

# ECHOPHYSIOLOGICAL REACTION OF SOME VINE VARIETIES FROM IASI, TARGU BUJOR AND COTNARI IN WINTER 2010-2011 CONDITIONS

## CERCETĂRI PRIVIND REACȚIA ECOFIZIOLOGICĂ A UNOR SOIURI DE VIȚĂ DE VIE DIN PODGORIILE IAȘI, COTNARI ȘI TÂRGU BUJOR, ÎN PERIOADA DE REPAUS VEGETATIV

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**Abstract.** *The determinations made in this paper are part of a comprehensive study conducted on some vine varieties ( White Feteasca, Royal Feteasca, Italian Riesling, Grey Băbească, Francusa, Cotnari Grasa, Romanian Tamaioasa), vines grown in three regions of Moldova: Iași, Cotnari and Târgu Bujor. The research conducted in the climatic conditions of November 2010 - February 2011 enabled us to highlight, in the case of the studied varieties, aspects of tissue aging (wood maturation) - premise of resistance to negative temperatures in winter and bud viability. The maturation degree of the wood can be assessed by determining the water content of the shoots, which varies depending on variety and the wood / bone ratio. The water content of the cells is correlated with the amount of osmotic pressure - another indicator for maturation and assessing of the frost resistance - led by the carbohydrate content, free ions or amino acids, especially proline.*

**Key words:** vine varieties, frost resistance, starch, protein

**Rezumat.** *Determinările realizate în prezenta lucrare fac parte dintr-un studiu complex realizat asupra unor soiuri de viță de vie (Fetească albă, Fetească regală, Riesling italian, Băbească gri, Frâncușă, Grasă de Cotnari, Tămâioasă românească) cultivate în trei zone viticole ale Moldovei: Iași, Cotnari și Târgu Bujor. Cercetările efectuate în condițiile climatice ale lunilor noiembrie 2010 - februarie 2011, ne-au permis să evidențiem la soiurilor luate în studiu, aspecte referitoare la maturarea țesuturilor (maturarea lemnului) - premiză a rezistenței la temperaturile negative din timpul iernii, precum și viabilitatea mugurilor. Gradului de maturare a lemnului poate fi apreciat și prin determinarea conținutului de apă al lăstarilor, care variază în funcție de soi și de raportul lemn/măduvă. Conținutul de apă al celulelor este corelată cu valoarea presiunii osmotice - un alt indicator al gradului de maturare și de apreciere a rezistenței la îngheț - determinat de conținutul în glucide, ioni liberi sau aminoacizi liberi, în special prolina.*

**Cuvinte cheie:** ecofiziologie, viță de vie, rezistență ger, amidon, proteine

## INTRODUCTION

In order to establish the areas where grapevine can be cultivated on the one side and the appropriate wine assortments on the other side, an important element

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that must be bared in mind is represented by the ecologic characteristics of the areas. The pedoclimatic conditions influence the length of the vegetation period (precociousity), conditions the quantity and the quality of crops, offering originality to the grapes and the wines resulted in a specific area (Jitareanu Carmen-Doina, 2007).

The capacity to resist to negative temperatures is obtained over a long and complex process that starts before the first frost; it is related to the accumulation of the reducing glucides, the amidines' hydrolysis, the modification of the tissues' resistance to dehydration and their capacity to regenerate (Howell, G.S. 2003).

The grapevine's capacity to adjust and its strength to resist to low temperatures is related to a series of physiological and biochemical changes that are influenced by the accumulation and the dynamic of some chemical compounds that protect the cellular protoplasm from the irreversible coagulation of proteins, that is caused by the mechanical and destructive action of intracellular freezing (Burzo, 1999; Fennell Anne, 2004).

Starting with the second part of October, the enzymatic hydrolysis process of amidines intensifies, leading to the growth of the content of soluble glucides, growth that is related to the decrease of the frost temperature. In December and January, the content of soluble glucides reaches its maximum (10-12% s.u.), period in which there are also recorded the lowest temperatures. In February – March, the concentration level of glucides decreases as they take part at the respiratory process (the respiratory process intensifies in this period).

## MATERIAL AND METHOD

**Determining the vine buds viability** was used to the sectioning method.

Each bud is sectioned with a blade or a very sharp knife, starting from the base of the tendril towards its top (Rotaru Liliana, Petrea Gabriela, 2006).

**Wood maturation.** To determine the starch presence in the annual branches it was used the color reaction/test with the help of the Lugol reactive, I in KI. The branches were sectioned with the microtome and the materials were analyzed at the microscope.

**Water content and its forms: free water – bound water.**

The tendrils for fruit production, recently harvested and were stored into a drying stove, up to a constant weight to a temperature of 40°C to determine the content of free water and at 105°C for the total content of water.

**Determining the quantity of nitrogen and calculating the amount of raw protein** from the grapevine's tendrils in December 2010 – was performed after a standard identical to the International Standard Project ISO 5983:1992, which replaces STAS 9597/3-74.

## RESULTS AND DISCUSSIONS

**Determining the grapevine buds viability**

The bud's viability was appreciated according to the color of the tissues. If the entire group of buds that form the winter bud was green, color characteristic to living tissues, the bud was considered to be viable. The bud was considered non-

viable and lost if the tissues of the main bud were grey – black, color characteristic to dead tissues. (fig. 1 a and b).



**Fig. 1** - Image at the Binocular magnifier of the grapevine bud complex

After analyzing the buds from the grapevines species included in this study, in the conditions of the winter of 2010 – 2011, it was noticed that the “White Feteasca” variety had a high percent of viable buds in all the three vineyards. (82-100%), and it was followed by “Italian Riesling”, “Frâncușa” and “Royal Feteasca”, the lowest potential fertility being present at the “Grey Babeasca” variety (58-60%) (fig. 2).

A distinct case is represented by the variety “Grasa de Cotnari” that in the winter of 2010-2011 presented a high percent of viable buds in the Cotnari vineyard (94%) but a very low percent (38%) in Iași.

Referring to the areas from where the analyzed species come from, the Cotnari vineyard results to be very favorable since both “White Feteasca” and “Romanian Tămâioasă” presented 100% viable buds, potentially fertile. The other two species included in the study have high percentage of potentially fertile buds.

#### **Wood maturation – the amount of starch in the grapevine shoots**

Starch accumulates mainly in the inner layers of the xylem, the starch level starts decreasing in autumn and continues until January; this period is followed by growth with a spring maximum. The moment temperature decreases, the starch level diminishes because of hydrolysis and the glucides level grows correspondingly (fig. 3).

Observing the starch level in the shoots during dormancy, it was noticed that all grapevines varieties presented lower quantities of starch in February 2011. The differences were due to temperature values and to the metabolic characteristics of the species.

#### **Water content and its forms: free water – bound water**

One clue regarding the grapevines’ resistance to frosty weather is offered by the proportion of the two types of water that exists in the shoots, free water – bound water, the superior values of this relation indicating the grapevine’s sensibility to low negative temperatures.

In November, free water – bound water report presented values that were superior in the middle parts of the shoots, comparatively with the basal internodes that are generally more resistant to frost.

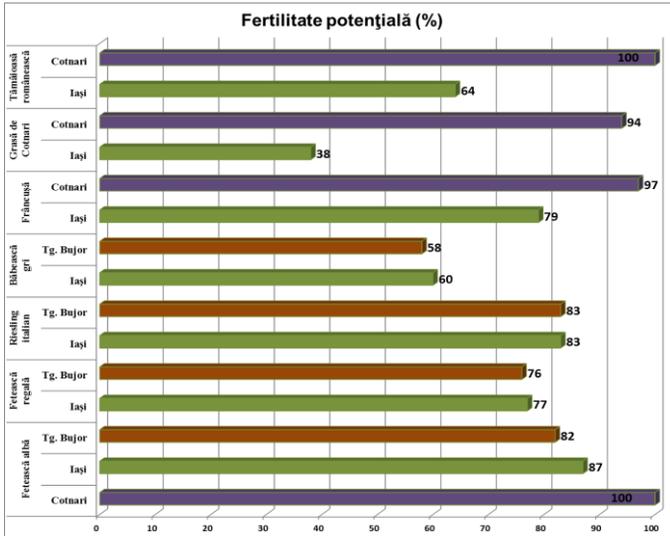


Fig. 2 - Bud losses at the species included in the study, in the winter of 2010-2011

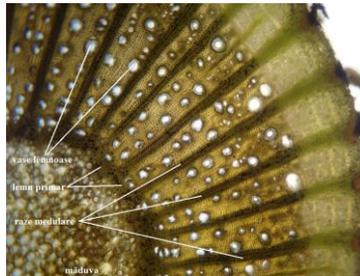


Fig. 3 – Starch distribution in grapevine shoots

The lowest values of this parameter were recorded at the grapevine species cultivated at Cotnari, demonstrating that these species adapted better to the difficult conditions of winter than the species cultivated in Iași. This fact was also confirmed by the analysis of the viability of the fruit buds that reached values of 100% (fig. 4).

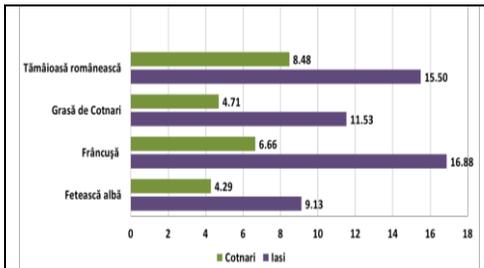


Fig. 4 - The effect of pedoclimatic conditions on the free water – bound water report in November, in the shoots of the grapevine species cultivated in the vineyards from Iași and Cotnari

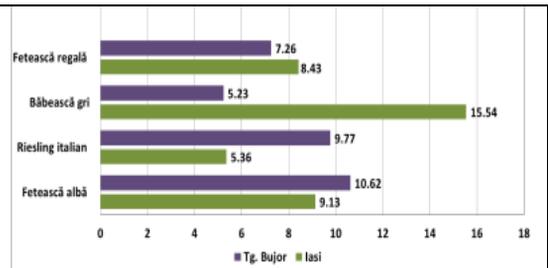
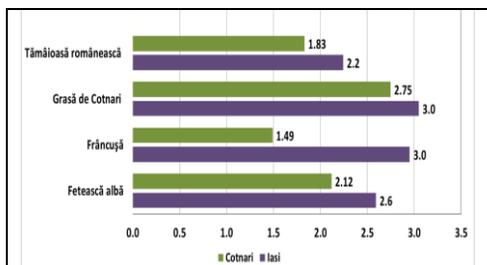
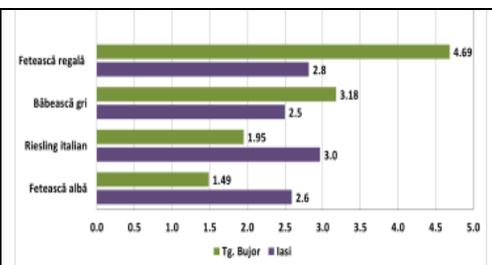


Fig. 5 - The effect of pedoclimatic conditions on the free water – bound water report in November, in the shoots of the grapevine species cultivated in the vineyards from Iași and Târgu Bujor

In the case of the species cultivated at Târgu Bujor, just like in the case of those cultivated at Cotnari, the free water – bound water report is lower if we compare it with that from Iași, and this shows that they are more resistant to freezing (fig. 5). The free water – bound water report showed in November values between 16.88% - 26.43 % at the “Frânçușă” variety that was cultivated in Iași and the lowest values at “White Feteasca” from Cotnari vineyard.



**Fig. 6** - The effect of pedoclimatic conditions on the free water – bound water report in February, in the tendrils of the grapevine species cultivated in the vineyards from Iași and Cotnari



**Fig. 7** - The effect of pedoclimatic conditions on the free water – bound water report in February, in the tendrils of the grapevine species cultivated in the vineyards from Iași and Târgu Bujor

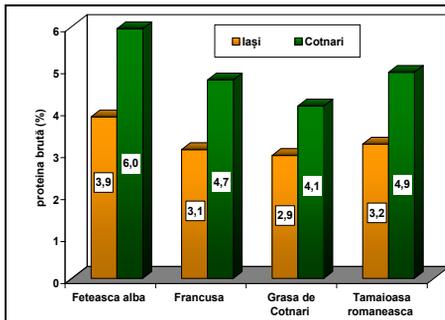
In February, after the annealing process, after the shoots got through the period with negative temperatures it can be seen a decrease of the total amount of water at all the species included in the study (fig. 6).

All species presented lower values at the free water – bound water report comparatively to those from November and this proves that they have moved on to the 3rd phase of the annealing process that consists in cell dehydration, the transfer of free water to the intracellular areas and water loss during transpiration (fig. 6 and 7).

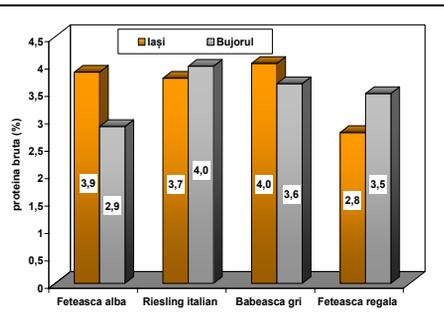
#### **The total protein content from the grapevine tendrils in December 2010**

After determining the total protein level at the species included in the study, the results of the analysis show that in the shoots, the grapevine species from the vineyard situated in Iași, the raw protein level varies from 2,9% at “Grasa de Cotnari” to 3,9% at “White Feteasca” (fig. 8). Comparing the grapevines cultivated in Iași to those cultivated at Cotnari resulted that the latter one stored more raw protein than the first one, the values varying from 4,1% at “Grasa” and 6,0% at “White Feteasca”. Since the concentration level was higher, this contributed to improving the buds capacity to resist to cold and these species had practically no bud losses during winter.

Analyzing the species cultivated at Târgu Bujor and comparing them to those cultivated in Iași results that only between two species - “Royal Feteasca” and “White Feteasca” – there are significant differences as far as the total amount of protein is concerned. These differences are positive in the case of “Royal Feteasca” where the values varied from 3,5% at Târgu Bujor and 2,8% at Iași and negative for “White Feteasca” with values of 3,9% in Iași and 2,9% at Târgu Bujor. For the “Italian Riesling” and “Grey Babeasca” there were not significant differences from one vineyard to the other (fig. 9).



**Fig. 8 -** Raw protein concentration level in the tendrils from the grapeyards in Iași and Cotnari



**Fig. 9 -** Raw protein concentration level in the tendrils from the grapeyards in Iași and Târgu Bujor

## CONCLUSIONS

1. After analyzing the buds from the grapevines species included in this study, in the conditions of the winter of 2010 – 2011, it was noticed that the “White Feteasca” variety had a high percent of viable buds in all the three vineyards. (82-100%). Referring to the areas from where the analyzed species come from, the Cotnari vineyard presents itself as a very favorable one for both species.

2. The species cultivated at Cotnari presented the lowest values of report free water – bound water, if we compare them to those cultivated in Iași; this proves that the species cultivated at Cotnari adjusted better to the inauspicious winter conditions, fact that was also confirmed by the analysis of viability of the fruit buds that presented values of 100%. In February, after annealing and after the shoots got over the negative temperatures it can be seen a decrease of the total amount of water for all the species included in the study.

3. The results for determining the total quantity of protein for the species included in the study from the three vineyards mentioned, point out that the grapevines cultivated at Cotnari presented more raw protein, the higher concentration influencing the buds capacity to face the cold and these species did not present bud losses during winter.

**Acknowledgments.** This study was realised and published within the research project POSCCE-A2-O2.1.2-2009-2 ID.653, code SMIS-CSNR 12596.

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# PRELIMINARY STUDIES CONCERNING THE AMINOACIDS INFLUENCE ON SOME DEHYDROGENASES AT *MONILINIA LAXA* (ADERH. & RUHL.) HONEY PARASITE ON PLUM TREE

## STUDII PRELIMINARE PRIVIND INFLUENȚA UNOR AMINOACIZI ASUPRA UNOR DEHIDROGENAZE LA SPECIA *MONILINIA LAXA* (ADERH.& RUHL.) HONEY PARAZITĂ PE PRUN

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**Abstract.** *This study aimed the evaluation of the activity of some dehydrogenases from the Krebs cycle, as the principal energy supplier that assures the fabrication of mediators and products so that they may maintain the equilibrium between cells and to avoid the uneconomic supraproduction of metabolites and, respective, of glucose-6-phosphate dehydrogenase, ubiquitous enzyme that catalysis the conversion of glucose-6-phosphate in glucono-lactone-6-phosphate with NADP<sup>+</sup>. The experiments were made using cultures of Monilinia laxa (Aderh.&Ruhl.) Honey on mediums supplemented with different types of aminoacids. The enzymes activity was determinated using the spectrophotometric method of Sisoiev and Krasna (modified by Artenie) and some semnificative differences were recorded, variations influenced by the age of the culture and the aminoacid type used in working samples, compared with the control sample.*

**Key words:** dehydrogenases, amino acids, *Monilinia laxa*

**Rezumat.** *Studiul de față a urmărit evaluarea activității unor dehidrogenaze ale ciclului Krebs, ca principal furnizor de energie ce asigură producerea de intermediari si produși astfel încât sa mențină starea de echilibru a celulelor si pentru a evita supraproducția neeconomică de metaboliți și, respectiv, a glucozo-6-fosfat dehidrogenazei, enzimă ubicuitară ce catalizează conversia glucozo-6-fosfatului în glucono-lacton-6-fosfat în prezența NADP<sup>+</sup>. Experimentele s-au derulat în condițiile cultivării fungului Monilinia laxa (Aderh.& Ruhl.) Honey pe medii suplimentate cu diferite surse de aminoacizi. Activitatea enzimelor, urmărită în dinamică, a fost determinată prin metoda spectrofotometrică Sisoiev și Krasna (modificată de Artenie), fiind constatate diferențe semnificative în funcție de vârsta culturii și de tipul aminoacidului la variantele de lucru în comparație cu martorul.*

**Cuvinte cheie:** dehidrogenaze, aminoacizi, *Monilinia laxa*

## INTRODUCTION

Ubiquitous organisms, the fungi, have developed along time various nutritional strategies which allowed them to adapt in all conditions of the environment and this, due to the genetic background of the fungal cell which enabled the expression a phenotype that allows use of any organic compounds or inorganic nitrogen from the living environment. Data from literature indicates, however, that the mixtures of

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