Influence of protein stabilization with aspergillopepsin I on wine aroma composition

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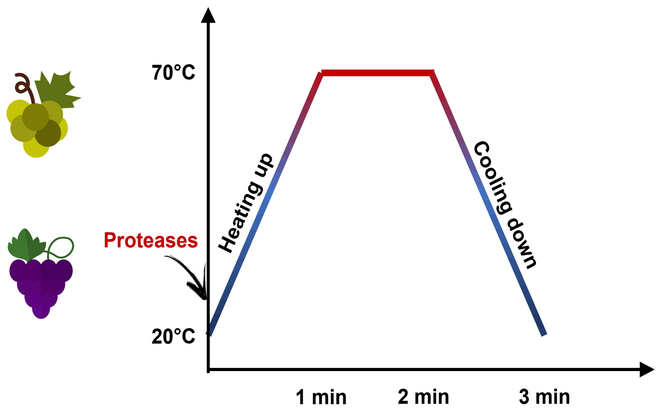
INTRODUCTION

The protein haze formation in white and rosé wines during storage, shipping and commercialization has always been an important issue for winemakers. Among the various solutions industrially proposed, the addition of proteolytic enzyme has been recently proposed as an interesting alternative. However, even if its efficacy on protein stability has been already established, the impact of the treatment with proteases on volatile aroma in wines is still poorly understood.

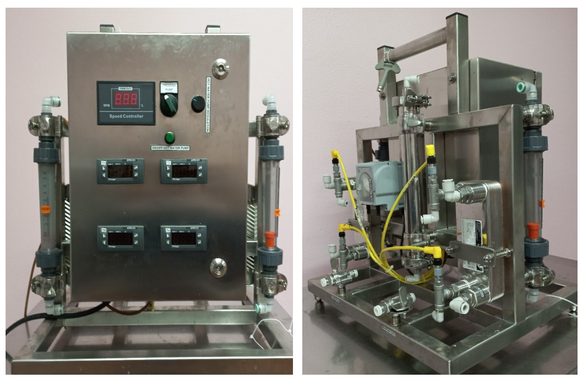
MATERIALS AND METHODS

The addition of Aspergillopepsin I (acid proteases from Aspergillus spp) has been studied in grape must coupled with a heat treatment (70°C/ 1 min; **HP**) according the instructions recently approved by OIV and the european commission for protein stability. Control wines were made from un-treated grape juice (**C**). After cold settling and racking, musts underwent to standardized winemaking processes. At the end of the alcoholic fermentation, wine volatile compounds were quantified by SPE-GC-MS/MS (Paolini et al., 2018) and LC-MS/MS (Tonidandel et al., 2021).

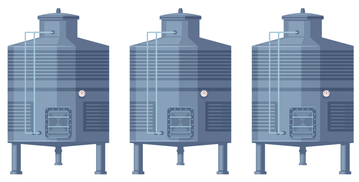
The experiment has been performed on different scales: a) **laboratory scale -** using 8 different grape musts, no replicates, data analyzed standardizing them among the varieties
b) **semi-industrial scale** - using 3 different grape musts in triplicates



Must treatment design



Heat exchanger used for the heat treatment



Standard winemaking process

GC-MS/MS analysis on final wines

RESULTS

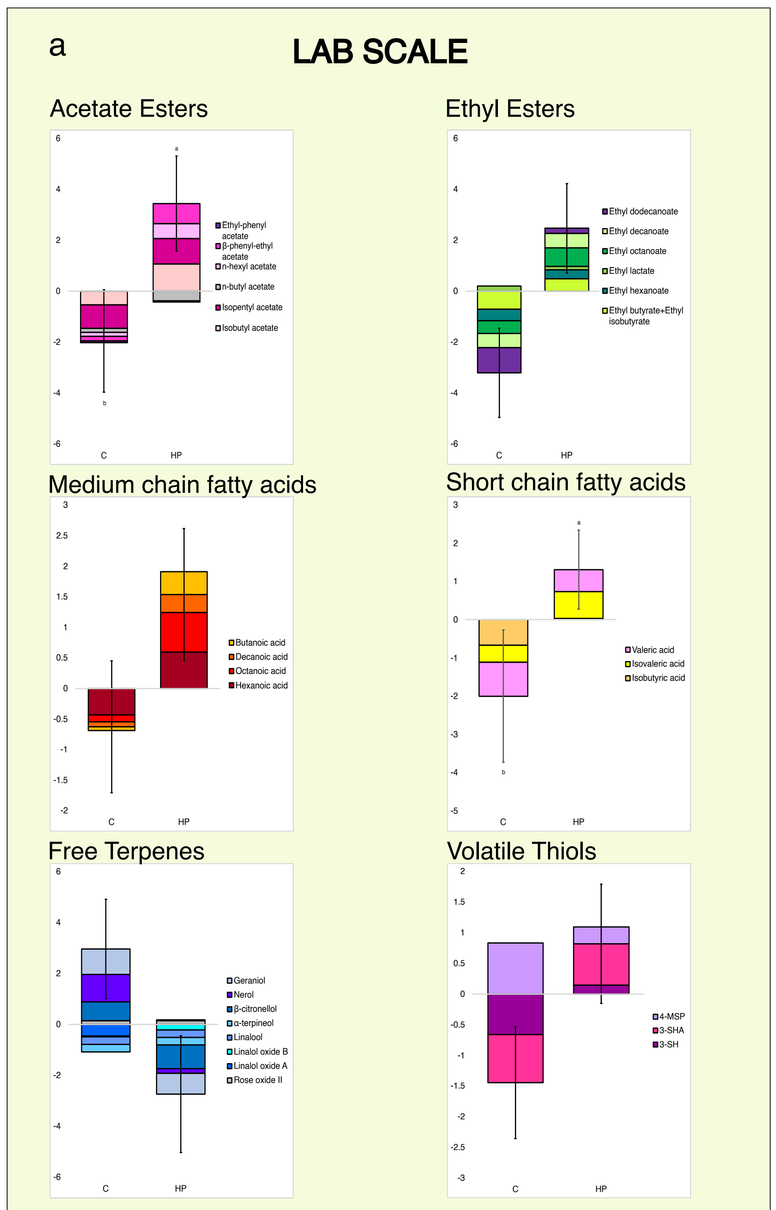


Fig.1. Average values ± standard deviation of the volatile compounds in final wines.
Letters denote significance groups (ANOVA; Tukey's post-hoc α = 5%).
Data are expressed as standardized values among the different grape varieties.

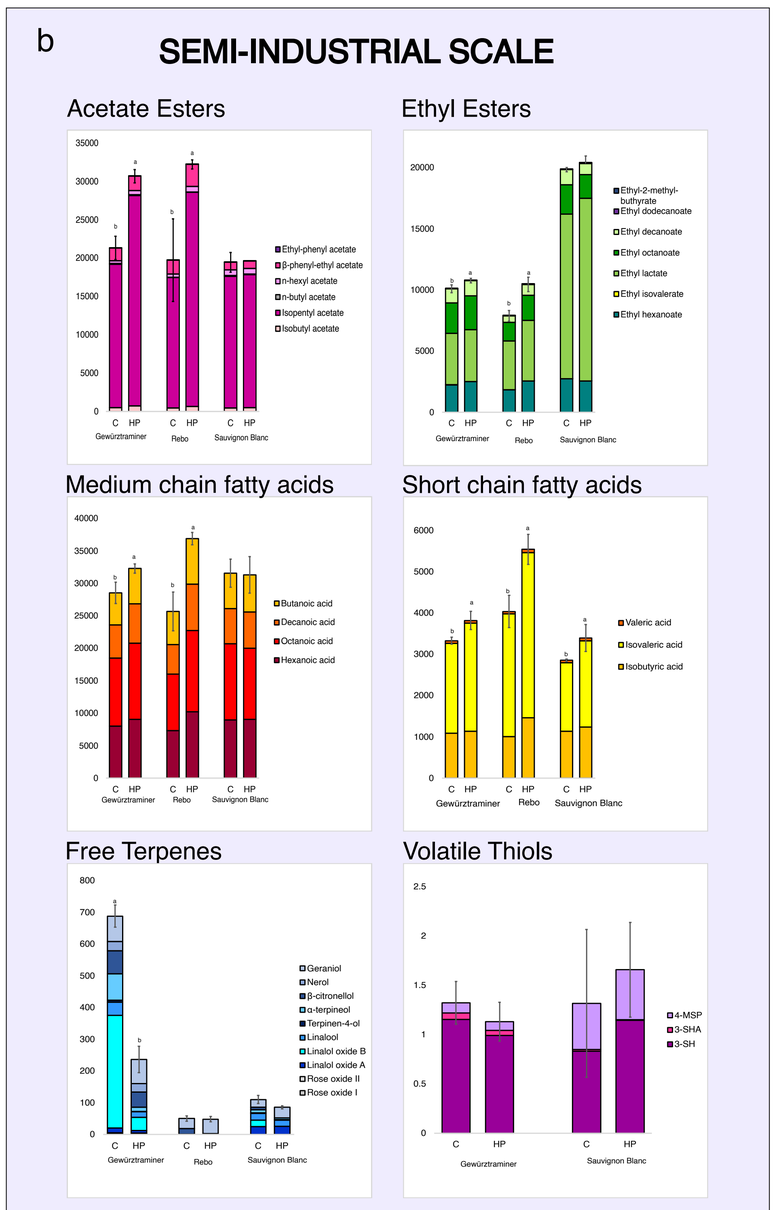


Fig.2 Average values ± standard deviation of the volatile compounds in final wines.
Letters within the same grape variety denote significance groups (ANOVA; Tukey's post-hoc α = 5%).
Data are expressed as nm/L.

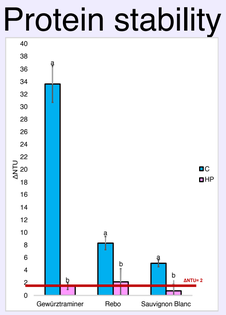


Fig.3. Results from heat protein stability test on final wines.
Data are expressed as ΔNTU values, considering 2 as threshold level for wine protein stability.

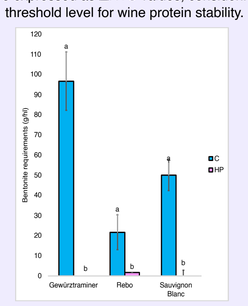


Fig.4. Average values ± standard deviation of bentonite requirements to reach stability in final wines.

Letters within the same grape variety denote significance groups (ANOVA; Tukey's post-hoc α = 5%)

Volatile compounds in final wines were analyzed in both lab and semi-industrial scales samples (Fig.1-2).

In addition, heat and bentonite tests were conducted on wines from semi-industrial scale trials (Fig.3-4).The purpose was to verify the effectiveness of the proteases addition coupled with the heat treatment as an alternative solution to reach protein stability in wines.

CONCLUSIONS

-This study provided an initial evaluation of the impact of combined heat treatment with proteolytic enzyme on the aroma profile of white and rosé wines

-Results are consistent between lab and semi-industrial scale

-Treated wines were on average already stable at the end of the alcoholic fermentation; bentonite addition was required only in one replicate among treated samples

-Treatment increased volatile yeast-derived compounds produced during the alcoholic fermentation

-Free terpenes concentration decreased in Gewürtztraminer, accordingly to the trend observed in the lab scale experiment, probably as a consequence of the heat treatment (Carlin et al., 2022)

FOR MORE INFORMATION:

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