

Impact of novel biotechnological strategies in the fermentation of Sicilian wines on the content of total polyphenols

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INTRODUCTION & AIM

Catarratto is the main white grape variety in Sicily, and enhancing its value is a key goal. The production of wine is pervasive across the island, a consequence of its genetic biodiversity, which has over time engendered viticultural plasticity and oenological versatility, accompanied by vigour and robust yields [1].

This study examined the impact of divergent fermentation strategies on the total phenolic content (TPC) of wines produced from *Catarratto* grapes. In particular, three biotechnological approaches were explored: (i) sequential inoculation using three novel non-*Saccharomyces* yeast strains (*Starmarella lactis-condensi*, *Candida oleophila*, and *Lachancea thermotolerans*) followed by *Saccharomyces cerevisiae*; (ii) *Catarratto* wines either non-macerated or subjected to short or long maceration in contact with orange seeds and peel, with/without sulfites, and fermented using *St. lactis condensi*, *S. cerevisiae*, and lactic-acid bacteria; and (iii) sparkling wines produced using the traditional method with selected *S. cerevisiae* strains.



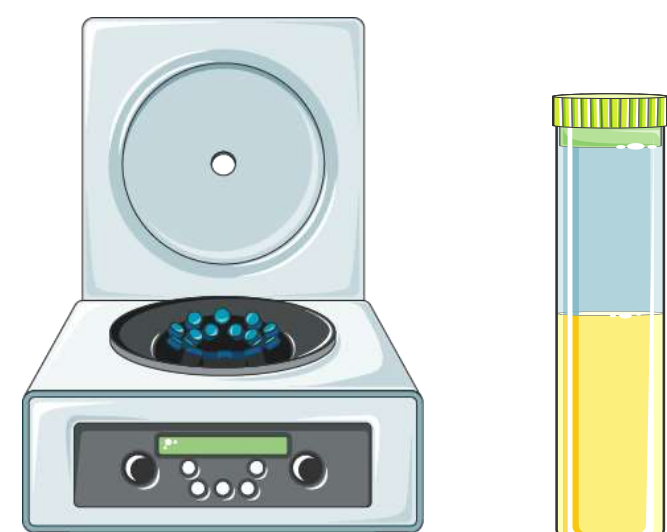
METHODOLOGY

Antioxidants extraction [2]



Extractable antioxidants (Aqueous-organic extract)

- **Dilution:** sample + 50% methanol + 2N HCl (pH 2)
- **Centrifugation:** 978 g/10 min
- **Recovery of the supernatant**
- **Addition of 70% acetone**
- **Centrifugation:** 978 g/10 min
- **Combination of both supernatants**

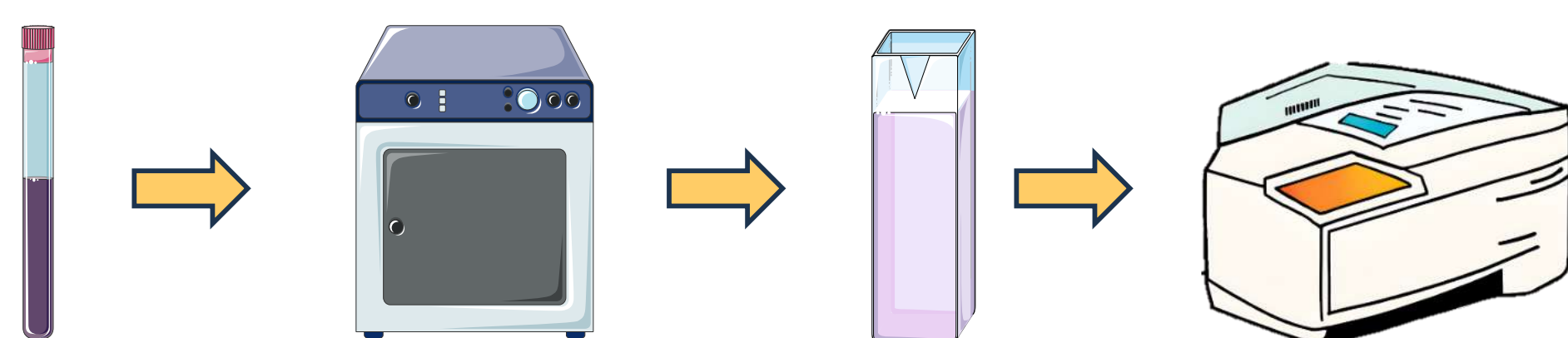


Total polyphenols [2]

- 3 mL Na₂CO₃
- 100 µL Folin-Ciocalteu
- 100 µL Sample

- 1 h darkness
- Room temperature

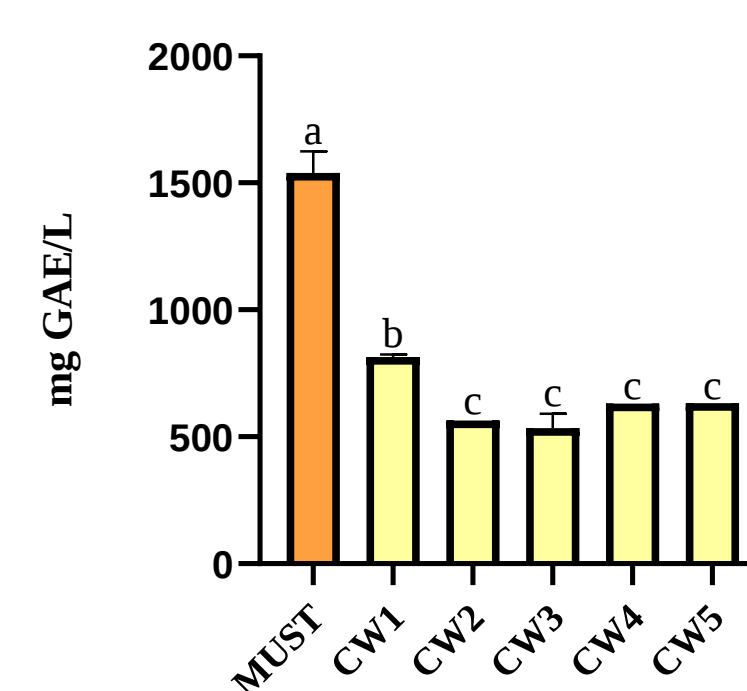
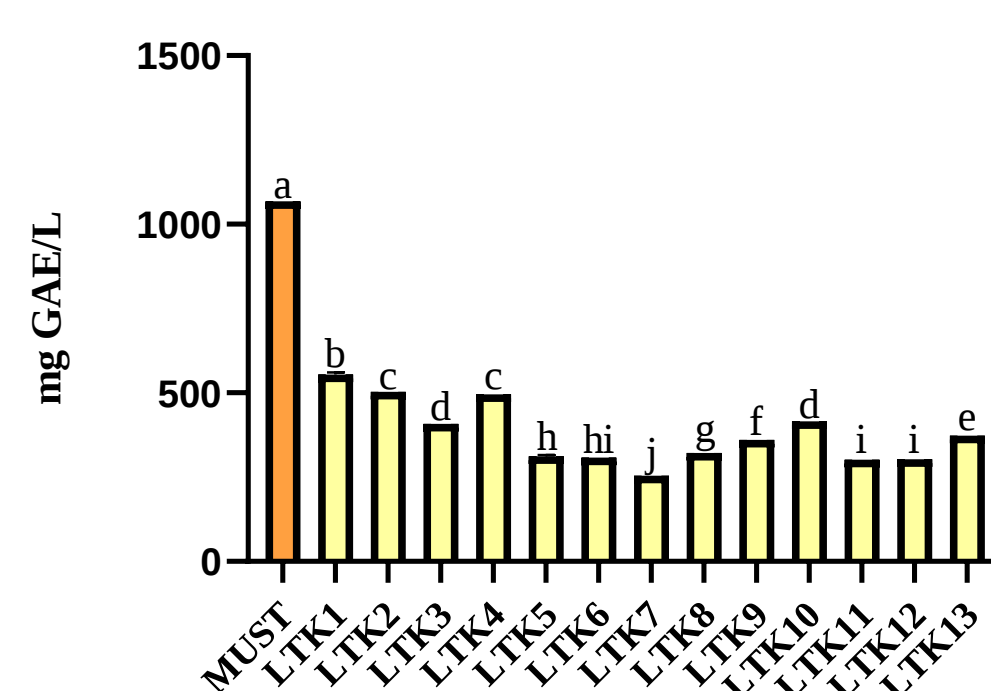
- λ = 765m
- mg GAE/L



RESULTS & DISCUSSION

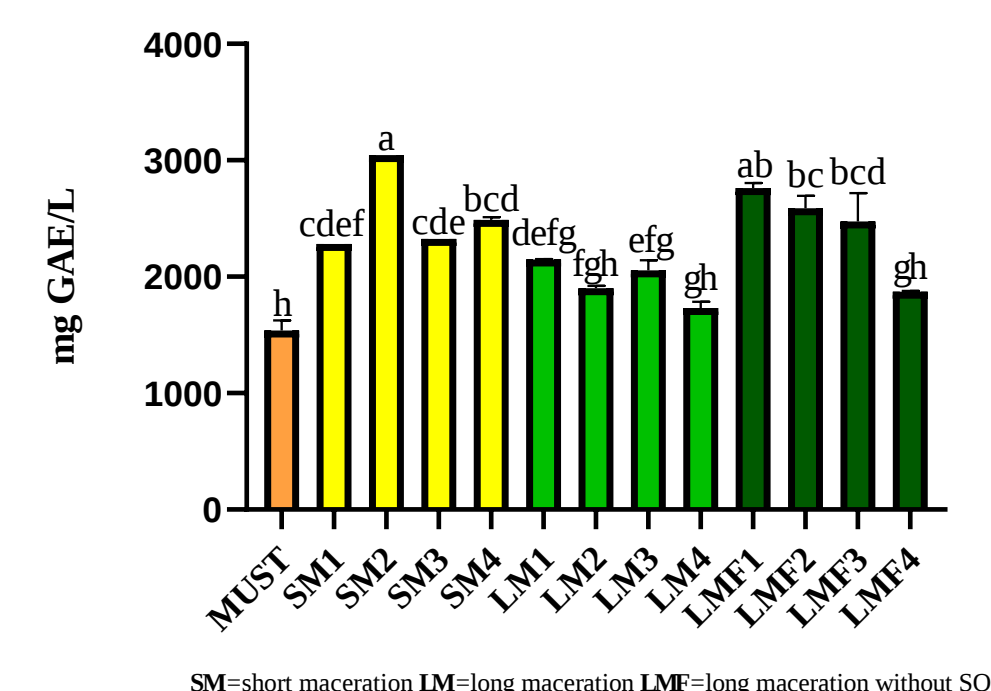
White wines

- Fermentation generally led to a reduction in TPC compared to must.



Orange wines

- Maceration increased the TPC, particularly when *St. lactis-condensi* was followed by *S. cerevisiae*. The highest total polyphenol values were obtained from SM2 and LMF1 yeast strains.

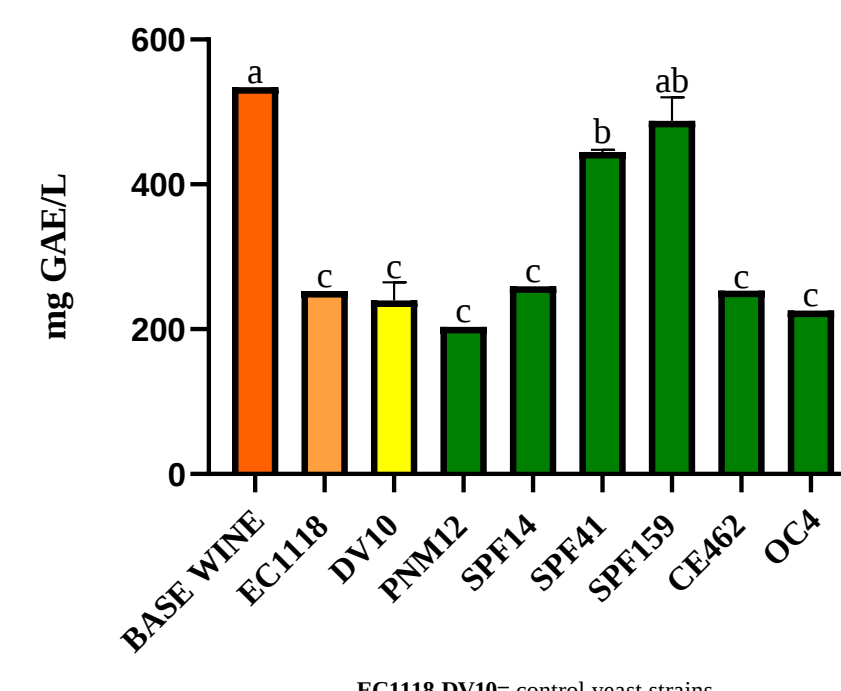


SM=short maceration LM=long maceration LMF=long maceration without SO₂

Different letters (a-j) indicate significant differences between the samples ($n = 3$ replicates per sample) One-way ANOVA followed by Tukey's test ($p < 0.05$). GAE: Gallic acid equivalent

Sparkling wines

- TPC varied significantly depending on the non-commercial strain of *S. cerevisiae* selected. The highest total polyphenol values were obtained from SPF159 and SPF41 yeast strains.



EC1118-DV10= control yeast strains

CONCLUSION

- The study demonstrated that divergent fermentation strategies exert a substantial influence on the TPC in wines derived from *Catarratto* grapes.
- Fermentation has been shown to generally reduce TPC compared to must, but the use of specific non-*Saccharomyces* yeasts, maceration, and the selection of *S. cerevisiae* strains in sparkling wines has been demonstrated to be effective in increasing its content.
- The findings of this study suggest that the implementation of targeted winemaking protocols can enhance the TPC and quality of *Catarratto* wines.

REFERENCES

[1] Fracassetti D, Stuknytė M, La Rosa C, Gabrielli M, De Noni I, Tirelli A. "Thiol precursors in Catarratto Bianco Comune and Grillo grapes and effect of clarification conditions on the release of varietal thiols in wine". *Aust. J. Grape Wine Res.* **2017**; 24(1): 125–133.

[2] Cuenca-Ortolá M, Alegría A, Cilla A. "Valencian Paella: Synergistic Antioxidant Properties of a Complete Dish versus Its Isolated Ingredients". *Biol. life sci. forum.* **2023**; 26(1): 55.

Acknowledgements

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