

STUDY ABOUT SOME WINE COMPOUNDS EVOLUTION AND CONTRIBUTION FOR PEOPLE HEALTH

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Abstract

For ages, wine has been an element of civilization in Romania, one of the most sacred symbols in the Roman Catholic religion and not only, a daily staple for dynasties of kings, etc. Historical documents and archaeological proofs place the beginnings of wine culture on the present territory of Romania some 4000 years ago.

Because the wine is used as part of medical treatment, till the beginning of 20th century, many specialists and also Romanian, try to give a scientific explanation about the wine effect on human health and the relation with quality of wines.

It is knowed that in moderate quantity the wine is extremely beneficial for health. Wine inhibits the growth of all microorganisms that cause several known diseases.

Keywords: wine, components, evolution, health, quality

1. INTRODUCTION

Wine plays an important role in social life, since it is consumed in the company of others.

Also, wine used to be a part of medical treatment till the beginning of 20th century.

In moderate quantity the wine is extremely beneficial for health. Wine inhibits the growth of all microorganisms that cause several known diseases.

In Romania the vines was favoured by its geographical position in South-Eastern Europe, by its proximity to the Black Sea, and by the specificity of the local soil and climate. Archaeological finds and historical documents place the beginnings of wine culture on the present territory of Romania some 4000 years ago.

High quality wines produced in the entire region were object of trade ever since ancient times. In the 19th century to the range of local vine varieties, i.e. Zghihara de Husi, Cramposia de Dragasani, Galbena de Odobesti, Feteasca alba, Feteasca neagra, Babeasca, Tamâioasa româneasca, there have been added acclimatized varieties (mainly imported from France, but also from Germany and Italy), like Pinot gris, Pinot noir, Italian Riesling, Merlot, Sauvignon blanc, Cabernet Sauvignon, Chardonnay, Muscat Ottonel etc.

The legend said that the god of wine was born in Thracia, in what is today the territory of Romania. In this area wine has been produced since the 7th century BC. After Dacia was conquered by the Romans (106 AD), all coins issued by the victors were minted with the new Roman province represented as a woman to whom two children were offering grapes, a symbol of the regions main riches.

Romania has an important producer of quality wines; and the period after 1989 when one notes a decline both on the technical plan and on the economic one, the process of creation of new plantations or replantations decreasing significantly.

In 1995 the agricultural surface of Romania was 14.797,2 thousand ha, of which arable soil 9.337,1 thousand ha, of which vineyards 292,4 thousand ha. The surface with grapevines has increased after 1989-1990 from 277 thousand ha to 303,9 thousand ha in 1993, but decreasing afterwards to 292,4 thousand ha in 1995, which represents 2,0% of the total agricultural surface of Romania. In 1995 the surface of the harvest grapevines represented 85,1% of the whole surface with grapevines and viticole nurseries. In 1996 this surface was 251,8 thousand ha. [11]

Between 1980 and 1989 there was an increase of the surface occupied by the transplanted and indigenous grapevines from 64,2% to 76,0% of the total surface of harvest grapevines. After 1989 there was a decrease of the surface occupied by the transplanted and indigenous grapevines from 72,0% in 1990 to 55,1% in 1997. An analysis of the form of property of the harvest grapevines shows the preponderance of the private sector (76,2%). [11]

Compared to the other countries, Romania is in a less advantageous situation, with only 1,8% young grapevines of the total cultivated surface (23,8% Hungary, 14,3% Australia, 6,2% Greece, 4,1% South Africa, 3,4% Portugal, 3,3% France, 3,0% Italy). [11]

Wine is consumed on a daily basis by millions of people worldwide and is often served with meals.

If some of the health benefits of wine are derived from phenolic compounds found in wine, it is important to know the concentrations of these compounds in different types of wine.

Wines with high concentrations of these compounds are likely to become very popular if the health benefits can be confirmed.

Wine-making is essentially a chemical process. It involves a chemical reaction in which sugars are turned to alcohol and carbon dioxide in the presence of yeast. There are also many other chemical processes going on which affect the strength, appearance, colour and taste of the wine.

The characteristics and quality of wines depend on multiple parameters comprising climatic and geological factors of production regions, grape varieties and maturation, technological practices. It is very important to have the organoleptic tests, analytical methods with increasingly applied to wine characterization.

For the quality determination traits that might be assessed include:

- balance between crop load and canopy capacity;
- uniformity/evenness of ripening;
- vigour/no growing tips after winter exposure;
- exposure/sunburn;
- diseases; and observable berry characteristics (size, seeds, flavors, colors, taste etc).

Also some chemical measurements that are available for assessing berry quality, such as total soluble solids (TSS) or acidity, are unquestionably important criteria for winegrapes: it is not possible to make table wine from grapes with TSS at less than around 14 degrees Brix as wine by legislative definition must contain greater than 8% alcohol.

Are important other measurement, for example potassium which is a good stimulant for muscles. It has beneficial effects on circulation too, because it eliminates the cholesterol that is harmful for our organism favoring the formation of the so-called good one.

Are many wine researchers propose to use of biogenic amines as potential descriptors of wine characteristics and quality.

Wine has positive effects of contrasting the formation of biliary stones and it also stimulates diuresis. Even ethyl alcohol is not only harmful. The ethyl alcohol presence in blood is fluidities. It also helps preventing different diseases in the cardio circulatory system, while it stimulates the development of immune defenses and cell degradation. This positive action derives from

antioxidants, from the substances that contrast the effects of free radicals that are more concentrated in red wines. Ethyl alcohol can have also ant depressive actions.

2. MATERIAL AND METHOD

The aim of this paper is to present the positive effects of the moderate wine consumption on heart disease, cancer and other diseases. In this aim it is important to identify the healthy compounds in different parts of grapes and using a correct wine technology for obtaining a good product for human health. For example, naturally present in the grape skin is the resveratrol, with important cardio protective quality.

Also, the resveratrol protects grapes and some other plants against fungal infections, have many beneficial properties, including antioxidant, anticoagulant, anti-inflammatory and anti-cancer effects.

Other natural compounds called poly phenols, founded in red and white wine are known to act as antioxidants. But red wine generally contains greater amounts of poly phenols, which include tannins and the pigments in grape skins that give red wine its color.

There are many different types of phenols which are highly volatile chemicals able to contribute to the subtle nuances of colors, texture, aroma and flavors of a wine.

In this paper we will present some Romanian wines studied for compounds evolution and the effect of these on health.

Many wine researchers agree that moderate wine consumption can reduce the risk of heart disease, but its important to clarify how individual components of wine (alcohol and principal polyphenols) can reduce the risk of coronary heart disease in certain individuals.

It is also important to know that polyphenols can reduce the rate of harmful cell oxidation and favorably affect other processes that, if unchanged, could lead to atherosclerosis and heart disease.

Some studies indicated that the cardio protective compounds in grapes, polyphenolic antioxidants, reside in the skin and seeds. Grape skins, which contain purple pigment, are crushed with the pulp to make red wines. But the skins are separated from the pulp to make most white wine. That situation led to the conventional belief that red wines and red grape juice are the most heart healthy.

White wine is traditionally made without the use of grape skins. Red wine is made by fermenting the

juice along with the skins. The skins give red wine its coloration and contain the highest concentration of polyphenols, which are potent antioxidants. The researchers theorized that they could boost the antioxidant capacity of white wine by extracting more grape skin polyphenols during processing.

Polyphenols are good reasons to explain the cardiovascular protective effect of wine, because they are abundant in wine especially red wine, and possess antioxidant and super oxide ion scavenging properties. A phenolic compound in wine can be derived naturally from plant or have microbial origin, consisting of a phenyl ring backbone with many substitutive possibilities. Phenolic compounds are commonly found in animal, plant and microbial tissues and contribute to defensive strategies as many are involved in plant protection as biologically active growth inhibitors of other living systems.

The majority of phenolics in the grape are found in the seed and skin. The skin of the grape plays a greater role in the production of red wine than white wine.

In wine they contribute to color and flavor. For many times red wine consumption has been connected with reduction of the incidence of atherosclerosis and heart disease in humans, most likely due to the presence of numerous bioactive phenolic compounds in red wine products.

Phenolics also have powerful antioxidant properties, which inhibit degradation of the cell walls both in coronary arteries and in the brain. It is known that the wine may be beneficial in the treatment of cancer and Alzheimer's Disease.

Phenolic compounds are considered to be the most important component of the winegrape for giving uniqueness and character to wines of the same variety and quality of production. Also, resveratrol, the compound in grape skins that has a number of beneficial health effects in humans, is not an incidental product in the plant. The soil fertility regime can have an important influence on plant compounds relative to wine and food quality. Applications of soluble synthetic nitrogen fertilizer cause a different response in the plant. Nitrogen can bring about significant changes in resistance to insect feeding as well as disease. Also high doses of soluble N have been shown to inhibit resveratrol production (cit. Fregoni).

In wines there are a lot of component groups and components with a direct influence on sensory perception. For example, alcohol causes blood vessels to dilate and can increase the intensity of all the other flavors in the wine. And after a few samples it can also degrade your ability to taste,

both due to its effect on the taste buds and on your mental strength.

3. RESULTS AND DISCUSSIONS

The wine quality is a complex process, because a wine consists of over 300 different chemical compounds, many of which are identical or similar to those found in fruits, vegetables, spices, herbs, and other substances.

The wine quality is, in large measure, determined by the grape and the winemaker. Grapes characteristics are governed principally by the combination between soil and climate, influencing grape chemistry and subsequent wine quality.

The term 'quality' is very used in reference to wine (Table 1).

Table 1. Grapes and some wines quality

Variety	Alcohol vol. %	Total acidity g/l H ₂ SO ₄	Volatil acidity CH ₃ COOH	Sugar g/l
Merlot	12,1	4,1	0,62	2,1
Cabernet Sauvignon	12,4	4,23	0,55	1,84
Fetească neagră	12,2	4,4	0,58	3,9
Pinot noir	11,94	3,9	0,68	2,8

Specialists of wine define characteristics of colour, aroma and taste, and to codify such terminology in what might be described as the "universal language of wine".

The year the grapes used to make the wine is harvested. Some years are recognized for particularly good growing conditions and wines made from grapes of these vintages are usually superior to wines made from grapes harvested in poor growing seasons.

Romanian law recognizes the following categories for wines: *Wines for current consumption*: Table wine (VM), Superior table wine (VMS); *Quality wines*: Wine of superior quality (VS), Quality wine with controlled appellation of origin (VDOC), Wine with controlled appellation of origin (DOC), Wine with controlled appellation of origin and quality degree (DOCC).

According to the sugar content, wines can be classified as follows: *dry* (up to 4 g/l), *medium-dry* (4-12 g/l), *medium-sweet* (12-50 g/l), *sweet* (over 50 g/l)(Figure 1.)

To improve the concept about the importance of wine production areas within Europe it has been introduced the concept of *terroir*" which considers

the specific characteristics of a wine that are induced mainly by geographical location and characteristics of production in the concerned areas.



Figure 1. Romanian wines. Stefanesti Arges vineyards

The authenticity of wine is guaranteed by strict guidelines laid down by the responsible national authorities that include official sensory evaluation, chemical analyses and examination of the register kept by the wine producer.

The researches made until now suggest that the Romanian wines present benefic characteristics for people (Table 2).

Table 2. Romanian wine components characteristics

Variety	GS B	Sugar g/l	Total acidity g/l H ₂ SO ₄	Anthocians mg/l	Production t/ha
Merlot	<u>143</u> = <u>169</u> 156	<u>196-</u> <u>215</u> 206	<u>5,1-6,0</u> 5,6	<u>950-1050</u> 1000	12,0
Cabernet Sauvignon	<u>128</u> = <u>192</u> 160	<u>200,6</u> = <u>222,7</u> 211,7	<u>5,8-6,0</u> 5,9	<u>1100-1940</u> 1200	6,03-8,1
Fetească neagră	<u>141</u> = <u>161</u> 150	<u>204-</u> <u>214</u> 209	<u>5,7-6,1</u> 5,8	<u>650-975</u> 812	8-10
Pinot noir	<u>105</u> = <u>127</u> 116	<u>198-</u> <u>219</u> 203	<u>5,0-5,5</u> 5,25	<u>600-875</u> 737	9,0

4. CONCLUSIONS

Moderate consumption of red wine has been widely reported to reduce risk for cardiovascular disease. Some researchers have attributed this cardio protective quality to the significant amounts of resveratrol naturally present in grape skin.

Resveratrol protects grapes and some other plants against fungal infections. It has been shown previously to have a number of potentially

beneficial properties, including antioxidant, anticoagulant, anti-inflammatory and anti-cancer effects.

The most important for evaluating a wine quality are sweetness and acidity. Saltiness is barely perceptible and serves mainly to heighten sweet and acidic flavors.

Maturation in bottle also influences aromas. For example young red wines smell of fruit; as they age, their bouquet evolves into complex perfumes that mingle cedar, tobacco, tea, mushrooms and spices.

Tannins are elements extracted primarily from grape skins (and so found mostly in red wines), but which can derive from stems or seeds, and also from oak, especially new oak barrels. They're perceived as an astringent feeling. Young red wines meant for long aging are pumped full of tannins, by extending the maceration period or otherwise enhancing their extraction, because tannins act as a preservative and their chemical evolution toward softer, silkier textures is part of the maturation of great wines (Table 3).

Table 3. Romanian wines characteristics

Variety	Extr. N g/l	Anthocians mg/l	IC DO42 0+ DO52 0+ DO62 0	T DO42 0/ DO52 0	Poliphenols g/l
Merlot	25,4	469	0,51	0,70	1,1
Cabernet Sauvignon	26,35	768	0,62	0,75	1,23
Fetească neagră	24,2	400	0,55	0,80	1,0
Pinot noir	23,0	290	0,40	0,60	0,97

With maturation development the tannins soften and the wine, which may be a collection of impressive but disparate impressions in its youth, will become more harmonious and complex.

The basic tastes of wine in the mouth are complemented by the aromatic qualities sensed by the olfactory system by way of the nasal passage at the back of the mouth. These aromas are conveyed to the olfactory bulb as the taster inhales through the mouth and exhales through the nose.

There are several factors behind this effect. One is the light evaporation that takes place as the wine is warmed by the mouth. Another is that the chewing motion used by tasters compresses and agitates the wine, liberating odorous particles. Also saliva, which is secreted liberally during tasting,

chemically modifies certain substances in wine and makes them odorous.

While technological improvements in grape growing and wine making have led to higher quality wines, climate is the wild card that determines year to year quality differences. The estimation of the relationships between vegetative and productive performances of vines may be successfully linked to the quality potential of the vineyard.

The influence of grape variety, type of vinification, wine pH, malolactic fermentation, and storage in bottle on biogenic amine concentrations will be studied.

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6. REFERENCES

- [1] Cotea D.V., *Tratat de Oenologie. Vol.I, Vinificatia si biochimia vinului*. Ed. Ceres, Bucuresti, 1985
- [2] Cotea D.V., Sauciuc H.J., *Tratat de Oenologie. Vol II, Limpezirea, stabilizarea si imbutelierea vinului*. Ed. Ceres, Bucuresti, 1988
- [3] Cheynier, V. et al. 1999. Phenolic composition as related to red wine flavor. In: *Chemistry of Wine Flavor*. A.L. Waterhouse and S.E. Ebeler (Eds.). American Chemical Society. Washington, DC
- [4] Gabriella Gazzani and colab. Antibacterial Activity of Red and White Wine Against Oral Streptococci, *ACS Journal of Agricultural and Food Chemistry*, July 11.
- [5] Gabriela Teodorescu. *Evolutia vinurilor*. Editura Transversal, 2007
- [6] Gheorghita M., Camelia Muntean, C-tin. Baduca, *Oenologie. Obtinerea, pastrarea si cinditionarea produselor vinicole*. Ed Sitech, Craiova, 2002
- [7] Isak S. Pretorius. Tailoring wine yeast for the third millennium: novel approaches to the ancient art of winemaking. Institute for Wine Biotechnology, University of Stellenbosch, Stellenbosch, ZA-7600, South Africa. *S. Afr. J. Enol. Vitic.* 2000.
- [8] Nicolai Pomohaci, Ioan Namolaşanu -, „Producerea și îngrijirea vinurilor”, Ed. Ceres-2000
- [9] Nicolai Pomohaci, V. Stoian, C-tin Sirghi - „Oenologie”vol. 2, Editura Ceres-2001
- [10] Smith, B.J. and J.B. Magee. 2002. Resveratrol content of muscadine berries is affected by disease control spray program. *HortScience*, 37(2)
- [11] www.transylvania.be/new/viticulture