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SOME RELEVANT QUALITY INDICATORS OF RED WINE FROM THREE GRAPES CULTIVARS – A MINIREVIEW

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Abstract

In the last years studies point out the fact that the red wine is one of the most consumed beverages over the world. Appreciation of quality in food products is a complex process and is often based on multi-dimensional facets, whose measurement requires clearly validated scales. Factors that influence the overall perception of wines in terms of quality are: geographical origin – ground type, climate, grape variety - and authenticity. One of the most important indicator of the red wine is polyphenolic compounds, such as flavonoids, anthocyanins and tannins present in large quantities in wine, especially in red wines; their composition in wine being influenced by the varieties, the vintage and the wineries. The aim of the present work is to make a short review about three types of wines: Cabernet Sauvignon, Merlot and Feteasca neagra quality attributes in order to establish the relationship of the intrinsic characteristics of each individual product and the extrinsic attributes and to adapt the scale to each considered product.

Key words*: red wine, South Region of Romania, Romania red wines, wine quality factors, geographical origin.*

INTRODUCTION

Nowadays, regardless of the geographical location of the vineyards in the world, it is not possible to produce high quality wines without taking into account the quality status of the grape at harvest (Pons et al., 2017). Geographical origin and authenticity are both factors influencing the overall perception of grapes and wines in terms of quality. Given the fact that the natural diffusional movement of elemental traces follows a pattern, moving from rocks to soil, and from the soil to the grape, allows for wines to be differentiated through the elemental analysis of their provenance soils. (Geana et. al., 2012). Overall wine is one of the most consumed beverages in the world (Hosu et al., 2013).

In recent years, the assessment of wine traceability and authenticity became a prerequisite in many countries. The consumers have been increasingly interested in information on the characteristics and the quality of foods, especially with regard to composition, nutritional properties and origin (Charlton et al., 2010; Versari et al., 2014). The wine industry is a particular example in which authenticity has been extensively investigated because wine is a product widely consumed over the world and which can be easily adulterated (Makris et al., 2006). The wine authenticity is guaranteed by strict guidelines elaborated by responsible national authorities, and includes sensory evaluation and several chemical analyses (Versari et al., 2014). Also, wine is a complex beverage recognized for its beneficial effects on human health, contributing to an improvement in the quality of life (Hosu et al., 2015).

Otherwise, wine is an alcoholic beverage that contains various polyphenols extracted from grapes during the processes of vinification (Rastija and Medić-Šarić, 2009a). The polyphenolic compounds, such as flavonoids, anthocyanins and tannins are considered to have antioxidant activity, protecting the body cells against oxidative stress. These compounds are present in large quantities in wine, especially in red wines, which may explain so-called French paradox. Moreover, polyphenolic compounds are responsible for the quality of red wines, influencing their astringency, bitterness and colour. The viticulture practices, different oenological techniques, the varieties and the harvesting year of grapes and the wineries influence the polyphenolic composition of press wines (Cliff et al., 2007).

In the case of wine, bitterness and astringency are amongst the least understood perceptions. This can be due to a number of different

reasons related to their complexity and multimodality, probably also because they induce fatigue generating great individual variability among consumer perception, but maybe also because most often previous research has neglected interactions with other stimuli such as aroma or taste. (de-la-Fuente-Blanco et al., 2017).

That is why the quality perception is influenced by the characteristics of the product which have been mainly classified into intrinsic and extrinsic factors (Charters and Pettigrew, 2007). Intrinsic cues are those related to the product itself (physical part of it) and its organoleptic properties such as aroma, in-mouth properties or colour. Extrinsic cues refer to properties which are not physically part of the product such as package design or region of origin. For the specific case of wine, intrinsic cues of previously experienced wines are determinant in repurchase situations (Mueller et al., 2010). The importance of extrinsic properties lies on the fact that at wine purchase the consumer is rarely able to taste wine and thus has to rely on extrinsic cues to infer wine quality (Sáenz-Navajas et al., 2016).

Quality perception through sensory properties it is very important, but fermentation is the most critical value adding activity in the winemaking process, with significant technical, equipment and human resource demanding to associate with the process (Muhlack et al., 2013). Although ethanol is the main product of wine fermentation, the concentration and composition of phenolic compounds such as tannins and anthocyanins, as well as aroma and flavour components have the greatest influence on the overall sensorial quality of the young wine (Bisson and Karpel, 2010; Cheynier et al., 2006; Garde-Cerdan and Ancín-Azpilicueta, 2006; Gonzalez-Barreiro et al., 2015). As such, understanding the impact of parameters that affect the concentration of these compounds during winemaking is vital for producing a final product of desired quality and composition. In conclusion, not only anthocyanins and proanthocyanidins, who are very important to analyse, can drastically change the characteristics of the resulting wine, but also the others parameters because each grape variety has a specific characterisctic compounds responsible for the quality of red wines, influencing their astringency, bitterness and colour. (Setford et al., 2017).

Also 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 the 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 (Frost et al., 2017).

The aim of this study is to make a critical review about quality indicators (physical-chemical due sensorial parameters) of these three types of wines: Cabernet Sauvignon, Merlot and Feteasca neagra red wines.

CABERNET SAUVIGNON, MERLOT AND FETEASCA NEAGRA GRAPES CHARACTERISTICS

Grapes characteristics

According to the latest research several grapevine varieties like Cabernet Sauvignon, Merlot, Feteasca Neagra, Pinot noir, Burgundy, Cadarca, were investigated during 2006-2007, 2008-2009, 2011,2012, 2013-2014 years, in order to obtain wines with denomination of origin controlled in different wine centers: Murflatar, Jidvei, Halewood wineries (Artem et al., 2014; Chira et al., 2010; Dobrei et al., 2016; Petropulos et al., 2013). The studies present the evolution of routine quality control parameters - sugars content, acids, titratable acidity, sugar-acidity index and phenolic compounds - anthocyanins and polyphenolic index. The reported results were useful to find the optimum moment for grape harvest ensuring the production of high quality wines and to show that the antioxidant content of samples depends on the analyzed material and on the grape variety. The latest research revealed that phenolic compounds from the three red grape varieties play an important role in the quality of red wine, particularly on colour and astringency and also are responsible for the sanogenic or multiple benefic effects on human health after a moderate consumption of wine. By their

physico-chemical attributes the phenolic compounds are rightly considered the most important group of chemical compounds in grapes, after sugars and acids. The type and concentration of phenolic compounds in wine depends on grape variety, ripening, atmospheric conditions, viticultural and vinification techniques. In the studied wines, phenolic acids represented by galic and syringic acids were reported in relative lower amounts, between 0.10 and 1.04 mg/L for galic acid and 0.10 and 1.33 mg/L with important amounts in Feteasca neagra wine variety. (Artem et al., 2014; Hosu et al., 2014, Rodríguez-Delgado et al., 2002).

Cabernet Sauvignon is one of the world's most widely recognized red wine grape variety, being grown in America, Australia, Asia and Europe. Grape bunches are tronconical or conical shaped, with rare grains rachides. The average weight of the bunches is 100-140 g. The grapes have spherical shape, franc taste and thick skins, colored in dark red-purple, with intense pruine and they have a long vegetation period (180-190 days) and the climate of the growing season affects how early the grapes will be harvested (in Romania, the grapes ripen usually in September). The sugar concentration and the total acidity can reach 240 g/L, and 5.0-5.5 g/L H_2SO_4, respectively. Cabernet Sauvignon can be grown in a variety of climates, being resistant to frost, drought and gray mold, but is affected by rot (Patic, 2006).

Figure 1. Cabernet Sauvignon grapes (Mike Roberts, 2016)

Merlot is an old variety of red wine grape from Gironde-Bordeaux wine-growing region. The name Merlot is thought to derive from the "Old French" word for young blackbird, merlot, a diminutive of merle, the „blackbird" (*Turdus merula*), probably from the colour of the grape. Beyond France it is also grown in Italy, Eastern Europe and New World, especially California. It grows in many regions where also grow Cabernet Sauvignon but tends to be cultivated in the cooler parts of those areas. In areas that are too warm, Merlot will ripen too early. Merlot grapes are identified by their loose bunches of large spherical berries. The colour has less of a blue/black hue than Cabernet Sauvignon grapes and with a thinner skin and fewer types of tannin. Grapes have a middle vegetation period (170-180 days), a large force of growth and develop rich foliage. A characteristic of the Merlot grape is the propensity to quickly overripe. It normally ripens up to two weeks earlier than Cabernet Sauvignon. Compared to Cabernet, Merlot grapes tend to have a higher sugar content 205-240 g/L, and total acidity of 4.5-5.5 g/L H2SO4. Merlot thrives in cold soil, particularly ferrous clay. The grapes tend to bud early which gives it some risk to cold frost and its thin skin increases its susceptibility to rot. If bad weather occurs during flowering, the Merlot wine is prone to develop colour (Patic, 2006).

Figure 2. Merlot grapes (http://sedimentality.com/variety-focus/red-wine-grapes/merlot/)

Feteasca Neagra is a dark-skinned grape variety native to the Republic of Moldova and Romania, although it is now more widely planted in the latter. It is considered to make some of the top red Romanian wines, exhibiting spicy, smoky fruit characters and good tannin structure. The grapes are medium to large, cylindrical-conical bunch with spherical, medium-sized berries and dark

purple skins. Although it is a vigorous vine, it is resistant to frost, drought and rot, Feteasca Neagra has quite a low productivity (sometimes around 30 % of regular). For this reason, when pruning the vines, a large number of buds are left. Feteasca Neagra reaches maturity shortly before Merlot, generally after September 15th, with a growing season of about 160-170 days. This variety easily accumulates significant amounts of sugar (230 -240 g/l) and has good acidity of over 7 g/l tartric acid. Favourable conditions for the maturation of this variety are provided by sunny slopes, where the - accumulation of anthocyanins reaches optimum levels. More often, bunches don't mature uniformly, so they should be granted special attention at harvest (Patic, 2006).

Figure 3. Feteasca neagra grapes (Răzvan Avram, 2017)

Grapes quality parameters

The ripening period of the grapes is different from one year to another and from one vineyard to another, depending mainly on the climate. For this reason, it is necessary to follow the evolution of maturation of each variety, every year. Harvesting of the grapes is very important and it must be done timely because, generally, the quantity and quality of the harvest depends on it. Grapes full maturation is reached when the weights of grape berries achieve a maximum value and the evolution curve begins to decrease. At this moment, the sugar content of the grapes is also at its maximum. The evolution of sugar remains stationary for a few days and total acidity is reduced substantially and the evolution curve indicates a slow decrease of acidity. Reaching full maturity varied from variety to variety depending on the genetic traits. First varieties that reach ripeness in the Murfatlar region are for example, Pinot noir and Feteasca Neagra, followed by Cabernet Sauvignon and Merlot. Although, from the vineyards Murfatlar, Ploiești (Halewood Wineries) and Jidvei red wines, harvest of 2011, 2012, 2013 showed significant amounts of polyphenols, they contribute to color formation, stability and sensory characteristics thereof. Red wines Cabernet Sauvignon from Murfatlar, Pinot Noir from Jidvei and Merlot from Murfatlar had the most significant amounts of glycerol, so from the sensory point of view they can be characterized as unctuous wine, full bodied and with a sweet taste effect (Artem et al., 2014, Hosu et al., 2011, Stegarus et Tita, 2015).

Climate in the years of Dobrei et al. (2016) research was very different with extremes influences on the vine, which made it possible to observe experimental variants responses to climatic stress conditions, and favorable conditions.

Following parameters have been investigated: the weight of 100 berries (g), sugars (g/L), total acidity expressed as tartaric acid (g/L) and phenolic maturity reflected in total anthocyanin (mg/L), polyphenols index.

Sugars content was determined using an electronic refractometer, total acidity was evaluated volumetrically, the weight of 100 berries was done gravimetrically. Total anthocyanin and polyphenols index were achieved according to ITV method [1] and is based on the extraction of phenolic compounds in acidic conditions (ethanol 95% and hydrochloric acid (HCl) 0.1% v/v), at room temperature, for two hours. Anthocyanin concentration was estimated by measuring the absorbance of the extract solution after dilution 1:20 with 1% HCl solution, at 520 nm, while polyphenol index was estimated by measuring the absorbance of the extract after a dilution 1:100 with distillate water, using a spectrophotometer with quartz cuvette of 1 cm (Artem et al., 2014).

2013 harvest year was noted as an year when the five varieties of grapes for red wines showed a high potential for accumulation of sugars with values above 214 g/L at harvest for Feteasca Neagra, Pinot Noir, Merlot and Cabernet Sauvignon varieties. For all investigated varieties, sugar accumulation rate

was more intense at the beginning of ripening and then decreased gradually as approaching full maturity. As regards the accumulation of sugars and anthocyanins in grapes there are certain correlations, the cultivars being differentiated quantitatively by their genetic traits, but decisively influenced by the specific conditions of the production year. Accumulation of phenolic compounds in grapes evaluated by the anthocyanin content and polyphenols index ranged between 312.1-589.3 mg/L for total antocyanins, with higher values for Cabernet Sauvignon variety. The study was carried out with samples from a total of 24 wine samples (Cabernet-Sauvignon cultivar) and a total of 7 wine samples (Merlot cultivar), although there were measured the Pinot Noir samples. Wines are all of known ageing periods and they are kept under similar conditions during and after the wine-making process. From the results obtained we can say that Pinot Noir has a lower astringency, same as Merlot. Cabernet Sauvignon wines from Sâmbureşti and Jidvei may be tougher characters, astringent, compared with those from Murfatlar, where values are lower in polyphenol (Artem et al., 2014, Chira et al., 2010, Hosu et al., 2011, Stegarus et Tita, 2015). In the next years was verified the influence of the seeds and skins extracts, wine and grape variety on the antioxidants content of samples and to estimate statistically the relationships between grape varieties based on their antioxidant activity. The results showed that the antioxidants content of seeds for all grape varieties was higher than the antioxidants content of wine. The antioxidants content of seeds and skins were reported to the antioxidant content of the wine. The Merlot variety was found to have the highest diversity of antioxidants in the grape, having in same time the highest content of antioxidants. Regarding the red wines, the most significant amounts of higher alcohols are in samples from Dobrogea, Oltenia followed by those from Muntenia and Transylvania. Volatile fatty acids present very similar values in wines from Oltenia, Dobrogea, Muntenia and significantly superior values in wines from Transylvania. Wines from Dobrogea and Muntenia present the most significant amount of esters, followed closely by those in Transylvania; the lowest content of esters have the ones from Oltenia.

The aldehydes were identified in high concentrations in red wines from Transylvania, followed by those in Oltenia, Dobrogea and Muntenia, and terpene compounds were found in wines from Muntenia and Transylvania. Lowest temper compounds quantity was identified in red wines from Dobrogea. It can be said that depending on the region which these wines are from, although it is the same variety, their aromatic structure sometimes differ greatly (Hosu et al., 2014; Stegarus et Tita, 2015).

The sugar and anthocyanins accumulation in grapes showed certain similarities, these being related to genetic nature of each variety, but also decisively influenced by the specific conditions of production year (Artem et al., 2014).

Year 2014 was less favourable for grapevine growing, with excess rainfall, while 2015 was a dry year. Feteasca neagra registered the highest sugar concentration (Dobrei et al., 2016).

The results of 2014 year also show that 'Cabernet Sauvignon' and 'Merlot' grapes varieties are very different in terms of antioxidants content (Hosu et al., 2014).

CABERNET SAUVIGNON, MERLOT AND FETEASCA NEAGRA WINES

Today, Romania is an important European wine producer and therefore the wine industry is facing increasing competition worldwide due to globalization of food markets. In this highly competitive market, the wines authenticity has become a key factor in establishing its effective cost. Thus, accurate methods for wine analysis that may certify the quality and authenticity of Romanian wines are mandatory (Geana et al., 2015). The chemical profile of a wine is derived from the grape, the fermentation microflora, secondary microbial fermentations that may occur, aging and storage conditions (Styger et al., 2011).

Wines quality parameters

Phenolic compounds are responsible for sensory characteristics in wine, such as colour, mouthfeel, and flavour (Li et al., 2009).

Wine flavor is composed by a wide variety of compounds with different aromatic properties which presence and concentration depends on a

number of factors including grape cultivar, composition of grape must, yeast strain, fermentation conditions, winemaking practices, wine aging and storage conditions, among others (Moreira et al., 2016). Flavor constitutes one part of the intrinsic quality of wines and drives consumer preference. One of the main characteristics of great red wines is their aromatic complexity, with nuances such as herbaceous, green pepper, blackcurrant, blackberry, or figs and prunes. It is generally recognized that grape intrinsic composition, in terms of flavor and flavor precursors gives wine specific volatile compounds composition (Pons et al., 2017).

Aroma is a key attribute for professionals and consumers and is therefore one of the major attribute driving the intrinsic quality of wine. In recent years, research in enology and in wine flavor chemistry has made it possible to identify and quantify hundreds of volatile compounds including terpenes, C13-norisoprenoids, thiols, carbonyls, pyrazines and benzene derivatives. Wine flavor, resulting in the combination of volatile compounds found in grapes, produced during fermentations and also aging (González-Barreiro et al., 2015), cannot be fully described without an understanding of the role played by its individual molecular components, their concentrations, odor thresholds and interactions with other compounds (Ferreira et al., 2002; Pineau et al., 2007).

The grape varieties selected for identification of compounds associated with the dried fruit character were *Vitis vinifera* L. cv. Merlot and Cabernet Sauvignon. Sensory analyses were performed by a panel of five judges recruited from the staff of the research unit. All panelists from Bordeaux area had extensive experience in wine tasting and had regularly participated in sensory panels with red Bordeaux wines. All the assessments were performed at room temperature in individual booths under daylight. Wine and must (50 mL) were presented in standard 'XL5-type' tasting glasses with glass covers identified by random three-digit codes and assessed within 15 min of pouring. Each must and wine were submitted to the panelists just after the bottle was opened. During the two sessions, organized in the same week, they were asked to evaluate the intensity of dried fruit aroma on a 0–5 scale (0: no odor, 1: discrete odor, 2: just perceived odor, 3: recognized odor, 4: clear odor, 5: strong odor) (Pons et al., 2017).

An independent and specific descriptive sensory analysis was conducted to confirm that the aroma vectors as well as taste (bitter and sour) and astringency stimuli generate specific aroma/flavour differences and did not change others. Results, however, revealed the existence of a quite limited number of sensory interactions affecting exclusively bitterness (bitterness sourness and bitterness-animal), while confirmed that in the red wine context, astringency is driven almost exclusively by polyphenols and that it is not influenced by taste or aroma interactions (de-la-Fuente-Blanco et al., 2017).

Phenolic compounds appear as the grape changes colour, substituting the chlorophyll. They are of great oenological importance and play a key role in determining the quality of the wine. Along with their nutritional and pharmacological properties they also account for characteristics like colour, aroma, taste and astringency (Bartolomé et al., 2004; Harborne and Baxter, 1999). Their antioxidant properties also have positive effects on a wine's stability (Cheynier, 2001; Waterhouse, 2002). The total content of polyphenols is also an indication as to whether the wine can be aged (Mulero et al., 2015). Generally, wine phenolic compounds are composed of two main groups, anthocyanins and non-anthocyanin phenolic compounds (namely, hydroxybenzoic acids, hydroxycinnamic acids, flavan-3-ols, flavonols and stilbenes) (Gao et al., 2014).

Anthocyanins, which are found in the grape skin of nonteinturier cultivars and transferred to the must during the first days of winemaking, are the principal responsible for the color of red wine (Briz-Cid et al., 2014).

The young red wines show the highest content of monomeric anthocyanins (responsible for the red color wines in the first stages of the life of wine (Alcalde-Eon et al., 2007; Torchio et al., 2011) but they are involved in different reactions (copigmentation, polymerization, winemaking and further into the wine aging) that can change its concentration (Briz-Cid et al., 2014).

Grapes of the *Vitis* type are relatively rich in phenolic compounds compared to other edible fruits. The grape essentially contains non flavonoid compounds in the pulp and flavonoid compounds in the skin, seeds and stems. It is estimated that seeds contain 65% of the polyphenols of the bunch, the stem 22%, the skin 12% and the pulp just 1% (Hidalgo Togores, 2003). Hence, the technological transformation the grape undergoes conditions the extraction of these compounds and, therefore, contributes to the polyphenolic content of the wines. Vinification involves musts and wines being in constant evolution. The phenolic content of the wine depends on the raw material and the type of vinification followed, which affects physical phenomena (diffusion from the solid parts, extraction of wood compounds, etc.), and chemical and biochemical phenomena (oxidation, degradation, condensation etc.) (Mulero et al., 2015).
The anthocyanic content of Cabernet Sauvignon wines were significantly higher than for other varieties. In all wine varieties from Murfatlar vineyard, the most abundant anthocyanin was malvidin-3-O-glucoside (Mv), being in agreement with other published results (Fanzone et al., 2012), possible due to the fact that this anthocyanin is thought to be a more stable compound than the other. The second most abundant anthocyanin was malvidin 3-O-acetylated glucoside, in all wines. Higher values of delphinidin-3-glucoside (De) were found in Cabernet Sauvignon variety followed by the Feteasca Neagra and Pinot Noir varieties. Contents of cyanidin-3-glucoside (Cy) were nearly the same in all varieties, while petunidin-3-glucoside (Pt) was higher in Feteasca Neagra and Cabernet Sauvignon varieties and peonidin-3-glucoside (Pe) was higher in Pinot Noir varieties. Feteasca Neagra and Mamaia varieties showed lower content of acylated anthocyanins, compared to the others, while coumarylated anthocyanins were higher in Feteasca Neagra and Merlot varieties (Geana et al., 2015). The addition of tannins was shown to increase total polyphenols levels and total tannins levels. No significant effect was observed on the monomeric flavanols because the added tannins are condensed tannins which cannot release monomeric flavanols (Ghanem et al., 2017)

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 (Frost et al., 2017).
Tannin concentration is correlated with wine bitterness and astringency (Vidal et al., 2003, Kennedy et al., 2006;). Villamor et al. (2013) evaluated three tannin concentrations in a model red wine showing that increased tannin content increased the perceived intensity of drying and bitter.
Acidity has been shown to alter bitter and sour perception, but pH is also associated with altering astringency (Fischer and Noble, 1994; Fontoin et al., 2008; Gawel and Van Sluyter et al., 2013).
Ethanol content has been shown to decrease astringency, but increase bitterness (Fontoin et al., 2008; Vidal et al., 2003).
This review was centred on three varieties of wine grapes to obtain three red wines Cabernet Sauvignon, Merlot and Feteasca neagra. The Merlot variety was found to have the highest diversity of antioxidants in the grape, having in same time the highest content of antioxidants.
The most intense colour was shown by Cabernet Sauvignon and Feteasca neagra wines - these two being also the varieties with the highest content of anthocyanins; middle colour attributes presented Merlot wine variety. Quality of raw material has a decisive role for the production of quality wines. Red wines obtained in 2013 harvest are dry wines with a highalcohol level. The total acidity, expressed as tartaric acid, had the highest value for Feteasca neagra variety; low volatile acidity indicate a correct fermentation processes in terms of alcoholic fermentation and malolactic fermentation. Furthermore, the unreduced extract values certify the quality of obtained wines and their qualification as wines with denomination of protected origin. The type and

concentration of phenolic compounds in wine depends on grape variety, ripening, atmospheric conditions, viticultural and vinification techniques (Rodríguez-Delgado et al., 2002). In the studied wines, phenolic acids represented by galic and syringic acids were reported in relative lower amounts with important amounts in Feteasca neagra wine variety. Higher levels of total polyphenols were reported for Cabernet Sauvignon, followed by Feteasca neagra variety (Artem et al., 2014).

Wine quality is mainly defined by sensory attributes, which are determined by the physical and chemical characteristics of the wine. Since phenolic compounds are essential constituents of wine and are responsible for important organoleptic characteristics such as color, astringency and bitterness, they constitute an important quality parameter of red wine. In wine, they are mainly composed of anthocyanins, including monomeric anthocyanins and their derivatives, and non-anthocyanin phenolic compounds which include hydroxylbenzoic and hydroxycinnamic
acids (and their derivatives), flavanols and flavonols. The color of young red wine is mainly a result of the quantity and quality of
monomeric anthocyanins, while astringency and bitterness is related to flavanols and phenolic acids (He et al., 2012a, 2012b).

Intrinsic sensory cues driving global quality involved colour (red colour), aroma (defective and roasted aroma) and in-mouth (astringency) properties. It is interesting to note that visual and in-mouth sensory cues differed depending on the information that experts had access to when judging wine. Red colour of wines was a significant parameter taken into account (together with other sensory parameters) when evaluating the global quality of wines (Sáenz-Navajas et al., 2015).

CONCLUSIONS

Regarding the wine age, Cabernet Sauvignon and Merlot wines showed highest phenolics amount in 2006 and 2007, respectively, suggesting that the content of phenolics does not depend only on wine age, but also on the initial phenolic compounds levels, the conditions during storage, as well as the applied techniques for winemaking (Petropulos et al., 2013)

In the harvest 2011, 2012, 2013 years the results showed that the red wines contain significant amounts of higher alcohols in the samples of Dobrogea, Oltenia followed by those from Wallachia and Transylvania. Volatile fatty acids present very similar values in wines from Oltenia, Dobrogea, Muntenia and significantly superior wines from Transylvania. Dobrogea and Muntenia wines from presenting the most significant amount of esters, followed closely by those in Transylvania and the lowest content of esters that from Oltenia. Aldehydes were identified in high concentrations in red wines from Transylvania, followed by those in Oltenia, Dobrogea and Muntenia and terpene compounds in wines from Wallachia and Transylvania. It can be said that depending on the region from which these wines, although it is the same variety, their structure aromatic sometimes differ greatly. Sugars determined red wines studied them within the category of dry and semi-dry area resulting values were included in the current standards, glucose, fructose actually showing similar values resulting from biochemical processes that occur during alcoholic fermentation. Variation values in sugar for the same sort of wine in different years can be explained by climatic conditions specific ripening and maturation of grapes, precipitation and temperature variations thereof (Stegarus et Tita, 2015).

The year of 2013 was noted as an year in which the grape varieties for red wines showed a high potential for accumulation of sugars, with values above 214 g/L at harvest for Feteasca neagra, Pinot noir, Merlot and Cabernet Sauvignon, the highest value reached in Feteasca neagra variety. Red wines produced in 2013 were dry wines with a high alcohol level, of more than 13.0% vol. The most intense colour was shown by Cabernet Sauvignon and Feteasca neagra wines, these being also the varieties with the highest content of anthocyanins; middle colour presented Merlot wine variety and lower intensity was found for Pinot noir, which presented also the smallest values of anthocyanins (Artem et al., 2014)

Young wines of 2013 and 2014 harvests can be well characterized based on anthocyanin,

parameters that are in higher amounts in young wines compared with aged wines. Certain anthocyanins and anthocyanin ratios (De, Pe, Pec and Pt/Mv, Mvc/Mv) coupled with sugars like glucose (3.83 ppm 1H NMR signal) can be estimated as variables for differentiation of aged wines from 2010. Isotopic variables (d18O and d13C) and amino acids like alanine (1.47 ppm and 1.45 ppm 1H NMR signals) represent useful parameters for 2012 vintage differentiation, while isotopic variables ((D/H)II and R) and sugars (3.18 ppm 1H NMR signal and 62.58 ppm 13C NMR signal) were highlighted for 2011 vintage differentiation (Geana et al., 2015)

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