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AROMATSKI PROFIL VINSKOG TALOGA SORTE *MALVAZIJE ISTARSKE*

AROMATIC PROFILE OF *ISTRIAN MALVASIA* WINE LEES

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INTRODUCTION

Recognizing various winemaking waste, from grape pomace, skins, seeds and wine lees, as valuable resources is gaining recognition.[1] Wine lees, the sediment of solid and liquid material settled at the bottom of tanks and barrels during and after fermentation, is composed mainly of residual yeast biomass, including cells undergoing autolysis, tartrate crystals and precipitated phenolic and aromatic compounds carried over from must and wine.[1, 2] Because of their composition, lees are potentially valuable in food, cosmetic and other industrial applications. *Istrian Malvasia* (*Cro.* Malvazija istarska) is a widely planted native white grape variety in Croatia, grown principally in the Istria region. Istrian Malvasia wines are typically characterized by a fermentation derived fruity and floral aroma with a subtle muscat character.[3]

The aim of this study is to characterize the volatile aroma profile of Istrian Malvasia wine lees to support their possible reuse, rather than conventional disposal practices.

Keywords: wine lees, Istrian Malvasia, volatile compounds, HS-SPME, GC-MS

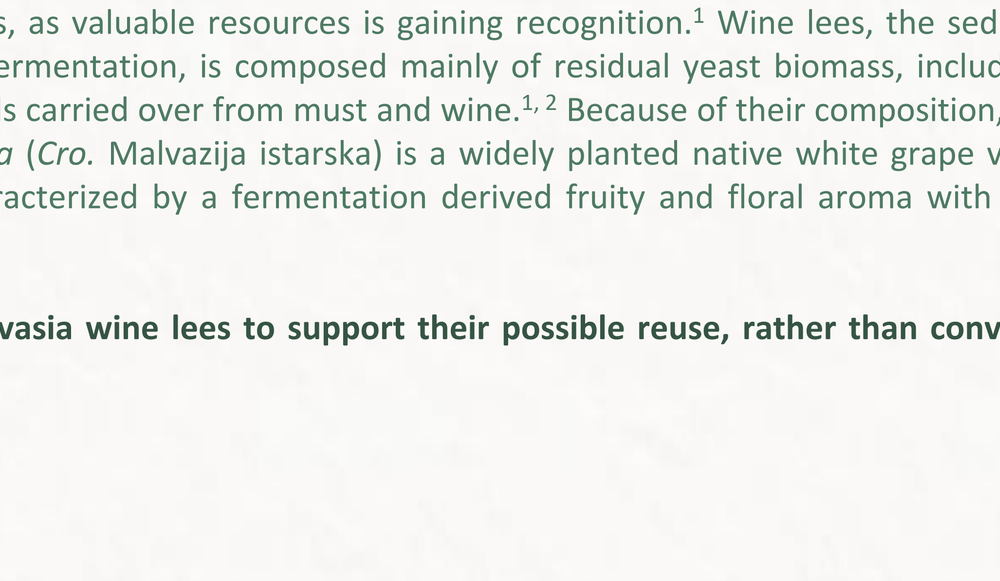
METHODOLOGY

Four lees samples from Istrian Malvasia wine production (2022 vintage) were collected from the same grape source. All underwent identical pre-fermentation handling before inoculation with a selected commercial yeast strain and vinification in a specific vessel type (Table 1.). S2 and S3 completed primary fermentation in stainless steel before being transferred to barrels at ~10 g/L residual sugar. S1 and S4 fermented and matured entirely in stainless steel. All four samples were sampled directly from the vessel immediately after the final racking and stored at -18°C prior to analysis.

Volatile compounds were isolated by HS-SPME using a DVB/CAR/PDMS fiber. The collected volatiles were separated on an Agilent 8890 GC coupled with a 5977B MS detector. Compound identification relied on spectral matching against Wiley 20 and NIST 20 libraries, in addition to retention indices calculated from C8-C40 n-alkanes.

Table 1. Production parameters for the four Istrian Malvasia samples (S1-S4).

Sample	Yeast strain	Dose	Vessel	Maturation on Lees
S1	Lallemand Cross Evolution (*S. cerevisiae* var. *cerevisiae*)	25 g/hL	Stainless steel tank	~ 6 months, weekly bâtonnage
S2	Oenofrance Selectys La Croquante (*S. cerevisiae*)	25 g/hL	French oak barrel, 1000 L, used (2018)	~ 9 months, weekly bâtonnage
S3	Lallemand EC 1118 (*S. cerevisiae* var. *bayanus*)	25 g/hL	French oak barrel, 2000 L, new	~ 9 months, weekly bâtonnage
S4	Oenofrance Selectys La Croquante (*S. cerevisiae*)	20 g/hL	Stainless steel tank	~ 6 months, weekly bâtonnage



RESULTS

- Esters dominated the volatile profile across all samples (Figure 1.), led by ethyl decanoate, ethyl octanoate and ethyl dodecanoate (78-87% of total identified volatiles). These yeast-derived, fatty acid ethyl eseters, contribute fruity aroma notes.[4, 5]
- Samples matured in oak (S2 and S3) showed closely mathching volatile profiles despite different yeast strains. By contrast, the two samples matured in stainless steel (S1 and S4), display greater variablity, particulaly in ethyl dodecanoate, diethyl succinate, 2-phenylethanol, 3-methylbutan-1-ol.
- Diethyl succinate and 2-phenylethanol were higher in S4 than in the remaining samples. Diethyl succinate is produced from succinic acid and ethanol. 2-Phenylethanol is a yeast-derived volatile, associated with rose aroma. [4, 5]

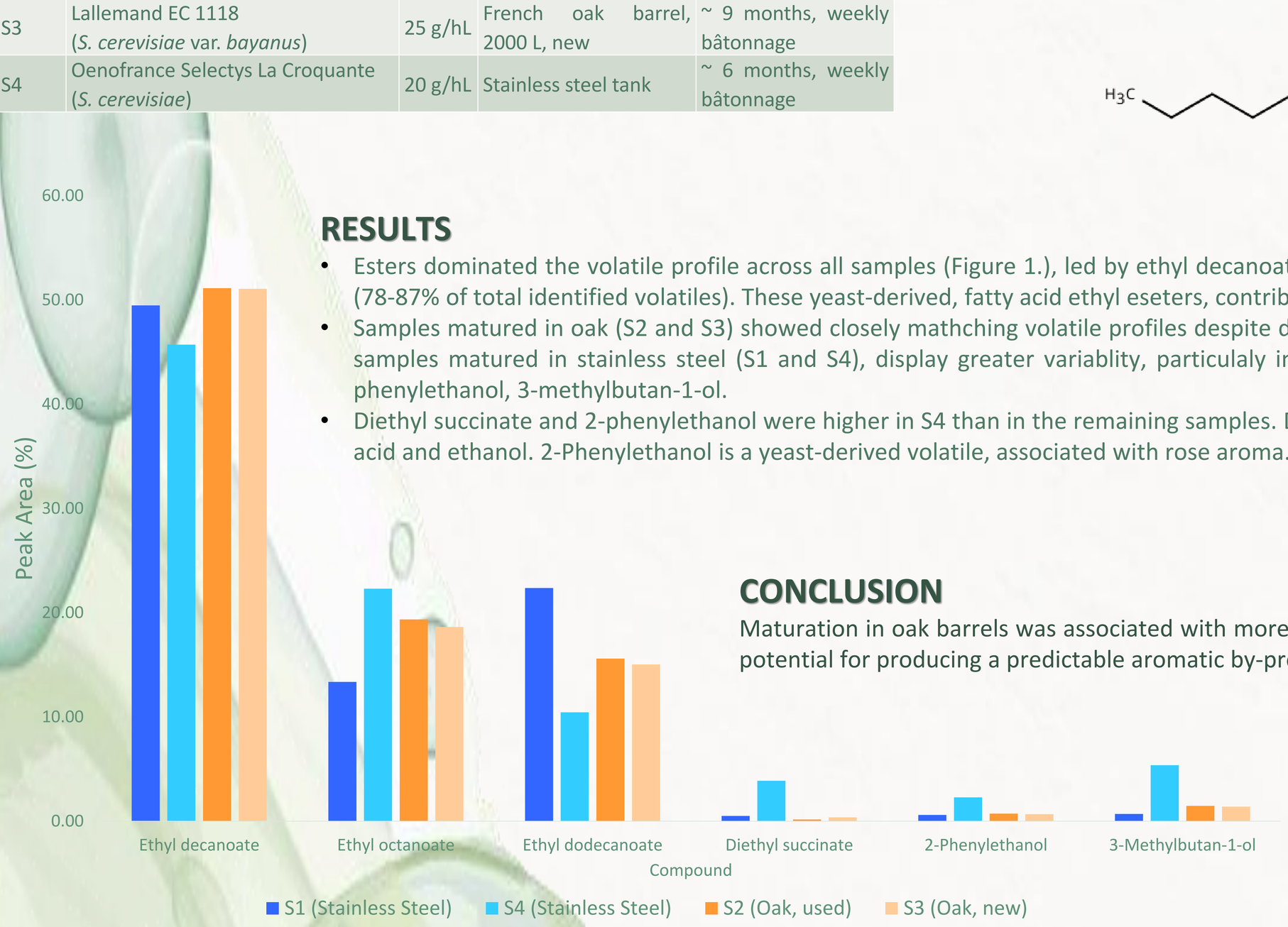


Figure 1. Relative abundance (Peak Area %) of the six most abundant volatile compounds identified across all samples, grouped by production variant.

CONCLUSION

Maturation in oak barrels was associated with more consistent lees volatile profiles, indicating potential for producing a predictable aromatic by-product for downstream valorization.

Literature

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