

# “Development of Fruit Juice Blended Carbonated Beverages”

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## ABSTRACT:

The food industry is now facing increasing pressure to ensure that their company's activities are environmentally sensitive, but there is also increased internal pressure to maintain or increase profitability in the face of fierce competition. The food-processing industry has special concerns about the health and safety of the consumer. The carbonation process is cheap and safe and apparently does not have any negative effects on cultured dairy products (Fairbairn and Law, 1986). Different methods can be used to add carbon dioxide to a product, such as the addition of carbonated water, production of a liquid drinkable yogurt by a commercial carbonation process, and the addition of metal carbonates. There are particular problems in the manufacture of non-carbonated RTD beverages that are not aseptically packed. These relate to microbial contamination. Products that have no carbon dioxide in their head space are particularly vulnerable to contamination by moulds and certain types of bacterial infection. A secondary advantage of introducing carbon dioxide under pressure to sweetened yogurt beverages is their expanded shelf-life. Carbonated fruit based beverage is a new concept which provides nutritional elements of the fruit along with natural pigments and flavour in addition to carbonation effects.

**Keywords:** Carbonation, Yoghurt, Papaya, Fermentation, Beverage, Nutritional value.

## INTRODUCTION

Fermented milk products have been well recognized to have therapeutic, anticholesterolemic, anticarcinogenic properties which is superior over non fermented dairy products in term of nutritional & health attributes due to several beneficial micro flora. (Gardiner et.al; 2002). Carbonated soft drinks are known for their thirst quenching and refreshing properties. Yoghurt is a product of the lactic acid fermentation of milk by addition of a starter culture containing *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus* [Mckinley M. C. (2005)] also its major food constituents are predigested due to fermentation process. Yoghurt gels are formed by the fermentation of milk with thermophilic starter bacteria; milk is normally heated at high temperatures (e.g. 85°C for 30 min), which causes the denaturation of whey proteins. The carbonation process is cheap and safe and apparently does not have any negative effects on cultured dairy products (Fairbairn and Law, 1986). Gas flushing (carbon dioxide or nitrogen) is a viable alternate method to extend the shelf life of fruit-flavored yogurt. This process particularly inhibits the growth of yeast and molds in yogurt. Papaya can be eaten as a fruit, a smoothie or even a milkshake. Papaya contains natural fiber, carotene, vitamin C and essential minerals. Papayas also contain enzymes like arginine and carpain. Arginine is essential for male fertility and carpain is considered to be good for the heart. Papaya is a fruit high in fiber which lowers cholesterol levels. Also it contains antioxidants which prevent the cholesterol from oxidizing. When cholesterol in the body gets oxidized, it can lead to heart-attacks. The anti-oxidants in papaya also help

in controlling premature ageing, which helps to give a young look.

**Table 1: Nutritional Values of 100g of Papaya Fruit**

Sr. No	Constituents	Ripe papaya	Green papaya
1)	Protein	0.6g	0.7g
2)	Fat	0.1g	0.3g
3)	Minerals	0.5g	0.5g
4)	Fibre	0.8g	0.9g
5)	Carbohydrates	7.2g	5.7g
6)	Energy	32kcal	27kcal
7)	Total carotene	2740 µm	0
8)	Beta carotene	888µm	0

## MATERIALS AND METHODOLOGY

### Procedure for Studies on Development of fruit flavored carbonated yoghurt.

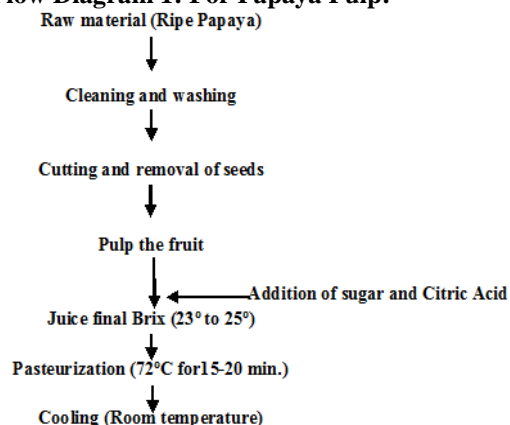
All the raw material required for projects are obtained from the local market during investigation.

#### 1. Preparation of Beverage-

Yoghurt was prepared by method described by Farinde, and Obatolu (African Journal of Biotechnology, Vol.7, 2008).

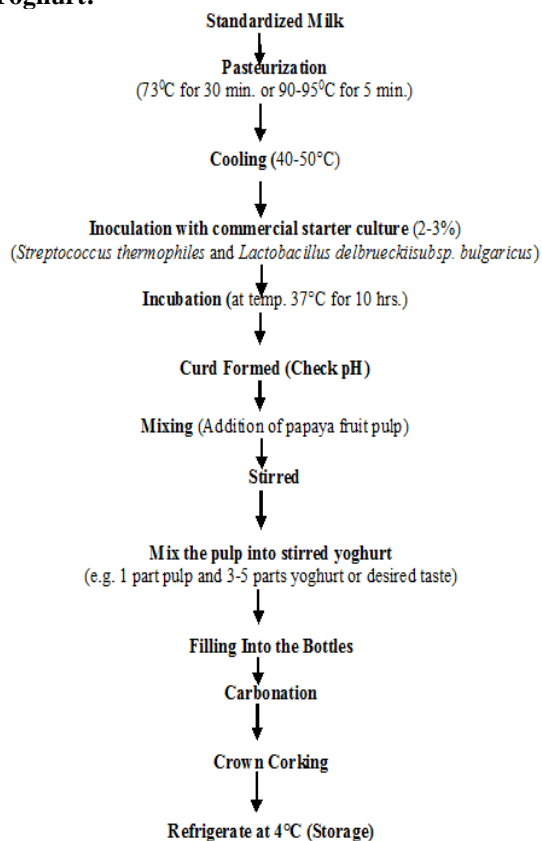
## 2. Procedure For Papaya Pulp

### Flow Diagram 1: For Papaya Pulp:



Raw material was obtained from local market, basic operation was done by manually like cleaning and washing of fruits then cut the fruit with help of knife and remove the seeds from fruit. Then cut into pieces and with help of pulper pulp will be collected in stainless steel pot. The pulp was pasteurised in stainless steel steam jacketed kettle and pulp was collected in stainless steel pot for further use and stored at 4°C temperature.

### Flow Diagram 2: Papaya Fruit pulp Carbonated Yoghurt:



## Chemical Analysis:

### Methods for Chemical Analysis of yoghurt-

- Determination of Fat:** The fat was determined by Gerber's method described in BIS 10500 (1991). The butyrometer were placed in the centrifuge machine & was revolved at a speed of 1100 rpm for 5 min. After centrifugation butyrometer was taken out in upright position with stopper end downward. The fat column which appeared clear, yellowish liquid in the upper portion, fat level adjusted with key & reading was noted.
- Determination of Protein:** The Protein was determined by adopting standard procedure of Ranganna (1991) by using Micro Kjeldhal method. A standard procedure recommended is Micro Kjeldhal method by which protein content of given sample was determined. The percent nitrogen was calculated & protein was quantified in the sample by multiplying with factor 6.25.

#### Protein

$$= \frac{(Sample - Blank) \times N \text{ of HCl} \times 0.04 \times 25 \times 100}{Aliquot \text{ taken} \times \text{wt. of sample (gm) for digestion}}$$

- Determination of Carbohydrates:** The Carbohydrates were determined by adopting standard procedure of ISI: 1981. The Carbohydrate contents of samples were determined by difference i.e. by subtracting the sum of percent value of moisture, protein, fat, & ash from 100.
- Determination of Total Solid:** The Total Solid was determined as per procedure given in (PFA 1954 & BIS 1991).

$$\% \text{ Total Solid} = \frac{C - A}{B - A} \times 100$$

- wt. of metal dish + lid
- wt. of metal dish + lid + sample before heating
- wt. of metal dish + lid + sample after heating

- Determination of Ash:** The sample ignited to burn off all organic matter in the sample. The inorganic material, which does not volatilize at that temperature, is ash that is gravimetrically determined (Association of Official Analytical Chemists 1984).

$$\text{Moisture (\%)} = \frac{(W2 - W3)}{(W2 - W1)} \times 100$$

Where,

W1 - Mass of dish

W2 - Mass of dish + sample

W3 - Mass of dish + after drying to constant mass and cooling

- Determination of pH:** The pH of the sample was measured by using digital pH meter. Firstly the pH meter was standardized at 25°C by using standard buffer solution. The pH of the sample was observed on the dial and recorded.
- Acceptability of Yoghurt:** The extent of acceptability of Yoghurt was judged by sensory or organoleptic evaluation using 9-point Hedonic Scale as described by Gupta (1999). The acceptability statement & marking scheme used were as follows.

**Table 2: The acceptability statement & marking scheme**

Score	Reaction
9	Like extremely
8	Like very much
7	Like moderately
6	Like slightly
5	Neither like nor dislike
4	Dislike slightly
3	Dislike moderately
2	Dislike very much
1	Dislike extremely

**RESULT AND DISCUSSION**

**Standardization of Process for Fruit Pulp**

The best combination for the final product which prepared in the work and commercialization and for industrial used as well (may vary with the variety of fruit). The best combination for the final product which prepared in the work and commercialization and for industrial used as well (Table3).

**Table 3: Standardization of Process for Fruit Pulp**

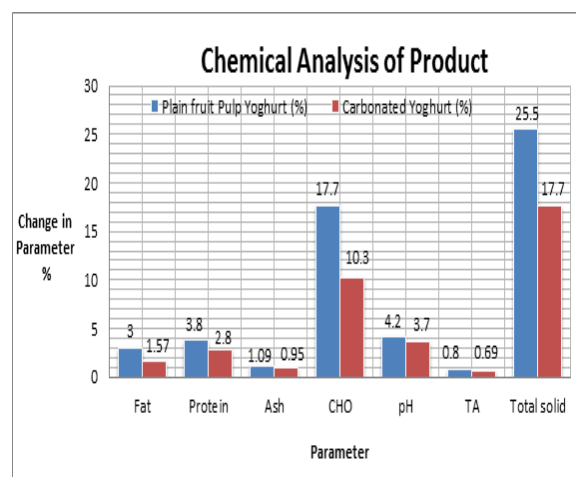
Sr. No	Parameter	Papaya pulp
1)	TSS (° Brix)	11
2)	pH	4.5
3)	Acidity	2.20
4)	Moisture	80%

**Chemical Analysis of Product:**

**Table 4. Chemical analysis of product**

Sr. No	Parameter	Plain fruit Pulp Yoghurt (%)	Carbonated Yoghurt (%)
1)	Fat	3.0	1.57
2)	Protein	3.8	2.80
3)	Ash	1.09	0.95
4)	Carbohydrate	17.7	10.30
5)	pH	4.2	3.7
6)	Treatable Acidity	0.80	0.69
7)	Total solid	25.5	17.7

Chemical Composition of Non-Carbonated and Carbonated by using Papaya fruit pulp were studied as T0 & T1 resp. And Presented in Table no.4, Fat content for treatment T0 & T1 were 3.00% & 1.57% resp. , Protein content for treatment T0 & T1 were 3.80% & 2.80% resp., Ash content for treatment T0&T1 were 1.09% & 0.95% resp. Carbohydrate content for treatment T0 & T1 were 17.7% & 10.30% resp. , pH content for treatment T0 & T1 were 4.2 & 3.7 resp., Tritable Acidity content for treatment T0 & T1 were 0.80% & 0.69% resp. , Total Solid content for treatment T0&T1 were 25.5% & 17.7% respectively.



**Figure 1: Chemical Analysis of Product**

The Figure-2 had shown the difference between plain fruit pulp yoghurt and carbonated yoghurt in percent. It was observed that the difference in treatment T0 and T1 for every parameter. For fat the difference is 1.43%, protein content difference is 1%, Ash content for difference is 0.14%. Carbohydrate content for 7.4%, pH content for 0.50, Treatable Acidity content difference is 0.11%, Total Solid content difference is 7.8%. From chart we can conclude there is no big difference between plain fruit pulp yoghurt and carbonated yoghurt in percent. We can consider as safe for consumption.

**Table 5: Sensory evaluation score for fruit flavored carbonated yoghurt.**

Samples	Colour and appearance	Flavour	Taste	Consistency	Overall Acceptability
T0	7	6	7	7	7
T1	8	7	7.5	6	8

T0 - Preparation of yoghurt incorporated with papaya pulp was Non-Carbonated.

T1 - Preparation of yoghurt incorporated with papaya pulp was carbonated.

The overall acceptability of T1 is 8. Also as the storage time increase the taste and flavor is increasing.

## CONCLUSION

Carbonation apparently enhances the organoleptic qualities through its effect on mouthfeel, described as tingling, which imposes a refreshing quality. A secondary advantage of introducing carbon dioxide under pressure to sweetened yogurt beverages is their expanded shelf-life. It was observed that in chemical analysis the pH and Total acidity is decrease at the time of storage. The delicious papaya fruit has nutritional values that make it potent as a raw material in the food processing industry beyond mere raw consumption. The use of papaya extends beyond just as a raw material in the food and pharmaceutical industry; as study shown in table no.4 and Figure-3 make clear that chemical parameter difference is not much between plain fruit pulp yoghurt and carbonated yoghurt in percent. We can consider as safe for consumption. It has further potential applications and uses yet to be fully explored, derived and understood. Carbonated fruit based beverage is a new concept which provides nutritional elements of the fruit along with natural pigments and flavors in addition to carbonation effects.

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