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IMPACT OF DIFFERENT VINIFICATION METHODS ON THE POLYPHENOLIC CONTENT IN RED WINES

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Introduction

- Polyphenols are large family of naturally occurring, structurally diverse, organic compounds abundant in plants. Phenolic compounds such as anthocyanins, flavonoids and tannins are important constituents of red wine contributing to the taste, color, mouthfeel and quality.
- They are also associated with the health-promoting properties of red wine.

Introduction

- In this study, total phenols (TP), total antocianins (TA) and colour parameters of *Vitis Vinifera* red wines Vranec and Pinot Noir from vintage 2020, produced in the Republic of N. Macedonia, have been evaluated.

VRANEC

- Vranec is the most important red variety in Macedonia.
- It represents 70 % of all red grape varieties grown in our country.
- From this grape variety quality red wines are produced.



PINOT NOIR

- In Macedonia, it can be found in Veles, Kumanovo, Ovce Pole, Bitola and other wine districts. It ripens at the beginning of September in the Veles vineyards. The cluster is small, cylindrical, long and compressed. The berry is small, dark blue coloured and with thin skin.
- The Macedonian Pinot Noir is a wine of terrific elegance and complexity, rich yet linear pretty, but with depth and power.



AIM OF THE STUDY

- Total antocianins (TA) and total phenols (TP) in red wines Vranec and Pinot Noir, vintage 2020, produced in the Republic of N. Macedonia, have been evaluated.
- Wines from both varieties have been produced with two winemaking techniques, including **classical fermentation** and **roto process** in order to study the effect of **vinification on the phenolic content and colour**.

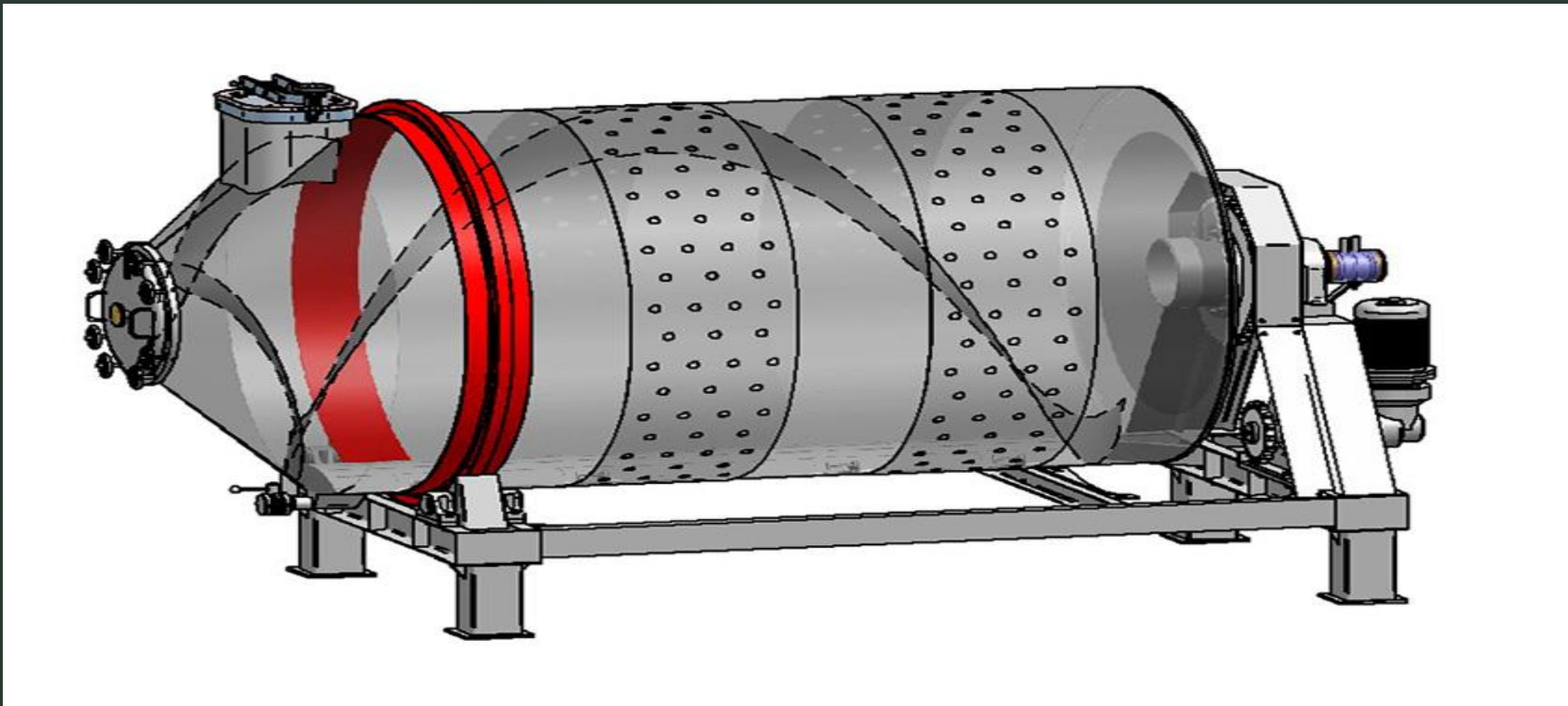
CLASSICAL FERMENTATION

- Made in a classic fermenter
- Cylindrical stainless steel vessels with a conical bottom.
- Supplied with a pump that transports the fluid from the bottom to the top.
- Temperature regulation, cooling with circulating water.
- Fermentation lasts from 6 to 9 days.



ROTO FERMENTER

- Cylindrical vessel in horizontal position.
- Supplied with a rotation program.
- The contact area between the must, the skins and the seeds is better.
- Maceration lasts longer and is more effective.



EXPERIMENTAL

- Spectrophotometric determination of total anthocyanins (TA) and total phenols (TP).
- Total phenols were determined using the Folin-Ciocalteu method at 765 nm and expressed as gallic acid equivalent (GAE, mg/L).
- Determination of the total anthocyanins was realized by the method proposed by Di Stefano et al.
- Colour parameters, including color intensity (CI) and hue (H) were determined by direct measurement of the wine absorbance at 420 nm, 520 nm and 620 nm.



EXPERIMENTAL

Folin – Ciocalteu method

- A mixture of two acids, namely phosphotungstic ($\text{H}_3\text{PW}_{12}\text{O}_{40}$) and phosphomolybdic ($\text{H}_3\text{PMO}_{12}\text{O}_{40}$) acids, react with mono and dihydroxylated phenolic substances due to their high ability to donate electrons. This reaction creates a blue coloured complex that is quantified at 750 nm. After a simple wine dilution, the Folin-Ciocalteu reagent is added. A 20 % Na_2CO_3 solution is then added to the mixture with some additional distilled water. The sample is then incubated for 30 min before absorbance measurement

EXPERIMENTAL

▶ Total Antocianins Determination

- The samples were diluted with a solution consisting of 70/30/1 (v/v/v) ethanol/water/HCl, the absorbance was measured at 540 nm.
- The coloration of anthocyanins are highly influenced by pH, with lower pH values leading to a higher proportion of anthocyanins in the red flavylum ion form. This property is exploited in this method to quantify the anthocyanin content.

EXPERIMENTAL Colour parameters

- Colour parameters, including color intensity (CI) and hue (H) were determined by direct measurement of the wine absorbance at 420 nm, 520 nm and 620 nm.

RESULTS AND DISCUSSION

Total phenolic content in both wine varieties

Wine	Total Phenols (mg/L) Roto Fermenter	Total Phenols (mg/L) Classical Fermenter
Vranec	1690	1240
Pinot Noir	1120	940

RESULTS AND DISCUSSION

Content of total anthocyanins in both varieties of wine

Wine	Total Antocianins (mg/L) Roto Fermenter	Total Antocianins (mg/L) Classical Fermenter
Vranec	248	211
Pinot Noir	236	198

RESULTS AND DISCUSSION

Colour intensity and Hue in both varieties of wine

Wine	Vranec		Pinot Noir	
	Colour intensity	Hue	Colour intensity	Hue
Roto Fermenter	21.7	4.5	5.8	6.0
Classical Fermenter	20.8	4.3	5.4	4.0

CONCLUSION

- Considering the influence of winemaking method, it was observed that the roto process gives better results and higher content of total phenols and anthocyanins, observed in both varieties.
- This is because maceration and extraction are much better in roto fermenters than in classical fermenters.

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- **THANK YOU FOR YOUR
ATTENTION**