

Topic: Analysis and composition of grapes, wines, wine spirits

Effect of pre-fermentative steps on thiol precursors in Grillo must

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The varietal thiols, namely 3-mercaptohexan-1-ol (3MH), 3-mercaptohexylacetate (3MHA), and 4-mercapto-4-methylpentan-2-one (4MMP), are sulphur-containing aromas associated with the typical flavour of several white wines, such as Sauvignon blanc wine, conferring guava, citrus and passion fruit notes. These compounds occur as non-volatile sulphide precursors in grape berry, where they share their sulphur atom with a cysteine residue. 3MH bound with cysteine (Cys-3MH), glutathione (GSH-3MH) and also cysteine-glycine (CysGly-3MH) has been described, while 4MMP occurs as cysteine (Cys-4MMP) and glutathione (GSH-4MMP) conjugates. S-3-(hexan-1-yl)-glutathione (GSH-3MHA1) was also identified, and it can be considered as a thiol precursor. Recently, the presence of thiol precursors was reported in the Italian autochthonous variety Grillo, and their concentrations strongly decreased when must was produced under commercial conditions.

This study investigated the influence of pre-fermentative operations on thiol precursor concentrations. Grillo grape was pressed under industrial conditions; must samples were collected after crashing, at draining, at pressing yield of 20%, 40% and 60%, at the end of pressing, during transfer in clarification tank, in a clarification tank and after clarification. The must was either air-exposed or air-free during the pre-fermentative steps. Thiol precursors were determined in SPE-purified must samples by UPLC-HRMS.

Cys-3MH, GSH-3MH and GSH-3MHA1 strongly decreased after crashing, and small concentrations were found in drained must samples independently of the presence of air. In particular, the crashing played a major role on GSH-3MHA1 content; a further decrease of both Cys-3MH and GSH-3MH was found due to the must transfer in clarification tank. In general, precursor amounts were lower in must samples produced in air-free condition, except for clarified musts where the precursor contents were comparable in both air-exposed and air-free conditions.

For the must production at industrial conditions particular attention should be given to the grape pressing for limiting the loss of thiol precursors. The air-exposure of must has a limited positive influence on thiol precursors, since the removal of solid parts with the clarification is responsible for their further loss. The proper management of these winemaking steps could allow to preserve major levels of thiol precursors.

Keywords: Thiol precursors; Grillo grape; Pressing; UPLC-HRMS.