GEORGIAN ABORIGINAL AND IMPORTED RED GRAPES PHENOLIC MATURITY INDEX AND ITS IMPACT ON RED WINE QUALITY

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Abstract

The main role in red wine assessment is the biologically active substance - phenolic compounds and their transformation products that actively participate in wine formation at all stages of its production and storage and directly influence the taste, bouquet, color and transparency of wine. These substances are formed in the grape and wine is transferred into the alcoholic fermentation process. The first stage of wine making - to determine the exact period of vintage, the technical maturity of the grapes is determined mainly by the sugar-acidity index and the grapes are given direction. According to the OIV law of wine, the red grape vintage period (the technical maturity of the grape) is determined by the sugar-acidity index with the Phenolic Maturity Index Report. For this purpose, red grapes anthocyanin and phenolic compounds are determined at different stages of grape ripening and the vintage begins when the indicator in this variety of red grapes is collected in the maximum amount. It is known from the literature that the maximum amount of anthocyanin coincides with the maximum amount of sugar content. This is a significant prerequisite for applying origin wine. Therefore, quantitative and qualitative study of phenolic compounds is a Actual issue in the modern Winery. During the grape processing, the biologically active substances from the grape skin and seeds are moving in the grape juice. These substances determine the color, taste and bouquet of wine future. This is the difference between red wines and other types of wines. The study of changes in phenolic compounds is an extremely topical problem of modern scientific research to improve the quality of red wines.

Keywords:

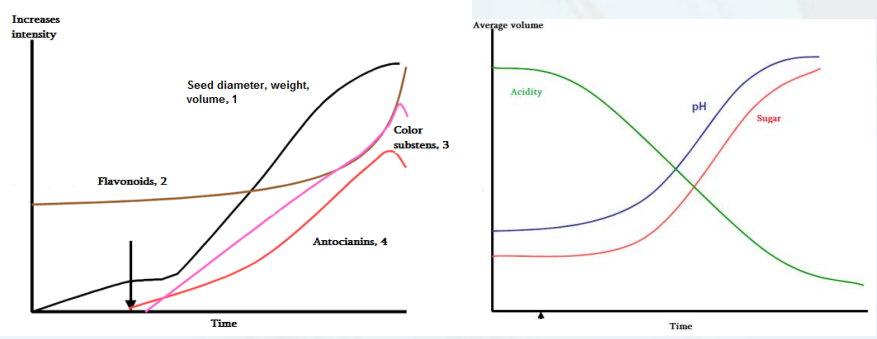
Honey, alcoholic fermentation, tyrosyl, tyrosine, higher alcohols.

Over the years scientists were taught and today they are taught to introduce introductory grape varieties in Georgia's soil-climatic conditions and their use of wine. Vine varieties introduced in Georgia have been adapted into the agro-climatic conditions of our country.

The purpose of our research was to determine the phenol maturity index, total anthocyanin, tannins and phenol compounds in the Aboriginal and introducing red grapes and in the grape juice; determine the optimal date of vintage and study their influence on the red wine quality. The following tasks were needed to achieve the purpose:
1) determination of the total phenolic compounds, tannins and anthocyanin to the different maturity periods and for each variety grapes to the determination of the phenol index; 2) Determination of the optimal date of vintage start based on phenolic maturity index and production of the test wines. 3) Study of Physical - Chemical and Organoleptic Indicators of Phenolic Compounds in the Testing and Control wines at the different stages of the wine making and wine aging;

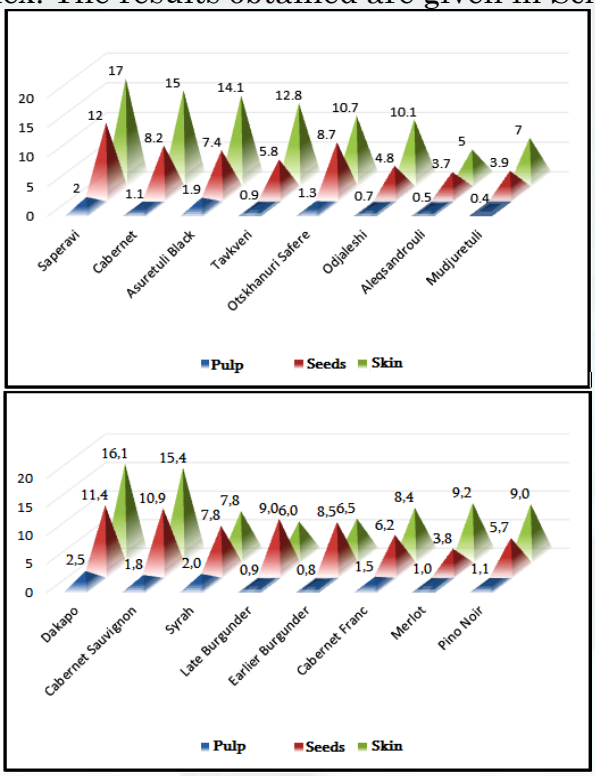
The research objects was, aboriginal (Saperavi, Cabernet, Asuretuli Black, Tavkveri, Otskhanuri Sapere, Odjaleshi, Aleksandrouli and Mujuretuli) and introduced (Merlot, Cabernet Sauvignon, Dacopo, Late Burgunder, Early Burgunder, Syrah, Pino Noir and Cabernet Franc) to examine agricultural technological characteristics of the bunch of red grapes and to determine the quantity of phenolic compounds and the total phenolic index in their wines. Aboriginal red grapes - Saperavi and wines from him were taken to control. It did not protect the phenol maturity phase and the calculation of the phenomenal index was not calculated. Grapes agricultural - technological features are the bunch length, width and volume. They influence the wine phenolic quantitative composition and color intensity.
Determining the quality of wine is one of the main attributes of a wine's color, which is determined containing by the free anthocyanin and polymer phenolic compounds. Red pigmentation is largely dependent on fluid pH and the stage of ripening of grapes.

By official method - Glories; Di Stefano and ITV (Phénolique des Raisins Rouges par la Méthode I.T.V. Institut tehnique du vin) was determined the maturity of the phenolic compounds in grapes and wine. The color characteristics of the OIV (Organization International Vine and Wine) method are processed by the international organization. Grape and wine phenols and free anthocyanin have been determined by the Gloria method, the length of the spectrophotometer 520 nm wavelength, the phenol Index 280 nm wavelength, color characteristics (density 520 and 420 nm, intensity 420 + 520, tone and 420/520) 520 and 420 nm wavelength. The works were performed by highly sensitive liquid chromatograph (HPLC) according to Di Stefano's method. The difference between red wine making methods is based on the phenol formation of the phenolic compounds, as reflected in the skins, or pulp and retention must fermentation. Therefore, the small parts of the bunches, its agricultural - technological characteristics and the total number of phenolic compounds have a large role in shaping red wine color and taste. Investigate the amount of agricultural and technological characteristics and phenolic compounds of red grapes: According to Prosto - Serdov method was determined technical (linear and voluminous) indicators for experimental aboriginal and introduced red grapes. Summary of data received and analysis shows, that the introduction of red grape varieties, like aboriginal varieties, weigh, length and width corresponding to the ampelographic gradation. As aboriginal as well as in introducing grapes quantitative changes of sugar, acids and phenolic compounds are progressively gradual according to grape growth and maturity. For illustration see chart 1 and 2.



phenolic substances, sugar and acids accumulation tendencies, during grape growth and ripening

For the study of the dynamics of accumulation of common phenolic compounds in different parts of the grapes during maturity, we removed the skin, the seed and the pulp from the grapes seeds and we took the sweet for analysis. In The experimental samples was studied in the total phenol Index. The results obtained are given in Schedule 1 and Scheme 3.



Scheme 3. a) Aboriginal and b) in various parts of introducing grape grains the total number of phenolic compounds for maturity period, mg / l

The analysis of the results from the scheme 3 shows that the attitude similar to the change in the total number of phenolic compounds is observed in the aboriginal and introducing grapes skin, seeds and pulp. It is especially distinguished by the Saperavi pulp, it characterized by intense red color. Grape berries will go through different stages of ripening (Fruit set; Verizon, Ripening) which is significantly affects its chemical composition. For the Fruit set period phenolic compounds are mainly distributed in the skin and seeds. For the grape Veraison period phenolic compounds lose green color and gets red color.

In the grape ripening period phenolic compounds continues to decrease. For the ripening period these substances are mostly remain in the skin and seeds. The amount of phenolic compounds moving in the grapes sweet and wine are of the particular importance in the process for the red wine making. One of the goals of our research was study phenolic compounds in the different periods of maturity of aboriginal and introduced red grape varieties.

Table 1.

Dynamics of changes in the number of phenolic compounds of aboriginal and inroduced varieties of red grapes at different ripeness stages, Mg/L

Names of samples	The total amount of phenolic compounds in different periods of ripening, mg / l		
	Fruit set	Veraison	Ripening

Aboriginal			
Saperavi	37.1	32.2	17.1
Cabernet	33.0	28.5	15.2
Asureti Black	35.4	27.4	14.8
Tavkveri	30.4	25.9	13.5
Otskhanuri Saper	32.1	29.0	16.0
Ojaleshi	29.4	27.3	12.8
Aleksandroul i	25.5	24.8	14.0
Mujuretuli	26.3	25.1	13.7
Introduced			
Dacapo	31.1	30.4	15.4
Cabernet Sauvignon	29.1	20.5	14.8
Syrah	27.4	19.8	12.0
Earlier Burgunder	28.0	22.0	11.5
Cabernet franc	25.8	19.4	12.3
Late Burgunder	20.1	18.7	11.4
Merlot	22.4	17.4	13.2
Pino Noir	24.7	18.9	12.5

Table 1 is showing the dynamics of the change in the number of phenolic compounds of testing and control grapes for the different periods of ripening. As seen from the research, from the fruit set to full maturity the total number of phenolic compounds for approximately 15 - 20 mg / l is reduced in the Saperavi grape skins. A similar change has taken place in the case of the introduced red grapes. Agricultural and Technological Data of Local and Introduced Varieties and Quantitative Composition of Phenolic Compounds Allows us to produce high quality red wines.

Modern winery practices show that the red grape varieties in addition to the "alcoholic maturity" (sugar/acidity index) it is necessary to determine the "phenolic maturity" (total phenomenal index) which is an important criterion for the red grapes wine. "Phenolic maturity" determines optimal stages of color in grapes and it is calculated by the total polyphenol index indicator.

Phenolic maturity index, which reflects the ability to quantify anthocyanins extraction is one of the most common methods, wich is used for grape ripening and optimal harvest times determination. With this method it is possible to predict the characteristics of the wine and phenol stabilization. There are different methods of determining the phenol maturity of grapes. Vintage start is recommended immediately after starting the reduction of antocyanine number. The exact date depends on the Reducing rhythm of anthocyanin and the kind of vine.

The next goal of the research was, that we would have to conduct a comparative study of the sugar-acidity index and the phenolic index for the experimental aboriginal and introducing red grape varieties in the vineyard. At the same time, we have determined the total amount of the antocyanine and tannins in red grapes and the total phenolic Index with spectrophotometric methods using. Total number of anthocyanin, phenol Index and total amount of tannins from the skin and seeds have been produced by Glories Method formulas. It was revealed that when the number of anthocyanin increases then the grapes reach optimal condition of tech maturity and grapes phenol compounds are also approaching the phenolic ripening phase. Seeds tannins should be reduced at this maturity time. The higher the

number of grape anthocyanin, the more the possibility of extraction of anthocyanin in the sweetness.

So, the increasing number of anthocyanin shows the optimal phase of grapes phenolic maturity and determines the phenol index. At this moment Phenolic ripening phase coincides with the maturity phase of technical maturity. Results are showing table in 2. As shown in Table 2, In the introduction of grape varieties, grape Dakapo was distinguished by the quantity of phenolic compounds and the polyphenol content in the pulp and anthocyanin partially close Saperavi pulp quantitative indicators.

Table 2
Comparison of grapes and polyphonic index of red grapes of aboriginal and introducing grape varieties

The vine Varieties	Index		Vine varieties	Index	
	Sugar / Acidity	Polyphenol		Sugar / Acidity	Polyphenol
Saperavi	30.0	59.7	Dacapo	35.6	49.4
Cabernet	31.9	40.1	Cabernet Sauvignon	38.4	40.1
Asuretuli Black	34.2	44.0	Syrah	40	39.5
Tavkveri	29.8	47.3	Earlier Burgunder	37.2	25.4
Otskhanuri Sapere	27.9	38.7	Cabernet franc	40.1	24.2
Odjaleshi	26.1	35.2	Late Burgunder	45.8	38.7
Aleksandrouli	48.0	26.4	Merlot	41.7	43.0
Mujuretuli	41.1	28.5	Pino Noir	41.4	41,5

In the red grapes was determined the number of antioxidants and according to the category of red grapes. Results are showing table 3.

Table 3
The range of grape categories, the number of antioxidants

Anthocyanin number of grape quality categories was determined (A pH = 1.0)					
Vine varieties	Good	Excellent	Vine varieties	Good	Excellent
Saperavi	> 3500	> 4500	Dakapo	> 2450	> 3000
Cabernet	> 2300	> 2900	Early burgunder	> 1100	> 1500
Tavkveri	> 1850	> 2000	Late Burgundy	> 1150	> 1550
Asuretuli black	> 1400	> 1900	Cabernet Sauvignon	> 1600	> 2000
Otskhanuri sapere	> 1550	> 1750	Cabernet Franc	> 1150	> 1400
Odjaleshi	> 1600	> 1800	Merlot	> 1400	> 1650

Alexandroull	> 1300	> 1850	Pino Noir	> 1000	> 1400
Mujuretuli	> 1450	> 1700	Syrah	> 1550	> 1800

By determination of Grape phenolic maturity phase and phenol index May be considered in the red grape harvest and wine production processes in order to produce high quality wine. After determining the date of red grape phenol maturity and vintage date, was determined red wine phenolic index and the number of phenolic compounds and anthocyanin's numbers transposed from the sweet to the wine, during the different of the maceration time. We made tested red wines from the grapes picked up in the phenolic maturity phase, for control sample we took aboriginal red grape Saperavi (Without phenomenal maturity phase) and its wine.

Conclusions:

For the first time we have studied Aboriginal (Saperavi, Cabernet, Tavkareri, Asureturi Black, Otskhanuri Sapre, Alexandrouli, Mujuretuli, Odjaleshi) and Introduced (Pino Noir, Cabernet Sauvignon, Caberne Franc, Dacopo, Merlot, Syrah, Early, Late Burgundy) Agricultural technological data of the varieties of red grapes, phenol maturity index and defined there Each given a variety of vintage datsqebios optimal period. It was established that: 1) Antcyanines are found in red grapes before Verizon period, their number increases during ripening period and they decreases for full ripening of grapes; 2) Free forms of antioxidants is cause to red color for young wine and the anthocyanin-tannin complex compounds is take part in maintaining the red wine color stability.

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