

Development and Analysis of Blended Pineapple-Watermelon Ready To Drink (RTD) Juice.

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Abstract: The physicochemical properties of juice from pineapple and watermelon and their ready to drink (RTD) blends were carried out. The % watermelon juice and pineapple juice of each formulation (v/v) were BL1 (70:30), BL2 (60:40), BL3 (50:50), BL4 (30:70) and BL5 (40:60). The standards were done without blending the two juices SPJ (100% standard pineapple juice) and SWJ (100% standard watermelon juice). The results of the analysis of Vitamin C content (mg/g) gave 125.26 in SWJ, 38.90 in SPJ, 111.58 in BL1, 98.94 BL2, 86.31 BL3, 72.63 BL4 and 84.21 BL5 respectively. The vitamin C content of the RTD blends increase with high proportion of SWJ. The results revealed that all the blends especially 70:30 (watermelon: pineapple) gave an improved composition in terms of the physicochemical properties determined.

Keywords: Physicochemical, blends, ready to drink, pineapple, watermelon, juice, vitamin C

I. Introduction

Fruit juices are liquid, non-alcoholic products with a different degree of clarity and viscosity, obtained through pressing or breaking up the fruits with or without sugar or carbon dioxide addition [1]. Fruit juices are ready and rich sources of vitamins, fibre and mineral salts for human consumption [1]. Fruits consumption is beneficial to health and contributes to the prevention of degenerative processes, particularly in lowering the incidence and mortality rate of cancer and cardiovascular diseases [2]. Based on fruits antioxidant capacities, these fruit juices are used as indicators for healthy nourishment as well as protection factors of the human body against oxidative destruction [1].

The increasing social and economic importance of food products besides the technology complexity of producing, processing and fragile food materials requires a more extensive knowledge of their physical properties because the rheological properties play an important role in the handling and quality attributes of processed foods [3].

Present dietary scenario necessitates exploring the possibilities of incorporating novel ingredients in commonly consumed foods rather than developing new food product [4].

Food constitutes one of the most important foods for man. Their regular and copiously consumption maintains health and makes up for the losses in the human diet.

Costescu *et al.*, [1] recommended the consumption of natural juices with pulp from food and medical points of view.

Pineapple (*Ananas comusus*) and watermelon (*Citrullus lamatus*) are considered for this purpose. The two fruits are always available all the year round in the markets throughout Nigeria especially in South-western part of the country.

Pineapple (*Ananas comusus*) belongs to the family of bromeliaceae. It is a tropical, perennial, drought tolerant plant that grows up to 5-8ft in height and spreads around about three to four feet. It is essentially a short stout stem with a rosette of waxy long, needle-tipped leaves. The fruit is described as compound (multiple) fruit that develops from many small fruits fused together around the central core. It pulp is juicy and fleshy with the stem serving as a supporting fibrous core. It is an excellent source of antioxidant vitamin C which is required for the collagen synthesis in the body.

Watermelon (*Citrullus lanatus*) belongs to the family Cucurbitaceae. This tropical flowering plant produces a special type of fruit with a thick rind (exocarp) and fleshy center (mesocarp and endocarp). Fresh watermelon may be eaten in a variety of ways and is often used to flavor drinks. Watermelon contains about 6% sugar by weight with the rest being mostly water. As with many other fruits like orange, grapes and lemons dominate the market and because of high demand for juicy materials to quench thirst as well as to improve health, there is need to examine other available fruits and possibly their blends (with other fruits) in order to satisfy the consumers need. The aim of this research is therefore to develop and determine chemical characteristics of ready to drink (RTD) fruit juices from pineapple and watermelon fruits.

II. Materials and Methods

2.1 Materials

2.2 Raw Sample Collection

Pineapple and watermelon fruits used for the preparation of the juices and their blends were obtained from a local seller in Ayetoro market, Osogbo, Osun state, Nigeria. They were brought into the applied Chemistry laboratories of Osun state Polytechnic, Iree in a polythene bag and were identified as pineapple (*Ananas comusus*) and watermelon (*Citrullus lanatus*) by a botanist.

2.3 Extraction of Juice

The fruits were washed thoroughly in running water. Fruits were peeled with the help of stainless steel laboratory knife and seeds from watermelon were removed manually. The pulps were grinded separately and the juice extracted using a laboratory electric juice extractor. The extracted juice were filtered through double muslin cloth and immediately stored at refrigerated temperature further use.

III. Methodology

3.1 Blended Ready-To-Drink (RTD) Juice Preparation

Two standards (100% pineapple and 100% watermelon) and five samples of blended ready to drink juice containing different percentages of pineapple and watermelon juice were developed.

Table: Physicochemical Characteristics of the Fruit Juices and their RTD Blends

Parameters	SWJ	SPJ	BL1	BL2	BL3	BL4	BL5
Ash content (%)	0.62	0.44	0.54	0.49	0.46	0.53	0.52
Water content (%)	92.50	83.55	87.45	91.70	88.82	86.64	85.47
Organic matter (%)	93.38	99.56	99.46	99.51	99.54	99.47	99.48
Total solid (°Brix)	4.02	10.62	6.03	7.03	7.30	9.03	8.02
pH	5.20	3.80	4.40	4.20	4.10	4.00	4.10
Specific gravity	1.016	1.040	1.024	1.028	1.032	1.036	1.032
Refractive index at 20°C	1.337	1.349	1.342	1.343	1.344	1.346	1.345
Temperature (°C)	25.00	26.00	26.00	26.00	26.00	26.00	26.00
Conductivity (umhos)	2.9 x 10 ³	3.4 x 10 ³	3.1 x 10 ³	4.0 x 10 ³	3.8 x 10 ³	3.65 x 10 ³	3.96 x 10 ³
Viscosity (Pal/Sec)	1.15	1.30	1.21	1.25	1.46	1.31	1.23
Total sugar (%)	4.25	10.60	6.50	7.00	7.25	9.00	8.00
Sucrose (%)	4.00	10.00	6.00	7.00	8.00	9.00	8.00
Carbohydrate (%)	40.00	95.00	60.00	70.00	76.00	89.00	88.00
Titrateable acidity (mg/g)	30.00	124.00	51.00	63.00	77.00	89.00	82.00
Ascorbic acid (mg/g)	125.26	38.95	111.58	98.94	86.31	72.63	84.21
Volatile acidity (mg/g)	0.02	0.07	0.03	0.05	0.05	0.05	0.05

Note

SWJ- 100% standard watermelon juice SPJ- 100% standard pineapple juice
 BL1- 70% watermelon and 30% pineapple BL2- 60% watermelon and 40% pineapple
 BL3 - 50% watermelon and 50% pineapple BL4 - 30% watermelon and 70% pineapple
 BL5 - 40% watermelon and 60% pineapple.

IV. Discussion

The physicochemical properties of the two standard fruit juices from pineapple and watermelon and their blends were presented on the table above.

Vitamin C contents of the standard watermelon juice of 125.26 ± 0.05 mg/g was about three times more than that of standard pineapple juice of 38.95 mg/g. The addition of pineapple juice to watermelon juice reduced the vitamin C contents while addition of watermelon juice to the pineapple juice increased the vitamin C contents of the blends. The developed ready to drink (RTD) fruit juices and SWJ were higher than the 60 mg/day recommended daily allowance of vitamin C needed by an adult male [5]. The vitamin C contents of the two standards and their blends are lower than the vitamin C content of blended cashew apple juice with some tropical juice [5].

The carbohydrate content (%) of the SPJ of 95.00 ± 0.01 was higher than 40.00 ± 0.05 of SWJ. The carbohydrate contents of the blends also showed some levels of improvement in BL1, BL2 and BL3 on addition of more pineapple juice to the blend.

All the samples have higher pH values than pH 4.0 reported for cashew/pineapple blend of ratio (4:1). SPJ with pH of 3.8 correspond to the pH value obtained for cashew/grape blend of ratio 20:1 [5]. The pH values were however similar to those reported for papaya and aloe vera juice [6]. The results on pH showed that standard pineapple juice is acidic and that of watermelon was of medium acidic medium.

Titration acidity in mg/g increases as the addition of pineapple juice to the watermelon increases. This increase in titration acidity of the blends corresponds to decrease in pH as shown on the table above.

The total soluble solids (TSS) in Brix and total sugar (%) were also found to increase with increase in the volume of pineapple added to the watermelon juice. Increase in TSS is an indication that the pineapple addition has resulted in high sugar-to-acid ratio in the blends and this confirmed a high correlation between total soluble solids and sugar content as observed by Ravi *et al.*, [7]. The values obtained for the total solids were very much lower than the average of 11.7^oBrix reported for choke cherry fruit cultivars [8] and 16.7% TSS reported for pomegranate fruit juice by [10]. The increase in TSS on addition of pineapple to watermelon could also be attributed to the conversion of polysaccharides and other constituents of the juice to sugar [6, 9].

The refractive index of the samples at 20^oC was considerably close to each other with BL1 and BL2 having the same value of 1.342 while BL3, BL4 and BL5 have 1.344, 1.346 and 1.345 respectively. These values are similar to those reported for orange, grape and tomato juices by Tressler [11].

The total sugar (%) of 0.60 for SPJ was more than twice the amount found in SWJ (4.25). The amount of total sugar in the two standards and all the blends were lower than 18.10% and 18.28% obtained for both the improved and indigenous juice from Jamun fruit [3].

The result revealed that addition of pineapple juice to the watermelon juice led to increase in the sugar content while reversing the process reduced the sugar content of blends. The total sugar content of some of the blends fell within the value of 9.9% and 11.1% reported for grape and orange juices respectively by Gergen, [12].

The sucrose content in % was higher in the standard pineapple juice (10.00%) than the watermelon juice (4.00%). Sucrose is one of the disaccharide that is very useful to the body in the provision of energy.

The percentage ash content of the watermelon juice was found to be more than that of pineapple juice. Ash content is a very good index of the mineral contents of a sample and therefore the standard juice samples and the various blends could serve as good and very cheap source of nutritive mineral elements to the body.

The moisture content of SWJ of 92.50% was higher than 83.55% obtained for SPJ. The moisture content of the blends decreases with increase in the proportion of watermelon in the blends.

The organic matter (%), specific gravity, temperature, conductivity and viscosity properties of the fruit blends followed the same pattern as observed for pH, total sugar and sucrose contents.

V. Conclusion

The present study showed that blending of fruit juices could enhance their nutritional quality and development of new products. The information therein will assist in providing knowledge base evaluation and development of blends that may benefit fruit processing industry in Nigeria.

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