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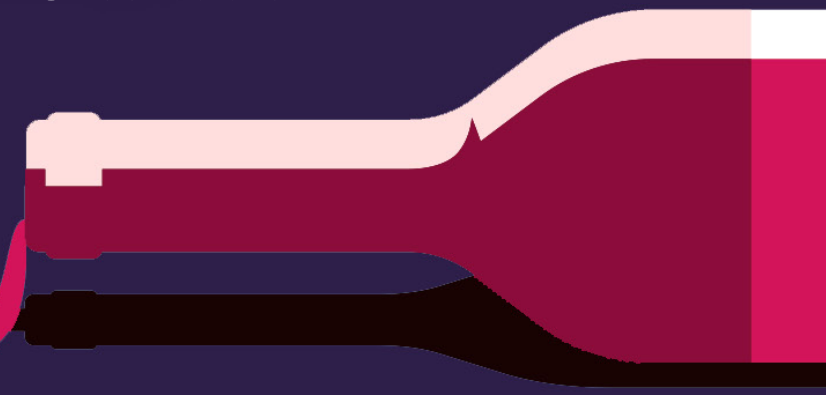
BOOK OF ABSTRACTS



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EVIDENCE OF THE INTERACTION OF ULTRASOUND AND ASPERGILLOPEPSINS I ON UNSTABLE GRAPE PROTEINS

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Most of the effects of ultrasound (US) result from the collapse of bubbles due to cavitation. The shockwave produced is associated with shear forces, along with high localised temperatures and pressures. However, the high-speed stream, radical species formation, and heat generated during sonication may also affect the stability of some enzymes and proteins, depending on their chemical structure. Recently, Celotti et al. (2021) reported the effects of US on protein stability in wines. To investigate this further, the effect of temperature (40°C and 70°C; 60s), sonication (20 kHz and 100 % amplitude, for 20s and 60s, leading to the same temperatures as above, respectively), in combination with Aspergillopepsins I (AP-I) supplementation (100 µg/L), was studied on unstable protein concentration (TLPs and chitinases) using HPLC with an UV–Vis detector in a TLPs-supplemented model system and in an unstable white wine. In model wine, neither temperature nor sonication affected TLPs concentration, suggesting their unfolding reversibility. However, the presence of AP-I during US treatment reduced protein concentration, up to complete removal under the most powerful conditions. In wine, the temperature effect was enough to lower chitinase levels (~48% and ~54% reduction at 40°C and 70°C, respectively) but had an undetectable effect on TLPs level. US significantly reduced both protein families, being more effective on chitinases (52% and 69% reduction at 20 s and 60 s, respectively) than TLPs (~11%) with the most powerful treatment. Interestingly, US was more successful than heating on chitinase (32%) and TLPs (15%) removal at the most energetic conditions. The supplement of AP-I combined with heating or US further reduced protein concentration. For heat treatment, both proteins were affected at both temperature conditions (TLPs: ~25% and ~23%; chitinases: ~58% and ~46%), while AP-I combined with US only affected TLPs under the most energetic treatment (~18%). The study found that US can affect unstable grape proteins and has additional mechanisms beyond sonication-induced temperature increase. When combined with AP-I, it further reduces unstable proteins, and suggests interaction between the US and AP-I. Further investigation is required to determine if US treatment destabilises proteins through a mechanism distinct from temperature increase, considering other factors affecting protein stability in winemaking conditions.

1. *Celotti, E., Barahona, M. S. O., Bellantuono, E., Cardona, J., Roman, T., Nicolini, G., & Natolino, A. (2021). High-power ultrasound on the protein stability of white wines: Preliminary study of amplitude and sonication time. LWT, 147, 111602.*