Script

Wine

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1. Introduction

A simple definition of wine is the fermented juice of the grape. Nevertheless any fruit with a good proportion of sugar may be used for wine production. Thus, citrus, banana, apple, pineapple, strawberries etc., may all be used to produce wine. Such wines are always qualified as fruit wines. If the term is not qualified then it is regarded as being derived from grapes, *Vitis vinifera.* The production of wine is simpler than that of beer in that no need exists for malting since sugars are already present in the fruit juice being used. This however exposes wine making to greater contamination hazards.

Wine is today principally produced in countries or regions with mild winters, cool summers, and an even distribution of rainfall throughout the year. In North America, the United States is the leading producer, most of the wine coming from the State of California and some from New York. In Europe the principal producers are Italy, Spain and France. In South America, Argentina, Chile, and Brazil are the major producers; and in Africa, they are Algeria, Morocco, and South Africa. Other producers are Turkey, Syria, Iran, and Australia.

Wine has been produced for thousands of years. The earliest evidence of wine to date was found in the Republic of Georgia where 8,000-year-old wine jars were uncovered. Traces of wine have also been found in Iran with 7,000-year-old wine jars and in Armenia with the 6,100-year-old. The earliest form of grape-based fermented drink however, was found in northern China, where archaeologists discovered 9,000-year-old pottery jars. Wine had reached the Balkans by 4500 BC and was consumed and celebrated in ancient Greece, Thrace and Rome. It has been consumed for its intoxicating effects throughout history and the psychoactive effects are evident at normal serving sizes.

The history of wine and winemaking is as old as civilization itself. Stories abound about how wine was first discovered, and one of the more delightful tells of a mythical Persian king called Jamsheed. At his court, grapes were kept in jars for eating out of season. One jar was discarded because the juice had lost its sweetness and the grapes were deemed to be poisonous. A damsel from the king's hareem was suffering from nervous headaches and tried to take her life with the so-called poison. She fell asleep, to awake later feeling revived and refreshed. She told everyone what she had done and of the miraculous cure, and there upon 'a quantity of wine was made and Jamsheed and his court drank of the new beverage'. The great civilizations of Ancient Greece and Rome trace wine back into their pre-history, with similar legends about its discovery. Ancient Egypt has left us wine lists and wall paintings; indeed they even recorded the vintage, vineyard and winemaker on individual jars of wine. The world of wine has grown enormously in the past 20 years, and its international face and accompanying tastes have changed beyond recognition.

During the Vedic period of Indian history (2500 to 200 BC), based originally around the Indus River system, wine was worshipped as the liquid god Soma because of its medicinal attributes. The Hindus' most ancient sacred text, called the Vedas, credited Soma with great medicinal powers. Another Hindu sacred text is the Rig-Veda, which contained hymns praising Soma such as: 'This is Soma, who flows wine, who is strength giving . . .'; and 'the god Soma heals whatever is sick . . . makes the blind see and the lame walk'.

Thus, by the end of the 20th century, wine was established as a medicine in continental Europe and Australia, although the Temperance Movement had eroded its position in the UK and the USA. Since then, the scientific evidence on wine as a medicine has multiplied enormously, especially during the past decade.

2. Classification of Wines

Grape wines may be classified in several ways. Some of the criteria include place of origin, color, alcohol content and sweetness. This system classifies wine into two groups: natural wines and fortified wines.

A. *Natural wines*: 9-14% alcohol; nature and keeping quality mostly dependent on 'complete' yeast fermentation and protection from air

1. *Still wines* (known as 'Table' wines intended as part of meal); no carbon dioxide added.
    (a) *Dry table wines*: (no noticeable sweetness)
        (i) White; (ii) Rose (pink); (iii) Red
    (b) *Sweet table wines*
        (i) White (ii) Rose

Further naming of above depends on grape type, or region of origin.

2. *Sparkling wines* (appreciable CO2 under pressure)
    (a) White (Champagne); (b) Rose (Pink Champagne); (c) Red (Sparkling burgundy; cold duck)

B. *Fortified (Dessert and appetizer) wines*: Contain 15 to 21% alcohol; nature and keeping quality depends heavily on addition of alcohol distilled from grape wine.

1. *Sweet wines*
    (a) White (Muscatel, White port, angelica)
    (b) Pink (California tokay, tawny port)
    (c) Red (Port, black Muscat)

2. *Sherries*: (White sweet or dry wines with oxidized flavors)
    (a) Aged types
    (b) Flor types
    (c) Baked types

3. *Flavored specialty wines* (usually white Port base)
    (a) Vermouth (pale dry, French; Italian sweet types)
    (b) Proprietary brands

The natural wines: These result from complete natural fermentation. Further fermentation is prevented because the sugar is to a large extent exhausted. Spoilage organisms such as acetic acid bacteria do not grow if air is excluded. Owing to the natural limit of sugar in grapes, the alcohol content does not usually exceed 12%. They are sub-divided into still (without added CO2) and sparkling (with added CO2).

Table wines: In general the natural wines are usually consumed at one sitting once they are opened. For this reason they are called 'table' wines and intended to be part of a meal. They are usually served in generous amounts, partly because they contain less alcohol than the desserts and appetizers and partly because they do not have a high keeping quality once opened compared with appetizers and dessert wines.

Dessert and appetizer wines: The second broad group of wines are dessert or appetizer wines. As can be seen from their names they are served at the beginning (appetizers) or at the end (dessert) of meals. They contain extra alcohol from distilled wines, partly to make them more potent, but also to preserve them from yeast spoilage. These are divided into three categories: (a) Sweet e.g. port; (b) Sherries – sweet or dry, they originated from Portugal and are characterized by flavors induced by various degrees of oxidation; (c) Flavored wines e.g. vermouth; these are flavored with herbs and other components which are secrets of the producing firms.

Sparkling Wines: Sparkling wines contain CO2 under pressure before they are opened. They are called sparkling because the gentle release of carbon dioxide from the wine after the bottle is opened gives the wine a sparkle. The best known of the sparkling wines is produced in Champagne region in northern France which has given its name to the wine.

Fortified wines: In other wines contact with oxygen no matter how small is undesirable. The fortified wines are however produced by the deliberate but controlled oxidation of wine. The oxidation is achieved by prolonged ageing in the pressure of air, by the growth of an aerobic yeast or by heating. The consequence of this oxidation is a product which has a dark, reddish-brown color with a characteristic flavor, whether the starting wine is white or red. For sherry therefore a white wine is used but for port or Madeira a red or a white wine may be used.

All the three fortified wines have a high alcohol content of ranging from 15-20% (v/v), derived from added alcohol hence their name. They are usually separated into two groups: (a) Vermouth (b) Other flavor wines (Special natural wines).

Fruit wines: Cider and Perry

Often fruits do not contain enough sugar to make a potent alcoholic beverage. Under such conditions, extra sugar in the form of sucrose is added to encourage fermentation. Fruit wines are popular in some countries where grapes cannot thrive.

Cider is derived from apples, (*Malus pumila*) and perry from pears or a mixture of pears and apples. They differ from other fruit wines in that their alcohol content is low (4-5% with a maximum of 7-8% v/v) because sugar is not usually added. The basic processes are similar to those of grape wine: pressing out the juice, fermenting, maturing, and bottling. Fruit wines have been made from cashew, pineapples, and other fruits.

Palm wine

Palm wine is a general name for alcoholic beverages produced from the saps of palm trees. It differs from the grape wines in that it is opaque. It is drunk all over the tropical world in Africa, Asia, South America.

Palm wine is usually a whitish and effervescent liquid both of which properties derive from the fact that the fermenting organisms are numerous and alive when the beverage is consumed.

The sap of the palm is obtained from a variety of positions: the stem of the standing tree, the tip or trunk of the felled tree and the base of the immature male inflorescence. Which method is favored depends on the country concerned but most studies have centered on inflorescence wine. The sap produced by this method in *Elaeis guiniensis* contains about 12% sucrose, about 1% each of fructose, glucose, and raffinose, and small quantities of protein and some vitamins and is a clear, sweet, syrupy liquid.

To produce palm wine a succession of microorganisms occurs roughly: Gram negative bacteria, lactic acid bacteria and yeasts and finally acetic acid bacteria. The organisms are not artificially inoculated and find their way into the wine from a variety of sources including the air, the tapping utensils including previous brews and the tree. The wine contains about 3% (v/v) alcohol and since the bacteria and yeasts are consumed live, it is a source of (single cell) protein and various vitamins.

3. Processes in Wine Making

Although so-called wine can be made from other fruits, in this context it is the grape alone that counts. There is no other fruit that can provide such a wonderfully diverse and complex drink with such infinite variations of flavour. It is a many faceted drink, enjoyable in its youth yet capable of considerable longevity. It enhances any social occasion, inducing conviviality and conversation; it can turn a humble picnic into a feast, or a simple dinner into a banquet. While in rural communities in countries worldwide, wines have from time immemorial been produced from all manner of plant materials (and not only fruits), I restrict discussion in the present sub topic to the products of commercial entities furnishing wines based on the grape.

Crushing of Grapes: Selected ripen grapes are crushed to release the juice, which is known as ‘must’, after the stalks, which support the fruits have been removed. These stalks contain tannins which would give the wine a harsh taste. The skin contains most of the materials which give wine its aroma and colour. For the production of red wines the skins of black grapes are included, to impart the colour. The chief sugars in grapes are glocuse and fructose; in ripe fruits they occur in about the same proportion. Grape juice has an acidity of 0.60-0.65% and a pH of 3.0-4.0 due mainly to malic and tartaric acids with a little citric acid.

Fermentation by yeast: The grapes themselves harbor a natural flora of microorganisms (the bloom) which in previous times brought about the fermentation and contributed to the special characters of various wines. Nowadays the must is partially ‘sterilized’ by the use of sulphur dioxide, a bisulphate or a metabisulphite which eliminates most microorganisms in the must leaving wine yeasts. Yeasts are then inoculated into the must. The yeast which is used is *Saccaromyces cerevisiae* and other yeasts which have been used for special wines are *Sacch. fermentati, Sacch. oyiformis* and *Sacch. bayanus.*

Wine yeasts have the following characteristics: (a) growth at the relatively high acidity (i.e., low pH) of grape juice; (b) resistance to high alcohol content (higher than 10%); (c) resistance to sulfite.

Ageing and Storage: The fermentation is usually over in three to five days. At this time 'pomace' formed from grape skins (in red wines) will have risen to the top of the brew. As has been indicated earlier for white wine, the skin is not allowed in the fermentation. At the end of this fermentation the wine is allowed to flow through a perforated bottom if pomace had been allowed. When the pomace has been separated from wine and the fermentation is complete or stopped, the next stage is 'racking'.

The wine is then transferred to wooden casks (100-1,000 gallons), barrels (about 50 gallons) or tanks (several thousand gallons). The wood allows the wine only slow access to oxygen. Water and ethanol evaporate slowly leading to air pockets which permit the growth of aerobic wine spoilers e.g. acetic acid bacteria and some yeasts. The casks are therefore regularly topped up to prevent the pockets. In modern tanks made of stainless steel the problem of air pockets is tackled by filling the airspace with an inert gas such as carbon dioxide or nitrogen.

Clarification: The wine is allowed to age in a period ranging from two years to five years, depending on the type of wine. At the end of the period some will have cleared naturally. For others artificial clarification may be necessary. The addition of a fining agent is often practiced to help clarification. Fining agents react with the tannin, acid, protein or with some added substance to give heavy quick-settling coagulums. In the process of setting various suspended materials are adsorbed. The usual fining agents for wine are gelatin, casein, tannin, egg albumin, and bentonite. In some countries the removal of metal ions is accomplished with potassium ferrocyanide known as 'blue fining'; it removes excess ions of copper, iron, manganese, and zinc from wines.

Packaging: Before packing in bottles the wine from various sources is sometimes blended and then pasteurized. In some wineries, the wine is not pasteurized, rather it is sterilized by filtration. In many countries the wine is packaged and distributed in casks.

4. Wine Defects

The most important cause of wine spoilage is microbial; less important defects are acidity and cloudiness. Factors which influence spoilage by bacteria and yeasts include the following (a) wine composition, specifically the sugar, alcohol, and sulfur dioxide content; (b) storage conditions e.g. high temperature and the amount of air space in the container; (c) the extent of the initial contamination by microorganism during the bottling process.

When proper hygiene is practiced bacterial spoilage is rare. When it does occur the microorganisms concerned are acetic acid bacteria which cause sourness in the wine. Lactic acid bacteria especially *Leuconostoc,* and sometimes *Lactobacillus* also spoil wines. Various spoilage yeasts may also grow in wine. The most prevalent is *Brettanomyces,* slow growing yeasts which grow in wine causing turbidities and off-flavors. Other wine spoilage yeasts are *Saccharomyces oviformis,* which may use up residual sugars in a sweet wine and *Saccharomyces bayanus* which may cause turbidity and sedimentation in dry wines with some residual sugar. *Pichia* is an aerobic yeast which grows especially in young wines with sufficient oxygen. Other defects of wine include cloudiness and acidity.

Wine Preservation: Wine is preserved either by chemicals or by some physical means. The chemicals which have been used include bisulphites, diethyl pyrocarbonate and sorbic acid. Physical means include pasteurization and sterile filtration. Pasteurization is avoided when possible because of its deleterious effect on wine flavor.

5. Health benefits and disadvantages of wine:

Heath benefits:

- **Promotes Longevity:** The Evidence: Wine drinkers have a 34 percent lower mortality rate than beer or spirits drinkers.
- **Reduces Heart-Attack Risk:** The Evidence: Moderate drinkers suffering from high blood pressure are 30 percent less likely to have a heart attack than nondrinkers.
- **Lowers Risk of Heart Disease:** The Evidence: Red-wine tannins contain procyanidins, which protect against heart disease. Wines from Sardinia and southwest France have more procyanidins than other wines.
- **Reduces Risk of Type 2 Diabetes:** The Evidence: Moderate drinkers have 30 percent less risk than nondrinkers of developing type 2 diabetes.
- **Lowers Risk of Stroke:** The Evidence: The possibility of suffering a blood clot□related stroke drops by about 50 percent in people who consume moderate amounts of alcohol.
- **Cuts Risk of Cataracts:** The Evidence: Moderate drinkers are 32 percent less likely to get cataracts than nondrinkers; those who consume wine are 43 percent less likely to develop cataracts than those drinking mainly beer.
- **Cuts Risk of Colon Cancer:** The Evidence: Moderate consumption of wine (especially red) cuts the risk of colon cancer by 45 percent.
- **Slows Brain Decline:** Brain function declines at a markedly faster rate in nondrinkers than in moderate drinkers.

Disadvantages:

The negatives of wine are mainly related to the amount of alcohol swallowed, not the particularities of wine itself, with one exception:

The headache caused by wine: This pain is caused by tannin, a chemical responsible for the red color and strong taste of red wine. This chemical is usually found in grape skins, so it is less common in the case of white wine. The tannin can cause migraines to those who suffer from this, or can cause headaches even to people without such problems. The sensitivity to tannin varies from person to person.

Other problems are related to **the amount of alcohol** present in wine. This can vary from 10% to 15%. The alcohol in large quantities reduces concentration and attention, it slows the brain activity and blocks the reflexes. Its unlucky contribution is felt in all kind of accidends, especially road accidents. The health problems associated with alcohol primarily binds to excessively or regular use. The negative health consequences includes cirrhosis – destruction of liver, osteoporosis, risk of cancer, high blood pressure, stomach ulcers, acute and chronic pancreatits and high level of triglycerides.

Conclusion: The natural wine, rich in sugars, organic acids, glycerol, phenol compounds, amino acids, vitamins – A, B1, B2 and mineral salts, provides a highly nutritional intake and mineralizing for the body. Therefore, the wine has always been recommended for it’s

antianemic, restorative, refreshing and energizing properties. However, it is still an alcoholic drink, and the lack of measurement can lead to serious problems.