



Università degli Studi di Udine

EMaVE Consortium – Vinifera Euromaster
European Master of Science (M.Sc.) in Viticulture and Enology

**Effect of must composition and nutrient
supplementation on the production of sulfur dioxide by
different strains of *Saccharomyces cerevisiae* during
alcoholic fermentation**

A Thesis Submitted in Partial Fulfillment of the Requirements for the
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This work aimed to learn about the influence of grape juice composition on the formation of sulfur dioxide by different commercial dry-yeast strains, under fermentation conditions close to usual winemaking.

A set of commercially available active dry-yeasts was screened in order to comprehensively identify genetical differences and to evaluate the effects of specific amino acids on gene expression profiles.

These commercial strains were used to set up small-volume fermentations to investigate the effect of sulfites and sulfates on the production of sulfur dioxide during alcoholic fermentation. SO₂ production was different for the different strains: high quantities of sulfites were positively related to the initial sulfate concentration in the fermentation media, while sulfite amounts did not have any stimulatory effect. Conversely, low SO₂ producing strains generally generated reduction off-flavors of higher intensity.

In a second set of experiments, the effect of serine and aspartic acid supplementation on sulfur dioxide production was examined. Together with sulfates; in fact, these two compounds act as precursors of sulfur containing amino acids. Based on the results of the first set of trials, only two yeast strains were used: one was a low and one was a high SO₂ producer.

The two strains demonstrated a different ability in using sulfate and as a consequence a different production of SO₂. The use of sulfate by the high SO₂ producing strain, was not affected by amino acid supplementation. This strain was characterized also for its higher glutathione formation and/or release.

Finally, gene expression profiles of the two different dry-yeasts tested, evidenced that the apparent genetic similarity between the two strains correspond to a very different fermentation behavior.