# INFLUENCE OF GRAPE SEEDS ON THE CHEMICAL COMPOSITION OF RED WINES

## INFLUENȚA SEMINȚELOR DIN STRUGURI ASUPRA COMPOZIȚIEI CHIMICE A VINURILOR ROŞII

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***Abstract.*** *The fact that, to enriche whith phenolic compounds the red wine three main uvologic elements are participating, namely: grapes skins, grapes and seeds, it is known. At the moment, the enrichment process of wines with tannins extracted was studied, more detalied, from the peel and bunch and less from seeds. In this context samples of wines Merlot obtained from maceration-fermentation of must whith seeds extracted in an amount of 25, 75 and 100% and from must whith seeds added to the existing ones in an amount of 30, 60 and 100% were researched. The wine sample produced from the usual must served as a martor. The result of research showed that variants in which the seeds were found in small amounts or were absent are distinguished by their high content in phenolic compounds. Adding wet seed in different proportions reduces the content of phenolic substances and anthocyans.*
***Key words:*** *maceration–fermentation, seeds, phenolic substances, anthocyans.*

***Rezumat.*** *Este cunoscut faptul că la îmbogățirea vinurilor roșii cu compuși fenolici participă trei elemente uvologice principale și anume: pielița boabelor, ciorchinii și semințele. În lucrarea de față a fost studiat procesul de îmbogățire a vinurilor cu taninuri extrase din pieliță și ciorchini și mai puțin din semințe. În acest context au fost supuse cercetărilor mostrele de vin din soiul Merlot obținute prin macerarea–fermentarea mustuielii din care s-au extras semințele în proporții de 25, 75 și 100% și în care s-au adăugat semințe la cele existente în proporții de 30, 60 și 100%. În calitate de martor a servit mostra produsă din mustuiala obișnuită. În urma cercetărilor s-a constatat, că variantele în care semințele s-au aflat în cantități mici, sau au lipsit, se disting printr-un conținut mai mare în compuși fenolici. Adăugarea semințelor umede în diferite proporții diminuează conținutul în compuşi fenolici și în substanțe colorate.*
***Cuvinte cheie:*** *macerare–fermentare, semințe, substanțe fenolice, substanțe colorante.*

## INTRODUCTION

Red wine, unlike the white ones are much richer in chemical composition due to the longer contact of the must with the solid parts of grapes.

Besides the characteristics of both types of wine compounds (alcohols, organic acids, nitrogenous substances, minerals, glycerol etc.) they have in large

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amounts phenolic and coloring substances.

It is known that red wine enrichment with coloring and phenolic substances (tannin) participates three elements of grapes constituent namely the skin, clusters of grapes and seeds (Rusu, 2006; Valuico, 1973). Coloring substances are located in the skin, while some varieties, very few in number, in pulp too. The tannins are concentrated in large quantities in the skin and clusters of grape. According Valuico G. (Valuico, 1976) - fermentation maceration in the presence of clusters of grape allows the extraction of phenolic substances in 84% of its potential in grape. In this case, red wines contain more phenolic substances with P-vitamin properties (tannins, leucoanthocyans, flavanols, catechins, phenolic acids, etc.) and vitamins of group B. Although fermentation with clusters of grape has a beneficial effect on the chemical composition of wine this process now does not have a wide application in the production of red wines. Note that until now has been studied in more detail the enrichment process of red wines with tannin extracted from skin and clusters of grape and less from seed. As mentioned Cotea, 1985, seed chemical composition differs from the other elements of grape. The water content is 28-40% by weight, cellulose - up to 28% nitrogenous substances varies between 0.8 and 1.2%, the tanning substances - 4-6%, oils - 10-25% and minerals - 2-4%. From the chemical composition of seed main technological importance for red wines have tanning substances.

However, many authors consider that seed from must influence bad the quality of red wine and recommend that they to be removed. Thus Prida I. et al. 2012 proposes that the first 3-5 days after the formation of the hat, the sedimented seeds to be eliminated. On the other hand, in the modern oenology it practice use of enotannin obtained from grape seeds in the production of various types of wines (Cozub and Rusu, 1996; Țârdea *et al.,* 2010).

From the above it can be concluded that, on the role of seed in the production of red wines, among specialists oenologists there is no single opinion. The purpose of the investigations is to determine the influence of the seed from must on enrich with phenolic compounds red wine in fermentation maceration process

## MATERIAL AND METHOD

The research was conducted in the laboratory of oenology and wines with denomination of origin of Practical Scientific Institute of Horticulture and Food Technology.

As experimental samples were served wines produced in the wine region of Centre Merlot grape variety, vintage year 2014.

Table 1 presents the basic indices of Merlot grape. Sugars content is 242 g / L, and titratable acids 7.4 g / L. These data show that the grapes used for the experiment were harvested at full maturity, in which the seeds are ripe. The potential total phenolic substances is 2448 mg / L and 872 mg coloring / L, higher values for Merlot.

*Table 1*

**Basic indices of grape used to obtain experimental samples**

| Variety name | Harvest Year | Physico-chemical | | | | |
|---|---|---|---|---|---|---|
| | | Sugars, g/L | Titratable acidity, g/L | pH | Phenolic substances, mg/L | Coloring matters, mg/L |
| Merlot | 2014 | 242 | 7,4 | 3,36 | 2448 | 872 |

To determine the effect of seeds on the extraction process during maceration-fermentation were fitted experiments with different amounts of seed.

The experiments scheme is the following variants: Variant 1 - adding wet seeds in the must in a proportion of 30% from the the quantity of seeds in must; Variant 2 - adding to the must 60% wet seeds; Variant 3 - adding to the must wet seeds at a rate of 100%; Variant 4 - the separation of seeds from the must 30%; variant 5 - separation from the must of seeds 60%; variant 6 - separation of the seeds from must at a rate of 100%. As a witness sample served wine made from the usual must.

Experimental samples were obtained under microvinification. For each sample were taken 3 kg of grapes that were manual crushed with removal of clusters of grape and the must obtained was sulfided with 75 mg / kg total $SO_2$. The removed seeds from must were released from pulp, which is then added to the respective variant must. In maceration-fermentation variants that provide seeds surplus were added seeds results from previous vinification. Must maceration-fermentation was carried for 8 days at 25-28oC, after the wine has been separated from solids in the laboratory press. The wine obtained was subjected post fermentation, clarification, and then peeled from the yeast sediment, and poured into bottles.

In the obtained wine samples were determined major physico-chemical indices being used standard methods; total phenolic substances with the Folin-Ciocalteu method reagent and coloring substances with OIV method. After 3 months of pulling off sediment samples were subjected tasting, using scores of appreciation from 7.80 till 8.00 points. Besides the physical and chemical clues wine samples were investigated in spectrophotometer in the range of 400-600 nm wavelength.

## RESULTS AND DISCUSSIONS

The results of physicochemical analysis of samples of wine obtained by maceration-fermentation of must with differing seeds content are shown in Table2.

Wine samples investigated are distinguished by a high alcohol content, ranging from 13.75 till 14.71% vol., A fact that confirms their use in the production grapes with a high degree of maturity. Residual sugar not exceed 1.55 g / L, indicating that falls within the limits set for dry red wines.

Wine samples investigated are distinguished by a high alcohol content, ranging from 13.75 till 14.71% vol.

*Table 2*

**Physicochemical indices of samples of wine obtained by maceration-fermentation of must with differing seeds content**

| Experimental variant | Alcohol, %vol. | Sugars, g/L | Titratable acidity, g/L | Volatile Acidity, g/L | pH | Phenolic substances, mg/L | Coloring substances, mg/L | Total soluble salts, mg/L | Conductivity, µS/cm | organoleptic Note,points |
|---|---|---|---|---|---|---|---|---|---|---|
| V-1 | 13,88 | 1,23 | 7,10 | 0,26 | 3,60 | 1663 | 256 | 757 | 1520 | 7,80 |
| V-2 | 13,97 | 1,11 | 7,15 | 0,26 | 3,63 | 1419 | 233 | 758 | 1515 | 7,85 |
| V-3 | 14,40 | 1,43 | 7,42 | 0,33 | 3,66 | 1822 | 271 | 801 | 1602 | 7,80 |
| V-4 | 14,16 | 1,28 | 7,35 | 0,26 | 3,75 | 1914 | 353 | 819 | 1637 | 7,90 |
| V-5 | 14,24 | 1,17 | 7,27 | 0,26 | 3,53 | 1888 | 325 | 761 | 1525 | 7,90 |
| V-6 | 14,71 | 1,07 | 7,2 | 0,33 | 3,73 | 2052 | 374 | 796 | 1594 | 7,85 |
| Witness | 13,75 | 1,55 | 7,05 | 0,26 | 3,32 | 1762 | 290 | 784 | 1552 | 7,85 |

A fact that confirms their use in the production grapes with a high degree of maturity. Residual sugar not exceed 1.55 g / L, indicating that falls within the limits set for dry red wines. Titratable acidity in wine samples is 7.05 to 7.42 g / L - large enough values in red wines that did not happen malo-lactic fermentation. Volatile acidity does not exceed 0.33 g / L, which confirms that the must maceration-fermentation was done in good condition. Total soluble salt content of experimental samples have values that do not deviate much from the witness. In experimental samples this index ranging from 757 up to 819 mg / L, while in the witness he is 784 mg / L. This is due to the fact that in the experimental samples and the witness content of the acid in and acid salts the wine do not vary widely. The conductivity of the wine is to the totally soluble salts content. For the experimental samples, variants 3 and 4, which is characterized by a higher content of total soluble salts have a high electrical conductivity - 1602 and 1637 respectively mS / cm.

Note that in both cases, when must maceration- fermentation proceeds in the presence of an excess of seed or when in the must is a smaller amount of seed or missing them entirely, basic indices of experimental samples did not differ essentially from those of control sample.

As regards the content of phenolic compounds obtained results indicate a more pronounced change between the experimental samples and compared with the control (see fig. 1).

Research has shown that in variants 1 and 2, the production of which have been added seeds in a proportion of 30 to 60%, the content of phenolic compounds is lower than in witness- 1663, 1419 mg / l and 1762 mg / L. A higher content of phenolic substances (1822 mg / L) compared with the witness was documented in experimental sample obtained by adding seed at 100% (variant 3). Regarding the content of the coloring substances results are similar to literature wich confirm on the adsorption of anthocyanins by seeds during maceration -fermentation process.

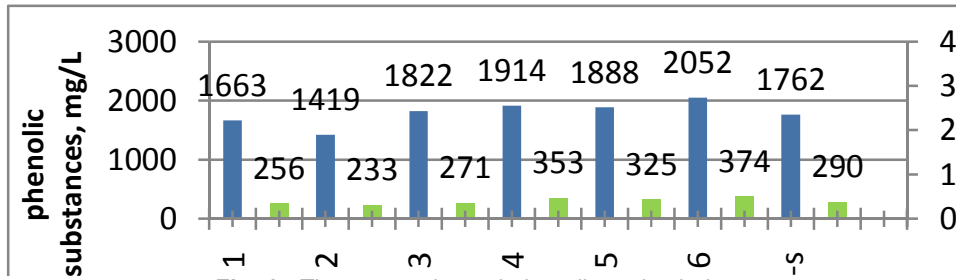


**Fig. 1 -** The content in total phenolic and coloring substances in experimental and witness wines

In variants 1, 2 and 3 obtained with added seeds coloring matter content is lower than in witness.

In the variants obtained by separating the seeds from the must (4, 5 and 6) as can be seen, the content of the coloring is higher compared to the witness and reduction is due to the quantity of seeds which, as already mentioned, serve as adsorbents them. I variant 4 - the content of coloring is 353 mg / L, variant 5 - 324 mg / L and variant 6 (seedless) - 374 mg / L, while in witness this index is only 289 mg / L. Note that in these samples was found and a higher content in phenolic substances. For example, the sample obtained seedless value of this index is 2052 to 1762 mg / L in witness. And the other two experimental samples this index is higher compared to the control.

Note that currently authors do not have reasoned explanations regarding the increase of the amount of phenolic substances in samples of wine produced seedless or with small quantities of seed. In this chapter we assume that seeds have an unfavorable role on the process of extraction of phenolic compounds from the skin. But to confirm this hypothesis is necessary to conduct further research. Another explanation for this phenomenon can be decreased volume as a result of the abolition must seeds, lead to the concentration of phenolic compounds in it and the wine respectively.

Figure 2 presents spectrograms of absorption experimental wine samples and witness. In the visible spectrum at a wavelength of 520 nm, anthocyanins give maximum absorption. Spectrograms obtained show that the experimental samples obtained by reducing the amount of seeds is characterized by a high content of anthocyanins. Spectrograms character samples of wine produced surplus seeds they demonstrate lower content of anthocyanins, especially in variant 3 (adding seed at 100%).

The most interesting gustatory qualities distinguish variants 4, 5 and 6, partial or total removal products seeds. These samples have a round taste, soft, moderate astringency and a dark ruby beautiful color, very intense, and their flavor is predominant shades of red fruit. Sensory appreciation of these wines was at the level of 7.85 (variant 6) and 7.90 points (variants 4 and 5).

The research results can be concluded that the excess seed is not beneficial to the quality of red wines.

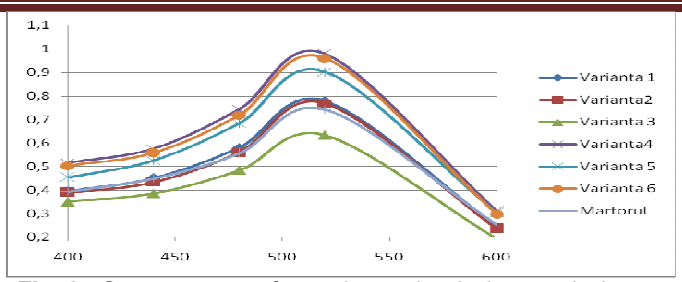


**Fig. 2 -** Spectrograms of experimental red wines and witness

Making must fermentation maceration from which it was removed some of the seeds positively influence the quality of wine. In this chapter the research will continue.

## CONCLUSIONS

1. Both the surplus, as well as the small amount of seeds from the must not influence the basic indices of red wines.

2. When fermentation maceration surplus seeds constituting 30-100% lead to the minimization of coloring matter and not contributing to the increase in phenolic substances.

3. Elimination of the seeds from must in the ratio of 30-60% allows retention of coloring substances because removing a portion of the absorption substrate.

4. The red wines produced by removing a quantity of seeds are distinguished by high olfacto-gustatory quality. They are round, well-structured taste and moderate astringency.

5. As a practical guideline proposes in process of maceration-fermentation of the must to eliminate the amounts of seeds as much as possible bigger, which will increase the quality of red wines.

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