

**PARTICULARITIES OF THE MORPHOLOGY AND THE
BIOCHEMISTRY OF THE GRAPE BERRIES OF VINE
INTER-SPECIFIC HYBRIDS OF 4th BACKCROSS
(*VITIS VINIFERA* L. X *MUSCADINIA ROTUNDIFOLIA*
MICHX) AND OF *VITIS VINIFERA* SUBSP.
SYLVESTRIS GMEL.**

**PARTICULARITĂȚILE MORFOLOGICE ȘI BIOCHIMICE ALE
BACELOR HIBRIZILOR DE VIȚĂ DE VIE INTERSPECIFICI
(*VITIS VINIFERA* L. X *MUSCADINIA ROTUNDIFOLIA* MICHX.) DE F₄
ȘI *VITIS VINIFERA* SUBSP. *SYLVESTRIS* GMEL**

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Abstract. *Physico-chemical analysis carried out on berries vine distant hybrids (*V. vinifera* L. x *M. rotundifolia* Michx.) of the IV generation showed that the concentration of phenolic substances, resveratrol, pectin, etc. is relatively higher than in the vine varieties of crop (*V. vinifera* L.). However, forest vine (*V. sylvestris* Gmel.), has concentrations of phenolic substances, resveratrol, pectin etc. much more than distant hybrids of vine (*V. vinifera* L. x *M. rotundifolia* Michx.) of the IV generation.*

Key words: berries, distant hybrids, phenolic substances, resveratrol, pectin.

Rezumat. *Analizele fizico-chimice efectuate asupra bachelor hibrizilor distanți de viță de vie (*V. vinifera* L. x *M. rotundifolia* Michx.) de generația a IV-a au demonstrat faptul că concentrația substanțelor fenolice, resveratrolilor, pectinelor etc. este relativ mai mare decât în soiurile viței de vie de cultură (*V. vinifera* L.). Vița de vie de pădure (*Vitis sylvestris* Gmel.) deține însă concentrații de substanțe fenolice, resveratrol, pectine etc. cu mult mai sporite decât hibrizii distanți de viță de vie (*V. vinifera* L. x *M. rotundifolia* Michx.) de generația a IV-a.*

Cuvinte cheie: bacă, hibrizi distanți, substanțe fenolice, resveratrol, pectină.

INTRODUCTION

Scientific research has shown that some plants such as grape, blueberry, pomegranate etc. contain a substance called *resveratrol*, a phytoalexin, whose function is involved in protecting the plant against various environmental factors that have a negative influence on the development of the plant organism. Resveratrol is a powerful antioxidant with anti-inflammatory properties found in significant concentrations in the wine.

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MATERIAL AND METHOD

The plant material was composed of grapes interspecific hybrids of the fourth backcross (*Vitis vinifera* L. x *Muscadinia rotundifolia* Michx.) (The hybrids were obtained in the Laboratory of Dendrology of the Botanical Garden (Institute) of Academy of Sciences of Moldova), the *Muscadinia rotundifolia* Michx., of *Vitis vinifera* L. (or vines planted), *Vitis vinifera* subsp. *Sylvestris* Gmel. (or wild grape or vine wood). Morphological and biochemical tests were according to methods approved by the International Office of Vine and Wine (1999). The morphological analysis were performed in the Laboratory of Dendrology of the Botanical Garden (Institute) of the Academy of Sciences of Moldova, such biochemical were performed in the laboratory control of the quality of the wines on the National Institute of Vine and Wine of the Republic of Moldova and the National School of Agronomy of Montpellier, France.

RESULTS AND DISCUSSIONS

Morphological and biochemical elements and clusters of grapes that have reached maturity, are shown in table 1.

Table 1

The morphological particularities of the grape berries of inter-specific hybrids of the 4th backcross (*V. vinifera* L. x *M. rotundifolia* Michx)

Nr.d/o	Hybrid	Morphological particularities
1.	DRX-M ₄ -502	Gapes of cylindrical shape, length 12 cm. Bay of medium size. Length - 20 mm. Shape - elliptical short. Color yellowish-green film.
2.	DRX-M ₄ -510	Bunch of grapes very short. Number of bays from 90 to 120. Small bay. Length of 16 mm. The shape is a truncated cone. Color yellowish-green film.
3.	DRX-M ₄ -515	Grapes of cylindrical uniaxial, with one wing, of small size (10 cm in length). Bay average (20 mm long), elliptical and short. The membrane is pink. The consistency of the pulp is dense.
4.	DRX-M ₄ -520	Grapes of cylindrical biaxial, small, 20 cm long. Very small bay. Yellowish-green color.
5.	DRX-M ₄ -537	Grapes of medium size. Bay of yellowish-green, elliptical short. Growing season 180 days.
6.	DRX-M ₄ -541	Grapes of small dimensions. Bay of yellowish-green color. elliptical short. Growing season 180 days.
7.	DRX-M ₄ -542	Grapes of medium size, 19 to 22cm in length. Cylindrical, uniaxial, single wing, with 110 to 120 seeds. The bay is shaped like a truncated cone. Yellowish-green color. Length from 16 to 18 mm. The pulp is juicy and not very consistent.
8.	DRX-M ₄ -545	Grapes of short dimensions of 18 cm length. Cylinder-shaped cone, uniaxial, a compactness of 80 seeds. The bay is small, of uniforms elliptical, with the color yellow. Growing season about 180 days.
9.	DRX-M ₄ -660	Bay of medium size, 21 mm in length. The uniform size. Form of a truncated cone. Circular cross section. Color of the blue-violet film. Succulent flesh. Consistency pulp very hard.
10.	DRX-M ₄ -678	Grapes form, cylinder cone, uniaxial. Small, 10 cm in length. Bay of medium size, 20 mm in length. Cylinder-shaped cone. Yellowish-green color. Consistency of the pulp very hard.
11.	<i>Vitis sylvestris</i>	Very small grapes, 10 cm in length. Berry small, round, 6 to 10 mm in diameter. Color of a blue-violet shade.

The biochemical composition is very different from one genotype to another, both quantitatively and qualitatively. The following materials were assayed in grape berries: total polyphenols, resveratrol, pectin, organic acids, pH.

The biochemical analysis demonstrated a concentration of total polyphenols compounds, which varies among genotypes: 1970 mg/kg for hybrid purple-blue berries (DRX-M4-660), 597 mg/kg for hybrid pink peppercorns DRX-M4-515), and for hybrid yellow-green berries in the intervals of 219 mg/kg (DRX-M4-520) until to 309 mg/kg (DRX-M4-545). This important biological index is a characteristic of resistance against fungal attack by parasites, bacteria, etc. of phylloxera. Concerning hybrid DRX-M4-660, with purple-blue berries, containing 1970 mg/kg of polyphenols compounds, it should be noted that over the content of those noted in the varieties Kismis of Bujac (481 mg/kg), Kismis Moldova (399 mg/kg) and Pamyat Juraveli (511 mg/kg), determined in the years 2003-2007 at the National Institute of Vine and Wine of the Republic of Moldova (Gaina B. et al. 2007; Odageriu G. et al. 2007; Heroiu Elena et al. 2005).

Compared with the inter-specific hybrids and species mentioned above, the wild grape (*Vitis silvestris* Gmel.) With purple-blue berries contains 2019 mg / kg of phenolic compounds, which is absolutely remarkable. Figure 1 shows the overall results and highlights the hybrid DRX-M4-660 and *Vitis silvestris* Gmel.

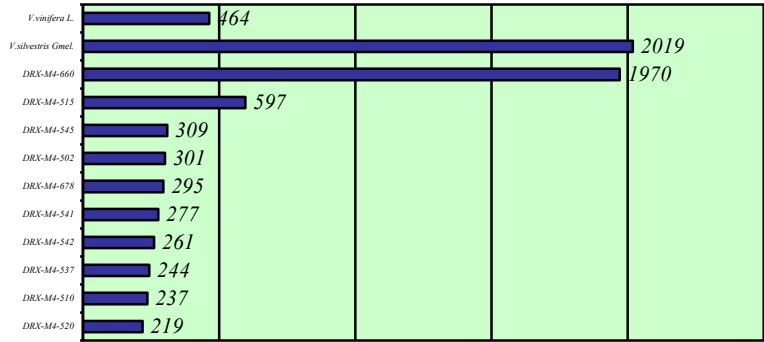


Fig. 1. Content of grape berry total polyphenols compounds (mg/kg) of inter-specific hybrids *V. vinifera* x *M. rotundifolia* and of *V. silvestris*.

It should be noted that in inter-specific hybrids of the fourth generation of backcrosses, there is also a relatively high concentration of resveratrol, from 4.9 mg/kg (DRX-M4-510) to 14.0 mg / kg (DRX-M4-660).

Resveratrol is also involved in resistance to pests and pests, as well as trap free radicals in the human body. In the hybrid grapes to dark purple-blue color, along with high concentrations of polyphenols compounds of 1970 mg/kg (DRX-M4-660), relatively high concentrations of resveratrol of 14.0 mg/kg were detected (DRX-M4-660). As polyphenols compounds, resveratrol content, it also very important, more than twice that of *Vitis vinifera* grapes. If we consider the

following varieties in the South of wine from Moldova during the years 2005-2007 concentrations between 5 and 7 mg/kg were found for Cabernet Sauvignon, Merlot and Pinot-Noir (Heroiu Elena et al. 2005).

The wild vine *Vitis silvestris* in the bays has 16.0 mg/kg of resveratrol, which is again quite significant, while the highest values are those of *Muscadinia rotundifolia*. Figure 2 shows the overall results.

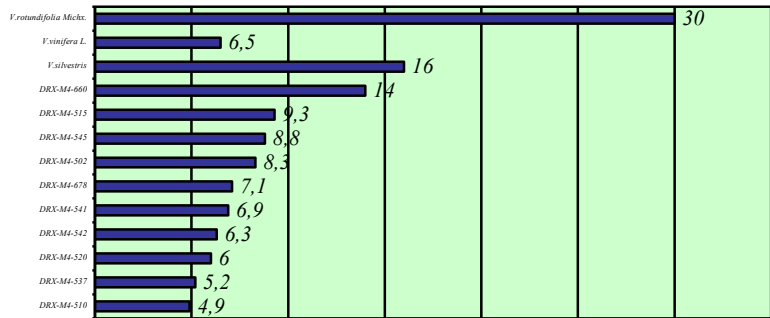


Fig. 2 - Content of grape berry total resveratrols (mg/kg) of inter-specific hybrids *V. vinifera* x *M. rotundifolia*, of *M. rotundifolia* and of *V. silvestris*.

An equally important element for use in products œnothérapie inter-specific hybrids for the consumption of pectins, which are dietary fiber, and are responsible for some balance in the blood of the human body, including the reduction of absorption through the intestinal wall of the first saturated fat and LDL cholesterol (that of oxidized lipids that induce various adverse effects, according to Mr. Montignac, 2010).

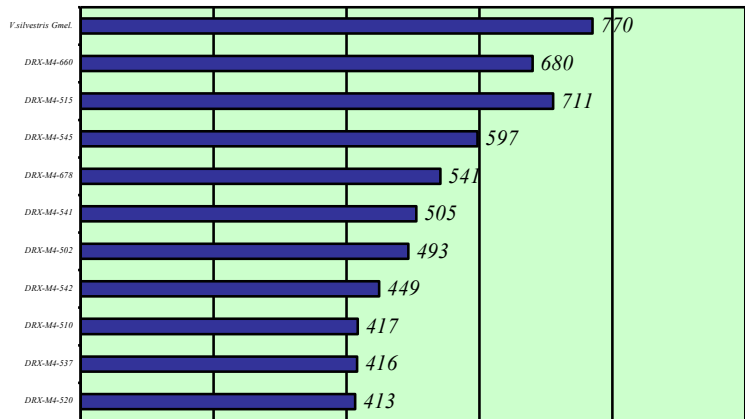


Fig. 3 - Content of total pectins of inter-specific hybrids *V. vinifera* x *M. rotundifolia* and of *V. silvestris*.

In interspecific hybrids it was found that the concentration in the bays of pectin's varies in the range of 413 mg/kg (DRX-M4-520) up to 711 mg/kg (DRX-M4-515). The values of *Vitis sylvestris* here as remarkable. Figure 3 shows the results.

The human body receives almost 50% more fiber needed by consuming an amount of 250-360 g of grapes (the rest of the contribution comes from the bread, vegetables etc.).

The analysis of the potential of the main organic acids in grapes - malic acid and tartaric acid - as well as those of titratable acidity and pH, show a normal presence of these in the total range of biological substances that influence taste, freshness and balance sensory components of the grapes of inter-specific hybrids of the fourth generation of backcrosses *Vitis vinifera* L. x *Muscadinia rotundifolia* Michx., *Vitis sylvestris* is here in the usual standards. Figure 4 shows these values.

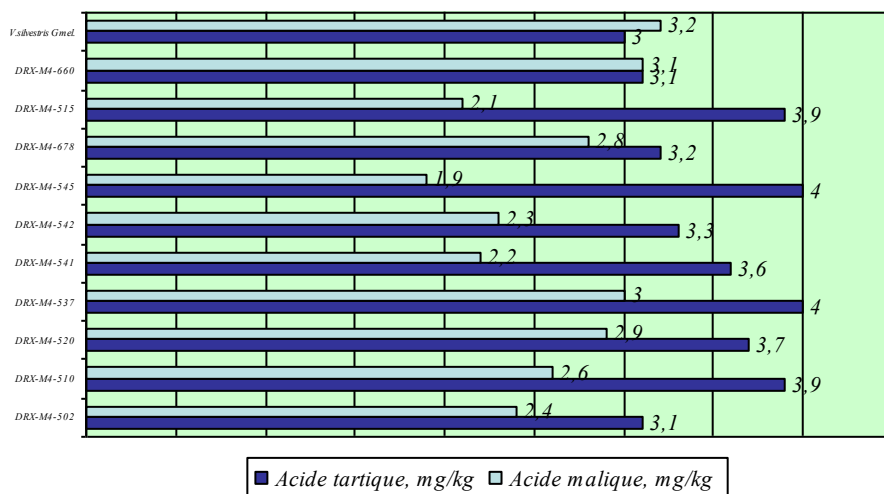


Fig. 4 - Content (mg/kg) of malic acid and tartaric acid of inter-specific hybrids *V. vinifera* x *M. rotundifolia* and of *V. sylvestris*.

According to the results of biochemical analysis performed on the berries of inter-specific hybrids of grapevine (*V. vinifera* L. x *M. rotundifolia* Michx.). Fourth generation of backcrosses, it was found that their contents of polyphenolic compounds, resveratrol or pectin is relatively higher as in vine varieties cultivated (*V. vinifera* L.).

The American vine (*M. rotundifolia* Michx.) has an absolute resistance against phylloxera snout and that of leaves (gall), and a series of resistance to major fungal parasites. It is logical to observe that the concentration of total resveratrols reaches the limit of 30 mg/kg, and also that the levels of total polyphenolics and total pectins are higher than in the European vine (*V. vinifera* L.) n'is not resistant to phylloxera pest or fungal.

Interspecific hybrids (*V. vinifera* L. x *M. rotundifolia* Michx.) are not attacked by the phylloxera gall or snout, or by the major fungal parasites. Their

contents of the above compounds is higher than for vines cultivated less may, however, that the progenitor of resistance *M. rotundifolia* Michx.

But the result perhaps the most original on the wild grape (*V. silvestris* Gmel.) Which is not known to possess significant resistance to biological pests, parasites and pests before. However it is suitable for environments often difficult, and therefore probably has genes for abiotic stress tolerance of the environment. In any case, it contains concentrations of polyphenolic compounds, resveratrol and pectins much higher than inter-specific hybrids, and therefore *Vitis vinifera* L.

CONCLUSIONS

1. Inter-specific hybrids of grapevine (*V. vinifera* L. x *M. rotundifolia* Michx.) arrays with yellowish-green color have total polyphenolic contents within: from 219 g / kg (DRX-M4-520) to 309 mg/kg (DRX-M4-545), resveratrol total of 4.9 mg/kg (DRX-M4-510) to 8.3 mg/kg, and total pectin 413 mg/kg (DRX-M4-520) to 597 mg/kg (DRX-M4-545), inter-specific hybrids with pink berries (DRX-M4-515) holds: the total polyphenolic concentrations of 597 mg/kg, resveratrols total of 9.3 mg/kg, and total pectin 711 mg/kg, and inter-specific hybrids with berries blue-violet (DRX-M4-660) have total polyphenolic content of 1970 mg/kg of resveratrol total of 14.0 mg/kg and total pectin 680 mg/kg.

2. The wild grape (*V. sylvestris* Gmel.) berries with a hint of blue-violet holds: the total polyphenolic content of 2019 mg/kg of resveratrol total of 16.0 mg/kg and 770 mg/kg of total pectin.

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