

Wine Production from Different Types of Fruit Peels and *Beta vulgaris*

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ABSTRACT

The process of wine making begins with selection of fruit. Adding the pulp of *Beta vulgaris* with the different types of fruit waste peels, helps to increase the alcohol percentage and it gives natural color to the wine. The wine is produced by using the *Saccharomyces cerevisiae*. Primary and Secondary fermentation of these material is done for 7 to 28 days respectively, during which aliquots sample analysis of pH, alcohol estimation, Protein estimation, Carbohydrate estimation, Ash percentage, etc were carried out using standard procedure. During the fermentation period, consistent increase in alcohol content was observed with the time. This study shows that acceptable wine can be produced from different types of fruit peels and *Beta vulgaris*.

Wine has been produced by mixing different types of fruit peels and *Beta vulgaris*.

Among all the wine attributes, the contribution of fruit peels and *Beta vulgaris* wine was maximum.

Keywords- Wine production, Fruit peels, *Beta vulgaris*, Fermentation, *Saccharomyces cerevisiae*

I. INTRODUCTION

Wine is an alcoholic beverage made from fermented fruits juice, without the addition of sugar, acids, enzyme and water. The earliest archaeological evidence of grape wine has been found at sites in Georgia(6000BC), Iran(5000BC), Sicily(4000BC). The oldest evidence of wine production has been found in Armenia(4100 BC). Most commercially produced wines are usually made from fermented grapes. During this process, yeast is added to crushed fruits. No other chemicals or sugars are added. Yeast has the capability of converting the sugar from fruits into an alcoholic compound and thus reducing the sugar content in it for the production of different types of wine. The wine mainly has 5 types, that are - 1. Red wine. 2. White wine 3. rose wine. 4. Dessert wine 5. Sparkling wine. Fruits and vegetables are consumed in large quantities all over the world. However, the peels of these fruits, which by themselves have a high nutritional value are usually discarded and turn into waste. In our study we propose to make wine using such fruit peels. This will reduce wastage and provide us with a commercially valuable product like wine.

For our study, we used peels of commonly available fruits such as banana, sweet lime, pomegranate, watermelon, orange, etc. were used and the pulp of *Beta vulgaris* (Beet root) is used for the wine production. Beet root pulp gives the wine a rich red color. Peels were anaerobically fermented with *Saccharomyces cerevisiae* for a period of 7-28 days. The alcoholic by product obtained as a result were checked for their physicochemical properties.

II. MATERIALS AND METHODS

Sample Collection

The peels of Banana, Pomegranate, Sweet lime, Watermelon and pulp of beet root, etc. The covers or peels are found in every local market, juice center and in home as well also.

Activation of Yeast

For the wine product the yeast balls were needed not yeast powder. *Saccharomyces cerevisiae* (Baker's Yeast) is preferred mostly and in that some(1gm) sugar was added. It was dissolved and then Yeast (5gm) were added corresponding to the volume of fruit peel juice. It was stirred thoroughly for proper mixing and kept for 1hr. All this procedure was done in aseptic condition.

Inoculum Preparation

Take the fruits peels of thoroughly washed. Weight all the samples(15gm each) in equal quantity, but all the process is done in aseptic condition. Grind the sample with the help of Grinder and make the juice of it. Then filter the juice and pour into the flask. Then add yeast in all the flask. Adjust the pH it should be acidic(3-6) and temperature it should be at (37°). Add the pinch of antifungal reagent in the juice. The flask is plugged tightly with the help of cotton plug. Keep it on shaker for half an hour. Then keep it for incubation for 8-10 days and after that do the necessary test for wine. Then wine is ready to drink.

Physicochemical Analysis

a) **pH Determination:** The pH was determined using digital pH meter. The pH was acidic as required.

b) **Determination of Reducing Sugar:** The quantitative estimation of reducing sugar of the wine was determined using the method described by MILLER(1971) using 3,5 dinitrosalicylic acid (DNSA). The optical density of

sample was read against the blank in the colorimeter at 540nm absorbance.

c) **Determination of Protein Content:** The quantitative estimation of proteins of wine is also done by using the biuret method. The absorbance checked at 540nm in colorimeter.

d) **Determination of Fat Content:** The sample was taken in beaker and weighted as W, 10ml of D/W water where added, and the solid was dispersed by agitating it. Then 10ml of concentrated hydrochloric acid was added and kept in boiling water bath until the solid particles dissolved and the mixture become brown in color. Then allowed to cool and added 10ml of alcohol and stirring vigorously. A dried clean flask was weighted and recorded as W1 and the ether layer was transferred into the flask and placed into boiling water bath to evaporate the ether. The fat and the flask was weighted and recorded as W2, then the fat content was calculated as follows:

$$\% \text{Fat} = \frac{W2 - W1}{W} \times 100$$

where,

W = weight of sample

W1 = Weight of dried flask

W2 = Weight of dried flask fat residue.

e) **Amino Acid Estimation:** analysis for the presence of different types of amino acids was done using following tests Xanthoprotic Reaction, Milons Reaction, Hopkin'test ,etc.

f) **Carbohydrate Test:** There are the many test available for the carbohydrate test for e.g, Benedict Test. OR. The total carbohydrate content was obtained from fat, protein, moisture and ash content analyses where sum up and the carbohydrate content was calculated as follows:

$$100\% (\% \text{moisture} + \% \text{protein} + \% \text{fat} + \% \text{ash}).$$

g) **Alcohol percentage/ alcohol determination:** It is determined by two methods:

1) **Quick method:** In the quick method by using the instrument called as refractometer.

2) **long method/Reaction method :** The method consist of color reaction of ethanol with sodium dichromate. The colorimeter quantification was based on formation of green colored chromate ions resulting from treatment of ethanol and sodium dichromate as limiting reaction in presence of sulfuric acid and acetate buffer pH 3.8. The absorbance maxima for the ethanol was found to be 578nm.

h) **Ash Content:** The evaporating dish was used for checking the ash content. A preweighed dry dish was taken measured volume of sample was taken into this dish n kept in hot air oven for 1 hr till it got dried completely. The dish with the ash content was then weighed again and amount of ash was recorded from the weight of the evaporating dish. And calculate the ash

content. The result where calculated by using the following formula:

$$\% \text{ Ash content} = \left(\frac{W3}{W2} - \frac{W1}{W1} \right) \times 100$$

where,

W1= Weight of empty dishes,

W2= Weight of dish +Sample before ashing

W3= Weight of dish + Sample after ashing

i) **Moisture Content:** Sample was weighted into petri dish and placed in air draught oven at 100° for 1hour. The petri dish was then weighted after cooling. Loss in weight was calculated as the percentage moisture content and this was expressed by the following formula:

$$\% \text{ Moisture} = \frac{\text{loss in weight due to dryness}}{\text{weight of sample taken}} \times 100$$

$$\% \text{ Moisture} = \frac{W2 - W3}{W2 - W1} \times 100$$

where,

W1 = Weight of empty dish

W2 = Weight of dish + sample before drying,

W3 = Weight of dish + Sample after attaining constant weight on drying.

III. RESULT

The fruit both as well as in processed form not only improves the quality of our diet but also essential ingredients like vitamins, Minerals, carbohydrates etc. Wine were successfully developed using the fruit peels and the *Beta vulgaris*. The alcohol percentage of the wine is **11.9%**. The present study was carried out in small scale. The application of peels waste and *Beta vulgaris* wine production may provide alternatives to the already established wine produced from other raw materials such as grapes. Throughout the period of fermentation pH of the must was within the acidic range.

Components	Amount
Alcohol%	11.9%
pH	3.8
Reducing Sugar mg/ml	0.45mg/ml
Protein content mg/ml	1 mg/ml
Ash%	4.27%
Moisture%	80.43
Fat %	0.521
Carbohydrate %	15.10
Energy (Kcal/g)	65.97
Protein %	0.97

IV. DISCUSSION

In this research work, the choice of fruit peels (Banana, Pomegranate, Sweet lime, Watermelon) and *Beta vulgaris* (beet root pulp) were deliberate. From the table it was observed that the alcohol percentage is ranges

from 11 – 12 respectively. The fruit contained reasonable amount of carbohydrate, which gives an account of their high caloric value. The amount of carbohydrate in percentage is 15.10%. This work shows that the pH ranges of fruit peels and *Beta vulgaris* is 3.8 ± 0.01 respectively, while there is no significant difference in the values of reducing sugar amongst the samples. Also the ash content in the wine it is 4.27% respectively. In this study shows result of protein content in mg/ml is 1mg/ml and while it is calculated in the percentage it came as 97%. Remarkable amount of alcohol was produced from the wine during the fermentation with the yeast. In the present study, the amount of fat is 0.521% . After the 28 days fermentation of wine the moisture content is 80.43% it is same throughout the period of fermentation. And the most important part that the energy(Kcal/g) content it is 65.97 respectively. The studies has shown that during the fermentation of fruit peels and *Beta vulgaris* , the low pH is inhibitory to the growth of spoilage organism but creates conducive environment for the growth of desirable organism. Also, the low pH and high acidity are known to give fermenting yeasts competitive advantages in natural environment.

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