present in the juicy pulp. (Pradeep kumar *et al.*, 2011) [3].

2. Materials and Methods

2.1 Physico-chemical properties of Singapore cherry fruit

Fruits were randomly selected from the lot for the analysis of physical characteristics such as fruit weight, fruit length, and fruit width. Chemical characteristics include pH, total soluble sugars, reducing sugars and anthocyanin.

2.2 Nutrient composition of Singapore cherry fruit

Nutrient composition of the Singapore cherry was analyzed for macro (moisture, protein, fat, total minerals and crude fiber) and micro (vitamin C and minerals) nutrient analysis.

2.3 Sample preparation

Singapore cherry fruits were cleaned by removing stalk, bruises, and other extraneous matter. Fruits were dried for 36hrs at 60°C in hot air oven.

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The dried fruits were powdered and stored in air tight container for further analysis. Analysis was done in duplicates using analytical grade chemicals. Results were expressed on dry weight basis.

2.4 Ready-to-serve (RTS) beverage

Fruits were selected and washed in clean water. Pulp was extracted by grinding the fruits in mixer grinder. Sugar, citric acid, salt and water were mixed thoroughly. The mix was strained and boiled for 2 to 3 minutes. The mix was cooled and pulp was added and thoroughly mixed and filled in to pre-sterilized bottles. The final product contained 10 per cent fruit pulp, 1.5 per cent acidity and total soluble solids (TSS) 30 - 32°Brix.

2.5 Sensory evaluation of developed products

All the developed products were evaluated by 20 semi-trained panel members from the Department of Food Science and Nutrition, GKVK, UAS, Bangalore- 560065. The products were evaluated for appearance, texture, Flavour, taste and overall acceptability using 9 point hedonic scale.

Table 3: Sensory scores of the Ready-To-Serve (RTS) beverage from Singapore cherry blend

| Variations | Mean sensory scores | | | | | | |
|----------------|---------------------|--------|---------|-------|-------------|-------|-----------------------|
| | Appearance | Colour | Texture | Aroma | Astringency | Taste | Overall acceptability |
| T ₁ | 6.43 | 6.5 | 6.75 | 6.93 | 6.75 | 7 | 6.93 |
| T ₂ | 7.31 | 7.06 | 7.40 | 7.68 | 7.30 | 7.56 | 7.68 |
| T ₃ | 7.81 | 7.81 | 7.75 | 7.68 | 7.25 | 7.93 | 7.93 |
| T ₄ | 7.75 | 7.87 | 7.87 | 7.93 | 7.5 | 7.93 | 7.81 |
| F- value | * | * | * | * | NS | * | * |
| SEm±(0.05) | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.01 | 0.01 |
| CD value | 0.90 | 0.90 | 0.83 | 0.70 | - | 0.65 | 0.71 |

Table 4: Proximate composition of best accepted Ready-To-Serve (RTS) beverage prepared from Singapore cherry blend

| Nutrients | Quantity (100ml) |
|--------------------|------------------|
| Moisture (%) | 89 |
| Protein (g) | 0.8 |
| Fat (g) | 0.5 |
| Total minerals (g) | 1.6 |
| Crude fiber (g) | 0.3 |
| *Carbohydrates (g) | 7.8 |
| **Energy (kcal) | 40 |

*values obtained from difference method.

**calculated based on protein, fat, and carbohydrate content

3. Results and Discussion

Variation T₃ (50:25:25Singapore cherry, Rose apple and Passion fruit) scored highest values for all the sensory attributes i.e. appearance (7.81), colour (7.81), texture (7.75), aroma (7.63), astringency (7.25), taste (7.93), and over all acceptability (7.93) over the other variations and T₄ was followed by T₃. Control (100% T₁) was scored least when compared to all the other variations and significant difference was observed in the products with respect to appearance, colour, texture, aroma, taste and over all acceptability except astringency. The products developed from the Singapore cherry fruit blend was not commercially viable products and the investigation was done to minimize the loss of the underutilized fruits in a useful manner. Three products were prepared using Singapore cherry fruit as base fruit(50 per cent) and rose apple and passion fruits in different variations and the control was prepared using 100 per cent Singapore cherry fruit. T₃ variation which was prepared with Singapore cherry rose apple and passion fruit in the ratio of 50: 25: 25

2.6 Nutrient analysis of the best accepted products

Best accepted products from sensory evaluation were analyzed for the proximate principles and micro nutrient analysis.

Table 1: Physical characteristics of Singapore cherry fruit

| Characteristics | Observations |
|--------------------------|---------------|
| Fruitcolour | Yellow to red |
| Mean weight of the fruit | 1.80g |
| Mean length of the fruit | 1.00cm |
| Mean width of the fruit | 1.20cm |

Table 2: Chemical properties of the Singapore cherry

| Chemical constituents | |
|---|------------|
| pH | 6.29 |
| Reducing sugars | 8.5% |
| Anthocyanin | 5.4mg/100g |
| Total soluble sugars (TSS)°Brix at different stages | |
| Semi ripened fruits | 17.2 |
| Ripened fruits | 18.5 |
| Fully ripened fruits | 19.5 |

were best accepted in all the three products. Which was evident from the sensory evaluation, where panelists liked the taste of 50 per cent blended passion fruit products (7.68 out of 9 points) i.e T₂ and T₄ (7.93 and 7.81 out of 9 points) scored highest score for aroma and also for the taste. Analogous study conducted by Ravishanker *et al.* (2011) found the same results i.e blended (rose apple: Jamun) nectar was accepted more compared to the control.

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