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Varietal Thiols in White Wines from Portuguese Grape Varieties

Introduction

Sulphur compounds, specially volatile thiols, as 4-mercapto-4-methylpentan-2-one(4MMP), 3-mercaptohexanol (3MH) and 3-mercaptohexyl acetate (A3MH), make a positive contribution to the varietal aroma of certain fruits, wines, and other fermented beverages.

Wines made from Sauvignon blanc world widely, are the example of the successful impact of this profile of aromas in the taste of the consumer.

This work aim to evaluate the presence of these volatile thiols in wines produced with Portuguese grape varieties.



Material and Methods

Wines

Commercial Portuguese wines from *Vitis vinifera* varieties: **Sauvignon blanc**, **Antão Vaz**, **Arinto**, **Fernão Pires**, **Verdelho**, **Viosinho**. All wines were produced in 2009. The Arinto and Fernão Pires wines were also produced in 2010.

Analytical and sensorial determinations

The wines were tested randomly regarding the aromatic composition, by a trained panel of 10 experienced tasters.

Sulphur compounds were determined by gas chromatography with different detectors:

Flame photometric detection (GC/FPD),
Mass spectrometry (GC/MS)
Flame ionization (GC/FID)
Olfactometry (GC/O)

Results

The analyses by GC-O showed the existence of two olfactory zones related to **4MMP** and **3MH** in all wines. A third olfactory zone for **3MHA** was only detected for the youngest wines from 2010 vintage.

Table 1. Retention times, Kovats retention index, descriptor/olfactory zone, chemical compound, and aroma intensity of different wines.

Retention time	KRI (I)	KRI (II)	Descriptor/Olfactory zone	Chemical compound	Antão Vaz	Arinto	Fernão Pires	Sauvignon blanc	Verdelho da Madeira	Viosinho	Arinto (2010)	Fernão Pires (2010)
12'10"	1210	-	Dirty socks	-	1	1	1	1	1	2	2	1
13'30"	1223	-	Fruity	-	1	1	1	1	1	1	2	1
21'25"	1398	1394 ^A	Black current/ box	4MMP	1	1	1	3	2	1	1	2
23'30"	1424	1400 ^B	Straw	3-Octanol	1	0	1	1	1	1	1	0
25'30"	1465	1449 ^A	Vinegar	Acetic acid	2	2	2	1	1	2	2	1
27'40"	1502	-	Garlic	-	2	1	2	1	1	1	1	2
29'05"	1525	-	Coriander	-	2	2	2	1	3	3	3	2
36'10"	1545	-	Straw/herby	-	1	1	1	1	1	2	1	0
36'30"	1649	1644 ^A	Cheese	Butyric acid	2	2	2	2	2	3	2	1
39'00"	1691	-	Chrysanthemum	-	2	1	2	1	1	1	3	3
41'10"	1728	-	Cooked cabbage	-	0	0	1	2	0	1	0	0
41'5" – 42'3"	1741	1735 ^A	Box/passion fruit	3MHA	0	0	0	0	0	2	2	1
47'30"	1842	1822 ^C	Rose/honey	2-Phenylethyl acetate	2	2	2	2	2	3	2	2
49'3" – 50'15"	1883	1872 ^D	Sweaty/passion fruit	3MH	3	3	2	2	2	3	3	3
53'30"	1959	1965 ^B	Floral/rose	2-Phenylethanol	2	2	2	2	0	3	2	2

KRI (I): Kovats retention index calculated; KRI (II): Kovats retention index obtained from literature; ^AFerreira et al. (2001); ^BYung et al. (1993); ^CSchnermann et al. (1997); ^DCullere et al. (2004).

4MMP: 4-mercapto-4-methyl-pentan-2-one, 3MHA: 3-mercaptohexyl acetate, 3MH: 3-mercaptohexan-1-ol.

0: not detected, 1: low intensity, 2: medium intensity, 3: high intensity.

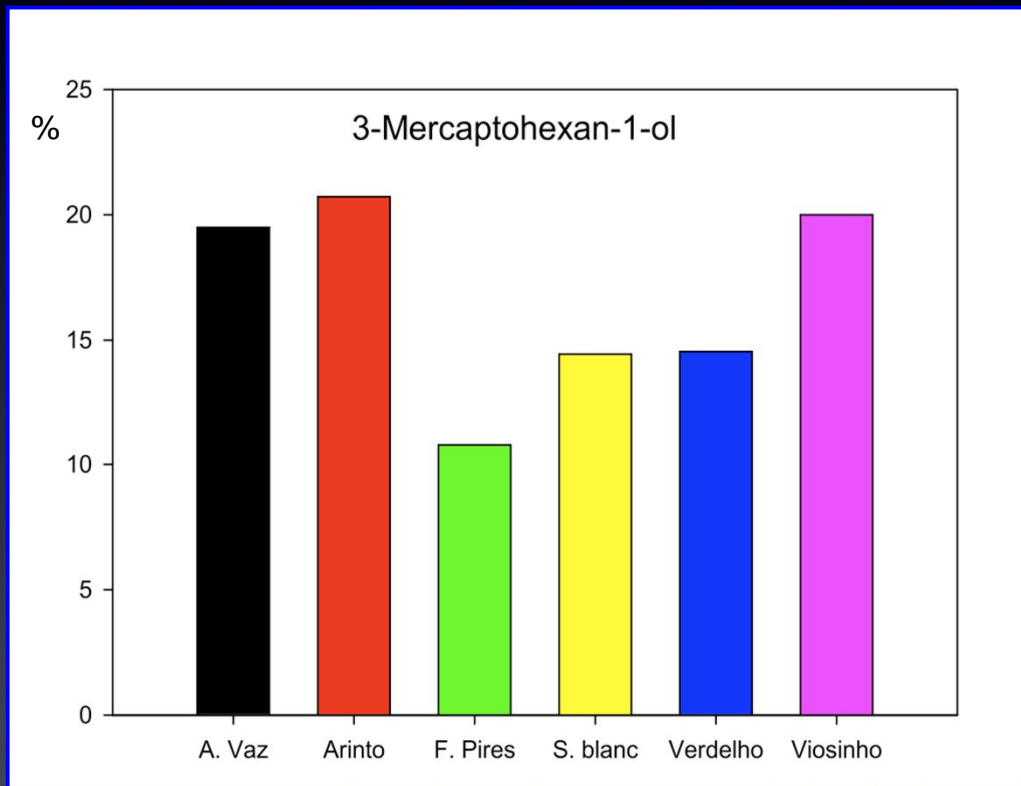
Table 2. Average scores of aroma descriptors of different wines from sensory analysis

Aroma	Antão Vaz	Arinto	Fernão Pires	Sauvignon blanc	Verdelho da Madeira	Viosinho
Fruity	1.0	3.2	3.4	2.7	2.9	2.5
Floral	2.0	2.5	2.8	2.4	2.2	2.4
Grape fruit	3.2	2.5	2.5	2.4	2.4	1.7
Passion fruit	2.6	2.9	2.4	1.9	2.6	1.6
Black currant	2.5	1.7	1.4	2.1	1.4	2.2
Herbaceous	2.1	1.7	1.7	2.2	1.6	2.0

The results of GC-O are in agreement with those obtained by sensory analysis

Results

The formal identification of 3MH was achieved by GC-MS. However, it was only possible to evaluate the content of 3MH in wines by GC-FPD:



Conclusions:

This work highlights the presence of volatile thiols in wines from Antão Vaz, Arinto, Fernão Pires, Verdelho da Madeira and Viosinho varieties. The GC-FPD methodology used in this work allows obtaining some interesting results on the 3MH level in wines. Further work is needed to quantify volatile thiols in other Portuguese white wines.

Obrigado, Danke, Thank you, Merci, Grazie...