



Abstract

Sulfur Dioxide (SO₂) Replacement with *p*-Coumaric Acid: A Green Alternative in Wine Industry [†]

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Abstract: **Introduction:** Sulfur dioxide has been traditionally used in winemaking as an effective preservative even though it often has negative taste- and health-related effects on consumers, particularly when used in excess. Furthermore, it can induce both SO₂-related resistance and SO₂-related viable but not culturable (VBNC) states in different wine yeast and bacteria species. Currently, the replacement of sulfur dioxide with plant-derived compounds, used as food bio-preservatives, has been proposed in winemaking at the laboratory scale as a green and healthier alternative. **Purpose:** To replace sulfur dioxide with *p*-coumaric acid, a plant-derived phenolic compound, in winemaking on an industrial scale in order to produce a safe, natural wine that is more sustainable, authentic and healthier. **Methods:** Both sulfur dioxide- and *p*-coumaric acid-treated wine was made in parallel at a winery on an industrial scale (into two 10,000 L stainless steel tanks) using the same quantity of the same grape variety (10,000 kg of Lemnos Island organic white wine grapes, Muscat of Alexandria) during the harvest of 2019 and following the same oenological procedures. The influence of *p*-coumaric acid on wine properties and quality was compared with that of sulfur dioxide under the same conditions after 3 months of storage in a bottle. To this end, several analytical parameters of wine related to oenological, microbiological, antioxidant, sensory and safety properties were determined according to the International Standards Organization (ISO) and International Organization of Vine and Wine (OIV) official analytical methods for both wine samples. **Results:** In general, there were no significant differences observed in stability, microbiological, antioxidant and oenological profiles due to sulfur dioxide replacement with *p*-coumaric acid, while the sensory profile was slightly ameliorated. **Significance:** This replacement technology resulted in a suitable green alternative to sulfur dioxide and could be easily applied to the wine industry in order to guarantee high-quality green products.

Keywords: food bio-preservatives; green products; wine industry; sulfur dioxide; *p*-coumaric acid



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Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/Foods2021-10944/s1>, Figure S1: Stability profile; Figure S2: Sensory profile; Table S1: Oenological & antioxidant profile; Table S2: Microbiological profile.

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