

# Effect of Different Levels of Spinach Juice on Spinach Juice Whey Beverage

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**ABSTRACT:** The present investigation was carried out to standardize the spinach juice. Spinach beverage was standardized by using and mixing different ingredient (juice, salt, whey, sodium benzoate, etc.) which were used at different quantity. Beverage was prepared by blending spinach juice and spinach juice at different ratios (T = 100:0, T<sub>1</sub> = 90:10, T<sub>2</sub> = 80:20 T<sub>3</sub> = 70:30). Beverage was heated below boiling point for a few minutes and sodium benzoate was added into it. It can be concluded that the spinach beverage could be prepared by using spinach juice. The proportion spinach juice may be taken as 10 % juice and 90 % whey beverage for getting the best organoleptic quality product. Also, looking to the higher nutritious virtues, the developed whey based ready to serve beverage from spinach juice could be recommended for the large scale production at industrial level.

**KEYWORDS :** Spinach juice, Beverage, leafy vegetable

## I. INTRODUCTION

The nutritional food value of spinach and other green leafy vegetables is greater than the nutritional food value of almost any other food. There's a reason Popeye ate his spinach everyday to stay strong. Most leafy greens like spinach contain oxalic acid. Oxalic acid affects the body's calcium absorption but cooking spinach can help to eliminate the effects of the oxalic acid. With this there are tons of vitamins and nutrients present in cooked spinach. It contains vitamin K, A, Manganese, Folate, Magnesium, Iron, Vitamin C, Vitamin B2, Calcium, Potassium, Vitamin B6, Tryptophan, Vitamin E, Dietary Fiber, Copper, Vitamin B1, Protein, Phosphorous, Zinc, Omega-3, Fatty Acids, Vitamin B3 and Selenium. The vegetables spinach exhibited moderate iron content i.e. 4.39 mg/100 gm (Mandle, *et al*, 2012).

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 mental function, improve gastrointestinal system, help eyesight and provide body with iron, which gives energy. Spinach is a great source of a variety of vitamins and nutrients. These vitamins and nutrients can help body in a lot of different ways.

Whey is one of the principle by products of the cheese industry and a major part of which is constituted by channa whey in India. Whey retains about 55% of the native milk nutrients with half of the ash and one fourth of the protein. The by-product thus provides maximum biological value with minimum calories. Dairy whey remaining from home-made cheese making has many uses. It is a flour conditioner and can be substituted for milk in most baked good recipes that require milk (bread, pancakes, muffins, etc.). Whey can also be added to breakfast smoothies for additional protein (Raffald, 1782 and Rail and Beryl, 1994).

Whey was also used in central Spain to enrich bakery products. In some traditions, it was used instead of water to produce bread dough. Because whey contains lactose, it should be avoided by those who are lactose intolerant. (Feedstuff, 2011). Liquid whey contains lactose, vitamins, protein, and minerals, along with traces of fat. In 2005, researchers at Lund University in Sweden discovered that whey appears to stimulate insulin release, in type 2 diabetics (Frid, 2005).

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## Objectives of the present study

To prepare beverage from incorporating Whey, spinach juice at different composition.

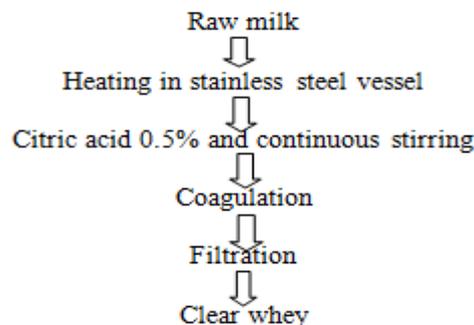
1. To prepare product of good organoleptic properties.
2. Value addition to the waste from fermented milk products
3. To analyze product physically
4. To prepare product which is economical and nutritious from consumer's as well as manufacturer's point of view.

## II. MATERIALS AND METHODS

This study was conducted in Deptt. of Dairy science, Mahatma Basweshwar Mahavidyalaya, Latur. Fresh leafy vegetable spinach were purchased from local market and were washed with clean water to remove dust, dirt and outer material. spinach was cut into desired pieces for further processing. Then, it was washed with water. Blanching was done for time and temperature 100 °C for 3 min and immediate cooling was done in cold water to prevent further cooking. After completion of pretreatments, It was difficult to extract the juice from it so that pieces were crushed in mixture after that placing in muslin cloth and carry out squeezing with pressing to extract the juice then it was filtered to get clear strained juice.

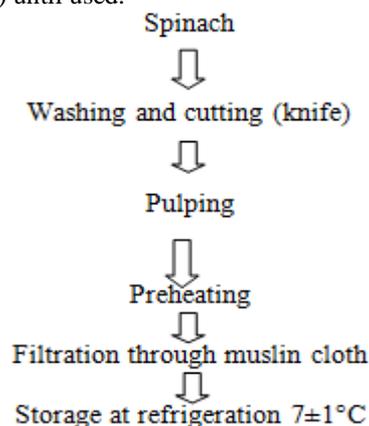
### Preparation of Milk Whey:

The milk was heated in a stainless steel vessel to. The hot milk was acidified by adding citric acid (0.5%) followed by continuous stirring resulting in complete coagulation of milk protein (casein). The liquid (whey) was filtered using muslin cloth.



### Preparation of spinach juice:

The spinach was washed and cut into small pieces. The pulping was done by using mixed grinder and pulp was preheated in a water bath. The pulp was pressed through a muslin cloth to extract the juice. The spinach juice was kept at a refrigeration temperature (7±1°C) until used.



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Spinach beverage was standardized by using and mixing different ingredient (juice, salt, whey, sodium benzoate, etc.) which were used at different quantity. Beverage was prepared by blending spinach juice at different ratios ( $C = 100:0$ ,  $C_1$  and  $S_1, = 90:10$ ,  $C_2$  and  $S_2, = 80:20$   $C_3$  and  $S_3, = 70:30$ ). Beverage was heated below boiling point for a few minutes and sodium benzoate was added into it. Sensory evaluation was made through panel of 6 semi-trained judges. The panel evaluated the acceptance level of beverage for flavour, appearance, taste and overall acceptability. A 9-point hedonic scale was used for this purpose. The data obtained were subjected to statistical analysis using standard deviation and comparison of means by LSD test.

### III RESULTS AND DISCUSSION

**Table, 1 Effect of level of spinach juice on spinach whey beverage**

Treatment	Sensory attributes			
	Flavour	Taste	Appearance	Overall acceptability
<b>T<sub>0</sub></b>	8.25±0.85	8.5±0.57	8.25±0.95	7.75±0.95
<b>T<sub>1</sub></b>	6.0±2.44	6.0±2.94	5.75±2.21	5.75±2.22
<b>T<sub>2</sub></b>	5.75±1.70	5.5±1.73	6.0±2.16	5.5±1.29
<b>T<sub>3</sub></b>	5.5±2.38	5.0±2.94	6±2.58	5.25±2.06

Mean ±SD of four replications

The mean sensory score given by the panelists to the beverage sample prepared at different treatment given in table, 1 the maximum mean sensory score was obtained by the beverage sample of treatment T<sub>0</sub> combination for the flavour, appearance, taste and overall acceptability attributes of sensory evaluation which was without addition of spinach juice. Also the mean sensory score of beverage sample T<sub>1</sub> combination was found maximum in case of flavour, appearance, taste and overall acceptability. Hence the sample T<sub>1</sub> having 10 ml spinach juice and 90 ml of milk whey per 100 ml of whey beverage was found superior. The reason might be that the high level of spinach juice increases the intensity of spinach flavour as result most of the panelist suggested to add less amount of juice. Due to this fact rest of the samples got low score. The present investigation corroborates with the results reported by Naik, *et al.*, (2009), and Dhamsania and Varshney (2013), Dande, *et al.*, (2016) for the sensory characteristics of whey based water melon beverage, ripe banana and carrot juice beverage respectively. The present investigation also conformity with that of Duric, *et al.*, (2004), Jinjark, *et al.*, (2006), Singh and Gaikwad (2012), Singh and Singh (2012), Landge and Gaikwad (2013). However Yadav, *et al.*, (2013) prepared the whey beverage by utilizing the aloe vera in their investigation they reported that the sample with 14% juice content and 14% TSS supplemented with mint and ginger in a specified ratio (80:10:10) was found to be superior over the other samples in terms of organoleptic qualities.

### IV. CONCLUSION

It can be concluded that the spinach beverage could be prepared using the spinach juice. The proportion of spinach juice may be taken as 10 ml juice and 90 ml whey beverage per 100 ml of the beverage preparation for getting the optimum organoleptic quality. Also, looking to the higher nutritious virtues, the developed whey based ready to serve beverage from spinach juice could be recommended for the large scale production at industrial level.

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