

RESEARCH CONDUCTED DURING THE DORMANT PERIOD IN GRAPEVINE

CERCETĂRI EFECTUATE ÎN TIMPUL REPAUSULUI VEGETATIV LA VIȚA DE VIE

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Abstract: Vine resistance over the winter is influenced by the maturation of the shoots on the one hand, and the genetic resistance of cultivated plants, on the other hand. A big problem is the intensity of extreme values of climate factors. Although they were considered incidental in recent years they have become common. Due the excessive heating of the air in winter, often producing strong annealing, negative values occur leading to loss of viability buds (Dobrevă et al., 2006). Among the carbohydrates, starch is the most important reserve substance of string, and the percentage that is in the string, the end of the growing influence plant resistance to low temperatures in winter conditions. Starch content values close to normal (3.6%) were recorded in most varieties analyzed, except Fetească albă in Dealul Bujorului vineyard cultivated and grown cultivar Riesling italian in Dealul Bujorului vineyards and Iasi, which starch content was a maximum, showing that the enzymatic hydrolysis was less pronounced.

Key words: vineyard, starch, low temperatures

Rezumat : Rezistența viței peste iarnă este influențată de maturarea lăstarilor, pe de o parte, și de rezistența genetică a soiurilor cultivate, pe de altă parte.

O mare problemă o constituie intensitatea valorilor extreme a factorilor climatici. Dintre aceștia, temperatura este cea mai agresivă. Pe fondul încălzirii excesive a aerului în lunile de iarnă, care produc adesea decădiri puternice, survin valori negative ce conduc la pierderea viabilității mugurilor (Dobrevă et al., 2006). Dintre hidrații de carbon, amidonul este cea mai importantă substanță de rezervă din coarde, care în funcție de procentul în care se găsește în coarde, la sfârșitul perioadei de vegetație, influențează rezistența plantei în condițiile temperaturilor scăzute din timpul iernii. Valori ale conținutului în amidon apropiate de cele normale (3-6%) s-au înregistrat la majoritatea soiurilor analizate, excepție făcând soiurile Fetească albă cultivat în podgoria Dealu Bujorului, precum și soiul Riesling italian cultivat în podgoriile Dealu Bujorului și Iași, la care conținutul de amidon a fost maxim, demonstrând că procesul de hidroliză enzimatică a fost mai puțin intens.

Curvinte cheie: viță de vie, amidon, temperaturi scăzute

INTRODUCTION

Shoots maturation, on the one hand, and genetic resistance of cultivated varieties influence grapevine resistance during winter, on the other hand. Shoots

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maturation should not be neglected, because there is interdependence between all successive events during the year. A big problem is the intensity of extreme values of climate factors. Although they were considered incidental in recent years they have become common.

Among these, the temperature is the most aggressive. Due the excessive heating of the air in winter, often producing strong annealing, negative values occur leading to loss of viability buds (Dobrevă et al., 2006). In October, negative air temperatures interrupt often suddenly the grapevine vegetation and, respectively the wood maturation. The winter frosts harshness and their damages require vineyards protection (Jerzy, 2007).

Among the carbohydrates, starch is the most important reserve substance of cane, and the percentage that is in the cane, the end of the growing influence plant resistance to low temperatures in winter conditions. Furthermore the amount of starch in the grapevine canes is influenced by maturation period of the shoots. A good cannes maturation determines a higher accumulation of reserve substances (Dejeu, 2010, Nedelkovski et al., 2012).

Starch is accumulates mainly in the inner layers of the xylem, from the fall from the decrease in starch content until January, followed by an increase with a maximum spring. With the decrease of temperature decreases the starch content due to hydrolysis and increases the corresponding amount of carbohydrates. The vine frost resistant varieties the starch accumulation begins earlier and it is more intense. After frost in the resistant varieties, the starch transition to soluble carbohydrates is rapidly produced, while in the low frost resistant starch kept at a higher level. (Jităreanu et al., 2011).

MATERIAL AND METHOD

The aim of this study was to determine the frost resistance at grapevine varieties: Fetească albă, Fetească regală, Frâncușă, Grasă de Cotnari, Tămâioasă românească, Riesling italian and Băbească gri grown in vineyards Iasi, Cotnari and Dealul Bujorului. The biochemical indicators used for appreciation of maturation stage of canes, were: starch soluble carbohydrates and protein concentration in the canes.

Starch content (%) of canes vine was determined by analyzing the annual elements (the rod cane), freshly harvested. To determine the presence of starch in the annual branch color reaction was performed using Lugol reagent, I in KI. Branches were cut with the microtome, preparations were made and then examined under a microscope.

The degree of maturation of canes by determining the amount of carbohydrates in cane were chemically determined by anthrone reagent method (Călugăr et al., 2010). For that 10 canes were collected in different parts of the hub of each variant for each variety.

Determination of nitrogen was made after a standard identical to the draft International Standard ISO 5983: 1992, replaces STAS 9597 / 3-74. The standard used to set the method for determining total nitrogen content by the Kjeldahl method and the calculation method of crude protein content.

Kjeldahl digestion converts nitrogen compounds (proteins, amines, organic compounds) in ammonium compounds. Free ammonia is released by the addition of caustic substances, which are then expelled by distillation and subsequently titrated.

The principle of the method consists in organic matter mineralization with sulfuric acid in the presence of a catalyst, alkalizing products of reaction, distillation and titration of ammonia released, calculate the total nitrogen content and multiplying the result by the conventional factor 6.25 to obtain crude protein content.

RESULTS AND DISCUSSIONS

Starch content (%) in grapevine canes

In winter the starch begins to decrease, and the concentration of sugars begins to rise, and these changes are associated with the development of hardy vines. During winter starch is synthesized, thus increasing the concentration of sugars in the cane, which is used as a barrier against injury caused by low temperatures. In late winter there is a reverse conversion of carbohydrates, thus increasing the concentration of starch and sugars reduces the (Bennett, 2002).

Starch accumulation in vine chords is slow at the beginning, but during periderm formation increases strongly. All starch accumulates extensively in later stages of maturation.

Measured by the three experimental fields in december 2012 showed a normal behavior of the varieties analyzed, confirming all aspects of starch accumulation in cane (fig. 1). During the spring increases (february), the amount of starch decreased, a phenomenon observed by reducing color. Starch located in phloem rays decreased faster than the xylem rays. Notable amounts of starch remained in the rays of xylem (fig. 1).

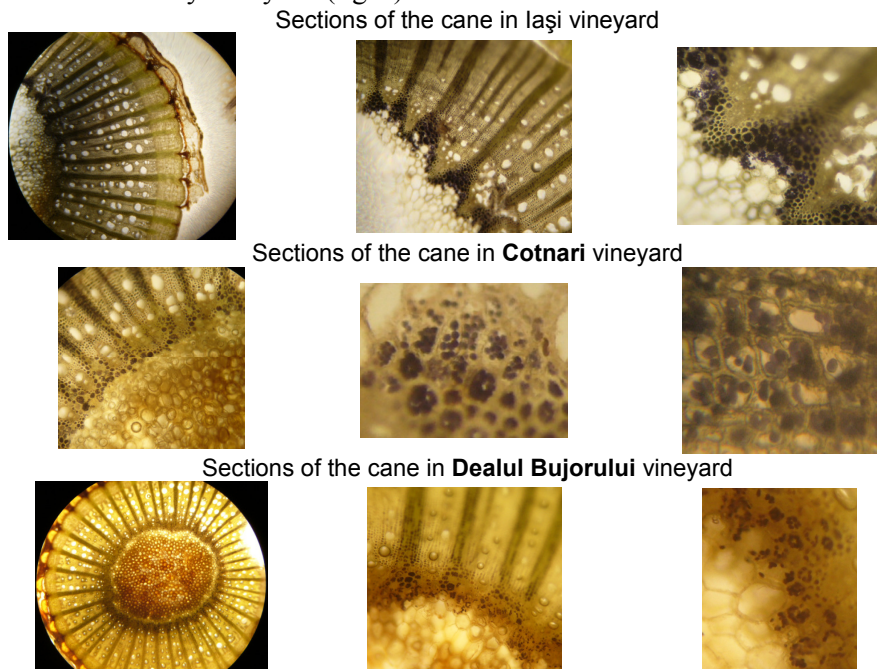


Fig. 1 - Sections through the canes of vines during the dormant period

Quantitatively, the values of the concentration of carbohydrates and starch, showed good maturation of the wood in all varieties tested.

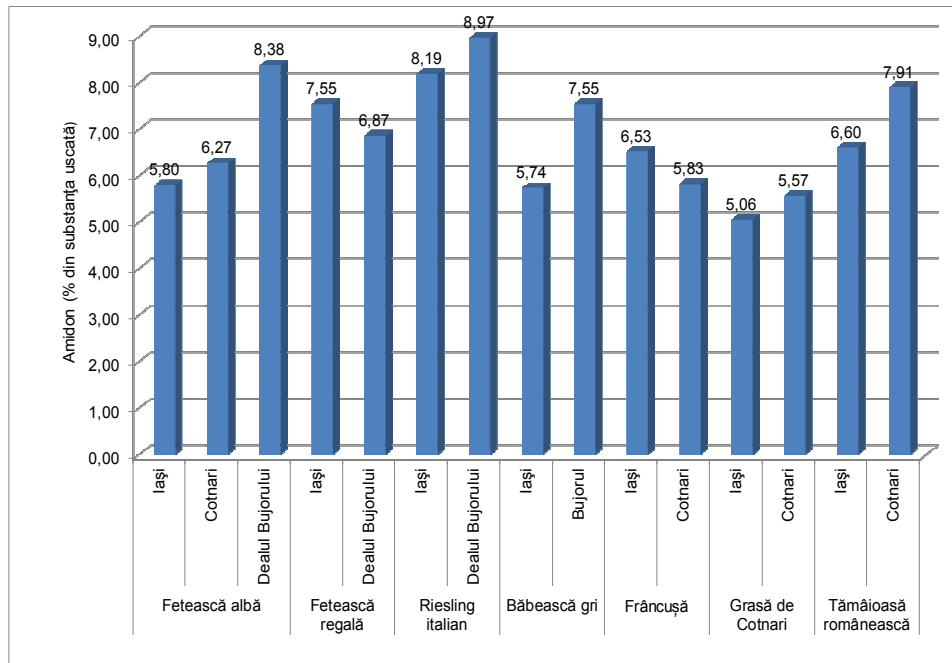


Fig. 2 - Canes starch content (% of dry matter) during deep sleep of grapevine, in horticulture year 2012-2013

Percentage concentration of starch content showed that its enzymatic hydrolysis process was more or less intense, depending on each genotype, a process which began with the gradual decrease in temperature from the end of October. Variability in starch content ranged from 5.06% for variety grown in the vineyard Cotnari Iasi, 8.97% Italian Riesling variety grown in the vineyard Dealul Bujorului (fig. 2).

Starch content values close to the normal (3.6%) were recorded in most varieties analyzed, except Fetească White Dealu Bujorului vineyard cultivated and grown cultivar Italian Riesling vineyards Dealu Bujorului and Science, in which the starch content was between 8.19% and 8.97%, showing that the enzymatic hydrolysis was less intense.

Riesling italian variety distinguished by a maximum of starch content in both vineyards analyzed canes (Iasi and Dealul Bujorului) showing the greatest resistance to low temperatures during the rest 2012-2013.

Carbohydrate concentration during vine dormancy in horticultural year 2012-2013

Changes in carbohydrate content is the main biochemical change that occurs in the tissues woody vine hub during dormant, these organs causing frost resistance of wood.

Grape sugars resulting from the process of photosynthesis during the growing place of all organs hub green vine. Wood bodies sucrose as starch is deposited, becoming a stable reserve of carbohydrates, accessible hub bodies throughout the growing season. Massive flow of carbohydrates during phenophase of firstfruits comes in mostly from the hydrolysis of starch stored in the organs woody vine hub.

At the same time, removal of water by sweating process causes an apparent increase of the total carbohydrate content. Since mid-October, the enzymatic hydrolysis of starch increases, leading to an increased soluble carbohydrate content, correlated with decreasing growth temperature freezing.

Carbohydrate accumulation had the same intensity for the seven species analyzed, the values ranging from 6.96 to 13.5% (fig. 3).

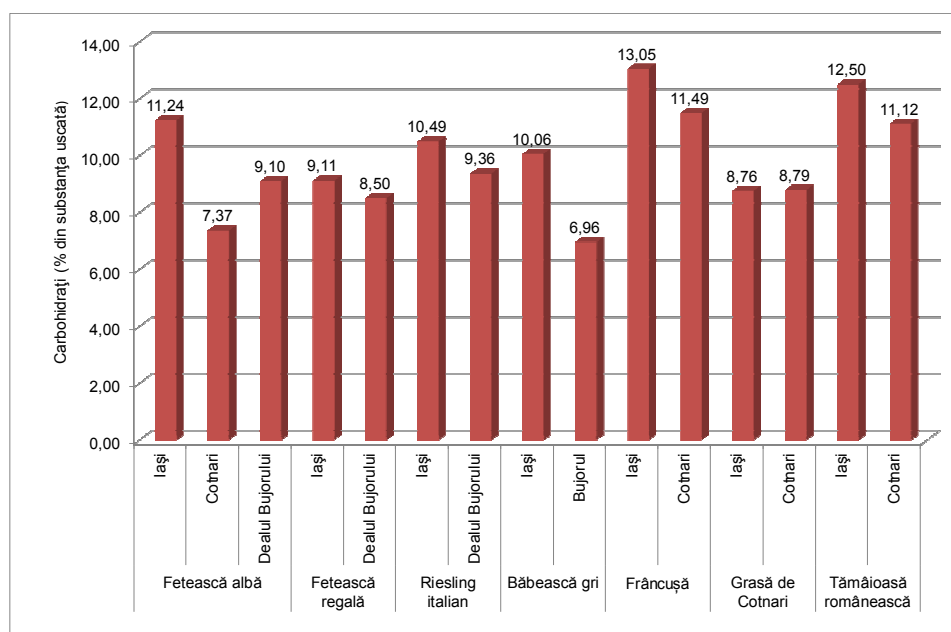


Fig. 3 - Carbohydrate content of canes (% of dry matter) during deep sleep period of grapevinevine, in horticulture period 2012-2013 year

Carbohydrate content of the canes, caused a individualization of the variety Frâncușă, which recorded the highest values of 13.5% and 11.49% Iași vineyard vineyard Cotnari. Thus, we conclude that this variety has adapted to the climatic conditions in the NE part of the country, accumulating during the growing season

a sufficient amount of reserve substances, which ensures the optimum wintering. The same behavior had the and variety Tămâioasă românească, with values of 12.5% in Iași and 11.12% in Cotnari.

At the opposite side was the Băbească gri variety grown in Iasi, which accumulated the smallest amount of carbohydrates (6.96%), which does not provide good resistance to winter in northern Romania.

Total protein content of the canes during the rest of the horticultural year 2012-2013

Before the abscisic of the leaves occurs the hydrolysis of protein and poliglucides in leaves and their retranslocation form of free amino acids, respectively, soluble carbohydrates in canes and shoots.

At the same time, there is also retranslocation of high mobility ions (nitrogen, phosphorus, potassium, magnesium), all these compounds contribute to increasing of the tolerance capability of the vine negative temperatures in the rest period, as a respiratory substrate or for the production of biochemical energy.

Results of the total protein content varieties studied in the three vineyards covered can be found in figure 4.

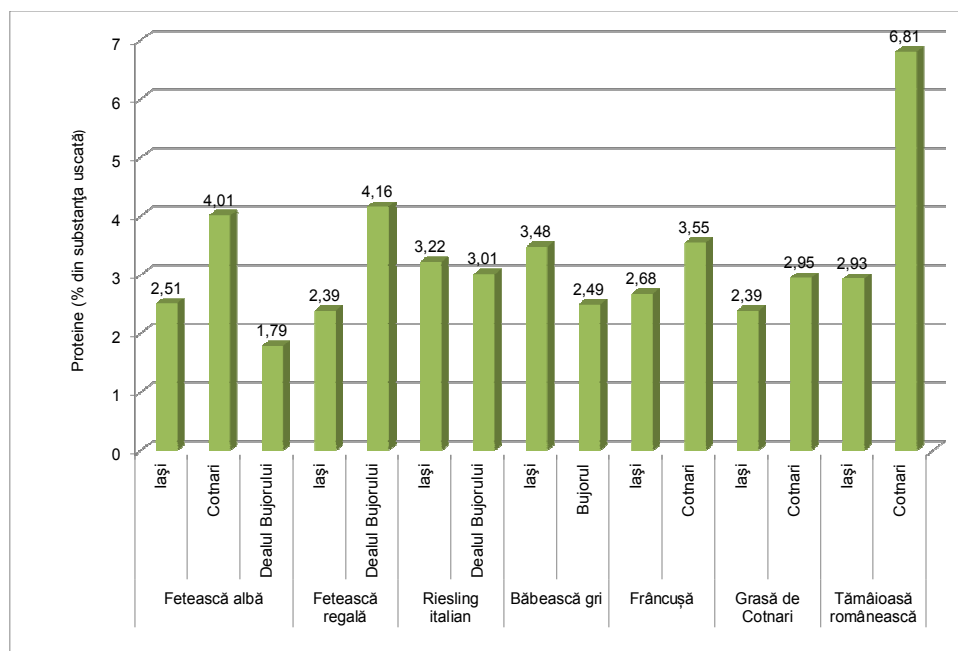


Fig. 4 - Protein content of the canes during deep sleep period in grapevine, since horticulture period 2012-2013 year

Compared with the vines grown in Iasi, the vineyard Cotnari accumulated more crude protein values ranging from 2.95% variety Grasa de Cotnari and

6.81% in Tămâioasă românească variety, which has contributed to a better resistance frost buds.

The analysis of the varieties grown in the vineyard Dealul Bujorului compared with those from Iasi, shows that there are significant differences in the total protein content in Fetească alba, Băbească gri, Riesling italian, with one deviation from the Fetească regala to that reported an increase of 1.8%.

These differences are positive for Fetească regală, where values ranged from 4.16% to 2.39% in Bujorul and Iasi and Fetească albă negative values 2.51% and 1.79% in Iasi and Bujoru, Băbească gri with a difference of 0.99%. Riesling italian variety were not significant differences depending on the vineyard (fig. 4).

The high protein concentration contributed, at the varieties from Cotnari, to a better resistance to frost of the buds, basically at these varieties there are no loss of eyes in winter.

CONCLUSIONS

1. Starch content values close to normal (3-6%) were recorded in most analyzed varieties, except Fetească albă cultivated in Dealul Bujorului vineyard and Riesling Italian variety of Dealul Bujorului and of Iași vineyards to which the starch content was high, which indicates a reduced hydrolytic activity.

2. Carbohydrate content of the canes caused a individualization of the variety Frâncușă, which recorded the highest values in Iași vineyard and winery Cotnari, this variety has adapted to the climatic conditions in the NE part of the country, accumulating during the growing amount sufficient reserve substances, which ensures the optimum wintering.

3. Compared to the vines grown in Iasi, the vineyard Cotnari crude protein accumulated more Grasă de Cotnari and Tămâioasă românească varieties, which has contributed to a better resistance to frost of the bud. The analysis of the varieties grown in the vineyard Dealurile Bujorului compared with those from Iasi, shows that there are significant differences in the total protein content.

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