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

STUDII ASUPRA INFLUENȚEI DIVERSELOR TRATAMENTE OENOLOGICE ASUPRA UNOR VINURI DIN PODGORIA COTNARI

MĂLUȚAN G.[1], COLIBABA Lucia Cintia[1], NICULAUA M.[2], COTEA V. V.[1], NECHITA C.B.[1], TUDOSE-SANDU-VILLE St.[1], CODREANU Maria[1]
e-mail: cintia_colibaba@yahoo.co.uk

Abstract. *The specific sensorial profile of each wine is determined by its aroma compounds . The different different oenological treatments applied to the wines can strongly influence its nose and character. The famous grape variety Grasa de Cotnari 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: *Grasa de Cotnari, 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. Celebrul soi de struguri Grasa de Cotnari 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, Grasa de Cotnari, gazcormatografie, tratamente oenologice*

INTRODUCTION

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).

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

[1]University of Agricultural Sciences and Veterinary Medicine Iasi, Romania
[2] "Oenological Research Center – Iasi Branch of the Romanian Academy

compounds, the concentration of which is often very small, i.e. part per billion (mg L˙1).

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 produced .

MATERIAL AND METHODS

Grapes of the Grasă de Cotnari 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:

Gr M - fermentation appeared spontaneously, no extraction enzymes were used, but a maceration-fermentation of 8-12 hours was used (control sample);

The extraction enzyme Vulcazyme arome® (3 g/hL) was used for the next 4 samples.

Gr V1 - selected yeasts (Cross Evolution® - 20 g/hL) were added to the must;

Gr V2 - selected yeasts (Cross Evolution® - 20 g/hL) and nutrients (Fermoplus integrateur®, 35 g/hL) were added to the must;

Gr V3 - selected yeasts (Cross Evolution® - 20 g/hL) and nutrients (Fermoplus integrateur® , 35 g/hL) and limpidity enzymes (Zymoclaire CG® 1,5g/100 kg grapes) were added;

Gr V4 - selected yeasts (Zymaflore X 16® - 20 g/hL), nutrients (Fermoplus integrateur® -35 g/hL and limpidity enzymes (Zymoclaire CG® - 1,5 g/hL) 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 și 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 itstays 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

The profile of volatile acids varies according to the used treatment. Octanoic acid is found in the highest quantity, its concentration decreasing as different products are used. Isobutiric acid is not identified in samples GC M and GC V4. Isobutiric acid is found in natural form in the Ceratonia siliqua plant, while isovaleric acid is identified in many essential oils, as well as plants. Isovaleric acid has an odor reminiscent of cheese and sweat, while its esters have a nice smell, being used in the perfume industry.

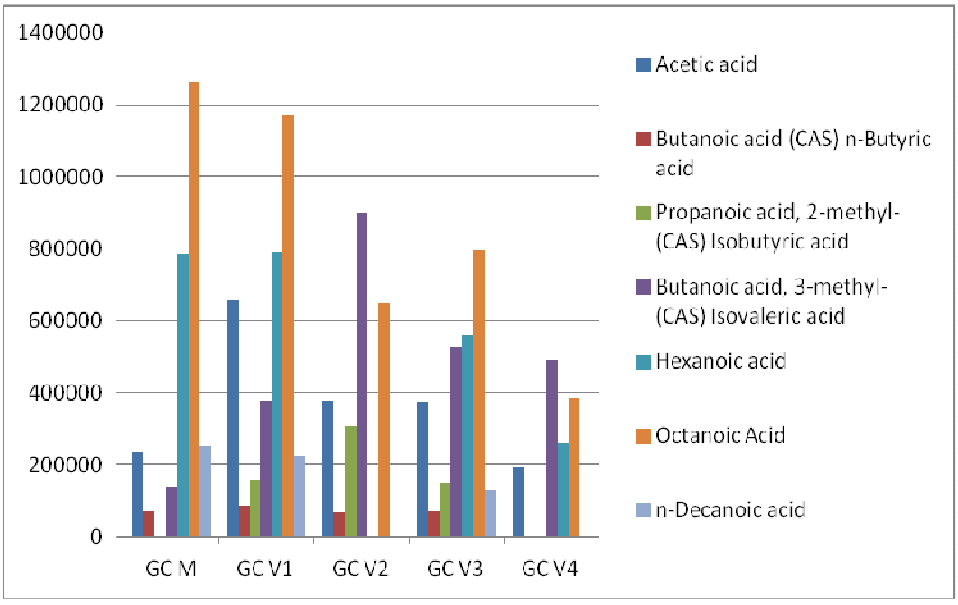

Fig. 1 - Graphical representation of acids identified in wines of Grasă de Cotnari obtained experimentally with different yeasts, nutrients and enzymes, in 2010

Wine esters are formed during fermentation and during wine maturation or aging. Killian E. and Ough C.S., 1979 accentuate the fact that a great influence on ester formation is the temperature during alcoholic fermentation. At temperatures

lower than 10 °C, fruity esters are formed (isoamyl acetate, isobutyl acetate, ethylic butyrate and hexyl acetate). At temperatures between 15 and 20 °C, esters with a big molecule are formed (ethyl octanoate, ethyl decanoate etc) with waxy sweet smells.

Many esters, having a nice smell, are used as artificial essences, some with fruity aromas. For example, amyl acetate has a typical smell of bananas, ethyl butyrate has strong notes of pineapple, isoamyl butirate smells of pears. In general, all the esters of the isovaleric acid have similar odors similar to that of pears.

The number and the quantity for the identified esters in the Grasă de Cotnari samples (fig. 1) differ according to the products or the treatments used. Within the analysed samples, the maximum concentration is in the case of isoamyl acetate (banana oil), in all of the samples. Second in concentration, ethyl lactate, with creamy notes, similar to those of coconut, butter and fruits, is only identified in the samples GC M, GC V1, GC V2 and GC V3. In the variant GC V4, the commercial yeast strain Zymaflore X 16® was used, in comparison to the Cross Evolution® yeasts in the rest of the samples.

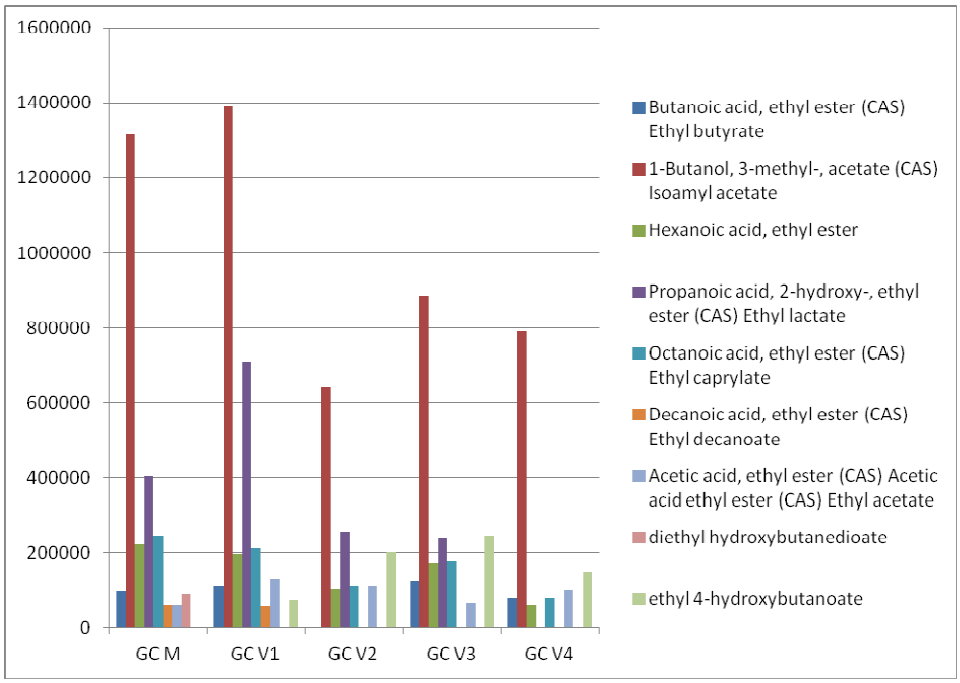

Fig. 2 - Graphical representation of esters identified in wines of Grasă de Cotnari obtained experimentally with different yeasts, nutrients and enzymes, in 2010

A large diversity of the esters is found in the analysed samples. Among the identified esters are: ethyl butirate, isoamyl acetate, hexanoic acid, ethyl ester, ethyl lactate, esters of fatty acids, ethyl acetate.

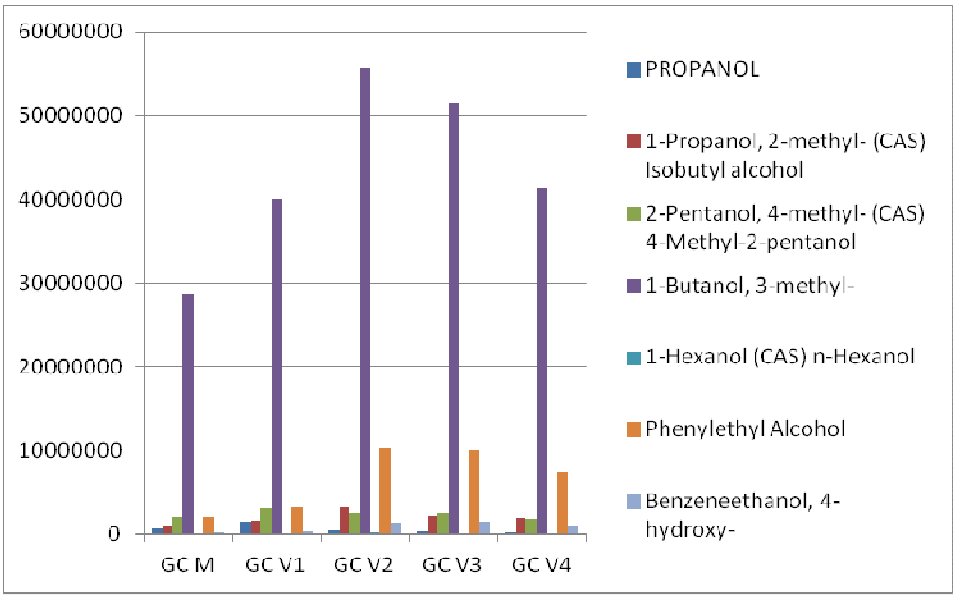

Fig. 3 - Graphical representation of alcohols identified in wines of Grasă de Cotnari obtained experimentally with different yeasts, nutrients and enzymes, in 2010

Superior monohydroxilic aliphatic alcohols are formed during desamination and decarboxilation of must's aminoacids. Superior alcohols belong to the aliphatic aromatic compounds, contributing directly to forming the aging bouquet of wine or indirectly, by forming esters.

The highest quantity of 1-butanol, 3-methyl is identified in CD V2, where the must was treated with selected yeasts (Cross Evolution® - 20 g/hL) and nutrients (Fermoplus integrateur®, 35 g/hL) were added to the must; phenylethylalcohol, with sweet rose notes, is found in its highest concentration, also in GC V2, similar to CG V3.

CONCLUSIONS

1. Esteres identified in Grasă de Cotnari differ according to the used oenological products and treatments.

2. Superior alcohols: 1-butanol,3-metil and phenylethylalcohol were identified in Grasă de Cotnari wines processed with selected yeasts (Cross Evolution® - 20 g/hL) and nutrients (Fermoplus integrateur®, 35 g/hL).

3. Isoamyl acetate, the ester found in its highest concentration in the analysed wine samples, is found at highest value in wines obtained from must where selected yeasts (Cross Evolution® - 20 g/hL) were added.

4. Taking into analysis the quantity and the diversity of the aroma compounds identified, the best results were obtained in GC V1 and GC V2, as well as the control sample.

***ACKNOWLEDGMENTS**: This study was realised and published within the research project POSCCE-A2-O2.1.2-2009-2 ID.653, code SMIS-CSNR 12596.*

REFERENCES

1. **Bayonove C., 1993** - *Les composés terpeniques*. In: B. Doneche, Editor, Les acquisitions récentes en chromatographie du vin. Applications á l'analyse sensorielle des vins, Lavoisier, France.
2. **Baumes R.L, Bayonove C., Barrillere J.M., Samson A., Cordonnier R., 1989** - *La macération pelliculaire dans la vinification en blanc. Incidence sur la composante volatile des vins,* Vitis.
3. **Cotea V. D., 1985** - *Tratat de Oenologie, vol 1.* Editura Ceres, Bucureşti.
4. **Killian E, Ough C.S., 1979** - *Fermentation Esters — Formation and Retention as Affected by Fermentation Temperature,* Am. J. Enol. Vitic., vol. 30, no. 4, pp. 301-305.