RESEARCHES CONCERNING THE DELIMITATION OF THE VINEGROWING AREAS OF HIGH QUALITY (TERROIRS VITICOLES) IN VALEA CALUGAREASCA VITICULTURAL CENTER

CERCETĂRI PRIVIND DELIMITAREA AREALELOR VITICOLE DE CALITATE (TERROIRS VITICOLES) ÎN CENTRUL VITICOL VALEA CALUGAREASCA

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Abstract. *Within the context of the ever increasing competing challenge on the wine market, of the over production of the wines and of the evolution of the consumers' taste shifting toward highly typical and authentic wines, it has become more than necessary to identify the vinegrowing areas suitable for obtaining typical wines of high quality. The optimal exploitation of the natural potential (i.e. ecopedoclimatic) of the different vinegrowing areas from Valea Calugareasca center, the high quality vitivinicultural products are expected to be obtained, their capacity of competing on the domestic and foreign markets being quite high. The research works developed within 2002-2006 showed that grape and wine quality compulsorily depends on genetic, ecological and technological factors, that dependence being highly complex and variable when the quality is represented not only by the sugar content in grapes (i.e. wine alcoholic strength), but also by other grape and wine compounds contributing as well to defining the quality concept. The management of the vitivinicultural products with denomination of origin will ensure the rational exploitation of the vinegrowing areas, complying with the sustainable agriculture principles. The wine consumers will have therefore the guarantee that the products they consume are safe for their health.*

Rezumat. *În contextul creşterii concurenţei pe piaţa vinurilor, al supraproducţiei de vinuri şi al evoluţiei gustului consumatorilor către vinuri de mare tipicitate şi autenticitate, este resimţită necesitatea identificării arealelor adaptate obţinerii unor producţii de vinuri de mare calitate şi tipicitate. Prin valorificarea optimă a potenţialului natural (ecopedoclimatic) al diferitelor areale viticole din centrul viticol Valea Călugărească, se estimează obţinerea unor produse viti-vinicole de înaltă calitate, cu un potenţial concurenţial ridicat pe piaţa internă şi externă. Cercetările efectuate în perioada 2002-2006 au demonstrat că dependenţa calităţii strugurilor şi vinului de factorii genetici, ecologici şi tehnologici care o condiţionează, este deosebit de complexă şi variabilă, în situaţia în care calitatea nu este asimilată numai cu conţinutul în zahăr al strugurilor, respectiv cu tăria alcoolică a vinului, ci şi cu alti compuşi ai strugurilor şi vinurilor, care contribuie în mod nemijlocit la definirea noţiunii de calitate. Realizarea managementului produselor vitivinicole cu denumire de origine va asigura o exploatare raţională a arealelor viticole în concordanţă cu principiile agriculturii durabile. Consumatorii de vin vor avea garanţia că produsele pe care le consumă sunt sigure pentru sănătatea lor.*

MATERIAL AND METHOD

In the Valea Călugărească wine-growing centre, the researches have focused on identification, delimitation and characterization of 10 homogenous geopedological sequences and it was quantified the impact of ecopedological factors on the vine-bearing/parent stock bio-systems within the ecopedological constants delimited according to the following criteria:

- Local relief (geomorphology) and elevation as associated landscape;
- Terrain geology and lithology, as: rock type, structure and stratification;
- Pedological nature of the terrain, as: soil type or soils complex;
- Pedoclimate of the area, as: soil and subsoil, vine/soil interface, development of the radicular system of the vines;
- Mesoclimate of the area, as: environment and vine-soil-climate relation;
- Reputation of the owner, as human factor, who by the observance of the technological requirements for vine and cellar ensures the getting of products (grapes, wines) of remarkable quality and typicality.

The ecological constants, as basic natural units, chosen according to the aforementioned criteria, imprint the finite product characteristics of "uniqueness", non-reproducible in other conditions.

RESULTS AND DISCUSSIONS

Within the delimited eco-geo-pedological sequences were identified 4 soil classes, in which 11 types and subtypes of soils were individualized (table 1).

Table 1

Types of soil with DCO (Denomination of Controlled Origin) and DCOQL (Denomination of Controlled Origin with Quality Levels) capability identified at the Valea Călugărească wine-growing centre within the eco-geo-pedological sequences

Soil class	Soil type	Symbol	Field
Iluvi-argillaceous soils	*Iluvi-argillaceous brown, vertic*	*BD (vs)*	*Chițorani*
	Brown-red, molic, vertic	*BR mo-vs*	*Valea Mieilor*
	Iluvi-argillaceous brown-red molic, vertic, pseudo-glazed	*BR mo-vs-pz*	*Valea Mantei*
Cambi-soils	*Eumesobasic brown, vertic*	*BM mo-vs*	*Chițorani*
Vertisoils	*Chromic vertisoil, lightly eroded*	*Vs cr-(e)*	*Valea Săracă*
Undeveloped truncated or cleared soils	*Coluvi-soil typical*	*CO ti*	*Wine-growing Highschool*
	Alluvial soil typical	*SA ti*	*Chițorani*
	Cleared anthropic soil, argillaceous, reddish, pseudo-glazed	*AD ar-r-pz*	*Valea Nicovani*
	Cleared anthropic soil, argillaceous, vertic, pseudo-glazed	*ADar-vs-pz*	*Valea Mantei*
	Cleared anthropic regosoil	*ADrs*	*Valea Săracă*
	Cleared anthropic regosoil, pseudo-rendzinic, vertic, pseudo-glazed	*ADrs-pr-vs-pz*	*Valea Mantei*

These types and subtypes of soils represent entities different morphologically and agro-chemically, but approximately identical inside the eco-geo-pedological sequence. The predominant soils are: Royal „Fetească", Italian Riesling, Grand Burgund, Black „Fetească", Merlot and Cabernet Sauvignon

engrafted onto various parent stocks), soils representative for the Valea Călugărească wine-growing centre.

As to texture a very significant variation is observable, the argil (< 0.002 mm) is between 15-60%, with dominance of the heavy texture (clay-argillaceous, argillaceous-clayish).

Soils have a light acid-neutral-light alkaline *reaction*, the latter category having a greater diffusion, as a result of $CaCO_3$ presence in most soils. A light acid reaction (pH values between 6.2-6.8) is detectable in the brown-reddish soils, in the light pseudo-glazed coluvi-soils, in the eumesobasic brown soils and vertisoils, and the light alkaline reaction (pH values between 7.5-8.4) can be detected in most of the coluvi-soils and anthropic soils where $CaCO_3$ is present starting from the soil surface.

The $CaCO_3$ content varies between large margins. In the brown-reddish soils (except for the brown-reddish molic light pseudo-glazed soil) the basic profile presents $CaCO_3$ contents of 7.8-8.4%; in coluvi-soils $CaCO_3$ is present starting from the surface in a ratio of 3.5-9.0%; the anthropic soils are generally carbonated from the surface, the $CaCO_3$ content oscillating between 3.0-29.1%; vertisoils demonstrate a content generally reduced between 1.3-3.5%.

The humus content in the brown-reddish soils is (0.96-3.31%), in vertisoils (1.23-3.15%), in coluvi-soils (1.33-2.85%), in brown-eumesobasic soils (1.85-2.50%) and it is reduced in anthropic soils (0.36-0.95%).

Humus content is correlated with *the total nitrogen*, which demonstrates in the cleared horizon the biggest values in brown-reddish soils (0.135-0.182%) and the smallest values in carbonaceous anthropic soils (0.051-0.070%).

Regarding the supply of *free phosphorous (P_2O_5),* its content in the cleared horizon is low to the environment oscillating between 3.5-10.4 mg/100 g of soil in the brown-reddish soils; 10.0-12.0 mg/100 g of soil in the brown-eumesobasic soils and between 3.9-4.6 mg/100 g in vertisoils.

The supply of *free K_2O* in the cleared horizon is characterized by values varying between 8.8-24.7 mg/100 g of soil in the brown-reddish soils, between 17.4-28.4 mg/100 g of soil in the brown-eumesobasic soils and between 11.1-18.6 mg/100 g of soils for vertisoils.

The Architectonics of the Radicular System. By analyzing the distribution of the radicular system of the vine-bearing/parent stock combinations within the studied soils we can observe modifications of this distribution, depending on the soil type, on the argil content, on the mineralogical nature of the argil and on the total and active lime carbonate content.

It was observed that the brown-reddish soils provide the most even development of the radicular system (figure 1), being followed by the brown iluvi-argillaceous soils, while the vertisoils present immediately below the surface a minimum number of roots, these ones developing in the cleared horizon, where the A and By horizons display a modified structure, cracks and more significant possibilities of ingression. In the un-cleared horizons, the number of roots decreases almost to extinction.

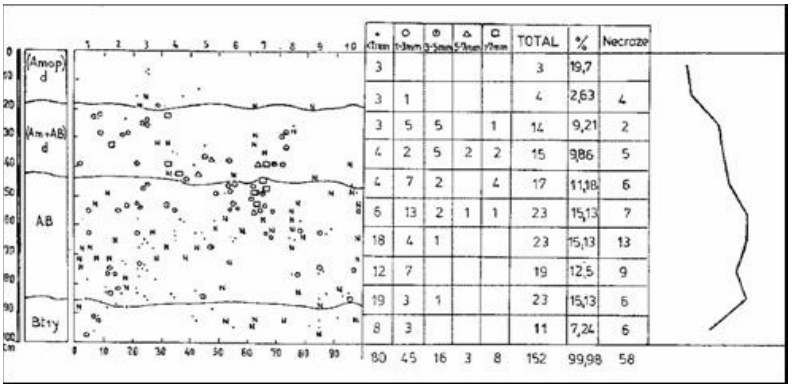

Fig. 1 – Diagram of the radicular system distribution for the Cabernet Sauvignon/Ruggeri 140 variety on brown-reddish molic, vertic, pseudo-glazed soil (BR mo-vs-pz)

Regarding the grape production and its quality, it can be observed that the soils with a higher fertility (high contents of humus and free nutritive elements) and which had a larger capacity for water storage, have provided the highest vintage. The Great Burgund variety has recorded the highest output for the following soils: eroded chromic vertisoil (4.69 kg/vine stock), coluvi-soil typical (3.67 kg/vine stock) and cleared anthropic regosoil (2.64 kg/vine stock); the Merlot variety on iluvi-argillaceous brown, vertic soil had 1.61 kg/vine stock). Still the highest accumulations of sugars and anthocyans in the grapes were recorded in the case of anthropic regosoils, poorer in humus and nutritive elements, but richer in carbonates.

The variation amplitude of the multiannual average of total acidity is lower, spanning between 4.5 g/l H_2SO_4 (brown-reddish molic, vertic soil) and 4.7 g/l H_2SO_4 (cleared anthropic regosoil) in the case of Cabernet Sauvignon; between 5.3 g/l H_2SO_4 (coluvi-soil typical) and 5.2 g/l H_2SO_4 (eroded chromic vertisoil) in the case of Grand Burgund.

The physical-chemical and organoleptic analysis of the wines obtained within each geo-pedological sequence.

The quality gain of the wines is due to their organoleptic value, alcoholic proof and sugar.

The highest alcoholic potential (13.8% alcohol/volume) was recorded in the case of the Merlot variety (high quality superior red wine), corresponding to a maximum level of the variety. The Cabernet Sauvignon variety demonstrated an alcoholic potential of 13.0% /volume). Alcohol (figure 2). The Cabernet Sauvignon wines are difficult to label, since the wine from UNTB 2 has a superior physical-chemical composition and the wine from UNTB 9 has a better organoleptic value. Overall, the wine from UNTB 9 has surpassed the qualitative level of the wine from UNTB 6 by 9%.

The values regarding the content of anthocyans (figure 3) have oscillated between 299 mg/l in the Cabernet Sauvignon variety (high content of poly-phenols – D_{280}=67), 291 mg/l in the Grand Burgund variety and 173 mg/l in the

Merlot variety (the latter had an IC/D_{280} ratio with a super-unitary value of 1.37, favorable to a good evolution under baric pressure).

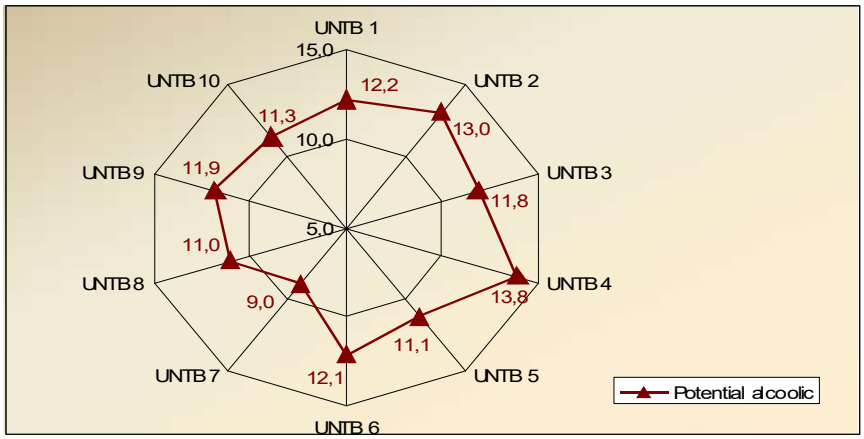

Fig. 2 – Impact of UNTB on the alcoholic potential of the obtained wines

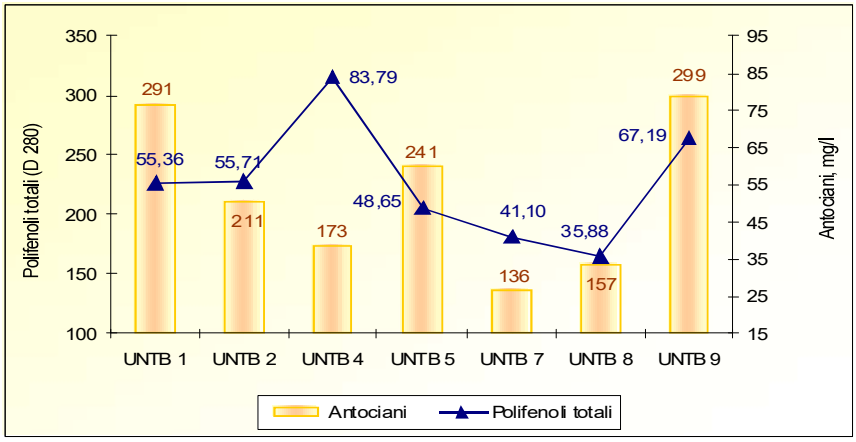

Fig. 3 – Impact of UNTB on the content of anthocyans and total poly-phenols

The tannin content was higher in the Merlot variety (3.866 g/l), Cabernet Sauvignon (2.207 g/l – UNTB 9 and 1.395 g/l – UNTB 2) and lower in the Grand Burgund variety – UNTB 8, 0.365 g/l respectively (figure 4).

Worthy to note that the obtained red wines can be labeled in the DCO-GL (Designation of Controlled Origin – Gathered Late) since they have showed values of the non-reducer extract between 29.36 g/l in Merlot and 26.28 g/l in the Cabernet Sauvignon variety (figure 5).

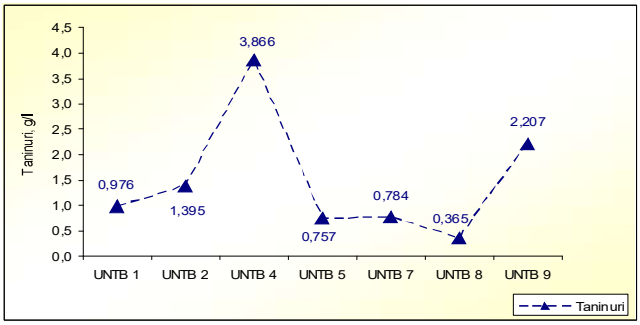

Fig. 4 – Impact of UNTB on the tannin content of the obtained wines

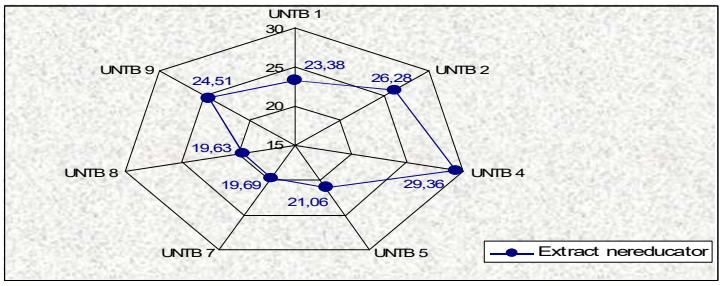

Fig. 5 – Impact of UNTB on the non-reducer extract content of the obtained wines

CONCLUSIONS

By the optimum exploitation of the natural potential (eco-pedoclimatic) of the various wine-growing areas from the Valea Călugărească vine centre, the production of high quality vine-wine products is anticipated, with a high competitive potential on the internal and external market.

By the correct zoning of the wine-growing and parent stock soils in the territory, the natural resources of the vine centre are capitalized in optimum conditions, fact which contributes to the preservation of the wine-growing land fund and the regional protection of the wine-growing ecosystem.

The researches conducted have demonstrated that the dependence of grapes and wine quality on the genetic, ecologic and technologic factors which condition it, is particularly complex and variable, taking into account that quality is not only assimilated with the sugar content of grapes, with the alcoholic proof of the wine respectively, but also with other compounds of grapes and wines which directly contribute in defining the notion of quality.

The management of the vine-wine products with designation of origin will ensure a rational exploitation of the wine-growing areas according to the sustainable agriculture principles.