

# Optimization of Health Beverage Prepared from Sugarcane Juice Blended with Spinach and Lime 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 nations to be healthy, strong and productive. The nutritional status of its people must be good in the millennium we are placing the upward trained in nutritional and health awareness which are increased the consumer demand for functional food. The present study was carried out to prepare health beverage by using Sugarcane Juice Blending with Spinach and Lime Juice with the objective to assess the sensory acceptability of the product and chemical properties. Four beverage formulations were prepared by blending of Sugarcane juice, Spinach juice, and lime juice in ratio: (100:00:00)% (v/v); (70:25:5)% (v/v); (60:30:10)% (v/v) and (50:35:15)% (v/v) and they were marked as T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub>, and T<sub>3</sub> 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 analysed statistically using variance and critical difference techniques. All the control and experimental treatments were also analysed chemically using AOAC procedure. On the basis of analysis, it was concluded that T<sub>2</sub> (60% sugarcane juice, 30% spinach juice and 10% lime juice) was found to be best among the four treatments in case of organoleptically, chemically and microbiologically point of view.

**Keywords:** Health Beverage, Sugarcane juice, Spinach juice, Lime juice, Physico-chemical.

## I. INTRODUCTION

The fruits and vegetable based nutritious beverage are popular in good demand in urban areas for the preparation of ready to serve (RTS) beverages. During the off seasons, the pulp or juice of these can be preserved for preparing RTS beverages. 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 et al., 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.

The largest fruit juice consumers are New Zealand (nearly a cup, or 8 ounces, each day) and Colombia (more than three quarters of a cup each day). Fruit juice consumption on average increases with country income level. (Stephen et al., 2015). Fruits juices and its juices constitute one of the most important foods for human beings. Their regular consumption maintains health and make up for the losses in the human diet.

The blending of different fruits juices increases the nutritional profile and the viability of the product (Okworiet al., 2017).

**SUGARCANE** - is a tropical, perennial grass of the genus *Saccharum* that forms lateral shoots at the base to produce multiple stems, typically three to four meters high and about five cm in diameter. The stems grow into cane stalk, which when mature constitutes approximately 75% of the entire plant. Sugarcane juice is the juice extracted from pressed sugarcane. It is consumed as a beverage in many places. Thus it helps in fighting various types of cancer such as prostate and breast cancer and it is proven remedy for Jaundice, helps to maintain a good digestive system. It is the best choice to rehydrate the body and regain lost sugar levels.

**SPINACH** - (*Spinacia oleracea*) is a leafy green flowering plant native to central and western Asia. Its leaves are common edible vegetables consumed either fresh or after storage using preservation techniques by canning, freezing, or dehydration. The nutritional food value of spinach and other green leafy vegetables is greater than the nutritional food value of almost any other food.

Spinach is also great for helps to stay healthy. While the nutritional food value of spinach is extremely high. Spinach can help to build stronger bones, improve the cardiovascular system within

body, help improve gastrointestinal system, help eyesight and provide body with iron, which gives energy. These vitamins and nutrients can help body in a lot of different ways.

**LIME** -(Citrus aurantifolia) juice has been shown to have both medicinal and cosmetic values. The juice contains a high quantity of citric acid giving them their characteristic sharp (tart) flavor. Citrus fruits are notable for their fragrance, partly due to flavonoids and limonoids contained in the rind, and most are juice-laden. (Colker C.M. 2012).Limes are good source of magnesium and potassium and help to improve digestion, lower blood presser and reduce inflammation and helps with weight loss.In cooking lime is valued both for acidity of its juice and the floral aroma of its zest.

## II. MATERIALS AND METHODS

The ingredients and chemicals used for this work were purchased from the a local market at Gaughat, Prayagraj,UP.

### RAW MATERIAL –

Sugarcane juice

Spinach juice

Lime juice

### CHEMICAL –

Sodium Benzoate

### EQUIPMENTS–

Weighing balance

Grinding machine

### MISCELLANEOUS –

Measuring cyclinder, beaker, strainer

### PLAN OF WORK –

### TREATMEANT COMINATION

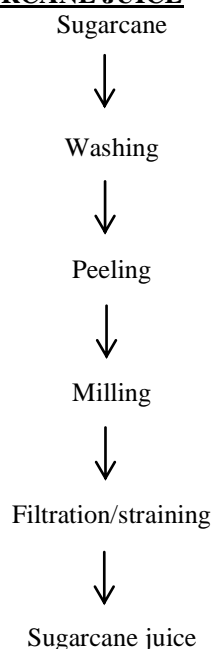
	Sugarcane juice (SC)	Spinach juice (SJ)	Lime juice (LJ)
T <sub>0</sub>	100	00	00
T <sub>1</sub>	70	25	05
T <sub>2</sub>	60	30	10
T <sub>3</sub>	50	35	15

### Plan of layout –

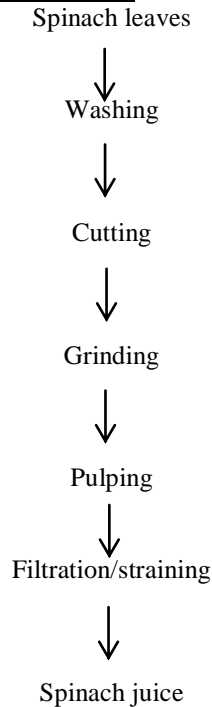
Number of replication - 5

Number of treatment – 4

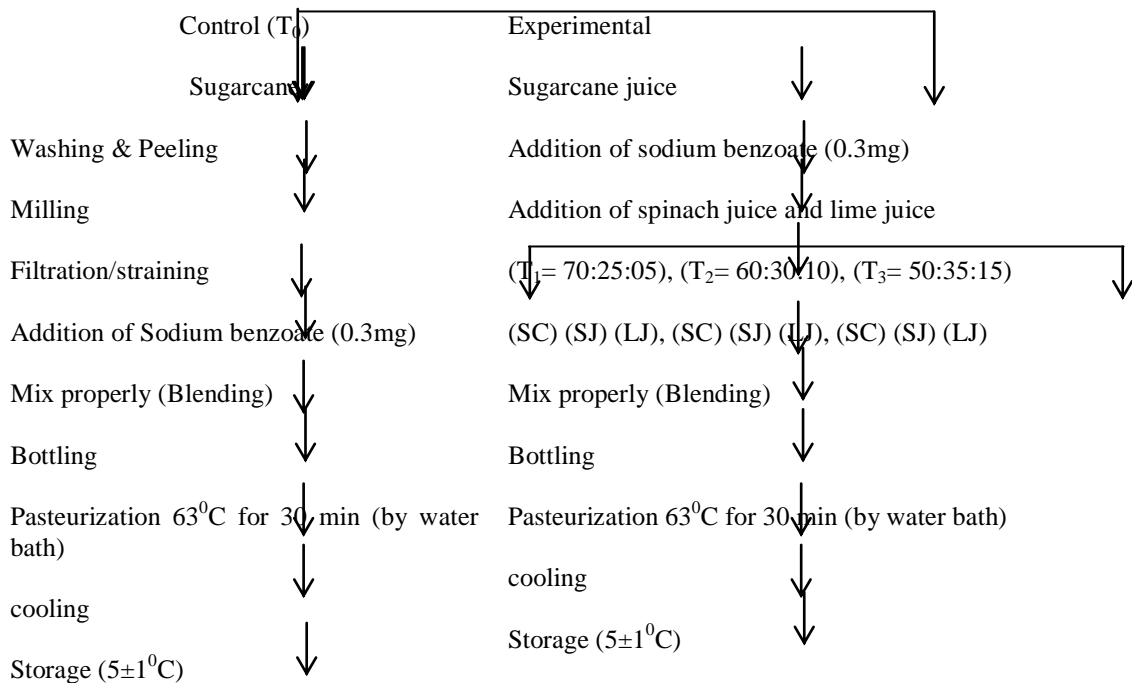
### METHOD OF PREPARATION OF SUGARCANE JUICE



**METHOD OF PREPARATION OF SPINACH JUICE**



Flow diagram adopted for preparation of control and experimental health beverage juice.



**Average of data obtained on different parameters of control and experimental health beverage**

Parameter	T $\sigma$	T1	T2	T3
<b>1. Physico-chemical analysis</b>				
Carbohydrate%	13.11	10.06	9.38	9.20
Protein%	0.16	0.87	1.03	1.2
Fat%	0.40	0.39	0.36	0.37
Fiber%	0.56	1.02	1.28	1.47
Ash%	0.23	0.52	0.59	0.61
Total solid%	14.46	12.86	12.65	12.85
Moisture%	85.54	87.14	87.36	87.15
TSS%	18.5	19.0	19.5	20.0
Iron%	1.12	1.49	1.60	1.55
Acidity%	0.95	0.33	0.28	0.28
pH	5.0	4.8	4.7	4.58
Ascorbic acid%	6.73	13.16	15.34	17.53
<b>2. Organoleptic score</b>				
Colour & Appearance	8.20	6.60	6.40	5.80
Consistency	4.80	5.80	7.40	4.80
Flavor	7.80	8.20	8.20	5.80
Overall acceptability	6.93	6.87	7.33	5.47
<b>3. Microbiological analysis</b>				
SPC(x10 <sup>-3</sup> cfu/ ml)	6.80	13.40	14.60	8.28
Coliform	Nil	Nil	Nil	Nil
<b>4. Cost of product</b>				
Health Beverage (Rs./Liter)	100	92.5	89	85.5

### III. RESULT AND DISCUSSION

**Carbohydrate** - The highest mean of Carbohydrate percentage was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T $\sigma$  (13.11) followed by T1(10.06), T2 (9.38) and T3(9.20). 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 Sugarcane juice blended with Spinach and Lime juice in T3 (1.20) followed by T2 (1.03), T1 (0.87), T $\sigma$ (0.16). It is therefore concluded that there was significant difference between the all treatments which may be ascribed to addition of different level of health beverage.

**Fat** - The highest mean of fat percentage was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T $\sigma$  (0.40) followed by, T1 (0.39), T3(0.37) and T<sub>2</sub>(0.36). 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.

**Fiber** - The highest mean of Fiber percentage was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T3 (1.47) followed by T2 (1.276), T1 (1.02) and T $\sigma$ (0.56). It is therefore concluded that there was significant difference between the all treatments 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 Sugarcane juice blended with Spinach and Lime juice in T3 (0.61) followed by T2 (0.59), T1 (0.52) and T $\sigma$ (0.23). It is therefore concluded that there was a non-significant difference between the T2 -T3 and all treatments was significant which may be ascribed to addition of different level of treatments.

**Total solids** - The highest mean of Total solids percentage was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T $\sigma$  (14.46) followed by T1(12.86), T3 (12.85) and T2(12.636). It is therefore concluded that there was non-significant

difference between the T1-T3 and all treatments was significant which may be ascribed to by the different level of health beverage.

**Moisture** -The highest mean of Moisture percentage was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T2 (87.364) followed by T3 (87.15), T1 (87.14) and T $\sigma$ (85.54). It is therefore concluded that there was non-significant difference between the T1-T3 and all treatments was significant which may be ascribed to addition of different level of treatments.

**TSS** - The highest mean of TSS percentage was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T3 (20.0) followed by T2 (19.5), T1 (19.0), T $\sigma$ (18.5). It is therefore concluded that there was significant difference between the all treatments which may be ascribed by different level of health beverage.

**Iron** - The highest mean of Moisture percentage was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T $\sigma$  (1.60) followed by T $\sigma$  (1.55), T $\sigma$  (1.49) and T $\sigma$  (1.12). It is therefore concluded that there was non-significant difference between the T1-T3, T2-T3 and all treatments was significant which may be ascribed to addition of different level of treatments.

**Acidity** - The highest mean of TSS percentage was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T $\sigma$  (0.95) followed by T1 (0.33), T2 (0.28), T3 (0.28). It is therefore concluded that there was non-significant difference between the T1-T2, T1-T3, T2-T3 and all treatments was significant which may be ascribed to addition of different level of treatments.

**pH** - The highest mean of pH was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T $\sigma$  (5.0) followed by, T1 (4.8), T2 (4.7) and T3 (4.58). 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 Acid percentage was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T3 (17.53) followed by T2(15.34), T1 (13.16), T $\sigma$ (6.73). It is therefore concluded that there was significant difference between the all treatments which may be ascribed by different level of health beverage.

### Organoleptic parameter

**Colour & Appearance** – The highest mean of Colour & Appearance score was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T $\sigma$  (8.20) followed by T1(6.60), T2 (6.40) and T $\sigma$ (5.80). It is therefore concluded that there was non-significant difference between the T1-T2, T1-T3, T2-T3 and all treatments was significant which may be ascribed by different level of health beverage.

**Consistency** - The highest mean of Consistency score was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T2 (7.40) followed by T1 (5.80), T3 (4.80) and T $\sigma$ (4.80). It is therefore concluded that there was non-significant difference between the T $\sigma$ -T1, T $\sigma$ -T3, T1-T3 and all treatments was significant which may be ascribed by different level of health beverage.

**Flavor** - The highest mean of Flavor score was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T2 (8.20) followed by T1 (8.20), T $\sigma$ (7.80) and T3 (5.80). It is therefore concluded that there was non-significant difference between the T $\sigma$ -T1, T $\sigma$ -T2, T1-T2 and all treatments was significant which may be ascribed by different level of health beverage.

**Overall acceptability** - The highest mean of Overall acceptability score was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T2 (7.33) followed by T $\sigma$ (6.93), T1(6.87) and T3 (5.47). It is therefore concluded that there was non-significant difference between the T $\sigma$ -T1, T $\sigma$ -T2, T1-T2 and all treatments was significant which may be ascribed by different level of health beverage.

### Microbiological parameters

**SPC** - The highest mean of SPC was recorded in the health beverage prepared from Sugarcane juice blended with Spinach and Lime juice in T3 (15.00) followed by T2 (14.60), T1 (13.40), T $\sigma$ (6.80). It is therefore concluded that there was non-significant difference between the T1-T2, T1-T3, T2-T3 and all treatments was significant which may be ascribed by different level of health beverage.

**Coliform** - The coliform count in control and experimental sample were found to be absent.

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