ORGANOLEPTIC, BIOCHEMICAL AND UVOLOGIC FEATURES OF THE DISTANT HYBRIDS OF VINE (*VITIS VINIFERA* L. *x MUSCADINIA ROTUNDIFOLIA* MICHX.)

PARTICULARITĂŢI ORGANOLEPTICE, BIOCHIMICE ŞI UVOLOGICE ALE HIBRIZILOR DISTANŢI DE VIŢĂ DE VIE (*VITIS VINIFERA* L. x *MUSCADINIA ROTUNDIFOLIA* MICHX.)

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Abstract. *Analyzing the organoleptic features of distant hybrids of vine Vitis vinifera L. x Muscadinia rotundifolia Michx. compared with common species of table grapes, mainly characterized by large grape berries (length, weight, diameter, etc.) it appears that distant hybrids: DRX-M_4-502 and DRX-M_4-578, have medium sized berries (20 mm.), DRX-M_4-571 and DRX-M_4-640, have berries of 21 mm, and DRX-M_4-512, have berries of 22 mm in length. These hybrids don't have the specific characteristics of direct production hybrids, characterised by the foxat taste of the grape berries, caused by the presence of the methyl anthranilate. The distant hybrids studied according to the classical uvologic and technological principles can be classified as follows: 5 distant hybrids are attributed to the table vine species and 2 distant hybrids have mixed properties. According to the physical and biochemical indices of the grapes of the studied distant hybrids, their characteristics are similar to European vine species.*
Key words: *berry, flavor, taste, resveratrol, pectin, sugars, pH, morphology.*

Rezumat*. Analizând particularităţile organoleptice ale hibrizilor distanţi de viţă de vie Vitis vinifera L. x Muscadinia rotundifolia Michx. în comparaţie cu soiurile de viţă de vie tipice de masă, ce se caracterizează în special prin bace de dimensiuni mari (lungime, greutate, diametru etc.) se constată faptul că hibrizii distanţi: DRX-M_4-502 şi DRX-M_4-578 deţin bace de mărimea mijlocie (20 mm.), DRX-M_4-571 şi DRX-M_4-640 deţin bace cu dimensiuni de 21 mm, iar DRX-M_4-512 deţine baca de 22 mm în lungime. Aceşti hibrizi nu posedă caracterele specifice hibrizilor producători direcţi, una din caracteristicile cărora fiind gustul de foxat al bacelor, condiţionat de prezenţa metilantranilatului. Hibrizii distanţi studiaţi în conformitate cu principiile clasice uvologice şi tehnologice pot fi clasificaţi astfel: 5 hibrizi distanţi sunt atribuiţi soiurilor de masă, iar 2 hibrizi distanţi deţin proprietăţi mixte. Conform indicilor fizici şi biochimici ai bacelor hibrizilor distanţi studiaţi, caracteristicile acestora sunt similare soiurilor de viţă de vie europene.*
Cuvinte cheie*: bacă, aromă, gust, resveratrol, pectine, zaharuri, pH, morfologie.*

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INTRODUCTION

Plants, including vines, are one of the main sources of phytochemical compounds with medicinal, aromatic, cosmetic, nutritional properties etc.

As a result of numerous studies over the years, the most chemicals that are found in different anatomical parts of the vine have been identified. The acids, tannins and pigments are chemicals that determine the taste, aroma and color of berries.

Physicochemical peculiarities of grape berries are varied and depend on the characteristics of the soil, the pedo-climatic conditions of the region, agro technical works undertaken and the time of harvest.

Scientific studies have shown that certain plants, such as grapes, blueberries, pomegranate etc. contain a substance called resveratrol, which determines the plant resistance to various unfavorable environmental factors. It was found that this substance is present in large quantities in grapes with berries of red or blue-violet color (especially in their rind) (Alexandrov, 2012).

MATERIAL AND METHOD

Distant hybrids of vine (*Vitis vinifera* L. x *Vitis rotundifolia* Michx Muscadinia.) served as study material.

Botanical description of distant hybrids was performed during all phases of the vegetative stages; the organs of the plants were studied from spring, at bud unfolding, until early autumn, at the fall of the leaves. The bio-morphological characteristics of the organs were studied at the stages of: - bud unfolding – leaf and shoot growth - blossoming – berries growth - grapes ripening, wood maturing and leaf drop. (Alexandrov E., 2010)

The methods exposed in the Technical regulations "Methods of analysis in the domain of wine production" were used while performing the biochemical and uvologic analyzes.

RESULTS AND DISCUSSIONS

Analyzing the features of the distant hybrids of vine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) in comparison with common species of table grapes, which are characterized primarily by large berries (length, weight, diameter), it has been found that the distant hybrids DRX-M_4-502 and DRX-M_4-578 have medium-sized berries (20 mm.), DRX-M_4-571 and DRX-M_4-640 have berries of 21 mm and DRX-M_4-512 has berries of 22 mm in length.

According to the consistency of the pulp it has been found that the grapes of the distant hybrid DRX-M_3-3-1 can be used both for direct consumption and for industrial processing, the same as the vine species Chasselas Rose and Muscat Hamburg, which are used for consumption and light wines production.

The distant hybrid DRX-M_4-578 has typical properties of the vine species *Vitis vinifera* L. - berries with a slight floral aroma with savour of quince.

From organoleptic point of view, the studied distant hybrids don't possess the specific characteristics for the direct production hybrids, for example, the

foxat taste of berries, conditioned by the presence of the methyl anthranilate. According to the studies of Cotea (1985), a high concentration of methyl anthranilate - 0.2 mg/l, which prevents their use for food or wine production, is characteristic for the direct production hybrids. The results of the chromatographic investigations carried out at the National Institute of Vine and Wine have shown that at the majority of intraspecific hybrids this index is 2-5 times lower, so the grapes of these hybrids can be used in food (Gaina, 1990).

According to the taste and aroma characteristics, the distant hybrids DRX-M_3-3-1; DRX-M_4-502; DRX-M_4-512 etc. can be attributed mainly to the species of table grapes.

It has been attested that the distant hybrid DRX-M_4-580 has obvious herbaceous nuances, in their structure the flavour of Melissa prevails. For this hybrid, an optimal, balanced ratio of acidity, sugars and tannin substances is characteristic. The distant hybrid DRX-502-M_4 is characterized by the crisp pulp of the berry with pronounced taste features typical for table grapes. The berry juice of most distant hybrids has a pleasant fresh taste (with moderate acidity), and some have a harmonious, sweet, soft taste, (DRX-M_4-609, DRX-M_3-3-1).

The distant hybrid DRX-M_4-640, which has a lower organoleptic grade (8.6), is characterized by tannic and astringent taste, and its aroma is dominated mainly by sloe and red fruit nuances. A high organoleptic appreciation, of 8.9 points, has the distant hybrid DRX-M_3-3-1, with a well ripe plum aroma and a mellow taste.

In conclusion, we can state that the distant hybrids studied according to the classical technological and uvologic principles can be classified as follows: 5 distant hybrids are attributed to the table grape species and 2 distant hybrids have mixed properties, so they can be used for current consumption and for industrial processing.

These results, being intermediate in the programme of study of distant hybrids, reflect the climatic conditions characteristic for 2012.

The summer of 2012 in Moldova was abnormally warm and dry. The average air temperature for the period from June to August was higher than normal values with 3.0 to 4.5 ° C and it was +21.7 ... +24.8 ° C.

In June, the average air temperature was higher than normal values with 2.9 - 4.4 °C, and, it was +20.7 ... +24.0 °C.

The average daily air temperature in June reached +29 ... +31 º C on the territory of Republic of Moldova and the maximum air temperature this month reached +37.2 ...+40.1 ºC.

July was the warmest month of this year, with a monthly average air temperature of +23.7...+26.7 °C, exceeding the norm with 4.3 - 5.7 º C.

The abnormally warm weather continued in the first 10 days of august. The average air temperature was +24.1...+27.5 ºC; so, it was with 4.1 - 5.6 ºC higher than the normal temperature at this time.

In the summer of 2012, the maximum soil surface temperature reached the value of 71 º C. The number of days with the maximum air temperature of +30 °

C and higher in this summer was 39-62 days (while the norm is about 8-27 days). The number of days with temperatures of 35 º C and higher was generally 16-35 days (the norm is about 1-2 days). Values of air temperature of +40 °C and higher were registered on 40% of the country for the first time, the number of days with such values being 1-3 days.

The quantity of rainfall during the summer in the country was basically 70-145 mm (35-70% of the norm). The total number of days without precipitations throughout the season was about 60 days.

Compared to the summer of 2011, this season was with 1.5 to 2.5 ° C warmer and with considerably less precipitations (with 20-120 mm).

Taking into account the weather conditions during June - August 2012, it was established that the most part of the country showed strong and very strong drought. The hydrothermal coefficient for that period averaged 0.5, which corresponds to strong and very strong drought.

In such climatic conditions, mixed vine varieties acquire easily specific characteristics of table grape varieties and acquire less characteristics of the varieties used in industrial processing (they have less juice and berries are crunchy).

In the years with high humidity and moderate temperatures, the opposite phenomena are observed: pulp is less crunchy and is juicier; the juice is more acidic, with lower carbohydrate concentration (Gaina et al., 2006).

As for the biochemical and physicochemical indicators, according to the concentration of organic acids (tartaric and malic acid) all distant hybrids can be attributed to European vine species Vitis vinifera L., the tartaric acid varying in the range of 3.2 g /dm^3 up to 4.7 g/dm^3 and malic acid varying from 1.9 g/dm^3 up to 3.1 g/dm^3.

The glucose and fructose concentration constitute on average 95.5 - 99.3% of the total concentration of sugars (100%).

The glucose / fructose ratio is typical for European vine varieties, varying in the range of 1.04 - 1.17.

The concentration of phenolic substances denotes the belonging of the obtained distant hybrids to the varieties of table grapes. The amount of these substances in distant hybrids of vine with green-yellow berries varies within the limits from 201 mg/dm^3 up to 293 mg/dm^3 and for hybrids with berries with a blue-violet hue - from 777 mg/dm^3 up to 809 mg/dm^3.

It is worth mentioning that the resveratrol concentration, as a biological compound for human nutrition, is relatively higher compared to classical vine varieties (4.1 - 5.3 mg/dm^3) and it varies at distant hybrids within the limits from 5.7 mg/dm^3 to 11.7 mg/dm^3.

According to physical and biochemical indices of the berries of the studied distant hybrids, their characteristics are similar to European vine varieties: the total nitrogen varies within the limits from 563 mg/dm^3 până la 740 mg/dm^3, phosphorus – 179-263 mg/dm^3, calcium 107-156 mg/dm^3, potassium – 1367-2013 mg/dm^3 and magnesium - 103-144 mg/dm^3.

The colour of vine berries is a very stable morphological character. This index has not only a practical significance for winemaking, but is also used as a character of determination and classification of species and varieties of vine. Some grape varieties can be distinguished only by the colour of the berries.

Analyzing the physicochemical characteristics of the berries of distant hybrids of vine *(Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.*),* in comparison with the berry colour, it was found that the concentrations of chemical substances: phenolic substances, resveratrol, pectin etc. vary depending on the colour of berries.

The concentration of phenolic substances in berries of distant hybrids of vine varies depending on their colour: distant hybrids with green-yellow berries contain on average 268.5 mg/dm^{3}phenolic substances and distant hybrids with blue-violet berries contain on average 793 mg/dm^3.

The resveratrol concentration also varies from 7.03 mg/dm^3 in berries with a green-yellow hue to 10.1 mg/dm^3 in berries with a blue-violet hue.

The mass concentration of pectins also varies from the 567 mg/dm^3 in berries with a green-yellow hue to 705.5 mg/dm^3 in berries with a blue-violet colour. (Fig.1.)

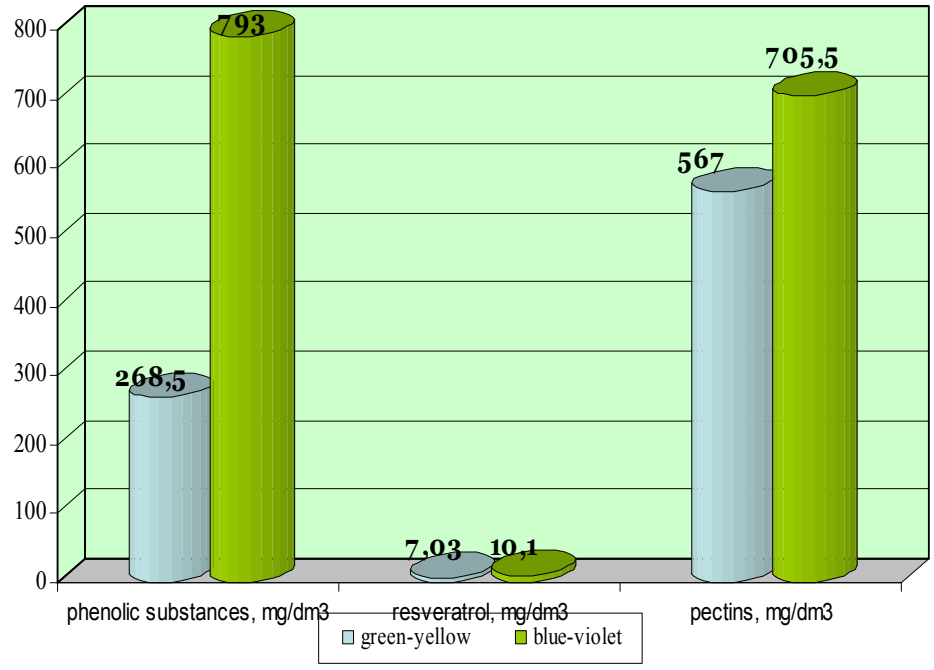

Fig. 1 - Physico-chemical peculiarities depending on the color of distant hybrids' berries (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.)

CONCLUSIONS

1. The distant hybrids of vine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.), studied according to classical uvologic and technological principles, are classified in the following way: 5 distant hybrids are attributed to the table grapes varieties and 2 distant hybrids possess mixed properties (for current consumption and industrial processing).

2. From organoleptic point of view, the studied distant hybrids of vine (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) don't posses characteristic features of direct production hybrids, which have a specific taste of foxat (due to the presence of the methyl anthranilate) or herbaceous taste (hexanal, Hexenal, cis-and trans-derivates).

3. According to the concentration of organic acids (tartaric and malic acid), all distant hybrids can be attributed to European vine species Vitis vinifera L., the tartaric acic ranging from 3.2 g/dm^3 to 4.7 g/dm^3 and the malic acid - from 1.9 to 3.1 g/dm^3.

4. The most distant hybrids have crunchy pulp and the taste of the juice is pleasant, harmonious, fresh (with moderate acidity), sometimes sweet and soft (DRX-M_4-609; DRX-M_3-3-1).

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