

Development and quality evaluation of unripened mango and *Aloe-vera* RTS (ready to serve) beverage

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SUMMARY :

The present research work was undertaken to develop the technology for development and quality evaluation of unripened mango and *Aloe vera* RTS beverage prepared from unripened mango juice and *Aloe vera* juice and to study the changes in chemical composition and sensory qualities of the RTS with different proportions of juice of unripened mango and *Aloe vera* held at the department of Agricultural Process Engineering, K.K. Wagh College of Agriculture Engineering and Technology. Different treatments were used for the study using different proportion of juice of unripened mango and *Aloe vera* namely T₁, T₂ and T₃. On the basis of sensory score and physio-chemical composition we found that treatment T₃ (60:40) was found best.

KEY WORDS : RTS, Chemical analysis, Sensory evaluation

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Fruits and their value added products plays an important role in human diet because they provide most vital nutrients specially carbohydrates, vitamins, proteins and another micro nutrients for growth of human body and good physical as well as mental health. Normal consumption of fruit reduces the risk like various chronic disease. Blending of fruit juices are practiced to overcome the high cost of some exotic fruit juice seasonal availability balancing of flavours and other sensory components. Nutritional properties can also be improved

by blending various fruit juices. Now-a-day's people prefer beverage which has physiological benefits beside nutrition to reduce the risk of various health problems.

Unripe mango (*Mangifera indica*) :

Known as the "king of fruit." The mango is an antioxidant-rich health booster. Low in calories and high in vitamins and minerals. Mangoes offer many nutrients that boost health. (Shobhana and Rajlaxmi, 2010).

Mango (*Mangifera indica*.) is commonly cultivated

in many tropical and subtropical regions and distributed worldwide. There are over 500 classes of mango varieties; some of them have evolved and have been described throughout the world. The genus of *Mangifera* consists of 69 species and mostly restricted to tropical Asia. The main mango producing countries of the world are India, Pakistan, Mexico, Brazil, Haiti, Philippines and Bangladesh. Mangoes grow widely throughout Bangladesh and are raised mostly as homestead plantations. The soil and climatic conditions of Bangladesh especially northern regions are suitable for mango cultivation (Ara *et al.*, 2014).

Mango fruits are consumed, among other reasons, for their pleasant flavour. They are rich sources of vitamins A, B6 and C. Mango fruits are being increasingly processed into products such as dried mango slices (chips). These products have longer shelf-life and therefore, assure all year round availability of mango in different forms. The stage of ripening of mango fruits influences consumer acceptability. This is because it affects the physico-chemical characteristics of the mango fruit. In order to produce mango juice of acceptable quality, determination of the most appropriate stage of ripening of fruits for juice production should be known. Some physio-chemical changes occurring in fruits were monitored during ripening. The results showed that there were significant increases ($P < 0.05$) in total soluble solids and pH while titratable acidity and vitamin C content declined with ripening. No significant differences were observed between the different stages of ripening in any of the proximate parameters with the exception of the ash content. Juice showed increased levels of ash with ripening. Magnesium levels in juice increased with ripening whereas the levels of phosphorus, potassium, calcium and sodium declined. Sensory evaluation of the juice produced from unripe Keitt mango fruits were more acceptable than half ripe and fully ripe mango fruits. The study showed that unripened mango fruits were better in producing juice of acceptable sensory quality (Shobhna and Rajlaxmi, 2010).

Aloe-vera:

The plant *Aloe vera* is used in Ayurveda, Homoeopathic and Allopathic streams of medicine, and not only tribal community but also most of the people for food and medicine. The plant leaves contains numerous vitamins, minerals, enzymes, amino acids, natural sugars

and other bioactive compounds with emollient, purgative, antimicrobial, anti-inflammatory, antioxidant, aphrodisiac, antifungal, antiseptic and cosmetic values for health care. This plant has potential to cure sunburns, burns and minor cuts and even skin cancer. The external use in cosmetic primarily acts as skin healer and prevents injury of epithelial tissues, cures acne and gives a youthful glow to skin, also acts as extremely powerful laxative

Aloe vera also called as *Aloe barbadensis* is Mill, which belongs to the family Liliaceae. It is a perennial, dearth resisting succulent plant. *Aloe vera* grows everywhere in the world but the *A. barbadensis* Miller and *A. aborescens* are considered to be the most potent ones. It has a well-known history of using in folk medicine for the treatment of skin and other disorders, now the health benefits of *Aloe vera* have been propagated throughout the world. Today, the *Aloe vera* industry is flourishing and the gel is widely used in many products, such as fresh gel, juice and other formulations for health, medical and cosmetic purposes. The decent scientific investigations on *Aloe vera* have gained more attention to detail over the last few decades due to its reputable medicinal, pharmaceutical and functional food properties. Photochemistry of *Aloe vera* gel has revealed that it has more than 200 active substances including vitamins, minerals, enzymes, sugars, anthraquinones of phenolic compounds, lignin, saponins, sterols, amino acids and salicylic acid. Polysaccharides from *Aloe vera* are considered to be the active ingredients for Aloe's anti-inflammation and immune modulation effect.

Health benefit of unripe mango:

Prevents cancer, lowers cholesterol, alkalizes the whole body, anti-inflammatory.

Health benefits of *Aloe vera*:

Aloe helps with digestion, *aloe* helps in detoxification, *aloe* alkalizes the body, cardiovascular health, *aloe* helps boost the immune system, *aloe vera* is great for the skin, weight loss – a secondary effect.

Innovativeness of product:

Now-days wide range of RTS drink are available. To avoid a dangerous health disease, consumption of healthy and nutritious food is necessary. As a source of minerals, vitamins, antioxidants and bioactive compounds

in the root extract was used in preparation of RTS drink. *Aloe vera* is rich source of fibre and antioxidant which is usually less consumed by people although having several health benefits. Blending these compounds together has not only improved its taste acceptability but also increased its nutritional value. This energy drink has increased the overall utilization of *Aloe-vera* in the market along with providing several health benefits.

Objectives:

In light of the above points following objectives were decided for the research study.

- To prepare RTS beverage from unripened mango and *Aloe vera*.
- To evaluate chemical and sensory properties of mango and *Aloe vera* RTS.

EXPERIMENTAL METHODS

The experimental study was carried out in the laboratories of Food Science and Technology, K.K. Wagh College of Food Technology and Agricultural Process Engineering K.K. Wagh College of Agriculture Engineering and Technology, Nashik. The methodology adopted has been described below:

Raw material :

Unripened mango, *Aloe vera*, sugar.

Equipments used:

Knife, plate, vessel, bowl, mixing spoon, weighing balance, measuring cylinder, gas, refractometer, mixer, muslin cloth, thermometer, pH meter.

Preparation of mixed fruit juice:

After obtaining mango and *Aloe vera* pulp it was ground in grinder separately for preparing mango and *Aloe vera* juice, respectively. Both the juices were then strained using muslin cloth to get fresh mango as well as *Aloe vera* juices, respectively.

Sample	Unripened mango juice (ml)	<i>Aloe-vera</i> juice (ml)	Sugar (g)	Water (ml)
T ₁	80	20	110	900
T ₂	70	30	120	900
T ₃	60	40	140	900

Sr. No.	Ingredients	Quantity
1.	Unripened mango juice	60 ml
2.	<i>Aloe-vera</i> juice	40 ml
3.	Sugar	140 g
4.	Water	900 ml

Formulation:

Physico-chemical analysis:

Determination of pH:

pH is defined as the logarithm of the reciprocal of hydrogen ion concentration in grams per litre of the samples. The pH values were determined with the help of an electronic pH meter (Thermo Scientific, 2 stars).

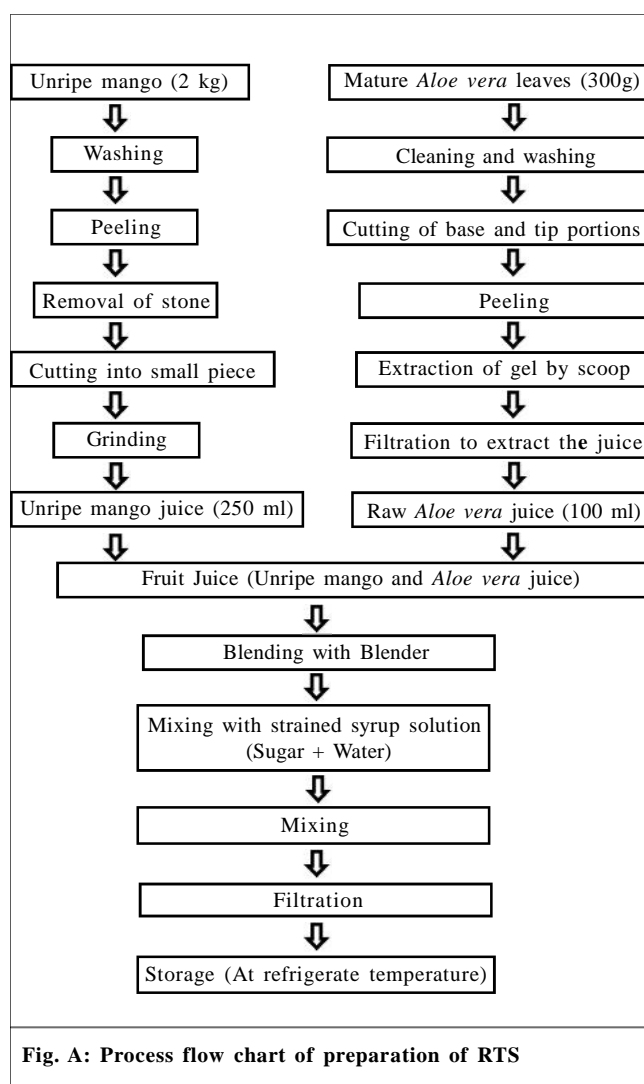


Fig. A: Process flow chart of preparation of RTS

Determination of acidity:

$$\text{Total acidity (\%)} = \frac{\text{Titre value} \times \text{N. of NaOH} \times \text{Eq. Wt. of citric acid} \times 100}{\text{Volume of aliquot taken for estimation} \times \text{Weight of sample} \times 1000}$$

Determination of total soluble solids :

TSS measurement was done using a hand Refractometer (ERMA INC., Tokyo, Japan) (1 to 30 °Brix) and value was expressed in °Brix.

Sensory evaluation:

The samples of RTS beverage prepared from unripened mango and *Aloe-vera* were evaluated by a six untrained panelists, who evaluated the product for appearance, colour, texture, flavour and overall acceptability (Krokida *et al.*, 1999). This panel was selected randomly on the basis of gender and age and was briefly acquainted with the sensory characteristics that were to be judged and also with the available scales according to which the samples were to be rated. The panel members were requested to assemble at one place prior to evaluation as the samples were required to be judged immediately when opened. Each member was provided with the sensory evaluation rating scales based on which the rating was given to various samples. The average values of the rating given by all the members were then calculated and used for further analysis.

The sensory evaluation scale for rating the sensory quality of composite flour biscuit was developed on the basis of four main parameters *i.e.* colour, flavour, texture and appearance and these quality characteristics of the samples were examined by using the rating scales. The flavour was rated by smelling the sample. The texture was rated by checking hardness and softness of the

surface of biscuit sample. The samples scoring an overall quality of 7 or above were only considered and those receiving 6 or below were considered unacceptable.

EXPERIMENTAL FINDINGS AND ANALYSIS

This chapter includes the results of physico-chemical composition of the composite flour biscuits.

Physico-chemical properties of biscuits:

The physico-chemical properties of wheat flour, green gram flour and maize flour biscuits were determined in the Department of Agricultural Process Engineering and Technology.

Chemical properties of RTS:

The chemical properties of RTS prepared from unripened mango and *Aloe-vera* determined in department of Soil Science and Agriculture Chemistry Lab.

Chemical composition of RTS beverage:

Table 1 shows the chemical properties of RTS, from table it can be seen that TSS, Acidity, pH content of RTS varied from 10.5 to 11 °Brix, 0.10 to 0.12 per cent and 2.90 to 2.80 for 1000 ml, respectively. The highest TSS was found in treatment T₁ whereas lower TSS was found in treatment T₂ and T₃ as compared to treatment T₁ from Table 1, it can also be seen that the lower acidity was found in treatment T₃ as compared to treatment 1 and 2. The higher pH was found in treatment T₃ and treatment T₁ and T₂ having lower pH (Chauhan *et al.*, 2012; Sasikumar, 2015 and Sasikumar and Vivek, 2015).

Sensory evolution of RTS beverage:

The data on sensory evolution of RTS beverage are

Table 1: Chemical composition of RTS

Sample	TSS (°Brix)	Acidity (%)	pH
T ₁	11	0.12	2.80
T ₂	10	0.11	2.85
T ₃	10.5	0.10	2.90

Table 2: Sensory evaluation of RTS beverage

Sample	Colour	Flavour	Taste	Overall cceptability
T ₁	7.5	7.5	7.8	7.6
T ₂	7.7	7.7	7.6	7.7
T ₃	7.8	7.6	8.0	7.8

presented in Table 2.

For the treatment T₁, the average mean score for colour, flavour, taste and overall acceptability was 7.5, 7.5, 7.8 and 7.6, respectively. For treatment T₂, the average mean score for the colour, flavour, taste and overall acceptability was 7.7, 7.6, 7.6 and 7.7, respectively. For treatment T₃, the average mean score for the colour, flavour, taste and overall acceptability was 7.8, 7.6, 8.0 and 7.8, respectively (Boghani *et al.*, 2012; Gopakumar and Kavita, 2014; Kausar *et al.*, 2016 and Sharma *et al.*, 2015).

The study was carried out on the development and evaluation of Unripe Mango *Aloe vera* RTS by using different proportion of Unripe Mango, *Aloe vera* juice. The summary was based on physio-chemical analysis of Unripe Mango *Aloe vera* RTS done at laboratory in the “Dept. of Agricultural Process Engineering, K.K. Wagh college of Agriculture Engineering and Technology, Nashik. Study was conducted of Unripe Mango *aloe vera* RTS with sugar syrup, for their physio-chemical. Unripe Mango juice was blended with *Aloe vera* in different proportion.

T ₁	80:20	Unripe mango juice : <i>Aloe vera</i>
T ₂	70:30	Unripe mango juice : <i>Aloe vera</i>
T ₃	60:40	Unripe mango juice : <i>Aloe vera</i>

Unripe Mango *Aloe vera* RTS was prepared by using water and sugar and fruit juice. And organoleptic evaluation of prepared products was carried out by hedonic scale rating.

Conclusion:

From above study it can be concluded that treatment T₃ was prepared with combination of unripe mango (60%) and *Aloe vera* (40%) was the best.

The RTS prepared by Unripe Mango and *Aloe vera* which consisted 3 samples, among which sample T₃ was concluded to be the best sample among the all proximate

composition revealed that sample T₃ contains (10.5°Brix) TSS and (0.10%) acidity, (2.90) pH. Sample T₃ contained about 60 ml of mango, 40 ml of *Aloe vera*, 900 ml of water and 140 g of sugar.

LITERATURE CITED

- Ara, R., Motalab, M., Uddin, M. N., Fakhruddin, A. N. M. and Saha, B. K. (2014).** Nutritional evaluation of different mango varieties available in Bangladesh. *Internat. Food Res. J.*, **21** (6): 2169-2174.
- Boghani, A.H., Raheem, A. and Hashmi, S.I. (2012).** Development and storage studies of blended papaya-*Aloe vera* ready to serve (RTS) beverage; *Food Process & Technol.*, **3** (10): 1-5.
- Chauhan, D.K., Puranik, V. and Rai, G. K. (2012).** Development of functional herbal RTS beverage; *Open Access Scientif. Reports*, **1**(12): 1-5.
- Gopakumar, A.S. and Kavita, M.S. (2014).** Processing and preservation qualities of value added products based on Garciniacambogia (*Malabar tamarind*). *IOSR J. Environ. Sci. Toxicol. & Food Technol.*, **8** (1) : 01-09.
- Kausar, H., Parveen, S., Saeed, S., Ishfaq, B. and Ali, M.A. (2016).** Development and standardization of ready to serve *Aloe vera* lemon functional drink, *J. Environ. Sci. Toxicol. & Food Technol.*, **10** (4): 47-52.
- Sasikumar, R. (2015).** Preparation of therapeutic RTS beverage from *Aloe vera* gel and aonla fruit juice and evaluation of storage stability; *Asian J. Dairy & Food Res.*, **3** (2): 151-155.
- Sasikumar, R. and Vivek, K. (2015).** Process development of therapeutic RTS beverage from blend of *Aloe vera* and pine apple, *J. Agric. Technol.*, **2** (1&2): 7-12.
- Sharma, R., Tandon, D., Joshi, V.K. and Attri, S. (2015).** Development and evaluation of different beverages from *Aloe-vera* (L.) Burm.f. for their nutritional, functional and sensory qualities; *Indian J. Nat. Prod. & Resour.*, **6** (4): 278-282.
- Shobana, V. and Rajalakshmi, K. (2010).** Quantitative analysis of primary metabolites in *Mangifera indica* (Unripem mango). *Rasayan J. Chem.*, **3** (3): 597-599.

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