Effect of nitrogen supplementation on yeast fermentation performance and mead quality

A. P. Pereira[1,2], A. Mendes-Ferreira[2], J. M. Oliveira[3], L. M. Estevinho[1] and A. Mendes-Faia[2]

[1]CIMO, Centro de Investigação de Montanha, Escola Superior Agrária, Instituto Politécnico de Bragança, Campus de Santa Apolónia - Apartado 1172, 5301-855 Bragança, Portugal
[2]IBB, Institute for Biotechnology and Bioengineering, Centre of Genomic and Biotecnology, Universidade de Trás-os-Montes e Alto Douro, Apartado 1013, 5001-801 Vila Real, Portugal
[3]IBB, Institute for Biotechnology and Bioengineering, Centre of Biological Engineering, Universidade do Minho, 4710-057 Braga, Portugal.

Mead is a traditional drink, containing 8-18% (v/v) of ethanol, which results from the alcoholic fermentation of diluted honey performed by yeasts. However, when it is produced in a homemade way, mead producers find several problems, namely, the lack of uniformity in the final product, slow or premature fermentations arrest, and the production of ‘‘off-flavours” by the yeasts. These problems could be due to several factors, including lack of essential nutrients such as a deficiency in available nitrogen. Additionally, it has been reported that mead fermentation is a time-consuming process, often taking several months to complete, depending on the type of honey, yeast strain and honey-must composition. Since mead production is a time-consuming process, to make its production viable it is necessary to reduce the fermentation time while producing an end product of quality. Thus, the aim of this study was to evaluate the effect of nitrogen addition to honey-must on two active dry wine yeasts (ADWY) fermentation performance, as well as on the mead composition and volatile aroma compounds production.

Honey must was prepared according a recipe developped in our laboratory, and supplemented with potassium tartrate and pH adjusted to 3.7 with malic acid. Then to study the effect of nitrogen adittion a part of honey-must was adjusted with diammonium phosphate (DAP) to achieve the concentration of nitrogen required by yeast to complete alcoholic fermentation. The honey-musts were inoculated in order to obtain a pitching rate of 1×107 viable cells/ml. Several parameters were determined during the fermentation to evaluate the effect of nitrogen addition on yeast growth, fermentation profile, mead composition and mead aromatic profile. For this study as biological material were selected the ADWY Saccharomyces cerevisiae Lalvin QA23 and Lalvin ICV D47.

The supplementation of honey-must with DAP reduced fermentation lenght in aproximadatelly seven days, however sugars were not fully consumed, suggesting that other factors could be interfering with yeast growth. Furthermore, it was verified that for both yeasts the specific growth rate and final biomass were higher in musts supplemented with DAP. Mead final composition was similar in the two experimental conditions, however, even in the honey-must to which DAP was not added about 25 mg/L of assimilable nitrogen remained at the end of fermentation. Some fermentative aroma compounds which contribute to the sensorial quality of mead, including alcohols, fatty acid ethyl esters, acetates, volatile phenols and volatile fatty acids, were identified and quantified. Global analysis of volatile profile revealed that the concentration of fatty acid ethyl esters and volatile phenols was higher in meads supplemented with DAP. The concentration of volatile phenols was below their perception threshold but the levels of acetate and ethyl esters could contribute to enhance fruity character in meads produced. These results are very useful for optimise the mead production and improving its quality.

Keywords mead; assimilable nitrogen, yeast performance, aromatic profile

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