IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 4, April 2025
Impact Factor: 7.67

An Overview of Molecular Techniques for Profiling Microbial Communities in Beer and Wine

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Abstract: *Recent developments in molecular biotechnology have introduced a variety of advanced techniques for examining the microbial ecosystems involved in food and beverage fermentations. Techniques such as denaturing gradient gel electrophoresis (DGGE), terminal restriction fragment length polymorphism (T-RFLP), fluorescent in situ hybridization (FISH), clone library construction, and quantitative PCR (qPCR) offer sensitive and reliable methods for analyzing microbial communities. These molecular approaches present significant advantages over traditional culture-based methods. Beyond their value in fermentation research, many of these tools also hold promise for rapid quality control in the beverage industry. Moreover, the growing availability of next-generation sequencing platforms, including Illumina and 454 sequencing systems, is making high-resolution microbial analysis more accessible to researchers focused on food and fermentation science. These technologies allow for detailed insights into microbial diversity and composition, enhancing our understanding and management of complex fermentation processes and hygiene practices. This review highlights the currently available molecular techniques for microbial community profiling, discusses their relevance to fermentation research and industrial applications, and explores future directions in microbial analysis for beer and wine production*

Keywords: Community profiling, DGGE, Fermentation, Microbial ecology, Next-generation sequencing, Beer, Wine, Lambic, American coolship ale

DOI: 10.48175/IJARSCT-25103