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RESEARCH ON CAPITALIZING ECOLOGICAL CONDITIONS SPECIFIC TO THE PERIURBAN AREA OF THE CITY OF CRAIOVA THROUGH CULTIVATION GRAPES FOR OBTAINING D.O.C. WINES "BANU MĂRĂCINE"

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ABSTRACT

The peri-urban area is located on the border between the urban and the rural environment, it has distinct characteristics that reflect the influences of both types of spaces. The Banu Mărăcine wine area is recognized as part of the wine areas with the widest vocation for obtaining wines with the right to carry the designation of controlled origin (D.O.C). Starting from these considerations, vine growers and especially the specialists from the Banu Mărăcine S.D., try to identify possibilities to maintain at a high and constant qualitative level the specific character of wine production, taking into account the climatic changes that have occurred in the last years. The present paper represents a case study regarding the results of grapevine cultivation in the Banu Mărăcine wine area, located in the peri-urban area of the city of Craiova.

INTRODUCTION

The grapevine (Vitis vinifera L.) is a plant with great adaptability to variable environmental conditions, a fact demonstrated also by the expansion vine culture on all continents (Pastore et al. 2022). However, the impact of the specific climate changes of recent years is affecting the sustainability of the wine industry. The projections regarding climate changes in the coming years predict scenarios that would affect the vine culture seriously (Battaglini et al. 2009, Costea D. 2006, Leeuwen et al. 2019). The climatic and pedological conditions specific to the cultivation area impose the assortment of varieties and the direction of production (Bucur&Dejeu 2017).

The effect of variable climatic conditions in each crop year on the vine has been the subject of studies by numerous researchers (Cichi et al. 2009, Costea et al. 2015, Mărăcineanu et al. 2019, Xenophon et al. 2020).

The ecological offer specific to the cultivation area has a decisive role in determining the assortment of cultivated vine varieties to obtain a quality production (Băbeanu et al 2017, Costea et al 2023, Mărăcineanu et al 2021). The specific ecological characteristics of the wine-growing area and the climatic conditions characteristic of each year of cultivation influence the intensity of the physiological and biochemical processes in the grapevine plant, through them, the accumulation of substances that determine the quality of the grape harvest and give specific results

to the wines obtained in the respective year and area (Căpruciu et al. 2022, Costea et al. 2015, Dobrei et al. 2023). The temperature variation influences the chemical composition of grapes, influences sugars accumulation, acidity the content of anthocyanins in grapeskins and the flavor precursors (Bucur & Dejeu 2017, Căpruciu et al 2023).

Through the research carried out, the scientific community tries to offer new solutions to growers to counteract the negative effect of the variability of climatic conditions by trying to identify the reaction mechanisms of the vine (Burzo et al. 1999, Costea et al. 2010) and the adaptive responses of the vine to abiotic stress (Bataglini et al. 2019, Dobrei et al. 2023) to identify the most suitable technological measures that can be applied (Costea et al, 2017, Dobrei et al 2021).

MATERIAL AND METHODS

Observations and determinations were made at the wine farm at the Banu Mărăcine Didactic Station, located in the demarcated area for the production of wines with Controlled Designation of Origin (DOC) "Banu Mărăcine" from the Dealurile Craiovei wine region.

In accordance with the objectives of the research theme, the observations and determinations focused on: the monitoring of climatic factors for the assessment of the favorability of the study year (2023) and the study of the influence of the ecoclimatic resources characteristic of the study years on the bioproductive parameters in the Chardonnay variety grafted on the Teleki 4 Selection rootstock Oppenheim 4 (SO4), with a planting distance of 2 x 1.2 m, semi-tall growth, single cordon training methods, spur pruning, 21 buds per plant. The vineyard is in its 8th year since planting.

The effect of varied climatic resources on the studied varieties was evaluated by analyzing biological indicators: the viability of growth buds and shoot maturation and bioproductive parameters – the evolution of weight, volume, acidity, and sugar in the berries during ripening. Weather data from data provided by WorldWeather Online.com were used to assess the climatic conditions. Other observations and determinations made are specific to the field of study

RESULTS AND DISCUSSIONS

Evaluation of climate conditions during the experimental period.

The evaluation of the climatic favorability of the crop year was carried out by means of several climatic factors that influence the growth and fruiting of the vine. The meteorological data from the experiment period are presented in figures 1-4, in detail in the upper part of the figures and in the lower part of the figure the variation of the climate factor during the period 2010-2023 can be observed.

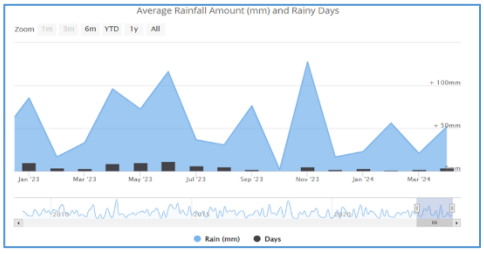

Figure 1- Monthly rainfall amount and rainy days

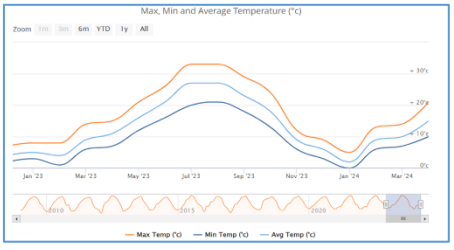

Figure 2- Monthly average of minimum, average and maximum temperatures

Studying the amount of precipitation from the year 2023, it is found a larger amount of precipitation in the first part of the vegetation period (April-June 2023 - figure 1) and precipitation above the multiyear average in September at the end of the period of the ripening period, a fact that was reflected in the slightly lower sugar content at harvest.

Comparing the average temperatures from the year 2023 with the multi-year average, higher values of temperatures are found, especially in the period June - September (fig 2) when the average temperature values were higher with approximately 0,8-1 degrees Celsius.

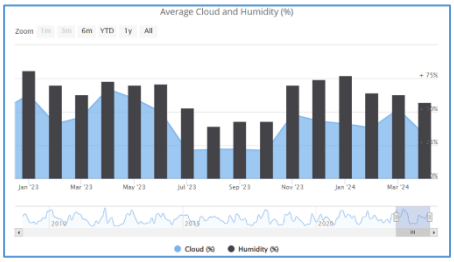

Figure 3 – Hygroscopicity and cloudiness values

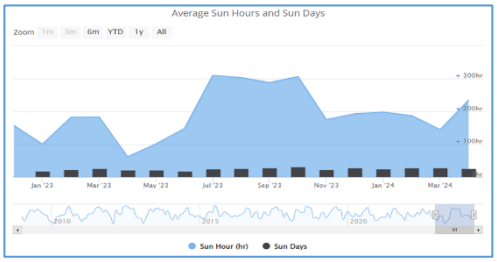

Figure 4 – Sun hours and Sun days

The values of hygroscopicity (fig. 3) and sunshine hours (fig. 4) indicate the favorability of the crop year for the vine, with higher insolation values and lower hygroscopicity being recorded in July and August, a fact that influenced the determined bioproductive indices and was found in the quantity and quality of the production obtained.

Analysis of the biological indicators

The factors that influence the initiation of phenophases during the vegetation period are ecological, genetic, physiological, biochemical and technological.

The evolution of the main phenophases of the variety Chardonnay in 2023, when the study was carried out, is presented in the table. 1

Table 1

The evolution of the main phenophases of the variety Chardonnay

Variety	Budburst	Flowering	Veraison	Fruit maturation and Harvest
Chardonnay	20 IV- 25.IV	2.VI-8.VI	15.VIII-20.VIII	20.IX-25.IX

From the data presented in table 1 it can be observed that the budburst started on April 20 and lasted about 5 days; the flowering started at the beginning of June (2.06.2023) and lasted 5-7 days; the veraison started in the middle of the month August, and the grapes reached full maturity in the last decade of September.

The viability and fertility of the buds

Checking the viability of the buds is an absolutely necessary work before cutting the vine to establish the charge of buds on the plant due to the loss of buds that can occur during the period of low temperatures. The viability and fertility values

of the buds vary depending on the genetic characteristics, the quantity and quality of last year's metabolites, and the level of negative temperatures.

Bud viability and fertility were determined in March, after the danger of severe frost had passed and before cutting. In the year 2023, for the Chardonnay grape variety, the viability of the buds had values of about 85.5% (figure 6), (this value also due to the mild winter) and allowed the vine cuttings to be done without problems.

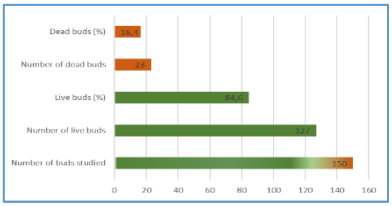

Figure 5. Bud viability

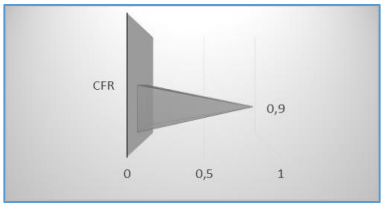

Figure 6. Bud fertility

The relative fertility coefficient represents the value expression of the ratio between the number of inflorescences on the plant and the total number of shoots on the fruit elements of the plant. The relative fertility coefficient had the value of 0.9 (figure 6). The relative fertility coefficient, thus established, helps us to determine the number of buds required for a certain planned production.

Analysis of the bioproductive parameters

Vine plants interact with environmental factors specific to each crop year and respond in the form of morphological, physiological and biochemical reactions that result in quantitative and qualitative changes in the chemical composition observed throughout the plant, but especially in the grapes obtained.

Analyzing the experimental results obtained with the Chardonnay variety, we can observe the influence exerted by the environmental conditions through the results obtained in terms of the growth rate of the grains and the content in sugars and acidity. Figure 7 shows the dynamic evolution of the weight and volume of the berries during ripening (from the beginning of ripening to harvesting).

Figure 7 The dynamic evolution of the weight and volume of the berries during ripening

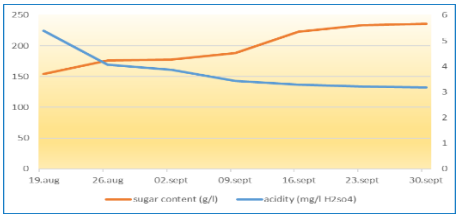

Figure 8 Evolution of sugar content and acidity of berries during maturation

It is observed that the lower amount of precipitation during the vegetation period did not negatively influence the growth and fruiting process, but the precipitation in September had a negative influence on the ripening process, from the point of view of quantitative (fig. 7) and qualitative parameters (fig. 8), the volume and weight of the berry being greater but the amount of accumulated sugars lower.

However, the Chardonnay variety demonstrated a high accumulation potential, the sugar parameter increasing during the maturation period up to a value of 225 g/l under conditions of acidity at harvest of 3,8 g/l (fig 8).

CONCLUSIONS

The cultivation of vines can represent a successful economic activity in the peri-urban area of the municipality of Craiova, given the favorable climatic conditions and the tradition of obtaining quality wine products in the region.

The specific ecosystem of the area where the case study was carried out ensures heliothermic resources which, along with the balanced rainfall regime, create optimal conditions for obtaining quality wine productions, a fact also revealed by the case study carried out on the Chardonnay variety.

The thorough knowledge of the biological, physiological and productive characteristics of the grape variety grown on a certain area characterized by specific environmental conditions, as well as the possibilities of action on the plants, through the cultivation technologies, is an essential condition for obtaining high productions of grapes, qualitatively superior, in conditions of increased economic efficiency;

The diversity of climatic conditions during the research period was found in the variations of the bio indicators studied.

The studied variety interacted with environment conditions, expressing their adaptative potential in a specific way.

The Chardonnay variety taken in the study demonstrated the a good ripening of the wood, a good viability of the buds, and a high accumulation potential of the chemical constituents that indicate the quality.

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