UDC 663.48:663.81:613.24

THE POTENTIAL OF THE JUPITER GRAPE FOR THE PRODUCTION OF ROSE WINES AND BIOACTIVE EXTRACTS

https:// doi.org/ 10.15673/fst.v20i1.3362

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Abstract.. Jupiter grape is a red-blue interspecific seedless hybrid developed at the University of Arkansas in 1984, which, due to its high adaptability, has recently been actively cultivated in Ukraine. This creates prospects for its integrated use in winemaking, in particular for the production of rosé wines and for obtaining biologically valuable extracts from grape skins as a secondary raw material. The article is devoted to the study of the potential of the Jupiter grape variety in the context of integrated processing, which includes the production of rosé wine and the subsequent utilization of grape pomace after must separation to obtain extracts with enhanced biological value. The research materials included Jupiter grapes cultivated in the Kyiv region, rosé wine material produced from them, grape pomace after must separation, as well as hydroalcoholic extracts of the pomace obtained after a 10-day extraction process. To intensify the extraction process, pectolytic enzyme preparations were applied. Based on the analysis of the phenolic potential of the Jupiter grape variety, including the technological reserve and maceration capacity of phenolic and colouring compounds, the optimal orientation of its use for rosé wine production and the limited suitability for red wine production were determined. It was established that hydroalcoholic extraction of grape pomace remaining after rosé wine production for 10 days at a temperature of 20 °C ensures effective recovery of phenolic (81–91%) and colouring (42–55%) compounds. It was proven that the application of pectolytic enzyme preparations intensifies the extraction process, while the use of the preparation Depectil Clarification provides the maximum yield of target components. It was shown that the decrease in the redox potential of the extracts during extraction correlates with the accumulation of phenolic and colouring compounds and the formation of a moderately reducing environment favourable for preserving their bioactive forms. The obtained hydroalcoholic extracts are characterized by high biological value and can be considered a promising raw material for beverage flavouring and the development of natural functional products.

Keywords: Jupiter grape, pigments, phenolic compounds, biological value, redox potential, enzyme preparations, pomace, extract, rosé wine.

Cite as Vancouver style citation

The potential of the Jupiter grape for the production of rose wines and bioactive extracts / Bilko M. et al. Food Science and Technology. 2026;20(1):47-55. https:// doi.org/10.15673/fst.v20i1.3362

Цитування згідно ДСТУ 8302:2015

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Introduction. Formulation of the problem

Ukraine's post-war recovery requires the development of new approaches to the agri-food sector, focused on increasing the added value of products, the efficient use of raw materials, and the implementation of sustainable development principles. Of special relevance in this context are the directions of a perfect circular economy, which aims to close resource cycles and preserve valuable materials in the economic system.

Viticulture has traditionally been an important component of the agricultural economy of the southern and western regions of Ukraine. Along with autochthonous and classic European grape varieties, introduced varieties that are highly adaptable to the country's soil and climatic conditions, have stable yields, and valuable chemical composition are of considerable interest. One such variety is Jupiter, an early seedless red variety of American selection, characterized by high productivity (200–250 cwt/ha), increased frost resistance up to –27 °C, and pleasant organoleptic characteristics of the berries [1].

Ukrainian winemaking is actively developing, offering consumers more and more high-quality and interesting beverages. The adaptation of the Jupiter variety to Ukrainian conditions opens up prospects for its complex use as a raw material for winemaking, in particular for the production of rosé wines, as well as for obtaining biologically valuable extracts from the skin, which can be considered as secondary raw material.

It is widely known that grape skins are a source of phenolic compounds, anthocyanins, and other biologically active substances that can be used in functional beverage technologies, enotherapy, and other areas of food biotechnology.

The comprehensive processing of Jupiter grapes is in line with modern circular economy principles, promotes the reduction of raw material losses and contributes to the creation of products with high added value. In the post-war period, such approaches can play an important role in restoring regional agri-food systems, creating new jobs and strengthening Ukraine's export potential.

In this context, research into the potential use of Jupiter grapes in rosé wine production and biologically valuable extracts is important and promising from both a scientific and practical point of view.

Analysis of recent research and publications

Jupiter grapes are a popular red-blue seedless interspecific hybrid bred at the University of Arkansas in 1984.

In the US and other countries, like Canada, Indonesia and Ukraine, Jupiter grapes have started to be grown in regions that were previously considered unsuitable for growing thin-skinned varieties due to cold winters. At the same time, the specific climatic features of the growing season, in particular the combination of high daily temperatures and low night temperatures, contribute to the formation of a high-quality crop with an optimal balance of sugars and organic acids [3-5].

Jupiter is characterized by large oval berries with a crisp texture and an intense varietal aroma. The source of Jupiter's muscat flavour was the variety *Vitis vinifera L. Gold* and the source of seedless grapes was the Glenora variety. The aromatic profile is represented by muscat tones with notes of elderberry and red grapefruit, combined with a harmonious sweet taste. The combination of these organoleptic indicators determines the suitability of the variety for both fresh consumption and its potential for use in winemaking [6].

According to the results of many years of research, it has been established that the average sugar content in berries of this variety was 18.6–20.6%, pH 2.9–3.5, titrated acidity 3.9–6.7 g/L, additionally confirming its suitability for processing into wine products [7–8].

In Ukraine, Jupiter is cultivated in Bessarabia, in the eastern regions of Ukraine – Zaporizhzhia and Dnipropetrovsk regions, in the south-western regions of Podillia [9] and is used mainly to produce rosé wines of various styles: from dry table wine “Jupiter” from the Bakot Bay and “Pink Square” from Podillia, sparkling, as confirmed by the commercial wine “PetNat Jupiter” from the Ukrainian producer “Fathers Wine”, semi-dry from “Zelenytsi” in the Podillia Tovtry to pink dessert wine.

Jupiter grapes produce red wines with an intense taste of blackberries, cherries, and a slight note of tobacco. It is similar to Cabernet Franc in its herbal notes and to Petit Verdot in its deep colour and structure. Rosé wines from this variety are characterized by a bright pink colour and expressive muscat bouquet, with notes of barberry, strawberry, white currant and Duchess pear. The taste profile is characterized by freshness and harmony with shades of ripe red berries and caramel-fruit nuances [9]. These organoleptic characteristics indicate the complexity of this variety, but in the majority of cases, Jupiter grapes are used for the production of rosé wines.

It should be noted that the biological value of red grapes is due to the presence of phenolic compounds, which include polyphenols and flavonoids, in particular catechins, anthocyanins, leucoanthocyanins and other biologically active substances. These compounds demonstrate antioxidant, P-vitamin, antimicrobial, anti-sclerotic and immunomodulatory activity [10].

Scientists note that Jupiter grapes have significant antioxidant properties and contain many polyphenols with antioxidant effects. Although no scientific studies of the phenolic complex of this variety have been found in the literature, studies of Jupiter leaves have shown the presence of a significant amount of phenolic compounds and flavonoids, which indirectly confirms the active phenylpropanoid metabolism of the variety, indicating that the plant actively synthesizes phenolic complex substances, including phenolic acids, flavonoids, anthocyanins, flavanols and tannins, the majority of which have biological activity [11].

During the production of rosé and red wines, phenolic compounds are partially extracted from grapes, but most of them are lost along with the pomace [12, 13]. At the same time, grape pomace constitutes 20-30% of the total weight of grapes [14] and is a valuable secondary raw material, since the main amount of phenolic compounds is localized in the skin of the berries [15, 16]. The skin accounts for 50% of the pomace weight [17]. The juice contained in the pomace includes the whole spectrum of organic substances characteristic of grapes, namely carbohydrates, organic acids, nitrogenous substances, pectins, aldehydes, esters, enzymes, vitamins and aromatic compounds [18].

To the present day, there are no systematic scientific studies focusing on the content of phenolic compounds in Jupiter grapes, as well as the trends of their transition during the wine-making process. In addition, no scientific studies have been found in the available scientific sources that evaluate the possibility of using grape pomace of this variety to obtain extracts with high biological value. It is important to study and optimize extraction to maximize the recovery of phenolic compounds.

Research objectives and tasks

Based on the information presented above, the objective of the study was to determine the content of phenolic compounds in Jupiter grapes, establish the trends of their transition during the production of rosé wine and evaluate the possibility of using grape pomace of this variety as raw material for obtaining extracts with biological value.

To achieve this purpose, the following tasks had to be solved:

1. To study the morphological and organoleptic characteristics of Jupiter grape bunches and berries.
2. To determine the indicators of the phenolic complex and its carbohydrate-acid potential to evaluate the suitability of the variety in wine technology.
3. To determine the content of the main physicochemical quality indicators and organoleptic characteristics of rosé wine material and extract from Jupiter grape pomace.
4. To investigate the effect of enzyme preparations on the dynamics of the content of phenolic and colouring substances and the redox potential in water-alcohol extracts from Jupiter grape pomace.

Research materials and methods

Jupiter grapes, cultivated in the Kyiv region, at technical maturity. Pink dry wine materials were produced from grapes using the white processing method, must was calculated at 70% of the grape weight and sulfited at a rate of 50±5 mg/L of sulfur dioxide, decanted by sedimentation at a temperature of 14...15 °C for 12 hours without the use of sorbents, The clarified must was directed for fermentation on Lalvin EC-1118 yeast (France) at a temperature of 17±2 °C for 10 days.

The pomace remaining after obtaining the must was extracted with a water-alcohol solution with a volume fraction of alcohol of 40±1% vol. for 10 days. The extraction temperature was 20±2 °C with stirring once a day for 5 minutes. To intensify the process, pectolytic enzyme preparations with different compositions or enzyme ratios were used: variant 1: Depectyl Clarification (pectinase, polygalacturonase, pectinesterase, pectoliasis), variant 2: Sofrazim (pectinase, polygalacturonase, pectinesterase, pectoliasis), variant 3: Cuve Blanc (pectinase, β-glucanase), France. The dosage of the preparations was 20 mg/kg of pomace. The preparations were added to the pomace before adding the water-alcohol solution, after dissolving them in a small amount of water. The ratio of pomace to solvent was 1:3. The extracts were studied for the dynamics of phenolic and colouring substances during 10 days of extraction, with samples taken once a day during the first three days, as well as on the 5th and 10th days.

After fermentation and separation from yeast sediment, the pink wine material and grape pomace extracts were stored in a cold storage room in fully filled bottles without access to light.

The morphological and organoleptic characteristics of the bunches and berries of the Jupiter grape variety were determined in accordance with the ampelographic descriptors of the International Organization of Vine and Wine (OIV). The mass concentration of sugars, titratable acidity according to DSTU 4112.3 and hydrogen index (pH) according to DSTU 6045 were determined. The technical maturity index (TMI) was calculated as the product of the mass concentration of sugars and the square of the pH value. The glucoacidity index (GAI) was determined as the ratio of the mass concentration of sugars to titratable acidity [19].

The technological reserve of phenolic and colouring substances (TRPS and TRCS) was determined by the colorimetric method. The macerating capacity of grapes for phenolic (FSmats) and colouring substances (CSmats) was assessed by their transfer during maceration of the mash for 4 hours at a temperature of 20–22 °C [20].

The content of phenolic substances was determined by a colorimetric method using Folin-Chocolatier reagent and the content of colouring substances was determined by a colorimetric method after colour stabilization with an acidified alcohol solution.

The redox potential (Eh) of water-alcohol extracts was determined by a potentiometric method using a combined platinum electrode with a built-in Ag/AgCl comparison electrode. Measurements were carried out at a temperature of 20 ± 1 °C after stabilization of the indicator, which did not exceed 2–3 min. The Eh values were recorded in millivolts (mV) relative to the comparison electrode.

Optical indicators were determined by measuring absorbance at wavelengths of 420 and 520 nm, with color intensity (CI) calculated as the sum of the absorbance values, and hue (H) calculated as the ratio of the absorbance at 420 nm to that at 520 nm.

The main physicochemical indicators of grapes, pink wine materials and pomace after obtaining the must were determined using generally accepted methods in winemaking. Organoleptic characteristics were determined by a descriptive method.

Statistical processing of experimental data was performed using Microsoft Excel software (Microsoft Office 2007 package). The study was performed in three repetitions and the results are presented as average values with standard deviation (M ± SD).

Results of the research and their discussion

Analysis of Jupiter grapes allowed us to establish the main mechanical and organoleptic characteristics, which are presented in Table 1.

Table 1 – Morphological and organoleptic characteristics of bunches and berries of Jupiter grapes

Indexes	Value
Average bunch weight, g	360-485
Bunch shape	cylindrical-conical with moderate berry density
Average berry weight, g	3.8-5.2, large berries
Berry shape	oval, typical for the variety
Seed presence	rudimentary
Skin thickness	Thin
Pulp consistency	dense, crisp, juicy
Juice content in berries, %	70…75
Berry colour	dark blue with a pruinose layer
Berry/juice aroma	characteristic of the variety, with tones of muscat, notes of peach and orange peel
Taste	pleasant, sweet

The morphological and organoleptic characteristics of grapes shown in the table indicate their high technological suitability for winemaking. The significant weight of bunches and berries, combined with thin skin and juice content of 70–75%, ensure a high yield of must. The aromatic profile with muscat tones and fruity-citrus notes creates the potential for wines with a pronounced varietal character. The combination of characteristics allows this variety to be considered as a promising raw material for the production of aromatic wines.

The morphological characteristics of the berries, in particular their thin skin and dark colour, indicate a concentration of phenolic and colouring compounds in the skin, which allows the grape pomace after juice extraction to be considered a promising secondary raw material for obtaining extracts with increased biological value.

Further research has made it possible to determine the technological reserve of phenolic and colouring substances in Jupiter grapes, their maceration capacity according to these indicators and indicators of carbohydrate-acid potential (Table 2)

The phenolic complex indicators of Jupiter grapes indicate a moderate technological reserve of phenolic and colouring substances with limited maceration capacity – 31% and 17%, respectively, which determines the low efficiency of their extraction under traditional red wine production conditions. This feature of the phenolic profile is partly due to the seedless type of berries and can lead to unstable colour and imbalance in the organoleptic properties of wines [21].

Therefore, the production of red wines from this grape variety is unreasonable, since processing using red technology is not accompanied by a sufficient supply of tannins and pigments necessary for the formation of a harmonious wine structure and colour fixation [22]. As a result, such wines may be characterized by a tendency to oxidative changes and an imbalance of organoleptic indicators, in particular excessive bitterness or a decrease in the intensity of the varietal aroma. On the other hand, short-term contact of the must with the pomace during the production of rosé wines ensures controlled extraction of anthocyanins and the formation of a more balanced flavour profile that corresponds to the biochemical characteristics of the Jupiter grape variety. Therefore, the Jupiter grape variety should be primarily used for the production of rosé wines.

The carbohydrate-acid potential of the Jupiter variety is characterized by a harmonious ratio of sugars and acids, which is confirmed by the values of pH, the glucoacidometric index and the technical maturity index (Table 2) and correspond to the requirements for varieties for processing into table wines [23] and are confirmed by data obtained after analysing rosé wine from the Jupiter variety (Table 3)

Table 2 – Indicators of the phenolic complex of Jupiter grapes and their carbohydrate-acid potential (*n=3, p≤0.05*)

Technological reserve, mg/L		Maceration capacity, mg/L		pH	Mass concentration, g/L		GAI	TMI
FS	CS	FS	CS		sugars	titrated acids		
2090±22.1	515±20.7	637±7.2	85±3.4	3.50±0.02	198±1.8	6.9±0.1	2.87	242.6

Table 3 – Physicochemical indicators of rosé wine from Jupiter grapes (*n=3, p≤0.05*)

Volume fraction of alcohol, %	Mass concentration, mg/L				pH	Optical indicators	
	sugars	titrated acids	phenolic substances	colouring substances		CI	H
11.5±0.5	2.8±0.1	6.2±0.1	310.6±4.1	12.3±0.5	3.20±0.02	0.20±0.01	1.92±0.02

The combination of these indicators indicates the suitability of Jupiter grapes for the production of rosé wines with standard physical and chemical characteristics.

After the production of rosé wine, grape pomace remained, to which a water-alcohol extractant was added in order to obtain an extract. The presence of ethanol in the composition of 40% vol. of the extractant contributes to the effective extraction of phenolic compounds and anthocyanins in particular, which are the main pigments of red grape varieties and have biological value. The water-alcohol medium promotes the destruction of cell membranes, which intensifies the extraction process and maximizes the release of phenolic substances.

To intensify the extraction process, pectolytic enzyme preparations with different enzyme compositions were used, which, in addition to depolymerization and de-esterification of pectin substances in the cell walls of grape skins, contribute to the intensification of the extraction of phenolic and colouring compounds from the skins of grape pomace.

The dynamics of the extraction process of phenolic and colouring substances are shown in Fig. 1.

The data in Figure 1-A show that the extracts obtained were characterized by significant values of phenolic substances on the 10th day of the process and amounted to 1.70...1.92 g/L depending on the experiment, which is 81...91% of their total technological reserve in grapes. The content of colouring substances (Fig. 1-B) varied between 210.6 and 282.0 mg/L, that accounted for 42–55% of their total technological reserve in grapes.

It should be noted that during the first day of extraction, the level of phenolic compound extraction is 65–70% and that of colouring substances is 71–81% of the values recorded on the 10th day of the process.

A positive effect of enzyme preparations on extraction efficiency was established in all experimental variants, while quantitative differences were observed between samples. The use of the enzyme preparation Depectyl Clarification, which contained pectinase, polygalacturonase, pectin esterase and pectoliasis, increased the yield of phenolic substances by 14% and coloured compounds by 34% in extracts compared to the control sample.

A comparison of the effects of different enzymes showed that, despite the identical qualitative composition of the Depectyl Clarification and Sofrazim enzyme complexes, they had different efficiencies in extracting phenolic and colouring substances, which is due to differences in the ratio and activity of individual enzymes and the characteristics of the preparations' formulations [24]. The enzyme preparation "Cuve blanc", which contains only pectinase and β-glucanase, had the least effect on the extraction of phenolic compounds and provided an average level of extraction of colouring substances compared to other enzyme preparations studied.

During the extraction of grape pomace in all samples studied, there was a general tendency toward a decrease in redox potential throughout the observation period (Fig. 2).

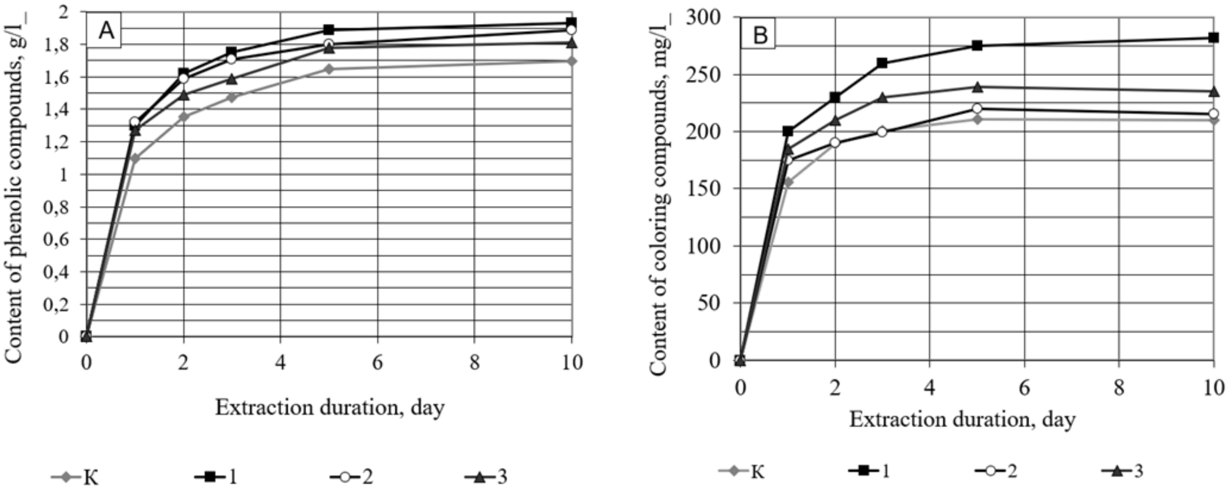

Fig. 1. Dynamics of the extraction process of phenolic (A) and colouring substances (B) from Jupiter grape pomace during 10 days: experiment variants: K – control without the use of enzyme preparations, 1 – Depectyl Clarification, 2 – Sofrazim; 3 – Cuve blanc, (*n=3, p≤0.05*)

The decrease in redox potential values indicates the accumulation of reducing compounds in the extract – phenolic and colouring substances, with correlation coefficients of -0.86 and -0.82, respectively. At the beginning of the process, the redox potential values ranged from 361±1.8 to 380±2.0 mV and at the end of extraction, they ranged from 146±0.7 to 173±0.9 mV, depending on the experimental variant.

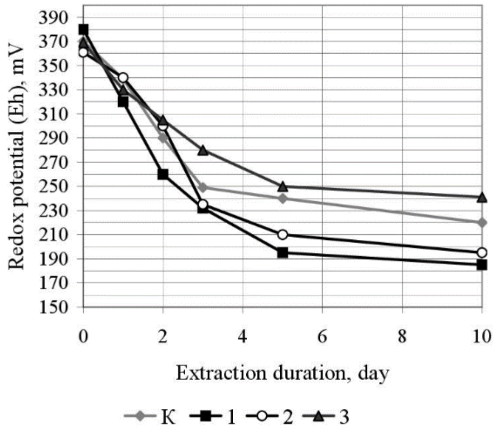

Fig. 2. Dynamics of redox potential (Eh, mV) of extracts from Jupiter grape pomace over 10 days: experimental variants: K – control without the use of enzyme preparations, 1 – Depectyl Clarification, 2 – Sofrazim; 3 – Cuve blanc, (*n=3, p≤0.05*)

In the control sample, a gradually and relatively uniform decrease in the redox potential was observed from 370 mV at the beginning of the process to 220 mV on the 10th day of extraction. This indicates the active removal of reducing components without the use of enzyme preparations.

In the experimental samples, the dynamics of the redox potential is different. In the initial stages of extraction up to 3 days, the Eh values in most experimental variants are higher or comparable to the control, which may indicate a change in the rate of transition of phenolic compounds into solution under the influence of enzymes.

At later stages of the process – 5–10 days in samples 1 and 2 – a more pronounced decrease in redox potential is observed compared to the control, indicating intensified extraction and an increase in the content of reducing substances in the extract. In contrast, sample 3, where Cuve Blanc was used, is characterized by relatively high redox potential values throughout the experimental period, which may be associated with the slow extraction of phenolic components.

At the same time, the stable, moderately reducing character of the medium is an important factor in preserving the bioactive forms of phenolic substances. Enzyme preparations form a more stable redox potential, indicating the preservation of the biological activity of the extract.

Statistical data processing allowed us to establish a relationship between the content of phenolic and colouring substances and the duration of extraction (Table 4).

Table 4 – Results of regression analysis

Regression equation	R^2 – coefficient of determination
$Y_1=1.29\cdot X - 0.26\cdot X^2 + 0.016\ X^3$	0.96
$Y_2= 191.2\cdot X - 39.14\cdot X^2 + 2.29\ X^3$	0.95
$Y_3=321.12\cdot e^{-0.068X}$	0.80
Y_1 – mass concentration of phenolic substances, g/l; Y_2 – mass concentration of colouring substances, mg/l, Y_3 – redox potential, mV; X – duration of extraction, days	

The main quality indicators of the extract obtained using the enzyme preparation are presented in Table 5.

Analysis of the data in Table 5 allows us to conclude the following. The strength of the extract indicates stability against fermentation even at low sugar concentrations, that, in turn, give it a pleasant taste. The presence of organic acids gives the extract a pleasant acidic freshness and the high content of phenolic and coloring compounds characterizes the extract as a product with high biological value. The optical characteristics indicate color saturation, in which red pigments predominate.

The aroma of the Jupiter grape pomace extract is characterized by pronounced muscat and floral notes with citrus and red berry undertones, complemented by light spicy and phenolic nuances, due to the high concentration of aromatic compounds in the berry skin.

Table 5 – Physicochemical indicators of the extract (variant 1 – using the enzyme preparation Depectyl Clarification) from the pomace of Jupiter grapes (*n=3, p≤0.05*)

Physical and chemical indicators						Optical indicators	
Volume fraction of alcohol, %	Mass concentration, mg/L				pH		
	sugars	titrated acids	phenolic substances	coloring substances		CI	H
21.58±0.5	30.0±2.0	4.4±0.1	1928.1±20.2	282.0±8.5	4.0±0.02	2.99±0.03	0.56±0.01
Organoleptic indicators							
Color – rich, garnet with a purple tint *Aroma* – bright, rich, muscat, tones of orange peel, elderberry and acacia, hints of raspberry and blackberry, light tones of spices *Taste* – sweet, moderately extractive, harmonious							

Conclusion

Jupiter grapes were studied as a promising raw material for complex processing to obtain rosé wines and pomace extract with biological value, which corresponds to modern principles of the circular economy, contributes to reducing raw material losses and forming products with high added value.

Analysis of the mechanical properties of the berries and juice yield of 70–75% confirms the suitability of Jupiter grapes for winemaking. At the same time, the characteristics of the technological reserve of phenolic and colouring substances and their maceration capacity, which is 31% and 17%, respectively, indicate the limited feasibility of using the red processing method, since prolonged maceration will not ensure the formation of wine with sufficient structural fullness. The optimal method is the pink method of processing, which allows the varietal potential to be realized without the risk of forming structurally unstable wines.

Based on the analysis of the carbohydrate-acid potential of Jupiter grapes, it has been established that the use of the rosé method of processing ensures the production of high-quality table wines with a harmonious balance of indicators, which is confirmed by the physical and chemical characteristics of the final product.

It has been established that water-alcohol extraction of grape pomace remaining after the production of rosé wine for 10 days at a temperature of 20 °C ensures effective extraction of 81–91% of phenolic substances and 42–55% of colouring substances.

It has been proven that the use of pectolytic enzyme preparations intensifies the extraction process and the use of the Depectyl Clarification preparation ensures the maximum yield of phenolic and colouring compounds compared to the control.

It has been shown that the dynamics of the redox potential of extracts is characterized by a steady decrease in Eh during the extraction process, which correlates with the accumulation of phenolic and colouring substances and indicates the formation of a moderately reducing environment. The use of enzyme preparations contributes to the stabilization of the redox potential, which is an important factor in preserving the bioactive forms of phenolic compounds and increasing the biological value of the extract.

The resulting water-alcohol extract from Jupiter grape pomace is characterized by a high content of phenolic and colouring substances, rich colour, pronounced aromatic profile and harmonious taste properties, which allows it to be considered a perspective product for flavouring beverages, creating natural flavour and aromatic additives and can be used in functional or gastronomic products.

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ПОТЕНЦІАЛ ВИНОГРАДУ СОРТУ ЮПІТЕР ДЛЯ ВИРОБНИЦТВА РОЖЕВИХ ВИН І БІОАКТИВНИХ ЕКСТРАКТІВ

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Анотація. Виноград сорту Юпітер — червоно-блакитний міжвидовий безнасінний гібрид, виведений в Університеті Арканзасу у 1984 році, який завдяки високій адаптивності останнім часом активно культивується в Україні. Це відкриває перспективи його комплексного використання у виноробстві, зокрема для виробництва рожевих вин і отримання біологічно цінних екстрактів із виноградної шкірки як вторинної сировини. Статтю присвячено дослідженню потенціалу винограду сорту Юпітер у контексті комплексної переробки, що передбачає виробництво рожевого вина та подальше використання виноградної вичавки після відокремлення сусла для отримання екстрактів із підвищеною біологічною цінністю. Матеріалами досліджень був виноград сорту Юпітер, культивований в Київській області, виготовлений із нього рожевий виноматеріал, виноградна вичавка після відокремлення сусла, а також водно-спиртові екстракти вичавки, отримані після 10-добового екстрагування. Для інтенсифікації процесу екстрагування застосовували ферментні препарати пектолітичної дії. На основі аналізу фенольного потенціалу винограду сорту Юпітер, зокрема технологічного запасу та мацеруючої здатності фенольних і барвних речовин, визначено оптимальну спрямованість його використання у технології рожевих вин та обмеженість застосування для виробництва червоних вин. Встановлено, що водно-спиртове екстрагування виноградної вичавки, яка залишається після виробництва рожевого вина, протягом 10 діб за температури 20 °С забезпечує ефективне вилучення фенольних 81…91 % і барвних 42…55 % речовин. Доведено, що застосування ферментних препаратів пектолітичної дії інтенсифікує процес екстрагування, при цьому препарат Депектил кларифікейшн забезпечує максимальний вихід цільових компонентів. Показано, що зниження окисно-відновного потенціалу екстрактів у процесі екстрагування корелює з накопиченням фенольних і барвних речовин та формуванням помірно відновного середовища, сприятливого для збереження їх біоактивних форм. Отримані водно-спиртові екстракти характеризуються високою біологічною цінністю та можуть бути використані як перспективна сировина для ароматизації напоїв і створення натуральних функціональних продуктів.

Ключові слова: виноград сорту Юпітер, барвні речовини, фенольні речовини, біологічна цінність, окисно-відновний потенціал, ферментні препарати, вичавка, екстракт, рожеве вино.

Received 15.01.2026 **Reviewed 08.02.2026**

Revised 23.02.2026 **Approved 03.03.2026**