

STUDY REGARDING THE INFLUENCE OF LOW WINTER TEMPERATURES BETWEEN 2011-2012 ON THE VIABILITY OF WINTER BUDS OF SOME TABLE GRAPE VARIETIES IN THE CONDITIONS OF THE DIDACTIC EXPERIMENTAL FIELD IN BUCHAREST

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Abstract

In general, new table grape varieties in Romania are obtained through intraspecific hybridization, which represents a method of improvement of grapevine varieties, with multiple possibilities, far from being completed. This method has as target the hybridization of two or more varieties, so that the new variety will contain new, superior characters and features in comparison with the one found in the genitors (parents). Thus, in the present paper frost resistance of some table grape varieties obtained in Romania with genitors from the Cardinal and Afuz ali genitors, as mother or father, has been analyzed, taking as witnesses these two varieties due to the fact that they are well-known in the wine-growing practice as being the most sensible-to-frost varieties from the table grape varieties group (Cardinal: -15^o-18^oC, Afuz Ali: -16^o-18^oC). The obtained results highlight the fact that the dimension of the hereditary transmission of the frost resistance to the descendants depends highly on the genitor varieties resistance to this factor, as well as the period and the level of the destructive temperatures recorded in the rest of the vine.

Keywords: intraspecific hybridization, table grapes, genitors, frost resistance, sensibility

INTRODUCTION

In the wine-growing practice on one hand and the grapevine varieties amelioration operations on the other hand, it has been observed that, the heredity of the characters and features of new varieties obtained by sexual hybridization are more obvious (sometimes they even manifest the heterosis phenomenon for one or more characters), as the genitors are genetically further and have distant origins (*Proles pontica x Proles orientalis*, *Proles occidentalis x Proles orientalis*). In these situations, as a general rule, the characters of the first variety prevails [1, 2, 3].

Following the manifestation and the degree of hereditary variability for one or more characters, in the wine-growing practice, the research analyzes a series of characters including: the growing force, the number of grapes on a grapevine, the production per grapevine, the sugar quantity, the acidity of the grape must, various maturation age, grapes dimension, the resistance to diseases

and pests, the resistance to drought and frost, etc. [2, 3].

In the present paper there have been tested four varieties of table grapes with different maturation ages under the aspect of their resistance to the low temperatures in the winter 2011-2012.

MATERIAL AND METHOD

For this reason, a frost resistance analysis of some table grapes varieties obtained in Romania has been made.

There were taken into account varieties with common genitors Cardinal and Afuz ali, as a motherly or fatherly form, taking as witnesses for being known as the most sensible to frost in their group (Cardinal -15^o-18^oC, Afuz Ali -16^o-18^oC).

The research has been made on one hand in order to study the transmission of the frost sensibility to the descendants and on the other hand to observe the destructive effect of the frosts recorded in the winter of 2011-2012 on these grapevine varieties.

The varieties are grown in the experimental field from the Ampelographic Collection of the University of Agronomic Sciences and Veterinary Medicine – Bucharest, and they are conducted on a semi-high form, mixed cutting system (Guyot on a semi-stem cutting type, with a load of buds of 36 buds/vine).

The chords of the analyzed varieties have been collected from a medium number of 6 grapevines for each experimental version, and the length of the chords was established to 20 buds/chord.

The moment of collecting the chords was 19th of March 2012, practically before performing the cuts in dry of the grapevine.

After the collection, they have been introduced with the base in water to stimulate the rehydration of the tissues, and after this the determination of the winter buds viability was made (the method used: longitudinal cutting the winter bud, examining the bud complex under the magnifier, determining this way the viability of the bud complex).

Experimental variants

Victoria – Obtained at S.C.V.V. Dragasani through sexual hybridization of the varieties Cardinal and Afuz Ali and approved in 1978 (Victoria Lepadatu and Gh. Condei).

The variety stands out through a good frost resistance (-20°C).

Azur – Obtained at S.C.V.V. Dragasani from the hybridization of the varieties Coarna neagra and Cardinal, approved in 1984 (Victoria Lepădatu, Gh. Condei).

The variety stands out through a good frost resistance (-20°C).

Transilvania – Obtained at S.C.P.P. Cluj Napoca, through sexual hybridization between the varieties Black rose and Cardinal, approved in 1984.

The variety stands out through its sensibility to frost (-18°C).

Greaca – Obtained at S.C.V.V. Greaca, through sexual hybridization of Bicane and Afuz Ali varieties and it was approved in 1979 (Gr. Gorodea).

The variety stands out through its tolerance to frost (-20°C).

Cardinal (witness) – Obtained through the hybridization of Ahmeur bou Ahmeur and Alphonse Lavallee.

The variety stands out through frost sensibility (-15° - 18°C).

Afuz Ali (witness) – Native from Asia Minor, it is supposed to be a selection of the assortment group Rozaki.

The variety stands out through its sensibility to frost (-16° – -18°C).

RESULTS AND DISCUSSIONS

Under the climatic aspect, the experimental field territory is situated in the second zone, moderately warm, an area with second degree of favourability regarding the culture of the grapevine.

The wine year 2010-2011 has been characterized through high temperatures during summer ($38,0^{\circ}\text{C}$ - 10.07.), less rain, marking the unfavourable climate conditions in June-July which determined a rush of the aging process, thus negatively favouring the quality of the production.

It was followed by a long and drought autumn, practically a period of 4 months of no rain or unimportant rain quantities.

Due to the rain deficit, the minimum destructive temperatures recorded at the end of January (Table 1), between $-16,2^{\circ}\text{C}$ and $-22,4^{\circ}\text{C}$, as well as the temperatures in the first decade of February, $-16,9^{\circ}\text{C}$ and $-24,2^{\circ}\text{C}$, have produced important damages to the viability of grapevine winter buds in general, and to the analyzed varieties in particular.

In the information of the same table, it is shown that the number of days with destructive temperatures for the grapevine surpassed ten, six of them being consecutive.

Analyzing the bud losses (table 2), it is shown that Victoria and Greaca varieties, for which one of the genitors is Afuz Ali, have recorded the most important losses percentages, from 3,5% (Greaca) to 13,46% (Victoria).

This results really to those registered by the Afuz Ali variety (6,66%) and even under his values in Greaca variety case.

For the varieties for having Cardinal variety as one of the genitors, the situation is slightly different, as follows: Transilvania variety

records losses of 26,41% and Azur variety records losses of 43,10%, in comparison with the witness variety 27,58%.

Table 1. The synthesis of climatic elements

Day number	DECEMBER			JANUARY			FEBRUARY		
	Air temperature			Air temperature			Air temperature		
	medium	maximum	minimum	medium	maximum	minimum	medium	maximum	minimum
01	-0,3	9,9	-7,6	-0,5	6,0	-3,7	-16,6	-8,6	-23,1
02	-1,0	8,7	-7,9	0,3	6,9	-4,4	-13,9	-10,7	-16,9
03	2,5	11,7	-2,1	4,0	11,7	-1,8	-10,6	-8,1	-12,1
04	6,3	15,9	-0,7	1,0	8,7	-4,9	-4,3	-2,3	-8,1
05	7,3	15,3	0,7	4,4	10,0	-0,6	-1,9	-0,3	-5,4
06	7,8	11,3	5,4	4,9	6,8	3,1	-6,8	-5,2	-7,3
07	4,3	6,8	1,3	4,1	6,7	2,4	-9,0	-7,3	-10,4
08	0,9	4,2	-2,2	2,1	4,3	-0,5	-11,6	-7,3	-13,6
09	1,8	8,3	-4,3	0,0	4,8	-4,2	-17,3	-7,7	-24,2
10	3,9	8,5	-0,3	1,9	7,0	-0,6	-13,9	-7,4	-18,7
11	6,5	11,5	3,8	-0,2	4,5	-5,0	-14,8	-11,2	-20,8
12	5,4	6,7	3,0	1,1	8,7	-3,7	-9,9	-8,2	-11,8
13	6,5	7,2	5,9	2,9	9,0	-0,9	-6,3	-3,2	-8,9
14	4,6	5,9	4,0	2,5	6,4	0,2	-6,5	-3,3	-8,5
15	3,4	5,0	1,9	-0,8	4,6	-4,3	-11,0	-5,7	-17,4
16	4,5	10,1	1,9	-1,9	2,9	-6,2	-3,2	1,3	-8,1
17	4,5	7,3	1,6	-2,5	2,0	-6,9	-5,2	-0,7	-12,7
18	4,2	8,5	1,7	-3,2	-0,4	-5,8	-7,6	1,0	-14,1
19	-1,0	2,3	-6,1	-3,2	1,1	-8,3	-8,0	3,0	-16,9
20	4,0	4,7	2,0	2,7	6,6	-3,9	-2,7	6,5	-10,1
21	1,5	4,2	0,1	1,6	4,7	0,2	-1,4	3,8	-7,4
22	0,6	2,8	-2,1	-2,3	2,0	-5,6	-3,0	3,4	-8,7
23	1,1	3,5	-0,7	3,2	8,7	-1,3	-4,7	-1,7	-7,4
24	-2,4	0,7	-5,4	0,5	6,2	-3,7	0,3	5,3	-4,4
25	-1,6	2,4	-6,6	-0,5	2,3	-1,9	4,4	11,5	-0,7
26	1,5	5,3	-0,6	-6,2	-1,8	-8,1	1,4	8,4	-4,1
27	-1,0	3,5	-3,7	-8,7	-6,0	-9,7	1,1	4,2	-2,3
28	2,0	6,2	-1,3	-11,8	-6,9	-16,2	-3,0	2,4	-9,2
29	4,5	8,2	2,6	-16,0	-7,4	-22,4	-2,9	2,3	-9,3
30	0,5	4,3	-1,7	-12,7	-8,0	-18,3			
31	-1,0	0,6	-4,5	-15,1	-7,4	-21,9			
AVERAGE	2,6	6,8	-0,7	-1,6	3,4	-5,4	-6,5	-1,6	-11,1

A significantly lower loss has been recorded at the table grape varieties Azur and Transilvania, having Cardinal and frost resistant varieties as genitors: Coarna neagra (-22°C) and Black rose (-20°C).

Considering the recorded losses, we tried to establish an estimated grape production for the wine year 2012: the highest percentage of the effective production potential of each variety has been recorded by Azur (40-45%), Transilvania (25-30%) and Cardinal (25-30%), practically the ones that have as genitor, the Cardinal variety.

The estimated grape production percentages recorded by the other varieties included in the study, where one of the genitors is Afuz ali variety, are very low, being situated between 0-15%.

Table 2. Synthesis regarding bud losses on the varieties including in the study

Studied varieties	Main buds		Estimated grape production %
	Viable %	Dead%	
<i>Victoria Cardinal and Afuz Ali</i>	13,46	86,54	10-15
<i>Azur Coarnă neagră and Cardinal</i>	43,10	56,89	40-45
<i>Transilvania Black rose and Cardinal</i>	26,41	73,58	25-30
<i>Greaca Bicane and Afuz ali</i>	3,5	96,49	0-5
<i>Cardinal (witness)</i>	27,58	72,42	25-30
<i>Afuz ali (witness)</i>	6,66	93,34	5-10

CONCLUSIONS

Destructive temperatures, low temperature limits, the alternation and the duration of this low temperatures, produced important damages to grapevine in general and the table grape varieties in particular.

Hence, we conclude that the degree of hereditary transmission to frost resistance to the descendants depends highly on the resistance of the genitor varieties to this factor.

In the case of the Victoria variety, where both varieties are genitors, it hasn't been highlighted through high percentages of viable buds compared to the varieties in which genetical structure includes only one of them; on the contrary in this case, the variety is even more sensible than the genitors.

Azur variety takes over from Coarna Neagra the highest frost resistance (in this case, prevailing the features of the first genitor). Although the Cardinal variety is known as

being one of the most sensible to extreme climate conditions, for the year 2011-2012 Afuz ali variety and the varieties that have it as a genitor proved to be more sensible.

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