

THE BEHAVIOR OF SOME GRAPEVINE VARIETIES FOR WHITE WINES REGARDING FROST RESISTANCE ON 2011/2012 WINTER IN IAȘI AND COTNARI VINEYARDS

COMPORTAREA UNOR SOIURI DE VIȚĂ DE VIE PENTRU VINURI ALBE PRIVIND REZISTENȚA LA GER ÎN IARNA ANULUI 2011/2012 ÎN PODGORILE IAȘI ȘI COTNARI

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Abstract. *In this paper we present the behavior of some grapevine varieties for white wines from Iași and Cotnari vineyards: Fetească albă, Grasă de Cotnari, Frâncușă, Tămâioasă românească, Risling italian, Fetească regală și Băbească gri at low temperatures that occurred during 2011/2012 winter. It was discovered that a large amount of main winter buds have been affected by the harmful low temperatures, fact that will have major implication on production levels this year.*

Key words: grapevine varieties, Iași, Cotnari, vineyard, winter buds.

Rezumat. *În lucrare se prezintă comportarea unor soiuri de viță de vie pentru vinuri albe din arealul podgoriei Iași și Cotnari: Fetească albă, Grasă de Cotnari, Frâncușă, Tămâioasă românească, Risling italian, Fetească regală și Băbească gri la temperaturi scăzute înregistrate în iarna anului 2011/2012. S-a constatat distrugerea unui număr mare de muguri de rod principali afectați de temperaturile minime nocive, fapt ce va avea implicații majore asupra nivelurilor de producție din acest an.*

Cuvinte cheie: soiuri de viță de vie, Iași, Cotnari, podgorie, mugure de rod.

INTRODUCTION

In the temperate climate conditions of our country, grapevine is located at the north limit of economic culture, therefore, negative low temperatures resistance in winter, is the concern of many wine growers and it is the object of various research studies (Cichi, 2006).

The frequency of cold winters with critical minimum temperatures for grapevine is relatively high, therefore is necessary to establish new technologies and the selection of new grapevine varieties better adapted to that environmental conditions. Several research have shown that most varieties cannot face temperatures lower than -20°C, during the latent period of vegetation. The most sensitive to low winter temperatures are the winter buds and the diaphragm. The principal bud of winter bud have the lowest resistance; lateral buds have a higher resistance than principales buds, and the sprig buds are the most resistant (Dejeu, 2010). The resistance level depends on several factors such as: intensity and frost period, the occurring

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period in relation to the vine stock preparing level (quenching), strings maturation level, low and high temperatures alternation, the size of grape harvest and culture technologies performed in the previous year (Rotaru et al., 2010).

Grapevine varieties for wine have a low frost resistance between -20°C -22°C , while the buds have a lower resistance, minimum starts at -8°C . The most damage is caused by the sudden temperatures drops occurred to late winter, when the vines lose strength (Cotea and Cotea, 1996).

MATERIAL AND METHOD

In 2011/2012 winter in vineyard area from the study (Cotnari, Iasi) there were slightly higher than the multiannual average in December, so that in January and February to witness a severe cooling. This phenomenon manifested between January 26 – February 20 2012, when the absolute minimum temperatures dropped below the strength of the vine, extreme values were being recorded over about 20 days.

In order to study the frost's negative effects in the winter of 2011/2012, observation to winter buds were made. The testing of buds viability was done by direct method, longitudinal winter bud sectioning and bud complex examination to binocular magnifier. Were used one year sprout from the seven varieties, representing 1% of all vines in experimental plots. Samples were maintained in water at $20-24^{\circ}\text{C}$, for 48 hours, for tissue rehydration, and for more precise observation between damaged and viable tissue it used binocular magnifier. The biological material used was the grapevines varieties from Iasi and Cotnari vineyard. Climatic data were provided by weather station Iasi and Cotnari.

RESULTS AND DISCUSSION

Due to low winter temperatures, the vine ends up with winter buds loss, which is variable depending on the temperatures level and duration. The longer the low temperatures last, the higher the damage level becomes, being destroyed not only low resistance organs (winter buds), but also the ones with a better resistance (annual sprout, multiannual wood). The level at which the vine is affected depends on species, variety, applied technology and the level of hardening and nutrients reserve accumulation during the vegetation.

The climatic conditions, especially the air temperature, directly affect the buds viability. The harmful minimum temperatures for winter buds were registered in January and February (table 1 and 2). The first heat shock occurred in the last decade of January, when temperature dropped to $-21,7^{\circ}\text{C}$, followed by a decline even more pronounced till $-28,4^{\circ}\text{C}$, period that caused significant buds loss, especially since in this period were recorded extremely low temperatures successively. It is noted that in Cotnari vineyard in the recorded critical interval, the thermic balance of values below resistance limit was $-389,3^{\circ}\text{C}$, for a total of over 14 days. The minimum temperature in January in Iasi vineyard was $-17,9^{\circ}\text{C}$, registered in last decade. On the other hand the frost effects were also felt in February, in first and second decade, when temperatures reached to $-26,6^{\circ}\text{C}$. For Iasi vineyard the heat balance of values below the vine resistance limit was $-339,3^{\circ}\text{C}$, cumulated over a period of 16 days.

Table 1

The absolute minimum temperatures recorded in air,
for 2011/2012 winter, in Cotnari vineyard

Luna	Decade	The sum and no. of days with temperatures of :			Absolute minimum value/date
		-15... -20 ^o C	-20...-25 ^o C	-25... -30 ^o C	
January	I	-	-	-	-6,2/08.01.12
	II	-	-	-	-10,2/18.01.12
	III	-70,7/4	-21,7/1	-	-21,7/29.01.12
February	I	-15,4/1	-48,3/2	-128,5/3	-28,4/02.02.12
	II	-53,0/3	-24,4/1	-27,3/1	-27,3/13.02.12
	III	-	-	-	-10,3/21.02.10

Table 2

The absolute minimum temperatures recorded in air,
for 2011/2012 winter, in Iași vineyard

Luna	Decade	The sum and no. of days with temperatures of :			Absolute minimum value/date
		-15... -20 ^o C	-20...-25 ^o C	-25... -30 ^o C	
January	I	-	-	-	-5,9/01.01.12
	II	-	-	-	-11,2/19.01.12
	III	-68,2/4	-	-	-17,9/29.01.12
February	I	-34,2/2	-113,5/5	-	-24,6/02.02.12
	II	-50,8/3	-20,4/1	-52,2/2	-26,6/12.02.12
	III	-	-	-	-10,3/21.02.10

As a consequence, buds losses were significant. For this there have been made buds viability tests, deciding upon the percentage viable (primary and secondary) winter buds according to winter buds position on the sprig (1-3; 1-6; 1-12) and the winter buds losses to, depending on variety (table 3). Following analysis, to the most varieties, there was a higher viability to the chords top.

Table 3

The buds viability situation to studied varieties, in 2011/2012 winter

Variety	Vineyard	% of viable winter buds-chord position								
		1-3			1-6			1-12		
		Pr	Sec	% potent fert.	Pr	Sec	% potent fert.	Pr	Sec	% potent fert.
Fetească albă	Cotnari	14	32	32	14	37	37	12	49	49
	Iași	25	85	85	19	80	80	16	71	71
Fetească regală	Iași	7	29	29	7	41	41	15	44	46
Riesling italian	Iași	42	57	57	30	57	57	27	63	63
Băbească gri	Iași	11	18	19	6	22	22	10	62	32
Frâncușă	Iași	55	60	60	42	55	55	45	62	62
	Cotnari	42	57	57	30	57	57	27	63	63
Grasă de Cotnari	Iași	22	42	42	19	48	48	19	55	55
	Cotnari	14	32	32	14	37	37	12	49	49
Tămâioasă românească	Iași	11	18	19	6	22	22	10	62	32
	Cotnari	7	17	17	3	25	25	3	34	34

In the analysis of the buds viability situation it was found that the lowest frost resistance was recorded at Feteasca regala variety, cultivated in Iasi vineyard, where the percentage of principal viable buds was of 7-15%, but also the Tămâioasă românească variety which was most affected (fig. 1), the principal buds were affected over 80% in both vineyards. A low viability was recorded also to Babească gri variety, cultivated in Iasi vineyard, the dead bourgeons are above 75%. The best behavior to frost was recorded to Fetească albă variety, with short vegetation period, where the main buds were destroyed at a rate of 61-83%, the higher losses were recorded in Cotnari vineyard.

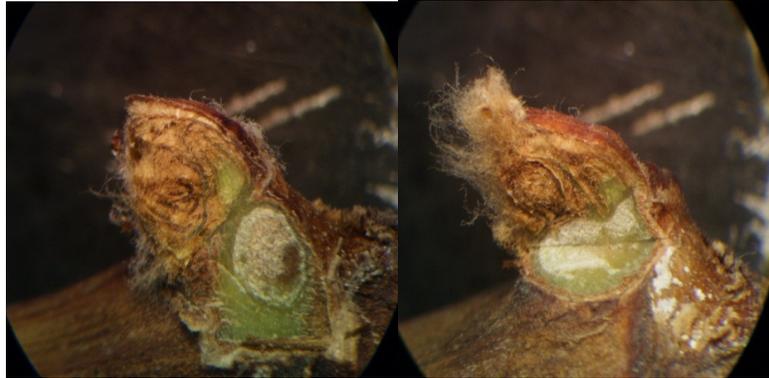


Fig. 1 - Various degrees of damage to the winter bud complex

CONCLUSIONS

1. The absolute minimum temperatures recorded in 2011/2012 winter affected the vines by their cumulative effect leading to important buds losses.
2. North – eastern Romania, in last years, has seen an increase in extreme wheater phenomena, dry summers and severe winters, threatening unprotected vine culture.
3. Among studied varieties the most resistant is the Fetească albă variety, and the Tămâioasă românească variety has the lowest frost resistance, suffering major buds losses in both vineyards Iasi and Cotnari.

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