

INFLUENCE OF CLIMATIC CONDITIONS ON THE QUALITY OF GRAPES AND WINES OBTAINED FROM ALIGOTÉ AND FETEASCĂ REGALĂ VARIETIES CULTIVATED IN IAȘI-COPOU VITICULTURAL CENTER

INFLUENȚA CONDIȚIILOR CLIMATICE ASUPRA CALITĂȚII STRUGURILOR ȘI A VINURILOR DIN SOIURILE ALIGOTÉ ȘI FETEASCĂ REGALĂ CULTIVATE ÎN CENTRUL VITICOL COPOU IAȘI

ZALDEA Gabi¹, NECHITA Ancuta¹, CODREANU Maria¹, DAMIAN Doina¹
e-mail: gabizaldea@yahoo.com

Abstract. *In recent years there have been increasingly frequent extreme weather: frost, prolonged drought, heavy rains during flowering, which have an adverse impact on the vine. Recorded heavy rainfall in May and June of 2013, more than double compared to normal values during flowering and heavy rainfall and a climate cool in September, helped decrease the quantity and quality. This paper presents the values of climatic factors and their impact on the quality of grapes and wines from varieties Aligoté and Fetească regală cultivated in Iasi - Copou viticultural center*

Key words: *climatic conditions, grape, wine*

Rezumat. *În ultimii ani s-au înregistrat tot mai frecvent fenomene climatice extreme: îngheț, secetă prelungită, ploi abundente în perioada înfloritului, care au un impact nefavorabil asupra viței de vie. Precipitațiile abundente înregistrate în lunile mai și iunie din anul 2013, mai mult decât dublu comparativ cu valorile normale, din perioada înfloritului precum și ploile abundente și instalarea unui climat răcoros în luna septembrie, au contribuit la diminuarea producțiilor cantitativ și calitativ. În lucrare sunt prezentate valorile factorilor climatici și impactul acestora asupra calității strugurilor și a vinurilor din soiurile Aligoté și Fetească regală cultivate în centrul viticol Copou Iași*

Cuvinte cheie: *condiții climatice, struguri, vin*

INTRODUCTION

Vineyards in the north-east of Moldova at the northern limit of the culture of the vine are more affected by climate change occurring in the last decades.

Temperatures rising in recent years (average, maximum) in late April and early May led an earlier phenophases vegetation vine and wine appearance of disturbances in ecosystems viticols (Zaldea et.al., 2013).

Also, it was found, in recent years, a trend of forced ripening grapes unwanted repercussions on the quantity and quality of grapes (Vasile et.al., 2010).

¹Station of Research and Development for Winegrowing and Wine Production of Iași, Romania

MATERIAL AND METHOD

To analyze the temperature (average maximum, minimum) and rainfall were used automatic station data recorded by automatic station Agroexpert of SCDVV Iași and from Moldova Regional Meteorological Center.

To assess the aggressiveness of the main pathogens that cause serious damage: mildew (*Plasmopara viticola*), powdery mildew (*Uncinula necator*) and downy mildew (*Botryotinia fuckeliana*) values were calculated on the intensity, frequency and intensity of their attack for each variety grape. The maturation of the grapes was followed in August aiming at: the evolution of the 100 grain weight (g), developments in sugar content (g/L), the evolution of total acidity (g/L tartaric acid). The wines were characterized physico - chemical OIV standards.

RESULTS AND DISCUSSIONS

Climatic conditions during the period 2011 - 2013, different from one year to another, prolonged drought, absolute minimum temperature under the threshold of resistance of grapevine frost, heavy rainfall in a short period had a negative impact on vineyards.

Analysis of climatic elements show that winter 2013 was normal in terms of thermal average air temperature in January was close to normal (-3,3°C to -3,6°C) and in February the average temperature was higher than normal (0,0°C to -1,9°C). No absolute minimum temperature were registered below the vine resistance to frost (table 1).

Table 1

Temperatures of year 2013, compared to the normal

Month	The air temperature, °C				The soil temperature, °C			
	Average		Maxim. abs.	Minim. abs.	Average		Maxim. abs.	Minim. abs.
	Multiannual	2013			Multiannual	2013		
I	-3,6	-3,3	5,3	-14,3	-3,1	-4,2	2,3	-20,5
II	-1,9	0,0	6,6	-6,9	-1,8	-0,5	14,8	-10,0
III	3,3	1,5	17,2	-11,2	3,8	2,4	28,6	-12,2
IV	10,1	12,0	31,0	-0,5	12,3	13,9	45,6	-3,0
V	16,1	18,6	30,4	9,9	20,6	23,0	48,8	8,3
VI	19,4	20,0	32,7	10,1	24,7	24,5	55,6	9,4
VII	21,3	20,5	33,7	10,8	26,4	26,1	60,5	9,1
VIII	20,6	21,2	32,9	11,3	25,2	26,9	58,0	8,9
IX	16,3	14,2	25,6	5,0	17,7	16,0	40,2	2,3
X	10,1	10,7	23,8	-0,1	10,7	11,3	33,5	-3,8
XI	4,1	8,2	22,4	-6,0	3,6	7,9	29,8	-6,2
XII	-0,8	0,4	12,5	-7,8	-1,5	-0,3	14,3	-9,3
yearly	9,6	10,3			11,6	12,3		

Spring has been warmer than normal in April and May there were 1.9 higher average temperatures that 2,5°C to normal. The end of April and early May were recorded maximum air temperatures respectively 31,0°C and 30,4°C which led an earlier phenophases of vegetation vines about two weeks (the budbursting and growth shoots).

In other months, there were values close to the normal temperatures. The

highest temperature was recorded in July and was 60,5°C and 33,7°C air and the soil surface.

Recorded heavy rainfall in May 113.8 mm and June with 174.3 mm, more than double compared to multiannual values during flowering and rainfall and a climate cool in September have adversely affected the quantity and quality grape production, wine default (table 2).

Table 2

Precipitations, the hygroscopicity and insolation in the year 2013

Month	Precipitation, mm		Hygroscopicity, %		Insolation, no. hours	
	multiannual	2013	multiannual	2013	multiannual	2013
I	28,9	43,8	81	88	71,7	71,6
II	27,4	22,8	79	86	72,3	60,2
III	28,1	47,4	72	74	130,0	140,4
IV	40,3	32,5	62	62	171,3	207,9
V	52,5	113,8	62	59	220,9	273,6
VI	75,1	174,3	63	73	264,6	237,2
VII	69,2	57,2	62	66	294,4	282,1
VIII	57,6	41,3	63	61	272,0	279,9
IX	40,8	82,0	66	72	215,4	145,4
X	34,4	0,6	73	78	155,0	126,2
XI	34,6	32,5	78	80	65,6	86,7
XII	28,9	7,9	82	83	55,9	76,3
Yearly	517,8	501,1	70	74	1989,1	1987,5

Specific climatic conditions of year 2013 were favorable development of major pathogens that vine mildew, powdery mildew and the downy mildew of grapes. The conditions for applying six phytosanitary treatments (table 3) studied varieties behaved differently.

Table 3

Phytosanitary treatments carried out the year 2013

Date of treatment	Target organism	The phytoprotection product use	Dose/ha, concentration
10 April	<i>Uncinula necator</i> + <i>Eriophies sp.</i>	Mixture sulfocalcic	12 L, 2%
17 May	<i>Plasmopara viticola</i> + <i>Uncinula necator</i>	Antracol + Kumulus	3,0 kg + 3,0 kg
28 May	<i>Plasmopara viticola</i> + <i>Uncinula necator</i>	Mikal + Topas	3,0 kg + 0,250 L
05 June	<i>Plasmopara viticola</i> + <i>Uncinula necator</i>	Mikal + Topas	3,0 kg + 0,250 L
01 July	<i>Plasmopara viticola</i> + <i>Uncinula necator</i>	Antracol + Kumulus	3,0 kg + 3,0 kg
22 August	<i>Botryotinia fuckeliana</i>	Mythos	3,0 L

To assess the aggressiveness of pathogens mentioned above were calculated values on the intensity, frequency and intensity of their attack for each variety (table 4).

If Aligoté variety manifested mildew attack leaves at a rate of 56.37% and 10.97% intensity determinations performed in phenological stage BBCH 85-87. The grapes observations revealed a frequency of 14.36% and attack intensity of 5.73%.

Observations on the evolution of pathogen *Uncinula necator* reveal a degree of attack of 2.16% (leaves) and 0.65% (grapes). The variety Fetească regală showed behavior similar pathogen attack Aligoté variety.

Table 4

Intensity, frequency and degree of attack of pathogens in vineyards of Iasi

Variety grape	The pathogen	Organs analyzed	Elements determined		
			Intensity %	Frequency %	Degree of attack %
Aligoté	Mildery (<i>Plasmopara viticola</i>)	leaf	10.97	56.37	6.18
		grape	5.73	14.36	0.82
	Powdery mildew (<i>Uncinula necator</i>)	leaf	6.48	33.33	2.16
		grape	4.47	14.66	0.65
	Downy mildew (<i>Botrytis cinerea</i>)	grape	3.00	4.16	0.12
Fetească regală	Mildery (<i>Plasmopara viticola</i>)	grape	14,3	46,44	6,64
		leaf	3,9	42,77	1,6
	Powdery mildew (<i>Uncinula necator</i>)	grape	11.29	25.00	2.82
		leaf	4.64	16.88	0.78
	Downy mildew (<i>Botrytis cinerea</i>)	grape	3.00	1.16	0.03

In the Iasi vineyard, in the same ecosystem and technology, grape production was variable from one variety to another, the most productive proving to be Aligoté 10000 kg/ha (table 5). The variety Fetească regală were obtained small production (6700 kg/ha) and he was strongly affected by drought and frost the previous year.

The harvest quality evaluated by average mass of the grape, the berry, sugar content, acidity of the must and indexes technological, proving the hereditary characteristics of these and modify them under the influence of unfavorable climatic factors.

The average mass of the grape and berry had similar values of the biological potential of the variety, standing out is the large grape varieties for wine grapes Fetească regală 181 g/grapes, and berries that were bigger, with an average mass of 100 berries of 192 g.

Production indices qualitative assessment in sugar content and total acidity of must highlights the different accumulations from one variety to another. It has manifested a higher biological potential accumulation of sugars Fetească regală (202 g/L) compared with Aligoté (180 g/L) that has accumulated in the known potential realized in normal years in terms of climate. Total acidity of the the must was within normal limits with specific values varieties (table 5).

Table 5

The grape production and quality

Variety grape	Production kg/ha	Average mass of the grape, g	Average mass of 100 berries, g	Sugars g/L	Total acidity g/L H ₂ SO ₄	Other comments
Aligoté	10000	145	163	180	7.3	healthy grapes
Feteasca regala	6700	181	192	202	7.2	healthy grapes

Analyzing the interrelation between climatic factors and dynamic the evolution of grape maturation was found that concentrations of sugars were strongly influenced by the thermal factor, the smallest accumulation taking place between 05 - 08.10.2013, following a gradual increase from 10 - 14.08.2013 between 14.08 - 08.30.2013 accumulations were moderate, and the last stage of determination (30.08 - 09.10.2013) they were slow (figure 1).

Both varieties of the must total acidity has evolved descendent from 5.08 until 14/08/2013, remaining constant until 08.30.2013, with a small of decrease tendency until 09/10/2013 (figure 2).

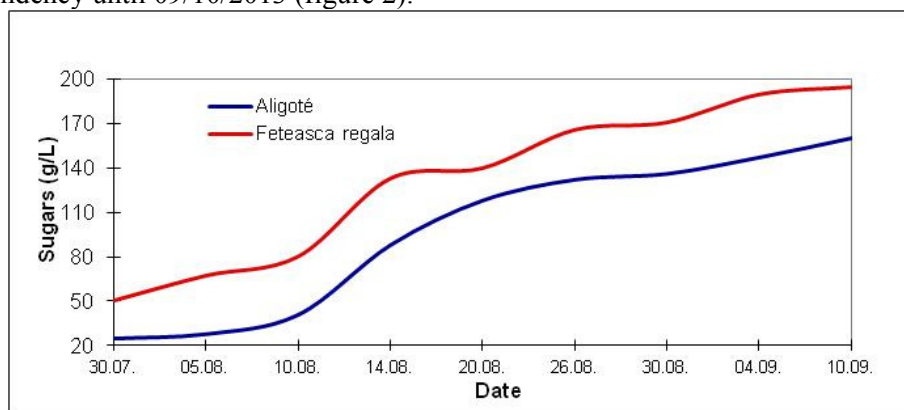


Fig. 1 – The evolution during ripening grape sugars

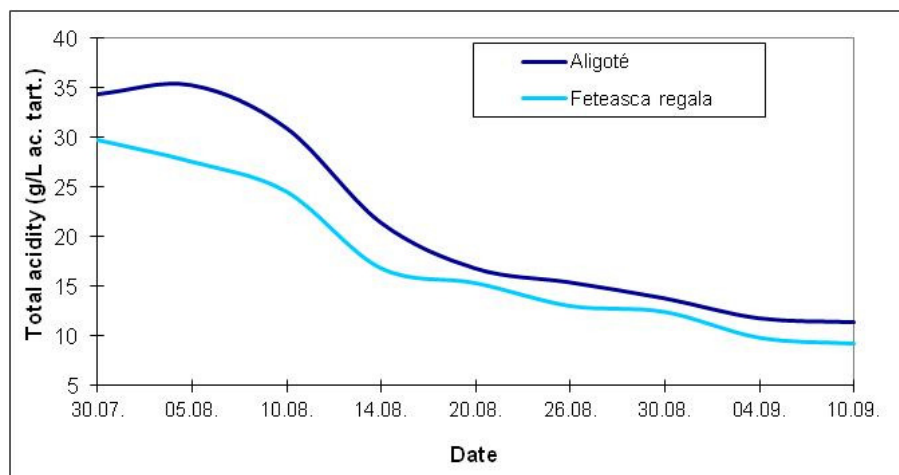


Fig. 2 - The evolution during ripening total acidity

The quality of wine grapes defined types that were obtained the year 2013. The Aligoté grapes belonging to varieties and harvest Fetească regală 2013 met the physicochemical characteristics for the wine IGR. The table 6 presents the results of physico - chemical characteristics of wines produced. In close correlation with quality grapes vinified, the wine is noted obtained Fetească regală.

Table 6

Physico-chemical	Variety grape	
	Aligoté	Feteasca regala
The free sulfur dioxide (mg/L)	38	40
Total sulfur dioxide (mg/L)	90	142
pH -ul	3,37	3,05
Density (g/cm ³)	0,9918	0,9913
alcohol concentration (% vol.)	10,6	12,3
Total acidity (g/L ac. tartaric)	4,70	7,20
Volatile acidity (g/L acetic ac)	0,45	0,50
Unfermented sugars (g/L)	0,20	2,00
The total dry extract (g/L)	20,30	24,00
Extract unreduced (g/L)	20,30	23,00
Ash (g/L)	1,99	2,24

It presents the balanced concentrations of physico - chemical, some values are higher compared to wine made from Aligoté variety namely the alcohol (12.3% vol.), unreduced extract (23.0 g/L) and total acidity (7,2 g/L C₄H₆O₆).

CONCLUSIONS

1. In the viticultural center Copou Iasi, in conditions of year 2013, grape production was variable from one variety to another, the production proved to be Aligoté. The variety Feteasca regala small productions were obtained which is severely affected by drought and frost the previous year.

2. Analyzing the interrelation between climatic factors and dynamic the evolution of grape maturation was found that concentrations of sugars were strongly influenced by the thermal factor.

3. The quality of wine grapes defined types that were obtained the year 2013. Thus, the Aligoté grapes belonging to varieties and Feteasca regala met the physicochemical characteristics for the wine IGR.

Acknowledgments: The work was developed within the framework of the Sectoral Project ADER 2020, PS 2.2.5. entitled "Technological links of vine culture and processing of raw materials to ensure the commercial farm income, while respecting the criteria of cross-compliance".

REFERENCES

1. **Vasile Ancuța, Zaldea Gabi, Damian Doina, 2010** – *The influence of climatic changes on the dynamics of the vegetation phenophases in the vine varieties cultivated in Copou vine growing center of Iași.* Lucrări Științifice Seria Horticultură Vol. 53, U.S.A.M.V. Iași. Editura "Ion Ionescu de la Brad" ISSN 1454-7376, pp. 407 - 412.
2. **Zaldea Gabi, Mântăluță Alina, Damian Doina, Savin C., Alexandru C., 2013** - *The hidric and thermic stress in the agricultural year 2011-2012 and this influence on SCDVV-Iasi vineyards.* Lucrări Științifice Seria Horticultură Vol. 56, no.1., U.S.A.M.V. Iași. Editura "Ion Ionescu de la Brad" ISSN 1454-7376, pp. 319 - 324.