

Contributions to Determining the Varietal Thiolic Compounds of the Sauvignon Blanc Obtained in the Blaj Winegrowing Centre – the Târnavă Vineyard

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Abstract. The varietal volatile thiols give the Sauvignon Blanc a specific flavored property characterized by notes of grapefruit, citric and exotic fruits. They are synthesized from the aroma precursors during the alcoholic fermentation. This study was made in the Vinification Complex of S.C. Promotion Blaj and the biological material used was represented by the Sauvignon Blanc grapes. From a 2010 harvest of Sauvignon Blanc wines there were determined 4-mercapto-4-methylpentan-2-one (4MMP) and 3-mercaptohexan-1-ol (3MH). According to the yeasts used to ferment the grape must the quantities are: 1.45-10, 85 ng/L 4MMP and 424,7 and 900,3 ng/L 3MH.

Keywords: varietal thiols, cysteinic aroma precursors, yeasts, 4-mercapto-4-methylpentan-2-one, 3-mercaptohexan-1-ol

INTRODUCTION

The flavored aroma specific to the Sauvignon Blanc type is owed to the varietal thiols and the pyrazinic compounds that are found in the wine (Marais, 1994; Tominaga *et al.*, 1998; Țârdea, 2007). The flavored thiols compounds can not be found in the grape itself so they need to be synthesized by the yeast during the alcoholic fermentation process from the cysteinic aroma precursors that exist in a proportion of 50-60% in the skin of the grape (Peyrot des Gachons *et al.*, 2002). The ecoclimatic factors influence the accumulation of aroma precursors in the grapes. Applying the technological operation of pellicular maceration of crushed grapes, favors the growth of the cysteinic compounds concentration in the must (Roland Aurelie *et al.*, 2011). The yeasts used in fermenting the must have an important role in helping the thiolic flavors manifest themselves.

The main volatile varietal thiols from the Sauvignon Blanc wines are: 4-mercapto-4-methylpentan-2-one (4MMP) and 3-mercaptohexan-1-ol (3MH), which are also responsible for the grapefruit, citric and exotic fruit flavors.

MATERIAL AND METHOD

The study was made in 2010. The grapes came from a Sauvignon Blanc plantation belonging to the Blaj winegrowing centre – the Târnavă vineyard. There have been conceived four experimental variants in conditions of industrial vinification (Tab. 1): cluster removing and crushing, pre-fermentative pellicular maceration for 20-24 hours, separation the free run must.

Tab. 1.

Experimental variants

Experimental Variants	Pectolytic Enzymes	Pellicular Maceration	Selected Yeast	Fermentation Activators
V. 1	Yes	20-24 hours	—	Yes
V. 2	Yes	20-24 hours	Fermactive AP	Yes
V. 3	Yes	20-24 hours	Zymaflore X5	Yes
V. 4	Yes	20-24 hours	Vulcaferm Aroma	Yes

A static clearing of the must was done through draught at a low temperature by administering pectolytic enzymes. The alcoholic fermentation took place at a controlled temperature (16-18°C). There has been used yeast from the spontaneous flora in the control variant (V.1) and selected yeast for the other 3 variants. After 14 days from the beginning of the alcoholic fermentation process, the first wine decant was performed and the adding of sulfites was done up to a level of 40 mg/L free SO₂. The wines were conditioned though sodium bentonite in dosage of 0.8 g/L. After 20 days from administering the bentonite we filtered the wine through sterile plates.

The variants have been analyzed from a physics and chemistry point of view through official recognized methods after which the volatile thiolic compounds were dosed, 4MMP and 3MH, using gas chromatography.

RESULTS AND DISCUSSION

The year of 2010 can be characterized as a normal year for the Blaj winegrowing centre, with temperatures slightly higher during the summer months (+0,7°C up to +1,2°C) and more abundant in rain (Tab. 2).

Tab. 2.

Climatic data from the Blaj winegrowing centre, year 2010

Month	Average Monthly Temperature (°C)			Rainfall Total (mm)		
	actual	normal	dif.+/-	actual	normal	dif.+/-
January	-1,9	-2,7	+0,8	40,2	26,3	+13,9
February	0,4	-0,1	+0,5	20,0	21,2	-1,2
March	4,9	4,7	+0,2	39,7	23,9	15,8
April	10,9	10,4	+0,5	68,3	68,3	0
May	15,8	15,2	+0,6	90,4	80,2	+10,2
June	19,3	18,3	+1,0	155,4	93,6	+61,8
July	21,0	19,8	+1,2	65,8	99,0	-33,2
August	20,0	19,3	+0,7	70,5	64,0	+6,5
September	15,1	15,1	0	36,8	56,7	-19,9
October	10,4	9,5	+0,9	31,2	36,6	-5,4
November	4,2	3,8	+0,4	31,2	36,5	-5,3
December	-0,7	-1,1	+0,4	48,5	33,3	+15,2
Annual values	10,0	9,4	+0,6	698,0	639,6	58,4

The physical and chemical composition parameters that characterize the Sauvignon Blanc wine quality from the Blaj winegrowing centre are the following: alcohol 11,4-11,7% vol., total acidity 4,94-5,35 g/L sulfuric acid, volatile acidity 0,29-0,41 g/L acetic acid, pH

3,08-3,12, glycerol 7,8-8,5 g/L, non-reducing dry extract 19,7-20,2 g/L, reducing sugars 1,1-1,4 g/L, total sulfur dioxide 98-120 mg/L (Tab. 3).

Tab. 3

The physico-chemical parameters of the composition of Sauvignon blanc wines – Blaj winegrowing, year 2010

Analyzed parameters	Variants	V.1	V. 2	V. 3	V.4
Alcoholic titre (% vol)		11,4	11,6	11,7	11,6
Total acidity (g/L H ₂ SO ₄)		4,94	5,35	5,19	5,26
Volatile acidity (g/L CH ₃ COOH)		0,41	0,32	0,30	0,29
pH		3,09	3,12	3,10	3,08
Reducing sugars (g/L)		1,4	1,2	1,3	1,1
Free SO ₂ (mg/L)		32,7	44,2	42,5	42,5
Total SO ₂ (mg/L)		102	120	116	98
Glycerol (g/L)		7,8	8,2	8,3	8,5
Non-reducing dry extract (g/L)		19,7	20,0	20,2	20,1

After analyzing the varietal thiolic compounds (4MMP and 3MH), which determines the flavor of the Sauvignon Blanc wines, there have been discovered concentrations exceeding the sensorial perception in all the experimental variants (Tab. 4).

Tab. 4

The concentration of volatile varietal thiols (4MMP and 3MH) in the Sauvignon Blanc wines from the Blaj winegrowing centre, year 2010

Experimental variants	4MMP(ng/L)	3MH(ng/l)
V1	4,85	900,3
V2	1,45	807,5
V3	11,20	778,2
V4	10,85	424,7
Average	7,08	727,7
The sensorial perception threshold	0,8	60

The lowest values of 1,45 ng/L 4MMP were recorded in the V.2 variant and 424,7 ng/L 3MH in the V.4 variant, and the highest values in the V.3 variant of 11,20 ng/L 4MMP and 900,3 ng/L 3MH in the V.1 variant. This means that the Sauvignon Blanc wines produced in the Blaj winegrowing centre contain high amounts of volatile thiols, fact that gives them the typical specific of the Sauvignon Blanc variety. The yeast used in fermenting the must, influence the release of varietal flavor compounds from the cysteinic aroma precursors (Fig. 1).

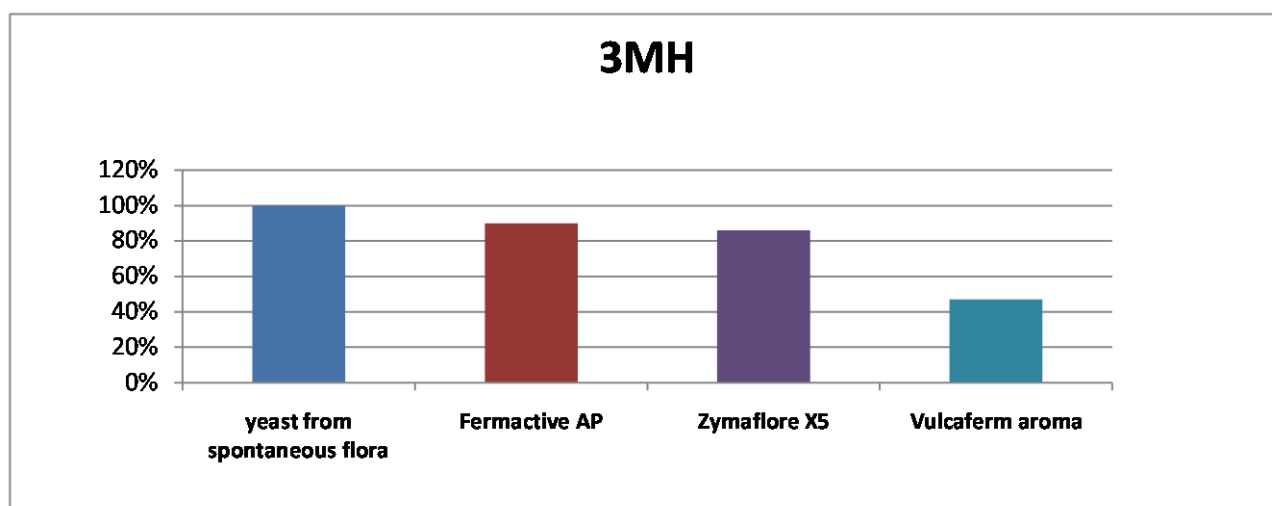
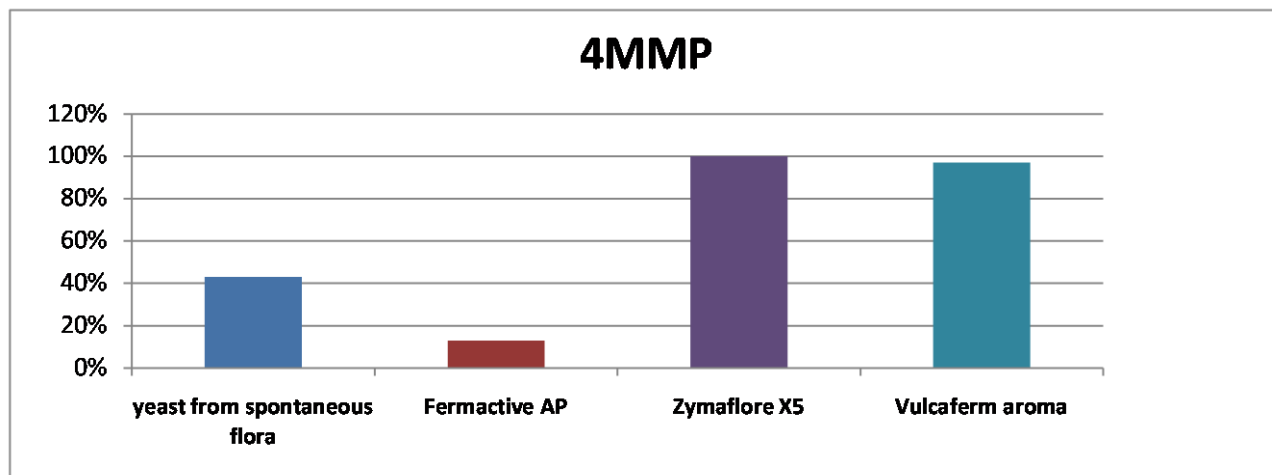


Fig. 1. The evolution of volatile varietal thiols (4MMP and 3MH) according to the yeasts used in fermenting the must (100% was assigned to the highest values recorded)

CONCLUSIONS

The yeasts used in fermenting the Sauvignon Blanc must influence the composition of the volatile varietal thiols (4MMP și 3MH) from the wines. The varietal flavored character is optimized by using the yeast stems capable of synthesizing, through the cysteinic precursors, the thiolic compounds that add the citric, grapefruit and exotic fruit flavors.

For making the quality Sauvignon Blanc wines in the Blaj winegrowing centre – the Târnave vineyard, it is necessary to apply the technological operation of pre-fermentative pellicular maceration for 20-24 hours. When fermenting the must it is recommended using selected yeasts such as Fermactive AP (*Saccharomyces cerevisiae*), Zymaflore X5 (*Saccharomyces cerevisiae/Torulaspora delbrueckii*) and Vulcaferm aroma (*Saccharomyces cerevisiae*). Good results may also be obtained using yeasts from the spontaneous flora.

REFERENCES

1. Marais, J. (1994). Sauvignon blanc cultivar aroma - a review. *S. Afr. J. Enol. Vitic.*, 15: 41-45.
2. Tominaga, T., A. Furrer, R. Henry and D. Dubourdieu (1998). Identification of new volatile thiols in the aroma of *Vitis Vinifera* L. var. Sauvignon blanc wines. *Flavour Fragrance Journal*, 13: 159-162.
3. Țârdea, C. (2007). *Chimia și analiza vinului*. Editura "Ion Ionescu de la Brad". Iași.
4. Roland, Aurelie, R. Schneider, F. Charrier, F. Cavelier, M. Rossignol and A. Razungles (2011). Distribution of varietal thiol precursors in the skin and the pulp of Melon B. and Sauvignon Blanc grapes. *Journal of Agricultural and Food Chemistry*. 125: 139-144.
5. Peyrot des Gachons, C., T. Tominaga and D. Dubourdieu (2002). Localization of S-Cysteine Conjugates in the Berry: Effect of Skin Contact on Aromatic Potential of *Vitis vinifera* L. cv. Sauvignon Blanc Must. *Am. J. Enol. Vitic.* 53: 144-146.