Autochthonous non-*Saccharomyces* extra-cellular metabolism of tryptophan, tyrosine, and phenylalanine

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Abstract

Amino acids are crucial nitrogen sources in yeast metabolism, influencing both biomass production and fermentation rate. The breakdown byproducts of amino acids contribute to the aroma of the wine and wine's health benefit compounds. This study focused on the yeast's extracellular metabolic profile of tryptophan, tyrosine, and phenylalanine belonging to the group of aromatic amino acids in experimental Maraština wines. Alcoholic fermentations were conducted on sterile grape Maraština must using seven autochthonous non-*Saccharomyces* yeasts in sequential fermentation with commercial *Saccharomyces cerevisiae*. Trials were performed with isolates *Metschnikowia pulcherrima* K-6, *Metschnikowia chyrsoperlae* K-11, *Metschnikowia sinensis/shanxiensis* P-7, *Lachancea thermotolerans* P-25, *Pichia kluyveri* Z-3, *Hanseniaspora uvarum* Z-7, and *Hanseniaspora guillermondii* N-29, each in triplicate. The control treatment involved commercial strains *L. thermotolerans, M. pulcherrima*, and *S. cerevisiae*. A UHPLC-QqQ-MS/MS method was employed to monitor 37 metabolites, with 26 detected in the extracellular extracts produced by yeasts. The most significant changes in the concentration of identified compounds occurred in *M. sinensis/shanxiensis/S. cerevisiae* and *H. guillermondii/S. cerevisiae* ferments. *M. sinensis/shanxiensis* with *S. cerevisiae* produced higher amounts of N-acetyl derivatives of tryptophan and phenylalanine, as well as xanthurenic acid and tyramine. Wines produced by *H. guillermondii* in sequential fermentation with *S. cerevisiae* had the highest concentration of L-kynurenine and 3-hydroxy anthranilic acid. These findings contribute to our understanding of how autochthonous non-*Saccharomyces* yeasts contribute to the aroma profile of wines, providing new insights into biotechnological tools for the production of wine starter cultures.

Keywords: autochthonous yeast, wine, metabolism, non-*Saccharomyces*, starter culture