P56: XINOMAVRO NAOUSSA RED WINES TYPICALITY; LINKING SENSORY AND PHYSICOCHEMICAL DATA

Adamopoulou E. [1], *Leloudi M.-Chr.* [1], *Hatzidimitriou E.* [1]

[1] Aristotle University of Thessaloniki, School of Chemistry, Laboratory of Food Chemistry and Technology, Thessaloniki, Greece – evroadam@chem.auth.gr; mcleloudi@chem.auth.gr; effiehd@chem.auth.gr

Abstract − Typicality rating of 10 red wine samples, using a non-structured scale, at left "very bad example", at right "very good example" of what a panel of wine experts, professionals, initiated assessors and consumers, considered to be a typical Xinomavro Naoussa wine, was combined to physicochemical analysis (color characteristics, phenolic content) and GC analysis of volatile profile. Assessors were able to successfully identify the Xinomavro Naoussa samples and rate them as the most typical. Based on both physicochemical and sensory data, wines were successfully grouped according to composition and origin (monovarietal or blended, Naoussa or other PDO's).

Keywords: Xinomavro, Naoussa, typicality, sensory analysis, physicochemical analysis

1. INTRODUCTION

Typicality can be defined as the character of what is typical, what makes a specific product possible to differentiate, identify, and recognize from others [1].

Applied to PDO wines, typicality which corresponds to biochemical, physicochemical and sensory characteristics, is the most synthetic expression of the grape variety, soil and wine making process [2].

Typicality assessment is a very interesting and current subject for both wine producers and researchers. The former seek through adapted vine culture techniques and modern winemaking practices to enhance those characters that distinguish their wine among other varietal or PDO wines, giving identity and contributing to its commercial high-added value. For their part, researchers are interested in identifying those organoleptic and physicochemical characteristics forming the aforementioned characters.

Xinomavro is probably the most important indigenous red grape variety of Northern Greece. It is cultivated in Naoussa, Amyntaio, Goumenissa and Rapsani, as well as Pella, Siatista, Grevena, Kozani, Velvento, Vertisko, Asko Thessalonikis and Sithonia Chalkidikis to give the corresponding PDO and PGI wines, respectively. Compared to Amyntaio, the other monovarietal PDO wine, typical Naoussa wines have a higher alcoholic strength, less acidity, less malic acid and enriched aromas [3, 4].

Typicality rating following wines' sensory analysis by a panel of experts and use of statistical tools to link sensory perception of typicality and wine physicochemical characteristics, is crucial to enable the control and management of typicality and therefore the quality of a wine. The present study is a preliminary work in this direction, and aims more specifically in typicality assessment of Xinomavro Naoussa red wines.

2. EXPERIMENTAL

2.1. Wine samples

10 commercially available red wines, Greek, French and Italian, served as samples (Table 1). The wines were kindly provided by the organizers after the sensory session that took place in Christos Lanaras "Vetlans" multi-venue in the context of the "Naoussa, Wine City" events, 9-11 December 2016 and in particular the event "Naoussa and LOOKALIKES". Wines' selection was made by a MW. Of the ten (10) wines assessed, at the end of the event we had at our disposal in sufficient quantity to proceed with analytical determinations, seven (7) wines (Samples Ξ_Σ, Ξ_{N1}, Ξ_A, P, Ξ_{N2}, Γ, I_3).

2.2. Sensory analysis

41 assessors, 21 men and 20 women, aged 18 to

Table 1. Samples used in this study

	sample	Varietal composition[a]	Denomination (PDO, PGI)	Vintage
1	Ξ_Σ	Xinomavro (XM) 100%	PGI (Siatista)	2011
2	Ξ_{N1}	XM 100%	PDO (Naoussa)	2011
3	Ξ_A	XM 100%	PDO (Amyntaio)	2012
4	B	PINOT NOIR 100%	APPELLATION D'ORIGIN CONTROLEE Gevrey-Chambertin (Bourgogne, France)	2013
5	I_1	NEBBIOLO 100%	DENOMINAZIONE DI ORIGINE CONTROLLATA Nebbiolo d'Alba (Piemonte, Italy)	2013
6	P	Xinomavro, Krasato, Stavroto	PDO (Rapsani)	2013
7	Ξ_{N2}	XM 100%	PDO (Naoussa)	2012
8	I_2	NEBBIOLO 100%	DENOMINAZIONE DI ORIGINE CONTROLLATA E GARANTITA Barolo (Piemonte, Italy)	2012
9	Γ	XM 70%, Negoska 30%	PDO (Goumenissa)	2013
10	I_3	SANGIOVESE 100%	DENOMINAZIONE DI ORIGINE CONTROLLATA E GARANTITA Brunello di Montalcino (Tuscany, Italy)	2011

>50 years old, took part in sensory analysis. They comprised wine experts (oenologists, winemakers), wine professionals (sommeliers, wine journalists), initiated assessors and consumers.

Wines were assessed in a blind tasting; assessors were only informed that there were Xinomavro wines and wines from foreign varieties that resemble Xinomavro.

Wines were served in two groups of 5 samples each. The assessors were asked, after tasting all five samples, to try to identify the sample, which in their opinion, was Xinomavro Naoussa. In each group there was only one Xinomavro Naoussa, two samples either Xinomavro monovarietal or blend and two samples from foreign varieties.

Additionally, assessors were asked to complete a properly formulated questionnaire and evaluation sheet related to typicality rating of the given wines.

2.3. Physicochemical analysis

Measurements of appropriate diluted wine samples' absorbance at 420, 520 and 620 nm, were carried out using a Hitachi U-2000 spectrophotometer (Tokyo, Japan). Color intensity was calculated as the sum of A_{420}, A_{520}, and A_{620} nm (10 mm path length) while hue was calculated as the ratio between A_{420} and A_{520} nm (OIV, 2017). Total anthocyanin content, ionization index (%) and total phenols were determined according to Ribéreau-Gayon et al. (2006). The Glories method (Glories, 1978) was used for the determination of tannin concentration. All measurements were performed in triplicate.

Volatile compounds were analyzed using a FFAP fused capillary column after HS-SPME sampling (DVB/CAR/PDMS 50/30µm SPME-fiber) followed by GC/FID analysis.

PCA analysis and statistical comparisons of the mean values for all parameters determined were performed by one-way analysis of variance (ANOVA), followed by the multiple Duncan test ($p < 0.05$ confidence level) using the SPSS v.21.0. statistical package.

3. RESULTS AND DISCUSSION

3.1. Typicality rating

Assessors as a whole group (Figure 1) as well as in separate groups of experts, professionals, or initiated assessors/consumers (Table 2), were able to distinguish and successfully identify the two Xinomavro Naoussa wine samples (Ξ_{N1} and Ξ_{N2}), as they rated them with the highest scores, characterising them as the most typical. These samples, regardless of the assessors group, were statistically significantly different from all others, forming a category on their own. Xinomavro from Siatista X_Σ (PGI Siatista), was rated the third most typical sample, while sample B (Pinot noir, Burgundy), was found the less typical. Classification of the remaining samples showed variation depending on the assessors group.
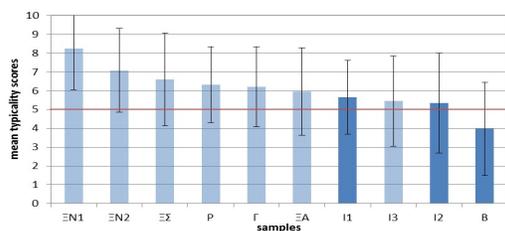
Figure 1. Ranking of commercial red wine samples with regard to Xinomavro PDO Naoussa typicality (10=very typical, 0=non-typical; all assessors included)

Table 2. Sensory scores of commercial red wine samples, with regard to Xinomavro PDO Naoussa typicality (10=very typical, 0=non-typical), for different groups of assessors

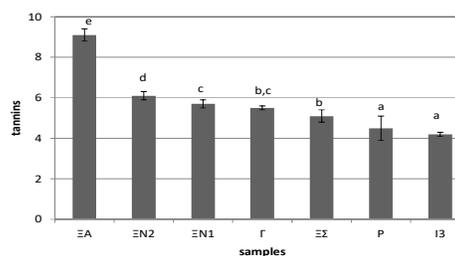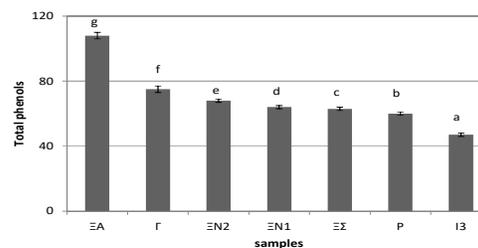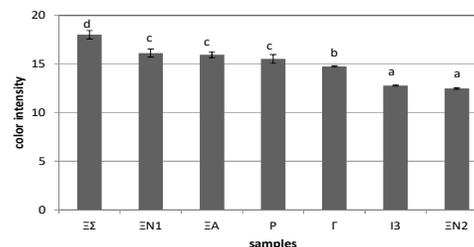| sample	wine experts	professionals	Initiated assessors/consumers
Ξ_Σ	7,0±2,4 ^{c,d}	5,8±2,6 ^a	6,9±2,3 ^{b,c}
Ξ_{N1}	**7,8±2,1 ^d**	**9,0±0,9 ^b**	**8,5±1,8 ^d**
Ξ_A	5,3±2,1 ^{b,c,d}	4,8±2,6 ^a	6,6±1,9 ^{b,c}
B	1,7±2,3 ^a	3,5±2,9 ^a	4,7±2,1 ^a
I_1	5,2±2,1 ^{b,c,d}	5,8±2,4 ^a	5,6±1,9 ^{a,b}
P	5,6±1,3 ^{b,c,d}	5,7±2,3 ^a	6,8±1,8 ^{b,c}
Ξ_{N2}	**7,7±2,1 ^d**	**6,3±2,5 ^{a,b}**	**7,2±2,2 ^c**
I_2	3,8±3,1 ^{a,b}	5,0±1,8 ^a	5,9±2,7 ^{a,b,c}
Γ	5,0±2,1 ^{b,c,d}	5,2±2,5 ^a	6,7±1,9 ^{b,c}
I_3	4,0±2,2 ^{a,b,c}	4,5±1,9 ^a	5,9±2,5 ^{a,b,c}

3.2. Physicochemical characteristics

Ranking of wines according to total anthocyanins, ionization index, color intensity, total phenols and tannins is presented Figures 2-3.
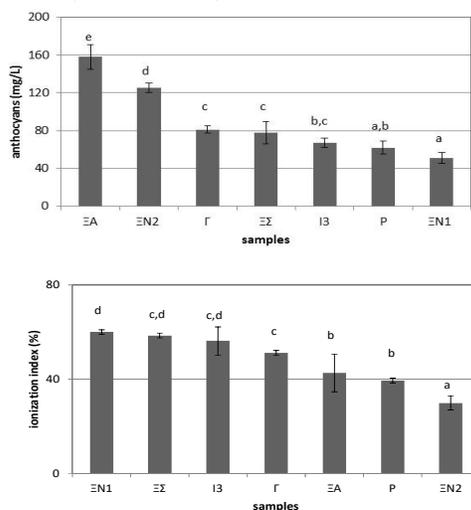

Figure 2. Anthocyanin content and ionization index of commercial red wine samples used in this study

Figure 3. Color intensity, total phenols and tannin content of commercial red wine samples used in this study

The two PDO Naoussa wines examined, X_{N1} and X_{N2}, rated in sensory analysis as the most typical Xinomavro Naoussa ($X_{N1}>X_{N2}$), showed significant differences between them in (a) total anthocyans content ($X_{N2}>X_{N1}$), ionization index ($X_{N1}>X_{N2}$), color intensity ($X_{N1}>X_{N2}$), and hue ($X_{N2}<X_{N1}$). The same wines, showed similarities between them and differences with other wines, with regard to total phenols and tannin content –medium to high total phenols and tannin content- which is in line with the data available for the grape variety and the PDO area. The above is visualized in the PCA analysis (Figure 4).

The X_Σ sample (PGI Siatista), the third most typical wine, showed the second highest ionization index value, and the highest color intensity one.

The X_A sample (PDO Amyndeo), with a moderate typicality score (6 out of 10), showed the highest values of total anthocyans, total tannins, and total phenols. Relatively high were the values of other analyses.
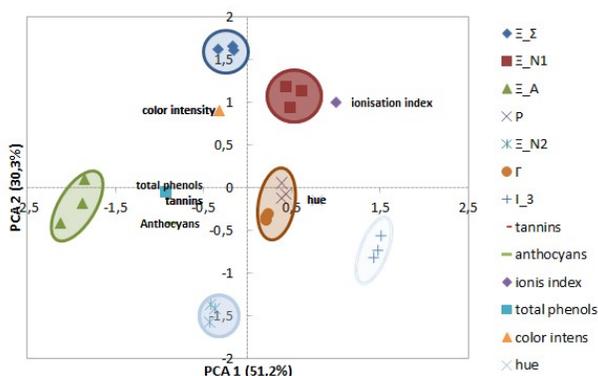
Figure 4. PCA analysis of physicochemicala and sensory data of the commercial red wines included in this study

Xinomavro blend wines (P and Γ) (PDO Rapsani and Goumenissa, respectively), given moderate typicality ratings, 4th and 5th, respectively, showed little variation in almost all analyses results, most probably due to their composition. That was also reflected in the PCA analysis, where the samples were close in the graphical representation.

Finally, the Italian sample I_3, last one in typicality rating of the 7 samples tested physicochemically and 8th in the general classification, was characterized by the lowest values in all analyses and a representation far away from the other samples and physicochemical parameters in PCA (Fig. 4).

4. CONCLUSIONS

Despite the extremely low number of samples per case, differences were observed between the red Xinomavro monovarietal and blend wines and others from non-native grape varieties/foreign appellations, depending on the origin and composition. Assessors as a whole group as well as separate groups (wine experts, professionals, initiated assessors/consumers) managed to distinguish and successfully identify, in a blind sensory tasting, the two samples Xinomavro PDO Naoussa, characterizing them as the most typical ones. This suggests that Xinomavro PDO Naoussa wines, despite the fact of their differentiation, they have a characteristic, distinctive and recognizable organoleptic character, contributing to their undoubted typicality.

REFERENCES

[1] I. Maitre, R. Symoneaux, F. Jourjon, E. Mehinagic, Sensory typicality of wines: How scientists have recently dealt with this subject. Food Quality and Preference, 21, (2010), 726-731

[2] J. Salette, La typicité: Une notion nouvelle au service du produit, de ceux qui l'élaborent et de ceux qui le consomment en l'appréciant, Revue des Oenologues, 85, (1997), 11-13.

[3] N.A. Nikolaou, Viticulture, Sychroni Paideia Publications, Thessaloniki, 2011, 978-960-357-081-3 (in Greek)

[4] ENOAVE Study "Redefining the OPAP Zones Naoussa and Goumenissa», (2005). http://www.wineroads.gr/fileviewer.php?file_id=2291, in Greek