



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2022; 11(11): 1708-1713  
© 2022 TPI

[www.thepharmajournal.com](http://www.thepharmajournal.com)

Received: 19-09-2022

Accepted: 22-10-2022

#### Ansari Altamash

M.Sc. (Food Technology)  
Student, Sam Higginbottom  
University of Agriculture,  
Technology and Sciences, Rewa  
Road, Naini, Allahabad,  
Uttar Pradesh, India

#### ER Shanta Peter

Assistant Professor,  
Sam Higginbottom University of  
Agriculture, Technology and  
Sciences, Rewa Road, Naini,  
Allahabad, Uttar Pradesh, India

#### Himani Nautiyal

M.Sc. (Food Technology)  
Student, Sam Higginbottom  
University of Agriculture,  
Technology and Sciences, Rewa  
Road, Naini, Allahabad,  
Uttar Pradesh, India

#### Corresponding Author:

##### Ansari Altamash

M.Sc. (Food Technology)  
Student, Sam Higginbottom  
University of Agriculture,  
Technology and Sciences, Rewa  
Road, Naini, Allahabad,  
Uttar Pradesh, India

## Studies on the preparation of gummy candy from a blend of pineapple and beetroot juice

Ansari Altamash, Er. Shanta Peter and Himani Nautiyal

### Abstract

Nowadays, the functionalization of food products using natural health-promoting ingredients is of great interest. The consumption of gummy candy is widespread among people of different ages but mainly by children. The formulation of this product requires sugar that contributes to their flavour and consistency. The purpose of this study was to develop gummy candy by using pineapple and beetroot juice. This nutrient rich gummy candy with functional properties will provide consumers with unlimited nutrient advantages and high beta-carotene. For treatment T<sub>1</sub>, gummy candy was standardized to 95% pineapple juice, beetroot juice 5%, agar-agar 5% and sugar 30%, and treatment T<sub>2</sub> was standardized to 90% pineapple juice, beetroot juice 10%, and treatment T<sub>3</sub> was standardized to 85% pineapple juice, beetroot juice 15%, and for control gummy candy was standardized to 100% pineapple juice, whereas the concentration of agar- agar and sugar was kept constant throughout the treatments. The physico-chemical analysis for prepared gummy candy samples from different treatments and control was performed as: beta- carotene, protein, fat, acidity, ascorbic acid, ash, carbohydrate, moisture and reducing sugar for estimating its nutritional content. Also, organoleptic characteristic like (colour & appearance, body & texture, flavour & taste, and overall acceptability) was scrutinized by trained panellist using 9-points Hedonic Scale. The treatment T<sub>2</sub> containing 10% beetroot juice scored the highest acceptability. Microbiological analysis was carried out to assess the shelf- life of the treatments which was checked via, SPC (Standard Plate count) and Coli form test. All treatments were replicated three times and the data obtained during investigation were statistically analyzed by using analysis of variance (ANOVA) and critical difference (C.D.) techniques.

**Keywords:** Gummy candy, pineapple juice, carrot juice, agar-agar and sugar

### Introduction

Gummy candy is a unique candy composed of agar-agar or gelatine, flavourings, colourings, sweeteners (corn syrup, sucrose) and water. Food acid such as citric acid and malic acid are also added in order to give a tart flavour to gummies. Because of its nature it can be moulded into literally thousands of shapes, making it one of the most versatile confection products ever. First developed in Germany in the early 1900s, by a man named Hans Riegel. Traxel (1993)<sup>[7]</sup> Pineapple (*Ananus comosus*, *Bromeliaceae*) is a wonderful tropical fruit having exceptional juiciness, vibrant tropical flavour and immense health benefits. Pineapple contains considerable amount of calcium, potassium, and vitamin C. It is low in fat and cholesterol. It is also a good source of vitamin B1, vitamin B6, copper and dietary fibre. Pineapple is a digestive aid and a natural Anti-Inflammatory fruit. A group of sulphur-containing proteolytic (protein digesting) enzymes (bromelain) in pineapple aid digestion. Joy (2010)<sup>[4]</sup> Crushed pineapple is used in yogurt, jam, sweets, and ice cream. The juice of the pineapple is served as a beverage, and it is also the main ingredient in cocktails such as the piña colada. Vergara *et al.*, (1999)<sup>[9]</sup>.

### Health benefits of pineapple

- Prevents free radical damage: Pineapple are a rich source of antioxidants. They fight against free radicals in the body, preventing cell damage. These antioxidants help protect you from diseases like heart diseases, arthritis, various cancers etc.
- Strong bones: Rich amount of manganese present in pineapples helps in strengthening bones and connective tissues. A cup of pineapple juice gives roughly 73% of the required manganese for a day.
- Healthy gums: Eating pineapple benefits in strengthening gums, keeps teeth healthy and strong.
- Thwarts off cold: pineapples are abundant in vitamin C and bromelain, which fights against microbial infections. Eating pineapples with the prescribed medicines can help cure cold and cough effectively. Achumi *et. al.*, (2018)<sup>[1]</sup>.

**Table 1:** Nutritional Value of Pineapple per 100 g

Pineapple	
Water	86 g
Energy	50 kcal
Protein	0.54 g
Total lipid (fat)	0.12 g
Total dietary fibre	1.4 g
Carbohydrate	13.12 g
Calcium (Ca)	13 mg
Iron (Fe)	0.29 mg
Magnesium (Mg)	12 mg
Phosphorus (P)	8 mg
Potassium (K)	109 mg
Sodium (Na)	1 mg
Zinc (Zn)	0.12 mg
Copper (Cu)	0.11 mg
Vitamin C (ascorbic acid)	47.8 mg
Thiamine	0.079 mg
Riboflavin	0.032 mg
Niacin	0.5 mg
Pantothenic acid	0.213 mg
Vitamin B-6	0.112 mg
Folate	18 µg
β – Carotene	35 µg

Source: USDA, Nutritive value of food

Beetroot (*Beta vulgaris* L.) is a crop belonging to the *Chenopodiaceous* family having, bright crimson colour. Kumar (2015)<sup>[6]</sup> It is famous for its juice value and medicinal properties; and known by several common names like beet, chard, spinach beet, sea beet, garden beet, white beet and Chukander (in Hindi). Beetroots for processing and fresh markets are harvested mainly in September and October. Beetroot has been acclaimed for its health benefits, in particular for its disease fighting antioxidant potential, significant amount of vitamin C, and vitamins B1, riboflavin, niacin, B6, and B12 whereas the leaves are an excellent source of vitamin A. it's an excellent source of folic acid and a very good source of fiber & potassium Dobhal, *et al.*, (2019)<sup>[2]</sup> Betanin, obtained from the roots, is used industrially as red food colorant, to improve the colour and flavour of tomato paste, sauces, desserts, jams and jellies, ice cream, candy, and breakfast cereals, among other applications. Grubben, *et al.*, (2004)<sup>[3]</sup> Beetroot is a good tonic food for health and also revealed significant tumour inhibitory effects in skin and lung cancer Kapadia *et al.*, (1996)<sup>[5]</sup>.

### Health Benefits of Beet Root

Beets have many helpful plant compounds that reduce inflammation and protect cells from damage. Some of the other health benefits of beetroot include:

- **Increase Stamina:** Beetroot and its juice help heart and lungs work better during exercise. Nitric oxide from beets increases blood flow to muscles. Some athletes eat beetroot or drink beet juice when exercising to improve performance.
- **Prevent Heart Disease and Stroke:** Beets are rich in folate (vitamin B9) which helps cells grow and function. Folate plays a key role in controlling damage to blood vessels, which can reduce the risk of heart disease and stroke.
- **Lower Blood Pressure:** Beets are naturally high in nitrates, which are turned into nitric oxide in the body.

This compound lowers blood pressure by causing the blood vessels to relax and widen.

- **Boost Immune System:** Beets are high in fiber and promote the growth of good bacteria in gut. Having plenty of healthy bacteria in digestive system helps in fighting disease and boost immune system. Fiber improves digestion and reduces the risk of constipation. Usman *et al.*, (2015)<sup>[8]</sup>.

**Table 2:** Nutritional Value of Beetroot per 100g

Beetroot	
Water	87.58 g
Energy	43 kcal
Protein	1.61 g
Total lipid (fat)	0.17 g
Carbohydrate	9.56 g
Fibre total dietary	2.8 g
Calcium (Ca)	16 mg
Iron (Fe)	0.8 mg
Magnesium (Mg)	23 mg
Phosphorus (P)	40 mg
Potassium (K)	325 mg
Sodium (Na)	78 mg
Vitamin C	4.9 mg
Vitamin B1, thiamine	0.31 mg
Vitamin B2, riboflavin	0.04 mg
Vitamin B3, niacin	0.334 mg
Vitamin B5 pantothenic acid	0.155 mg
Vitamin B6	0.067 mg
Folate	109 µg
Betaine	128.7 mg
Vitamin A	2 µg
B- Carotene	20 µg

Source: USDA, Nutritive value of food

### Materials and Methods

The experiment "Studies on The Preparation of Gummy Candy from A Blend of Pineapple and Beetroot Juice" was carried out in research lab, Warner College of Dairy Technology, Sam Higginbottom University of Agriculture, and Technology & Science, Prayagraj (U.P.). The control and experimental gummy candy samples were tested and statistically analyzed.

### Plan of Work

#### Treatment Table

T<sub>0</sub>: Control prepared from pineapple juice, agar-agar & sugar. (100:05:30)

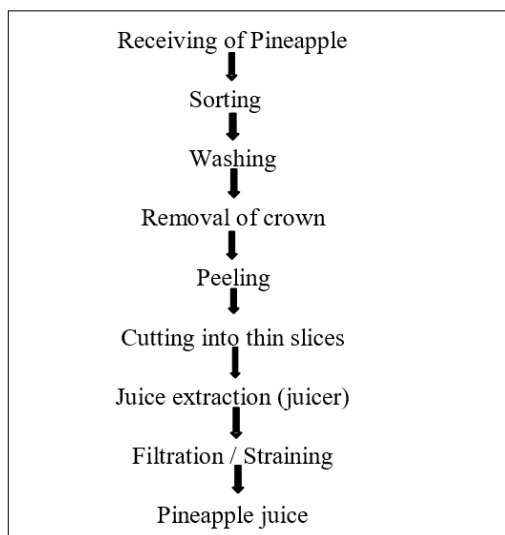
T<sub>1</sub>: Experimental sample prepared from pineapple juice, beet root juice, agar-agar & sugar. (95:05:05:30)

T<sub>2</sub>: Experimental sample prepared from pineapple juice, beet root juice, agar-agar & sugar (90:10:05:30)

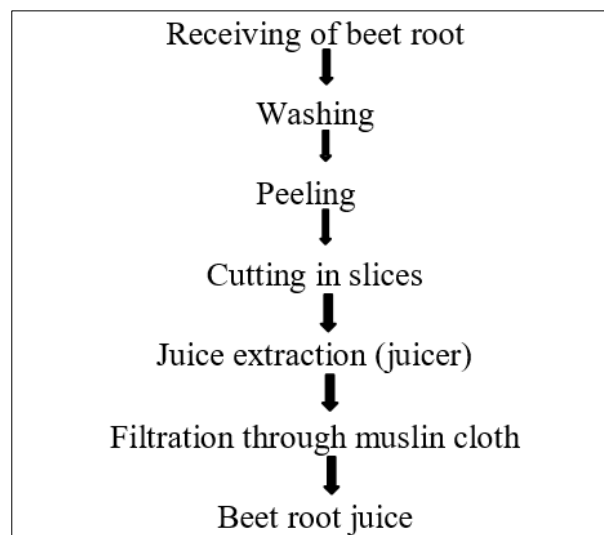
T<sub>3</sub>: Experimental sample prepared from pineapple juice, beet root juice, agar-agar & sugar (85:15:05:30)

**Table 3:** Treatment combination for control and experimental gummy candy

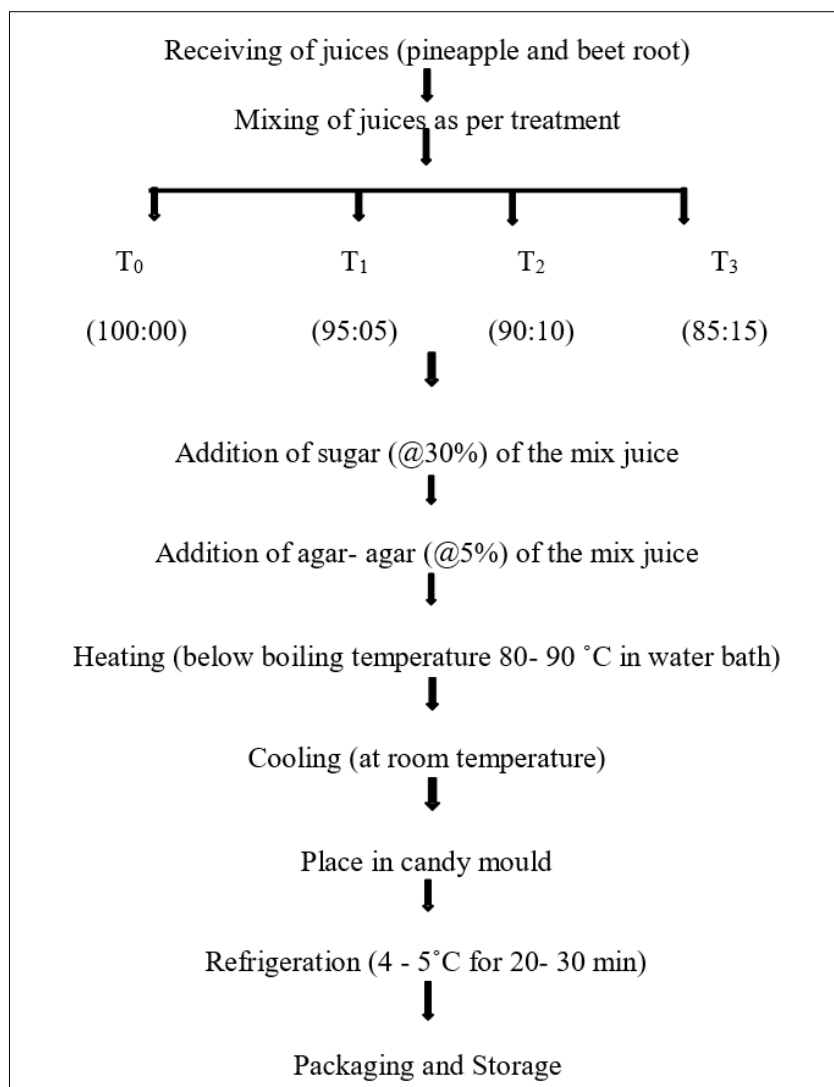
Treatment	Pineapple	Beet Root	Agar-Agar	Sugar
T <sub>0</sub>	100	-	05	30
T <sub>1</sub>	95	05	05	30
T <sub>2</sub>	90	10	05	30
T <sub>3</sub>	85	15	05	30



**Fig 1:** Method of Preparation of Pineapple Juice



**Fig 2:** Method of Preparation of Beetroot Juice

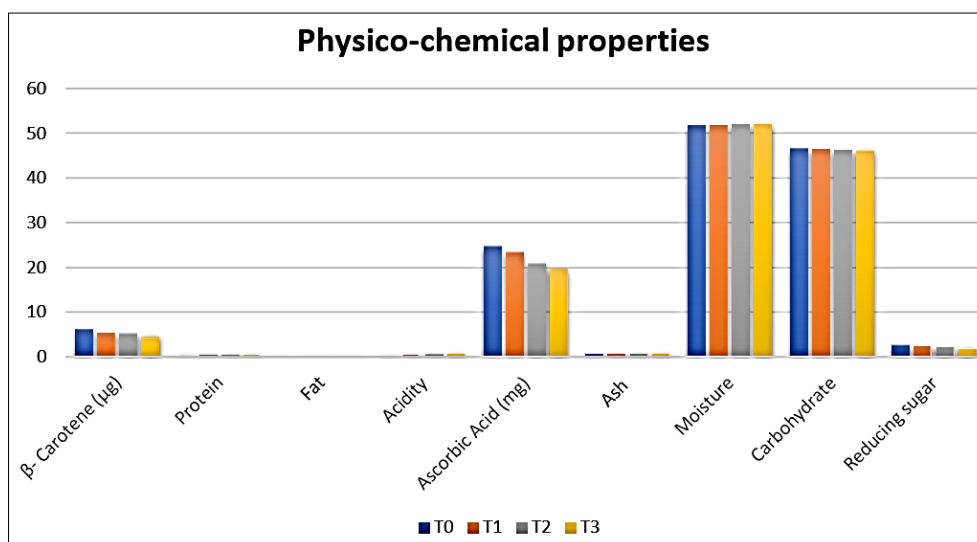


**Fig 3:** Flow Diagram for the preparation of Candy from Pineapple and Beet Root Juice

## Result and Discussion

**Table 4:** The different parameters of control and experimental gummy candy

Parameter	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
<b>Physico- Chemical Analysis (in per cent)</b>				
β- Carotene (µg)	6.46	5.50	5.42	4.86
Protein	0.45	0.49	0.50	0.55
Fat	0.07	0.09	0.10	0.11
Acidity	0.40	0.59	0.71	0.76
Ascorbic Acid (mg)	24.89	23.63	21.15	19.81
Ash	0.73	0.75	0.77	0.78
Moisture	51.88	51.99	52.13	52.23
Carbohydrate	46.87	46.68	46.50	46.33
Reducing sugar	2.91	2.59	2.29	2.14
<b>Organoleptic Scores (9 Point Hedonic Scale)</b>				
Colour & Appearance	7.2	7.4	7.8	7.6
Body & Texture	7.1	7.2	7.4	7.3
Flavour & Taste	7.3	7.4	8.1	8.0
Overall Acceptability	7.2	7.3	7.8	7.6
<b>Microbiological Analysis</b>				
SPC (×103 cfu/g)	156.00	99.66	96.00	81.66
Coliform (x103 cfu/g)	Nil	Nil	Nil	Nil
<b>Cost of Ingredients</b>				
Gummy Candy (in rupees/100 g)	36.32	36.82	37.32	37.82



**Fig 4:** Physico- Chemical Characteristics of Gummy Candy.

### Beta Carotene (µg)

The highest mean value for beta carotene content was recorded in the Gummy candy sample was significantly viable as T<sub>0</sub> (6.46) followed by T<sub>1</sub> (5.50), T<sub>2</sub> (5.42) and T<sub>3</sub> (4.86).

### Protein

The highest mean value for protein percentage was recorded in the Gummy candy sample was significantly viable as T<sub>3</sub> (0.55) followed by T<sub>2</sub> (0.50), T<sub>1</sub> (0.49) and T<sub>0</sub> (0.45).

### Fat

The highest mean value for fat percentage was recorded in the Gummy candy sample was significantly viable as T<sub>3</sub> (0.11) followed by T<sub>2</sub> (0.10), T<sub>1</sub> (0.09) and T<sub>0</sub> (0.07).

### Acidity

The highest mean value for acidity percentage was recorded in the Gummy candy sample was significantly viable as T<sub>3</sub>

(0.76) followed by T<sub>2</sub> (0.71), T<sub>1</sub> (0.59) and T<sub>0</sub> (0.40).

### Ascorbic acid (mg)

The highest mean value for ascorbic acid content was recorded in the Gummy candy sample was significantly viable as T<sub>0</sub> (24.89) followed by T<sub>1</sub> (23.63), T<sub>2</sub> (21.15) and T<sub>3</sub> (19.81).

### Ash

The highest mean value for ash percentage was recorded in the Gummy candy sample was significantly viable as T<sub>3</sub> (0.78) followed by T<sub>2</sub> (0.77), T<sub>1</sub> (0.75) and T<sub>0</sub> (0.73).

### Moisture content

The highest mean value for moisture content was recorded in the Gummy candy sample was significantly viable as T<sub>3</sub> (52.23) followed by T<sub>2</sub> (52.13), T<sub>1</sub> (51.99) and T<sub>0</sub> (51.88).

### Carbohydrate

The highest mean value for carbohydrate percentage was recorded in the Gummy candy sample was significantly viable as T<sub>0</sub> (46.87) followed by T<sub>1</sub> (46.68), T<sub>2</sub> (46.50) and T<sub>3</sub> (46.33).

### Reducing Sugar

The highest mean value for reducing sugar percentage was recorded in the Gummy candy sample was significantly viable as T<sub>0</sub> (2.91) followed by T<sub>1</sub> (2.59), T<sub>2</sub> (2.29) and T<sub>3</sub> (2.14).

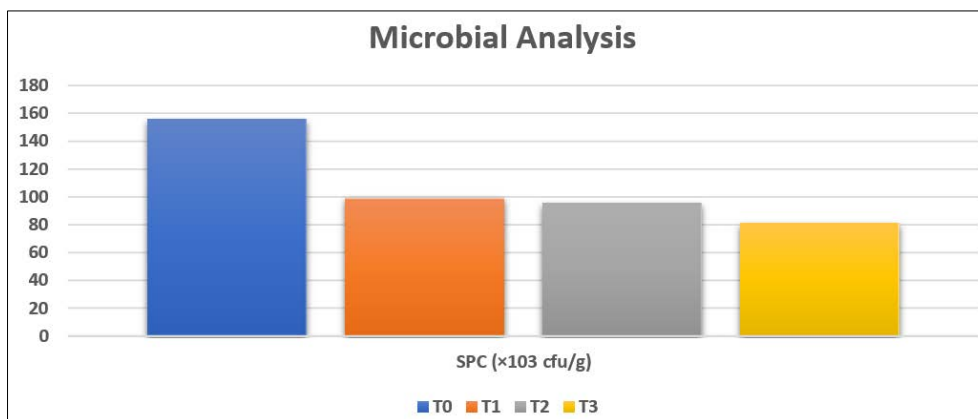


Fig 5: Microbial analysis of Value-Added Gummy Candy.

### Standard Plate Count (SPC)

The highest mean SPC score was recorded in the Gummy Candy sample was significantly viable as T<sub>0</sub> (156.00) followed by T<sub>1</sub> (99.66), T<sub>2</sub> (96.00) and T<sub>3</sub> (81.66).

### Coli form Count

It is evident from the experiment that the coli form count of control and experimental sample was Nil.

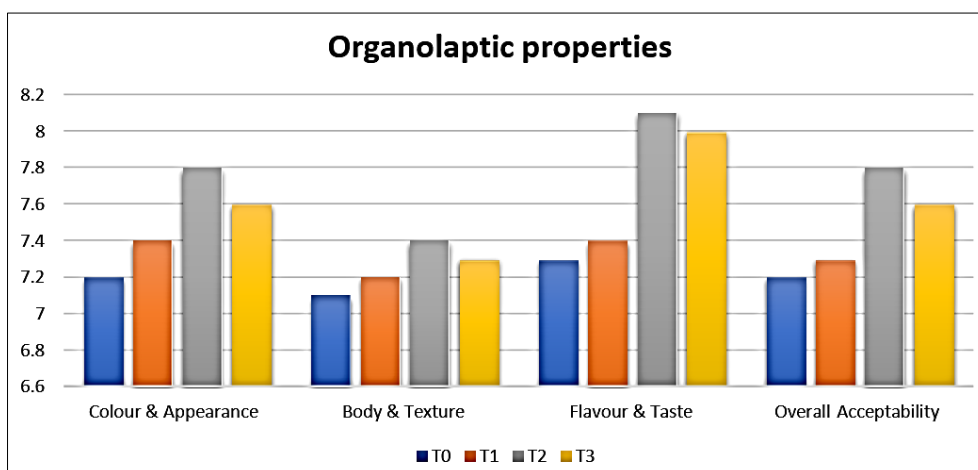


Fig 6: Organoleptic characteristics of Gummy Candy.

### Color and appearance

The highest mean value for color and appearance was recorded in the Gummy candy sample was significantly viable as T<sub>2</sub> (7.8) followed by T<sub>3</sub> (7.6), T<sub>1</sub> (7.4) and T<sub>0</sub> (7.2).

### Body and texture

The highest mean value for body and texture was recorded in the Gummy candy sample was significantly viable as T<sub>2</sub> (7.4) followed by T<sub>3</sub> (7.3), T<sub>1</sub> (7.2) and T<sub>0</sub> (7.1).

### Flavor and Taste

The highest mean value for flavor and taste was recorded in the Gummy candy sample was significantly viable as T<sub>2</sub> (8.1) followed by T<sub>3</sub> (8.0), T<sub>1</sub> (7.4) and T<sub>0</sub> (7.3).

### Overall Acceptability

The highest mean value for Overall Acceptability was recorded in the Gummy candy sample was significantly viable

as T<sub>2</sub> (7.8) followed by T<sub>3</sub> (7.6), T<sub>1</sub> (7.3) and T<sub>0</sub> (7.2).

### Conclusion

Based on the above findings, pineapple and beet root juice can be used satisfactory to make gummy candy with the addition of agar-agar and sugar. According to the findings, the experimental gummy candy in treatment T<sub>2</sub> (90:10) had the best organoleptic qualities and obtained the highest organoleptic evaluation score (color & appearance, body & texture, flavor & taste and overall acceptability). The beta carotene content of gummy candy was decreased when beetroot was added, and a high amount of beta carotene was detected in the T<sub>0</sub>(100:00) sample. On the basis of physico-chemical analysis treatment T<sub>0</sub> (100:00) and T<sub>1</sub> (95:05) showed satisfactory result for reducing sugar, ascorbic acid, and reducing sugar. The cost of making gummy candy was determined to be the highest in T<sub>3</sub> (85:15) at 37.82 per 100 g.

**References**

1. Achumi LV, Peter S, Das A. Studies on preparation of gummy candy using pineapple juice and carrot juice. *International Journal of Chemical Studies*. 2018;6(5):1015-1018.
2. Dobhal A, Awasthi P. Formulation of beetroot candy using simple processing techniques and quality evaluation. *Journal of Pharmacognosy and Phytochemistry*. 2019;8(4):913-916.
3. Grubben GJH, Denton OA. *Plant Resources of Tropical Africa 2. Vegetables*. PROTA Foundation, Wageningen; Backhuys, Leiden; CTA, Wageningen; c2004. p. 110.
4. Joy PP. Benefits and uses of pineapple, Pineapple. *Publication of Research Gate*. 2010;01:01
5. Kapadia GJ, Tokuda H, Konoshima T, Nishino H. Chemoprevention of lung and skin cancer by Beta vulgaris (beet) root extract. *Cancer Lett*. 1996;100(1-2):211-214.
6. Kumar Yashwant. Beetroot: A Super Food, international general of engineering studied and technical approach. *ISSN No. 2395-0900*. 2015;01(03):20.
7. Traxler Hans. The life and times of gummy bears. *Gelatin*. Gelatin manufacturers institute of America, Inc; c1993. p. 145.
8. Usman M, Davidson J. Health benefits of beetroot. *Mendon Cottage Books*; c2015. p. 6-8.
9. Vergara Benito S, Idowu Panna Melizah H, Sumangil Julia H. *Nata de Coco: A Filipino Delicacy (PDF)*. National Academy of Sciences and Technology, Philippines; c1999.