

Effect of the grape must extraction steps on the content of varietal thiol precursors

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The varietal thiols 3-sulfanyl-3-methylpentan-2-one, 3-sulfanylhexan-1-ol and its acetyl ester are the main responsible for boxwood, grapefruit and passion fruit notes of many white wines. These compounds occur in grape only as non-volatile precursors bound to S-glutathionyl- or S-cysteinyl-moieties but they are released by the yeast over the fermentation. However, the amount of these volatile compounds in wine is seldom related to the amount of their precursors in grape [1] because the lyase activity of yeast is a strain-dependent characteristic [2] and the probable contribution of hydrogen sulphide to the neoformation of the volatile thiols [3]. Fracassetti et al. [4, 5] reported massive loss of glutathione and glutathionyl- bounded varietal thiols as result of the grape juice extraction under production in industrial-scale conditions. Particularly, more than 60% of the precursors S-glutathionyl-3-sulfanylhexan-1-ol (GSH-3MH) and its aldehyde form (S-glutathionyl-3-sulfanylhexanal, GSH-3MHAl) got lost from Grillo and Catarratto bianco grape cultivars, the main Sicilian white grape cultivars, as result of the juice extraction. Such a behaviour can seriously detrimentally affect the flavouring properties of the final wine and it points out a further source of the lacking correlation between the amount of precursors in grape and volatile thiols in wine.

The reasons for such behaviour were investigated in Grillo grape pressed under industrial-scale production. Must samples were collected after crashing, at draining, at pressing yield of 20%, 40%, 60% and 70%, during transfer in clarification tank, in the 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 [5].

The concentration of thiol precursors detected following the crushing was comparable to the value found in grape, but it dramatically decreases (< 95%) in the must from the press loading. The concentration of thiol precursors increased as the must yield increased, and eventually equals the levels in the grape when a must yield of 60% was achieved. The final loss of thiol precursors was about 80% and 95% for GSH-3MH and GSH-3MHAl, respectively, in the must sampled at the

clarification vat (the last juice fraction was excluded). Higher loss of thiol precursors was observed when the must was produced under air-free condition, whereas higher amounts were recorded in laboratory-made must, especially when sodium fluoride or EDTA were added prior the pressing.

The results show that the contact of must with the grape skin leads to a loss of thiol precursors. Oxygen seems to be not involved in the oxidative loss of thiol precursor. The protective behaviour of the cation-binding compounds suggests that the cations occurring on the grape skin can be responsible for the loss of thiol precursors during the pre-fermentative steps.

Keywords: varietal thiol precursors, grape pressing, oxygen, Grillo grape.

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