Research Article

International Journal of Bioassays
ISSN: 2278-778X
www.ijbio.com

PREPARATION OF WINE FROM RED PUMPKIN AND SUGAR BEET ROOT

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Received for publication: February 22, 2013; **Accepted:** March 27, 2013

Abstract: Wine is an alcoholic beverage that can be produced by fermenting crushed grapes using variety of yeasts. In the present project red pumpkin and beet root was used for the preparation of wine. The smashed pieces of both were fermented in plastic jars. The process divided in two parts, every day shaking for 21 days after which supernatant collected and after 21 days the supernatant was kept undisturbed for next 21 days. After 42 days the specific gravity was tasted for confirmation of % alcohol and wine. The specific gravity of red pumpkin was observed 1.0853 by weight and that of beet root was 1.0743. The specific gravity indicates 11 to 14 % alcohol and wine is sweet.

Keywords: Red Pumpkin, Beet Root, Wine, Homemade, Specific Gravity

INTRODUCTION

The science of wine and winemaking is known as oenology. A person who makes wine is traditionally called a winemaker or *vintner*. Wine is an alcoholic beverage that can be produced by fermenting crushed grapes using variety of yeasts. In some places fruits like apple and berry are also used for the process to get apple wine or elderberry wine. The starch based things like rice and barely can also be used for preparing wine which resembles beer. However, grapes are the things that are widely used for the production of wine all over the world. The countries like France, Italy, Spain and US are some of the world largest producers of wine. Italy is the largest producer of wine in the world with the annual output of about 5000 tones and France is in the second largest producer with the annual production of about 4700 tons of wine. Red, White, Sweet, Sparkling and Deserting are different types of wines. Red, White and Sparkling wines are containing less amount of alcohol usually ranging from 10 to 14% by volume whereas the dessert ones contain more than 15 to 20% of alcohol. Winemaking can be divided into two general categories: still wine production (without carbonation) and sparkling wine production (with carbonation - natural or injected)[1].

During the primary fermentation, the yeast cells feed on the sugars in the must and multiply, producing carbon dioxide gas and alcohol. The temperature during the fermentation affects both the taste of the end product, as well as the speed of the fermentation. For red wines, the temperature is typically 22 to 25 °C, and for white wines 15 to 18 °C. For every gram of sugar that is converted, about half a gram of alcohol is produced, so to achieve a 12% alcohol concentration, the must should contain about 24% sugars. The sugar percentage of the must is calculated from the measured density, the must weight, with the help of a specialized type of hydrometer called a saccharometer. If the sugar content of the grapes is too low to obtain the desired alcohol percentage, sugar can be added (capitalization). In commercial winemaking, capitalization is subject to local regulations[1].

Alcohol of more than 12% can be achieved by using yeast that can withstand high alcohol. Some yeast can produce 18% alcohol in the wine however extra sugar is added to produce high alcohol content. During or after the alcoholic fermentation, a secondary, or malolactic fermentation can also take place, during which specific strains of bacteria (lactobacter) convert malic acid into the milder lactic acid. This fermentation is often initiated by inoculation with desired bacteria[2, & 7].

Health Benefits of Wines:-

Although it is understood that excessive drinking of wines causes some severe health problems, moderate taking of Red wine and other variety of wines is very helpful to avoid cardiovascular diseases and other heart problems. The presence of polyphenols in Red wines is considered as protective against such heart problems. The higher level of procyanidin in Italian wines is also responsible for reducing many other heart problems. Antioxidants found in the wines are working as anti-ageing agents and help keep youthfulness for moderate drinkers of wines. We can also avoid many liver diseases taking moderate quantity of wines in our daily life. Wines also seem very helpful for the people who are engaging in body exercises[2].

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Winemaking can become a mystifying experience for anyone familiar with its noble history. Wild grapes, Domesticated grapes, and various other fresh fruits like coconut (*Cocos nucifera*), pawpaw (*Carica papaya*) [11, 12] and vegetables can produce very exceptional wines. The objective of winemakers is to produce wines that we enjoy, usually created from locally available ingredients. The misconception that many winemakers have is that they intend to make the strongest wine possible, sacrificing quality. The amount of sugar called for in most recipes, no matter the source, will produce more alcohol than the yeast is capable of working off. Therefore, the resulting wine is likely to be extremely sweet with a "hot" alcoholic aftertaste that could require extensive aging to be enjoyable. Commercial wine yeast will ferment up to 11-12 % alcohol; therefore, producing a wine within the alcohol tolerance of the yeast will allow you to maintain complete control of the wine's sweetness. If the wine is not stabilized first, the yeast will eventually reactivate enough to blow out the corks or become effervescent (carbonated). The alcohol ranges in different types wines are white wines= 9-12 percent, rose wines = 9-12 percent, red wines =10-13 percent, fruit wines = 9-12 percent[5].

The red pumpkin & sugar beet are generally abundantly available in India throughout the year. The red pumpkin is not required cultivation process & it is also wildly available. Farmers do not pay much attention to these fruit vegetable. If the red pumpkin & sugar beet are utilized for the preparation of wine which has much importance & costly the farmer will get money by increasing the cultivation of these vegetables.

Objectives:

a) To provide simple method for wine making to farmers.
b) To make familiar Winemaking process for wine lovers.
c) To produce wines that we enjoy, usually created from locally available ingredients.
d) Saving Money
e) Aiming for Excellence
f) Develop a Profitable Business
g) Create a responsive business of wine making by farmers group[10].
h) Maximize economic growth of farmers by making wine from other sources like pumpkin and beet root rather than traditionally used sources like grapes in an environmentally sustainable manner[10].
i) Ensure the continued economic and sustainable production of quality wine from other resources.
j) Create stronger linkages with industry, local and state governments and regional development boards to encourage sharing of information, planning and investment through conducting such projects.

Fig.1 Red pumpkin

MATERIALS & METHODS

Ingredients:

Red pumpkin, Beet root, Sugar, Yeast, Campoden tablets (preservative), Wheat & Water, etc.

Miscellaneous/ Equipments:

Plastic Jars of Capacity 5 liters,
Gravity bottles 50ml capacity,
Cheese cloth, Funnel, Wooden spoon, Hand Gloves, BOD Incubator, Wine bottles, blender and slicer etc.

1. Red pumpkin & beet root were freshly purchased from the market.
2. Those were thoroughly washed in hot water, so as to disinfect them. These were sliced with the help of smasher or pestle in thin pieces. These were then placed in previously sterilized plastic or ceramic jars separately (Fig.1 & 2).

Red pumpkin Smashed

Fig.2: Beet Root Smashed

3. The double volume of boiled cool sterilized water is added in the jar.
4. The required amount of wheat grains & 50% of sugar is to be added in pumpkin & beet root smashed material in the container[3].
5. Then dried yeast powder in required quantity [10 gm] is added by dissolving yeast in lukewarm water.
6. Preservative is added to prevent unwanted bacterial & fungal growth.
7. The content in the jar mixed well with the help of wooden spoon.
8. The jars were closed air tightly & were kept in dark & cool place.
9. Every day the content was mixed with wooden spoon, each time the jars were tightly closed.
10. This processes followed up to 21 days[3].
11. After 21 days the content was filtered with cloth, solid was discarded & supernatant was collected in jar. In supernatant remaining amount of sugar is added[3].
12. The jars were kept in between 21 to 24°C temperature in BOD incubator (Fig.3b).
13. After 42 days the jar were placed at 7°C to set down the remaining solids.
14. After a total of 42 days, the jar is opened and gently taken out the clear wine on top and filled it up in a sterilized glass bottle.
15. The supernatant was tested for its alcohol content by using specific gravity bottle.
16. The supernatant was distillate (Fig.5) & tested for its alcohol at Dr B. B. Tanpure Sahakari Sugar factory distillery unit, Shri Shivajinagar, Rahuri.

Fig.3a. Beat root wine left, Pumpkin wine right (Clarification & Fermentation for 3 to 7 days).

Fig.3b: Beat root wine left, Pumpkin wine right (Sterilization & Fermentation for 7 to 14 days)

Flow diagram of the Process:

1. Primary Stage –---> Maceration---> Fermentation ---->Sterilization---> must (Smashed material) +water ---> Sulphiting
2. ---> After 24 hours Added Yeast (Temp.77 ° F- 25°C) check sp. gr. - store in dark and dry area
3. Day II---> Add sugar and other additives if needed > store room temp. 70°F-75°F
4. Day III –> Starring-→continue to ferment for 7 to 14 days > stirred daily (stirring prevents wine from turning to vinegar) (temp. 21-25°C)
5. Secondary Stage- straining or Filtration ---->supernatant collected ---> check sp gr. ---> if low i.e.0.999 ----> then add sugar
6. Clarification stage- kept for next 14 to 21 days for clarification---> adding stabilizer Ascorbic Acid---> prevents oxidation of wine---> temp. 15° C
7. Bottling stage (Fig.5) - Storage in cork bottles at temp. 15° C< ready after proper duration

RESULTS

The wine prepared by above process from two vegetable fruits was tasted for specific gravity by gravity bottle and alcohol content of distillate was

analyzed from Dr. B. B. Tanpure Sahakari Sugar factory distillery unit.

Table.1: The specific gravity [4] of red pumpkin wine and beet root

Substance	Specific gravity				Alcohol by volume	
	No. of estimations	Maximum	Minimum	Mean	No. of estimations	% of alcohol
Red pumpkin	05	1.0937	1.0721	1.0829	05	11 to 14
Beet root	05	1.0833	1.0721	1.0777	05	11 to 14

The sp. Gravity of red pumpkin wine =1.0853
The sp. Gravity of beet root wine = 1.0743

Table. 2: *Alcohol percentage of red pumpkin and beet root distillate.

Substance	Temperature indication (F)	Hydrometer reading from the chart	Alcohol by volume. % of alcohol
Red pumpkin	75	94.4	06.97
Beet root	75	91.1	11.54

*Dr B. B. Tanpure S.S. K. Ltd distillery unit

Table.3: The pH of red pumpkin and beet root wine.

Substance	pH			
	No. of Estimations	Maximum	Minimum	Mean
Red pumpkin	05	3.18	3.17	3.17
Beet root	05	3.38	3.37	3.38

Fig.4: Distillation of supernatant for Alcohol percentage

Suggestions-

a) Keep the jars & bottles cork to prevent fruit flies from being able to harm, they convert wine in to vinegar.
b) Do not expose to oxygen otherwise wine will be oxidized and its colour will change.
c) As the pH of wine is in between 3 to 3.5 (acidic) may cause harm to teeth and hence recommended that wine should be drink during meal.

Fig.5: Pumpkin wine (Bottling)

DISCUSSION

In the present investigation the specific gravity of beet root and pumpkin wine was 1.077 & 1.0829, respectively and alcohol content of beet root and pumpkin wine were 11.54 & 6.97, respectively. Similarly the pH was found to be 3.38 and 3.17 for beet root and pumpkin, respectively [7,8&9]. These parameters were in agreement with reference number 5 & 6 and analysis report provided by experts from Dr B. B. Tanpure Sahakari Sugar factory distillery unit indicates that liquid supernatant was wine. As the specific gravity of pumpkin and beet root wine is in between 1.00 to 1.54 gm by weight indicates 11 to 14 % of alcohol[4]. pH of Beer is 4 and pH of wine is 3.02 to 3.5in present project the pumpkin wine has pH of 3.17 and of beet root is 3.38[6] indicates 11 to 14% alcohol.

Wine was produced at 1:4 (must:sugar) from pawpaw (*Carica papaya*) and coconut (*Cocos nucifera*) using natural yeast (Receip A), natural yeast augmented with granulated sugar (Receip B), natural yeast augmented with Baker's yeast, granulated sugar (Receip C), a control consisting of granulated sugar and Baker's yeast (Receip D) [11 & 12]. In our process we prepared the wine by mixing all ingredients step by step mentioned in materials and methods keeping the temperature constant in BOD incubator. However, in controlled experiment we did not added the sugar, where we observed very low percent of alcohol and produced sparkling wine which was not sweet.

CONCLUSION

By using red pumpkin and beet root various wines can be produced by using the different receips A to D [11 & 12]. More research is required to determine the shelf stability of the various wines. The measurement of OD, total aerobic counts, colour, effect of variation of temperature on stability, percentage titratable acidity etc. these parameters are hereby recommended. The alcohol content of distillation of red pumpkin wine is 6.97% indicates dry wine& needs addition of sugar to

prepare sweet wine. Similarly, the alcohol content of distillation of Beet root wine is 11.54% confirms desired % of alcohol. Both can be used for wine making. The farmers and unemployed students can make wine with collaboration of wine industries and governments.

ACKNOWLEDGEMENT

We express our sincere thanks to Mr. Prasad Tanpure President, Dr B. B. Tanpure Sahakari Sugar factory and Shri Shivaji Shikshan Prasarak Mandal, Shri Shivajinagar, Rahuri for providing the laboratory facility. Our thanks are also due to Dr A. D. Kadlag for valuable suggestion and guidance provided during this Avishkar Project Selected for State level Avishkar Research Project Competition 2012 Workshop. The authors further extend their sincere thanks to BCUD, University of Pune, Pune for providing the funds to conduct this Avishkar Project. The project was selected for presentation from undergraduate Agriculture section at "State level Avishkar Research Project Competition workshop 2012 at University of Pune, Pune".

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Source of support: Nil
Conflict of interest: None Declared