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Development, Sensory and Chemical Attributes of the Jelly made by Incorporating *Aloe vera* gel in Pineapple Juice

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Abstract: ***Sensory attributes of the jelly prepared from Aloe vera gel and Pineapple (Ananas comusus) fruit juices was evaluated. The gel of Aloe vera and juice of Pineapple fruits were incorporated for the preparation of the jelly at different levels where A) 50% Aloe vera gel + 50% Pineapple juice, B) 40% Aloe vera gel + 60% Pineapple juice, C) 30% Aloe vera gel + 70% Pineapple juice and D) 20% Aloe vera gel + 80% Pineapple juice. Good quality jelly can be prepared by blending 40% Aloe vera gel + 60% Pineapple juice (B). Aloe Vera and Pineapple fruits have good medicinal and nutritional properties antidiabetic, antiulcer, antiseptic, antibacterial, anti-inflammatory, antioxidant and anticancer agent also, effective in treating stomach ailments, gastrointestinal problems, skin diseases, non-constipation, radiation injury, wound healing, burns, dysentery, diarrhea and in the treatment of skin diseases, etc.***

Keywords: *Aloe vera*, Pineapple, jelly, gel, juice, fruit

1. Introduction

Jelly is an easily digestible, appetizing and nutritionally far superior than mainly synthetic drinks and some confectionary products which are consumed on a daily basis. Jellies are the crystal clear products brought to a semisolid consistency and made from the strained juice or aqueous extracts of one or more fruits, mixed with foodstuffs with sweetening properties, with or without addition of water. Jelly should hold its shape but be soft enough to spread. Jelly is made by concentrating the mixture of strained juice, sugar, pectin etc. to not less than 65% Total Soluble Solids. Processing of fruits and vegetable to the jelly and other valuable products are way abundant fruits and vegetables can be utilized to reduce the wastage and bring economic returns to the farmer. Fruits generally used for making jelly are grapes, strawberry, apples, mango, pineapple, etc. But in this experiment *Aloe vera* gel was incorporated in preparation of jelly to increase its medicinal value.

Aloe vera (*Aloe barbadensis*) in one of the most important herbal remedies with a long lasting history for its curative and therapeutic properties for various ailments. Till date more than 75 active components with active medicinal value have been identified in *Aloe vera* and have to passes synergistic action in alleviating the diseased conditions [1, 2 and 3]. Herbal products are considered safe and widely use from the ancient time due to its medicinal qualities, flavor [4].The plant

has triangular, fleshy leaves with serrated edges, yellow tubular flowers and fruits that contain numerous seeds. Each leaf is composed of three layers [5].

a) An inner gel that contains 99% water and rest is made of glucomannans, amino acids, lipids, sterols and vitamins.
b) The middle layer of latex which is bitter yellow sap and contains anthraquinones and glycosides.
c) The outer layer of 15-20 cells called as rind.

The thick fleshy leaves of *aloe* plants contain not only cell wall carbohydrates such as cellulose and hemicellulose but also storage carbohydrates [6].The raw pulp of *Aloe vera* contains approximately 98.5% water, while the mucilage or gel consists of about 99.5% water [7]. The remaining 0.5 – 1% solid material consists of a range of compounds including water soluble and fat soluble vitamins, minerals, enzymes, polysaccharides, phenolic compounds and organic acids [8].

It has been hypothesized that this heterogeneous composition of the Aloe vera pulp may contribute to the diverse pharmacological and therapeutic activities which have been observed for *aloe* gel products[9].In the food industry, it has been used as a source of functional foods and as an ingredient in other food products, for the production of gel containing health drink beverages [10]. The bitter yellow exudate contains 1, 8 dihydroxyanthraquinone derivatives and their glycosides which are mainly used for their cathartic effects [11].

Table 1: Summary of the chemical composition of *Aloe vera* a leaf pulp and exudate [12, 13, 14, 15 and 16]

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, Acelylated mannan, acetylated glucomannan glucogalactomannan, galactan, galactogalacturan, arbinogalctan, galactoglucoarabinomannan, pectic substance, xylan, cellulose
Chromones	8-C-glucosyl-(2'-0 cinnamonyl)-7-0-methylaloediol, A,8-C-glucosyl(S)-aloesol, 8-C-glucosyl-7-0-methyl-(S)-aloesol,8-C-glucosyl-7-0-methyl-aloediol,8-C-goucosyl-noreugenin, isoaloeresin D, isorabaichromone, neoaloesins A
Enzymes	Alkaline phosphate, amylase, carboxypeptidase, catalase, cyclooxidase, cyclooxygenase, lipase, oxidase, phoshoenolpuruvate carboxylase, Superoxide dismutase.
Inorganic acid	Calcium, chorine, chromium, copper, iron, magnesium, managanese, potassium, phosphorous, sodium, zinc.
Miscellaneous including organic compounds and lipids.	Arachidonic acid, y-linolenic acid, steroids (campestrol, cholesterol, β- sitosterol), triglicerides triterpenoid, gibberllin, lignins, potassium, sorbate, salicyclicacid, uric acid.
Non-essential amino acid	Alanine, arginine, aspartic acid, glutamic acid, glycine, histidine
Essential amino acid	Hydroxyproline, isoleucine, leucine, lysine, methionine, phenylalanine, proline, threonine, tyrosine, valine.
Proteins	Lectins, lectin- like substance
Saccharides	Mannose, glucose, L-rhamnose, aldopentose.
Vitamins.	B_1, B_2, B_6, C, B-carotene, choline.

The main functional component of *Aloe vera* is long chain of acetylated mannose [16, 17, 18]. The wound healing property of *Aloe vera* gel has been attributed to mannose-6-phosphate [19]. Acemannanis considered asthe main functional component of *Aloe vera* and is composed of a long chain of acetylated mannose [16, 17, 18]. This complex carbohydrate accelerates wound healing and reduces radiation induced skin reaction [20, 21].The data suggests that specific plant sterols may also contribute to the anti-inflammatory activity of gel [22]. The *Aloe vera* sterol includes campesterol, β-sitosterol, lupeol and cholesterol which are anti-inflammatory in nature, helps in reducing the inflammation pain and acts as a natural analgesic. Other aspirin like compound present in *Aloe vera* is responsible for anti-inflammatory and antimicrobial properties [23]. The number of glycoproteins present in A*loe vera* gel has been reported to have antitumor and antiulcer effects and to increase proliferation of normal human derma cells [24-26]. *Aloe vera* is anthelmintic aperients, carminative, deobstruent, depurative, diuretic stomachic and emmenagoque. Juice is used in skincare medicine, dyspepsia, amenorrhea, burns, colic, hyperadenosis, hepatopathy, splenopathy, constipation, span menoeehea, abdominal tumors,dropsy carbuncles sciatica,lumbago and flatulence.[24,26] A number of glycoprotein present in *Aloe vera* gel has been reported to have anti-tumor and antiulcer effects and to increase proliferation of normal human dermal cells [24-26].Gel is useful in ulcerative colitis and pressure ulcers [27, 28].Aloe is extensively used in treating urine related problems, pimples and ulcers, etc. It is also used in gerontology and rejuvenation of aging skin. Scientific evidence for the cosmetic and therapeutic effectiveness of *Aloe vera* is limited and when present is frequently contradictory [29, 30].The bioactive compounds are used as an astringent, hemostatic, antidiabetic, antiulcer, antiseptic, antibacterial, anti-inflammatory, antioxidant and anticancer agent also, effective in treating stomach ailments, gastrointestinal problems, skin diseases, non-constipation, radiation injury, wound healing, burns, dysentery, diarrhea and in the treatment of skin diseases[31].The five Phytosterols of *Aloe vera*, lophenol, 24methyl lophenol, 24 ethyl lophenol, cycloartaanol and 24 methylene cycloartanol showed antidiabetic effects in Type 2 diabetic mice[32].*Aloe vera* contains polysaccharides which increase the insulin level and show hypoglycemic properties [33].

Aloevera emodin and anthraquinone,has the stability to suppress or inhibit the growth of malignant cancer cells making it to haveantineoplastic properties [34].Aloe juice is helpful in smooth functioning of the body machinery[35]. Pineapple (*Ananas comosus*),family Bromeliaceae, is one of the most important commercial fruit crops in the world. It is known as the queen of fruits due to its excellent flavor and taste[36]. Pineapples are consumed or served fresh, cooked, juiced and can be preserved. This fruit is highly perishable and seasonable. Mature fruit contains 14% sugar, protein digesting enzyme, bromelain and good amount of citric acid, malic acid and Vitamin A and Vitamin D [37] (Joy, 2013).The U.S. National Library of Medicine lists bromelain as a proteolytic digestive enzyme when taken with meals, bromelain aids in the digestion of protein working to break protein down into amino acids[38].The various food items like squash, syrup and jelly are produced from pineapple. Vinegar, alcohol, citric acid, calcium citrate, etc. are also produced from pineapple. Pineapple is also recommended as medicinal diets for certain diseased persons [39].Pineapple contains 81.2 % to 86.2% moisture and 13-19% total solids of which sucrose, glucose and fructose are the main components. The pineapple pulp has very low ash content, nitrogenous compounds and lipids. 0.1% from 25-30% of nitrogenous compounds is true proteins out of this proportion. Fresh Pineapple contains minerals such as calcium, chlorine, potassium, phosphorus and sodium [40].Pineapple juice is a good source of Ascorbic acid. Vitamin C fights bacterial and viral infections which is an effective antioxidant and helps the body absorb iron. Half a cup of pineapple juice provides 50% of an adult‟s daily recommended amount of Vitamin C [41].

2. Material and Method

2.1 Preparation of Pineapple Juice

Ripe pineapples were procured from the local markets of Nashik. The ground and stem portion were removed and fruit was washed in tap water. The pineapples were peeled with knives, eyes and barks removed and thus sliced. The prepared slices were soaked in the water containing 25%sugar of the weight of the pineapple slice and it was heated on a low flame. The prepared slices were crushed in a hydraulic press and juice was extracted using juice extractor. The juice was filtered was through muslin cloth.

2.2 Preparation of *Aloe vera* gel

The *Aloe vera* leaves after harvesting were washed with water because it contained dirt and other impurities which needs to be removed. Yellow fluid secretion from the leaves was completely removed to maintain purity by soaking leaves in water for 5 minute. In the *Aloe vera* processing industry, leaves are initially washed in a sterilizing solution and 200 ppm of solution of sodium hypochlorite [42]. The *Aloe vera* leaves were pre-conditioned by sun-drying, shade drying and by steaming and then the removal of outer skin and rind was done using a knife. Then the lower portion of the leaf base, tampering point of the leaf top, and the short spines were removed. The knife was then introduced in a mucilage layer, below the green rind to remove the top rind and similarly and the bottom rind was removed. The extracted gel was then mixed thoroughly to obtain uniform gel.

2.3 Preparation of jelly from Pineapple and *Aloe vera* gel blend

The blended jelly was prepared using 65% of Total Soluble Solids (TSS) and acidity 0.7%, 75% of blended juice of different blending ratio in the following ratios:
A) 50% *Aloe vera* + 50% Pineapple juice
B) 40% *Aloe vera*+ 60% Pineapple juice
C) 30% *Aloe vera* + 70% Pineapple juice
D) 20% *Aloe vera* + 80% Pineapple juice

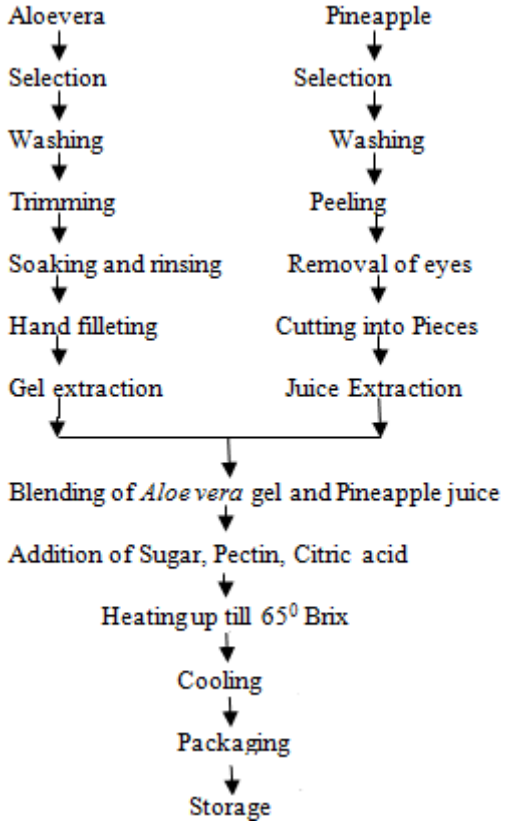
2.4 Sensory evaluation

The best blended jelly was selected by sensory evaluation which was conducted on 9 point Hedonic Scale for different sensory attributes like appearance, color, flavor and overall acceptability by a panel of 20 semi- trained members having prior experience of sensory evaluation of fruits and vegetable products.

2.5 Nutritional Evaluation

Nutritional evaluation of jelly made from the pineapple and *Aloe vera* blend was done for parameters like moisture content, fat content, protein content, ash content, acidity and it was carried out by AOAC method.

Flow chart:



3. Result and Discussion

3.1 Sensory Analysis

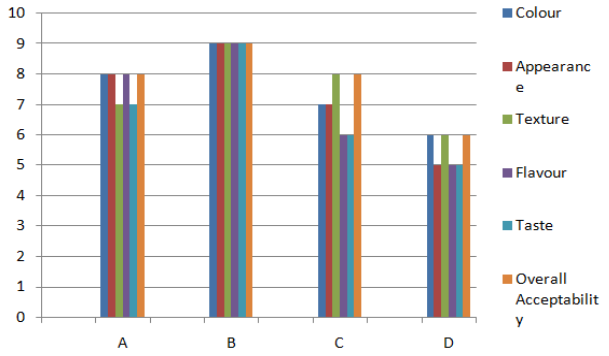
The *Aloe vera* gel and Pineapple fruit juice were blended in various ratios 50:50, 60:40, 70:30, 80:20. The experimental jelly prepared using *Aloe vera* and Pineapple was sensory evaluated by a panel of 20 members on a 9 point Hedonic Scale and marking was done on the basis of parameters like color, appearance, taste, texture, flavor and overall acceptability of the product was determined.

Table 2: Mean scores obtained for the various proportions of Pineapple and *Aloe vera.*

Samples	Sensory Attributes					
	Color	Appearance	Texture	Flavour	Taste	Overall Acceptability
A	8.0	8.0	7.0	8.0	7.0	8.0
B	9.0	9.0	9.0	9.0	9.0	9.0
C	7.0	7.0	8.0	6.0	6.0	8.0
D	6.0	5.0	6.0	5.0	5.0	6.0

The color and appearance of the jelly made from Aloe vera and Pineapple when taken in 60:40 proportion i.e. treatment B were good as is evident from the means scores obtained for these attributes. The maximum highest scores for color and appearance obtained were 9.0 for treatment B. Treatment C and D were not much acceptable from color and appearance point of view. The average scores for texture for B are 9.0 which are maximum and the minimum score is for D. The texture is highly affected by the concentration of the *Aloe vera* gel. Minimum average score obtained for taste was for sample D and highest for sample B. same were the results

obtained for the flavor attribute. The sample C and D were almost unacceptable because of increasing concentration of Pineapple and decreasing concentration of *Aloe vera*. The overall acceptability of A, B and C was good but sample B scored highest among these 3 samples. Sample B was „Liked Extremely" while Sample A and C. „Liked very much". The sample D was „liked slightly" and hence it was not acceptable. *Aloe vera* is rich in nutrients but is not accepted due to its poor taste and flavor. Blending *Aloe vera* and Pineapple is good option to improve the utilization of *Aloe vera*. Similar kind of research was done by [43]. Where he blended 30% papaya pulp with 70% guava to improve the nutritional as well as sensory qualities of the RTS beverage, which was found acceptable up to six months at room temperature (20 – 30^0.)



Graph 1: Sensory scores obtained during analysis

3.2 Chemical Composition

The data obtained on chemical properties such as TSS, acidity, moisture content, protein, fat and ash content for the sample B were recorded after the preparation on 0^{th} day and final value were as taken as given in table 4

Table 3: Chemical analysis of per 100 gm

Chemical Attributes	Values
TSS (^{0}B)	65
Acidity (%)	0.704
Moisture content (%)	0.72
Protein (g) (%)	1.0937
Fat (%)	0.6
Ash content (%)	5.42

References

[1] A. Salbert, D. Williamson,"Dietary intake and bioavailability of Polyphenols" J. Nutr. (3), pp. 2073-85, (2000).
[2] J. H. Hamman "Composition and applications of *Aloe vera* leaf gel. Molecules", (3), pp. 1599-616, (2008).
[3] F. Nejatzadeh-Barandozi. "Antibacterial activities and antioxidant capacity of Aloe vera", org. Med. Chem. Let, 3.5, (2013).
[4] D.R.Thomas, P.S.Goode, K. Lamaster and T. Tennyson,"Acemannan Hydrogel Dressing for Pressure Ulcers. A Randomized, Controlled Trial," Advances in wound Care, vol. (11), pp. 273-276, (1998).
[5] A. Surjushe, R. Vasani, DG saple, "Aloe Vera: A short review Indian J dermatol", (53), pp. 163-6, (2008).
[6] Ni. Y. Turner, D. Yates, K.M. Tizard,"Isolationand Characterization of structural components of aloe vera", L. Leaf pulp Int. Immunopharmacology, (4), pp.1745-1755, (2004).
[7] K. Eshun, He, Q, "Aloe vera: A Valuable ingredient for the food, Pharmaceutical and cosmetic injuries a review", Crit.Rev. food Sci. Nutr., (4), pp. 1745-1755, (2004).
[8] M. D. Boudreau, F. A. Beland, "An Evalution of the biological and toxicological properties of aloe Barbadensis (Miller), aloe vera", J. Environ. Sci. Health C,(24),pp.103-154, (2006).
[9] J. J. Talmadge, L. Chavez, Jacobs,"Fractionation of *Aloe vera* L. Inner gel, Purification and molecular Prolingof activity", International Immunopharmacology, 4 (14), pp. 1757-1773, (2004).
[10] J. H. Hamman, A. M. Viljoen, "Use of Aloe vera for increasing the availability of poorly absorbable drugs", .S.A. Patent application 2008/01542, (2008).
[11] B. Vazquez, G. Avila, D. Segura, B. Escalanate, "Anti-inflammatory activity of extracts from aloe Vera", gel J. Ethnopharmacol, (55), pp. 69-75, (1996).
[12] Ni, Y, Tizard, i. r., "Analytical methodology: the gel analysis of aloe pulp and its derivatives", In aloes the genus aloe, Reynolds, T, Ed.; CRC press Boca Raton, Pp. 111-126,(2004).
[13] E. Dagne, D. Bisrat, A. Viljoen, B. E. Vanwyk, "Chemistry of Aloe species", Curr. Org. Chem, (4), 1055-1078, (2000).
[14] Cosmetic Ingrediant Review Expert Panel Final Report on the safety assessment of aloe andongensis leaf juice, aloe arborescens leaf protoplasts, aloe barbadensis flower extract, aloe barbendensis leaf, Aloe Barbadensis leaf extract, aloe barbadensis leaf juice, aloe barbensis leaf polysaccharide, aloe barbadensis leaf water.Aloe Ferox leaf juice and Aloe Ferox leaf juice extract Int. J. Toxicol., (26), pp. 1-50, (2007).
[15] S. Choi, M. H. Cung, "a review on the Relationship between *aloe vera* Compounds and their biologic effects". Semin. Integr. Med, (1), pp. 53-62, (2003).
[16] A. Femenia, E. S. Sanchez, Simal. S. Roselloc, "Compositional Features of Polysaccharides from aloe vera 9 aloe Vera (aloe barbadensis Miller) Plant Tissues. Carbohydrate (polymer)", (39), pp.109-117, (1999).
[17] A. Djeraba and P. Quere, In VivoMacroPhage activation in Chickens with Acemannan, a Complex carbohydrate Extracted from Aloe vera, "International Journal of Immunopharmacology", vol.22, No. 5, Pp. 365-372, (2000).
[18] J.K.Lee, M.K. Lee, Y.P. Yun, Y. Kim., J.S. Kim, Y.Skim, K. Kim, S. S.Han and C.K. Lee, "International of Immunopharmacology", Vol. 1 No.7, pp. 1273-1284, (2007).
[19] R.H.Davis, J.J. Di Donato, G.M. Hartman and R. C. Hass, "Anti-inflammatory and wound healing activity of a growth substance in aloe vera." Journal of the American Podiatric Medical association, vol.84, No.2, pp, 77-81, (1994).
[20] M. Castleman, "The Healing Herbs," Rodale Press, Em-maus, pp. 42-44, (1991)
[21] P. de Witte, "Metabolism and Pharmacokinetics of An-thranoids," Pharmacology, Vol. 47, Suppl. 1, pp. 86-97, (1993).

[22] J. S. Haller, "A Drug for All Seasons, Medical and Pharmycological History of Aloe," Bulletin of the New York Academy of Medicine, Vol. 66, pp. 647-659, (1990).
[23] www.healingaloe.com,"Immunomodulatory Properties of Aloe vera Gel in Mice," International Journal of Green Pharmacy, Vol. 2, No. 3, pp. 152-154,(2008).
[24] S. W. Choi, B. W. Son, Y. S. Son, Y. I. Park, S. K. Lee, and M. H. Chung, "The Wound Healing Effect of a Glycoprotein Fraction Isolated from Aloe vera," British Jour- nal of Dermatology, Vol. 145, No. 4, pp. 535-545, (2001).
[25] A. Yagi, T. Egusa, M. Arase, M. Tanabe and H. Tsuji, "Isolation and Characterization of the Glycoprotein Frac- tion with a Proliferation promoting Activity on Human and Hamster Cells in Vitro from Aloe vera Gel," Planta Medica, Vol. 63, No. 1, pp. 18-21, (1997).
[26] A. Yagi, A. Kabash, K. Mizuno, S. M. Moustafa, T. I. Khalifa and H. Tsuji, "Radical Scavenging Glycoprotein Inhibiting Cyclooxygenase-2 and Thromboxane A2 Synthase from Aloe vera Gel," Planta Medica, Vol. 69, No. 3, pp. 269-271, (2003).
[27] L. Langmead, R. M. Feakins and S. Goldthorpe, "Randomized, Doubleblind, Placebo-Controlled Trial of Oral Aloe vera Gel for Active Ulcerative Colitis," Alimentary Pharmacology & Therapeutics, Vol. 19, No. 7, pp. 739-747, (2004).
[28] D. R. Thomas, P. S. Goode, K. LA Master and T. Tenny-son, "Acemannan Hydrogel Dressing for Pressure Ulcers: A Randomized, Controlled Trial," Advances in Wound Care, Vol. 11, 1998, pp. 273-276, (1998).
[29] E Ernst and A. FughBerman, "Methodological Considerations in Testing the Efficacy of Complementary/Alternative Treatments (CATs)," The Journal of Alternative and Complementary Medicine, Vol. 16, pp. 8-10,(1998).
[30] J. Marshall, "Aloe vera Gel: What Is the Evidence?" The Pharmaceutical Journal, Vol. 244, pp. 360-362,(2000).
[31] T. Rabe and J. Van Staden, "Antibacterial Activity of South African Plants Used for Medicinal Purposes," Journal of Ethno pharmacology, Vol. 56, No. 1, pp. 81-87, (1997)
[32] M. Tanaka, et al., "Identification of Five Phytosterols from Aloe vera Gel as Antidiabetic Compounds," Biological and Pharmaceutical Bulletin, Vol. 29, No. 7, pp. 1418-1422, (2006)
[33] A. Yagi, Y. Sato, Y. Miwa, A. Kabbash, S. Moustafa, K. Shimomura and A. El-Bassuony, "Ribosomal DNA Sequence Analysis of Different Geographically Distributed Aloe vera Plants: Comparison with Clonally Regenerated Plants," Saudi Pharmaceutical Journal, Vol. 14, No. 3-4, pp. 208-21,(2006).
[34] R. H. Thomson, "Naturally Occurring Quinines," 2nd Edition, Academy Press, London, (1971).
[35] P. L. Saroj, D. G. Dhandar and R. S. Singh, "Indian Aloe," Central Institute for Arid Horticulture, Bikaner, (2004).
[36] O. I. Baruwa, "Profitabiity and constraints of Pineapple production in Osun state, Nigeria", Journal of Horticultural Research. 21 (2). Pp- 59-64, (2013).
[37] P. Debnath, P. Dey, A. Chanda and T. Bhakta, "A survey on Pineapple and its medicinal value", Scholars Academic Journal of Pharmacy, 1(1): 24-29: pp. 2320-4206, (2012).
[38] P. P. Joy, "Benefits and uses of Pineapple. Pineapple research station, Kerala Agricultural University", Kerala, India, (2010).
[39] F. M. Moniruzzamam, Bangladesh Faler Chach (Fruit cultivation in Bangladesh), Second Edition, Bangla Academy, Dhaka, (1988).
[40] G. G. Dull, the Pineapple: General In: A.C. Hulme (Ed). The Biochemistry of Fruits and their products, Academics Press, New York. Vol. 2. Pp- 303-324, (1971)
[41] www.jilianmichaels. Com
[42] T. A. Waller, R. P. Pelley, F. M. Strickland, "Industrial Processing and quality Control of *Aloe barbadensis* (*Aloe vera*) gel". In: Reynolds (ed.) Aloes: The genus aloe. (RC Press), London, pp- 39-205, (2004).
[43] R. B. Tiwari, "Studies on blending of guava and papaya pulp for RTS beverages", Indian Food Packer 54: pp. 68-72, (2000).