CLIMATE EVALUATION OF VITICULTURE IN OLTENIA. CASE STUDY: CETATE - DOLJ

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Abstract

Oltenia is generally characterized by favourable climatic conditions for producing high-quality wines. On a statistical scale, viticulture in Oltenia accounts for approximately 20% of the entire country's viticulture. Corcova, Segarcea, Sâmburești, Drăgășani, Banu Mărăcine, Cetate, or Galicea Mare are just a few of the recognized major viticulture centers known for the quality of their wine production. This paper aims to evaluate the climatic characteristics of the viticulture center in Cetate, based on specific meteorological and climate indicators specific for viticulture in the current period. The climatic data and their interpretation describe the favourability of the climatic conditions for viticulture, the main climatic parameters' trends, and offer the possibility of establishing suitable varieties.

Key words*: viticulture climate, trend, variety*

INTRODUCTION

The assessment of the current climate with impact on vineyards and viticulture centers is not a recent concern. Periodically, the ecological factors that influence the quality and quantity of wine production must be evaluated to capture their evolution and establish the strategy to adapt viticulture to climate changes. For the Oltenia region, one can exemplify this concern through the papers of Buzatu G.D., Maracineanu L.C., 2015, Marinică I., Marinică F.A., 2016, Mărăcineanu L.C. et al., 2020, Popescu R.I., Giugea N., 2020. In other viticulture regions of Romania, we can mention the authors Beleniuc G. et al., 2020, for Dobrogea, or Baciu L.M., Giugea N., 2020, for Transylvania.

MATERIALS AND METHODS

Our approach represents a case study on the viticultural ecosystem in Cetate, aiming to highlight its climatic characteristics. The commune of Cetate is located in the south-western part of Dolj county (Figure 1), close to the border with Bulgaria, at 44°6' north latitude and 23°3' east longitude.

Figure 1. Location of the viticultural center Cetate (processed after revino.ro)

The highlight of the current climatic period (2016 - 2021) was based on the interpretation of recorded meteorological data, through the viticultural or specific meteorological climatic indicators. The climatic data regarding precipitation and

temperature were provided by the Regional Meteorological Center Oltenia.

The consulted specialized literature ensured a constant theoretical support for the characterization of the recorded values. We can thus mention the works of the following authors: Oşlobeanu M. et. al. (1980), Teodorescu Şt. et. al. (2021), Olteanu I. (2000), Olteanu I. et al. (2002), Mărăcineanu L. (2011).

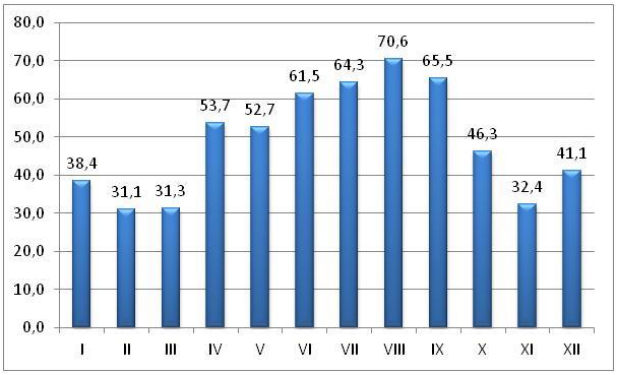

Figure 2. Annual distribution of precipitation in Cetate

RESULTS AND DISCUSSIONS

Climate evaluation

From the analysed average data, the month with the highest precipitation in Cetate is August, with 70.4 l/m^2, unlike Craiova, where June recorded the highest precipitation (Fig. 2). The annual distribution of precipitation indicates some consistency in values from June to September. The annual total sum is 588.9 l/m^2, which indicates favourability for viticulture. Referring to the values recorded during the vegetation period, the average volume is 368.3 l/m^2, favourable for viticulture. Some years recorded precipitation in the vegetation period approaching or exceeding 500 l/m^2, which can be considered excessive (Table 1), given that the annual sum remains favourable for viticulture.

Table 1. Viticulture climatic indicators of the Viticulture Center Cetate

Year	Annual precipitation (l/m^2)	Precipitation during the vegetation period (l/m^2)	Average annual temperature (^{o}C)	Average temperature during the vegetation period (^{o}C)
2016	476.9	348.1	12.49	19.95
2017	702.4	499.6	13.25	21.02
2018	544.3	292.6	12.38	19.60
2019	443.8	212.6	12.86	19.90
2020	809.5	529.6	11.27	18.73
2021	556.6	327.3	12.01	19.48
Average	588.9	368.3	12.38	19.78

Regarding temperature, the average for the period is 12.38°C, and for the vegetation period, it is 19.78°C. Due to this criterion, the viticulture center is favourable for cultivating early and mid-season maturation grape varieties, but such varieties are not grown here, as the focus is on winemaking. Another temperature indicator useful for assessing the viticulture center is the average temperature in the warmest month (July). In Cetate, this indicator has varied between 23.1 and 25.3°C, with an average of 24.28°C during the 2016-2021 period. The interpretation of this indicator suggests a favourable area for obtaining high-quality wines with controlled designation of origin. The thermal balance, active and useful, during the mentioned period, was calculated and is presented in Table 2. The average for the period sums up to 3617.2°C for the active thermal balance and 1795.9°C for the useful thermal balance. Considering these values, it is believed that the climate is favourable for viticulture. The cultivation of grape varieties for table grapes is favoured for those that fall into the early and mid-season maturity groups. However, the

maturation of late varieties remains uncertain.

Table 2. Thermal balance recorded in Cetate during 2016-2021

Year	Active thermal balance (^{0}C)	Useful thermal balance (^{0}C)
2016	3655.8	1825.8
2017	3853.0	2023.0
2018	3596.1	1766.1
2019	3592.9	1818.7
2020	3434.3	1600.6
2021	3571.2	1741.2
Average	3617.2	1795.9

A more complete picture of the oenoclimatic potential of this area can be obtained through the analysis of binary viticultural climate indicators (Table 3).

Table 3. Climatic indicators recorded in Cetate during 2016-2021

Year	Seleaninov hydrothermal coefficient	Martonne aridity index	
		Value	Climate type
2016	1.0	21.2	semihumid
2017	1.3	30.2	humid
2018	0.8	24.3	semihumid
2019	0.6	19.4	mediterranean
2020	1.5	38.1	humid
2021	0.9	25.3	semihumid
Average	1.0	26.4	semihumid

According to these indicators, the viticulture center presents, in terms of average values, a semihumid climate, favourable for carbohydrate accumulation in grapes. The climate characteristic may be due to the proximity of the Danube River. In fact, the climate graph of the period (Figure 3) shows the absence of drought in this area.

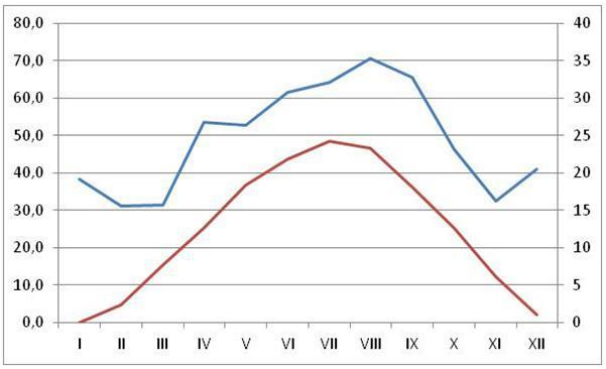

Figure 3. The climate graph of Cetate (2016-2021)

Climate trends in Cetate

We mention from the beginning that the identified trends in the viticulture center Cetate are based on climate data from the 2016-2021 period, which corresponds to a 6-year interval. For more accurate data, it is advisable for the study to refer to a longer time frame, ensuring a more accurate and comprehensive evaluation of the area.

Figure 4 illustrates the trend of recorded precipitation volume in Cetate.

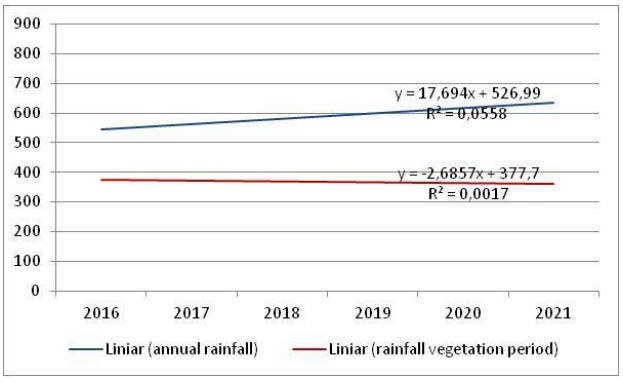

Figure 4. Precipitation trend in Cetate

In the first case, an ascending trend and a very weak positive correlation can be observed, while precipitation during the vegetation period show a slight negative trend of reduction.

Figure 5 illustrates the temperature trend, regarding the average temperature in July, the average annual temperature, and the average temperature during the vegetation period. As shown, all studied parameters show a decreasing trend. The correlation is negative, weak in the first case and moderate in the others.

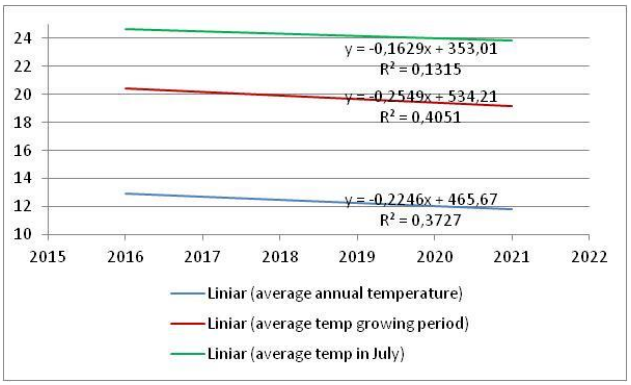

Figure 5. Temperature trend in Cetate

CONCLUSIONS

The Cetate viticulture center has a climate favourable for cultivating wine grape varieties. From the climatic analysis, it resulted that, in the case of cultivating table grape varieties, the ripening is certain for those with early and mid-season maturity and uncertain for those with late maturity.

The trend of precipitation and average annual temperature, evaluated based on the recorded values for 6 years, indicates an increase in precipitation volume and a decrease in temperature. In this case, the obtained climate graph based on the average values of the period does not show the presence of drought in the area.

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