

Sensory Attributes of the Mixed Fruit Jam made from Aloe Vera, Pineapple and Mango

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Abstract: Sensory attributes of the jam prepared from blend of Mango (*Mangifera indica*) and Pineapple (*Ananas comusus*) incorporated with Aloe vera was evaluated. Fruit pulp of ripe Mango and Pineapple fruits incorporated for the preparation of the jam at different levels where A (50% Mango Pulp + 20% Pineapple Pulp + 30% Aloe vera gel), B (40% Mango pulp + 40% Pineapple pulp + 20% Aloe vera gel), C (60% Mango pulp + 20% Pineapple pulp + 20% Aloe vera gel), D (40% Mango pulp + 50% Pineapple pulp + 10% Aloe vera). Good quality jam can be prepared by blending 40% Mango pulp, 40% Pineapple pulp and 20% Aloe vera (B). Mango, Pineapple and Aloe vera have good medicinal and nutritional properties like accelerating the wound healing, demonstrate antineoplastic, modulate immune function, anti-viral, anti-oxidant, etc. It is seen that the organoleptic score of the jam prepared by blending 40% Mango pulp, 40% Pineapple pulp and 20% Aloe vera was highest, i.e. 9.0 followed by the treatment A, D and C.

Keywords: Sensory analysis, aloe vera, pineapple, mango, jam, blends.

1. Introduction

Jam is the product brought to a suitable consistency, made from the whole fruits, pieces of fruits, the unconcentrated and/or concentrated fruit pulp or fruit puree of one or more kinds of fruit, which is mixed with food stuffs with sweetening properties with or without addition of water [1]. Generally, the fruits preferred for the preparation of jam are mango, pineapple, raspberry, blueberry, sour cherry, apple, etc. But the incorporation of *Aloe vera* was not found in jam therefore the jam prepared was incorporated with the *Aloe vera* pulp. According to Fruit Product Order the Total Soluble Solid (TSS) content of the jam should be 68.5⁰ Brix [2]. The procedure of making fruit jam is complicated with a number of variables which affects the quality of final product [3]. The ingredients of fruit jam are fruit pulp, sugar and glucose syrup, thickeners such as (E-440, E-410) and citric acid to bring the pH into desired range [3].

Aloe vera is perennial succulent xerophytes which develops water storage tissue in the leaves to survive in dry areas of low or erratic rainfall. The innermost part of leaf is clear, soft, moist, and slippery tissue that consists of large thin

walled parenchyma cells in which water is held in the form of viscous mucilage [4]. *Aloe vera*, a well known herbal plant has the potential to be the focal point for the yield of a functional beverage since it is known to offer protection from oxidative stress [5]. The thick fleshy leaves of aloe plant contains not only cell wall carbohydrates such as cellulose and hemicelluloses but also storage carbohydrates such as acetylatedmannans[6]. Aloe gel is 99% water with pH of 4.5 and is common ingredient in many non-prescription skin salves. The remaining solid material contains over 75 different ingredients. The gel contains an emollient polysaccharide, glucomannan. Acemannan the major carbohydrate fraction in the gel, is a water soluble long chain mannose polymer which accelerate wound healing, modulate immune function and demonstrates antineoplastic and antiviral effects. The gel contains enzymes such as bradykinase, cellulose, carboxy peptidase, cetalase, amylase and an oxidase. Magnesium lactate which helps prevent itching and salicylic acid and other antiprostaglandin compounds which relieve inflammation have also reported in the gel [7].

Table 1: Summary of chemical composition of aloe vera leaf pulp and exudates [8] [9] [10] [11] [12].

Class	Compounds
Anthraquinones/anthrones	Aloe-emodin, aloetic-acid, anthranol, aloin A and B (or collectively known as barbaloin), isobarbaloin, emodin, ester of cinnamic acid
Carbohydrates	Pure mannan, acetylated mannan, acetylated glucomannan, glucogalactomannan, galactan, galactogalacturan, arabinogalactan, galactoglucoarabinomannan, pectic substance, xylan, cellulose
Chromones	8-C-glucosyl-(2 ^{''} -O-cinnamoyl)-7-O-methylaloeol, 8-C-glucosyl-(S)- aloesol, 8-C-glucosyl-7-O-methyl-(S)-aloesol, 8-C-glucosyl-7-O-methyl- aloediol, 8-C-glucosyl-noreugenin, isoaloesin D, isorabaichromone, neoaloesin A
Enzymes	Alkaline phosphatase, amylase, carboxypeptidase, catalase, cyclooxygenase, cyclooxygenase, lipase, oxidase, phosphoenolpyruvate carboxylase, superoxide dismutase
Inorganic compounds	Calcium, chlorine, chromium, copper, iron, magnesium, manganese, potassium, phosphorous, sodium, zinc
Miscellaneous including organic compounds and lipids	Arachidonic acid, γ -linolenic acid, steroids (campesterol, cholesterol, β - sitosterol), triglycerides, triterpenoid, gibberillin, lignins, potassium sorbate, salicylic acid, uric acid
Non-essential and essential amino acids	Alanine, arginine, aspartic acid, glutamic acid, glycine, histidine, hydroxyproline, isoleucine, leucine, lysine, methionine, phenylalanine, proline, threonine, tyrosine, valine
Proteins	Lectins, lectin-like substance
Saccharides	Mannose, glucose, L-rhamnose, aldopentose
Vitamins	B1, B2, B6, C, β -carotene, choline, folic acid, α -tocopherol

Vitamins reported from the gel include the important antioxidant vitamins A, C, E, B1 (thiamine), B3 (niacin), B3 (riboflavin) as well as choline and folic acid. Some researchers suggest that there is trace amount of vitamin B12, which is normally only available from animal source. The gel also contains saponins (about 3%) , this may contribute cleansing and antiseptic properties to the gel. Water soluble glycosides are split by intestinal bacteria into a glycones which affects the laxative action. In small quantities when they do not exert their purgative effect, they aid absorption from the gastrointestinal tract and have and antimicrobial and pain killing effect [13] [14] [15]. *Aloe vera* has got different activities such as anti-fungal, anti-microbial, antineoplastic, antidiabetic, immunomodulatory etc. so it can be used as a better dermal preparation for treating various skin diseases [7]. *Aloe vera* gel has been reported to increase collagen and proteoglycan synthesis. Thereby promoting tissue repair [7]. Gel appears to exert its anti-inflammatory activity through bradykinase activity and thromboxane B2 and prostaglandin F2 inhibition [16]. *Aloe vera* can be used in treatment of HIV-AIDS. This is attributed to the antiviral and immune-modulating properties of acemannan. The acemannan act as bridge between foreign protein such as virus partied macrophages and facilitating phagocytosis this is a key component in boosting cell mediated immunity which is different in HIV infection[17] [18] [19].

Aloe vera gel is being used commercially for oral consumption and many claims are made for benefits in various internal inflammatory conditions. The anti-inflammatory action of gel in-vitro provide support for the proposal that it may have a therapeutic effect in inflammatory bowel disease [20][21][22]. *Aloe vera* assist in reducing blood glucose to more normal levels specifically in type I and type II diabetics not in non- diabetics [23][24][25][26]. *Aloe vera* gel is supplemented with cane sugar as a substrate for the production of functional fermented aloe vera based herbal wine [27].

Pineapple (*Ananus comosus*) is a wonderful tropical plant which possesses exceptional juiciness; vibrant tropical flavour and eminent health benefit [28]. 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 colour reminiscent of warm summer days. Pineapple is third most important tropical fruit in the world after banana and citrus [29]. 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 [30]. 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 [31].Pineapple also contains copper, another trace mineral. It assists in absorption of iron and regulates blood pressure and heart rate [32].

Table 2: Nutritional content table (nutritional composition of Pineapple fruit per 100 gm) [33].

Nutrients	Value
Calcium	16 mg
Energy	52 calories
Carbohydrate	13.7 gm
Dietary fibre	1.4 gm
Iron	0.28mg
Magnesium	12 mg
Protein	0.54 gm
Phosphorus	11 mg
Potassium	150 mg
Vitamin A	130 I.U
Vitamin B1	0.079 mg
Vitamin B2	0.031 mg
VitaminB3	0.489 mg
Vitamin B6	0.110 mg
Vitamin C	24 mg
Zinc	0.10 mg

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, oesophagus and stomach [32]. Malic acid makes up 13% of pineapple juice's acidic content. Malic acid boosts immunity, promotes smooth firm skin, helps to maintain oral health and reduces the risk of toxic metal poisoning [31]. Pineapple juice is high in manganese content which means it is a good choice for boosting fertility by enhancing the sperm quality [32]. Pineapple pulp has average crude fibre content of 0.45 ±0.03 gm/100 gm [34]. Pineapple creates low blood pressure, cure inflammation, used for weight loss, control the death rate and prevent diabetics and radical damage [35].

Pineapple can be blended with other fruits to improve their acceptability and make use of available nutrients. Therefore keeping in view of nutritional and functional attributes of pineapple the study was under taken to develop RTS beverage [36]. Mango (*Mangifera indica*) is among one of the tropical fruits and is greatly relished for its succulent, exotic flavour and delicious taste in most countries of the world [37].

Table 3: Nutritive value of mango (per 100 gm) [38].

Nutrients	Ripe mango	Unripe mango
Protein(g)	0.6	0.7
Fat (g)	0.4	0.1
Minerals(g)	0.4	0.4
Fibre (g)	0.7	1.2
carbohydrates(g)	16.9	10.1
Energy	74	44
Vitamin C (mg)	16	3
Total carotene (mcg)	2210	90
Beta carotene(mcg)	1990	-
Potassium (mg)	205	83
Sodium (mg)	26	43
Calcium (mg)	14	10
Iron(mg)	1.3	0.33
Phosphorus (mg)	16	19

Mango contains amino acid, carbohydrates, fatty acids, minerals, organic acids, proteins, vitamin A &C, and dietary fibres [39]. 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 [40]. This paper reports the sensory attributes of jam prepared from mango, pineapple and aloe vera.

2. Material and Method

2.1. Preparation of Mango pulp

Freshly ripe mango fruit were collected from the local market of Nashik and washed thoroughly in running tap water. The fruits were cut into halves and kernel was removed manually. The pulp was extracted and the rind was separated. The obtained pulp was grinded in food processor

and used for preparation of jam.

2.2. Preparation of Pineapple pulp

Ripe pineapples were procured for the local market of Nashik and good quality pineapples were selected. The crown and the stem portion were removed and fruits were washed in tap water. The pineapples were peeled with the help of knife and floral remnants (spiky protruding part) were removed and sliced. The prepared slices were crushed in food processor. The crush mass obtained was used for preparation of jam.

2.3. Preparation of Aloe vera gel

A fresh and good quality *Aloe vera* leaves were selected and washed thoroughly in running tap water. The outer skin was peeled off and the clear gel was extracted with the help of spoon. The clear gel was then subjected to mixing in a mixer, grinded in laboratory scale mixer to obtain uniform gel.

2.4. Preparation of jam from mango, pineapple pulp and Aloe vera gel blend

The jam was prepared from the blend of mango pulp, pineapple pulp and *Aloe vera* gel as per Fruit Product Order, 1955 specifications. That is TSS 68.5⁰ Brix, acidity 0.6% and pH 4.2 to 4.5. The pulps were blended in different ratios as described in table 4.

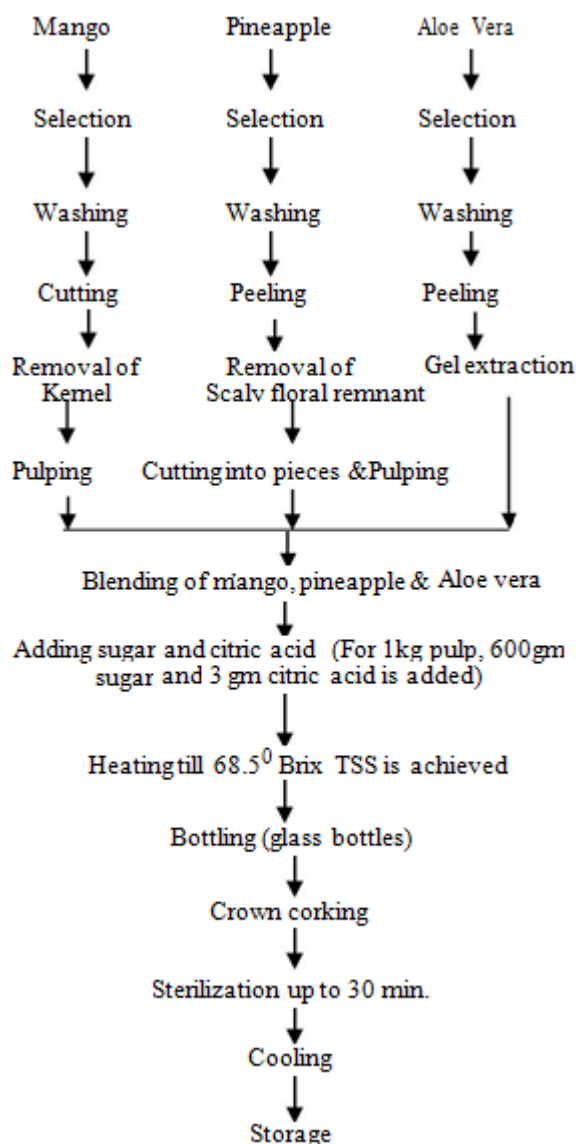
Table 4: Variations in Jam

Components	Samples			
	A	B	C	D
Mango pulp (%)	50	40	60	40
Pineapple Pulp (%)	20	40	20	50
Aloe vera Pulp (%)	30	20	20	10

Best blended jam was selected by the organoleptic evaluation which was conducted on 9 point hedonic scale for colour, appearance, taste, flavour and overall acceptability by 25 semi trained panellist or judges having prior experience of sensory evolution of fruits and vegetable product [36].

3. Nutritional Analysis

The nutritional evaluation of supplementary foods i.e. moisture content, fat content, protein content and ash content, was carried out by A.O. A.C (Association of Official Analytical Chemists) method.



4. Result and Discussion

4.1. Sensory Evaluation

The mango, pineapple pulp and *Aloe vera* gel were blended in various ratios as stated in table 4. The experiment was replicated 3 times and total 15 samples of jam were prepared and served to semi trained and trained panellists to judge the attributes. The samples were scored for their attributes such as colour, flavour, taste, appearance and overall acceptability and their mean was calculated and is given in table 5.

Table 5: Mean of hedonic scale score

Attributes	Sample			
	A	B	C	D
Color	8.0	9.0	8.0	8.0
Appearance	8.0	8.0	7.0	7.0
Taste	8.0	9.0	6.5	6.0
Flavor	8.0	9.0	7.0	6.0
Overall	8.0	9.0	6.0	7.0
Acceptability				

The colour and appearance of the jam made by blending of

mango, pineapple pulp and *Aloe vera* gel was found excellent as per the organoleptic scores. The organoleptic scores for the taste and flavour ranged from 6-9 and the highest score was for sample B which was found to be 9 and was superior in overall remaining treatments. The overall acceptability of sample B was found to be highest among all the other samples and the organoleptic score for the different attributes were found highest when compared to other samples. The sample B in which mango, pineapple pulp and aloe vera gel in the 40:40:20 proportions was the most acceptable blend. Similar studies were found and [36] recorded sensory attributes for development and storage study of naturally flavoured papaya- pineapple blended RTS beverages and [41] recorded the observation on preparation and storage of blended RTS beverage from bael and aloe vera.

Chemical Composition

The data obtained on chemical properties such as pH, TSS, acidity, moisture content, total sugar, carbohydrate, protein, fat & energy value for the sample B were recorded after the preparation on 0th day and final value were as taken as given in table 4

Table 6: Chemical analysis of per 100 gm

Chemical attribute	Values
Energy value (kcal)	334
Protein (g)	0.6
Carbohydrate (g)	81
Sugar (g)	56.1
Fat (g)	0.84

5. Conclusion

On the basis of above result it is possible to prepare the jam by blending fruits like pineapple and mango with *Aloe vera*. The incorporation of *Aloe vera* gel in fruit jam is highly acceptable. The jam blended with mango & pineapple pulp & *Aloe vera* gel is highly acceptable when it's in ratio 40:40:20.

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