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OLFACTOMETRIC CHARACTERIZATION OF *TAMAIOASA ROMANEASCA* WINE COME FROM DIFFERENT WINE REGIONS

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Abstract

The work refers to the analysis of aroma compounds identified in Tamaioasa Romanian wines from 2 distinct Romanian wine-growing areas: vineyard Stefanesti-Arges and Pietroasa, watching, and in particular the variation of flavorings depending on the region of origin.
Gas chromatographic method coupled with mass Spectrometry were identified 6 esters, 3 higher alcohols, 1 aromatic alcohol, 2 terpenes, 1 lactone, 1 acid and 1 aldehyde. The high concentration of ethyl acetate, ethyl butanoate, isoamyl alcohol were identified; flavor specific Tamaioasa Romanian wine is given by 1-α-terpineol, terpenic alcohol has been identified in this wine in large quantities.
Research has shown that wine-growing region influence the organoleptic characteristics of wine and aromatic content of their wines, so the wines can be very quickly recognized when tasting.

Keywords**:** *gas chromatography, mass spectrometry, volatile compounds, Tamaioasa Romaneasca wine*

INTRODUCTION

The specific character of wines produced from a grape variety aromatic flavor is given by variety, on the one hand, the way the flavors evolve during fermentation and during aging wines but also, the one-off character printed wine-growing zone (Baek H et al., 1997). Several studies have referred to the volatile aroma compounds of musts and wines from aromatic varieties, especially those of *Muscat* (*Muscat Ottonel*, *Muscat of Alexandria, Muscat of Hamburg*), semiaromatic varieties (*Sauvignon*) (Chandary S. et al., 1964) or neutral varieties (*Riesling*) (Chisholm M. G. et al., 1994). Flavor of these wines is determined by terpene alcohols, aromatic terpenes are specific to each variety (ex. the linalool for *Muscat Ottonel*, geraniol for *Muscat of Alexandria*, nerol for *Muscat of Hamburg* etc) (Guth H., 1997).
Our studies concerns the characterization aromatic potential of *Tamaioasa Romaneasca* wine and wine-growing region influence the aromatic character of these wines. Grape and wine aroma of *Tamaioasa Romaneasca*, (aromatic variety as *Muscat* group) is on terpenes and especially the 1-α-terpineol, a compound that is found in large quantities in these wines and ranging, in rather large limits depending on wine region. Variation of chemical compounds of wine is even more striking if the areas are much different in terms of growing conditions and climate ecopedological.

MATERIALS AND METHODS

Tamaioasa Romaneasca wine was analyzed in terms of physico-chemical characteristics: alcoholic strength (vol% alcohol), sugar content (g/L), total acidity (g/L sulfuric acid), total dry extract (g/L), acidity volatile (g/L acetic acid) and glycerol (g/L). All analyses were performed by the standard methods in the field (*Recueil des methodes internationales d'analyse des vins et mouts*, 2011). Chemical tests were followed by organoleptic analysis (tasting laboratory) and GC/MS (gas chromatography coupled with mass spectrometry method) analyses for identification and determination of volatile

compounds in the wines (Campeanu G. et al., 2001). Determination of volatile aromatic compounds in wine was performed using a Hewlett Packard 5890 gas chromatograph series II coupled to a mass spectrometer Hewlett Packard 5972 series II.

Extraction methods

Volatile compounds were isolated by solvent extraction. 75 mL of wine (containing internal standard IS, 2-ethyl hexanol) were extracted with 15 mL solvent of pentane (Serot T. et al., 2001): dichloromethane 2:1 in a separation funnel. Internal standard solution in absolute ethanol (Merck, Germany) was previously prepared by adding 20 µL (16.2 mg) of ethyl hexanol to 4 mL of ethanol. From this solution 10 µL were introduced in the wine sample. The solvent extract was placed in a 25 mL round bottom flask, then concentrated to about 1 mL under a gently nitrogen flow, at 25°C. This 1 mL volume was further concentrated in a 2 mL vial under nitrogen flow to about 100 µL. From this solution 1 mL was injected in split less injection mode.

Chromatographic conditions

A Hewlett Packard gas chromatograph equipped with split/splitless injector was used. 1µl from each extract was injected into an HP 5-MS capillary column with dimensions: 30 m x 0.25 mm x 0.25 µm film thickness. Column temperature: 30° C for 10 min., followed by temperature gradient 10° C/ min up to 80° C, then gradient of 25° C/min up to 250° C where stationed 10 minutes. The temperature of the injection port was 280° C and the detector (FID) temperature was set at 250° C. MSD conditions are: temperature 180° C ion source, ionization energy 70 eV, mass limit of 20-400 amu, electronic multiplier voltage 1700V, scan rate 1.60 s^{-1}. Injection mode: split, opening after 60 sec, and the split flow: 20 ml/ min. Quantitative determination and identification of volatile compounds based on the comparison of retention indices (RI), mass spectra and the estate of odors. Identification is based on the standard MS library Wiley.

RESULTS AND DISCUSSIONS

Chemical and organoleptic analyses of wine

The two wines *Tămâioasă Românească,* from the two Romanian wine regions, Stefanesti-Arges (TR I) and Pietroasa (TR II) were analyzed in terms of key physical, chemical and organoleptic parameters (Tardea C., 1980) and results are presented in Table 1. Organoleptic analysis of wines showed: *Tamaioasa Romaneasca* wines are aromatic white wines, high quality, with a sugar content of 38 respectively 45 g/L and an alcoholic strength of 11.4 respectively 12.5 vol% alcohol (fig. 1). Wines are rich, complex, balanced taste, smoothness and softness sensation is printed, probably higher in glycerol content (16 and 18 g/L). Wine *Tamaioasa Romaneasca* of Pietroasa is a high class wine, with a strong flavor and total particular flavor, honey and lime and acacia flowers and amber color.

Table 1 - The Main Physico-Chemical Parameters Analyzed wines

Wine	total acidity (g/L sulfuric acid)	sugar content (g/L sugar)	alcoholic strength (vol% alcohol)	Glycerol (g/L)	total dry extract (g/L)	volatile acidity (g/L acetic acid)
TR I	4.9	38	11.4	16	27	0.3
TR II	4.1	45	12.5	18	29	0.5

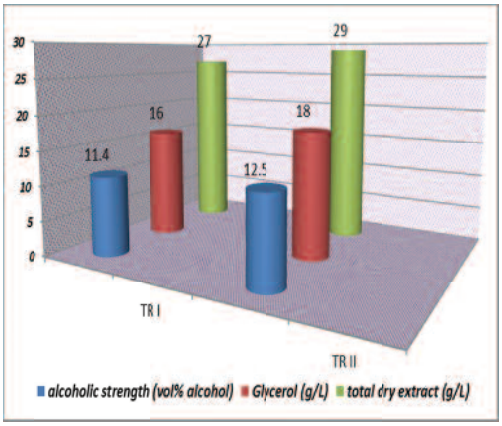

Figure 1. Physico-chemical analysis of the wines

GC/MS analyses of wines. Identification of volatile compounds

Results of the wine volatile compounds determined in *Tămâioasă Românească* wine are given in table 2. Given the large number of alcohols and acids contained in wine, the number of possible combinations (esters) is also very high, primarily ethyl esters, ethanol is mainly because the wine. Esters are formed in grape fermentation process in large quantities by enzymatic esterification and in the process of maturation and aging of wine by chemical esterification (Visan L. et al., 2010). Neutral esters (ethyl acetate, ethyl lactate etc.) are volatile and the wine bouquet, and affects acid esters are not volatile and have more influence on the taste of wine (fig. 2 and fig. 3). The *Tămâioasă Românească* wine stands for ethyl acetate, smelling the flowers and ethyl butanoate, smell of pineapple. Only *Tămâioasă Românească* wine of Stefanesti Arges region decanoate ester was identified as ethyl ester odor of chemicals.

Table 2- The Concentration of Wine Volatile Compounds Determined in *Tămâioasă Românească* Wines, (µg/L)

No.	Compound	Concentration (µg/L)	
		TR I	TR II
The concentration of esters			
1	Ethyl acetate	645	683
2	Butyl acetate	0.2	1
3	Ethyl butanoate	155	233
4	Ethyl octanoate	2	2
5	Methyl butanoate	90	56
6	Ethyl decanoate	2	-
The concentration of aliphatic alcohols			
7	2-methyl-1-propanol	19	22
8	3-methyl-1-butanol	200	280
9	1-hexanol	1	0.3
The concentration of aromatic alcohols			
10	Benzetanol	820	630
The concentration of terpenes			
11	Linalol	0.1	0.1
12	1- α -terpineol	2	3.7
The concentration of lactones			
13	γ-butyrolactone	56	78

Terpene alcohols are volatile class of compounds with the highest importance to wine aroma, terpenes, however, being found only wines from aromatic varieties: *Muscat Ottonel, Muscat of Alexandria, Muscat of Hamburg, Tămâioasă Românească* etc. Identification of terpenes in wine flavored variety shows the specific nature of each part, these compounds represent "key substances" (fig.4) that may contribute to the identity of a wine. Thus, terpene content varies by variety flavored: linalool is found in high concentration in wine *Muscat Ottonel,* geraniol in *Muscat of Alexandria* etc.

The *Tămâioasă Românească* wines analyzed are present 1-α-terpineol (an odorant monoterpenes with a very high potential, and linalool), α-terpineol printing wines sweet *incense* smell of lilac (Visan et al., 2012). Linalool is found in wines, but in very low concentrations. Although 1-α-terpineol was identified in both wines, noticed the wine TR II, by Pietroasa, with a about double content of 1-α-terpineol.

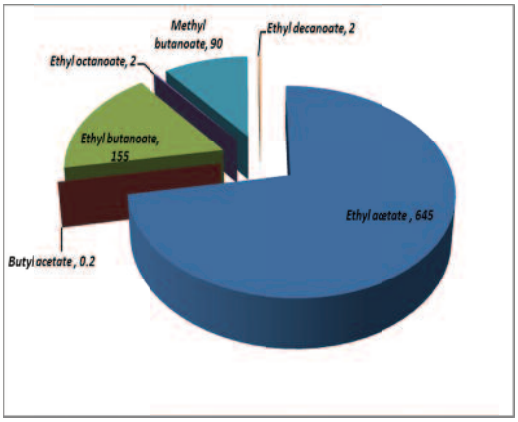

Figure 2. The main esters of a *Tamaioasa Romaneasca* wines, µg/L (TR I, Stefanesti)

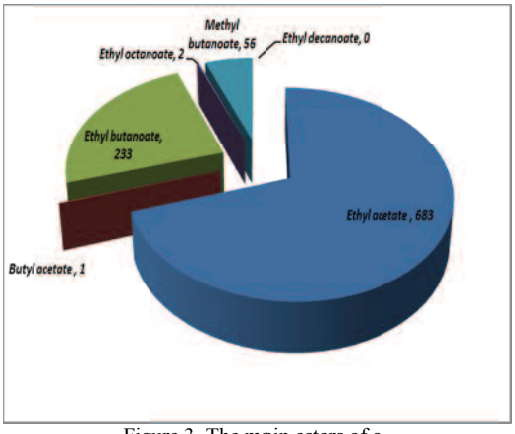

Figure 3. The main esters of a *Tamaioasa Romaneasca* wines, µg/L (TR II, Pietroasa)

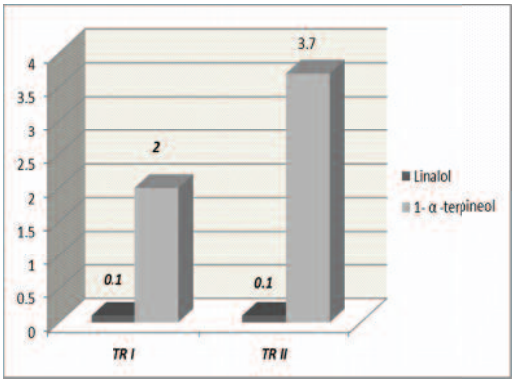

Figure 4. Concentration of terpenes in *Tamaioasa Romaneasca* wines (µg/L)

The higher alcohols were represented by 2-methyl-1-propanol, 3-methyl-1-butanol, 1-hexanol and benzetanol, in slightly different concentration (Fig. 5).

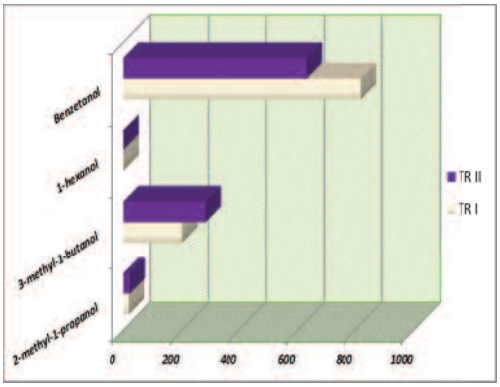

Figure 5. Concentration of higher alcohols in *Tamaioasa Romaneasca* wines (µg/L)

CONCLUSIONS

Aroma *Tămâioasă românească* wines is striking, but especially the standout wines from wine-growing center Pietroasa; wines have a strong and distinctive flavor, honey and lime and acacia blossom and amber color. Wine can be classified in the category high-class wines, is complex, robust, very well balanced.

Of esters were identified in both wines: ethyl acetate, butyl acetate, ethyl butanoate, ethyl octanoate, methyl butanoate and ethyl decanoate, the latter being found only in wine from Stefanesti-Arges wine-growing region. Concentrations in esters were slightly different, slightly higher Pietroasa wine-growing region.

Aromatic alcohols were represented by benzetanol, in slightly different concentration, higher in wine from Stefanesti-Arges wine-growing region.

Terpenic compound that print flavor of *Tamaioasa Romaneasca* variety is α-terpineol; the compound was identified in both wines, in wine from the Pietroasa wine-growing region, α-terpineol still being found in almost double the concentration Stefanesti-Arges wine.

Although flavored varieties presents a varietal aroma, though a great influence on the aromatic character of grapes and wines has wine-growing region, which can lead to large differences in the typical character of wines.

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