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THE BIOTECHNOLOGICAL POSSIBILITIES OF IMPROVING THE PHENOLIC COMPOSITION AND EXTRACTIVITY OF GREAT BURGUND WINES

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Abstract

The varieties with black grapes, selected from Pinot noir entered into the assortments of some Romanian vineyards after the reconstruction of viticulture patrimony, after the phylloxera disaster. The variety can be found in present also in the Dragasani vineyard. It is characterized through relative high productions, coming up to 10 – 12 t/ha. In some years, the quality parameters of wines obtained in classic mode don't satisfy the actual pretensions. Among these you can count phenolic compounds and extract, essential components for red wines. These can be substantial improved through the realization of the fermentation process under activity selected yeasts and pectolitic enzymes in relation with the periods and the temperatures of maceration, justify chosen.
Keywords*: grapes, variety, yeasts, enzymes, maceration, extract, polyphenols.*

Introduction

Through the basis particularities which separate red wines of other categories are extractives, generally, higher, the contents in anthocyans and the contents in other phenolic compounds. Through applying an uniform technology of primary wine-making, the component mentioned are influenced, as levels, by the genetic nature of varieties. In the case of using the same variety, the extractivity and the contents in polyphenols depends by the actions of biotechnological factors of primary wine-making. These aspects were well underlined in more studies and researches made on this subject (Canal-Llauberes, 1990; Băducă, 2003; Gheorghiță, 2006).

In assortment for red wines with remarkable production potential, but with some qualitative goals, you can count the Great Burgund variety. Also the goods and the wrongs of the oenologic potential of the variety, in normal wine-making, were mentioned in papers with high scientific and practical value (Măcău, 1994, Ionică, 2006). We can mention through the bad quality varieties a wicked extractivity, or a undeveloped phenolic composition, compared with the wines obtained from other varieties, intensively asked by the consumers. For finding better possibilities for extracting and phenolic composition of Burgund mare wines has been made a study of which results are the main object of this paper.

Experimental

The researches were done in the wine-growing years 2005 and 2006, using the Great Burgund variety grapes, planted in Dragasani vineyard. The grapes characteristics at the moment of harvest are showed in table 1.

Table 1. The Great Burgund grapes characteristics at the moment of harvest and wine-making

Vineyard	Viticultural year	Glucides g/l	Acidity g/l H_2SO_4	Anthocyans mg/kg beans	Total polyphenols g/kg beans
Drăgăşani	2005	202	4.96	1035	3.706
	2006	197	5.07	927	3.801

In equal conditions concerning: the level of sulphitation of must (50 mg/hl), the maceration-fermentation temperature (25 – 26°C), the homogenization regime of must phases (8 times/day), the biotechnological factors of viability involved in fermentation-maceration process were: spontaneous microflora yeasts (LI), selected yeasts (LSA – RT-73/P breed), selected yeasts (LSA) together with pectolitic enzymes (Lallzyme type).

The three variants of biological and biochemical orders acted each in 7 under-variants concerning the maceration periods, from 0 at 168 hours, from 24 in 24 hours.

For each variant and under-variant were determined: the contents in total extract, unreduced extract and ash, as well as the contents in

anthocyans, proportions of extracted anthocyans during the maceration, the contents in total polyphenols, tannin and unflavonic polyphenols. On the base of the ash and unreduced extract values we calculated the report ash · 100 / unreduced extract.

Results and Discussions

The polyphenolic constituents depending on the biotechnological factors and maceration periods evaluates like data mentioned in table 2. For all the variants, with using biological and biochemical factors, the contents in anthocyans are bigger for the same maceration periods to the variant with LSA+Ep, followed in decrease order of the variants with actions of LSA and LI.

For all the biotechnological variants, anthocyans extractivity from must increases on the measure of the extension but until 120 hours, after that is produced a decrease, determined, in fact, from the refixing of one proportion from anthocyans on solid fraction of must.

The total polyphenols, tannins and unflavonic polyphenols contents, know a continuous increasing on the measure of the extension of the must phases. For the same maceration-fermentation period, but, the contents of three phenolic parameters are bigger in the wines obtained through fermentation-maceration under the simultaneous act of selected yeasts and pectolitic enzymes, followed in descending order, of one obtained by fermentation with selected yeasts and spontaneous microflora yeasts.

The data showed in table 3 signifies the ways of how influenced the biotechnological factors and periods of contact between must phases on the contents in total extract, unreduced extract, ash and certainly about report ash · 100 / unreduced extract.

For all three biotechnological variants increased on the measure of the extension to the fermentation-maceration periods, and for one and same period of contact between the must phases the values of the contents present bigger values of the variant in which acted simultaneously selected yeasts and pectolitic enzymes.

From the comparative analysis to unreduced extract results that with the variant of fermentation-maceration under action spontaneous microflora yeasts this parameter evolves between 19.2 g/l (at white wine-making) at 24.8 g/l (at wine obtained through 168 hours

maceration). In the situation implication selected yeasts (LSA), for same the maceration period (168 hours), unreduced extract reaches a level of 25.7 g/l, and to the variant with combined action at selected yeasts and pectolitic enzymes (LSA+Ep) the content in extract presents a value of 26.2 g/l.

Following the unreduced extract evolution results that to all three biotechnological variants most higher rhythms of extraction at organic and mineral constituents from the solid parts of must are placed in the first 48 – 72 hours, but with most important amplitudes in the situation action jointly LSA+Ep.

The mineral substances (the ash), keeping the proportions, advances similarly unreduced extract from composition of whom do they part.

Conclusions

The polyphenolic composition and extractivity at Great Burgund red wines can be significant improved through the simultaneous use of fermentation-maceration of selected yeasts and pectolitic enzymes. The initial population of selected yeasts is supposed to be between 6–7 millions/ml, and the pectolitic enzymes dose of 2.5 – 3.5 g/hl. The notable results are obtained when the fermentation-maceration periods, below action selected yeasts is placed round of 120 hours (5 days) for contents in anthocyans and between 144 and 168 hours (6 – 7 days) for total polyphenols, tannins and unflavonic polyphenols.

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Table 2. Contents evolution of some polyphenols during maceration-fermentation process in function of biological and biochemical involved factors at primary wine-making (Great Burgund, Sâmbureşti – 2005)

Biotechnological variant	The maceration period hours(days)	Anthocyans mg/l	Anthocyans extraction %	Total polyphenols g/l	Tannin g/l	Unflavonic polyphenols g/l
Fermentation-maceration with spontaneous microflora yeasts (LI)	0	0	-	1.31	0.75	0.08
	24 (1)	205	19.8	1.74	0.87	0.22
	48 (2)	301	29.1	1.92	1.14	0.30
	72 (3)	411	39.7	2.08	1.36	0.37
	96 (4)	506	48.9	2.36	1.51	0.42
	120 (5)	683	66.0	2.52	1.72	0.45
	144 (6)	655	63.3	2.64	1.88	0.48
	168 (7)	613	59.2	2.77	2.12	0.51
Fermentation-maceration with selected yeasts (LSA): RT73/P – 6 mil.cell/ml	0	0	-	1.31	0.75	0.08
	24 (1)	258	25.0	1.86	0.98	0.24
	48 (2)	396	38.4	2.10	1.34	0.33
	72 (3)	482	46.6	2.35	1.57	0.36
	96 (4)	614	59.3	2.58	1.93	0.43
	120 (5)	695	67.2	2.72	2.16	0.46
	144 (6)	672	65.0	2.91	2.40	0.49
	168 (7)	645	62.3	3.06	2.65	0.50
Fermentation-maceration with selected yeasts + pectolitic enzymes LSA+Ep (Lallzyme – 3 g/hl)	0	0	0	1.31	0.75	0.08
	24 (1)	303	29.3	1.99	1.22	0.30
	48 (2)	412	39.8	2.32	1.42	0.34
	72 (3)	517	49.9	2.57	1.67	0.45
	96 (4)	675	65.2	2.93	2.19	0.48
	120 (5)	704	68.1	3.11	2.48	0.53
	144 (6)	682	65.9	3.28	2.79	0.57
	168 (7)	667	64.4	3.39	2.95	0.58

Table 3. The conjugate influence of the main biotechnological factors of the primary wine-making and of the maceration period an the extract and ash contents (Great Burgund – 2 006)

Biotechnological variant	The maceration period hours(days)	Total extract g/l	Unreduced extract g/l	Ash g/l	Ash × 100 / unreduced extract
Fermentation-maceration with spontaneous microflora yeasts (LI)	0	20.6	19.2	1.72	8.958
	24 (1)	21.8	20.9	1.84	8.804
	48 (2)	22.5	21.4	1.94	9.065
	72 (3)	23.3	22.8	2.16	9.474
	96 (4)	24.4	23.7	2.23	9.409
	120 (5)	24.7	23.7	2.27	9.578
	144 (6)	25.1	24.6	2.36	9.593
	168 (7)	25.3	24.8	2.41	9.718
Fermentation-maceration with selected yeasts (LSA): RT73/P – 6 mil.cell/ml	0	20.6	19.2	1.72	8.958
	24 (1)	22.4	21.7	1.92	8.848
	48 (2)	23.1	22.3	1.98	8.879
	72 (3)	23.9	23.2	2.26	9.741
	96 (4)	24.7	23.9	2.32	9.707
	120 (5)	25.5	24.3	2.36	9.712
	144 (6)	25.9	25.2	2.50	9.921
	168 (7)	26.1	25.7	2.50	9.728
Fermentation-maceration with selected yeasts + pectolitic enzymes LSA+Ep (Lallzyme – 3 g/hl)	0	20.6	19.2	1.72	8.958
	24 (1)	22.7	22.1	1.99	9.005
	48 (2)	23.5	23.2	2.28	9.828
	72 (3)	24.7	24.3	2.39	9.835
	96 (4)	25.2	24.6	2.43	9.878
	120 (5)	25.9	25.2	2.49	9.881
	144 (6)	26.4	25.6	2.51	9.805
	168 (7)	26.7	26.2	2.59	9.885