

## Study regarding the antocianic potential of inland breeds for red wines of Drăgăşani vineyard

Camelia Muntean, Felicia Stoica

University of Craiova

---

### Abstract

Drăgăşani vineyard, a traditional area for the production of white and flavoured wines, presently also distinguishes by red, challenging wines, both on the home market and on the foreign market. Lately, the Romanian breeds Novac, Negru de Drăgăşani and Fetească neagră, grew on the hills and sinclines of Drăgăşani “proved” an exceptional oenological potential both from the quantitative and qualitative point of view.

The grapes of the three Romanian breeds, the high level of convenience of the vineyard is reflected not only through the particularly advantageous proportions of glucides and acidity but also through totally adequate contents in antociani.

The antocianic complex gathers superior characteristics, both from the quantitative point of view and as a chromatic structure. The different categories of pigments from the complex present balanced proportions, able to emphasise in wines of red, intense colour.

Under the account of the antocianic potential the three breeds can compare to Cabernet Sauvignon and Merlot, grown in the most imposing Romanian and foreign vineyards.

**Keywords:** breed, phenophase, antociani, extraction potential, pigments, chromatic

---

### 1. Introduction

The geographical and climatic elements of the Drăgăşani vineyard (Teodorescu Şt. and the co-workers, 1987), very alike or even better than the specific elements of other vineyards famous for qualitative red wines (table 1) represented an objective support, particularly reasoned, which underlay to make the decisions regarding the development in the great win-growing area and the breeds of black grapes.

The oenological potential researches recently made in Drăgăşani vineyard have entirely confirmed the righteousness of the decisions and actions regarding the development in the area and the course of red wines along with the courses of white and flavoured wines (Ionică Laura, 2006; Nicolaescu C., 2007).

**Table 1.** Geographical and climatic elements of Drăgăşani vineyard in comparison with other vineyards for red wines (according to Teodorescu Şt. and the co-workers, 1987)

Vineyard	Northern latitude	Altitude m	Average T° per year °C	Rainfalls mm	Oenoclimatic ability
Drăgăşani	44°30'	182	10,8	684	4757
Valea Călugărească	44°58'	170	11,0	656	4724
Recaş	45°47'	140	10,6	636	4606

The issue of producing red wines in Drăgășani vineyard acquired increased bonds after introducing to the crop of the Novac and Negru de Drăgășani breeds – brilliant creations of the distinguished researcher eng. Mircea Mărculescu – taking into account the mentions regarding the hygienic and alimentary value of these products and according to EU recommendations regarding the reconsideration of the inland breeds. As in respect of red wines, the antocianic polyphenolic complex is the one which confer them the particularity and the general aspect, upon this topic have been initiated and developed researches upon the main Romanian breeds for high quality red wines, grew in the central area of Drăgășani vineyard.

## 2. Experimental

The study aimed the investigation of antocianic potential of Novac, Negru de Drăgășani and Fetească Neagră breeds, in comparison with the Cabernet Sauvignon breed – which is already famous in all great vineyards in the world.

The researches developed in the win-growing years 2005, 2006 and 2007 aimed: establishing the contents in antocian of grapes at full ripeness, antocianic phenolic ripeness and technological ripeness; the extraction potential of antocians of beans and the quantification of extracting potential of antocians proportion also known under the name of technological reserve; the percentage participation of the three pigments categories (yellow, red, blue); establishing the chromatic characteristics values (tinctorial intensity –  $I_c$ ; colour tonality –  $T_c$ ; flavilium cations –  $dA\%$ ) of antocianic excerpts, at the 3 phenophases of ripening.

In order to determine the chromatic components of antocianic complex there were used competitive spectrophotometric methods, recommended by OIV. The participation of pigments was established through the determination of optical densities: at 420 nm for the yellow component; at 520 nm for the red

component; at 620 nm for the blue component. The quantification of chromatic characteristics was made by applying the following formulae:  $I_c = Do_{420} + Do_{520} + Do_{620}$  nm;  $T_c = Do_{420} / Do_{520}$  nm;

$$dA\% = Do_{520} - \left( \frac{Do_{420} + Do_{620}}{2} \right) \times \frac{1}{Do_{520} \times 100}$$

## 3. Results and Discussion

The data enlisted in table 2 regarding the contents of antociani at grapes emphasize the differences between breeds under the aspect of their capacity of biosynthesis of the tinctorial substance and the role of climatic conditions typical for the win-growing years upon the antocians levels at the time of attaining the three phenophases of beans ripening.

Other aspects which arise from the results of table 2 consisted in the fact that the maximum antocians levels in grapes were reached after the complete ripening, and then the contents in these constituents decrease gradually as the grapes pass through the phenophasis of over ripening. For all breeds and ripening phenophases the smallest contents of antocians gathered in 2005, a very rainy year (over 1000 l/sqm of which over 800 l/sqm during the vegetation period), with a high cloud amount and the yearly average temperature under 11°C, and the highest in 2007, a very droughty year, excessively warm and with an exceptional duration of sunshine.

At the complete ripening, the highest content in antocians was registered at the grapes of the mark breed (Cabernet Sauvignon), followed decreasingly by Negru de Drăgășani, Novac, Fetească neagră. At the antocianic phenolic ripening the Novac breed is leading (1444 mg/kg b.), followed by Negru de Drăgășani and Cabernet Sauvignon (1409 mg/kg b. and respectively 1406 mg/kg b.), and on the last position Feteasca neagră is situated (1263 mg/kg b.). At the technological ripening (generally occurred, at 10-12 days after the phenolic ripening) were registered diminutions of antocians: with 3,7% at the

mark breed; with 2,3% at Feteasca neagră; with 2,8 at Novac; with 3,6 at Negru de Drăgășani. Despite all this diminutions, the contents seated between 1234 mg/kg b. at Feteasca neagră and 1404 mg/kg b. at Novac are considered good and very good in order to obtain some typical red wines from the colour point of view.

The colour of red wines – as intensity and quality – depends not only on the quantities

of antocians in grapes but also on their extraction potential level during fermentation-maceration. The extracting level of tinctorial substance and the quantities of antocians incorporated in wine (technological reserve) are quantified in table 3. From the data analysis results that the antocians extraction potential increases during running the phenophasis of over ripening.

**Table 2.** The antocians contents of the grapes at the time of attaining the main phenophases of the black grapes ripening

Breeds	Win-growing years	Phenophases of grapes ripening		
		Complete substance	Phenolic substance	Technological substance
		Antocians mg/kg b.	Antocians mg/kg b.	Antocians mg/kg b.
Cabernet Sauvignon - Mark	2005	1210	1322	1280
	2006	1289	1386	1326
	2007	1341	1509	1470
	AVERAGE	1280	1406	1359
Fetească neagră	2005	1005	1210	1195
	2006	1090	1244	1213
	2007	1163	1336	1295
	AVERAGE	1086	1263	1234
Novac	2005	1175	1305	1296
	2006	1226	1439	1399
	2007	1251	1590	1517
	AVERAGE	1217	1444	1404
Negru de Drăgășani	2005	1193	1362	1349
	2006	1218	1398	1303
	2007	1271	1466	1421
	AVERAGE	1227	1409	1358

Taking into account the average values per each experimental cycle and the aimed breed, the antocians extraction potential increased from 45,7% - 48,6% - to complete ripening, up to 52,5% (Novac) – 54,9% - Fetească neagră – at the technological ripening or of gathering. The studies on this theme established that in over ripening the antocians extraction potential increases due to the degradation of the walls where the antocians are found, under

the action of own pectolitic enzymes (CELOTTI E. and the co-workers., 1997).

The technological reserve, which resulted of the conjugation of antocians contents in beans and the extraction potential level situated between 672,4 mg (Fetească neagră) and 731,6 mg (Novac), at the phenolic ripening and between 678,7 mg (Fetească neagră) and 738,2 (Novac) at the technological ripening. These contents are particularly favourable to a tinge up to the present claims.

**Table 3.** The antocians extraction potential in grapes and the technological reserve of tinctorial substance

Breeds	Win-growing years	Antocians extraction potential %			Technological reserve mg/kg b.		
		MD	MF	MT	MD	MF	MT
Cabernet Sauvignon - Mark	2005	44,6	47,0	48,9	539,7	621,3	626,0
	2006	45,9	51,9	53,6	591,6	719,3	711,0
	2007	46,6	53,3	55,4	625,0	804,3	814,4
	AVERAGE	45,7	50,7	52,9	585,4	715,0	717,1
Fetească neagră	2005	46,8	51,0	53,0	470,3	617,1	633,4
	2006	48,2	53,8	55,1	525,4	669,3	668,4
	2007	50,8	54,7	56,7	591,0	730,8	734,3
	AVERAGE	48,6	53,2	54,9	529,0	672,4	678,7
Novac	2005	44,7	48,8	50,3	525,2	636,8	652,0
	2006	46,2	50,6	52,7	566,4	728,1	737,3
	2007	48,1	52,2	54,4	601,3	830,0	825,2
	AVERAGE	46,3	50,5	52,5	564,3	731,6	738,2
Negru de Drăgășani	2005	44,1	47,9	49,8	526,1	652,4	671,8
	2006	46,6	51,2	53,6	567,6	715,8	698,4
	2007	47,5	52,9	55,0	603,7	775,5	781,6
	AVERAGE	46,1	50,7	52,8	565,8	714,6	717,3

The quality of tinctorial substance of black grapes and red wines is defined by the proportions of different categories of pigments and the chromatic characteristics, in which the pigments categories are brought together. The elements of chromatic structure are quantified in table 4.

Under the same natural conditions, the genetic nature of breeds determines the differences in chromatic structure of the antocianic complex.

Thus, the yellow component (extinction at 420 nm) shows the highest values at Feteasca regală (in average 30,03%), and the lowest values at Novac (in average 28,68%). The red component (surprisingly) positiones in top the Fetească neagră breed (61,66%) although at this breed the yellow component also registers the highest values. This situation is determined by the lowest participation of the blue component (8,31%).

Concordantly to the contents in antocians the tinctorial substance is also situated between 2,536 (Fetească neagră) and 3,032 (Novac). The ration yellow pigments/red pigments bring to the top the Fetească neagră breed (0,486) and on the last position the Novac breed, due to the lowest proportions of yellow pigments. The flavilium cations (synthetic marker of pigments participation) positiones the breeds as it follows: Negru de Drăgășani (69,95), Cabernet Sauvignon (69,07), Novac (68,47), Fetească neagră (67,25).

### Conclusions

- \* The inland breeds Fetească neagră, Novac and Negru de Drăgășani, grew in Drăgășani vineyard elate of a remarkable antocianic potential.
- \* The antocianic potential of Novac and Negru de Drăgășani breeds is at least equal to the one of the famous breed

Cabernet Sauvignon although the production of the first two is of higher quality.

\* The antocianic potential of Fetească neagră breed is lower than that of the

above-mentioned breeds, the chromatic structure of the complex is particularly favourable to a tinge of wines without annoying shades of blue or violet, even when they are young.

**Table 4.** Chromatic structures of antocianic excerpts of grapes (at the technological ripening)

Breeds	Win-growing years	Participation of different categories of pigments			Chromatic characteristics		
		Yellow pigments %	Red pigments %	Blue pigments %	Ic	Tc	dA%
Cabernet Sauvignon - Mark	2005	30,41	60,64	8,95	2,833	0,501	69,12
	2006	28,16	62,17	9,67	2,940	0,452	69,30
	2007	29,33	59,36	11,31	3,111	0,494	68,80
	AVERAGE	29,30	60,72	9,98	2,961	0,482	69,07
Fetească neagră	2005	30,17	62,95	6,88	2,432	0,479	67,60
	2006	30,00	61,69	8,31	2,566	0,486	67,18
	2007	29,93	60,35	9,73	2,610	0,495	67,00
	AVERAGE	30,03	61,66	8,31	2,536	0,486	67,25
Novac	2005	29,41	60,89	9,70	2,935	0,483	68,69
	2006	28,71	61,24	10,05	3,020	0,468	69,13
	2007	27,92	59,98	12,10	3,143	0,465	67,45
	AVERAGE	28,68	60,70	10,62	3,032	0,472	68,42
Negru de Drăgășani	2005	29,03	60,85	10,12	2,883	0,477	70,01
	2006	29,00	60,25	10,75	2,916	0,481	69,64
	2007	28,46	60,36	11,22	3,090	0,470	70,21
	AVERAGE	28,82	60,48	10,70	2,963	0,476	69,95

## References

1. Celotti E., Bressan S., Battistutta F., Zironi R., 1997 - *Impiego degli enzimi nella macerazione delle uve rosse*. Vignevini, nr. 11, 57-70
2. Ionică Laura-Costinela, 2006 - *Studiul influenței conjugate a soiului, arealului de cultură și factorilor tehnologici de vinificație primară asupra compoziției și calității vinurilor roșii*. Teză de doctorat, Universitatea din Craiova.
3. Nicolaescu C., 2007 - *Studiul potențialului oenologic al arealului Dealul Banului - Strejești - Cârlogani din sudul podgoriei Drăgășani*. Teză de doctorat, Universitatea din Craiova.
4. Teodorescu Șt., Popa A., Sandu G.A., 1987 - *Oenoclimatul României*. Editura Științifică și Enciclopedică, București.