
ABSTRACT

Wine is an alcoholic beverage made from fermented grapes or other fruits. The natural chemical balance of grapes lets them ferment without the addition of sugars, acids, enzymes, water, or other nutrients. Yeast consumes the sugars in the grapes and converts them into alcohol. Different varieties of grapes and strains of yeasts produce different types of wine such as red wine ,white wine, sparkling wine, rose wine etc. Study was conducted to produce red wine without using any sugar and making use of the kitchen yeast strain i.e *Saccharomyces cereisiae* and was tested for the different physical and chemical characteristics of the wine such as acidity ,sugar content and other quantitative and qualitative tests. The wine was produced in simple lab conditions and using simple lab utensils and instruments so this techniques reduces the overall cost of wine production. The production and tests were conducted in small scale but this technique can be converted to large scale with few changes.

KEYWORDS: Fruit Wine, Wine Production.

INTRODUCTION

Wine is an alcoholic beverage made from fermented grapes or other fruits. The natural chemical balance of grapes lets them ferment without the addition of sugars, acids, enzymes, water, or other nutrients. Yeast consumes the sugars in the grapes and converts them into alcohol. Different varieties of grapes and strains of yeasts produce different types of wine. Red wine is now very common now in India also but is very expensive due to high cost of production. It will be very good if the cost of production can be decreased by making some changes in the materials and method.

Red wine – Red Wine is made from the must (pulp) of red or black grapes that undergo fermentation together with the grape skins.

White wine – White wine is made by fermenting juice which is made by pressing crushed grapes to extract juice; the skins are removed and play no further role. Occasionally white wine is made from red grapes; this is done by extracting grapes' juice with minimal contact with their skins.

Sparkling wine – Sparkling wine is a wine with significant levels of carbon dioxide. A classic example of a sparkling wine is Champagne. There are two levels of fermentation involved in making sparkling wine. It is the initiation of a secondary fermentation that distinguishes sparkling wine production and gives the wine bubbles.

Fortified wine - It can be red or white wine that has been flavoured by the addition of herbs and barks like cardamom, cinnamon, marjoram and chamomile. It is used primarily as pre-meal appetiser.

Rose wine – Rose wine is made from red grapes where the juice is allowed to stay in contact with the dark skins long enough to pick up a pink colour.

MATERIALS AND METHODS

Grapes: Grapes were purchased from market followed by its washing and then dried in air for half an hour.

Yeast: Dry yeast powder was purchased from market and then cultured in YEPD media for further use.

Lactic acid bacteria: We purchased Nutrolin B plus capsules from market and then cultured Lactic acid bacteria in luria broth.

Wine preparation:

- 1.5 kg grapes were weighed for the extraction of juice.
- Grapes were crushed in TLC tank to separate the skin of grapes and juice.
- Yeast paste was prepared and then added to the must (Grape skin & juice).
- This mixture is then kept in order to achieve primary fermentation for 15 days.
- After 15 days the must is then strained through muslin cloth to separate the juice from the skin of grapes.
- To the samples (grape juice), lactobacillus is then added for the secondary fermentation (malo-lactic fermentation) and kept for 20 days.

Produced wine is then is followed by many tests (qualitative and quantitative) in order to check for its alcohol and sugar content.

ACIDITY ESTIMATION:-

Material required : 4 pH tablet,7 pH tablet,9.2 pH tablet,Water,Buffer solutions, Juice sample (primary and secondary fermented)

- 1) Three solutions were prepared by adding the following:
 - i) 100 ml water + 4 pH buffer tablet
 - ii) 100 ml water + 7 pH buffer tablet
 - iii) 100 ml water + 9.2 pH tablet
- 2) Standardized the pH meter with the above three solutions.
- 3) Checked the pH of juice (primary)
- 4) Checked the pH of wine (secondary)

SUGAR ESTIMATION:-

Material required: Juice sample (primary and secondary fermented)
Anthrone, Glucose, Conc. H₂SO₄, Test tubes

ANTHRONE METHOD:

For juice sample after primary fermentation

- 1) Glucose stock solution preparation (1%): 1 gm glucose is added to 100 ml water.
- 2) Anthrone stock preparation (0.2%): 0.2 gm of anthrone is added to conc. H₂SO₄.
- 3) 1 ml juice (wine) is then added to 100 ml water.
- 4) Three test tubes were prepared for glucose stock solution with following composition:
 - i) 9 part water + 1 part glucose stock
 - ii) 8 part water + 2 part glucose stock
 - iii) 7 part water + 3 part glucose stock
- 5) Similarly three test tubes were also prepared for our juice sample with following composition:
 - i) 9 part water + 1 part juice
 - ii) 8 part water + 2 part juice
 - iii) 7 part water + 3 part juice
- 6) In all of these six test tubes we added 4ml of anthrone stock solution.
- 7) OD was taken at 450 nm for each of the 3 samples by using the 3 samples of glucose stock as the blank. The same procedure was repeated for the samples of juice (wine) after the secondary fermentation.

ALCOHOL ESTIMATION (QUALITATIVE):-

Material required: Juice sample (primary and secondary fermented), Iodine, Potassium iodide, Sodium hydroxide, Test tubes, Water bath, Beaker.

- 10 ml of both the samples were taken in two test tubes, one from primary fermented and second one from secondary fermented juice (wine).
- 100 μ l of iodine solution is added to the samples.
- 1 mg potassium iodide is then added.
- An addition of a small crystal of sodium hydroxide is then followed by the above step.
- This mixture is then kept in a water bath for 30 minutes.
- Yellow precipitate then confirms the presence of alcohol in the sample.

ALCOHOL ESTIMATION (QUANTITATIVE)

Evaporation method:

- 1) 2 empty beaker was taken and weighed using weighing balance.
- 2) 50 ml juice is then transferred to the one beaker and normal water to the other and again weighed.
- 3) The beakers was then kept on digestion unit at 35 °C for 20 minutes.
- 4) Beaker was then again weighed using weighing balance.
- 5) Using above data alcohol percentage (v/v) present in the wine was calculated.

RESULT AND DISCUSSION

- 1) **ACIDITY ESTIMATION:** The acidity of the wine was calculated to be 3.7 which is consumable for us.
- 2) **SUGAR ESTIMATION:** The test results show that, the amount of sugar present after the primary fermentation of wine is 86.67% and after secondary fermentation 62.68%.
Total amount of sugar converted to alcohol in pr. Fermentation = 13.33%
Total amount of sugar converted to alcohol in sec. fermentation = 37.32%
- 3) **ALCOHOL ESTIMATION (QUALITATIVE):** After addition of iodine, potassium iodide and sodium hydroxide to both the samples i.e- juice sample and wine sample, a yellow colored precipitate was formed which confirmed the presence of alcohol in both the samples.
- 4) **QUANTITATIVE ESTIMATION OF ALCOHOL CONTENT IN WINE:** Amount of alcohol calculated came out to be 9.4% v/v

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