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Effect of Blending Ratio of Pineapple on Sensory and Physicochemical Property of Mango Juice

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Abstract

Quality and alimental contents of single fruit juice can be ameliorated through mixing or blending process with other fruit juices. Pineapple and mango are the most popular tropical fruits with good characteristic taste. Fruit juices were developed from mango and pineapple with different proportions. The physico-chemical properties (TSS, pH and TA) and sensory quality (color, taste, Viscosity, mouth feel, aroma and overall acceptability) of developed juices were evaluated. Color properties of pineapple and mango juice blends at ratio of 85M: 15P; 70M: 30P; 55M: 45P was evaluated. Blends ratio 55M: 45P juice gives the best color performance in terms of hue, chroma and ΔE. Physico-chemical properties of juice blends ratio of 55M:55P also give results of pH (3.56) titratable acidity (0.79%), total soluble solid (14.60). Based the present study this study blending ratio of 55M: 45P resulted with best quality of juice compare to others blending ratios.

Keywords: Pineapple • Sensory • Physicochemical • Mango juice

Introduction

Fruits and vegetables play a number of important roles in human health. They provide antioxidants such as vitamin A, C and E, folate and potassium that are important in neutralizing free radicals (oxidants) known to cause cancer, cataracts, heart disease, hypertension, stroke, birth defects, and diabetes [1]. They are also good sources of minerals such as iron, zinc, calcium, potassium, and phosphorus and contain sample fiber, important for digestion and bowel movements [2]. Since a few decades, the interest and consumption of fruits has been increasing worldwide [3]. Of the different ways fruits are served to consumers, juice is one of the popular which can be produced at industry level in pasteurized and packed forms or as freshly squeezed and unpasteurized fruit juices form which are common in restaurants, cafeteria, hotels, and juice houses [4]. Juice is a liquid naturally contained in fruit or vegetable tissue and prepared by mechanically squeezing or macerating fresh fruits or vegetables without the application of heat or solvent commercially [5]. Juice may be also prepared in the home from fresh fruits and vegetables using variety of hand or electric juicers. Juice may be market in concentrate form, sometime frozen, requiring the user to add water to re-constitute the liquid back to its "original state. However, concentrates generally have a notice able different taste than their comparable "fresh squeezed" versions [6]. Among fruits pineapple (Ananus comosus) is a wonderful tropical plant which possesses exceptional juiciness; vibrant tropical flavor and eminent health benefit [7]. Pineapple is a member of bromeliaceae family and is composed of many flowers whose fruitlets are fused around core pineapples and is both sweet and tart with a beautiful, tropical yellow color reminiscent of warm summer days. Pineapple is third most important tropical fruit in the world after banana and citrus [8]. Pineapple contains 81.2 – 86.2% moisture and 13-19% total solid of which sucrose, glucose and fructose are the main component. Carbohydrate represents upto 85% total solid as fibre makes up for 2-3% of the organic acid. Citric acid is most abundant acid in pineapple fruit. The pulp has very low ash content, nitrogen compound and lipid. From 25-30% nitrogenous compound are true protein out of these proportion of calcium is 80% has a proteolytic activity due to the protease known as bromelain. Fresh pineapple contains minerals such as calcium, chlorine, potassium, phosphorous and sodium [9]). Half of cup a pineapple juice provide 50% of an adults daily recommended vitamin C. Ascorbic acid or vitamin C fights bacterial infection and viral infection which is an effective antioxidant activity and helps the body absorb body iron (G. G. Dull, 1971) Pineapple also contains copper, another trace mineral. It assists in absorption of iron and regulates blood pressure and heart rate. A Powerful antioxidant vitamin C supports the formation of collagen in bone, blood vessels, cartilage, muscle, as well as the absorption of iron. Vitamin C also retards the development of urinary tract infection during pregnancy and reduces the risk of certain cancer including colon, esophagus and stomach. Mango among one of the tropical fruits and is greatly relished for its succulent, exotic flavor and delicious taste in most countries of the world. Mango contains amino acid, carbohydrates, fatty acids, minerals, organic acids, proteins, vitamin A & C, and dietary fibres [10]. It is one of the most recommended fruit which have medicinal importance to fight beriberi, heal bronchial diseases and cure brain fatigue, mental depression, wrestle heartburn and insomnia [11].

Mango is a widely processed fruit to be used as a vital ingredient in many products. The increasing production of fruit and the perishable nature of the fruit and lack of facilities for transportation of the produce from the area of production to the consumer provide some necessity to manufacture it into various products [12]. The production of fruit and vegetable in Ethiopia is high. They are highly perishable crops due to the moisture content relatively with other food crops. Among those mangos is one of the fruit which is produced highly and it is seasonal crop. In addition to this, it also has high post-harvest loss; so in order to reduce its loss, it has to be process and produce juice. juice is processed product from fruit with longer shelf life than fresh fruits. The juice which produced from mango fruit contain some undesirable flavor and aroma. Due to this, pine apple juice has to be adding to prevent those undesirable aroma and flavor as well as to modify consistence of mango juice. Therefore, this study will be conducted to study the problem and to find out the possible solution (Figures 1 and 2).

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Material and Methods

Experimental site

The study was conducted at Hawassa University, Department of Food Science and Post-harvest Technology Laboratory.

Sample collection

The raw materials (mango and pineapple) for juice preparation were obtained from Hawassa local market.

Laboratory analysis/Physico-chemical analysis

Total Soluble Solids (TSS): The total soluble solids (TSS) levels of the juice were determined according to AOAC method by using hand refractometer. An appropriate quantity of sample of each product was placed on the prism-plate of the refractometer and the reading appearing on the screen will be directly recorded as total soluble solids. Results were expressed in Brix.

PH Value: The pH of the juice was determined by using digital pH meter. The pH meter was standardized with the help of a standard buffer with pH 4 solution prior to measurement.

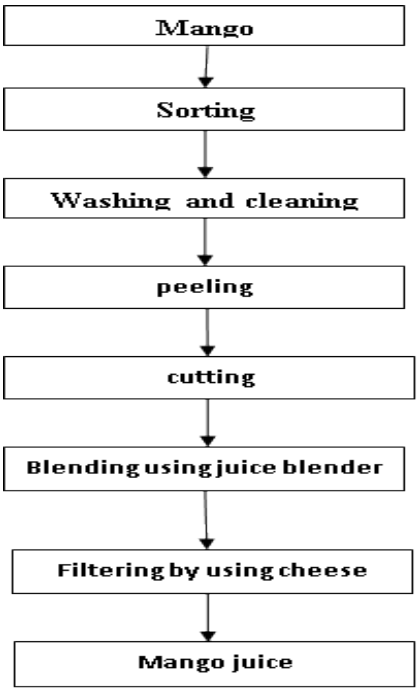

Figure 1. Preparation of mango juice.

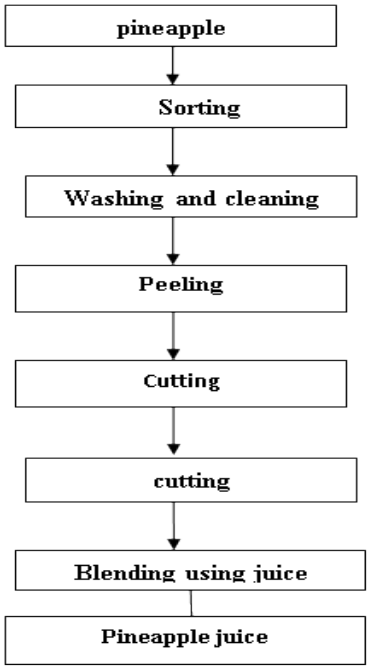

Figure 2. Preparation of pine-apple juice.

Titratable Acidity (TA): The juice was titrated with 0.1 M NaOH and the results were expressed in terms of percentage citric acid. It was calculated by the following formula:

$$TA\% = \frac{Nb \times Vb \times Ea \times df}{Vs} \times 100$$

Where: N_b = Normality of the base, V_b = Volume of the base, E_a = Mill equivalent weight of citric acid, VS = Volume

Sensory evaluation

Consumer oriented sensory analysis was done in duplicated using 5-point hedonic scale by 15 panelists. In which 5 is like moderately and 1 is dislike moderately like.

Experimental design

RCBD was used for sensory evaluation and CRD was used for physico-chemical analysis.

Data analysis

Analyses of variance (ANOVA) was used to analyses data at $p<0.05$ and the significance difference between means was determined by Fisher's LSD test. SAS, version 9.1 software was used to perform statically analyses.

Results and Discussion

Physico-chemical analysis of Mango and Pineapple Juice

The physiochemical analysis of mango and pineapple juice was presented as shown in Table 1. In the current study the pH of control sample and Pineapple Juice was ranged between 3.56 to 3.77. The highest pH was recorded in the control (mango) juice and the lowest pH was recorded in T3 (55% M and 45% P). The titrable acidity of the juice sample was ranged between 0.62 to 0.79. Treatment 3 had highest titratable acidity. But treatment 2 had lower titratable acidity. The total soluble solid (TSS) content was significantly different between treatment 2 and 3 after preparation of the juice. As discussed in factors contributing to huge variations in TSS content include among crop history [13].

Physiochemical analysis of mango and pineapple blended juice

There was a significant difference in pH between different proportions Table 2. the pH was decrease when the proportion of pineapple increase. This might be due to increase in titrable acidity, as acidity and pH are inversely proportional to each other. It was observed that the maximum pH (3.77) was recorded in the control (mango) juice. The increase in pH was due to decrease in titrable acidity which affects the organoleptic quality of juice as discussed [14]. The TSS increased with gradual increment of mango, which might be due to hydrolysis of polysaccharides into monosaccharide. The highest value of TSS was recorded in control and treatment 1 samples, which was statistically superior to other treatments Table 3. Similar results were also reported in juice blends [15-17] found an increasing trend in total soluble solids during preparation mango-pineapple beverages.

Table 1. Blending proportion of mango and pineapple.

Treatments	Mango %	Pineapple %
Control	100	0
T1	85	15
T2	70	30
T3	55	45

Table 2. Physiochemical analysis of mango and pineapple juice.

Treatments	pH	TA	TSS
Control	3.77 ± 0.07	0.62 ± 0.77	14.75 ± 0.35
T1	3.62 ± 0.03	0.6.4 ± 0.28	14.75 ± 0.07
T2	3.61 ± 0.14	0.68 ± 1.13	14.05 ± 0.07
T3	3.56 ± 0.02	0.79 ± 0.07	14.60 ± 0.14

Table 3. Sensory analysis of mango and pineapple juice.

Treatments	Color	Taste	aroma	Viscosity	mouth feel	over all acc
1	4.26 ± 0.80	4.2 ± 0.66	4.2 ± 0.66	4.36 ± 0.61	4.0 ± 0.87	4.26 ± 0.58
2	4.13 ± 1.00	4.03 ± 1.12	4.06 ± 0.90	4.36 ± 0.66	4.03 ± 0.88	4.26 ± 0.82
3	3.80 ± 1.12	3.76 ± 1.00	3.73 ± 1.11	3.73 ± 1.01	3.80 ± 0.92	3.83 ± 0.91
4	3.80 ± 1.37	3.46 ± 1.04	3.66 ± 1.12	3.63 ± 1.06	3.70 ± 0.98	3.86 ± 1.04

Sensory evaluation of mango and pineapple blended juice

The intention of this study was to incorporate the maximum possible quantity of pineapple juice in the juice mixture with higher sensory scores and adjustment of acidity to get good taste. It was observed that the highest sensory score was obtained with maximum incorporation of 45% pineapple juice in the juice blend. Therefore, the ingredient compositions having 45% pineapple juice were selected. This means 55m:45p. During color the mean square value of with respect to 1-4 treatments have no significant difference $p>0.05$ as well as in the taste the mean square value of in treatment 3 (3.76 ± 1) have highest mean square value, while treatment treatment four mean square (3.46 ± 1.04) is the least score value so this indicate highly significant at $p<0.05$ and during the aroma the mean square value of treatment 2 (4.06 ± 0.9) have highest score, while treatment 4 have least mean square value of (3.66 ± 1.22). So this indicates highly significant at $p<0.05$. The viscosity, mouth feel, and the overall acceptability of treatments were non-significant.

Conclusion

The results obtained shows that it possible to improve the juice quality attributes by blending of pineapple and mango juice. Appearance quality namely color parameter of pineapple and mango juice blends were amended as the blending ratio of pineapple increase in the blends. Different blending ratios of pineapple and mango juice were also contributed to different physicochemical quality of pH, titratable acidity, TSS of pineapple-mango juice blends. Based the present study this study blending ratio of 55M: 45P resulted with best quality of juice compare to others blending ratios.

References

1. Sharma, Shankar. “Yield and quality parameters of guava as influenced by foliar application of ferrous sulphate”. Ann Rep of Agri Res 19 (1998):196-198.
2. Ali, Ahmed. ‘’Factors influencing the quality and shelf-life of Mango deen”. (2003).
3. Anon. Mango in India, Central Food Technological Research Institute (1990).
4. Association of Official Analytical Chemistry Official Method of Analysis (21st edn).
5. Association of Official Analytical Chemists, Official Methods of Analysis. (15th edn).
6. Azeredo, Henriette, Edy Brito. "Effect of drying and storage time on the physico-chemical properties of mango leathers." Intern Jour of Food Sci & Tech. 6 (2006):635-638.
7. Baliga, Bantval Prabhakara, Shitole, Amar Devendra. "Cocoa butter substitutes from mango fat." Jour of the Amer oil Chem Soc 58 (1981): 110-114.
8. Mhatre, Minal, Jai, Tilak Jain, Strayo De. "Evaluation of the antioxidant activity of non-transformed and transformed pineapple: a comparative study." Food and Chem Toxi 11 (2009): 2696-2702.
9. Sanewski, Garth, Duane, Bartholomew. The pineapple: Botany, production and uses. CABI, 2018.
10. FAO. The world pineapple market: when growth goes hand in hand with diversity’, FAO Committee on Commodity Problems, Intergovernmental group on bananas and on tropical fruits.
11. Dull Gaby. The pineapple: general. In: AC Hulme (Ed.). The biochemistry of fruits and their products, Academic Press 2 (1971):303-324.
12. Murugesan, Premalatha. "Development and storage studies of naturally flavored papaya-pineapple blended ready-to-serve (RTS) beverages." Int J Sci Res 4 (2013): 856-860.
13. Mitra, Sisir K. Postharvest physiology and storage of tropical and subtropical fruits. New York: CAB International, USA, 1997.
14. Joy, Paul. "Benefits and uses of pineapple." Pineapple Research Station (Kerala Agricultural University), Vazhakulam, Kerala. (2010).
15. Hossain, Farid. “Nutritional Value and Medicinal Benefits of Pineapple”. Int J Nutri Food Sci 4 (2015):84-88.
16. Hemalatha, Rajendran, "Physicochemical constituents of pineapple pulp and waste." J Chem Pharm Res 5 (2013): 240-242.
17. Pal, Rajat Kumar. "Ripening and rheological properties of mango as influenced by ether and calcium carbide." J Food Sci & Tech 4 (1998): 358-360.

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