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Prajna Prabhakar Hegde
M.Sc. (PHT), Department of
Postharvest Technology, College
of Horticulture, UHS campus,
Bengaluru, Karnataka, India

Sadananda GK
Assistant Professor, Department
of Postharvest Technology,
College of Horticulture, UHS
campus, Bengaluru, Karnataka,
India

Sreenivas KN
Retired Dean, College of
Horticulture, Tamaka, Kolar,
Karnataka, India

Shankarappa TH
Associate Professor, Regional
Horticultural Research and
Extension Centre, UHS campus,
Bengaluru, Karnataka, India

Chandan K
Assistant Professor, Department
of Postharvest Technology,
College of Horticulture, Banavasi
road, Sirsi, Karnataka, India

Manjula GS
Ph.D Scholar, Department of
Postharvest Technology, College
of Horticulture, UHS campus,
Bengaluru, Karnataka, India

Mohamad Tayeebulla H
Ph.D Scholar, Department of
Postharvest Technology, College
of Horticulture, UHS campus,
Bengaluru, Karnataka, India

Abdullah Masoumi
M.Sc. (PHT), Department of
Postharvest Technology, College
of Horticulture, UHS campus,
Bengaluru, Karnataka, India

Correspondence

Sadananda GK
Assistant Professor, Department
of Postharvest Technology,
College of Horticulture, UHS
campus, Bengaluru, Karnataka,
India

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Development of healthy kokum blended RTS beverage using Aonla and Ginger

Prajna Prabhakar Hegde, Sadananda GK, Sreenivas KN, Shankarappa TH, Chandan K, Manjula GS, Mohamad Tayeebulla H and Abdullah Masoumi

Abstract

There is always demand from consumers all over the world for novel food products which may be nutritious and also delicately flavored. Juice blending not only improves quality and nutrition of basic raw material, but also offers to develop the new product. In this context highly functional kokum juice is blended with aonla and ginger in different ratio and they are analyzed for variation in pH, acidity, ascorbic acid, anthocyanin and antioxidant activity after blending. Blended RTS with 10 per cent kokum, 1 per cent aonla and 1 per cent ginger was found to be the best in terms of its sensory attributes like color, flavor, taste, after taste and overall acceptability and superior in terms of biochemical composition consisting of 13°Brix TSS, 2.54 pH, 0.8 per cent acidity, 48.75 mg/100 ml ascorbic acid, 3.12 mg/100 ml anthocyanin and 277.05 mg AEAC/100ml antioxidants. The biochemical properties of the Kokum RTS increased with the addition of aonla and ginger indicating that the blending of kokum with other fruits/economic parts increases its nutritional quality.

Keywords: Kokum, Health benefits, Blended beverage, Nutritional quality.

Introduction

Kokum (*Garcinia indica* C.), belongs to the family Clusiaceae (Guttiferae) is an indigenous tree spice of India, known by various names across India including *Bindin*, *Bhirand*, *Bhinda*, *Biran*, *Punarpuli*, *Katambi*, *Ratamba* or *Amsol*. Traditionally, kokum has been used as a hypo-cholesterolaemic agent, cardio tonic, antihelminthic, anti-acidic, anti-cancer and antioxidant activities. It is also used to treat various types of skin diseases, constipation, dysentery, heat stroke, pain, tumor, cardiovascular diseases and neurodegenerative chronic inflammatory diseases such as atherosclerosis, asthma, stroke, vasospasms, liver damage and Alzheimer's disease. Consumption of hydroxycitric acid inhibits fat synthesis, lipogenesis, decreases food intake and reduces body weight (Jena *et al.*, 2002) [10]. There is always demand from consumers all over the world for new food products which may be nutritious and also delicately flavored. Juice blending not only improves quality and nutrition of basic raw material, but also offers to develop the new product (Nath and Yadav, 2005) [13]. In this context highly nutritious kokum juice is blended with aonla and ginger which has an impact on nutritional and sensory quality of product.

Material and Methods

The experiment was carried out at the Department of Postharvest Technology, College of Horticulture, University of Horticultural Sciences Campus, GKVK (Post), Bengaluru, during the year 2016-17. The dried kokum rind was purchased from a local farmer in Vanalli village in Sirsi Taluk, Uttara Kannada district, Karnataka. Matured aonla fruits of uniform size and color were harvested from Regional Horticultural Research and Extension Centre, UHS Campus, GKVK (Post), Bengaluru. Fresh ginger rhizome and was purchased from a local vendor in Vidyanarayapura, Bengaluru. Extraction of juice: Dried kokum rind (100 g) was coarsely powdered and soaked in 500 ml of hot water (80 °C) (Kokum:Water, 1:5 w/v) overnight and it was filtered using muslin cloth to get a clear extract. Aonla fruits and ginger rhizomes were extracted in water at 1:1 and 1:2 w/v ratios respectively. The juice was extracted by using

muslin cloth and the obtained clear juice was used in the present study. Treatment Details: T₁: 10% Kokum, T₂: 10% Kokum+2% Ginger, T₃: 10% Kokum+2% Aonla, T₄: 10% Kokum+1% Aonla+1% Ginger, T₅: 8% Kokum+2% Ginger, T₆: 8% Kokum+2% Aonla and T₇: 8% Kokum+1% Aonla+1%Ginger.Procedure- RTS was prepared by mixing different amount of kokum, aonla and ginger extract with water as per the treatments, 13°Brix TSS was maintained in the blended juice by adding required quantity of sugar irrespective of treatments and the prepared juices were filled in 200 ml capacity pre sterilized glass bottles. Biochemical analysis: Blends were analyzed for TSS using digital hand refractometer (Make: Erma Optical Works Ltd., Tokyo, Japan, 0-32°B range). Acidity (AOAC, 2000) [3] and HCA (Asish *et al.*, 2008) [5] of blended juice was determined by titrating against 0.1N sodium hydroxide and per cent acidity

Results and Discussion

Table 1: Proximate composition of different raw materials used in experiment

Extracts	TSS (°Brix)	pH	Acidity (%)	Ascorbic acid (mg 100 ml ⁻¹)	Antioxidants (mg AEAC 100 ml ⁻¹)	Reducing Sugars (%)	Total Sugars (%)	Anthocyanin (mg 100 ml ⁻¹)	HCA (%)
Kokum	7.00	2.59	6.08	246.25	2436.35	14.11	19.80	27.38	20.10
Ginger	1.50	5.20	0.24	2.70	2134.15	0.64	1.60	—	—
Aonla	5.80	3.11	1.56	448.70	2871.42	4.59	9.50	—	—

Proximate estimation of raw materials was conducted and is presented in Table 1. Among different raw materials kokum had highest TSS, acidity, anthocyanins, HCA, reducing and total sugars as compared to ginger and aonla, while aonla had highest ascorbic acid and antioxidant capacity. Kokum blended juice was developed as per experiment designed and it was analysed for different biochemical parameters which were found significant and it is presented in Table 2. It was observed that with addition of aonla pH of the juice decreased significantly in all the treatments with highest pH 2.62 was observed in the T₅ followed by T₂ with 2.57 pH. Whereas, the lowest pH 2.51 was recorded in the T₃, decrease in pH may be due to the acidic nature of aonla which decreases the pH of the RTS drink (Joshi *et al.*, 1991) [11]. A significant increase in acidity was recorded with addition of aonla extract in the treatments, highest acidity per cent was observed in the T₃ (0.96 %) followed by T₆ (0.85 %), while lowest acidity was recorded in T₅ (0.44%), which was on par with T₂ (0.49%). The higher acidity in prepared drink might be due to acidic nature of kokum and aonla extract which had increases the acidity of the RTS drink (Joshi *et al.*, 1991 in plum; Deka, 2000 in mango-pineapple) [11, 8].

Ascorbic acid (AA) content was found highest (58.5 mg 100 ml⁻¹) in T₃ and T₆ whereas, the lowest (29.25 mg 100 ml⁻¹) AA content was recorded in T₂ and T₅, higher ascorbic content in developed drink might be due to the presence of more

was expressed in terms of anhydrous citric acid and HCA was determined by replacing equivalent weight of acid with equivalent weight of HCA and the pH of the juice was measured by using pH meter. Ascorbic acid was determination by 2, 6-dichlorophenol-indophenol dye method suggested by AOAC, 2006 [4]. Reducing and total sugars were determined according to the method suggested by Lane and Eynon, 1923 [12]. The total anthocyanin concentration was estimated as described by Fuleki and Francis (1968) [9] and antioxidant activity was determined by FRAP method explained by Benzie and Strain (1996) [6]. Sensory evaluation was recorded using 9-point Hedonic scale as laid out by Amerine *et al.* (1965) [2]. All the data were statistical analyzed in according to the Completely Randomised Design (CRD) suggested by Sunderraj *et al.*, 1972.

ascorbic acid content in aonla which increases the ascorbic acid content of the RTS drink (Deka, 2000) [8].

The highest anthocyanin content 3.15 mg 100 ml⁻¹ was recorded in T₁ which was followed by T₂ and T₄ with 3.13 and 3.12 mg 100 ml⁻¹, respectively and lowest anthocyanin content was recorded in T₆ with 2.43 mg 100 ml⁻¹. Variation in anthocyanin content in prepared product may be due to variation in per cent kokum extract in the product. The results are in consonance with findings of Siddharth and Ajaykumar, 2013 [16] in concord grape juice blended with kokum. Total antioxidant capacity was found significant in all the treatments with highest antioxidant activity was recorded in T₄ (277.05 mg AEAC 100 ml⁻¹) was followed by T₃ (250.67 mg AEAC 100 ml⁻¹) whereas, lowest antioxidant activity was observed in T₁(179.67 mg AEAC 100 ml⁻¹) which was on par with T₅ (182.77mg AEAC 100 ml⁻¹) higher antioxidant level in prepared blended product might be due to aonla and ginger, which are potential source of antioxidants, blending these with kokum might have contributed to the total antioxidant activity of the carbonated kokum drink. The recorded observation was in agreement with findings reported by Joshi *et al.* (1991) [11] in the preparation of plum appetizer, Deka (2000) [8] in mango-pineapple, lime-aonla and guava-mango RTS blends, Siddharth and Ajaykumar (2013) [16] in concord grape juice blended with kokum.

Table 2: Biochemical composition of kokum blended RTS beverage

Treatments	pH	Acidity (%)	Ascorbic acid (mg 100 ml ⁻¹)	Anthocyanin (mg 100 ml ⁻¹)	Antioxidants (mg AEAC 100ml ⁻¹)
T ₁	2.56 ^c	0.59 ^c	29.25 ^c	3.15 ^a	179.67 ^f
T ₂	2.57 ^b	0.49 ^c	29.25 ^c	3.13 ^a	244.99 ^c
T ₃	2.51 ^f	0.96 ^a	58.50 ^a	3.00 ^b	250.67 ^b
T ₄	2.54 ^d	0.80 ^b	48.75 ^{ab}	3.12 ^a	277.05 ^a
T ₅	2.62 ^a	0.44 ^c	29.25 ^c	2.55 ^c	180.77 ^f
T ₆	2.52 ^e	0.85 ^{ab}	58.50 ^a	2.43 ^d	238.52 ^d
T ₇	2.54 ^d	0.75 ^b	48.75 ^{ab}	2.54 ^c	214.35 ^e
Mean	2.55	0.70	45.96	2.85	226.57
SE.m ±	0.00	0.05	5.21	0.03	1.11
CD @ 1%	0.02**	0.22**	21.94**	0.11**	4.67**
CD @ 5%	0.01*	0.16*	15.81*	0.08*	3.37*

NS- Non Significant * - Significant at 5% **-significant at 1%

Similar alphabets in the superscript (column) are not significantly different (P ≥ 0.05)

Sensory evaluation

The sensory scores obtained for RTS drink prepared by blending kokum, aonla and ginger are given in Figure 1. The highest score for color 8.24 which was in the range of “Like very much” was recorded for T₃ followed by T₁ and T₄ receiving score 8.16. The lowest score (7.43) was observed in T₂. Highest sensory score for flavour was observed in T₄ (7.94) which was in the range of “Like moderately” was followed by T₁ (7.81) and minimum score was recorded for T₂ (7.43) followed by T₅. The highest sensory score for taste was recorded by T₁ (8.13) followed by T₄ which was in the range of “Like very much” having the score 8.06 while the lowest score 7.42 was received by T₂. Score for after taste with highest value (8.14) was received for T₄ followed by T₁ receiving score 7.92. The lowest score (7.56) was recorded in T₆. The maximum sensory score 8.27 was recorded for overall acceptability in T₄ which was in the range of “Like very much” followed by T₁ recorded 8.01 score. The minimum score 7.53 was recorded for T₂ followed by T₃ (7.66). The results are in agreement with Abhinav and Amol (2015) [1], Dnyaneshwar *et al.* (2013) [7] in carbonated pineapple, Shilpi *et al.*, (2014) [15] in aonla and lime carbonated beverage.

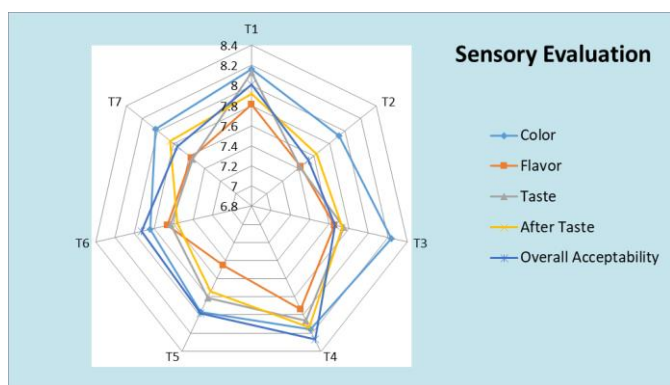


Fig 1: Sensory scores of kokum blended RTS beverage

Conclusion

Juice blending not only enriches quality and nutrition of basic raw material, but also offers to develop a better product. Kokum blending with ginger and aonla has enhanced the nutritional quality of the blended RTS. 10% kokum blended with 1% aonla and 1% ginger and TSS maintained at 13°Brix found to be the best recipe with higher combination of phytochemicals and higher scores presented as per sensory panelists.

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