THE FAVORABILITY OF THE VITICOL YEAR 2018 FOR THE CULTURE OF WINE IN THE ECOLOGICAL SYSTEM IN THE MURFATLAR VITICULTURAL AREA

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ABSTRACT

The culture of the vine in an ecological system requires particularly favorable climatic conditions that allow the growth, development and maturation of the grapes under optimal conditions. To do this, the climatic conditions must limit as much as possible the development of diseases and pests. Therefore, the temperature regime and the water regime are prime factors for the favorability of a wine-growing area. Research has shown that the year 2018 was particularly warm but also with a surplus of rainfall, especially during the growing season, which also led to a decrease in the duration of the sun's brightness. Therefore, the year 2018 was more favorable to the ecological system for the white varieties and less favorable for the red varieties.

INTRODUCTION

It is well known that the world’s great wines are produced in regions with an appropriate climate for growing specific grape varieties. Based on the environmental interactions, the viticultural profession has provided a world «zoning», mapping the ecopedological and geographical characteristics of the grape-growing territory in relation to the adaptive response of wine grapes (Morlat, R., 1992). In recent years, several integrated and interdisciplinary studies have been carried out to determine the aptitude of vines for cultivation in different viticultural zones. These studies show the impact of different environmental characteristics such as hydrology, geology, climate and the surrounding ecology, factors defining the singularity of an area in terms of grape production (Falcão L.D. e.a., 2010).

Grape quality varies according to the daily temperature range during the ripening period, because this parameter affects the sugar and anthocyanin composition, as well as the aroma; photosynthesis occurs during the day and at night the photosynthesis products move from the source leaves to the fruit. During grape ripening, cool night temperatures favor the sugar accumulation and restrictnthe vegetative growth (Mori K. e.a., 2007). Meteorological parameters have a crucial influence on grapevine (*Vitis vinifera* L.) production quantity and quality. Most of the commonly used bioclimatic indices are not appropriate to represent intravineyard micrometeorological variability, in particular the subdaily dynamics that are important in grape maturation processes (Matese A. e.a., 2012). Vine phenology and grape ripening are highly dependent on water uptake conditions. Moderate water deficits reduce shoot growth, berry size and yield and enhance fruit ripening and phenolic compound synthesis in the berries. These factors generally enhance grape quality for the production of red table wines (Van Leeuween C. e.a., 2009).

Final berry mass, a major quality factor in wine production, is determined by the integrated effect of biotic and abiotic factors that can also influence berry composition (Triolo Roberta e.a., 2018). Excessive vine vegetative growth in wet, cool climates increases management costs and compromises grape quality (Chou M.-Y., Vanden Heuvel Justine, 2019).

Pedoclimatic conditions affect grape and wine quality. In particular, the relationship between soil and grape quality is at the core of the terroir definition (De Santis Diana e.a., 2017). Grapevine yield and fruit composition largely depend on vine water status, which can be manipulated, especially in semiarid climates, by irrigation strategies and training systems (Mirás-Avalos J. e.a., 2017). Weather conditions have a significant impact on crops, and temperature is one of the main factors that controls plant development. Thermal time models based on temperature have been applied to predict the development of many species. To implement these models, determination of an appropriate base temperature (Tb) is required to characterize the differences among developmental stages and cultivars (Zapata Diana e.a., 2017).

MATERIAL AND METHOD

The favorability of the viticol years for the culture of the vine in ecological system was studied by analyzing the climatic data (temperature, precipitation, insulation) characteristics of the mentioned viticol year. In this respect, for each climatic factor, the data for the viticol year were compared with the multiannual average values. Regarding the temperature, the 3 types of thermal balance (global, active and useful), the average temperature of each month, the minimum and maximum temperatures of each month were analyzed. Regarding its precipitation, the values of each month were analyzed as well the number of days of precipitation of each month on 3 levels: over 0.1, 5 and 10 mm. The insolation was analyzed as the number of hours the sun shines during the vegetation period (April 1 - September 30).

RESULTS AND DISCUSSIONS

The data regarding the thermal regime characteristic of the year 2018 are presented in table 1 and shows that this was a particularly hot year, with an average temperature (14^0C) well above the multiannual average value (11.5^0C). Also, all the 12 months of the year were warmer compared to the multiannual average values of the respective months. The lowest difference was in December, when the average temperature was only 0.30C higher than the multiannual average temperature this month, and the biggest differences were in October (4.4^0C), August (4.3^0C) and July (4.2^0C).

The sum of global temperature degrees represents the sum of daily average temperatures. The multiannual average of this parameter is 4470.6^0C, of which 3422^0C during the growing season (April 1 - September 30), but the year 2018 has far exceeded these values (5160.4^0C, of which 4109^0C during the growing season). The sum of active temperature degrees represents the sum of daily average temperatures greater than 10^0C. And in this parameter, the values of 2018 were much higher than the multiannual average values. Thus, the sum of the active temperature degrees in 2018 was 4706.4^0C compared to a multiannual average of 3801.2^0C in while during the growing season the sum was 3965.1^0C compared to the 3583.5 multiannual average. The sum of the useful temperature degrees represents the sum represents the sum of the differences between the average daily temperature greater than 10ºC and the biological threshold of starting in the vegetation of the vines (10ºC). If the multiannual average was 1747.3ºC of which 1615.6ºC, in the growing season, in 2018 there were 2418.1ºC, of which 2 271.7ºC during the growing season. These very high values characterize a particularly hot viticultural year. Its favorability for the cultivation of vines in the ecological system must be analyzed in correlation with the water regime.

The analysis of the data on the precipitation regime show that the year 2018 was much wetter than the multiannual precipitation average. Thus, compared to an average of 436 mm of annual precipitation, in 2018, 654.8 mm of precipitation fell. The most important aspect, however, is that during the growing season there were 364.3 mm of rainfall, well above the multiannual average (245.7 mm). The months of June and July were particularly rainy. These were the only months of the year that far exceeded 100 mm of rainfall, especially in June (130 mm). In the two months, rainfall was 3 times higher than the multiannual averages. This makes the cultivation of vines in the ecological system very difficult because it greatly increases the risk of disease attack.

To better characterize the precipitation regime of 2018, we also analyzed the number of days with rainfall and the data show that this year there were 111 days with rainfall, of which 39 days had rainfall over 5 mm and only 20 days had rainfall over 10 mm. Curiously, in the two months with excess rainfall, there were only 4 days with rainfall greater than 10 mm. This shows that during these 4 days the rains were particularly abundant.

One of the consequences of the excess rainfall was the decrease of the insolation during the growing season from 1587 hours (multiannual average) to 1247 hours (the value of the year 2018). This greatly reduces the favorability of the viticultural year for the ecological system cultivation of varieties for red wines, which need high insolation values for anthocyanin synthesis. A duration of sunlight during the vegetation period of less than 1250 hours is incompatible with obtaining quality organic red wines.

CONCLUSIONS

The year 2018 was contradictory in terms of the favorability for the cultivation of vine in an ecological system in the Murfatlar viticultural area. On the one hand, it has been an excessively hot year, characterized by temperatures well above the multiannual averages throughout the months of the year, which can be beneficial for organic viticulture under certain conditions. This increase of heat was manifested especially in the summer and autumn months, from July to October, a period that coincides with the process of ripening the grapes, from véraison to harvest.

On the other hand, it was a year of excessive rainfall, but they were not distributed evenly throughout the year. Thus, in January, February and March, rainfall was much higher than the multiannual averages. For example, in March 2018 rainfall fell 71 mm, more than 3 times more than the multiannual average (21.7 mm). The situation was repeated in June and July. In May and August, rainfall was also higher than multiannual values but the differences were much smaller. In contrast, there were also months of precipitation well below the multiannual averages, as were April, September and October.

Thus, in April and October, rainfall was slightly over 5 mm, 6 times less than multiannual averages but in September rainfall was slightly over 4 mm, 10 times less than the multiannual average.

The only climatic element that registered a deficit compared to the multiannual averages was the insulation, which is explained by the prolonged nebula caused by the excess rainfall during the growing season.

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Table 1

The regime of temperatures

Month	Average monthly temperature		The sum of the temperature degrees					
			global		active		useful	
	Multiannual average	2018 year	Multiannual average	2018 year	Multiannual average	2018 year	Multiannual average	2018 year
I	0,5	3,4	4,1	105,5	2,6	10,0	0,0	0,0
II	1,3	3,4	62,6	95,8	14,7	36,0	2,7	6,0
III	4,2	4,8	125,6	147,4	41,3	10,8	9,3	0,8
IV	10,5	13,1	369,7	394,2	219,8	365,6	53,8	95,0
V	16,2	18	513,7	559,4	513,7	559,4	203,7	249,3
VI	20,4	23,9	620,1	719,1	620,1	719,1	328,1	419,2
VII	22,6	26,4	726,3	833,4	726,3	833,4	416,3	528,1
VIII	22,6	26,9	671,0	836,8	671,0	836,8	361,0	526,8
IX	17,6	21,7	521,2	650,8	521,2	650,8	252,7	350,8
X	12,0	16,4	373,1	509,9	311,4	509,9	81,4	197,5
XI	7,2	7,6	228,1	227,8	134,9	174,6	34,9	44,6
XII	2,3	2,6	255,1	80,3	24,2	0,0	3,4	0,0
Year	**11,5**	**14,0**	**4470,6**	**5160,4**	**3801,2**	**4706,4**	**1747,3**	**2418,1**

Table 2

The regime of precipitations and insolation

Month	Precipitations					Insolation (hours)	
	Multiannual average	2018 year	Number of days with rain			Multiannual average	2018 year
			> 0.1 mm	> 5 mm	> 10 mm		
I	31,0	54,0	8	5	2		

II	33,0	92,5	14	7	3		
III	21,7	71,0	13	6	3		
IV	33,5	5,2	2	0	0	160,7	196,8
V	50,2	67,2	7	3	2	261,8	212,6
VI	53,2	130,5	8	6	4	314,5	175,35
VII	35,6	110,8	15	4	4	323,7	196
VIII	31,6	46,4	3	1	1	305,5	280,9
IX	41,6	4,2	9	0	0	221,0	212,7
X	30,2	5,8	5	0	0		
XI	40,4	41	13	4	1		
XII	34,0	26,2	14	3	0		
Year	**436**	**654.8**	**111**	**39**	**20**	**1587.2**	**1274.3**