

Volatile composition of wines from cvs. Blanco lexítimo, Agudelo and Serradelo (*Vitis vinifera*) grown in Betanzos (NW Spain)

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ABSTRACT

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Wine aroma is formed by volatile compounds of different chemical natures and origins. Betanzos is the most northern viticole geographic area from Galicia (NW Spain). The aromatic profiles of wines produced from two white varieties (*Blanco lexítimo* and *Agudelo*) and one red variety (*Serradelo*) from Betanzos, harvested in 2006 and 2007, have been established by gas chromatography (GC/FID). A total of 35 varietal and fermentative aroma compounds were identified and quantified in free volatile form, which include terpenols, C₁₃-norisoprenoids, alcohols, esters, volatile fatty acids and volatile phenols. To ascertain the compounds with major impact odours, the Odour Activity Value (OAV) was calculated. Twelve compounds showed concentrations above their perception threshold (OAV>1). The results obtained suggest that ethyl octanoate (apple), isoamyl acetate (banana), ethyl hexanoate (fruity) and β-damascenone (floral) were the most powerful odorants for the white wines *Blanco lexítimo* and *Agudelo* from Betanzos. Ethyl octanoate and β-damascenone (fruity and floral aroma respectively) were the most odorant for the red wine *Serradelo*.

Key words: Agudelo, Blanco lexítimo, GC-FID, Serradelo, *Vitis vinifera*, volatile compounds.

INTRODUCTION

Wine aroma is formed by volatile compounds of different chemical natures and origins and they vary as a function of grape metabolism, variety and also certain cultural and climate-related factors²⁷. Although a great number of volatile aroma compounds are found in grapes, most of those found in wine are formed during fermentation by the yeast *Saccharomyces cerevisiae*²⁹. The effects of malolactic fermentation on the volatiles of wine has been the subject of controversy, but it is now generally

agreed that specific wine attributes are altered and that complexity is enhanced through the appearance of unique flavours and odours^{11,28}.

Among the compounds responsible for wine aroma are terpenols, C₁₃-norisoprenoides, alcohols, esters, acids and volatile phenols^{1,7,24}. Monoterpenols and C₁₃-norisoprenoids are characteristics of the grape, forming the varietal aroma of wines. Some of these volatile compounds are modified during yeast fermentation¹³. The secondary aromas, produced by yeast metabolism during fermentation include esters, acetates, alcohols and others.

The content of aromatic compounds of grapes makes it possible to classify the varieties into neutrals or aromatics¹⁶. The importance of these aromatic compounds depends not only on their concentration, but also on their olfactory perception thresholds, defined as the lowest concentration that can be detected by smelling^{5,17}. The concentration/threshold ratio, known as “odour activity value” (OAV), shows the contribution of a specific compound to the aroma of a wine. Compounds with an OAV>1 are considered to have an active contribution^{3,23}. However, this does not take into account the depressive or synergic odour effects resulting from the interactions of the different molecules present in the wines, but it can serve as a first approximation to the potential contribution of each compound to the global aroma^{6,18}.

During the last few years, there has been a growing interest in the recuperation of the denominated autochthonous varieties from Galicia. This is the case with the traditional grape varieties grown in Betanzos. Betanzos is an ancient winemaking area situated in the most northern viticole geographic area from Galicia (NW Spain). White cultivar *Blanco lexítimo* and *Agudelo* and red cultivar *Serradelo* are three *Vitis vinifera* grape varieties traditionally grown in Betanzos. As far as we know, aroma composition of wines from these cultivars has not yet been studied.

This paper reports the results of the first study on volatile composition of the monovarietal wines produced with cv. *Blanco lexítimo*, *Agudelo* and *Serradelo* grown in the same geographic area and made under the same fermentation conditions during two consecutive vintages (2006 and 2007). The main objective of this study was to identify and quantify the principal volatile compounds present in the wines of these cultivars and contribute to their characterization according to the aromatic profile.

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Odour Activity Values (OAV) were calculated in order to know the most potent aroma compounds of the wines studied.

MATERIALS AND METHODS

Grapes and wines

Two white grape varieties from *Vitis vinifera*, *Blanco lexitimo* and *Agudelo* and one red grape variety, *Serradelo*, grown in Betanzos (Galicia) from 2006 and 2007 vintages were considered in this study.

Monovarietal wine production was carried out in the Bescansa Winery from Betanzos. The white and red wines were prepared in 100 L Inox tanks. Spontaneous fermentation was realized at 18°C and 28°C, for white and red musts respectively and using standard winemaking practices. After fermentation the wines were filtered and transferred to 0.75 L bottles. The bottles were stopped and stored at 6°C until analysis two months after fermentation.

Ethanol, total acidity, volatile acidity, reducing sugars, pH and tartaric and malic acid contents of wines were determined according to OIV Official Methods²⁰.

Extraction of wine volatiles

In a 10 mL culture tube (Pyrex, ref. 1636/26MP), 8 mL of wine, 2.4 µg of internal standard (4-nonanol, Merck ref. 818773) and a magnetic stir bar (22.2 mm × 4.8 mm) were added. Extraction was done by stirring the sample with dichloromethane (Merck, ref. 1.06054) according to Oliveira et al²². After cooling at 0°C during 10 min, the magnetic stir bar was removed and the organic phase was removed using centrifugation ($RCF=5118$, 5 min, 4°C) and the extract recovered into a vial, using a Pasteur pipette. The aromatic extract (200 µL) was dried with anhydrous sodium sulphate (Merck, ref. 1.06649) and placed into a new vial²². Extractions of volatiles from each wine were carried out in triplicate.

GC-FID analysis

A Chrompack CP-9000 gas chromatograph equipped with a split/splitless injector and a flame ionization detector (FID) with a capillary column, coated with CP-Wax 52 CB (50 m × 0.25 mm i.d., 0.2 µm film thickness, Chrompack), was used. The temperature of the injector and detector were both set to 250°C. The oven temperature was held at 40°C, for 5 min, then programmed to rise from 40°C to 235°C, at 3°C min⁻¹, and then finally programmed from 235°C to 255°C, at 5°C min⁻¹. The carrier gas was helium 55 (Praxair) at 103 kPa and the split vent was set to 13 mL/min. Each 3 µL extract was injected in splitless mode (for 15 s). Quantification of volatiles, as 4-nonanol equivalents, was performed with Varian MS Workstation version 6.6 by comparing retention indices with those of pure standard compounds²².

Odour activity value

To evaluate the contribution of a chemical compound to the aroma of a wine the Odour Activity Value (OAV) was calculated as the ratio between the concentration of compound and the perception threshold found in the literature^{5,17,25,30}.

Statistical analyses

To establish the relationship between the aromas and the wines elaborated with different Betanzos cultivars, principal component analysis (PCA) was carried out. The calculations were performed using the Enterprise Guide 3 System Software (SAS Institute, Cary, NC, USA).

RESULTS AND DISCUSSION

Table I shows results for ethanol, total acidity, volatile acidity, reducing sugars, pH and tartaric acid of wines obtained from *Blanco lexitimo*, *Agudelo* and *Serradelo* varieties harvested in 2006 and 2007. All wines were fermented to dryness. The ethanol and acidity of the wines were very different for 2006 than for the 2007 vintages. The ethanol of the wines was higher in the 2006 than the 2007 vintage. Moreover, the 2007 vintage showed important levels of total acidity. Probably the climatic conditions were the principal factor that explains the existence of differences between years, in the general composition of wines from Betanzos, in the two years studied. This indicates that the degree of maturation was possibly incomplete in the 2007 vintage.

The volatile composition of monovarietal wines from *Blanco lexitimo*, *Agudelo* and *Serradelo* is shown in Table II. The data are expressed as the mean (µg/L) of the GC analyses of triplicate extractions. A total of 35 compounds were identified and quantified in the 2006 and 2007 vintages, 4 monoterpenic alcohols, 1 C₁₃-norisoprenoid, 7 alcohols, 11 esters, 7 volatile fatty acids and 5 volatile phenols. The represented compounds were chosen regarding their olfactive impact in *Loureiro* and *Alvarinho* wines from Portugal²³, i.e., compounds with OAV>0.1^{10,17}.

The total concentration of free volatile compounds was very different in the two vintages. White wine *Blanco lexitimo* had 28784.7 µg/L and 16808.2 µg/L of free volatiles in the 2006 and 2007 vintage, respectively, whereas the white wine *Agudelo* had 29945.3 µg/L and 13881.1 µg/L and the red wine *Serradelo* 25899.1 µg/L and 13710.1 µg/L. There were large differences in total volatile concentration between the two vintages. The results for volatile composition varied between vintages for the same variety and could have been strongly influenced by weather factors such as temperature and rainfall during ripening, fermentation conditions and the yeast involved^{4,19}.

Alcohols were quantitatively the largest group of the volatile compounds in *Blanco lexitimo*, *Agudelo* and *Serradelo* wines from 2006 vintage (45.8%, 49.5% and 59.5% respectively) and 2007 vintage (38.6%, 60.8% and

Table I. Chemical composition of wines from *Blanco lexitimo*, *Agudelo* and *Serradelo* from Betanzos (2006 and 2007 vintage).

	<i>Blanco lexitimo</i>		<i>Agudelo</i>		<i>Serradelo</i>	
	2006	2007	2006	2007	2006	2007
Ethanol (% vol)	12.8	12.0	11.7	10.6	11.0	11.1
Total acidity (g/L)	5.7	7.9	5.6	10.1	5.4	7.9
Volatile acidity (g/L)	0.5	0.3	0.5	0.5	0.6	0.3
Reducing sugars (g/L)	0.8	<1.0	<1.0	<1.0	0.5	<1.0
pH	3.1	3.4	3.3	3.0	3.2	3.0
Tartaric acid (g/L)	3.5	2.6	2.9	2.3	3.0	3.7
Malic acid (g/L)	<0.3	3.8	<0.3	5.4	<0.3	2.2

75% respectively) (Fig. 1). Alcohols are produced by yeast metabolism during alcoholic fermentation and play an important role in the flavour of the wines depending of the type of compounds and their concentration³¹. Among varietal compounds, four monoterpenols and one C₁₃-norisoprenoid were identified in the wines from Betanzos. Linalool, which has a floral aroma and low perception threshold, was quantitatively the main terpenol in *Blanco lexítimo* wine from the two vintages, 2006 and 2007, representing 73.6% and 85.8% respectively of the total terpenols analyzed. Similar results have been reported by other authors²³ for the *Loureiro* variety from *Vinhos Verdes* in Portugal, where linalool represented 75% of the total monoterpenic concentration, followed by *Alvarinho*, *Avesso*, *Amaral* and *Vinhão*. For *Serradelo* from the 2006 vintage, α -terpineol was the most important terpenol at 20.3 $\mu\text{g/L}$ and it accounted for 41% of the total monoterpenic concentration. Nerol and β -damascenone were important varietal compounds in the *Serradelo* wines from the 2006 vintage.

With regard to fermentative compounds, alcohols and esters were lower in 2007 for the three wines studied;

however, volatile phenols were higher in 2007 for *Blanco lexítimo* and *Agudelo*. Given that the fermentation conditions were the same, the differences in the wine composition may be attributed to the different must compositions between vintages.

Volatile phenols were high in *Serradelo* wines from the 2006 vintage, where 4-ethylphenol represented 86.6% of phenols analysed. Phenols present in young wines arise both from the grapes and from yeast metabolism².

In terms of the number of compounds quantified, esters represent the largest group (11 compounds). Table II shows ethyl hexanoate, ethyl lactate and diethyl succinate as having the highest concentrations in the 2006 vintage for the *Blanco lexítimo* and *Agudelo* wines. Similar results were found with the volatile composition of the *Zalema* white wines⁹. Isoamyl acetate showed the highest concentration from the three wines from the 2007 vintage.

Among volatile fatty acids, the concentration of octanoic acid was the highest for the three wines, *Blanco lexítimo*, *Agudelo* and *Serradelo*, from the two vintages studies.

Two PCAs were used to identify the aromas that discriminated best among the wines of the different varieties

Table II. Volatile composition of wines (mean of three replicates in $\mu\text{g/L}$) from *Blanco lexítimo*, *Agudelo* and *Serradelo* cultivars in consecutive vintages 2006 and 2007.

	<i>Blanco lexítimo</i>			<i>Agudelo</i>			<i>Serradelo</i>		
	2006	2007	Mean \pm SD	2006	2007	Mean \pm SD	2006	2007	Mean \pm SD
Terpenols									
Linalool	27.0	25.5	26.2 \pm 1.1	2.4	2.3	2.3 \pm 0.1	14.5	13.4	13.9 \pm 0.8
α -Terpineol	4.4	2.9	3.6 \pm 1.1	3.1	1.8	2.5 \pm 1.0	20.3	3.5	11.9 \pm 11.9
Citronellol	4.4	0.2	2.3 \pm 3.0	nd	2.4	-	5.6	1.5	3.6 \pm 2.9
Nerol	1.0	1.2	1.1 \pm 0.1	nd	nd	-	9.2	0.8	5.0 \pm 5.9
C₁₃-Norisoprenoids									
β -Damascenone	1.9	0.8	1.3 \pm 0.7	1.9	1.1	1.5 \pm 0.5	5.1	1.6	3.35 \pm 2.5
Alcohols									
1-Propanol	81.0	102.8	91.9 \pm 15.4	110.4	37.2	73.8 \pm 51.7	74.7	35.8	55.3 \pm 27.5
2-Methyl-1-propanol	868.2	1142.6	1005.4 \pm 194.1	1018.4	1068.5	1043.5 \pm 35.4	1679.2	1296.4	1487.8 \pm 270.7
1-Butanol	20.5	15.8	18.2 \pm 3.3	23.5	3.9	13.7 \pm 13.9	10.3	5.3	7.8 \pm 3.5
3-Methyl-1-pentanol	22.4	17.6	20.0 \pm 3.4	42.4	17.6	30.0 \pm 17.5	11.9	23.6	17.8 \pm 8.3
1-Hexanol	208.4	449.0	328.7 \pm 170.1	834.6	534.5	684.5 \pm 212.2	1080.4	1102.8	1091.6 \pm 15.8
3-(Methylthio)propanol	95.0	30.6	62.8 \pm 45.6	55.8	45.9	50.9 \pm 7.0	75.6	52.0	63.8 \pm 16.7
2-Phenylethanol	11903.4	4739.1	8321.2 \pm 5065.9	12740.3	6735.0	9737.7 \pm 4246.3	12466.9	7767.0	10116.9 \pm 3323.4
Esters									
Ethyl butyrate	121.5	154.2	137.8 \pm 23.1	165.5	86.8	126.2 \pm 55.7	112.0	83.6	97.8 \pm 20.1
Ethyl 2-methylbutyrate	7.7	0.2	4.0 \pm 5.3	13.4	1.4	7.4 \pm 8.5	6.7	0.9	3.8 \pm 4.1
Ethyl 3-methylbutyrate	15.1	0.9	8.0 \pm 10.0	21.6	2.6	12.1 \pm 13.5	5.9	1.7	3.8 \pm 3.0
Isoamyl acetate	268.3	1888.6	1078.5 \pm 1145.8	203.5	1371.1	787.3 \pm 825.6	141.3	460.7	301.0 \pm 225.8
Ethyl hexanoate	462.1	349.8	406.0 \pm 79.4	429.2	209.3	319.3 \pm 155.5	123.2	204.9	164.1 \pm 57.7
Hexyl acetate	9.2	138.2	73.7 \pm 91.2	13.6	80.1	46.8 \pm 47.0	2.5	29.3	15.9 \pm 18.9
Ethyl lactate	4722.8	201.6	2462.2 \pm 3197.0	5754.2	103.7	2929.0 \pm 3995.5	3541.9	135.3	1838.6 \pm 2408.8
Ethyl octanoate	820.2	784.7	802.4 \pm 25.1	717.5	247.5	482.5 \pm 332.3	139.3	234.2	186.7 \pm 67.1
Ethyl decanoate	173.8	93.7	133.8 \pm 56.7	158.7	18.8	88.8 \pm 98.9	34.0	31.5	32.8 \pm 1.7
Diethyl succinate	1749.2	48.3	898.7 \pm 1202.7	1801.7	49.1	925.4 \pm 1239.3	3452.6	73.6	1763.1 \pm 2389.3
2-Phenylethyl acetate	118.1	267.6	192.9 \pm 105.7	61.8	130.9	96.4 \pm 48.8	34.0	73.7	53.9 \pm 28.0
Volatile fatty acids									
2+3-Methylbutyric acid	49.2	49.9	49.6 \pm 0.5	95.1	64.5	79.8 \pm 21.6	27.1	31.7	29.4 \pm 3.3
Butyric acid	506.7	353.8	430.2 \pm 108.1	803.9	179.0	491.5 \pm 441.9	962.7	201.1	581.9 \pm 538.5
Hexanoic acid	957.7	1098.4	1028.1 \pm 99.5	945.9	469.2	707.5 \pm 337.1	281.9	379.0	330.5 \pm 68.7
Octanoic acid	4191.1	4083.6	4137.4 \pm 76.0	3782.1	2042.6	2912.4 \pm 1230.0	809.8	1226.3	1018.0 \pm 294.5
Decanoic acid	1229.2	605.4	917.3 \pm 441.1	33.0	218.4	125.7 \pm 131.1	280.0	227.4	253.7 \pm 37.2
Dodecanoic acid	39.9	36.8	38.4 \pm 2.2	59.0	5.2	32.1 \pm 38.0	18.5	7.3	12.9 \pm 7.9
Volatile phenols									
Guaiacol	4.2	nd	-	nd	nd	-	0.7	nd	-
4-Ethylphenol	52.0	nd	-	7.5	2.0	4.7 \pm 3.9	409.0	nd	-
4-Vinylguaiacol	6.7	35.8	22.6 \pm 18.7	15.4	29.8	22.6 \pm 10.2	5.2	nd	-
4-Vinylphenol	4.2	63.8	34.0 \pm 42.2	11.4	110.8	61.1 \pm 70.3	51.8	nd	-
Vanillin	38.2	24.7	31.5 \pm 9.5	18.4	8.1	13.2 \pm 7.2	5.4	4.5	5.0 \pm 0.6

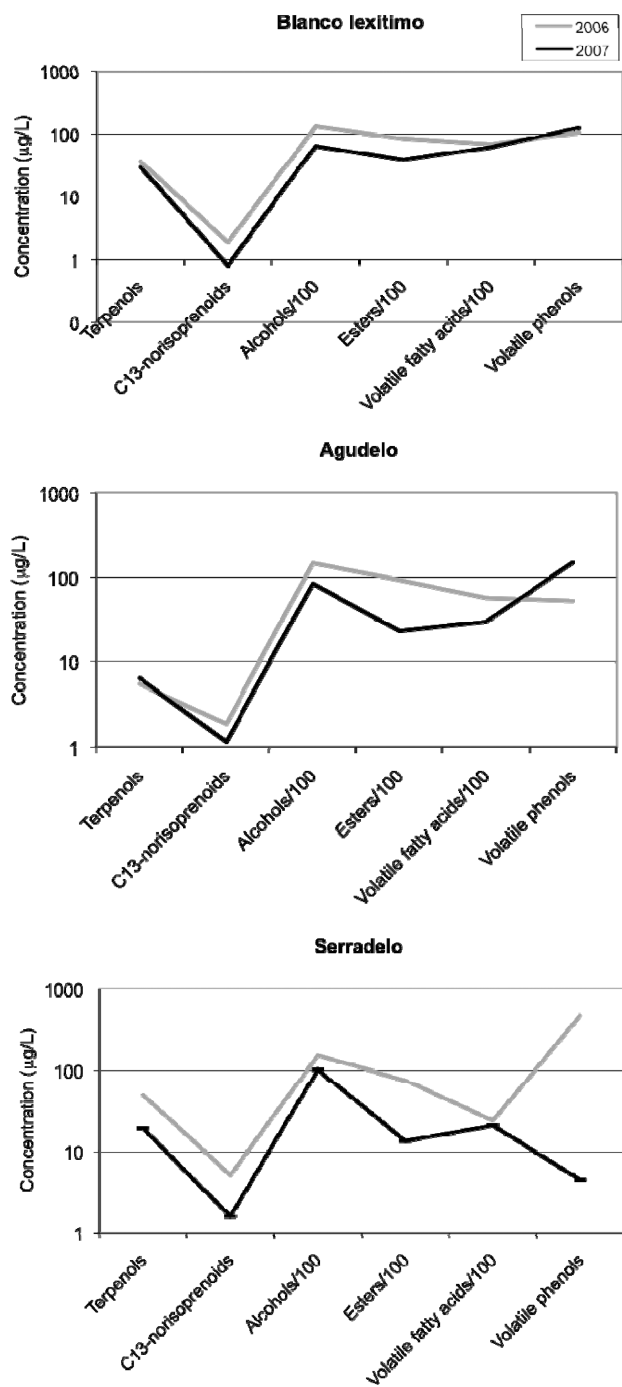


Fig. 1. Volatile composition of *Blanco lexítimo*, *Agudelo* and *Serradelo* wines of Betanzos from 2006 and 2007 vintages.

from Betanzos (Fig. 2). The first *PCA* (Fig. 2A) shows the varietal compounds where the first two principal components accounted for 92.60% of the total variance (71.70% and 20.89%, respectively). The first principal component (Prin1) was characterised by a higher amount of α -terpinol, nerol and β -damascenone attributes, with a positive loading. For the second principal component (Prin2), the attribute linalool was present with high contribution in the positive loading. The effect of cultivar was very important when the varietal compounds were analyzed.

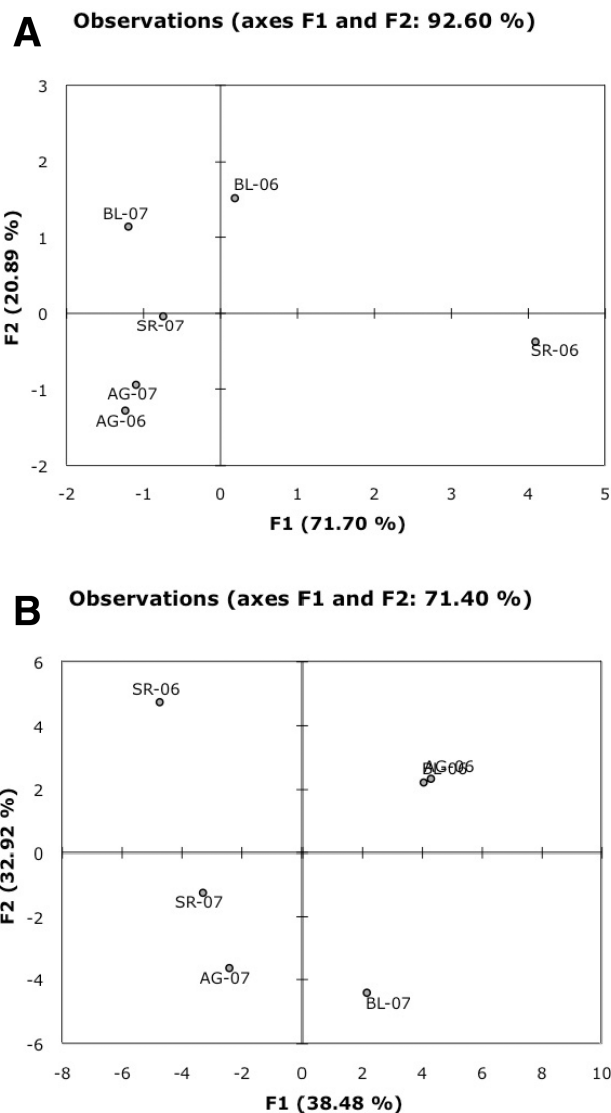


Fig. 2. Principal component analysis (*PCA*) for volatile compounds from *Blanco lexítimo* (BL), *Agudelo* (AG) and *Serradelo* (SR) wines cultivated from the 2006 and 2007 vintages: A) Varietal compounds and B) all volatile compounds.

The second *PCA* (Fig. 2B) shows all volatile compounds. The first two principal components accounted for 71.40% of the total variance (38.48% and 32.92%, respectively). The first principal component (Prin1) was characterised by 1-butanol, ethyl hexanoate, ethyl decanoate and decanoic acid attributes, with a positive loading. For the second principal component (Prin2), the attributes isoamyl acetate, hexyl acetate and 2-phenylethyl acetate showed positive loading and 2-phenylethanol and diethyl succinate showed negative loading. In this case the effect of vintage was shown when the fermentative compounds were studied.

In order to assess the influence of the compounds studied on overall wine aroma, the *OAVs* were calculated by dividing the concentration of each compound by its perception threshold. Only the compounds with an *OAV* greater than 1 contribute individually to the wine aroma¹⁰. Other authors used different methods to establish the

Table III. Odour activity values (*OAV*) of volatile compounds with more influence on the aroma of wines from *Blanco lexítimo*, *Agudelo* and *Serradelo* varieties in consecutive vintages, 2006 and 2007.

Compounds	Sensory descriptor	Odour threshold (µg/L)*	<i>Blanco lexítimo</i>		<i>Agudelo</i>		<i>Serradelo</i>	
			2006	2007	2006	2007	2006	2007
Linalool	aniseed, roses, floral	25	1.08	1.02	0.10	0.09	0.58	0.54
β-Damascenone	geranium, raisin-like, flowers	0.045	41.20	17.76	41.26	25.16	113.68	35.56
Ethyl butyrate	papaya, butter, sweetish, apple	20	6.08	7.71	8.28	4.34	5.60	4.18
Ethyl 3-methylbutyrate	fruity, apple, sweetish	3	5.03	0.30	7.21	0.85	1.98	0.57
Isoamyl acetate	banana, apple, estery, solvent	30	8.94	62.95	6.78	45.70	4.71	15.36
Ethyl hexanoate	apple, fruity, sweetish	14	33.01	24.99	30.66	14.95	8.80	14.63
Ethyl octanoate	apple, fruity, sweetish	5	164.03	156.94	143.50	49.51	27.86	46.83
2+3 Methylbutyric acid	cheese, old hops, sweaty	34	1.45	1.47	2.80	1.90	0.80	0.93
Butyric acid	buttery, cheese, sweaty	173	2.93	2.05	4.65	1.03	5.56	1.16
Hexanoic acid	goaty, fatty acid, vegetable oil	420	2.28	2.62	2.25	1.12	0.67	0.90
Octanoic acid	goaty, fatty acid, vegetable oil	500	8.38	8.17	7.56	4.09	1.62	2.45
Decanoic acid	waxy, tallowy, rancid, soapy	1000	1.23	0.61	0.03	0.22	0.28	0.23

* Odour descriptors and odour threshold reported in the literature^{5,17,25,30}.

would-be impact odorant based on aroma index, when the concentration was at least 20% of the threshold unit²⁶.

Table III shows the volatile compounds with an *OAV* greater than 1, perception thresholds taken from literature, descriptors of each compound and the corresponding calculated *OAV* for the three wines from two consecutive vintages, 2006 and 2007. Table III indicates that only 12 compounds out of the 35 compounds quantified can be found in the red and white young wines from Betanzos, at concentrations higher than their corresponding odour threshold, and possibly contribute to the wine flavour and aroma. The most aromatic wine was *Blanco lexítimo* with a total *OAV* = 275.64 in the 2006 vintage and *OAV* = 286.57 in the 2007 vintage, followed by *Agudelo* with a total *OAV* = 255.07 and *OAV* = 148.96 in the 2006 and 2007 vintages respectively.

Four ethyl esters (fruity aroma) were present at levels over the perception threshold in the three varieties. Esters contribute favourably to wine aroma as a fruity characteristic^{5,26}. Ethyl octanoate, isoamyl acetate, ethyl hexanoate and β-damascenone were the most powerful odorants for the white wines *Blanco lexítimo* and *Agudelo* from Betanzos. Isoamyl acetate was a more powerful odorant in all varieties from the 2007 vintages with respect to the 2006. Ethyl octanoate (*OAV* of 46.83 in the 2007 vintage) and β-damascenone (*OAV* of 113.68 in the 2006 vintage) identified with fruity and floral aroma respectively, and were the most odorant for the red wine *Serradelo*. The compound β-damascenone, with a very low threshold, was found in higher concentrations in some wines from the Canary Islands, such *Gual*, *Verdello*, *Marmajuelo*, *Listán* and *Malvasia* wines, which explains the flowery and fruity aroma of these wines¹⁵.

Volatile fatty acids have been described by other authors²⁶ with notes described as fruity, cheese-like and rancid. In our study 2+3 methylbutyric acid, butyric and octanoic acids showed high concentrations for the three wines analyzed, but the contribution to the wine aroma was low with respect to the other compounds. These compounds were studied by Kotseridis and Baumes¹² and were reported as impact odorants in several red Bordeaux wines.

Linalool, with aniseed, roses, floral and lemon aroma, was only present at a concentration above the odour threshold for *Blanco lexítimo* (*OAV* = 1.08 in 2006 vintage

and *OAV* = 1.02 in 2007 vintage). Linalool is one of the most important monoterpenic compounds, because it also presents a low perception threshold¹⁴. Among terpenols, only linalool had an *OAV* exceeding unity in *Albariño* wines from Galicia³² and *Loureiro* and *Alvarinho* from Portugal²³. The contribution of phenol volatiles to the wine aroma was not important in this study, however, the contribution to the aroma of compounds with near-unity *OAVs*, cannot be ignored, because they can enhance some existing notes by synergy with other compounds^{8,14}.

CONCLUSIONS

This work is a first study of the volatile composition of wines produced from the white varieties *Blanco lexítimo* and *Agudelo* and the red variety *Serradelo* grown in Betanzos and has determined the most powerful odorant compounds in these wines. Varietal and fermentative aroma compounds were identified and quantified in the free form. Twelve compounds were determined with more influence in the aroma of Betanzos wines from the 2006 and 2007 vintages. Ethyl octanoate, isoamyl acetate, ethyl hexanoate and β-damascenone were the most powerful odorants for the *Blanco lexítimo* and *Agudelo* white wines from Betanzos. Ethyl octanoate and β-damascenone (fruity and floral aroma respectively) were the most odorant for the *Serradelo* red wine. For the three monovarietal wines studied, this approach provided proof that white varieties from Betanzos were much richer than the red one. *Blanco lexítimo* is the most aromatic wine dominated by citric, banana, apple and pineapple aroma. *Agudelo* wine which is a minor aromatic, compared to *Blanco lexítimo*, presents high levels of fruity aromas and the red *Serradelo* wine was the most flowery wine, but with a minor aroma.

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