Polymeric pigments formed in sequential fermentation of red fresh musts by adding flavan-3-ols

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Introduction

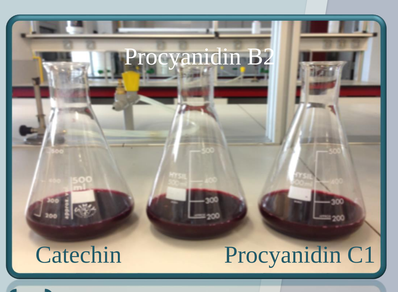
Red wine pigments are susceptible to degradation by light, SO_2 and changes in pH and temperature[1,2]. The formation of pyranoanthocyanins and polymeric pigments during fermentation and wine aging promote the stability of such pigments[3].

Glycolytic metabolites (e.g. acetaldehyde and pyruvic acid) may interact with anthocyanins and flavan-3-ols to form more stable molecules[4] without a drastic change in hue values. Procyanidins are molecules from the flavanoids family that may condense with anthocyanins[5].

The contribution of non-*Saccharomyces* yeasts (e.g. *L. thermotolerans*, *M. pulcherrima* and *T. delbrueckii*), in sequential fermentation with *S. cerevisiae* and *S. pombe*, to the production of stable pigments was assessed in this project. with the use of HPLC-DAD/MS-ESI. The red musts have been enriched with flavanols prior fermentation. Fermentative volatiles and sensorial analysis were also performed to characterize experimental wines produced.

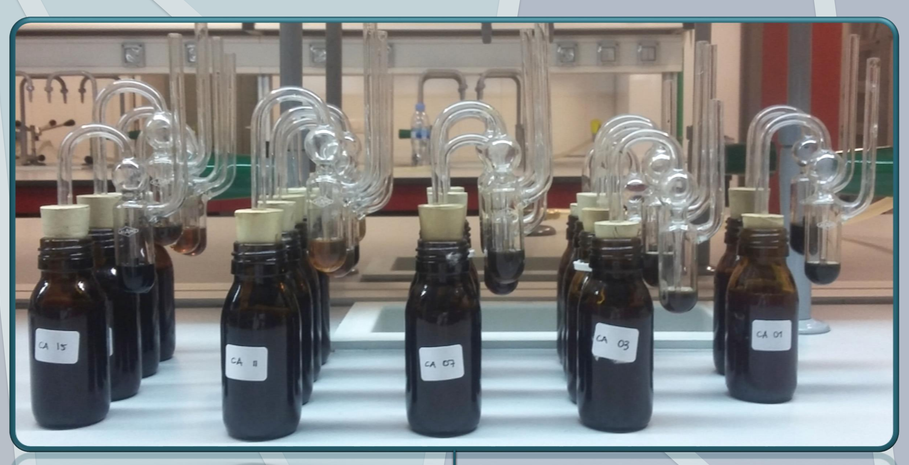
Materials & Methods

(1) Red must



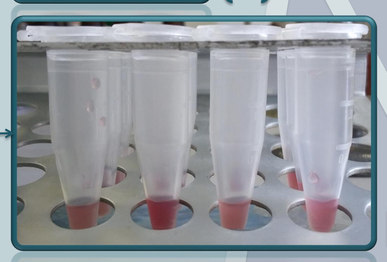
(2) Flavanol enriched must

(3) Yeast inoculum



(4) Red must fermentation

(5) Pigments characterization [HPLC-DAD/MS-ESI]
Fermentative volatiles [GC-FID]



(6) Fermentative metabolites [FT-IR]

(7) Sensorial analysis

Results

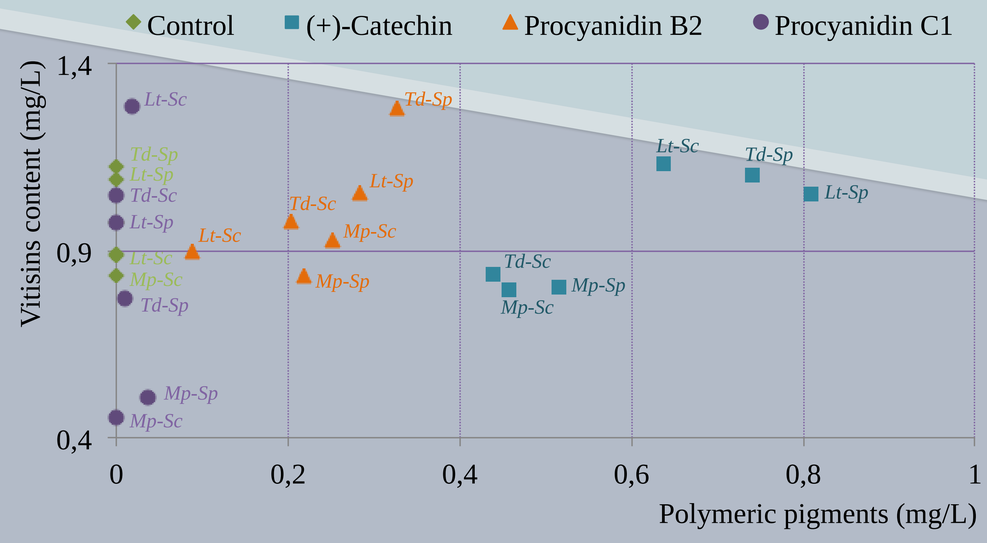


Fig 1. Concentration of vitisins (*ordinate*) and polymeric pigments (*abscissa*) produced by sequential fermentations. Each colour correspond to a different flavanol (*labels on top*).

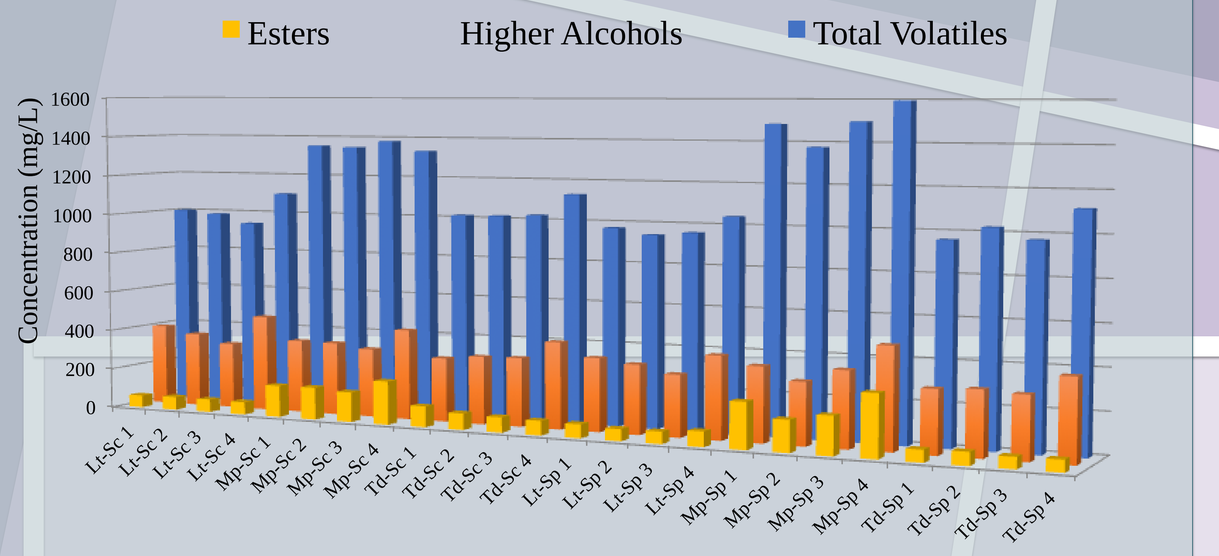


Fig 2. Volatile distribution of total esters, total higher alcohols and total volatiles of all red wines produced. Analysis was performed with GC-FID (n=3). Numbers refer to the flavanol used: 1) control, 2) (+)-catechin, 3) procyanidin B2 and 4) procyanidin C1.

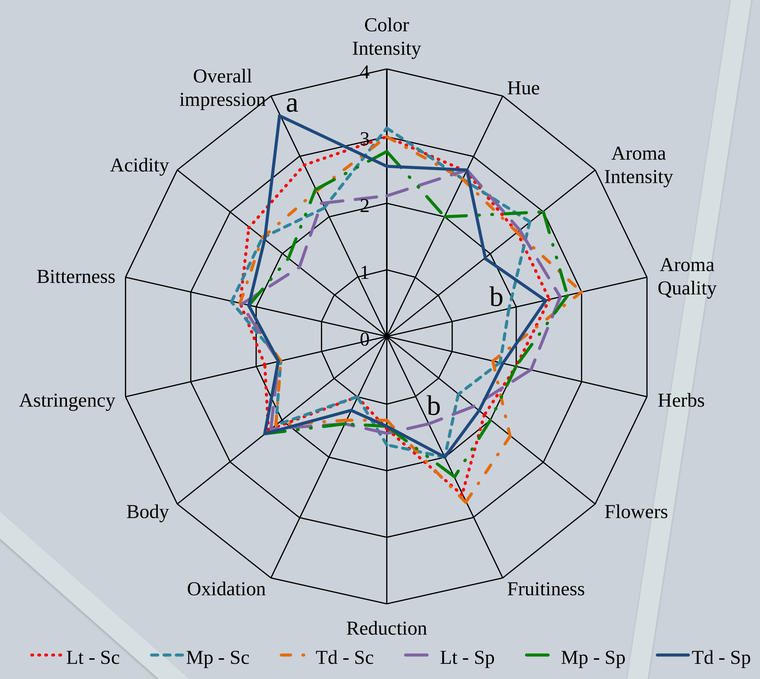


Fig 3. Sensory analysis of wines produced with must enriched with Procyanidin B2. Significant difference was perceived for fruitiness, aroma quality and overall impression.

Conclusions

Wines produced with *non-Saccharomyces* have developed the largest amount of polymeric pigments. *L. thermotolerans* in sequential fermentation with *S. pombe* preserved more monomeric anthocyanins.

Among the polymeric pigments formed, dimers with (+)catechin are the largest group.

Non-*Saccharomyces* yeasts produced larger amounts of esters and total volatiles while, in the sensory analysis, there were differences among the samples mainly in fruitiness and aroma quality.

After the results observed, it can be stress out the fact that metabolites from different fermentative yeast may not only produce more stable pigments but also to contribute to wine's complexity.

Acknowledgements

- ✓ The authors thank the personnel from the Department of Chemistry and Food Technology in the Universidad Politécnica de Madrid for excellent technical assistance.
- ✓ The project has been funded by Ministerio de Economía y Competitividad (MINECO) in Spain (Project AGL2013-40503-R).
- ✓ Special thanks to CONACYT Nuevo León (Mexico) for the doctorate scholarship granted.

References

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