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Measuring Elemental Sulfur in Late Manually-Treated Grape Juice in Relation to Polyfunctional Mercaptan Formation in Sauvignon Blanc Wines

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Abstract : Aim: Sauvignon blanc is the most substantial variety cultivated in almost 62% of all producing vineyards of New Zealand. The popularity of New Zealand Sauvignon blanc is due to its unique taste. It is the most famous wine characterized by its aroma profile derived from mercaptans. 3-mercaptohexan-1-ol (3MH) and 3-mercaptohexyl acetate (3MHA) are two of the most important volatile mercaptans found in Sauvignon blanc wines. “Viticultural” and “Enological” factors such as machine-harvesting, the most common harvesting practice used in New Zealand, can be among the reasons for this distinct flavor. Elemental sulfur is commonly sprayed in the fields to protect berries against powdery mildew. Although it is not the only source of sulfur, this practice creates a source of elemental sulfur that can be transferred into the must and eventually into wines. Despite the clear effects of residual elemental sulfur present in the must on the quality and aroma of the final wines, its measurement before harvest or fermentation is not a regular practice in the wineries. This can be due to the lack of accessible and applicable methods for the equipment at most commercial wineries. This study aims to establish a relationship between the number and frequency of elemental sulfur applications and the concentration of polyfunctional mercaptans in the final wines. Methods: An apparatus was designed to reduce elemental sulfur to sulfide, then an ion-selective electrode to measure sulfide concentration. During harvest 2022, we explored a wider range of residual elemental sulfur levels than what typically applies in the vineyards. This has been done through later manual elemental sulfur applications in the vineyard. Additional sulfur applications were made 20, 10 and 5 days prior to harvesting the treated grapes, covering long and short pre-harvest intervals (PHI). The grapes were processed into juice and fermented into wine; then, they were analyzed to find the correlation between polyfunctional mercaptans concentrations in the wines and residual elemental sulfur in the juice samples. Results: The research showed that higher 3MH/3MHA was formed when elemental sulfur was applied more frequent in the vineyards and supported the proposed pathway in which elemental sulfur is a source of 3MH formation in wines.

Keywords : sauvignon blanc, elemental sulfur, polyfunctional mercaptans, varietal thiols
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