Production of Home-made Wine from Citrus Citrullus Lanatus Linn and Prunus Domestica Linn

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Abstract

Wine is one of the most popular beverages globally and the human race has been preparing for years. The present research aimed to provide us with relevant information regarding preparation of home-brewed wine. Wine can act as a nutrient supplement for seasonal fruits and vegetables throughout the year. Using fruits having medicinal and nutritional value for wine production, the health benefits of them can be improved widely. It is a well-known fact that the safest wine to consume is the one produced commercially, but certainly there are ways to make perfectly aromatic, well-tasting and safe to drink wines in the comfort of our own homes. Grapes have been conventionally used so far to prepare wine, due to it being chemically well balanced. Using traditionally accepted methods coupled with various modern techniques, wine can be produced that is safe to consume and customised to our palates. In present research paper wine that has been prepared is made using Citrus lantanus Linn. or Watermelon and Prunus domestica Linn. or Plum. Morden techniques have been experimented and better wines cultured. Fermentation is carried out with Saccharomyces cerevisiae commonly known as baker's yeast. Daily monitoring was done to study the composition and characteristics of the wine. The wine produced resembled the commercial wine in terms of its composition, taste and aroma. There are several brands that commercially produce fruit wines, but it is yet to come to the forefront. Fruit wines bring in a potential for a lot of innovation, hence, seasonal fruits were used for the purpose of present research. The resulting wines that were produced using the given techniques were safe to drink and flavoured.

Keywords: wine, plum Prunus domestica Linn., watermelon Citrus lantanus Linn., fermentation, fruit

Introduction

Winemaking, a practice we have been following since 6,000 BC, which was the year of the earliest discovery of wine in Georgia. In India the earliest known evidence of grape-based wine comes from the late 4th century BC writings of Chanakya who the chief minister of Emperor Chandragupta Maurya was. In his writings, Chanakya condemns the use of alcohol while documenting the emperor and his court's frequent indulgence of a style of grape wine known as Madhu. In the centuries that would follow, wine became the privileged drink of Kshatriya or dominant class while the repressed caste typically drank alcohol made from wheat, barley and millet.

The most famous wine capital is Bordeaux, the capital of Southwest France, added to the UNESCO World Heritage list in 2007. Bordeaux wine region is an excellent gateway to some of the world's most famous vineyards. The city has more than 115,100 hectares of vineyards and produces around 6.5 million hectolitres of wine per year. With a special character and elegance, Bordeaux wine is known as one of the best in the world, mainly thanks to its terroir and climate coupled with assemblage and the pairing of grape varieties to terroir.
While the wine capital of India is Nasik, Maharashtra, the birthplace of Sula wines, one of the most famous wineries in India.
Fruit wines are fermented alcoholic beverages made from a variety of base ingredients (other than grapes); they may also have additional flavours taken from fruits, flowers, and herbs. This definition is sometimes broadened to include any alcoholic fermented beverage except beer.
In this day and age, wine drinking and creating has become its own niche. It is considered an art now wines are made with several different aromas and flavours. It is not just something one does only for pleasure but if one is skilled enough at identifying the subtle flavours, they can also pursue wine drinking as a career.
The study of wine is known as oenology derived from the Greek word oines which means wine and logos which means science. It refers to the science dedicated to the study and knowledge of wines. It also studies the cultivation of the vines, the production of the wine, its ageing and packaging, its tasting, its consumption and its marketing. Today, Louis Pasteur, having studied the action of yeast and bacteria as well as the process of fermentation, is considered to be the father of scientific oenology.
Fruit wine is prepared from the juice of a ripe fruit and fermented naturally with yeast. The alcohol formation in the fruit wine is through natural fermentation of the fruits and its content primarily varies in between 5% to 15%. To increase alcohol content, yeasts require sugar for generation of alcohol. The process called chaptalization is an alcohol enrichment process by addition of sugar in the fruit wine. The typical difference between grape wine and other fruit wines is that in production of the latter one, chaptalization along with some special enzymes are added to enhance its aroma quality. The grape wines are very common and have robust markets across the globe because grapes have sufficient content of sugar which results in 10-14% alcohol and are more stable. Yet, fruit wine has gained popularity in recent years with a high level of acceptance in the market. This acceptance is gained due to the sustainability of fruit wines and consumer's attraction towards trying new and innovative wines. Mostly fruit wines are matched perfectly with spicy food cuisines such as Indian cuisines whereas grape wines such as red wine matches better with western cuisines. The purity of fruit wines depends on the use of wholly fresh fruits and without addition of flavours and dilution.
This research explores the process of making fruit wine at a more personal level, i.e., the process of home-brewing. This is a process humanity has been perfecting since ages given that wine was commonly made at such a small scale for a long time before its commercialisation. For the purpose of this research, two types of fruit wines were made, Watermelon wine and Plum wine. While the watermelon wine has been made by simply following the procedure, the plum wine has been prepared with added flavours of certain spices such as cardamom, clove and cinnamon to check if it has an impact on the flavour and texture of the wine.

Review of Literature

Process of wine making

Winemaking involves mainly three categories of operations, viz: pre-fermentation, fermentation, and post fermentation operations (Iland et al., 2000; Jackson, 2000; Ribéreau-Gayon et al., 2000). In the case of wines made from grapes, pre-fermentation involves crushing the fruit and releasing juice. In case of white wine, juice is separated from the skin whereas in red wine the skins are not separated from the juice. Clarification of juice for white wine is usually achieved by sedimentation or centrifugation. Then yeast is added to the clarified juice to initiate fermentation. In red winemaking, the pulp, skins and seeds of grapes are kept together after crushing and during all or part of the fermentation. This is done to extract colour and flavour. Yeast is added to mashed pulp (must) in red winemaking.

Fermentation involves a reaction that converts the sugars in the juice into alcohol and carbon dioxide. Yeasts utilise the sugars during the fermentation period. A stuck fermentation occurs when yeasts do not completely utilise the available sugar and the rate of fermentation slows down and/or ceases. Clarification may be achieved by racking, filtration and/or centrifugation. Fermentation proceeds under anaerobic conditions and may be boosted with di-ammonium phosphate (DAP) to supplement nitrogen required for yeast growth in a non-traditional approach of winemaking. Post fermentation practices are done after fermentation has reached the desired stage or when fermentation is complete. Here, wine is racked off the yeast lees, usually in stainless steel vessels or in oak barrels. During the storage period, the wine may be filtered, cold stabilised, fine and/or blended.

Various fining agents such as enzymes, bentonite, diatomaceous earth, egg albumen etc. may be commercially purchased and added to aid in clarification of wines. Wine undergoes continued changes during maturation and at an appropriate stage; the wine is filtered and bottled. (Shrikant Baslingappa et al., 2014).

Plum wine

Plum contains 10–16% (w/v) of sugar and 5–14 g/kg of total acids. Glucose, fructose and sucrose are the principal sugars in ripened plum, while malic, citric, succinic, quinic and fumaric acids are dominant organic acids. The share of malic acid is up to 70% of total organic acids in ripened plums. Plum juice is also a good source of vitamins A (345 IU) and C (10 mg/L), as well as of potassium (157 mg/L). High content of natural phenolic phytochemicals, such as flavonoids and phenolic acids, is reported in plums. These compounds are effective natural antioxidants in the human diet which reduce the risk of cancer and other chronic diseases. Plums demonstrated high scavenger activity against oxygen-derived free radicals, such as hydroxyl and peroxyl radicals, and that activity is especially emphasised. (Uroš D. Miljić et al., 2014).

The optimal conditions for plum wine production were 18.3 °C, pH 3.0 and 7 days within which the production of 4.72% of ethanol, 1122 mg/L of methanol and 4.23 g/L of glycerol should be ensured. This was confirmed through the validation experiment. (Uroš D. Miljić et al., 2014)

Methanol has no organoleptic impact on wine. It is not formed by alcoholic fermentation, but exclusively from enzymatic hydrolysis of the methoxyl groups of pectins during fermentation. Furthermore, exponential increase in methanol concentration is observed with the increase of fermentation temperature. Increase in pH values of plum pomace has caused a slight increase in its content. Hence, the maximum

methanol content (1265 mg/L) is obtained when process parameters are 25 °C and pH 3.6, after 7 days of fermentation. (Uroš D. Miljić et al., 2014).
Glycerol is a non-volatile compound, without aro- matic properties, but which significantly contributes to wine quality by providing sweetness and fullness. The highest glycerol content (5.72 g/L) was obtained during fermentation at 25 °C and pH 3.6. Production of glycerol was more intensive during the first 4 days of fermentation, especially at the higher temperatures (Uroš D. Miljić et al., 2014).

Watermelon

The total bacteria; fungi; yeast and coliform count were determined. For fungi count; the media was treated with tartaric acid to inhibit the growth of bacteria. Enumeration of microorganisms was by serial dilution techniques. Petri-dishes were sterilised in an autoclave at 121°C for 15 minutes. Samples were homogenised and were transferred aseptically into the test tube using 1 ml sterile pipette and tenfold serial dilution was carried out. The plates were incubated at 37°C for 24 hours. The colonies were counted per plate using colony counters and expressed in colony forming units per ml (CFU/mL) and values were estimated by means of triplicate (Yusufu MI et al., 2018).

Fermentation

Fermentation is a process of deriving energy from the oxidation of organic compounds, such as carbohydrates and using an endogenous electron acceptor, which is usually an organic compound, as opposed to respiration where electrons are donated to an exogenous electron acceptor, such as oxygen through an electron transport chain. The risk of stuck fermentation and the development of several wine faults can also occur during this stage which can last from 5 to 14 days for primary fermentation and potentially another 5–10 days for a secondary fermentation. Fermentation may be done in stainless steel tanks, which is common with many white wines like Riesling, in an open wooden vat, inside a wine barrel and inside the wine bottle itself as in the production of many sparkling wines. (Saranraj P.et al., 2017)
Yeasts are of great economic importance. Yeasts, especially, different strains of S. Cerevisiae, have long been used to produce alcoholic beverages, solvents, and other chemicals. Yeast is a unicellular fungi or plant-like microorganism that exists in or on all living matter, i.e., water, soil, plants, and air. They are a microbial eukaryote, associated with Ascomycetes, and are rich in protein and Vitamin B. As a living organism, yeast primarily requires sugars, water, and warmth to stay alive. In addition, albumen or nitrogenous material is also necessary for yeast to thrive. There are hundreds of different species of yeast identified in nature, but the genus and species most used for baking are S. cerevisiae. The scientific name S. cerevisiae means “a mould which ferments the sugar in cereal to produce alcohol and carbon dioxide.” (Saranraj P. et al., 2017)
Fruit juices are fermented to produce wine, an alcoholic beverage. Grapes are usually preferred because of the natural chemical balance of the grape juice which aids their fermentation process without the addition of sugars, acids, enzymes, or other nutrients. However, fruits such as banana, cucumber, pineapple, and other fruits are used in wine production. Home-made wine production has been practised with various fruits such as apple, pear and strawberry, cherries, plum, banana, pineapple, oranges, cucumber, watermelon, and guava. Using species of S. cerevisiae which converts the sugar in the fruit juices into alcohol and organic acids, that later react to form aldehydes, esters, and other chemical compounds which also help to preserve the wine.Yeasts from other sources such as palm wine have also been used in the production of fruit wine. (Saranraj P. et al., 2017)

Fermentation is a viable technique in the development of new products with modified physicochemical and sensory qualities, especially flavour and nutritional components. Alcohol and acetic and lactic acid fermentation are important for quality in production. Of these, alcoholic fermentation is widely employed for the preparation of beverages in which alcohol is a major constituent. Fermented beverages have been known to humankind from time immemorial. An alcoholic beverage is a drink that contains ethanol. These are divided into three general classes for taxation and regulation of production, namely, beers, wines, and spirits distilled beverages such as whisky, rum, gin, and vodka. Beer is made by fermentation of starch combining yeast and malted cereal starch, especially barleycorn, rye, wheat, or a blend of several grains and usually flavoured with hops. It contains 4–8% alcohol and its energy value ranges between 28 and 73 kcal per 100 ml. Distilled alcoholic beverages are produced by distilling ethanol by fermentation of grains, fruits, or vegetables. They are made from sugarcane juice, molasses, fermented mash of cereals and potatoes, and fermented malt of barley and rye. The alcohol content in distilled alcoholic beverages ranges between 40% and 60%. (Pazhani Saranraj Et al, 2017).
Fermentation occurs in nature in any sugar-containing mash from fruit, berries, honey, or sap tapped from palms. If left exposed in a warm atmosphere, airborne yeasts act on the sugar to convert it into alcohol and carbon dioxide. (Pazhani Saranraj Et al, 2017).

Yeast

They can also decrease the concentrations of unwanted compounds that affect food safety, such as ochratoxin A, ethyl carbamate, and biogenic amines. Due to all those scientific advances, the main manufacturers have just started to commercialise dry non-Saccharomyces, such as Torulaspora delbrueckii, Schizosaccharomyces pombe, Metschnikowia pulcherrima, Lachancea thermotolerans, and Pichia kluyveri. Other non-Saccharomyces species with special enology abilities such as Candida zemplinina, Kloeckera apiculata, Hanseniaspora vineae, Hanseniaspora uvarum, C.stellata, Kazachstania aerobia, or Schizosaccharomyces japonicus could follow a similar progress. (Sergi Maicas, 2021)
Yeasts, the main microorganisms involved in alcoholic fermentation, are found throughout the world. More than 8,000 strains of this vegetative microorganism have been classified. About 9 to 10 pure strains, with their subclassifications, are used for the fermentation of grain mashes. These belong to the type of Saccharomyces cerevisiae. Each strain has its own characteristics and imparts its special properties to a distillate when used in fermentation. A limited number of yeasts in the classification Saccharomyces ellipsoides are used in the fermentation of wines from which brandy is distilled. The strains used in the fermentation of grain mashes are also used in the fermentation of rum from sugarcane extracts and in beer production. Since yeasts function best in slightly acidic medium, the mash, juice, sap, or extract prepared for fermentation must be checked for adequate acidity. If acidity is insufficient, acid or acid-bearing material are added. For distilled liquors, fermentation is carried out at 24° to 29°C for 48 to 96 hours, when the mash or must is ready for distillation. The alcohol content of the fermented must is about 7 to 9 percent. (J. Maud Kordylas, 1992).

Natural alcohol production in wine

People making their own alcoholic beverages often calculate the percentage of alcohol by volume by measuring their relative density with a hydrometer or their sugar content with a refractometer. These simple instruments cleverly detect how much sugar gets converted into alcohol during the fermentation process. Larger manufacturers may call upon laboratories that can analyse their beverages with more advanced techniques, including methods known as distillation and gas chromatography. (Article by B. Hayes/NIST, 2022)

One method involves an instrument called a hydrometer, which typically consists of a small, weighted tube with a numerical scale on it. In this method, you submerge the hydrometer tube into a container with a sample of your alcoholic beverage in it. The tube will sink by an amount that depends on how dense your alcoholic liquid is.

The density of the alcoholic liquid will change during fermentation, as sugar gets converted into alcohol (and for beer, bubbles of carbon dioxide, too). Before fermentation, the liquid (containing sugars that will be converted to alcohol) is denser than alcohol, and because of this, the hydrometer floats more before fermentation. After fermentation, the sugars are converted to alcohol, and the hydrometer will sink more after fermentation.

To measure ABV, you make two measurements with the hydrometer, one before fermentation and one afterward. With these measurements, you are basically finding out how much sugar in the beverage changed into alcohol during fermentation. By subtracting the first reading from the second one, and then making a simple calculation, you can find out how much alcohol is in there.

To accurately calculate the ABV, several important factors need to be considered. Temperature can affect the density, as well as the release of carbon dioxide bubbles in the case of beer. Manufacturers of hydrometers provide formulas and charts that make it easier for homebrewers and winemakers to convert their readings into an accurate ABV result. (Article by B. Hayes/NIST, 2022)

An alternative to using the hydrometer is a refractometer, another simple instrument that can be used to measure concentration of substances dissolved in a liquid. When light hits a liquid, it changes direction, a phenomenon known as refraction. Refractometers measure the degree to which the light changes direction. In an alcoholic beverage, the amount of sugar as well as alcohol greatly affects how light refracts in the liquid.

Homebrewers, whiskey makers, wine makers and even wine grape growers (vignerons) use the refractometer to measure the concentrations of sugar in the wort — the liquid extracted from the mashing process when brewing beer and whiskey. Within the instrument is a measurement scale (usually one called the Brix scale, or the similar Plato scale) that is used to indicate the concentration of sugar. Once yeast is added to the wort, it ferments, converting the sugar in the wort to alcohol. To calculate the ABV, brewers need to measure the sugar concentration of the wort before it ferments, and afterward once fermentation stops. (Article by B. Hayes/NIST, 2022)

Production of Methanol

Methanol (CH3OH) is a toxic alcohol that is found in various household and industrial agents. Methanol exposure can be extremely dangerous, with significant morbidity and mortality if left untreated. Methanol poisoning is most often due to accidental or intentional ingestions, and accidental epidemic poisonings due to distilling and fermenting errors and beverage contamination. Products that contain methanol include windshield washer fluid, gas line antifreeze, carburettor cleaner, copy machine fluid, perfumes, food warming fuel, and other types of fuels. Exposures can cause varying degrees of toxicity and can require a range of treatments from close laboratory monitoring to antidotal therapy and dialysis. The primary treatments are either ethanol or fomepizole, and unlike ethylene glycol toxicity, dialysis is often recommended. (John V. Ashurst et al., 2022).

Incidence of methanol contamination of traditionally fermented beverages is increasing globally resulting in the death of several persons. The source of methanol contamination has not been clearly established in most countries. While there were speculations that unscrupulous vendors might have deliberately spiked the beverages with methanol, it is more likely that the methanol might have been produced by contaminating microbes during traditional ethanol fermentation, which is often inoculated spontaneously by mixed microbes, with a potential to produce mixed alcohols. Methanol production in traditionally fermented beverages can be linked to the activities of pectinase producing yeast, fungi and bacteria. (Elijah Ige Ohimain, 2016).

Methanol is produced before and during alcoholic fermentation from the hydrolysis of pectins by pectinase enzymes (such as methyl pectinesterase) which are naturally present in the fruit. More methanol is produced when must is fermented on grape skins; hence there is generally more in red wines than in rosé or white wines. Exogenous pectinase enzymes are permitted for use in winemaking (generally as clarifying agents). (FIVS et al, 2016).

Durability of home-made wines

Without extra steps, your homemade wine can stay shelf stable for at least a year. If you store it out of light, in an area without temperature fluctuations, and add the extra sulfites before bottling, the longevity can increase to a few years. (Article on mednscorkandcap.com, 2019)

Some wines age better than others, and after the five-year mark, the wine can start to become a little less desirable. Drinking these wines in the first three years after making them is best.

Papaya peel in Home-made wine making as a clearing agent

Papaya peel has huge amounts of monosaccharides, pectin and protein which facilitate the growth of fungus (Chaiwut et al. 2010; Maran and Prakash 2015). Papaya peel contains partially esterified (45–51%) pectin (Boonrod et al. 2006). Utilisation of this by-product has been reported to produce the enzymes pectin methylesterase and polygalacturonase in SSF, which will also help to solve the pollution problem of papaya processing units. Papaya peel has been used along with 10% (w/v) orange peel for the production of pectin methylesterase (Patidar et al. 2016; Rebello et al. 2017).

Due to the wide applications of polygalacturonase and pectin methylesterase, there is a need to highlight recent developments on several aspects related to their production in SSF. Microbial sources, production, characterization and application of pectinases have been reviewed (Kashyap et al. 2001; Jayani et al. 2005; Favela-Torres et al. 2006; Sharma et al. 2013). However, the most common sources of pectinolytic microorganisms, recent development in SSF process for polygalacturonase and pectin methylesterase production, and their assay methods have not been considered until now. Therefore, these aspects have been focused in the present review. The applications of these enzymes in fruit juice clarification have also been discussed in the present review.

Pectinolytic enzymes are one of the upcoming enzymes of fruit industries. Fruit juices are naturally cloudy mainly due to the presence of pectin polysaccharides (Sharma et al., 2017). The high concentration of pectin leads to colloid formation in the juice, which leads to problems in the processing of clear fruit juices. The role of acidic pectinases in bringing down the cloudiness and

bitterness of fruit juices is well established (Kashyap et al. 2001; Jayani et al. 2005). In an unripe fruit, pectin is bound to cellulose microfibrils in the cell wall. Such pectin is insoluble and hence confers rigidity to cell walls. However, during ripening the structure of pectin is altered by naturally occurring enzymes in the fruits. As a result of this, the pectin becomes more soluble and softens the plant tissues (Caffall et al., 2009).(Patidar et al. 2016; Rebello et al. 2017).

Potassium Metabisulphite as a preservative in wine-making

Sulfites or sulfite agents such as sulphur-containing salts (sodium and potassium metabisulfite or bisulfite), sulphurous acid and sulphur dioxide (SO2) are the most utilised preservatives and seem indispensable in winemaking due to their antioxidative, antimicrobial and dissolving properties. While moderate oxidation improves the quality and sensory characteristics of red wines, SO2 is essential for the preservation of the colour and aroma of white wines. Due to its positive conservation and regeneration effect on wine aroma, SO2 is the most effective additive in wine production. Besides the direct oxygen scavenging and inhibition of oxidation enzymes, the main antioxidative function of SO2 is in its binding to hydrogen peroxide, which is the product of oxygen reduction. In that process, it prevents the aldehyde production and oxidation of other readily oxidizable compounds. Moreover, SO2 also reduces quinones (brown polymers) back to their phenol form and improves polyphenolic wine composition . Among its multifunctional properties, SO2 has a very important antimicrobial role against different unwanted microorganisms such as epiphytic yeasts, lactic acid bacteria (LAB) and, to a lesser extent, acetic acid bacteria (Ana-Marija Jagatić Korenika Et al, 2020).

Effect of Ethanol and Tannins on the taste

Tannins, including grape-derived condensed tannins (flavonoids) produce sensations of astringency in food and drink and form the ‘structure’ or ‘body’ of red wine. The term astringency refers to the drying and a puckering sensation in the mouth and is a characteristic of red wine and its mouth-feel. Wine tannin quality is dependent on the maximum intensity of the mouth feel, total duration and time taken to reach maximum intensity, as well as the extent of mouth drying and mouth roughness. The spectrum of subtle differences in astringency sensations was compiled as a ‘red wine mouth-feel wheel’ by Gawel et al., which include such descriptors as ‘powder’ through to ‘adhesive’ and ‘aggressive’. Astringent sensations of wine are considered pleasant when balanced with other factors including alcohol and sugar content. Higher concentrations of tannins

and acids compared with sugar results in a highly astringent wine that is considered ‘harsh’, ‘unripe’ or ‘green’, and conversely, higher concentrations of sugars can result in a wine that may be described as ‘thick’ or ‘flabby’. Astringency influences the quality of red wine and therefore knowledge of the structures of astringent compounds in a wine matrix and the impact of these structures on the sensory properties can be an important aspect of winemaking. (Jacqui M. McRae et al., 2011)

Tannin, acid, and ethanol are fundamental components driving overall aroma, taste and mouthfeel in red wine. Specific wine or vinicultural production practices modify these components prior to, or during vinification. The extraction of grape derived tannin is dictated by cap management and maceration (Sacchi et al., 2005). Ethanol, the result of sugar fermentation, is modified by altering juice sugar concentration during fermentation or harvesting at various fruit maturities. Acidity is also commonly adjusted prior to fermentation through the addition of tartaric acid. Tannin concentration is correlated with wine bitterness and astringency (Kennedy, Ferrier et al., 2006; Villamor et al., 2013; Vidal et al., 2003). Villamor (2013) evaluated three tannin concentrations (500, 1000, and 1500 mg/L) in a model red wine showing that increased tannin content increased the perceived intensity of drying and bitterness. They also report an interaction effect of ethanol and tannin on drying intensity. Vidal (2003) reports similar conclusions from their study also using model wine. (Scott C.Frost et al., 2017)

Typical American or European recipes will call for 1.5kg of grapes for every litre of wine. Some traditional Indian wine recipes, on the other hand, would use 200-500 gm of fruit per litre of wine or hard cider. This results in a wine that starts tasting too watery, i.e. lacks the body and mouthfeel. To compensate for this lack of body, wheat is added. The skin of the seeds is rich in tannins that make the wine less watery. (Article by Arishtam, 2020)

Materials and Methods

Material required for watermelon wine

1. 2.5L water
2. 800g sugar
3. 2 watermelons juiced and filtered.
4. 1 tablespoon of yeast
5. Handful of whole wheat grains lightly roasted.
6. Half a lemon water.
7. 5L jar
8. Muslin Cloth
9. Plastic Cling film
10. Rubber bands
11. Half a Papayas peels
12. Syphoning tube or medical drip tube
13. Potassium Metabisulphite

Method for making watermelon wine

1. Two watermelons must be cut into pieces and juiced. The juice must be filtered to remove all the fruit fibre and seed chunks.
2. This juice must be added to a sterilised 5L jar.
3. 2.5 L water must be boiled along with sugar. After boiling for 20-25 mins, it must also be slowly added to the jar.
4. Half a lemon juice must be added.
5. Half a papaya peel also must be added.
6. This should be kept to cool slightly for 4-5 hrs.
7. After the cooling period, 1 tablespoon of yeast must be added along with the wheat.
8. Next the jar must be covered with a cling film and secured with a rubber band.
9. This should be stirred using a sterilised wooden spoon everyday for 7 days.
10. On the 3rd or 4th day $^{1}/_{4}$ tsp Potassium Metabisulphite must be added and mixed, this is a preservative to prevent any bacterial or fungal growth.
11. Once the 7 days of fermentation are over, it should be left undisturbed for two to three weeks.
12. After 21 days the haze is expected to clear and settle down.
13. Thereafter the wine can be syphoned out using a brewer's syphoning tube or a medical drip tube.

14. This wine bottle must be corked tightly and left in a cool, dry place away from sunlight.

Process of watermelon wine making

Figure1: Two watermelons cut into pieces and deseeded.

Figure2 : Watermelon grinded and filtered to remove fiber and pulp.

Figure 3: Adding boiling water to the watermelon preparation.

Figure 4 : Adding handful of roasted wheat seeds.

Figure 5 : Adding yeast to watermelon solution.

Figure 6: Process of fermentation begins.

Figure6 : Filtering watermelon solution after the process of fermentation.

Figure7 : Watermelon wine after the process of fermentation and filtration has ended.

Materials required for plum wine

1. 2kg Plums
2. 2.5L water
3. 1 cinnamon stick, 3 cloves, 6 cardamom pods
4. 800g sugar
5. 1 tablespoon of yeast
6. Handful of whole wheat grains lightly roasted.
7. Half a lemon water.
8. 5L jar

9. Muslin Cloth
10. Plastic Cling film
11. Rubber band
12. Half a Papaya peel
13. Syphoning tube or medical drip tube
14. Potassium Metabisulphite

Method for making plum wine

1. The 2kg plums must be cut and deseeded. The pieces and seeds must be put into the 5kg jar.
2. 2.5 L water must be boiled along with sugar, 1 cinnamon stick, 3 cloves and 6 cardamom pods. After boiling for 20-25 mins, it must also be slowly added to the jar.
3. Half a papaya peel also must be added and half a lemon juice must be added.
4. This should be kept to cool slightly for 4-5 hrs.
5. After the cooling period, 1 tablespoon of yeast must be added along with the wheat.
6. Next the jar must be covered with a cling film and secured with a rubber band.
7. This should be stirred using a sterilised wooden spoon everyday for 7 days.
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11. Thereafter the wine can be syphoned out using a brewer’s syphoning tube or a medical drip tube.
12. This wine bottle must be corked tightly and left in a cool, dry place away from sunlight.

Process of making Plum wine

Figure 8 : Cutting 2kg plums into pieces and deseeding.

Figure9 : Adding 800g sugar and spices to boiling water.

Figure10 : Adding boiling sugar water to the jar with plum.

Figure11 : Lightly roasting a handful of wheat seeds to sterilize.

Figure12 : Adding yeast to plum mixture.

Figure 13 : Adding half a lemons juice to mixture.

Figure14 : Covering the jar with a cling film to prevent contamination.

Figure15 : Process of fermentation begins.

Figure 16 : Filtering plum wine after the process of fermentation has ended.

Figure 17 : Adding required amount of Potassium Metabisulphite

Observations

Watermelon wine:

Taste - Bitter, fruity, slightly tart

Colour - red colour

Visibility - translucent

pH - 5

Odour - fruity

Texture - dry, sharp

Final Specific Gravity - 1.000

Plum wine:

Taste - slightly sweet, fruity, slightly tart

Colour - peach colour

Visibility - clear

pH - 5

Odour - fruity

Observations as Figures

Figure 18 : Displaying pH 5 of watermelon wine.

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Figure 19 : Matching pH of 5 to respective colour to confirm.

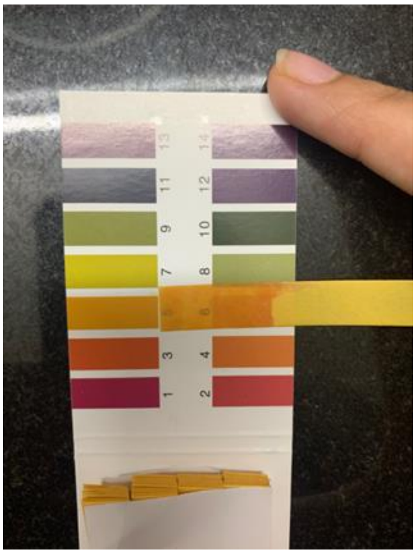

Figure20 : Hydrometer reading of watermelon wine.

Figure21 : Displaying pH 5 of Plum wine.

Figure 22 : Matching pH of 5 to respective colour to confirm.

Figure 23 : Hydrometer reading of Plum wine.

Result

Both wines have developed a delicious and slightly fruity taste, though plum more than watermelon. Both are slightly bitter as well because of the formation of alcohol and tannins but watermelon more than plum in this case. They also have a slight sour taste. Overall, they are well made. It is safe for consumption due to the addition of the preservative.

Watermelon wine, according to several investigations, has certain medicinal properties. It prevents breast, prostate, uterus, and lung cancer, helps to lower blood pressure, is a good helper for those who want to lose weight, is considered a good diuretic, reduces the risk of metabolic diseases. It helps fight muscle aches and helps improve skin tone and eyes health, it is an excellent aphrodisiac. (Article by: wineonmytime.com/watermelon-wine)

Researchers found that plum wines had a moderate total antioxidant capacity, similar to those of cherry and raspberry wines, but less than wines made from grapes or blueberries. Essential minerals including calcium, magnesium, manganese, zinc, iron and especially potassium were also present in the fruit wines

as well as the red wines. Plum wines and other fruit wines were found to contain significantly less headache-inducing histamines than red wines. (Article by: livestrong.com/is-plum-wine-healthy)
Winemaking has turned into a booming industry since the past few years. As we are aware, the Wine capital of the world is Bordeaux, France, but now wine making has been adapted by several other countries. Experts as well as home brewers, everyone has been experimenting with wine in their own ways. India has a not very well-known but a great fruit wine industry too. Some Indian brands include Wildberry Beverages, Coorg Wines, Rhythm Winery and Nara Aaba.

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