

Preparation and evaluation of wine from Sugarcane and carrot juice

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Abstract-Wine is one of the functional fermented food that have many nutritional benefits. Wine is produced by the fermentation of yeast which involves the conversion of sugar to alcohol. It can acts as a nutritional supplement for many fruits and vegetables. In the present project, sugarcane and carrot juice was used for the preparation of wine. Fermentation is carried out with *Saccharomyces cerevisiae*. It is commonly known as bakers yeast. Sugarcane (*Saccharum officinarum*) juice which contains high amount of sugar and so it is used as a raw material. It is rich in calcium, magnesium, iron and other electrolytes. Carrot (*Daucus carotasubsp.sativus*) juice is rich in vitamin A and C and it is a good source of antioxidants also. The main purpose of study is to develop the wine by adding sugarcane and carrot juice. Among the sugarcane blended with carrot juice non-pasteurized blended at 48.7% and PH 4.3 during the time of fermentation was observed. After five months of storage, alcohol content in the wine was increased. Therefore, the storage improves the quality of wine.

Keywords-Fermentation, carrot juice, sugarcane juice, wine

I. INTRODUCTION

Wine is one of the functional fermented food and alcoholic beverage. It is produced by fermentation of yeast which involves the conversion of sugar to alcohol. Antioxidants found in the wines are working as anti-ageing agents and helps youthfulness for moderate drinkers of wines [1]. Sugarcane (*Saccharum officinarum*) juice which contains high amount of sugar so it is used for preparing the fermented wine[2]. The cultivation of *Saccharum officinarum* and its hybrids is mostly used for the production of sugar and ethanol and other industrial applications in more than 80 countries around the world[3]. Carrot (*Daucus carotasubsp.sativus*) is one of the important root vegetable and it is a good source of antioxidants. It belongs to the family *Apiaceae*. It contains a good amount of Carbohydrates(9.58g), Protein(0.91g), Fat(0.25g), Cholesterol (0mg), Dietary fiber(2.90g), Energy (40Kcal) [4]. The high sugar content of sugarcane and high antioxidants and attractive color of carrot make is an ideal source for the preparation of wine from their blended juice.

II. MATERIALS AND METHODOLOGY

Sugarcane juice and carrots were purchased from the local market and they were taken to the laboratory for preparation. The entire process took place at Department of food technology, JCT college of engineering and technology.

1. Preparation of carrot juice

Daucus carotasubsp.sativus (Carrots) were purchased from the local market. They were washed and unwanted portions and the outer skin were removed, cutted into small pieces and grinded into fine paste and then boiled with small amount of water (250g/85ml) for 05-10 minutes. It was then filtered through a strainer to get the juice.



Figure 1 Carrot juice.

2. Preparation of Sugarcane juice

Fresh sugarcane juice was purchased from the local market. The Total Suspended Solids(TSS) of Sugarcane juice was made to 44°Brix by adding sugar. It is then blended with the carrot extract at different concentration 40%, 50%, 60% and 70%. Blended juice of each concentration was divided into two parts. The one was pasteurised at 68°C for 15-20 minutes and the other was

non-pasteurized for all blending concentrations. Before pasteurization, blended substrates were adjusted to the PH 4.5 with the addition of Citric acid.



Figure 2 Sugarcane juice.

Table 1 Nutritional content of Saccharum officinarum (Sugarcane)[5].

Nutrients	Energy
Protein	0.20g
Water	0.18g
Fat	0.09g
Sugar	25.69g
Carbohydrates	27.39g
Vitamins	0.44mg
Minerals	195.24mg
Total calories	110.22

3.Preparation of wine

The blended juice samples were inoculated with starter inoculum, Saccharomyces cerevisia strain isolated from palm juice at 1.2×10^7 cells per ml of 10% samples. Then this mixture was fermented at $(26 \pm 4^\circ\text{C})$ in an incubated chamber for three weeks [5].

III. ANALYSIS

After fermentation, when two consecutive days showed the same °Brix of the substrate and the analysis were done twice after three weeks and after five months of storage. The PH, TSS, alcohol % and reducing sugar content of the wine were determined.

1. Biochemical analysis

The PH, acidity, TSS, reducing sugar and alcohol content of the wine were determined using various methods.

1.1. TSS: TSS was measured by pocket refractometer. It measures the sugar content of prepared wine and the results were shown in degrees brix [6].

1.2. Alcohol content: The alcohol content of the wine was determined using High pressure liquid chromatography (HPLC) method [7].

1.3. PH: PH of wine was measured by using PH meter. By using this technique, the acidity or alkalinity of the wine was estimated [8].

1.4. Reducing sugar: Benedict's test was used to estimate the reducing sugar of wine. The prepared wine was heated with benedict's reagent and the color changed indicated the amount of reducing sugar present in the wine [9].

1.5. Sensory evaluation: Sensory evaluation for flavour, colour and overall acceptability were carried out under 5 point hedonic scale. Twenty members were used for this sensory evaluation [10].



Figure 3 preparation of wine.

IV. RESULTS AND DISCUSSIONS

The results of the both biochemical analysis and the sensory evaluation is showed below.

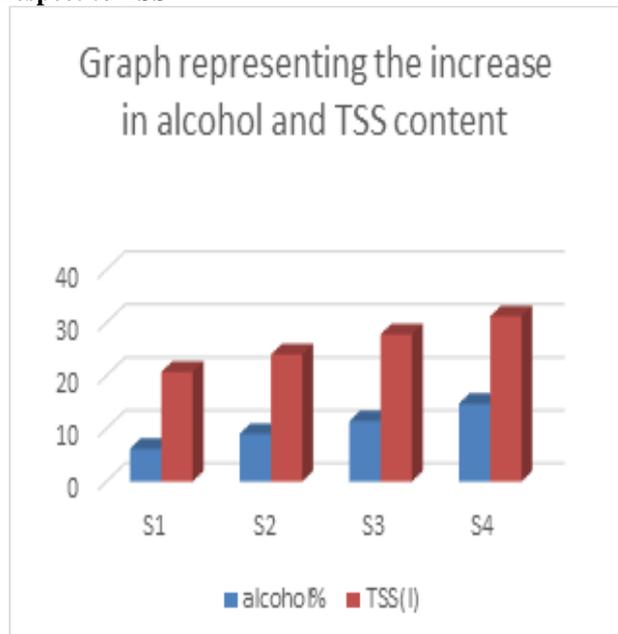
Table 2 Analysis of wine after fermentation for 3 weeks.

Sugarcane juice %	TSS[1] at PH[1] 4.5	TA %	PH	TRS	TSS	Alcohol %
40%	21.1	0.28	3.9	1.47	6.6	8.1
	20.8	0.31	3.6	1.68	6.9	7.6
50%	24.9	0.22	3.8	1.19	7.8	9.3
	24.1	0.30	3.6	1.20	7.9	9.1
60%	30	0.29	3.6	1.73	9.2	10.9
	29.2	0.36	3.5	2.8	9.7	10.2
70%	31.8	0.39	3.5	3.11	10.1	11.8
	31.0	0.44	3.4	5.92	10.6	11.4
SEm(+)	0.517	0.011	0.071	0.044	0.139	0.26
CD	1.58	0.05	-	0.12	0.43	0.76

Table 3 Analysis results after 5 months storage of wine.

Sugarcane juice %	TSS[1] at PH[1] 4.5	TA %	TRS %	TSS	Alcohol %
40%	21.1	0.44	1.4	6.2	8.5
	20.8	0.56	1.37	6.5	8.1
50%	24.9	0.56	1.04	7.3	9.7
	24.1	0.77	1.12	7.5	9.6
60%	30	0.46	1.44	8.2	11.2
	29.2	0.66	1.71	8.5	10.8
70%	31.8	0.71	1.66	9.0	11.9
	31.0	0.79	2.4	9.8	11.8
SEm(+)	0.517	0.017	0.042	0.112	0.271
CD	1.58	0.44	0.16	0.36	0.77

Change in alcohol% after Fermentation for different blending concentration of carrot sugarcane wine with respect to TSS



Hence, the maximum alcohol production (11.77-11.61) was observed at sugarcane juice of 70%. The total acidity ranges from 0.20-0.77%. Pasteurised juice produced less amount of alcohol % than non-pasteurized juice. Therefore, pasteurised samples are higher in acidity, TSS and reducing sugar but less in alcohol%, but in non-pasteurized samples, alcohol % of wine is more. After 5

months of storage, a small decrease in TSS and reducing sugar where the alcohol% and acidity of wine increases. These type of variations in the values might be due to further utilization of remaining sugar by the fermenting yeast and converts the sugar to CO₂ and ethanol. During primary fermentation, 70% of the alcohol was produced that last upto 3-7 days and the remaining 30% was produced by secondary fermentation that last upto 2 weeks. The TRS content of wine was significantly related to the TSS and alcohol content after 5 months of storage[9]. Among the samples prepared, non pasteurised 50% carrot sugarcane blending has highest sensory quality. Therefore non-pasteurized samples showed better acceptability as compared to pasteurised samples.



Figure 4 Prepared wine.

Sensory evaluation

Sensory evaluation for flavour, colour and overall acceptability were carried out under 5 point hedonic scale. The sensory scores ranges from 2.5-4.0 [10].

Table 4 Sensory evaluation of sugarcane carrot wine.

Sugarcane carrot blend juice %	Flavour	Color	Overall acceptability
40%	3.37	3.22	3.28
	3.11	3.12	3.11
50%	3.49	3.78	3.68
	3.38	3.51	3.40
60%	3.57	3.52	3.53
	3.29	3.30	3.27
70%	3.66	3.26	3.44
	3.58	3.11	3.20

V. CONCLUSION

The sugarcane carrot blended juice wine showed enhanced nutrient content, good color, flavour and overall acceptability. The wine produced from sugarcane and

carrot juice blend has been found to be acceptable, acceptable, as well as meeting all the standards required by a good wine in terms of colour, flavour, taste, aroma and overall acceptability.

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