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RESVERATROL IN KUBAN WINES

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Abstract

Purpose: The main purpose of viticulture is to improve the quality of the grapes, both to a greater extent for ampelotherapy and winemaking, and, to a lesser extent, to onotherapy.

Methodology: The article highlights the results of perennial (from 2014) studies of 18 promising technical grape varieties from different zones of the Krasnodar Territory: Anapo-Taman, Central, as well as Amur from the Black Sea zone of the Krasnodar Territory and two control Western European world-famous and most common varieties Merlot and Cabernet-Sauvignon in the same zones.

Result: The average values of resveratrol were found in wine materials from the varieties Vladimir and Dmitry (4.7 mg / dm3), Podlesny (3.9 mg / dm3), Saperavi Severny (3.5 mg / dm3), 40 let Octiabria (3.3 mg / dm3), Kurchansky and 40 let Pobedy (3.0 and 2.9 mg / dm3, respectively). On the other hand, as shown by the analysis of wine materials, the Antaris, Varyushkin, Mitsar and Plechistik varieties synthesize a lower content of resveratrol (1.0 and 0.9 mg / dm3, respectively).

Applications: This research can be used for the universities, teachers and education students.

Novelty/Originality: In this research, the model of resveratrol in Kuban wines is presented in a comprehensive and *complete manner*.

Keywords: *resveratrol, Kuban, wines.*

INTRODUCTION

The main purpose of viticulture is to improve the quality of the grapes, both to a greater extent for ampelotherapy and winemaking, and, to a lesser extent, to onotherapy. Qualitative indicators of grapes are sugars, organic acids, phenolic substances, amino acids, aromatic compounds, and other components. By biosynthesis, plants produce a wide range of secondary metabolites, among which are phenolic compounds important for both plants and humans: firstly, they protect plants from biotic and abiotic stress factors, secondly, most of these metabolites are responsible for organoleptic properties of products made from them; thirdly, these compounds are unique sources of nutritional supplements and pharmaceuticals.

Resveratrol (3,4,5-trihydroxystilbene), which acts as phytoalexin and usually synthesized in the cells of the skin and leaves during fungal infections, ultraviolet light, radiation, and other external influences, is under the greatest interest among phenolic compounds (Belyakova, 2007).

Resveratrol is also synthesized by not damaged plants, but to a much lesser extent (Guguchkina, 2001). Disease-resistant grapes have been found to produce and accumulate resveratrol in larger quantities than *Vitis vinifera* L. species. For example, Pinot Noir (Pinot Fran or Pinot Black), quite susceptible to fungal infections, produces and accumulates a higher concentration of resveratrol than other varieties, regardless of the nature of their origin (Bavaresco, 2005).

Resveratrol exists in the form of trans and cis forms, and the structures of its isomers are presents in Figure 1.

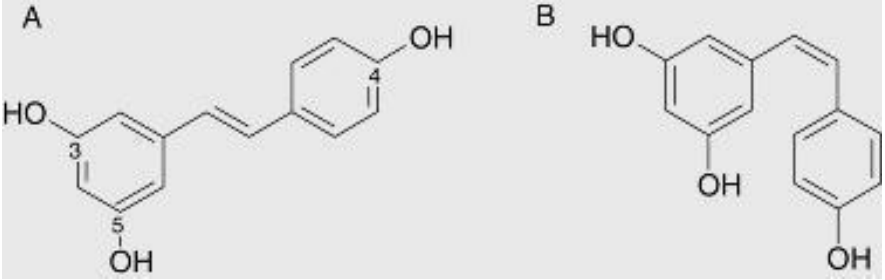

Figure 1: Chemical structure of trans- (A) and cis-resveratrol (B)

The first mention of resveratrol was made in 1939 in an article by the Japanese scientist Michio Takaoka. The amount of trans-resveratrol in grapes is 10 to 100 times greater than in other plants. Thus, the content of this stilbene in grapes ranges

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from 0.16 to 3.54 µg / g; and in dried grape skins up to 24 µg / g. The concentration of resveratrol in red wines ranges from 0.1 to 14.3 mg / l, in whites - 0.1 - 2.1 mg / l (Kursvietiene, 2016).

It has been proven that a high concentration of resveratrol is found in wines produced in cooler climatic regions. On the contrary, a significantly lower concentration of resveratrol is found in wines produced in relatively warm and dry climatic conditions. Resveratrol regulates the human immune system, the treatment of various inflammations, chemoprophylaxis, neuro and cardioprotection, lipid regulation, as well as in the treatment of diseases such as diabetes, Parkinson's disease, and cancer. In addition, it shows antibacterial, antiviral and antifungal activity (Shirvani, et al. 2015).

Therefore, knowledge of the factors that influence the amount of this compound in wine is important. It is well known that the content of resveratrol in wine depends, first of all, on the grape variety, clone, meteorological and soil conditions, as well as used agrotechnical methods (Ardakani, et al. 2015).

Due to the physio-chemical properties of resveratrol, as well as the complex composition of biological pathways in which it is found, its definition is difficult and time-consuming. There are many analytical methods for the determination of resveratrol in wine, which are based on the use of high-performance liquid and gas chromatography and capillary electrophoresis. In the method proposed by the Scientific Center of Winemaking, the determination of resveratrol is carried out on a device named Capel-103 R (Tereso, et al. 2018; Selomo & Govender, 2016; Murasheva, et al. 2018; Laamena, et al. 2018). It shows good sensitivity and reproducibility, and also has an increased separation factor with a shorter biochemical analysis time.

Aim: To achieve a better assessment of the influence of a grape variety on the content of resveratrol, we carried out a comparative study of wine materials from 20 red technical grape varieties without fungal infections in the same climatic conditions and at the same stage of ripening. This work contributes to the improvement of knowledge about the potential of promising technical red grapes grown in the Krasnodar Territory, including those introduced from abroad (Moldova, Serbia, Ukraine) and selection varieties SKZNIISiV(Soyollkham, B., Valášek, P., Fišera, M., Fic, V., Kubáň, V., & Hoza, I. (2011).).

OBJECTS AND RESEARCH METHODS

The article highlights the results of perennial (from 2014) studies of 18 promising technical grape varieties from different zones of the Krasnodar Territory: Anapo-Taman (Antaris, Varyushkin, Granatovy, Dostoyny, Zhupski Boyadiser, Mitsar, Plechistik, 40 let Octiabria), Central (Aleshkovsky, Vladimir, Dmitry, Kurchansky, Levokumsky, Olimpiysky, Podlesny, Saperavi Severny, 40 let Pobedy), as well as Amur from the Black Sea zone of the Krasnodar Territory and two control Western European world-famous and most common varieties Merlot and Cabernet-Sauvignon in the same zones.

Fresh grapes harvested at the time of full technical maturity were recycled according to the classic technology of red table wines preparations in the vine production department of the FSBSO SKFNCSVV. Measurement of the mass concentration of resveratrol in wine materials was carried out by capillary electrophoresis using a Capel-103 R device(Arce, L., Tena, M. T., Rios, A., & Valcárcel, M. (1998).).

RESULTS AND CONCLUSIONS

The content of resveratrol in test samples of wines (Fig. 2) showed that its concentration in wine materials varies from 0.9 to 11.4 mg / dm3(Gorzynik-Debicka, M., Przychodzen, P., Cappello, F., Kuban-Jankowska, A., Marino Gammazza, A., Knap, N., ... & Gorska-Ponikowska, M. (2018)).

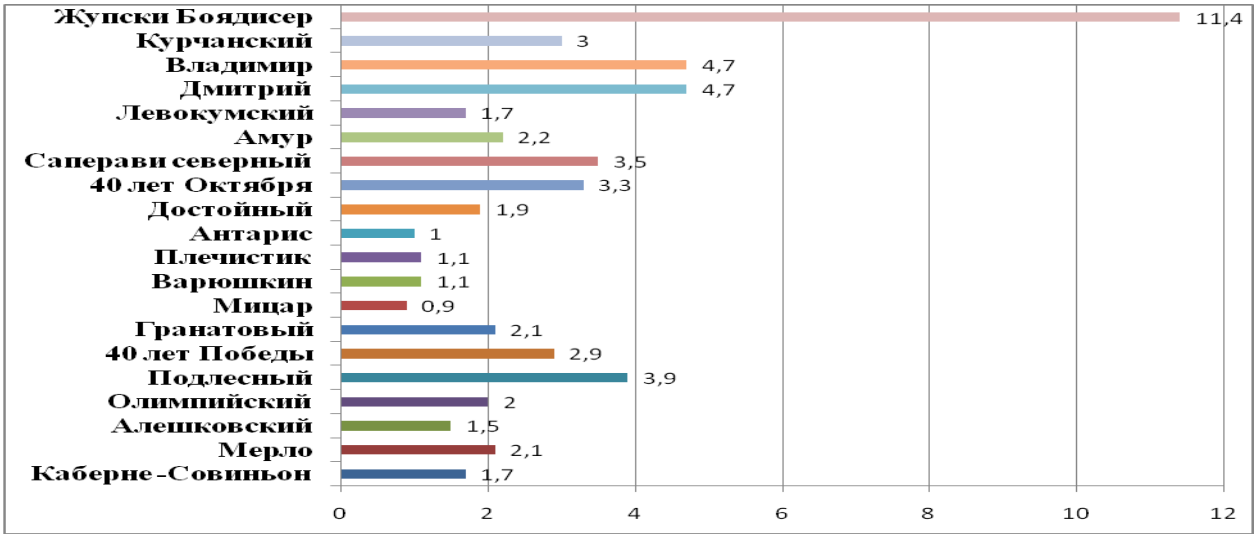

Figure 2: The content of trans-resveratrol in wine materials from different varieties of red grapes (mg / dm3)

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The highest level of resveratrol concentration was found in the wine material of the Yugoslavian variety Jupski Boyadiser (11.4 mg / dm3), in the population of which we have selected a highly productive clone and named the Kuchugur Boyadiser (Fig. 3).

Figure 3: Kuchugur Boyadiser

The average values of resveratrol were found in wine materials from the varieties Vladimir and Dmitry (4.7 mg / dm3), Podlesny (3.9 mg / dm3), Saperavi Severny (3.5 mg / dm3), 40 let Octiabria (3.3 mg / dm3), Kurchansky and 40 let Pobedy (3.0 and 2.9 mg / dm3, respectively). On the other hand, as shown by the analysis of wine materials, the Antaris, Varyushkin, Mitsar and Plechistik varieties synthesize a lower content of resveratrol (1.0 and 0.9 mg / dm3, respectively). In wine materials from other varieties (Amur, Granatovy, Dostoyny, Olimpiysky, Levokumsky and Aleshkovsky), the content of resveratrol was at the level of the values of classical varieties Cabernet Sauvignon and Merlot: 1.5-2.2 mg / dm3 (Xiang, L., Xiao, L., Wang, Y., Li, H., Huang, Z., & He, X. (2014).).

CONCLUSIONS

Comparative studies of various wine materials for the content of resveratrol showed that wine materials from resistant grape varieties, such as Zhupsky Boyadiser, Kurchansky, Vladimir, Dmitry, Podlesny, Saperavi Severny, 40 let Octiabria and 40 let Pobedy, growing in the Krasnodar Territory, by content of resveratrol 2-5 times more than the content of this in Western European varieties, such as Cabernet Sauvignon and Merlot, and hence they have a higher biological value.

The introduction of these valuable grape varieties into the zoned assortment of the North Caucasus will expand the range of high-quality dry and special wines that assist in the improvement of the health of our country's population.

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The author confirms that the data do not contain any conflict of interest.

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