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TRACES IN THE GLASS
MASS SPECTROMETRY
FOR QUALITY AND PROFILING
IN WINES, FERMENTED BEVERAGES, AND DISTILLATES

Main topics

Wine and Fermented Beverages quality

Traceability and Counterfeit in Fermented Beverages

Metabolomic and Proteomic Profiles in Wine, Beer, and Spirits

Cutting-Edge MS Techniques Applied to Enology

Monitoring Oenological Processes

Contaminants and Faults in Alcoholic Beverages

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SPME-GC-MS Screening of Aromatic Profiles in Beers Fermented with Non-Saccharomyces Oenological Yeasts

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The brewing industry is increasingly embracing diversity with a growing interest in utilizing novel starter cultures. These microorganisms, sourced from various indigenous biological resources, are capable of imparting unique and distinguishable sensory characteristics to beer. Current research focuses on exploring microbial biodiversity for beer production [1] with the aim to identify novel microorganisms that could enhance the quality and distinctiveness of the final products. Notably, non-*Saccharomyce*s yeasts have shown potential in imparting unique organoleptic properties to beer and are also being explored for low-alcohol beer production, a rapidly expanding market segment. This study integrates various brewing processes, technologies, and ingredients that have been developed globally over recent decades [2], contributing significantly to the field.

In this work, the contribution of 31 yeast strains from the Collection of Microorganisms of Viticultural and Oenological Environment (CREA-CMVE), along with two commercial non-Saccharomyces strains, to the volatile profile of malt-based fermentations was assessed using Solid Phase Microextraction coupled with Gas Chromatography-Mass Spectrometry (SPME/GC-MS). Strains from *the Zygosaccharomyces, Kazachstania*, and *Metschnikowia* genera exhibited a notable propensity to produce higher alcohols, such as isoamyl alcohol and phenylethyl alcohol, influencing the beer's aromatic profile significantly. It must be noted, however, that high concentrations of these compounds may lead to an overly robust olfactory impact. Alternatively, species such as *Lindnera saturnus*, *Pichia kluyveri*, and *Meyerozyma caribbica* were distinguished by their pronounced synthesis esters, like isoamyl acetate and 2-phenylethyl acetate. This capability could enhance the beer's aroma with floral and fruity notes, though it may also produce solvent-like notes if very high concentrations are achieved. Furthermore, an intricate relationship between yeast strains and hop-derived isoprenoids, including terpenes and sesquiterpenes, was observed. *Metschnikowia* and *Candida* species were implicated in the enhancement of these compounds in the beverage. The correlation between linalool accumulation and fermentations by *Starmerella* and *Hanseniaspora* is especially promising for aroma modulation.

This investigation underscores the pivotal role of specific yeast species in flavor and aroma development during beer fermentation and suggests new strategies for crafting distinctive beer profiles through yeast selection.

References

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