Analele Universităţii din Craiova, seria Agricultură – Montanologie – Cadastru (Annals of the University of Craiova - Agriculture, Montanology, Cadastre Series) Vol. XLX/2020

STUDIES REGARDING THE EVOLUTION OF CLIMATE INDICES IN THE MATURATION PROCESS OF GRAPES IN DRĂGĂȘANI VINEYARD

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Keywords: vineyard, indices, coefficients, climate

ABSTRACT

The Drăgășani vineyard has a favorable climate to ensure the ripening of the grapes as well as the strings necessary for next year's fruit. Being located in the Getic plateau, the vineyard has a temperate Mediterranean climate with oceanic influence. The study was carried out at the Research and Development Station for viticulture and vinification Drăgășani on Olt Hill in 2019. The objective of the study was to monitor the influence of the climatic profile on the physico-chemical parameters in the grape ripening process. For the evaluation of the area, the active and useful balance, the real insolation, the sum of precipitations, the heliothermal index, hydrothermal coefficient, the bioclimatic index of the vine and the oenoclimatic aptitude index during the vegetation and development period were calculated.

INTRODUCTION

Quality assurances of wine products requires in-depth knowledge of the natural (ecological) conditions at the vineyard level, special attention being paid to climate and soil factors (Stoica Felicia et al., 2008).

Due to the geographical position of the territory, the general climate in the Drăgășani vineyard is of a moderate continental temperate type, on the background of which some southern and southwestern Mediterranean influences are felt and accentuated continental in the east and northeast. This general latitudinal climatic ensemble is diversified altitudinally by the alternation of valley corridors and hilly interfluves but also by the different exposure of the slopes.

The climate, appreciated as a factor with very important influence, pleads decisively for the presence and development of the vineyard. Drăgăşani vineyard is characterized by a certain climatic zone, with a decrease of heliothermal resources from south to north and from upstream to downstream.

The research carried out in this sense during 20 years has highlighted the fact that in the Drăgăşani wine-growing area the requirements for the climate of the vine are abundantly fulfilled. Over the years, benefiting from rich climatic resources, the vineyard is favorable for obtaining high class wines (Teodorescu St. et al., 1987; Stoica Felicia, 2005; Băducă C. and colab, 2007; Stoica Felicia, 2008).

The quality of grapes, and implicitly that of wines, is decisively influenced by the temperature regime during the vegetation period, manifested by the rate of accumulation or degradation of some basic constituents that enter the chemical composition of grapes. The accumulation of sugars is much more influenced by temperature than by the number of hours of sunshine. The acidity content of the grapes is dependent on the thermal specificity of the climate, being low in the warm regions and higher in the cool ones. In areas with very hot climates, many aromatic constituents can form, but maintaining many of them in the grain is uncertain and short-lived. Therefore, the

wines from these areas are not only poor in acidity, flat but also lacking in fruitiness, although they are quite alcoholic and extractive (Teodorescu Şt., 1987).

It can be concluded that in areas with temperate climate "cold wine years" correlate with poor quality, at most mediocre products (grapes and wines), and "warm wine years" are considered good years for viticulture, obtaining products with composition and superior organoleptic characteristics (Roubert J., 1968, quoted by Stoica Felicia, 2003).

In terms of rainfall and relative air humidity, due to its strongly developed root system and high absorption capacity that allows it to explore a large mass of soil in search of water and food, the vine has a higher resistance to drought. than other crops. However, it is limited.

The lower precipitation limit for the cultivation of vines without irrigation is 400 mm of annual precipitation. The upper limit for normal cultivation is 800 mm and the optimal amount is 600-700 mm (Olteanu I., 2000) of which 250-400 mm during the growing season. The amount of water exceeding 250 mm is considered excess precipitation during the vegetation period (1.IV-30.IX) (Teodorescu Şt. Et al., 1987).

The relative humidity of the air is considered optimal when it has values between 70-80%.

In terms of light regime, the vine is a plant with high demands on light, being par excellence a heliophilous plant. Light is therefore one of the most important climatic factors for its production and quality.

Of all the cultivated plants, the vine makes the best use of the flow of light energy coming from the Sun and that is why it is considered that grapes are "concentrated sun" and wine "sun in glass" (Martin T., 1968).

Within the same hemisphere, light and temperature decrease from the Equator to the Poly. Research undertaken in this regard has shown that the aromas and proportions of carbohydrates in grapes decrease in the same order, from the Equator to the Poly and the acidity is reversed, increasing from the Equator to the Poly (Teodorescu Şt., 1970).

Viticultural science and practice have established other aspects of the relationship between light and viticultural production. It has been established that intense and long-lasting light determines the prolongation of the vegetation period and delays the maturation of the wood, and insufficient light determines the reduction of the photosynthesis process, the weakening of the stumps, their sensitization to the attack of diseases.

MATERIAL AND METHOD

According to the methodology adopted in our country, the study was carried out at the Research and Development Station for viticulture and vinification Drăgășani on Deaul Olt in 2019 compared to 2005-2013 and a series of coefficients and indices for quantifying meteorological data were investigated. registered at the Drăgășani Weather Station, frequently used in viticultural climatology. For the maturation process, the dynamics of the ripening process for the Tămâioasă Românească variety in 2019 was performed.

In order to assess the thermal resources, the useful and active balance will be calculated, as well as the determination of the real insolation, and the hydric resources will be evaluated by means of the sum of the annual precipitations from the vegetation period.

The calculation formulas are as follows:

Active thermal balance - $\Sigma\ t^0a$ - the sum of average daily temperatures higher than 10^0C (during the growing season)

Useful thermal balance - $\Sigma\ t^0u$ - the sum of the differences between the average daily temperatures higher than 10^0C and the biological threshold of 10^0C

Real insolation - Ir = $\sum$ effective hours of sunshine, from sunrise to sunset

Amount of precipitation - $\sum$ P - sum of precipitation (l / m^2)

Heliothermal index - Ihr = $\sum t_u^0 \times \sum i_r \times 10^{-6}$, where

Σ t^0u - useful thermal balance (^{0}C)
∑ir = sum of hours of sunshine during the growing season

Hydrothermal coefficient - C.h. = $\frac{\sum P}{\sum t_a^o} x10$, where

Σ t^0a - active thermal balance (^{0}C)
∑ P - sum of precipitation during the vegetation period (1.04 - 30.09)

Ternary indicators used in the most complete and complex evaluation of the viticultural area in the analyzed period were the bioclimatic index of the vine (elaborated by Constantinescu Gh. Et al., In 1964) and the oenoclimatic aptitude index (elaborated by Teodorescu Şt. Et al. , in 1977).

The bioclimatic index of the vine - $\text{I.b.c.v.} = \frac{\sum \text{Irx} \sum \text{ta}}{\sum \text{PxNzvx10}}$, where:

Σir - real insolation
Σ t^0a - active thermal balance
ΣP - the amount of precipitation during the vegetation period (1.04 - 30.09)
N.z.v. - number of days of vegetation (195)

Oenoclimatic aptitude index - I.a.o. = Σt^oa + Σir - (ΣP - 250),, where:
Σ t^0a - active thermal balance;
Σir - real insolation;
ΣP - the sum of precipitation during the vegetation period.

Analytical balance for the weight of 100 grains, the Zeiss portable refractometer for the relative sugar content (g / l) and the determination of acidity by titration with 1N NaOH were used in the determinations performed for the dynamics of grape ripening.

REZULTS AND DISCUSSIONS

The thermal balance plays an important role because the quality of the grapes depends directly on the amount of heat.

Table 1 shows the values calculated for the active heat balance, the useful heat balance, the real insolation, the amount of precipitation.

Table 1

The values of thermal and useful balances, insolation and the amount of precipitation during the vegetation period-wine year 2019

YEAR	2019					
MONTH	April	May	June	July	August	September
Active thermal balance	264	483,6	660	699,1	772,6	570,7
Useful thermal balance	53,5	206,6	360	399,1	462,6	298,2
Real insolation	149,7	247,8	321,2	330,4	346,4	269,4
The sum of precipitation	42,6	88,8	207,6	50,2	3,2	42,3

It is observed that in August 772.6 ° C is recorded and in September 570.7 ° C for the active balance.

The average value for the active thermal balance was in the analyzed period of 3398,650C (the minimum value being registered in 1988, with 3115.20C, and the maximum, of 3759.20C, in 2000, one of the warmest of the interval) .

The average value of the useful thermal balance was 1568,650C (the lowest value was 1285.20C in 1988, and the highest was 1929.20C in 2000).

The values of these thermal balances highlight the richness of the thermal resources of the Drăgăşani vineyard, which is the objective of the research, its special favorability for obtaining high-quality wines, both aromatic and red.

Due to climate change, Figure 1 shows a change in the amount of precipitation, if in 2005 the amount of precipitation is 812.5 l / m² reaching its

highest level compared to 2006 when it drops to 532.9 l / m,9, and compared to 2007-2011 there is a decrease (the lowest value of 201.6 l / m² in 2011).

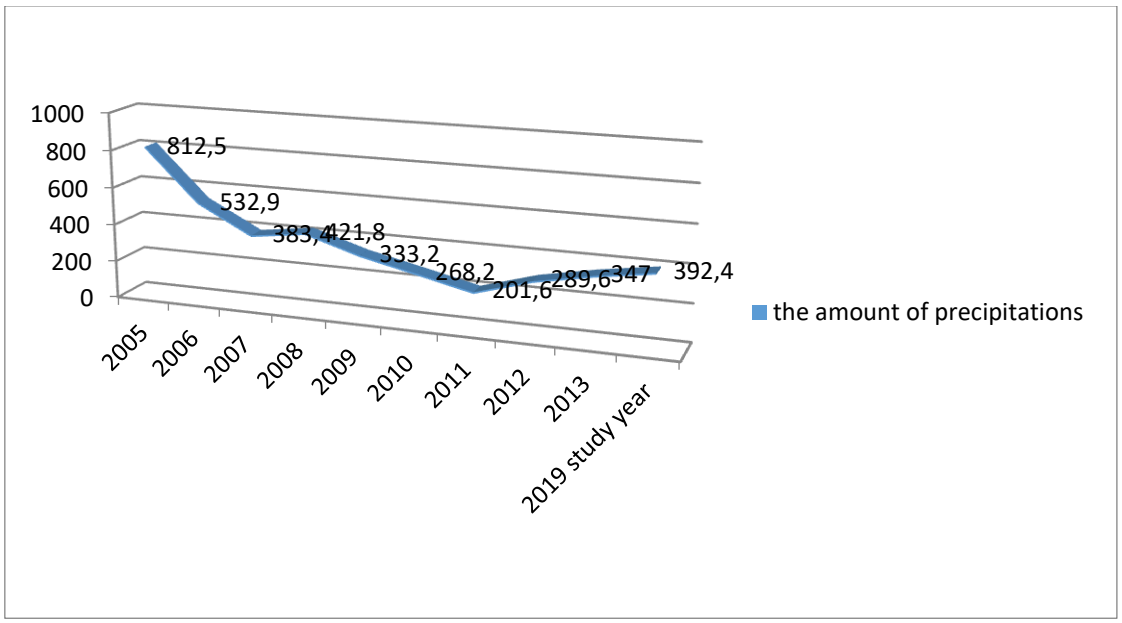

Fig. 1 The comparative evolution of the amount of precipitations in the vegetation period of the study year 2019 and the years 2005-2013.

In the study year there is an amount of 392.4 l / m² increasing compared to 2013 when the value reaches 347 l / m².

The climatic indices regarding the climatic characteristics from the Drăgăşani vineyard are presented in table 2

The data presented in the table eloquently express the particularly favorable degree of the Drăgăşani vineyard for the cultivation of vines. The richness of heliothermal resources is a necessary condition for the biosynthesis of aromatic compounds, but also of phenolic compounds (anthocyanins) being particularly favorable for obtaining aromatic and high brand red wines**.**

Table 2

Climatic indices specific to Drăgăşani vineyard during the vegetation period of the 2019 wine year

YEAR	2019					
MONTH	Aprilie	Mai	Iunie	Iulie	August	Septembrie
Heliothermal index	0,008	0,051	0,056	0,132	0,160	0,080
Hydrothermal coefficient	1,614	1,836	3,145	4,726	0,041	0,741
The bioclimatic index of the vine	0,476	0,692	0,442	2,359	4,288	1,864
Oenoclimatic aptitude index oenoclimatice	621,1	892,6	973,6	1229,3	1365,8	1047,8

The data in the table show very good values of all indices. The heliothermal index registers a 20-year average of 1.61 and for the years of

experimentation (1996-2001) the average is 2.15. The hydrothermal coefficient had a value of 1.14 during the vegetation period (average of 6 years) and the bioclimatic index of the vine registers values of 7.03 in the period 1996-2001 and the multiannual average (20 years) is 8.17 .

However, the most important synthesis index is the oenoclimatic aptitude index. As can be seen in Table 2.4. Drăgăşani vineyard falls into the group of favorability for obtaining high class white and red wines, exceeding the threshold of 4600, necessary for this group.

Figures 2 and 3 show the dynamics of grape ripening which is achieved by determining every 5 days, after the grapes enter the harvest phase, the following parameters: mass of 100 berries, sugar content and acidity content.

During the ripening period analyzed for the Tămâioasă Românească 104 variety, in 2019 it was observed that the grapes increased their volume reaching maturity (having required the amount of precipitation in the first week of September being 21.1 mm) the weight of 100 grains at harvest reaching 230g. The accumulation of sugar in the grains is done gradually depending on the daily temperature, and the optimal time for harvesting is when the accumulation of sugars reaches 224.5g / l.

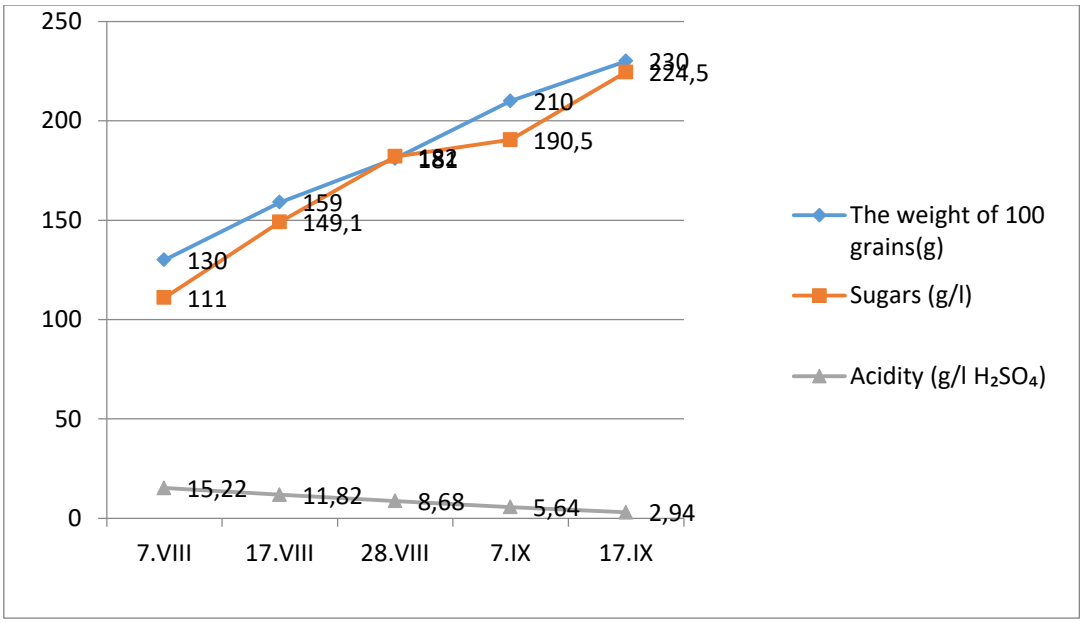

Fig.2 The baking process in 2019 for the Tămâioasă Românească 104 - Drăgășani variety

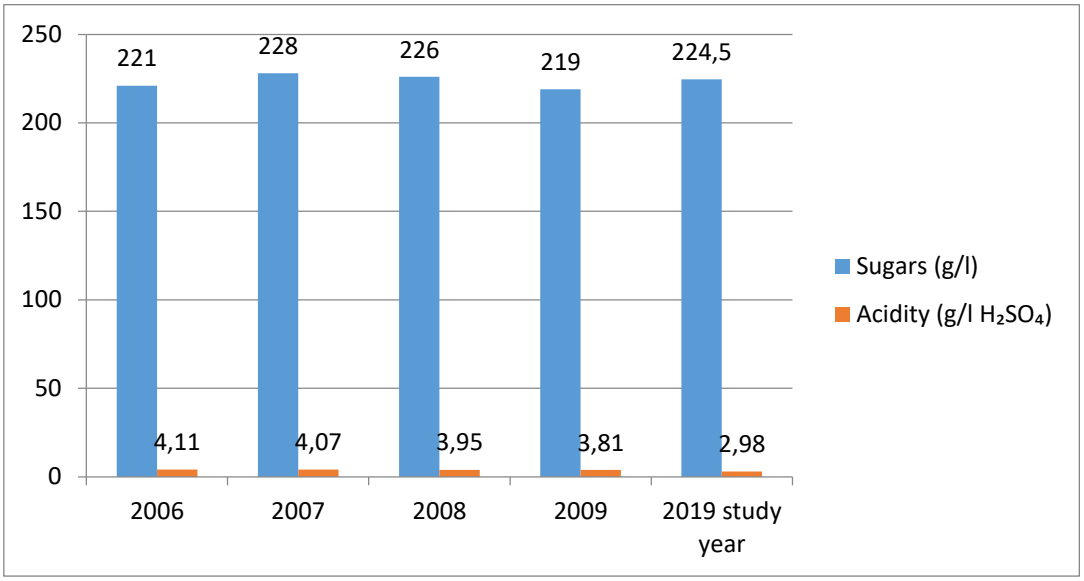

Fig.3 The evolution of the main quality parameters during the maturation of the grapesTămâioasă Românească 104 - Drăgășani

CONCLUSIONS

It can be concluded that the Drăgăşani vineyard benefits from a particularly favorable climate for viticulture, with a richness of heliothermal resources but also with a good precipitation regime. The climatic regime is characterized, as a whole, by a good distribution of precipitations, the rainiest months being the summer ones, especially July when the highest temperatures and the highest duration of the Sun's brightness are registered. During the months of August and September, when the grape ripening process is completed, the vineyard benefits from more heat and light, in parallel with a decrease in precipitation.

The data analyzed during the study period and over time show us that the Drăgășani vineyard is favorable for the cultivation and production of vines as planting material in the vineyard nursery within the Drăgășani Research and Development Station for viticulture and vinification

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