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Fermented Honey and Manna Ash Products: Novel Ecological Niches of Wine Yeasts

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The selection of novel strains of yeasts is still relevant to improve flavour of wines produced around the world. Several food niches have not been microbiologically investigated and they might represent important sources of microorganisms with technological aptitudes, e.g. in wine industry. To this purpose, two novel yeast communities associated with matrices rich in carbohydrates and characterized by low levels of water activity (a_w), such as fermented honey by-products (FHP) and "Manna" ash products (MAP) extracted from *Fraxinus angustifolia* (*Oleaceae*), were investigated. FHP contain mainly fructose and glucose, while MAP ash is mainly characterized by high concentrations of mannitol, fructose and mannitriose. The values of a_w of both matrices is around 0.5-0.6. Yeasts were isolated, subjected to the genotypic identification and then technologically characterized to evaluate their oenological potential.

The species *Lachancea fermentati*, *Pichia anomala*, *Pichia kudriavzevii*, *Saccharomyces cerevisiae*, *Wickerhamomyces anomalus*, *Zygosaccharomyces bailii* and *Zygosaccharomyces rouxii* were genetically identified from FHP samples. During the spontaneous alcoholic fermentation, the dominating species were *S. cerevisiae*, *Z. bailii* and *Z. rouxii* whose feed conversion ratio of sugars into ethanol was about 53%. On the other hand, MAP was characterized by the presence of *Candida aaseri*, *Candida lactis-condensi*, *Citeromyces matritensis*, *Lachancea thermotolerans*, *Saccharomyces cerevisiae* and *Zygosaccharomyces bailii*. Interestingly, both matrices showed the presence of *S. cerevisiae* at consistent levels and a high number of *L. thermotolerans* strains were isolated from MAP. Both species have interesting oenological potential.

Six strains of *S. cerevisiae* were tested as starters to ferment grape must from Grillo, Catarratto and Chardonnay cultivars at industrial winery-scale over two consecutive years. Interestingly, four strains isolated from FHP showed a fructophilic potential and the experimental wines were characterized by an intense floral flavour. Among non-*Saccharomyces* yeasts, *L. thermotolerans* strains showed resistance to ethanol up to 12-13 % (v/v) and ability to ferment grape must with a feed conversion ratio of sugars into ethanol of about 45-55%. Oenological potential was showed by *C. lactis-condensi* and *C. aaseri* since a high content of glycerol was produced at the end of alcoholic fermentation and a fructophilic aptitude was found.

In conclusions, the present research provided novel microbiological and physicochemical insights on the alcoholic fermentation conducted by novel starters belonging to *S. cerevisiae* and *L. thermotolerans* species and, for the first time, the species *C. lactis-condensi* and *C. aaseri* were found to be of relevance for wine application.

Keywords: Wine production, Fermented Honey

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