

# Investigations of the effects of ultrasound on thiol precursors of grapes

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High amplitude and power ultrasounds (US) were tested on the pre-fermentation maceration phase of white grapes to study the effect on thiol precursors. In particular, the research focused on the precursors of 3-mercaptohexan-1-ol (3MH) and 4-mercapto-4-methyl-pentan-2-one (4MMP) linked to glutathione (GSH) and cysteine (Cys). The treatment resulted in a significant extraction of phenolic compounds compared to controls in the short application time (3 and 5 min), confirming the extractive effect of US on grape skins. However, the concentration of thiol precursors did not vary and even, in the case of GSH-3MH, showed a negative trend with the treatment time applied.

Given the positive extractive effect of US, a direct interaction between US and thiol precursors is conceivable. This hypothesis was tested in a model solution added with 3MH and 4MMP precursors. The average concentrations of GSH-associated precursors were significantly decreased after treatment (~22% and ~18% for GSH-3MH and GSH-4MMP), while in the case of cysteine-related compounds the decrease was less important (~6% ~8% for Cys-3MH and Cys-4MMP). Subsequent analyses of volatile thiols showed that the degradation effect of US led to a significant release of the corresponding thiols (3MH and 4MMP). These results support previous experiences at industrial level where wines obtained after sonication of the crushed grapes (2 minutes) showed higher thiol concentrations and greater pleasantness compared to traditional maceration.

All the experiences highlight the interesting effect of US treatment on thiol precursors; from a technological point of view, US could be advantageously used in the management of the pre-fermentation maceration phase of aromatic varieties containing thiol precursors. The results of this and previous research make it reasonable that pre-fermentation maceration of white grapes could be replaced by a short treatment of the crushed grapes.