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Preparation and quality evaluation of health beverage from pineapple juice blended with beetroot and orange juice

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Abstract

Maintenance of optimal nutrition and positive health of population through assured nutrient intake continues to be a national priority for a nation to be healthy strong and productive, the nutritional status of its people must be good in the millennium we are replacing the upward trained in notional and health awareness which are increased the consumer demand for functional food. The present study was carried out to prepare health beverage by using pineapple juice blending with beetroot and orange juice with the objective to assess the sensory acceptability of the product and chemical properties. Four beverage formulations were prepared by blending of pineapple juice, beetroot juice, orange juice in ratio: (100:00:00)% (v/v), (70:5:25)% (v/v), (60:10:30)% (v/v) and (50:15:35)% (v/v) and they were marked as T0, T1, T2 and T3 respectively. Each treatment was replicated five times. Sensory Evaluation of the product was carried out under the criteria of 9 point Hedonic scale. The data obtained during the study was analyzed statistically using variance and critical difference techniques. All the control and experimental treatments were also analyzed chemically using AOAC (1980) procedure. On the basis of analysis, it was concluded that T2 (60% pineapple juice, 10% beetroot juice and 30% orange juice) was found to be best among the four treatments in case of organoleptic ally, chemically and micro-biologically point of view.

Keywords: Health beverage, pineapple juice, beetroot juice, orange juice, physico-chemical

Introduction

Every fruit has its some distinct properties which has and characteristics such as physical, nutritional, functional and chemical benefits which play important roles in the body, such as regulation/maintenance of blood pressure and adequate digestion of food. Fruit juices are common beverages in many countries of the world. In hot climate area, cafes, restaurants facilities to extract the juice from fresh fruit and then serving the juice liberally dozed with ice, to thirsty customers. Fruit juices processed under hygienic condition could play important role in enhancing consumer's health. Apart from nutritional quality improvement, beverage can be improved in its sensory and flavor characteristics according to their raw materials (Akin Wale Jain 2000 and Khurdiya 2004).

100% fruit juices are a smart addition to any well balanced diet, providing vitamins and minerals like folate, potassium, vitamin C. Fruit juices is also a convenient way for adult children to help reach the recommend of daily serving of fruit and vegetables. Juice is a liquid that is naturally contained in fruit and vegetables. Sometimes two or more juices are mixed to yield a well blanched, rightly flavored highly palatable and refreshing drink. Fruit beverage are digestible, highly refreshing, thirst quenching, appetizing and nutritionally far superior to many synthetic and aerated drinks. (Sidappa *et al.*, 1986) ^[11]

Beetroot (*Beta vulgaris*) is botanically classified as an herbaceous biennial from *Chenopodiaceae* family and has several varieties with bulb colors' ranging from yellow to red. Deep red-colored beetroots are the most popular for human consumption, both cooked and raw as salad or juice. There is growing interest in the use of natural food colors, because synthetic dyes are becoming more and more critically assessed by the consumer. But in food processing, as compared with anthocyanin and carotenoids, Betalains are less commonly used, although these water-soluble pigments are stable between pH 3 and 7. To improve the red color of tomato pastes, sauces, soups, desserts, jams, jellies, ice creams, sweets and breakfast cereals, fresh beet/beet powder or extracted pigments are used. It also contributes to consumes health and wellbeing because it is known to have antioxidants because of the presence of nitrogen pigments called betalains, mainly comprise of red-violet-colored betacyanins (betanin,

is obetanin, probetanin and neobetanin) and yellow–orange-colored betaxanthins (Singh & *et al*, 2014) ^[13].

Nutritional composition of Beetroot

Table 1: Beetroot (*Betavul cgaris*), fresh, nutritive value per 100 g.

Principle	Nutrient Value
Energy	180KJ (43 Kcal)
Carbohydrates	9.56 g
Protein	1.61 g
Fat	0.17 g
Folates	109 µg
Vitamin B ₆	0.067mg
Vitamin C	4.9 mg

(Source: USDA National Nutrient data base)

Pineapple [*Ananas comosus* (L.) Merr. Family: Bromeliaceous] 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. Based on fruits antioxidant capacities, they are used as indicators for healthy nourishment as well as protection factors of the human body against oxidative destruction. Fruits have been shown to contain high amount of minerals, moisture, low ash and crude fiber and are sources of sugar, vitamin A, C and B groups, low protein and lipid. Fruit juices are liquid, non-alcoholic products with certain degree of clarity and viscosity obtained through pressing or breaking up of fruits with or without sugar or carbon dioxide addition Fruits and its juices constitute one of the most important foods for man. Their regular consumption maintains health and makes up for the losses in the human diet. Recommend the consumption of juices with pulp from foods and medicinal points of view. (Costesu *et al*. 2006) (Baruwa, *et al* 2013)

Nutritional composition of pineapple

Table 2: Pineapple (*Anastomosis*), fresh, raw, nutritive value per 100 gm.

Principle	Nutrient Value
Energy	209kj 50kcal
Carbohydrates	13.52g
Protein	0.54 g
Fat	0.12 g
Vitamin A	58 IU
Vitamin C	47.8 mg

(Source: USDA National Nutrient database)

Orange (*Citrus sinensis*) on the other hand, is a distinguished, widely consumed fruit, particularly appreciated for its fresh flavor, vitamin C, and its natural antioxidants source having health benefits. Orange juice is rich in vitamin C, folic acid, potassium and excellent source of bioavailable antioxidant phytochemicals. Fruit juices are important trade commodities in most countries. Fruit juice blends can be produced from various fruits in order to combine all the basic nutrients present in these different fruits. This usually gives a better quality juice nutritionally and organoleptic ally. (Vasavada, 2003) ^[15].

Sugar is in a lot of so called healthy energy drinks now days. When i say sugar i mean regular processed sugar, the same thing found in those sugary soft drinks. (Steve B. 2012) ^[14]. while staple juice like apple and orange have remained popular for decades, many new and exotic juice choices have entered the market place in recent years, such as pomegranate,

mango, strawberry, grapes carane berry, pine apple, guava, kiwi, more. In addition to these verities beverage producers are now creating new and innovative juice combinations.

Nutritional composition of Orange

Table 3: Lime (*Citrus aurantifolia*), fresh, nutritional value per 100 gm.

Principal	Nutritional value
Energy	9kcal
Carbohydrates	1.9 g
Fat	0.2g
Protein	0.7g
Vitamin C	53.20 mg
Calcium	27 mg
Iron	0.7mg
Phosphorus	9mg

(Source: Gopalan) (Gopalan *et al.*, 2007) ^[6]

Justification

Now days people are getting more conscious about their health. So they want highly nutritive beverages. In Present investigation, effort were made to develop blended juice using pineapple, Beetroot, orange are most effective. Orange juices are rich in several important nutrients. It is rich in vitamin C, folate, potassium, Antioxidant. It is help to improve formation of bone, wound healing gum health. Also regulate blood pressure. Pineapple juice is very healthy as well as delicious. It also contain vitamin c beta-carotene. In this antioxidant can help to formation of collagen, boosting the immune system as well as digestion and lower the cancer. Beetroot is rich in vitamin A, C, B6 minerals and other nutrients such as iron, potassium. It is lower in calories stimulates liver function. Blended juice are helps to detoxify our body and provide nutrient. Blended drinks are also a good alternative source to the new product which combine new taste and improvement in the quality of nutrition.

Review of literature

Holdren *et al.*, (1972) ^[7] studied that juice squeezing from and developed mathematical relationship for processs. The experiment revealed that juice separation was a liner function of residual volume, compressive force and the time of compression. They also developed AF relationship on the basis of dry matter content of input and output materials. The dry matter content of the juice remained constant irrespective of the quantity of juice express and was independent of the compression time. Sims *et al.*, (1991) ^[12] Stated that the carrot – pine apple juice is relatively good source of beta carotene, Consumer like it because of its convince color, aromatic compound and refreshing characteristics. Vinson *et al.*, 1998; and Kahkonen *et al.*, (1999) stated that Beetroot ranks among 10 most powerful vegetables with respect to its antioxidant capacity ascribed to a total phenolic content of 50-60 µmol/g dry weight. Francis, (1999) ^[5] reported that When beet juice is used, it is most suitable in food with a low water activity, such as frozen novelties and fruit fillings Betanins, obtained from the roots, are used industrially as food colorants. e.g. to intensify the color of tomato paste, sauces, deserts, jams, jellies, ice cream, sweets and breakfast cereal. Pedreno *et al.*, and Escribano, (2001) ^[9] reported that Beetroot contains appreciable amount of nitrates and nitrites which are free radical scavenging compound and prevent active oxygen-induced free radical mediated oxidation of biological molecules. The high level of nitrates and nitrites facilitates

vasodilatation in humans, a desired property to enhance oxygen supply in body which energizes the entire body with better oxygen supply to brain, body muscles and vital organs. Ranganna S, (2003) [10] reported that the acidity was determined by titration using standard sodium hydroxide solution and expressed as anhydrous citric acid. Carvalho *et al.*, (2007) [4] reported that juice blending is one of the best method to improve the nutritional quality of juice. It can improve the vitamin and minerals content depending on the kind and quality of fruit and vegetables. Manoharan *et al.*, (2012) [8] reported that studied on organoleptic evaluation of beetroot juice as natural color for strawberry flavor ice cream.

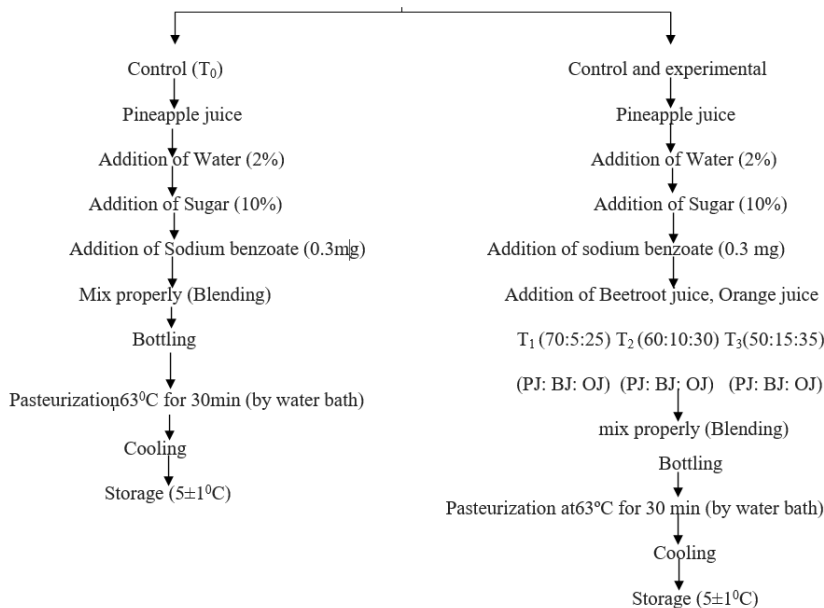
They observed that the betalams are nitrogen containing plant pigments whose colors range from red-violet betacyanins to yellow betaxanthins.

Materials and Methods

Procurement and collection of ingredients

- Pineapple to be purchased from local market of Prayagraj.
- Beetroot to be purchased from local market of Prayagraj.
- Orange to be purchased from local market of Prayagraj.
- Other materials also to be purchased from local market of Prayagraj.

Flow diagram adopted for preparation of control and experimental Health



Result and Discussion

The analyzed data is presented in this chapter under the following headings:

1. Chemical characteristics
2. Microbial characteristics
3. Organoleptic characteristics
4. Statistical characteristics
5. Estimation of cost of production

Table 4: Average data for different parameters of control and experiments (in percent)

Parameters	Treatments			
	T ₀	T ₁	T ₂	T ₃
1. Chemical Analysis				
Carbohydrate %	13.12	10.13	9.39	8.65
Protein %	0.54	0.89	1.00	1.12
Fat %	0.12	0.21	0.23	0.26
Ash %	0.46	0.47	0.48	0.49
Total Solid %	14.24	11.71	11.12	10.53
Moisture %	85.76	88.28	88.87	89.47
TSS %	18.5	19.0	19.5	20.0
Acidity%	0.95	0.33	0.28	0.20
pH	3.8	4.2	4.6	5.0
Ascorbic Acid%	50.0	45	44	43.5
2. Microbiological analysis				
SPC × 10 ⁻³ (colony forming unit /gm)	6.80	13.40	14.60	15.00
Coliform count	Nil	Nil	Nil	Nil
3. Organoleptic Score (9- point hedonic scale)				
Color and Appearance	7.12	7.86	8.56	7.56
Consistency	8.01	8.10	8.38	8.08
Flavor and taste	7.48	8.02	8.12	7.90
Overall acceptability	7.70	8.38	8.48	8.28
4. Cost analysis				
Health Beverage (Rs./Litre)	304	280.50	267	253.5

Summary and Conclusion

Physico- chemical analysis

Carbohydrate

The highest mean of Carbohydrate percentage was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root And Orange juice in T₀ (13.12) followed by T₁ (10.13), T₂ (9.39) and T₃ (8.65). It is therefore concluded that there was significant difference between the all treatments which may be ascribed to addition of different level of treatments.

Protein

The highest mean of protein percentage was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root and Orange juice in T₃ (1.12) followed by T₂ (1.00), T₁ (0.89), and T₀ (0.54). There was significant difference between all the treatment which may ascribed by the different levels of health beverage.

Fat

The highest mean of Fat percentage was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root and Orange juice in T₃ (0.26) followed by T₂ (0.23), T₁ (0.21), and T₀ (0.12). It is therefore concluded that there was significant difference between the T₀-T₁, T₀-T₂ & T₀-T₃ and all treatments was Non-significant which may be ascribed to addition of different level of treatments.

Ash

The highest mean of Ash percentage was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root And Orange juice in T₃ (0.50) followed by T₂ (0.48), T₁ (0.47), and T₀ (0.46). It is therefore concluded that there was significant difference between the T₀-T₂, T₀-T₃ and all treatments was non-significant which may be ascribed to addition of different level of treatments.

Total Solids

The highest mean of Total solid percentage was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root and Orange juice in T₀ (14.24) followed by T₁ (11.71), T₂ (11.12) and T₃ (10.53). There was significant difference between all the treatment which may ascribed by the different levels of health beverage.

Moisture

The highest mean of Moisture percentage was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root And Orange juice in T₃ (89.47) followed by T₂ (88.87), T₁ (88.28) and T₀ (85.76). There was significant difference between all the treatment which may ascribed by the different levels of health beverage.

TSS

The highest mean of TSS percentage was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root and Orange juice in T₃ (20.00) followed by T₂ (19.50), T₁ (19.00), and T₀ (18.50). There was significant difference between all the treatment which may ascribed by the different levels of health beverage.

Acidity

The highest mean of Acidity percentage was recorded in the health beverage prepared from Pineapple Juice Blended with

Beet Root And Orange juice in T₀ (0.95) followed by T₁ (0.33), T₂ (0.28), and T₃ (0.20). There was non-significant difference between all the treatment which may ascribed by the different levels of health beverage.

Ph

The highest mean of pH percentage was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root and Orange juice in T₃ (5.00) followed by T₂ (4.60), T₁ (4.20), and T₀ (3.80). It is therefore concluded that there was significant difference between the all treatments which may be ascribed to addition of different level of treatments.

Ascorbic acid

The highest mean of Ascorbic percentage was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root And Orange juice in T₀ (50.00) followed by T₁ (45.00), T₂ (44.00), and T₃ (43.00). There was non-significant difference between all the treatment which may ascribed by the different levels of health beverage.

Organoleptic parameters

Color & appearance

The highest mean of Color & Appearance score was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root And Orange juice in T₂ (8.56) followed by T₃ (7.56), T₁ (7.86), and T₀ (7.12). It is therefore concluded that there was significant difference between the all treatments which may be ascribed to addition of different level of treatments.

Consistency

The highest mean of Consistency score was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root And Orange juice in T₂ (8.38) followed by T₁ (8.10), T₃ (8.08), and T₀ (8.01). It is therefore concluded that there was non-significant difference between the all treatments which may be ascribed to addition of different level of treatments.

Flavor

The highest mean of Flavor score was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root And Orange juice in T₂ (8.12) followed by T₁ (8.02), T₃ (7.90), and T₀ (7.48). It is therefore concluded that there was significant difference between the T₀-T₁ & T₀-T₂ and all treatments was non-significant which may be ascribed to addition of different level of treatments.

Overall acceptability

The highest mean of Overall acceptability Overall acceptability score was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root And Orange juice T₂ (8.48) followed by T₁ (8.38), T₃ (8.28), and T₀ (7.70). It is therefore concluded that there was significant difference between the T₀-T₁, T₀-T₂ & T₀-T₃ and all treatments was non-significant which may be ascribed to addition of different level of treatments.

Microbiological parameters

SPC

The highest mean of SPC was recorded in the health beverage prepared from Pineapple Juice Blended with Beet Root and Orange juice T₃ (15.00) followed by T₂ (14.60), T₁ (13.40), and T₀ (6.80). It is therefore concluded that there was

significant difference between the T0-T1, T0-T2 & T0-T3 and all treatments was non-significant which may be ascribed to addition of different level of treatments.

Coliform

The coli form count in control and control and experimental sample were found to be absent.

Conclusion

In consideration of the experimental results obtained during the present analysis, it may be concluded that the Development of Health beverage prepared from a blend of pine apple beetroot, orange can be successfully prepared. According to analysis of different treatments T₂ (60% pineapple juice, 10% beetroot juice and 30% orange juice) was found to be best in terms of organoleptic, chemical, microbial and cost analysis.

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