STUDIES ON AROMA COMPOUNDS OF TĂMÂIOASĂ ROMÂNEASCĂ WINE FROM COTNARI VINEYARD

STUDIUL COMPOZIŢIEI DE AROME DIN VINURILE DE TAMÂIOASĂ ROMÂNEASCĂ DIN PODGORIA IAŞI

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Abstract: *In this study, the must obtained in 2011 from Tămâioasă românească variety was subjected to a number of 9 prefermentative treatments with oxalic acid, lactic acid, succinic acid, sodium silicate, tannins, bentonite, graphen, chitosan and activated charcoal. The results showed that the acetic acid, hexyl ester has been identified only in the samples treated with succinic acid (V3), sodium silicate (V4) and graphen (V7). The amount of ethyl octanoate range between 18, 28 ppm (V8) and 236, 18 ppm (V2).The sensorial analysis of the wine samples demonstrated the influence the prefermentative treatments have on wines' aroma.*

Key words: *Tămâioasă românească, oxalic acid, chitosan, activated carbon, ester*

Rezumat*. În acest studiu, mustul obţinut din soiul Tămâioasă românească în anii de recoltă 2011, a fost supus unui numar de 9 tratamente prefermentative cu acid oxalic, acid lactic, acid succinic, silicat de sodiu, tanin, bentonită, grafen, chitosan şi cărbune activ. Rezultatele au arătat că acetic acid, hexyl ester a fost identificat numai în probele tratate cu acid succinic (V3), silicat de sodiu (V4) şi grafen (V7). Cantitatea de ethyl octanoate a variat de la 18, 28 ppm (V8) până la 236, 18 ppm (V2). Analiza senzorială a probelor demonstrează influenţa puternică a tratamentelor prefermentative aplicate.*

Cuvinte cheie: *Tămâioasă românească, acid oxalic, chitosan, cărbune activ, ester*

INTRODUCTION

Several studies have been performed on the effect of enological practices on the wine's composition (Losada et al., 2010; Puig-Deu et al., 1996; Villanõ et al., 2006). The increasing of the titrable acidity and the total acidity of wine can be achieved by lactic acid, oxalic or succinic acid addition. The exogenous tannins are frequently added to wines during the winemaking process to stabilize colour, to modify mouth-feel, to mask green characters, to increase polyphenolics and aromatic stability (Harbertson et al., 2011; Parker et al., 2007). Sodium silicate is used to clarify wines (***OIV, 2013).The use of bentonite as a clarifying agent means to prevent the formation of protein haze in wines. Treating must with bentonite is recommended for

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wines which are to be clarified shortly after the completion of alcoholic fermentation (Ribéreau-Gayon and Dubourdieu, 2006). Recently characterized as "the thinnest material of the universe" (Geim and MacDonald, 2007), graphen is the two-dimensional version of graphite consisting of a two-dimensional arrangement of carbon atoms disposed in a hexagonal grid. Graphene is the best known conductor of electricity and heat. Graphene presents a whole range of special properties, which gives it great potential for the practical production of new uses. Chitosan treatment can be an effective method to clarify the must and to prevent protein haze (Rao et al., 2010; Domingues et al., 2011, ***OIV, 2013). Another clarifying agent is activated charcoal, useful for correcting organoleptic issues of wine obtained from musts affected by fungi such as grey rot (*Botrytis cinerea*) or oidium (*Uncinula necator*), to eliminate, possible contaminants, to correct the colour from white musts derived from the white juice of red grapes, from very yellow musts derived from white grape varieties and from oxidized musts (Ribéreau-Gayon and Glories, 2006).

The objective of the present study is to evaluate the influence of different enological treatments on the esters content and on the aromatic and taste profile of of Tămâioasă românească wine.

MATERIAL AND METHOD

Grape samples and winemaking

Tămâioasă românească grapes from Cotnari vineyard were harvested in 2011 at optimal maturity. The grapes were destemmed and crushed, and each must obtained was transferred in glass containers. Before fermentation, nine treatments were applied to the must : oxalic acid - 0,6 g/L (V1), lactic acid – 3 g/L (V2), succinic acid – 2 g/L (V3), sodium silicate – 2,4 g/L (V4), tannins – 0,05 g/L (V5), bentonite – 1 g/L (V6), graphen – 1 g/L (V7), chitosan – 1 g/L (V8) and activated charcoal – 1 g/L (V9). The must were stirred to ensure a homogenous fermentation. After alcoholic fermentation, wines were filtered using a filtration-filling device-Tenco Enomatic® followed by sulfur dioxide addition (40 mg / L) to preserve wine from microbiological damage. Bottling was done with a semi-automatic device. After six months of storage the wines were analysed. Also, for each grape variety, a control sample (V) was obtained without prefermentative treatment.

Regents for pre-fermentative treatments: tannin (Taniblanc® - from AEB Spa, Italy), bentonite (Bentonita Clarit PLV 45 – Sodinal, France). Oxalic acid, lactic acid, succinic acid, sodium silicate, graphen, chitosan and activated charcoal were purchased from Sigma-Aldrich, Germany.

Analysis of esters

The obtained extract was injected into a Shimadzu GC coupled with a QP2010 Plus mass-spectrometer. 1000 µL extract are injected into a

Supelco SLB 5 ms GC column, of 15 m length, column oven temperature 30 °C, injection temperature 250 °C, in splitless mode, initial temperature 30 °C for 1 minute, then if grows at a rate of 8 °C until 240 °C where it stays for 2.75 minutes. The carrier gas was Helium, column flow 0.75 mL/min, ion source temperature 250 °C, interface temperature 250 °C, detector voltage 0.9 kV, The aroma compounds were determined by means of the NIST 08, Wiley 08 and SZTERP spectrum library. The program lasts for 30 minutes.

Sensory analysis of wines

The wines were tasted by a group of 12 specialised wine tasters. Tulip glasses of 30 mL, accordimg to ISO requirements, were used.

The wines were analysed taking into consideration the visual, olphactive, tactile and taste. Each descriptor was graded from 1 to 5. A tasting sheet was used, where a series of visual, ophactory and taste descriptors were underlined. The grades were centralised and the mean of each descriptor was calculated.

RESULTS AND DISCUSSIONS

The esters that have been identified in Tămâioasă românească wines obtained through different prefermentative treatments are represented in table 1. Results shows that 1-Butanol, 3-methyl-, acetate is present in small quantity in the sample that was not subjected to prefermentativ tratments (M). Higher quantities were found in wines treated with chitosan (V8) and actvated carbon (V9). The addition of oxalic acid (V1) and activated carbon (V9) in wine contributed at increasing the amount of hexanoic acid, ethyl ester. The acetic acid, hexyl ester has been identified only in the samples treated with succinic acid (V3), sodium silicate (V4) and graphen (V9). The amount of ethyl octanoate range between 18, 28 ppm (V8) and 236, 18 ppm (V2) and the smallest quantity of decanoic acid, ethyl ester was found in sample treated with activated carbon.

Table 1

Contents in esters (ppm)

Esters	M	V1	V2	V3	V4	V5	V6	V7	V8	V9
1-Butanol, 3-methyl-, acetate	3,15	32,54	13,81	45,19	39,67	15,10	35,69	51,96	49,58	48,76
Hexanoic acid, ethyl ester	18,24	40,24	33,16	28,19	19,63	20,37	34,00	28,58	24,61	43,35
Acetic acid, hexyl ester	-	-	-	0,29	0,33	-	-	0,76	-	-
Ethyl octanoate	160,47	225,25	236,18	127,64	105,90	111,39	218,18	164,62	18,28	118,12
Decanoic acid, ethyl ester	25,07	51,47	63,06	32,93	28,88	33,95	47,68	35,76	58,88	10,32

The results of the organoleptic analysis of Tămâioasă românească wines can be seen in figures 1, 2 and 3.

The 2011 wines have a more pronounced vegetal aroma in the control sample (M) and in the sample treated with graphen (V7), a more pronounced moneral hue in the wine that was clarified with activated charcoal (V9), while a citric note is stronger in the sample where bentonite was used as fining agent (V6). A ripe fruits note were accentueated by the oxalic acid treatment (V1), sodium sillicate (V4) and tannin (V5). In wines that were fined with bentonite and activated charcoal, a more intense whif of exotic fruits was perceived.

Dry fruits were present in oxalic acid treated wines (V1) as well as activated charcoal (V9). The strongest sensation of green fruits was registered in the control sample and the sample fined with activated charcoal. This treatment did not suppres the sensorial profile of 2011 Tămâioasă românească. Moreover, the flwery, fruity and dry grass notes were more powerful. The same intense flowery note was identified in wines treated with bentonite (V6), graphen (V7) and chitosan (V8).

The wines that were fined with charcoal have a hig hacidity and a persistent taste. A high acidity was found in samples treated with lactic acid (V2) and succinic acid (V3). A slightly phenolic character was noticed in samples treated with sodium silicate (V4) and bentonite (V6). Evaluating onctosity and texture, the wines that were obtained through prefermentative treatments with graphen (V7) and chitosan (V8) were graded as best.

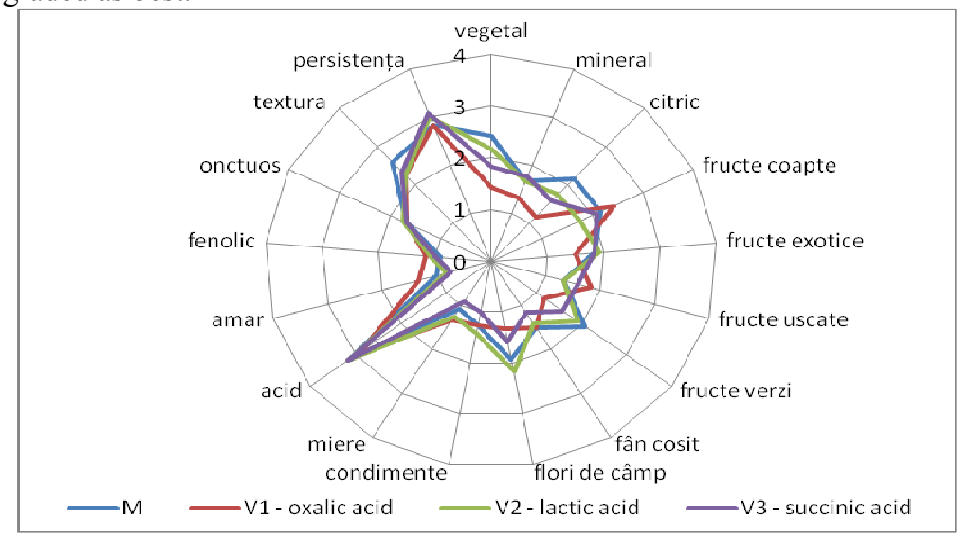

Fig. 1- *Aromatic profile of Tămâioasă românească wines obtained by oxalic acid, lactic acid and succinic acid addition*

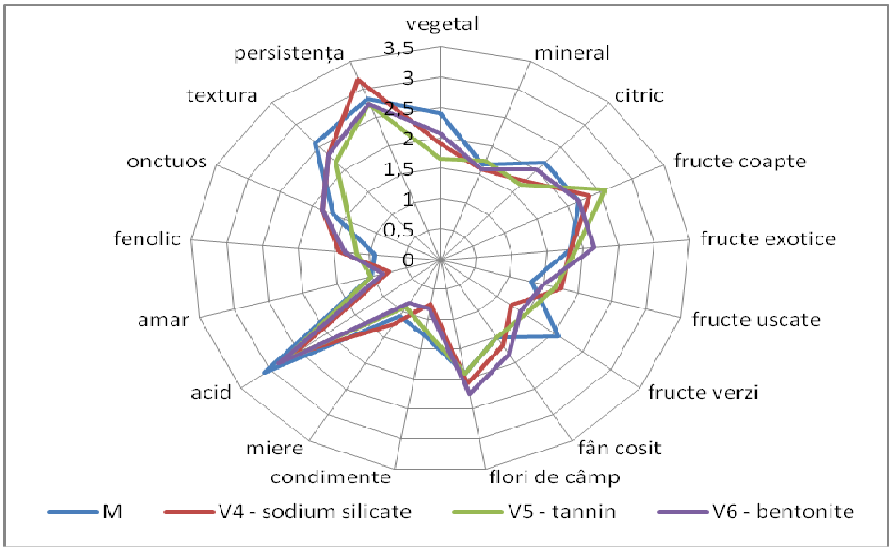

Fig. 2 - *Aromatic profile of Tămâioasă românească wines treated with sodium silicate, tannin and bentonite*

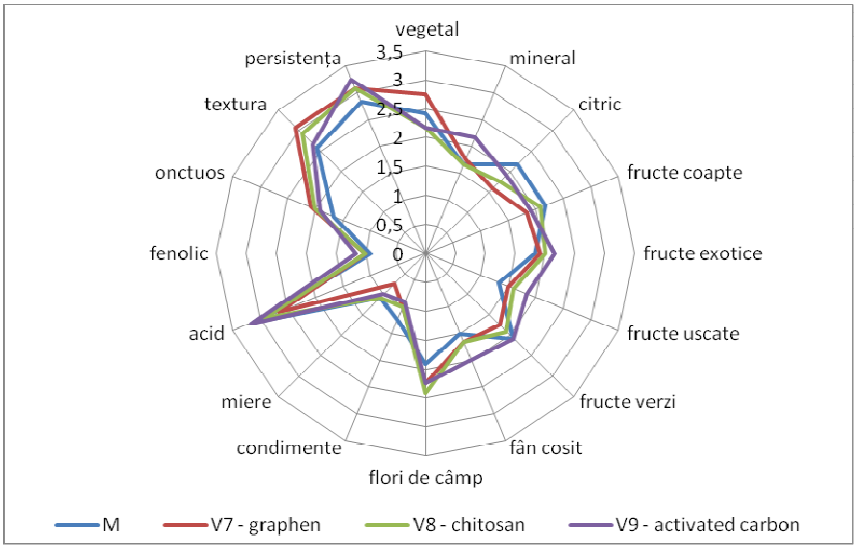

Fig. 3 - *Aromatic profile of Tămâioasă românească wines treated with graphen, chitosan, activated charcoal*

CONCLUSIONS

The aroma compounds identified in Tămâioasă românească wine samples are influenced by the applied treatments.

The acetic acid, hexyl ester has been identified only in the samples treated with succinic acid (V3), sodium silicate (V4) and graphen (V9).

The aromatic profile of Tămâioasă românească wines was influenced by the treatements that were appllied during the prefermentative period, resulting in intens notes of ripe fruits in the wine samples treated with oxalic acid, sodium sillicate and tannin.

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