THE SPECIFICITY OF THE AREA DOC DEALU MARE-VALEA CĂLUGĂREASCĂ FOR THERMAL NECESSARY OF VARIETIES FOR RED WINES

SPECIFICITATEA AREALULUI DOC DEALU MARE-VALEA CĂLUGĂREASCĂ PRIVIND NECESARUL TERMIC AL SOIURILOR PENTRU VINURI ROŞII

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Abstract. *The temperature exerts a significant influence on the development of vine and the grapes ripening. The thermal necessary of varieties is an important element which permits the evaluation of area at the level of potentiating wine varieties, but also forecasting based on mathematical models differentiated on varieties harvest date. The temperature evaluation, as part of viticultural climate, is based on parameters and temperature indicators. The objective of this study is to define the thermal necessary of varieties for red wines of the assortment Dealu Mare-Valea Calugareasca viticultural area and shape the grapes ripening in the heat-sugar concentration system resource in the grapes. The assortment studied is the following: Burgund mare, Cabernet Sauvignon, Feteasca neagra, Merlot and Pinot noir. The period of the study was between 1992 and 1996, and the validation of the model was achieved in 2012. Analyses of the correlation between temperature indicator and concentration of sugars in the grapes has shown that Huglin index had the highest correlation. It presented specific values when the grapes had the concentration of sugars of 180 g/l as follows: 1784 at Burgund mare, 1871 at Cabernet Sauvignon, 1685 at Feteasca neagra, 1780 at Merlot and 1675 at Pinot noir. The mathematical model of relationship sugars concentration-Huglin index was linear of the form y = a + bx. Values a and b were specific for each variety.*
Key words: *the thermal neccesary, grape maturity,viticulture climat*

Rezumat. *Temperatura exercită o influenţă semnificativă asupra dezvoltării viţei de vie şi a maturării strugurilor. Necesarul termic al soiurilor este un element important care permite evaluarea la nivel de areal viticol a gradului de potenţare a soiului dar şi prognozare pe baza modelelor matematice a datei de recoltare diferenţiată pe soiuri. Evaluarea temperaturii, ca element a climatului viticol, se face pe baza parametrilor şi a indicatorilor termici. Obiectivul acestui studiu este acela de a defini necesarul termic al soiurilor pentru vinuri roşii din sortimentul arealului viticol cu DOC Dealu Mare-Valea Călugărească şi de a modela maturarea strugurilor în sistemul resurse termice-concentraţie zaharuri în struguri. Sortimentul studiat este următorul: Burgund mare, Cabernet Sauvignon, Fetească neagră, Merlot şi Pinot noir. Perioada de studiu a fost 1992-1996 iar validarea modelului s-a realizat în anul 2012. Analiza corelaţiei dintre indicatorii termici şi concentraţia de zaharuri din struguri a arătat că indicele Huglin a avut cea mai mare corelaţie. El a prezentat valori*

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specifice soiurilor pentru momentul în care strugurii au avut concentraţia de zaharuri de 180 g/l, după cum urmează: 1784 la Burgund mare, 1871 la Cabernet Sauvignon, 1685 la Feteasca neagră, 1780 la Merlot şi 1675 la Pinot noir. Modelul matematic al relaţiei concentraţie zaharuri-Indice Huglin a fost liniar de forma y=a+bx. Valorile a si b au fost specifice fiecărui soi.
Cuvinte cheie: *necesar termic, maturitate struguri, climat viticol*

INTRODUCTION

The thermal necessary of varieties is an important element which permits the evaluation of area at the level of potentiating wine varieties, but also forecasting based on mathematical models differentiated on varieties harvest date.

The temperature exerts a significant influence on the development of vine and the grapes ripening (Coombe, 1987; Watson, 2003). The grapes ripening is typical of the variety and harvest year, the variety reaching maturity at sugar concentrations and at different times. The minimum values of Huglin index for grapes maturity is 1600°C. The literature mentions for grapes maturity at a sugar level between 190 g/l at Cabernet Sauvignon variety and 220 g/l at Merlot variety (Huglin, 1978).

MATERIAL AND METHOD

The study was realized in the period between 1992-1996, in DOC Dealu Mare-Valea Calugareasca viticultural area specialized in the cultivation of black grapes. The analysis was performed on Burgund mare, Cabernet Sauvignon, Feteasca neagra, Merlot and Pinot noir varieties.

Defining the thermal necessary of varieties has been established on the basis of correlation the Huglin index with grape sugar concentration during the period of grapes ripening. We used the information of wine climate and dynamics of the grape maturation from the database of IC-DVV Valea Calugareasca. The thermal necessary of varieties were evaluated on the basis of heliothermal index (HI) proposed by Huglin (1978), calculated from the beginning of bud burst, with the formula:

$$\sum_{M1}^{M2} \frac{[(T-10)+(Tx-10)}{2} * k$$

M1 represents the beginning of bud burst, considered as the moment in which were recorded 3-5 consecutive days with temperature greater than 10°C. M2 is the moment of full maturity of the variety. The variables of the equation include: T = average temperature of the air, Tx = maximum temperature of the air and the length of the day depending on latitude (k) that the conditions in our country, it takes the value of 1.04.

The mathematical model was achieved according to the concentration of sugar by Huglin index during ripening grapes. The information processing was done with the methods of mathematical statistics of XLSTAT program.

RESULTS AND DISCUSSIONS

The primary data of the period 1992-1996 regarding the thermal potential and the grapes maturity are presented in table 1.

Table 1

The evolution of the parameters analyzed in the period of vine vegetation (1992-1996) in DOC Dealu Mare-Valea Calugareasca viticultural area

Year	Date	The parameters analyzed	
		HI	Sugar (g/l)
1992	20.08	1327	99
	25.08	1404	116
	30.08	1503	129
	5.09	1563	143
	10.09	1594	160
	15.09	1637	170
	20.09	1679	181
	25.09	1706	192
	30.09	1753	201
1993	20.08	1651	62
	25.08	1753	90
	30.08	1819	106
	5.09	1872	130
	10.09	1929	149
	15.09	1999	158
	20.09	2058	170
	25.09	2104	181
	30.09	2146	185
	05.10	2160	185
1994	15.08	1364	125
	20.08	1425	139
	25.08	1490	149
	30.08	1558	168
	5.09	1621	174
	10.09	1683	180
	15.09	1755	190
	20.09	1819	197
	25.09	1869	201
1995	15.08	1256	103
	20.08	1322	112
	25.08	1393	125
	30.08	1453	137
	5.09	1489	148
	10.09	1528	157
	15.09	1578	169
	20.09	1605	176
	25.09	1633	186
	30.09	1655	190
	05.10	1661	199
1996	10.08	1262	100
	15.08	1316	124
	20.08	1370	134
	25.08	1424	152
	30.08	1492	160
	5.09	1543	168
	10.09	1569	172
	15.09	1593	182

In DOC Dealu Mare-Valea Calugareasca area the beginning of bud burst was achieved from 1 to 5 April, and veraison was registered during the period 4-13 August, differentiated depending on the variety. Thus, the Burgund mare variety, the beginning of veraison, was registered in average on August 5, with limits of variation between July 29 (1996) and August 11 (1993); the Cabernet Sauvignon the beginning of veraison, was registered on August 13, with the limits of variation between August 6 (1996) and August 18th (1992). Merlot and Pinot noir varieties came into veraison on August 8 and August 7, with limits of variation between July 31 (1996) and August 18 (1993) for Merlot variety and July 30 (1996) and August 16 (1993) in the case of Pinot noir variety. The Feteasca Neagra variety the beginning of veraison occurred on average on August 4, with the limits of variation between August 1 (1996) and August 6 (1995), (Figure 1).

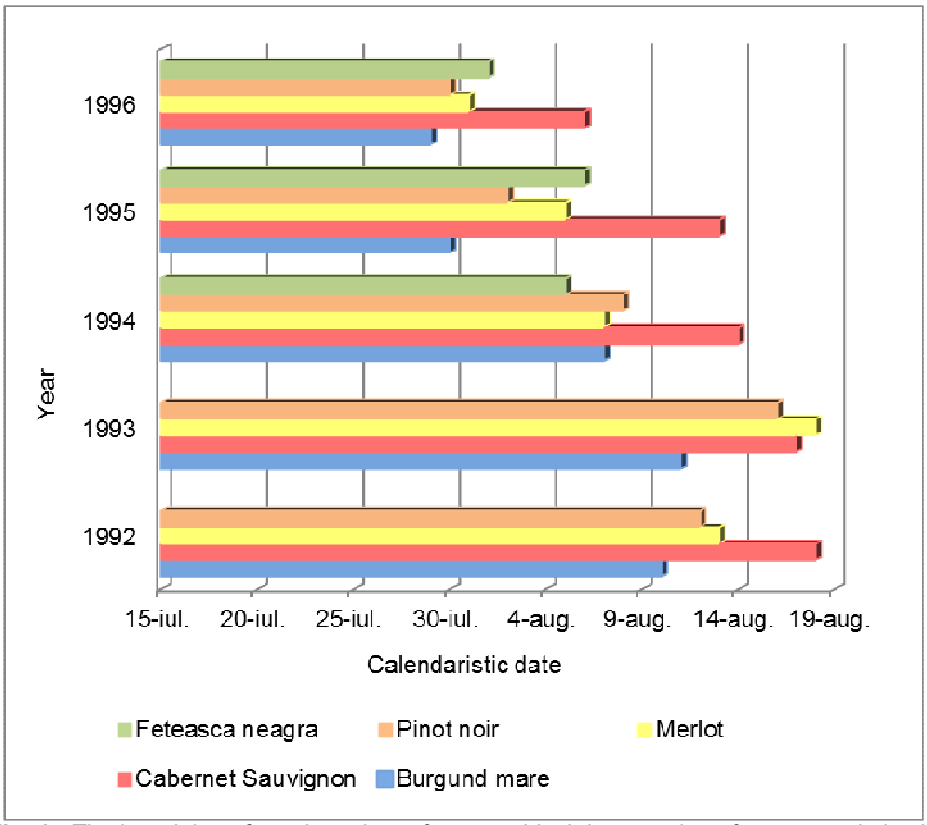

Fig. 1 - The beggining of veraison date of geographical demarcation of grapes varieties in DOC Dealu Mare-Valea Calugareasca viticultural area

The correlation between the sugar concentration and Huglin index to the maturation of the grapes for each variety is shown in Figure 2. Mathematical model for dynamics of ripening varieties in the coordinates of the sugars concentration Huglin index is presented in table 2.

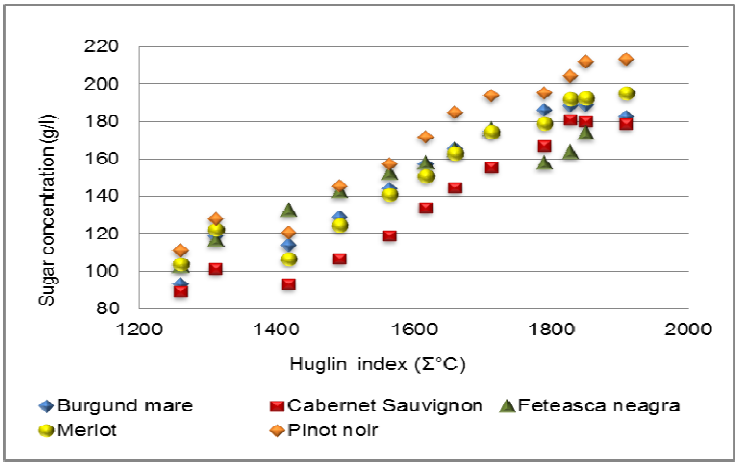

Fig. 2 - Dynamics of sugar concentration

Table 2

The regression equation between Huglin index values and the grapes sugar concentration

Vinifera variety	The equation	The regression coefficient	The significance
Burgund mare	-90.623+0.151*IH	0.97	**
Cabernet Sauvignon	-119.861+0.159*IH	0.97	**
Feteasca neagra	-96.223+0.163*IH	0.98	**
Merlot	-93.189+0.153*IH	0.97	**
Pinot noir	-103.756+0.169*IH	0.98	**

The modeling equation show distinct significant correlations for all analyzed varieties, the regression coefficient showing values between 0.97 in the case of Burgund mare, Cabernet Sauvignon and Merlot varieties and 0.98 for Feteasca neagra and Pinot noir varieties. The rate of increase in the sugar concentration is very high in the Pinot noir (0.169) and Feteasca neagra varieties (0.163) and low to Merlot (0.153) and Burgund mare varieties (0.151).

The thermal necessary of varieties cultivated in DOC Dealu Mare-Valea Calugareasca viticultural area for achieving full maturity result from the reporting sugar concentration to full maturity and Huglin index is presented in table 3.

Table 3

The thermal necessary of varieties depending on sugar concentration at full maturity in DOC Dealu Mare-Valea Calugareasca viticultural area

Vinifera variety	The sugar concentration at full maturity (g/l)	Calculated the thermal necessary
Burgund mare	170	1726
Cabernet Sauvignon	190	1949
Feteasca neagra	210	1879
Merlot	200	1916
Pinot noir	180	1679

The validation of the model for establishing the thermal necessary of varieties for achieving full maturity was made on the 2012 harvest. The validation results are presented in table 4.

Table 4

Comparing the model for establishing thermal necessary with the test for 2012 in DOC Dealu Mare-Valea Calugareasca viticultural area

Vinifera variety	Necessary thermal model	Calculated the thermal necessary
Burgund mare	1726	1693
Cabernet Sauvignon	1949	1913
Feteasca neagra	1879	1852
Merlot	1916	1883
Pinot noir	1679	1636

The relative difference between the model and the test varied between 97% (Pinot noir) and 99% (Feteasca neagra), which shows that the model has a very good reproducibility.

CONCLUSIONS

1. The beginning of bud burst and veraison is typical of the variety and harvest year.

2. The correlation of the sugar concentration and Huglin index of analyzed varieties in the ripening grapes are significant distinct for all varieties, with a value of the coefficient correlation between 0.97 (Burgund mare, Cabernet Sauvignon and Merlot) and 0.98 (Feteasca neagra and Pinot noir).

3. The rate of increase in the sugar concentration is very high, with values of 0.169 (Pinot noir) and 0.163 (Feteasca neagra) and low between 0.153 (Merlot) and 0.151 (Burgund mare).

4. The thermal necessary of varieties in order to achieve full maturity present the specific values: 1679 at Pinot noir, 1726 at Burgund mare, 1879 at Feteasca neagra, 1916 at Merlot and 1949 at Cabernet Sauvignon.

5. The validation of the test made on 2012 harvest shows that the model is replicable.

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