DIMETHYL SULFIDE: AN ENHANCER OR AN IMPORTANT COMPOUND OF VARIETAL AROMA?

SULFURA DE DIMETIL: POTENȚATOR SAU COMPUS IMPORTANT AL AROMEI VARIETALE?

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Abstract*: In this study, dimethyl sulfide (DMS) quantification was performed in red (VQPRD Naoussa) and rosé wines from Xinomavro variety. The research was carried out with wine samples of different vintages from wineries of North Greece located in Naoussa and Amyntaio. Potential dimethyl sulfide (PDMS) content was also quantified since it is considered to be transformed into the free form, after ageing. The quantification of the wine DMS and PDMS (estimated indirectly after the release of free DMS by heating in alkaline conditions) content was accomplished by solid-phase micro extraction (SPME) followed by gas chromatography coupled to mass spectrometry (GC-MS). The ageing effect, according to wine type and vintage was studied. The results showed that DMS and PDMS were characterized by a tendency to increase and decrease respectively, with ageing.*
Key words: dimethyl sulfide, Xinomavro variety, potential dimethyl sulfide, wine aging

Rezumat*: Acest studiu are ca scop principal cunatificarea sulfurii de dimetil (DMS) din vinuri roşii (VQPRD Naoussa) şi rosé obţinute din soiul Xinomavro. Au fost folosite vinuri din diverşi ani de recoltă şi diverse podgorii ale Greciei de Nord, din zona Naoussa şi Amyntaio. Conţinutul potenţial in sulfura de dimetil (PDMS)a fost cuantificat, considerându-se că, în procesul de învechire, trece în formă liberă. Cuantificarea DMS şi PDMS din vinuri s-a făcut prin micro-extracţie în fază solidă (SPME) urmată de gazcromatografie cuplată cu spectrometrie de masă (GC-MS). A fost studiat procesul de învechire în funcţie de tipul şi anul de recoltă a vinului. Rezultatele au demonstrat că DMS şi PDMS cresc şi, respectiv, decresc, o dată cu învechirea.*
Cuvinte cheie : sulfura de dimetil, soiul Xinomavro, conţinutul potenţial de sulfura de dimetil, învechirea vinului.

INTRODUCTION

The role of dimethylsulfide (DMS) in white and red wines aroma was identified and investigated by many researchers (Loubser & Du Plessis, 1977 ; Marais, 1979, Spedding, Eschenbruch & Purdie, 1980 ; Spedding & Raut, 1982 ; De Mora et al., 1987 ; Ferreira et al., 2003 ; Segurel et al., 2004 ; Ségurel et al., 2005 ;

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Escudero et al., 2007). Although the aroma of DMS was described as corn, cabbage, asparagus and molasses (Mestres et al. 2000), it has been demonstrated as an enhancer of the berry fruit note in red wines (Segurel et al. 2004 ; Escudero et al. 2007). The positive or negative effect at the bouquet depends on the concentration in the wines and relates to the grape variety (Spedding & Raut, 1982; De Mora et al., 1987; Segurel et al., 2004; Swan, 2000). The perception threshold is 24 μg/l for white wines and 27 μg/l for red wines (De Mora et al., 1986).

DMS levels increase during wine aging in the bottle (Marais, 1979, Spedding et al., 1980, Segurel et al., 2005, Fedrizzi et al., 2007).

High levels of DMS were reported in the wines of the Greek Cultivar cv. Xinomavro Anocibar, (Kotseridis and Bertrand, 1996). According to these results the levels in these wines were exceeding the perception threshold. The target of our current research was to validate these previous findings by using a deuterated internal standard (Segurel et al., 2004) as also to examine the DMS precursors levels of both the wines and grapes of this variety (Segurel et al., 2004, Segurel et al., 2005, Swan, 2000).

MATERIAL AND METHOD

Wine samples. Wine samples of Xinomavro, 15 red wines and 3 rosé wines from this variety but from different vintages were analysed. Red wines, vintages: 1992-2008. Rosé wines, vintages: 2006 - 2008.

Analysis of free and potential DMS. Free and potential DMS were analyzed using a method based on that described by Segurel et al. (2004) with some modifications. *Sample preparation for free DMS.* 25 ml of wine and 2.5μg $[^2H]_6$-DMS were placed to a 40 ml vial at 20 ºC with 3 g NaCl and a magnetic stir bar. The vial was sealed with a screw-top cap with silicon septa.

Sample preparation for potential DMS. 25 ml of wine were placed to a 40 ml vial at 20ºC with a magnetic stir bar. Free DMS that already exist in the sample was removed by bubbling nitrogen at 100 ml/min flow rate for 15 min with a magnetic stirring at 750 rpm. pDMS was released by heat-alkaline treatment. After the solution got cold, 2.5 μg $[^2H]_6$-DMS were added through the septa. The solution was equilibrated by magnetic stirring at 750 rpm for 5 min at 30ºC. Then the SPME needle inserted manually through the vial septum and the fiber (CAR/PDMS 75 μm) was exposed to the headspace of the sample for 30 min at 30ºC.

The analysis of DMS was performed using a Hewlett-Packard 5890 II GC, equipped with a Hewlett-Packard 5972 MS detector.

RESULTS AND DISCUSSIONS

As observed in fig. 1 the levels of DMS tend to rise during the ageing, which is in accordance with the relative biobliographic references. Especially after 10 years of ageing the levels found to be superior than 100 μg/L, which means that this volatile compound plays an important role to the wine aroma. On the other hand potential DMS tends to be reduced during the years which means that it is transformed to free DMS.

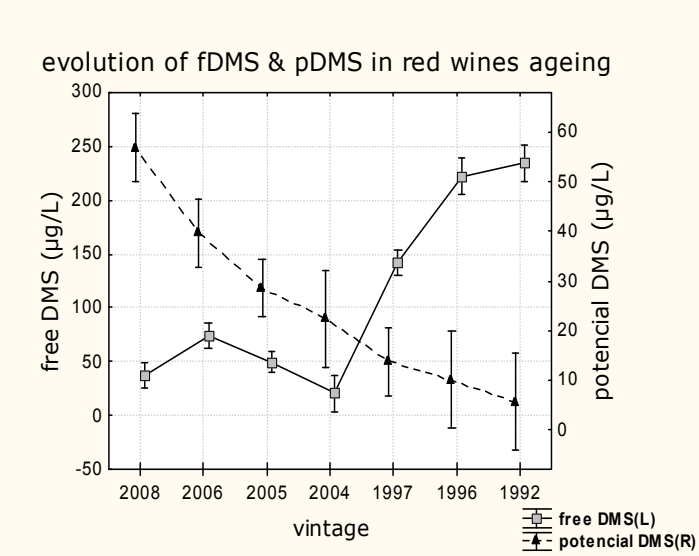

Fig. 1 - Evolution during ageing of DMS and DMS liberated by its precursors (potential DMS) in Xinomavro red wines

Concerning the rosé wines, a similar trend has been found as shown at figure 2.

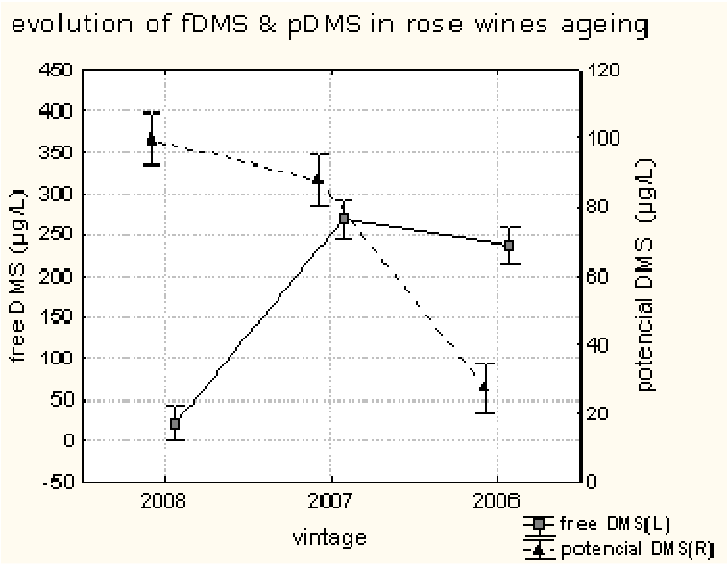

Fig. 2 - Evolution during ageing of DMS and DMS liberated by its precursors (potential DMS) in Xinomavro rosé wines

CONCLUSIONS

It is noteworthy that the levels of free DMS are getting significantly higher than those of red wines for the corresponding vintages. This could be explained by the different technological methods used for the production of rosé and red wines.

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