ADJUSTMENT OF THE VITICULTURAL ASSORTMENT TO THE CLIMATIC RESTRAINTS FROM SEVERAL VITICULTURAL AREAS OF OLTENIA

ADAPTAREA SORTIMENTULUI VITICOL LA CONSTRÂNGERILE CLIMATICE DIN DIFERITE AREALE VITICOLE ALE OLTENIEI

CICHI Daniela Doloris[1], COSTEA D.C.[1], OLTEANU I.[1], POPA Camelia[2], GIUGEA N.[1], MARACINEANU L.C.[1], CICHI M.[1]
[1]University of Craiova, Romania
[2]I.N.C.D.B.H.Stefanesti Arges, Romania

Abstract. *The evaluation of the impact of climatic changes on the management of viticultural resources and on viticultural areas at the level of worldwide geo-viticulture represents an objective of latest interest in the research field (Cotea V.V. şi colab., 2008; Dejeu L. and coll., 2008; Jones Gregory V., 2007). In this context are also to be noted our observations presented in this paper, which have been focused on the followings: the multicriterial evaluation of the pedoclimatic opportunities of viticultural areas as compared to the ecological, bioproductive and quality requirements of grapevine; the behaviour evaluation of several both cultivated and recent new varieties, in what concerns the way they express their biological, quantitative and qualitative potential, as result of the global warming, with the purpose of identifying the most well-adjusted genotypes, of providing a durable use and management of resources available at viticultural ecosystem level, as alternative for a durable and high quality viticulture.*

Key words: climatic changes, viticultural areas, global warming, grapevine

Rezumat. Evaluarea impactului modificărilor climatice asupra gestiunii resurselor viticole şi asupra arealelor viticole la nivelul geoviticulturii mondiale, constituie obiective de mare actualitate ale cercetării în domeniu (Cotea V.V. şi colab., 2008; Dejeu L. şi colab., 2008; Jones Gregory V., 2007). In acest context se înscriu şi studiile şi observaţiile realizate de noi în prezenta lucrare, care au vizat: evaluarea multicriterială a disponibilităţilor pedoclimatice ale arealelor viticole în raport cu exigenţele ecologice, bioproductive şi calitative ale viţei de vie; evaluarea comportării diferitelor soiuri aflate în cultură dar şi a unor soiuri noi, recent introduse în cultură, sub aspectul modului în care acestea îşi exprimă potenţialul biologic, cantitativ şi calitativ, ca efect al încălzirii climatice globale, în vederea evidenţierii celor mai bine adaptate genotipuri, a utilizării şi gestionării durabile a resurselor disponibile la nivelul ecosistemului viticol, alternativă pentru o viticultură durabilă, de calitate.

Cuvinte cheie: schimbări climatice, zone viticole, încălzire globală, struguri

INTRODUCTION

Present viticulture, characterized by a strong specialization of the wine-growing district production, is the result of the complex, settled relations, of the different viticultural genetic resources with pedoclimatic abilities of the different viticultural areas, of the assortments adjustment of the grafting biosystem, also of the viticulture and oenology techniques.

The climatic changes observed in the late years, more or less casual, can disturb the homogeneity of the conditions in viticultural biocenosis, with unforeseeable repercussions on the quality and quantity of the wine production.

MATERIAL AND METHOD

The evaluation of the climatic advantages has been realized as a synthesis of many climatic factors having impact on bioproductive behaviour and quality of vineyard, studying the normal conditions, the deficit or the excesses of the recorded values.

In this purpose, there had been processed and examinated the climatic data on several years, from the angle of certain general climatic indicators (unicriterial), also from some synthetically climatic indicators (multicriterial) specific to viticulture.

For studying and appreciating the impact of this multicriterial values on the evolution of some phenological descriptors (full ripening) or technological (quality potential) had been taken in view either ancient grapevine varieties, that existed in the cultivation (Muscat Perla Csaba, Victoria, Chasselas doré, Hamburg Muscat, Afuz Ali), or recently inserted varieties as Auriu de Ştefăneşti, Augusta (grapevine varieties that are recommended to consume as fresh fruits); Fetească albă, Fetească regală, Riesling italian, Muscat Ottonel, Tămâioasă românească (grapevine varieties of white flavoured wines); Fetească neagră, Cabernet Sauvignon, Merlot, Băbească neagră, Haiduc and Pandur (varieties of grapes for red wines), cultivated in Dealurile Craiovei Vineyard and wine-growing district Tâmbureşti (Sadova Corabia Vineyard).

RESULTS AND DISCUSSIONS

The extension of vine culture or the introduction in a certain area of some new grapevine varieties requires the assessment of ecological advantages for the assigned space in this purpose. In this way, it points out the factors that are optimum or restrictive, it lends a certain direction of production for the investigated wine centre or those sorts that are the most adapted to the climatic environment can be choosed.

The results of the climatological study from this thesis referees to the period of time 1961-2008, period long enough to allow us, on the one side, a interannual fluctuation from the climatic point of view, and on the other, a extensive succession pointing to the qualitative potential (accumulation of sugars, phenolic ripening) of the studied grapevine varieties.

In the purpose of a broader estimation of the climatic resources from the perspective of the viticulture climate from with the studied areas, we used a series of index with synthetic character (tables 1 and 2), which integrates the combined action of two or three climatic factors. This index allows the characterization of

viticultural ecosystem under different aspects of viticultural interest as: the thermic potential for the growth and fruit-bearing of the vine, the area potential for the cultivation of the distinct precocity sorts of vine, respectively the ripening potential of the grapes.

The complex synthetic analysis of the temporal evolution of this climatic index (table1) permits us to confirm a clear tendency of growth in the heliothermic and respectively, diminution of hydric resources.

In these conditions we found that the moderate hydric deficit had positive effects on the quality of red wine grapes, because it causes the accumulation of a grater quantity of antocians; due to the strong hydric deficit, the content of antocians is diminished in the inhibition process of biosynthesis (Costea D.C. and Coll., 2008).

As for the variation of acid value due to less favourable moisture content had been noticed more raised values and a lessen amplitude of the variation of values in the case of grape sorts for red quality wines by comparison with the sorts for white quality wines (tables 4 and 5).

The criterion of the content accumulation potential in sugars at full ripening had been restrained as a basis reference for the viticultural potentialities of studied areas. In this approach had been considered the different agro meteorological determiners, among them the Huglin index, after that we passed to statistic analysis, using the multiple line regression to estimate the value of sugars content.

Table 1

The evolution in time of certain climatic index of viticultural interest in some of Oltenia vineyards

Period	T°C annual	Σ Ta°C	Σ Tu°C	Real insolation (hours)	Total Precip. 01.04 – 30.09 (mm)	Total annual Precip. (mm)	Ibcv index	Iaoe index
Vineyard Banu Mărăcine								
1961-1970	10,71	3403	1649	1574	-	-	10,3	-
1972-1981	10,28	3289	1588	1551	-	-	7,5	
1991-2000	10,9	3356	1635	1606	323	545	9,71	4956
2000-2008	11,39	3404	1671	1595	358	463	8,55	4883
Vineyard Târnăvești								
2000-2008	12,6	3630	1937	1610	300,9	407	8,62	4741

The dynamics of grape ripening in some sorts of vine cultivated in the two viticultural areas from Oltenia, (directed on semitall stems; 1,2 x 2,2 m spaced out when planted, loaded at 50 buds per vine) allowed to establish the heliothermic exigencies in comparison with Huglin IH heliothermic index (table 3).

Table 2

Integrating some viticultural areas from Oltenia in multicriterial classifications of the climates (CCM)

Vineyard	Wine-growing district	IS index	Huglin index (IH)	IF index
Dealurile Craiovei	Banu Mărăcine	IS_1	IH_4	IF_4
	Brădeşti	IS_1	IH_4	IF_3
	Brabova	IS_1	IH_4	IF_3
Sadova-Corabia	Tâmbureşti	IS_1	IH_4	IF_3

After the synthetic analysis of the results acquired from the Banu Mărăcine vineyard had been noticed that, to achieve an average content of sugars in the unfermented wine about 180-200 g/l Cabernet Sauvignon sort requires the recording of 1894-2070 units, value that had been taken over by IH; between accumulation potential of sugars in must (of grapes) and the Huglin index had been established significant positive correlations (Cichi Daniela and coll., 2008).

Table 3

The exigency of some grapevine varieties towards IH, in achieving sugar content in unfermented wine with a value of 160-170 g/l for consumption grapes and 180-200 g/l (Banu Mărăcine and Tâmbureşti vineyards)

Huglin index (IH)	**Grapevine varieties**
1530-1610	Augusta, Auriu de Ştefăneşti, Victoria, Chasselas doré
1670-1740	Muscat de Hamburg, Muscat Ottonel, Fetească albă, Fetească neagră, Merlot, Pinot noir
1752-1800	Fetească regală, Tămâioasă românească, Riesling italian, Sauvignon
2030 - 2200	Băbească neagră, Haiduc, Pandur, Cabernet Sauvignon
2040-2250	Afuz Ali

After the synthetic analysis of the values taken by the recorded night cooling indicator (IF) we noted that the studied areas integrated according to medium values registered and by the multicriterial classification of the climates (MCC) in world-wide geoviticulture for the climate type with very cold nights IF4 and cool nights IF3 (table 2).This demonstrates that these areas are provided with conditions of night temperature and amplitudes of temperature day-night during the ripening of grapes, fact that provides the accumulation and preservation of a large quantity of antocians into the grape grain' skin.

Comparing the qualitative levels of the production for the two branches of grapevine varieties (white and red) we notice that each varieties operates with the complex influences of the climate, expressing in a specific way the quality potential, more accentuated oscillation amplitudes are obvious with red grapevines varieties (tables 4-5).

Table 4

The main elements of qualitative potential of the grapevine varieties for white wines in harvest (1991-2008)

Grapevine varieties	Sugars (g/l)	Total acidity (g/l H_2SO_4)
Riesling italian	180,5 - 220	3,48 - 5,2
	195,3	4,4
Fetească albă	187 - 225	3,62 - 5,25
	205	4,6
Fetească regală	179 - 217	3,94 - 6,00
	197	4,75
Tămâioasă românească	187 – 229	4,08 - 5,27
	207	4,7
Muscat Ottonel	178 - 224	2,62 - 3,55
	206,3	3,16

Table 5

The main elements of qualitative potential of the grapevine varieties for red wines in harvest (1991-2008)

Vineyard	Grapevine varieties	Sugars (g/l)	Total acidity (g/l H_2SO_4)	Antocians (mg / kg)
Dealurile Craiovei – Banu Mărăcine	Cabernet Sauvignon	189 - 223	4,5 - 5,88	1132 - 1242
		209	4,8	1176
	Merlot	181 - 235	4,0 - 5,37	997 - 1104
		214	4,32	1029
	Fetească neagră	183 - 239	4,01 - 5,54	991 - 1155
		221	4,47	1051
	Pinot noir	204 – 241	3,52 - 5,12	602 - 736
		227	4,61	709
Podgoria Sadova-Corabia/ Tâmbureşti	Merlot	154 - 189	3,5 - 4,86	896 - 925
		178	4,5	908
	Băbească neagră	169 - 185	4,93 - 5,2	597 - 650
		174	5,17	603
	Haiduc	173 - 195	4,19 - 5,0	600 - 680
		184	4,47	627
	Pandur	167 – 190	4,22 - 5,36	612 - 691
		181	4,61	634

CONCLUSIONS

According to the new directions in reorganization of the zone division in winemaking at worldwide level, in the classification system of worldwide climates, in comparison with the thermic resources, the studied areas are integrated in the climate classes IS1IH4IF4 and IS1IH4IF3. This provides great specialization and reorganization possibilities of the wine production, combining

the heliothermic quantum in cultivating sorts of grapes from the entire Rumanian varieties.

The climatic conditions, that characterize the studied viticultural ecosystems, may express an atypical character, respectively, excess from the heliothermic point of view and a deficit from the precipitations regime point of view.

The critical character of the hydric regime in the south of Oltenia represents the main restriction towards the extension in cultivating some sorts of vine. For this reason the investigations considering the varieties adaptation and new reorganizations in the use of strong mother plants.

The continuation and the extension of the profound studies on the knowledge of vulnerability in different grapevine varieties because of the climatic conditions, also on the adaptation possibilities of these varieties, will allow to estimate the impact which these changes can bring to the vine, on the one hand, but also on the possibility to anticipate on the viticultural potential of the different areas in certain predictable climatic conditions, on the other hand.

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