

## USE OF GRAPE OF VITIS LABRUSCA VARIETY IN THE REPUBLIC OF MOLDOVA

**\*Iorga Eugen, Golubi Roman, Achimova Tatiana, Fiodorov Stanislav, Nojac Elena,  
Vlădicescu Mihai**

„Practical Scientific Institute of Horticulture and Food Technology” – Chişinău, Moldova

**\*Iorga Eugen, [euiorga@yahoo.com](mailto:euiorga@yahoo.com)**

**Abstract:** Actual situation with grape of *Vitis Labrusca* varieties, as well as opportunities of their use are described. Results of investigations of the dynamic process of accumulation of the main nutritive substances in grape of Isabella and Noah varieties are presented. Organoleptical, as well as physical and chemical indices of juice and squash samples obtained from raw material harvested at different phases of ripening are determined. Depending on the ratio of glucides, organic acids and polyphenolic substances in grape, eventual range of non-alcoholic products that can be used widely in food industry is proposed. Principal directions of use of grape of *Vitis Labrusca* from the pre-ripening phase are identified: production of natural acidulants, “green juices” and derivative products (fruit and vegetable matrices).

**Keywords:** „*Vitis Labrusca*”, grape juice, glucides, acids,

In the Republic of Moldova, approximately 9.8 thou. ha of plantations of the grape hybrid varieties, including „*Vitis Labrusca*” (Isabella, Lidia, Noah), have remained mainly (80%) in the central zone. In 2011, it was planned to produce about 50 thou. tons; 20 thou. tons were directed for processing, while average yield amounted to 7-8 t/ha.

Wine-making of grapes of respective varieties was reduced due to the formation of methanol during alcoholic fermentation in amounts exceeding permissible limits, as well as anthocyanins with diglucosides passing into wine during maceration and presenting risk for consumer health [1-3]. Besides, demand for wines of these varieties at markets of the CIS countries has reduced. As a result, above mentioned wines remained in stocks of wine-makers, while purchase prices for grape have decreased by approximately 1.5 times and, thus, viticulturers bear economic losses.

Hence, it becomes reasonable to produce non-alcoholic products of grape of *Vitis Labrusca* varieties. Favorable pedologic and climatic conditions of the central zone permits cultivation of these varieties and production of high quality ecologically clean products (in this case, agricultural technology does not provide application of phytosanitary substances in amounts comparable with ones for European varieties). Depending on the content of glucides, organic acids, polyphenolic substances, mineral substances and vitamins that varies for the period of ripening, wide range of products like acidulants, „green juices” and blended food products can be produced.

It is also favorable that enterprises dealing with processing of fruits and vegetables, as well as can factories like „Călăraşi”, „Orhei-Vit” and „Eco-Vit” are located in this zone.

### Materials and methods

Grape of Noah and Isabella varieties harvested for the period of 23.08-16.09 was used as a raw material to produce juice samples. Titrable acidity expressed in g/l of tartaric acid was determined by titration with NaOH 0.1 N alkaline solution up to the slight pink

tint. The content of glucose and fructose was determined by high-performance liquid chromatography (HPLC) in accordance with Resolution Oeno 23/2003. 25ml juice samples were filtered through blocks of 0.45-0.8-1.2-5  $\mu\text{m}$  filters + pre-filter and were 5-time diluted by homogenization of 20 ml of juice with 80 ml of distilled water in 100 ml measuring flasks. 9ml of every diluted solution of juice were passed through filtering cartridge with last 6ml transferred into the test glass. Mobile phase - acetonitrile: water isocratic eluent in 85:15 ratio; flow rate - 1 ml/min; temperature in column- +20°C. Initially, 10 $\mu\text{l}$  standard solutions of fructose, glucose and saccharose of 5 g/l concentration each were introduced. Then, 10  $\mu\text{l}$  work juice solutions prepared of grape of different phases of ripening were introduced. Solutions were kept in Zorbax-NH<sub>2</sub> 150x4.5 column for some period specific for every substance. Quantitative analysis was carried out using refractometric detector.

The content of malic, tartaric and citric acids was determined by high-performance liquid chromatography (HPLC) in accordance with OIV General Methods. 20 ml juice samples were degassed and then filtered through 0.45  $\mu\text{m}$  cellulose membrane + pre-filter. 8ml of every juice solution were passed through filtering cartridge with last 5ml transferred into the test glass. Mobile phase - eluent solution of 0.0035 M sulfuric acid; flow rate – 0.5 ml/min; temperature in chromatographic column- +20°C. Initially, 10 $\mu\text{l}$  standard solutions of malic, tartaric and citric acids were introduced. Standard solutions had following concentrations: malic acid – 0.8 g/l; tartaric acid – 2.5 g/l; citric acid – 0.6 g/l. Then, 10  $\mu\text{l}$  work juice solutions prepared of grape of different phases of ripening were introduced. Acids were kept in Zorbax Sax 250x4.6 mm column for some period specific for every substance. Quantitative analysis was carried out using diode-array detector (DAD) at 192, 208 and 210 nm wavelengths.

### Results and discussions

Dynamics of accumulation of acids, glucides, phenolic substances, vitamins and mineral substances in grape was studied.

In season of the year of 2011 (23 August – 16 September), grape of „Vitis Labrusca” varieties - Isabella and Noah – were harvested at different stages of their ripening from trial plots of the National College of Viticulture and Winemaking „Stauceni”.

Samples of juice and squash were obtained in laboratory of every batch of harvested fresh grapes under the following technologic process.

For juice, grapes were washed with potable water, destemmed, rinsed and directed into the mechanical screw press, where juice was separated. Then, juice was transferred into the stainless steel vessels and thermally treated for 5 min at 95-98°C temperature. Afterwards, hot juice was poured in 650 ml and 1 l glass jars.

For squash, grapes were washed with potable water, destemmed, rinsed and directed into the pulper of 0.3 mm diameter; then, obtained squash was transferred into the stainless steel vessels and thermally treated for 6 min at 95-98°C temperature. Afterwards, hot squash was poured in 650 ml and 1 l glass jars.

From the organoleptic point of view, juices produced for the period of 1-7 September were estimated as best ones by appearance, color, taste and aroma.

Results of sensorial analysis of juices produced of grapes of Isabella and Noah varieties for the period of their ripening are presented in Figs. 1 and 2.

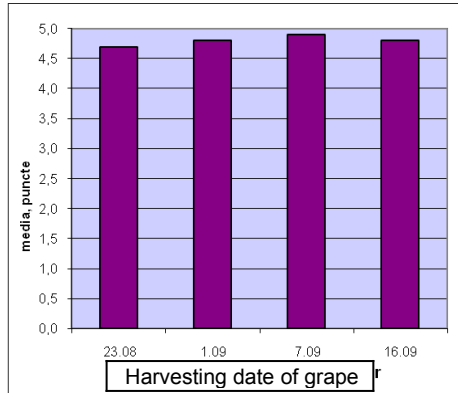


Fig. 1. Organoleptic appreciation of juices variety Isabella

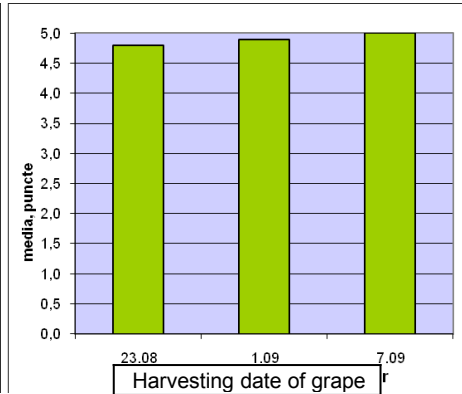


Fig. 2. Organoleptic appreciation of juices variety Noah

Concentration of organic acids and glucides in grape was determined by high-performance liquid chromatography (HPLC) (Figs. 3,4,5 and 6).

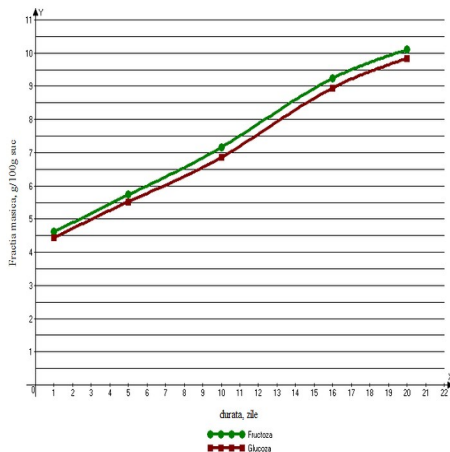


Fig. 3. Accumulation dynamics of glucides to Noah variety

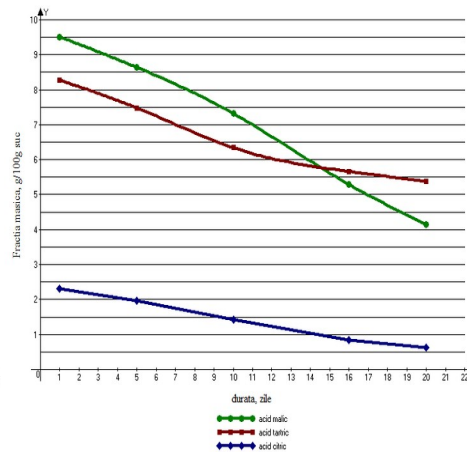


Fig. 4. Content diminution of organic acids to Noah variety

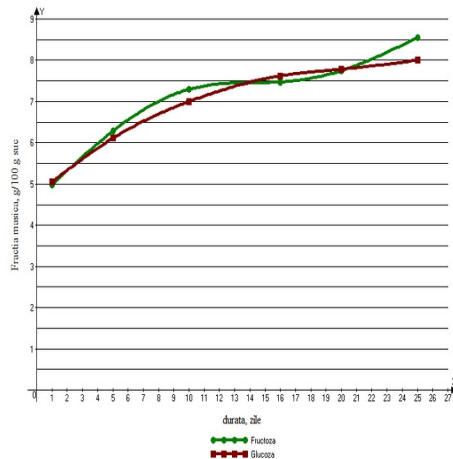


Fig. 5. Accumulation dynamics of glucides to Isabella variety

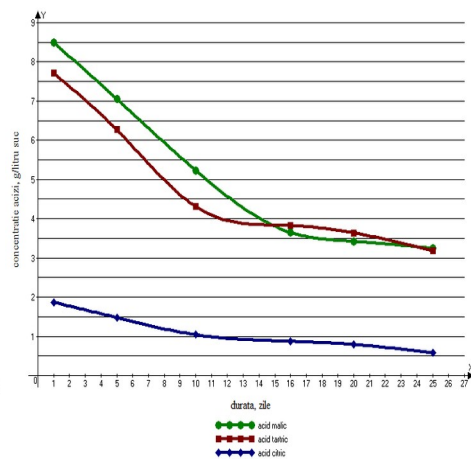


Fig. 6. Content diminution of organic acids to Isabella variety

Basing on the obtained results with regard to the total content of glucides and titrable acidity, sugar/acidity indices in juice samples produced of grape of Noah and Isabella varieties were determined (Table 1)

Table 1. Sugar/acidity indices of grape of Vitis Labrusca varieties

Juice obtained from grapes	Total content of glucides, g/100g	Titrable acidity expr. in tartaric acid, g/100g	Sugar/acidity indices	Harvesting date
Noah variety	9,05	2,17	4,2	23.08.2011
	14,02	1,70	8,2	01.09.2011
	18,19	1,30	14,0	07.09.2011
Isabella variety	10,03	1,85	5,4	23.08.2011
	14,30	1,10	13,0	01.09.2011
	15,59	0,97	16,1	07.09.2011
	16,55	0,75	22,1	16.09.2011

By ratio between the content of glucides and acidity, sample of Noah variety juice with 14.0 index of 07.09 and samples of Isabella variety juice with 13.0 and 16.1 indices of 01.09 and 07.09 respectively were selected by the taste panel as most optimal ones. They have pleasant sweet-sour taste, characteristic varietal color and well expressed, but not intense aroma. Juices with such properties meet requirements for non-alcoholic products of grape and can be consumed directly.

Grape juices with sugar/acidity indices between 5 and 10 are recommended as acidifiers in preparation of dishes, sauces and marinating of meat products.

Large content of simple glucides like glucose and fructose being presented in almost equal proportions provides an important quantity of energy required for vital activities of an organism.

Organic acids - tartaric, malic and in less degree citric one – determine characteristic taste of grape, create fresh and cool gustative sensation and have a refreshing effect.

The total content of polyphenolic substances (IPT) was determined under spectrophotometric method. For the period of 23.08-07.09, it varied within 350-400 mg/l with Noah variety and within 600-700 mg/l with Isabella variety and has increased up to 1,500 mg/l with Isabella variety for the period of 07-16.09.

Results obtained during studying of samples have contributed conceptual elaboration of the range of new food products of grapes of *Vitis Labrusca* varieties (Fig.7).

Trial lots were obtained in laboratory conditions. Correspondingly, following elaboration and improvement of the technologic scheme of production, some lots will be produced also in industrial conditions.

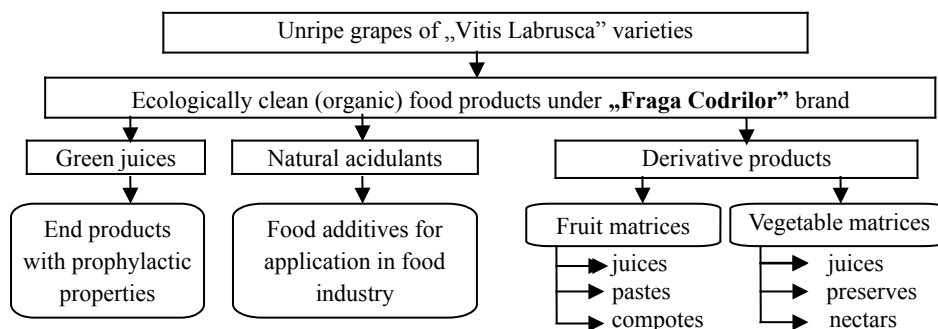


Fig. 7 Range of new food products of grapes of „Vitis Labrusca” varieties

### Conclusions

Additional advantages of the use of grapes of *Vitis Labrusca* varieties for production of non-alcoholic products :

- juices and squashes obtained of unripe grapes have larger content of organic acids and, therefore, less strict modes of pasteurization/sterilization can be applied;
- valuable nutritive compositions can be obtained with optimal glucides: organic acids : polyphenolic substances : mineral substances ratios;
- more acid juices can be clarified and concentrated obtaining natural acidulants;
- new range of functional beverages, nectars, pastes, blends with products of fruits/berries with high nutritional properties can be obtained;
- due to optimal content of nutrients, „green juices” possess with biological activity and curative properties.

### Bibliography

1. COTEA Valeriu D., ZĂNOAGĂ Cristinel V., COTEA Valeriu V., *Tratat de oenochimie*, vol. I, Editura Academiei Române, București, 2009.
2. RIBEREAU Gayon J., PEYNOD E., *Science et technique de la vigne, Biologie de la vigne*, tome 1, Dunod, Paris, 1971.
3. Самсонова А. Н., Ушева В. Б., *Фруктовые и овощные соки*, 2-е издание, Агропромиздат, Москва, 1990.