PHENOLIC COMPOUNDS FROM BUSUIOACĂ DE BOHOTIN OBTAINED THROUGH DIFFERENT MACERATION TECHNOLOGIES

COMPUŞI FENOLICI ÎN VINURILE DE BUSUIOACĂ DE BOHOTIN OBŢINUTE PRIN DIVERSE TEHNOLOGII DE MACERARE

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Abstract. *This study aims at identifying the main phenolic characteristics of an original Busuioaca de Bohotin wine from Pietroasa area, in Dealu Mare region. In 2009, the Busuioaca de Bohotin grapes were processed using different maceration technologies like: classical maceration, cryo-maceration, ultrasound maceration and microwave maceration, the general steps of wine-making following after. Different analytic methods (HPLC, index Folin-Ciocalteu, D_{280}) were used to determine the quantities of polyphenolic compounds from the obtained wine samples, while a computerised color of the wine is represented by the main chromatic parameters L, a, b.*

Key words: phenolic compounds, Busuioaca de Bohotin, maceration technologies

Rezumat. *Compuşii fenolici din vinurile aromate romaneşti reprezintă un domeniu prea puţin studiat. Această lucrare are ca obiectiv principal identificarea substanţelor cromatice din vinurile obţinute din struguri de Busuioacă de Bohotin recoltaţi din podgoria Dealu Mare, centrul viticol Pietroasa, în anul 2009. Vinurile au fost procesate prin aplicarea diverselor tehnologii de macerare (macerare pe boştina, criomacerare, macerare cu ultrasunete, macerare cu microunde). Vinurile au fost analizate prin utilizarea lichid-cromatografei şi a altor metode analitice, determinandu-se compuşii ce formeazş faimoasa culoare de „foiţă de ceapă". Este, de asemenea, descrisă şi variaţia diverşilor compuşi identificaţi în funcţie de metoda de macerare utilizată.*

Cuvinte cheie: compuşi fenolici, Busuioacă de Bohotin, tehnologii macerare

INTRODUCTION

In Romania, rose wines are weakly represented on the market, being obtained only in the south of the country, on the sandy soils of Oltenia, from the Roşioară, Băbească neagră and Merlot grape varieties (Muntean Camelia, 1997). Aromatic wines are much better represented, due to their flavour and sweetness: Muscat Ottonel, Tămâioasă românească and Busuioacă de Bohotin, in many local vineyads: Târnave, Dealu Mare (Pietroasa), Drăgăşani, Murfatlar, Cotnari, Huşi (Bohotin center), Iaşi (Tomeşti center) and more. The colour of rose wines varies on a large segment, from a pale pink (onion skin), to a light red. There are no well defined limits for the colour

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of rose wines differing according to viticultural area, used grape variety, technological process of wine-making. A special place among rose Romanian wines is occupied by Busuioacă de Bohotin, that can easily rival cosmopolitan varieties not only through its phenolic quality but also through its aroma (Vărăticeanu Gh. et al., 1998).

According to the annual climatic conditions, the obtained wines have a color intensity that varies between 0,048-0,325 nm and have a faint and very pleasant rose-like aroma.

MATERIAL AND METHOD

The research concerning the influence of different technological processes of maceration-fermentation on the extraction degree of phenolic compounds from Busuioacă de Bohotin grapes was done at the oenology Laboratory of the Agronomical University of Iasi. The Busuioacă de Bohotin grapes were harvested from Pietroasa center in 2009, at their technological maturity, being processed according to the steps of the general technology for obtaining rose-aromatic wines. The accent of the whole process was put on the maceration phase, done either in a classical manner (skin contact maceration) or through the modern methods described below.

The must analysis registered a sugar content of 240 g/L and a must acidity of 6 g/L tartaric acid. The characteristics of each maceration-fermentation technology was as follows:

- Classical maceration: in order to better underline the efficiency of the technological variants, in this case, the Busuioacă de Bohotin grapes were processed following the steps of the general technological flux for obtaining rose-aromatic wines. The pomace was macerated for 18 hours. After that, it was pressed with a hydraulic press and the must finished its alcoholic fermentation in glass vessels. The wines were racked, conditioned, filtered and bottled.
- Maceration with microwaves was done in the microwave oven of the oenology laboratory, with radiating waves of 350 W, respectively 650 W, for 10 minutes. Due to the irradiation, the cell's wall is destroyed, fact visible when the berries become opaque.
- Maceration with ultrasounds was performed in the ultrasounds bath of the Oenology Laboratory (frequency 45 kHz, power 160 W). The ultrasonic cavitation develops string forces that mechanically destroy the cell's wall and improve the material transfer. The pomace samples were treated for 15 minutes.
- Criomaceration was performed by keeping the grapes in the freezer at -20^{o}C and then processing them while still frozen.

The pomace obtained as described above was pressed with a hydraulic press and the must finished its alcoholic fermentation (QA23 yeast- *Saccharomyces cerevisiae)* in glass vessels. The wines were racked, conditioned, filtered and bottled.

The obtained wines were analysed physical-chemically: density, total acidity, volatile acidity, free and total SO_2, reductive sugars content, alcoholic concentration, non-reductive dry extract) as well as the phenolic compounds from them (total anthocyans content, total polyphenolic index, Folin-Ciocâlteu index, color determination). For these analyses, a UV-VIS Analytik Jena Specord 200 spectrophotometer was used as well as a Hewlett-Packard HP-1100 chromatograph with a C18 column.

RESULTS AND DISCUSSIONS

It is well known that when choosing a rose wine, the consumer is first attracted by its sensorial properties (color, acidity, aroma, body, astringency).

Therefore, in order to obtain rose wines of a high quality, a significant role is played by the used maceration-fermentation technique.

Table 1 presents the results obtained at the determination of the total poliphenolic index (TPI), for each used maceration-fermentation variant, as well as some data concerning the used dilution and absorbency. The data from the table prove that the classical maceration method extracts the highest quantity of anthocyans. A high quantity of anthocyans was also extracted by the microwave maceration method, at radiating doses of 650 W, respectively 350 W. The weakest results concerning the polyphenols quantity were registered in the ultrasounds maceration techniques, respectively in the criomaceration obtained wine samples.

Table 1

Values of the total polyphenolic index of wines obtained from Busuioacă de Bohotin grape variety through different maceration-fermentation methods

Technological variant	A280	Dillution	D280
Classical maceration	0,0997	100	9,97
Microwave maceration 650 W	0,0989	100	9,89
Microwave maceration 350 W	0,0872	100	8,72
Ultrasounds maceration	0,0212	100	2,12
Cryomaceration	0,014	100	1,4

Analysing the data from table 2 one notices that the highest quantities of anthocyans were extracted by classical maceration, while the microwave maceration at 650 W follows very close. The usage of criomaceration and maceration with ultrasounds registered the lowest quantities of anthocyans, fact proven also by the reduced absorbency noted at the wine sample.

Table 2

Values of anthocyans in wines obtained from Busuioacă de Bohotin grapes through different maceration-fermentation methods

Technological variant	A_{520} (sample)	A_{520} (control sample)	$A_{520\ p}$ - $A_{520\ m}$	Anthocyans mg/L
Classical maceration	0,1537	0,0265	0,1272	48
Microwave maceration 650 W	0,1345	0,0235	0,111	41
Microwave maceration 350 W	0,0996	0,0225	0,0771	28
Cryomaceration	0,0713	0,0135	0,0578	21
Ultrasounds maceration	0,0712	0,0165	0,0547	20

Table 3 shows data of the main chromatic parameters that characterise wine color: luminosity (L), a*-chromatic component of complementary colours red-green, b*- chromatic component of complementary colours yellow-blue, C*-clarity, H*-angle that characterises the hue.

With the help of the obtained data, a simulation of the wine's color was done with the help of a software (DIGITAL COLOUR ATLAS 3.0) in order to better accentuate the color differences and to classify the wines on sensoric perceptions. Digital Colour Atlas can compare the color tones of more than 150 color systems.

The changes of color components are relevant for underlining the influence of each technological variant.

Table 3

Values of chromatic parameters in wines obtained from Busuioacă de Bohotin grapes through different maceration-fermentation methods

Technological variant	L	a*	b*	C*	H*	L	Hue	Color
Classical maceration	43,10	57,39	16,29	28,86	47,78	0,98	1,43	
Ultrasounds maceration	59,26	43,06	43,78	11,98	44,19	0,32	1,15	
Microwave maceration 350 W	60,12	50,91	29,43	9,04	59,64	0,27	1,59	
Microwave maceration 650 W	79,02	29,40	24,78	7,33	67,51	0,21	1,92	
Criomaceration	85,24	12,43	5,68	5,60	76,68	0,14	2,40	

CONCLUSIONS

The maceration technologies influence the production technologies of rose wines.

1. It is noticed that for the obtaining of intensely coloured rose wines and a high anthocyans content the classical maceration method is optimal, while for the obtaining of paler wines, criomaceration and ultrasound maceration can be used.

2. According to the obtained results concerning the wines' color, the clearest wines are those obtained by criomaceration, in comparison with the wines processed by the classical maceration method, the darkest in color.

3. The color intensity decreases proportionally with the results of the wine's color simulation and with the classification established on the basis of the absorbtion spectra, while the hue values show an indirect proportional behaviour compared to the the results of the color simulation, also taking into consideration the influence of the used technological variant.

4. These data have an important role in correcting the wine's color according to consumer's preferences, its destination, as well as diversifying the chromatic pallet as to tickle not only the smell senses but also the visual ones.

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