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## Research on Frost Injury of New Romanian Grapevine Cultivars in the Winter 2014-2015

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### Abstract

An analysis of winter injury to 45 new Romanian grapevine cultivars for table grapes and for white and red wines was performed as a result of the severe winter 2014-2015, with minimum air temperature of -20.8°C (on the 8<sup>th</sup> of January). There were used 9 widespread varieties in Romania as controls. The research was performed in the plantation - collection of the University of Agronomic Sciences and Veterinary Medicine of Bucharest (44°46'N, 26°06'E, 91 m). There was determined the viability of primary and secondary buds in winter eye. In relation to these low temperatures, a better resistance, assessed on the basis of the percentage of primary and secondary viable buds, proved the varieties: Napoca, Milcov, Greaca, Xenia, Șarba, Crâmpoșie selecționată, Columna, Novac; as well as controls: Chasselas doré, Muscat de Hamburg, Riesling italian, Fetească albă, Cabernet Sauvignon. Varieties Călina, Transilvania, Triumf, Victoria, Blasius and Selena, proved to be sensitive to low temperatures. It is necessary to have a territorial distribution of cultivars according to their resistance to frost and the application of differentiated pruning to compensate the losses.

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## 1. Introduction

Under the conditions of Romania's temperate - continental climate and of climate changes, the minimum temperatures harmful for the vine during the dormant period have had a higher frequency and intensity in the latest 20 years (Bucur and Dejeu, 2013).

If 53 years ago, it was asserted that the frequency of the minimum temperatures harmful for the vine during the dormant period, estimated for a period of 75 years (1888-1963), was once in ten years (Popa et al., 1966), their frequency increased significantly, lately.

Temperatures dropping below vine's frost resistance level (-18 ... -20°C) are registered in many viticultural regions, mainly on lowlands, on valleys and less on hills.

Vine's frost resistance depends on many factors: variety (Georgescu et al., 1986; Rotaru et al., 2010; Stroe and Bucur, 2011; Haras and Rotaru, 2012), rootstock (Popa et al., 1966), duration of these temperatures, the moment and the way they occur (Oşlobeanu et al., 1991); the relief (Irimia et al., 2012), yields obtained in the previous year (Dejeu et al., 2005), the degree of canes maturation, acclimatization (Burzo et al., 2005), etc.

The dispositions of the plantations at different altitudes, on the lowlands, as compared to the hills, may determine differences of 5.0 – 7.1°C, regarding the minimum temperatures (Popa et al., 1966; Irimia et al., 2012; Planchon et al., 2014), causing more severe wintering conditions in the first case.

In the situation when the main bud was killed by frost, secondary or tertiary buds will push with in one to two weeks (Pickering et al., 2014). These secondary buds will not be as fruitful as primary buds, registering substantial crop losses, but they are important to restoring canopy and preparing for the following season.

## 2. Materials and Methods

The frost resistance has been followed at three groups of new varieties created in Romania, namely: table grape varieties (Augusta, Azur, Călina, Centenar Pietroasa, Chasselas de Băneasa, Coarnă neagră selecționată, Greaca, Istrița, Milcov, Muscat timpuriu de București, Napoca, Roz românesc, Select, Sylvania, Someșan, Splendid, Tamina, Timpuriu de Cluj, Timpuriu de Pietroasa, Transilvania, Triumf, Victoria and Xenia); new varieties of grapes for white wines (Alb aromat, Astra, Aromat de Iași, Băbească gri, Blasius, Columna, Crâmpoșie selecționată, Donaris, Furmint de Miniș, Miorița, Roz de Miniș, Selena and Șarba) and for red wines (Balada, Codană, Cristina, Haiduc, Mamaia, Negru aromat, Negru de Drăgășani, Novac and Pandur).

As controls, there were used the following varieties: Chasselas doré, Muscat de Hamburg and Afuz Ali, for table grapes; Fetească albă, Fetească regală and Riesling italian, for white wine; Fetească neagră, Băbească neagră and Cabernet Sauvignon, for red wines.

There were harvested every 10 randomized canes, of 10 eyes length, from normally developed, mature vines, for each variety in the plantation - collection of the University of Agronomic Sciences and Veterinary Medicine Bucharest (44°46'N, 26°06'E, 91 m).

There were sectioned the winter eyes situated on canes of usual dimensions, out of the ones which full fill the requirements to be kept at pruning. After sectioned them, there was registered the viability of primary and secondary buds.

## 3. Results and Discussions

Analysing the evolution of absolute minimum temperatures during vine's dormant period for 56 years (1961-2016) in Bucharest - Baneasa area, there was obtained a parabolic correlation shown in Figure 1, the downward trend of which is distinctly significant.

This shows a higher frequency and intensity of winter frosts damaging the vine in the latest two decades, as compared to the previous period.

In the last 20 years, minimum temperatures below -20°C which affect mainly the viability of primary buds were recorded in 1998 (-20.3°C, December 25); 2002 (-26.0°C, December 26); 2003 (-20.0°C, February 14); 2004 (-21.0°C, February 13); 2005 (-23.0°C, February 08); 2010 (-24.6°C, January 26); 2012 (-24.3°C, January 29); 2015

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