

# **Nitrogen metabolism in wine yeast during alcoholic fermentation: effect on growth, fermentation activity and aroma production**

## **ABSTRACT**

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Nitrogen deficiency has been associated with major problems encountered in contemporary wine making, especially those related to slow and incomplete fermentations. Under wine-making conditions, initial low levels of nitrogen act by limiting growth and biomass, resulting in a reduced fermentation rate. Nitrogen compounds present in the must have also influence on the production of volatile and non-volatile metabolites which regulate sensorial profile and quality of wine. Currently, the most common method for dealing with nitrogen-deficient fermentations is adding supplementary nitrogen. However, the effect of these additions is regulated by specific nitrogen requirements of each yeast strain and the conditions of fermentation.

This doctoral thesis studies the individual nitrogen metabolism of four commercial wine strains, widely used in Spanish wine industry, especially regarding cell growth and fermentation activity, as well as metabolites production. This study has focused on the importance of nitrogen quantity and quality presented in the must, in order to achieve optimal fermentation performance. Through this work the effectiveness of different markers has been tested to find a biosensor that can be used to detect nitrogen limitation conditions under fermentation process. This work has been performed using biochemical, analytical and molecular approaches. Thus, some genetic variations involved in nitrogen utilization have been detected, allowing in the future the possibility to enhance fermentation performance of these strains.