STUDIES ON THE INFLUENCE OF VARIOUS OENOLOGICAL TREATMENTS ON FETEASCĂ ALBĂ WINES FROM COTNARI VINEYARD

STUDII ASUPRA INFLUENȚEI DIVERSELOR TRATAMENTE OENOLOGICE ASUPRA VINURILOR DE FETEASCĂ ALBĂ DIN PODGORIA COTNARI

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Abstract. *The specific sensorial profile of each wine is determined by its aroma compounds. The different oenological treatments applied to the wines can strongly influence its nose and character. The very spread grape variety Fetească albă cv. was experimentally processed by using 4 commercial yeasts, enzymes and nutrients. A GC analysis revealed the sensorial profile of each sample. All the treated samples show a change in concentrations of aroma compounds compared to the control.*
Key words: *Fetească albă wine, gaschormatography, oenological treatments*

Rezumat. *Profilul senzorial specific fiecărui vin este determinat de compuși de aromă. Diversele tratamente oenologice aplicate vinurilor pot influența puternic naul și caracterul său. Mult răspânditul soi de struguri Fetesacă albă cv. din podgoria Cotnari a fost vinifcat în mod experimental prin utilizarea 4 drojdii comerciale, enzime și substanțe nutritive. O analiză gazcromatografică a identificat profilului senzorial al fiecărei probe. Toate probele tratate prezintă o modificare a concentrațiilor de compuși aromatici în comparație cu martorul.*
Cuvinte cheie: vin *Fetească albă, gazcormatografie, tratamente oenologice*

INTRODUCTION

The flavour profile of a wine is made up of three components: the primary aromas, characteristic of the variety of the grape used, secondary aromas, originating from yeasts during the fermentation process, and tertiary aromas (bouquet) developed during the maturing process of the wine in oak barrels or bottle (Etievant, 1991 and Piñeiro et al., 2006).

Cotnari aromatic compounds in wines are topics of endless debate. Aromas of dried apricot honey and nuts specific to Grasă de Cotnari wines (Cotea, 1985), notes of newly mown hay of Frâncușă or those of dewy vine in flower of Fetească albă, ending with the unmistakable scent of pear and basil of Tămâioasă românească are the result of miraculous combining of hundreds of compounds, the concentration of which is often very small, i.e. part per billion (mg L^{-1}).

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Aromatic bouquet formation depends on many factors related to the culture conditions of the vine, the technology of production, wine fermentation conditions and its aging (Cotea, 1985 Colibaba, 2010). Some classes of compounds such as the many alcohols, aldehydes, esters, acids, terpenic compounds and other minor form, in general, the volatile fraction present in grapes and it occurs during the process of fermentation and maturation (Bayonove, 1993; Baumes, 1989).

A study involving the use of oenological products (selected yeasts, nutrients, enzymes for fining or enzymes for extraction), so often used in winemaking practices is extremely necessary to detect their influence on the sensory profile of wines product.

MATERIAL AND METHOD

Grapes of the Fetească albă grape variety were used, harvested from Cotnari vineyard, in September 2011. The experimental samples were obtained by using the specific processes of aromatic wines; during maceration, different yeasts, enzymes and nutrients were used:

FA M - fermentation appeared spontaneously (control sample);

FA V1 - selected yeasts (Zymaflore X 16® - 20 g/hL) were added to the must;

FA V2 - selected yeasts (Zymaflore X 16® - 20 g/hL) and nutrients (Fermoplus integrateur®, 35 g/hL) were added to the must;

FA V3 - selected yeasts (Zymaflore X 16® - 20 g/hL), nutrients (Fermoplus integrateur®, 35 g/hL) and limpidity enzymes (Pecvine V® - 3 g/100 kg grapes) were added;

FA V4 - selected yeasts (IOC Expression® - 15 g/hL), nutrients (Fermoplus integrateur®, 35 g/hL) and limpidity enzymes (Pecvine V® - 3 g/100 kg grapes) were added.

GC analysis methods

The samples obtained through the process described above were subjected to the SPE extraction by means of LiChrolut EN/RP-18 (40-120 µm) 100 mg and RP (40-63 µm) 200 mg, 6mL Standard PP and LiChrolut EN (40-120 µm) 500 mg, 6 mL Standard PP

20 mL wine samples were passed through a C18 bed SPE cartridge. The adsorbent bed was first conditioned with 10 mL dichloromethane, 10 mL methanol and 10 mL aqueous solution of ethanol 13% v/v. The adsorbent bed was dried up by means of a 20-minute forced air jet. The compounds retained in the adsorbent layer were then recovered by percolating the bed with 2 mL dichloromethane. The resulting extract was sealed hermetically and then injected into the Shimadzu 5 GC-2010 gas-chromatograph coupled with a QP2010 Plus mass spectrometer.

1000 µL extract were injected splitless into the chromatographic pipe. The aroma compounds were determined by means of the NIST 08, Wiley 08 and SZTERP spectrum library.

GC-MS parameters:

1. Gas chromatographer:

- oven temperature: 35 °C;
- injector temperature: 220 °C;
- injection mode: splitless;
- carrier gas: He;
- column flow: 1 mL/min;

- oven temperature programme: 35 °C for 5 mins, rising at a rate of 4 °C minute up to 250 °C, where it stays for 13,25 mins;
-temperature of the ion source: 250 °C;
-interface temperature between gas-chromatographer and mass spectrometer: 250 °C;
-mass domain: 50–200 m/z;
-detector sensitivity: 1,05 V

2. Injection parameters:
-syringe of: 10 µL;
-prewashing of syringe with solvent: 3 times
-syringe volume filling: 5 µL;
-prewashing of syringe with sample: 2 times;
-post-washing with solving of the syringe: 5 times

RESULTS AND DISCUSSIONS

Fetească albă samples processed by adding different yeasts, nutrients and enzymes (Fig. 1), show a wide range of acids, which is influenced by the applied processing technology. The control sample, FA M, and FA V1, where selected yeasts were used (Zymaflore X 16 ®) at a dose of 20 g / hL and FA V2, where in the must selected yeasts were added (Zymaflore X 16 ®) at a dose of 20 g / hl as well as nutrients (Fermoplus integrateur ®) at a dose of 35 g / hL, show a small change in the acid number and the determined concentration in most of the fatty acids, which have the specific odor of manure, sweat, goats and livestock.

In samples FA V3, with selected yeasts (Zymaflore X-16 ®) at a dose of 20 g / hl, nutrient (Fermoplus integrateur ®) at a dose of 35 g / hL and fining enzyme (Pecvine V ®) and FA V4 (yeast selected (IOC Expression ®) at a dose of 15 g / hL, nutrient (Fermoplus integrateur ®) at a dose of 35 g / h and fining enzymes (Pecvine V ®), one can immediately observe a distinct change and expanded both the number of acids identified as well as their concentration. Thus, if the FA V3, acetic acid, butanoic acid and octanoic acid are no longer detected, while the amounts of isobutyric acid, isovaleric acid, hexanoic acid and decanoic acid decrease to almost half compared to the control sample. In FA V4, while butanoic acid is again identified, the amounts of acids do not change significantly.

Esters identified in samples of Fetească albă (fig. 2) have a pretty diverse palette, but varying concentrations depending on oenological products used. Isoamyl acetate, ester with a strong smell of bananas and found in highest concentration in all samples, has a maximum concentration in FA V2 variant produced by using selected yeast (Zymaflore X-16 ®) at a dose of 20 g / hL and nutrient (Fermoplus integrateur ®) at a dose of 35 g / hl.

Esters of fatty acids complement their flavors of tropical fruit and apple, pear and strawberry, to the identified sensory profile.

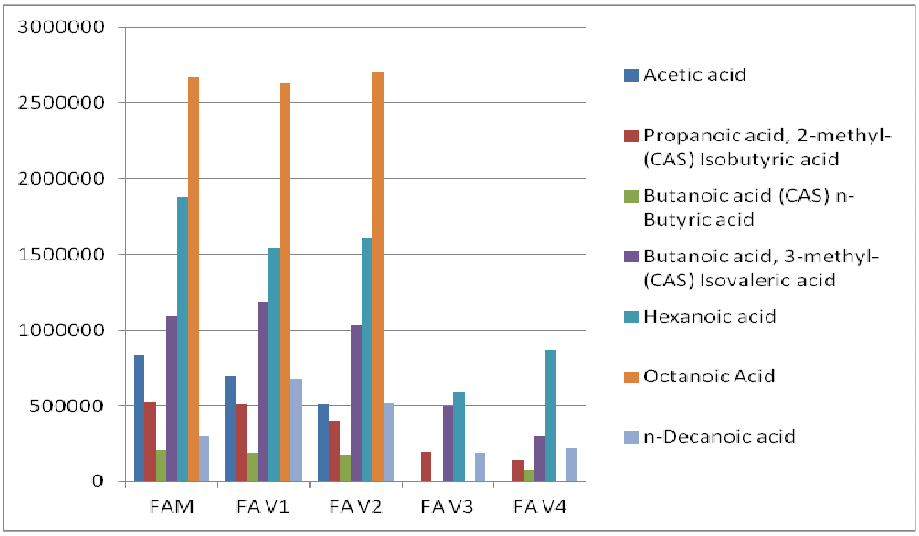

Fig. 1 - Graphical representation of acids identified in wines of Fetească albă obtained experimentally with different yeasts, nutrients and enzymes, in 2011

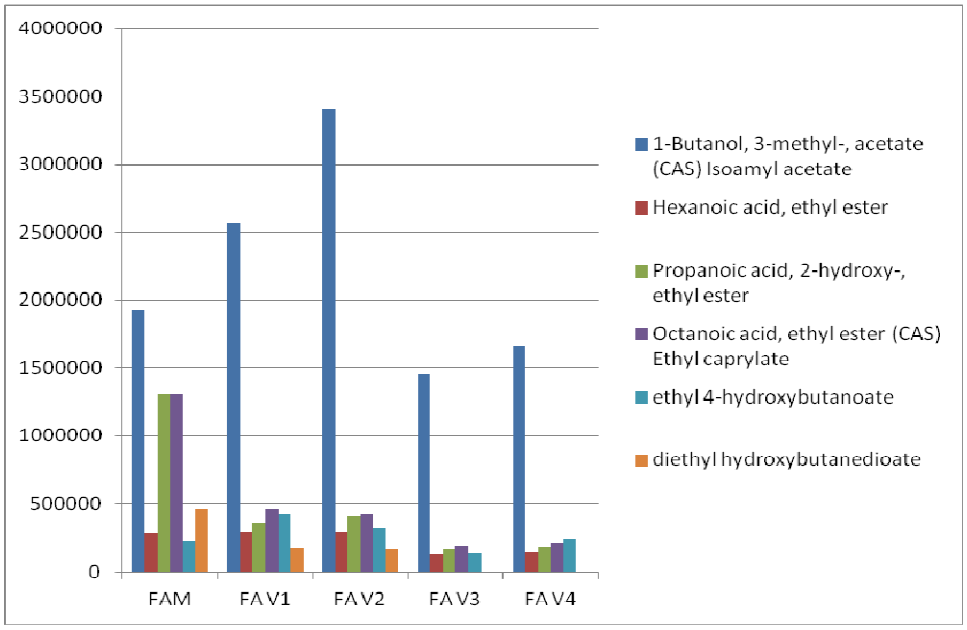

Fig. 2 - Graphical representation of esters identified in wines of Fetească albă obtained experimentally with different yeasts, nutrients and enzymes, in 2011

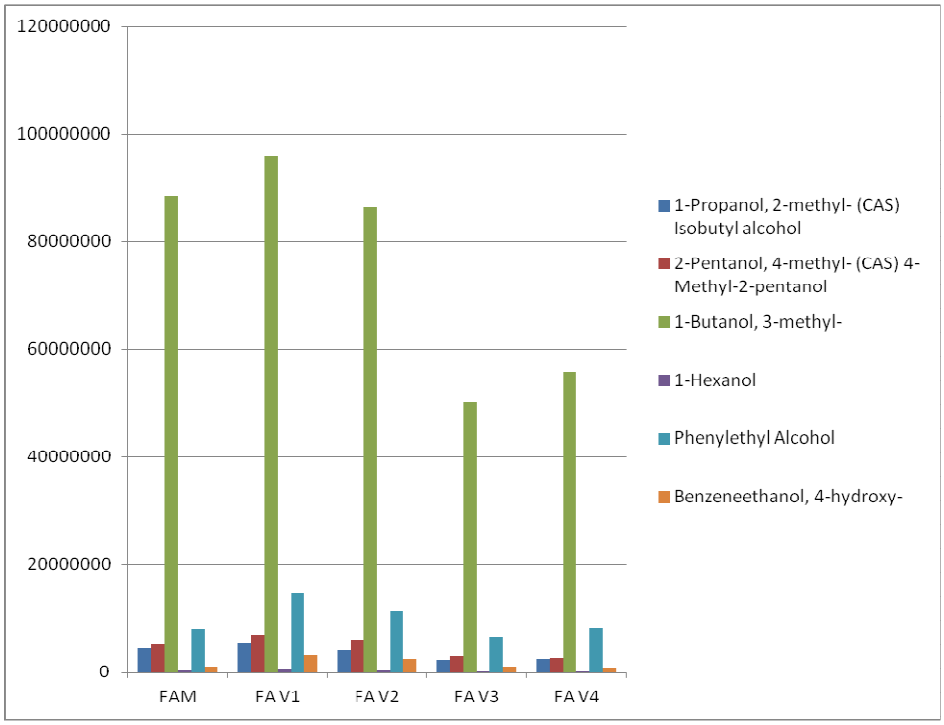

Fig. 3 - Graphical representation of superior alcohols identified in wines of Fetească albă obtained experimentally with different yeasts, nutrients and enzymes, in 2011

From the point of view of identified superior alcohols (fig. 3) 1-butanol 3-methyl occupies in the samples for the experimental Fetească albă a leading position in relation to the quantity, being about 9 times higher than the concentration of phenylethylalcohol, the following alcohol in quantitative terms. The range and diversity of higher alcohols differ depending on oenological products used. Phenylethylalcohol has a strong rose aroma and it is found to be in similar amounts in all samples, the highest , however, being recorded in FA V1.

CONCLUSIONS

1. Esters identified in Fetească albă wines obtained under different experimental conditions or treatments vary depending on the products used.

2. Superior alcohols 1-butanol 3-metil and phenylethylalcohol have been identified in the maximum amount of Feteasca alba FA V1 processed with selected yeasts (Zymaflore X 16®) at a dose of 20 g/hL.

3. Isoamyl acetate, found in the highest concentration from all the esters, is identified in the wines obtained from grape must where selected yeasts (Zymaflore X 16®) at a dose of 20 g / hl and nutrient (Fermoplus integrateur®) at a dose of 35 g / hL were added.

4. From the point of view of quantity and the number of the aroma compounds, the best results have been observed in samples FA M, FA V1 and FA V2.

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