

EXPLORATION OF MATRIX-ASSISTED LASER DESORPTION IONIZATION-TIME OF FLIGHT MASS SPECTROMETRY AS A FAST IDENTIFICATION TOOL FOR BEER SPOILAGE BACTERIA

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Beer is a beverage with good microbiological stability because it contains almost no oxygen and nutrients for the growth of many bacteria. In addition, low pH, high CO₂-content and the presence of ethanol and antibacterial hop compounds ensure microbial stability. Nevertheless, beer spoilage induced by bacteria is a common problem in the brewing industry and these spoilage bacteria typically cause visible turbidity, acidity and off-flavours. In modern breweries the hop-resistant, Gram positive, lactic acid bacteria '*Lactobacillus backi*', *Lb. brevis*, *Lb. lindneri*, '*Lb. brevisimilis*', *Lb. coryneformis*, *Lb. plantarum*, *Lb. malefermentans*, *Lb. parabuchneri*, *Pediococcus damnosus*, *P. inopinatus* and *P. dextrinicus* are generally regarded as the most hazardous beer spoilage bacteria.

Currently these spoilage bacteria are detected with culture-dependent methods using selective media or with faster identification methods such as DNA-typing, ribotyping and other PCR-based techniques. These approaches are notoriously laborious, expensive, time-consuming and moreover, they lack specificity and sensitivity.

This research aims to develop a quick, specific and inexpensive method to detect and identify contaminants and beer spoilage bacteria in the brewing industry. To achieve this, an extensive database comprising Matrix-Assisted Laser Desorption Ionization-Time Of Flight Mass Spectrometry (MALDI-TOF MS)-profiles of well-established and correctly identified contaminants and beer spoilage strains is built. In addition to these strains, strains originating from other niches besides beer are also included in order to encompass the phenotypic diversity of all spoilage species. The resulting set of profiles allow to assign species-specific biomarker peaks, which are reproducible for a given spoilage species (or even strain). Consequently, an identification of an unknown beer spoilage bacterium can be easily performed.