

EXPLORATION OF MALDI-TOF MS AS A FAST IDENTIFICATION TOOL FOR FOOD SPOILAGE BACTERIA

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Microbial food spoilage leads to considerable economic losses worldwide. Therefore, early and fast identification of spoilage bacteria and determination of their spoilage capacity are becoming increasingly important in quality control of food products. Currently, spoilage bacteria are detected with culture-dependent methods using selective media or faster identification methods such as DNA-typing, ribotyping and 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 spoilage bacteria in food products, more particularly in the brewing industry. To achieve this we are building an extensive database comprising matrix assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS) profiles of well-established and correctly identified beer spoilage bacteria and contaminants. In addition, strains originating from other niches will also be included in order to encompass the phenotypic diversity of all spoilage species. The resulting set of profiles will allow to assign species-specific biomarker peaks, specific and reproducible for a given spoilage species (or even strain). Finally, these biomarkers will be used in the final identification of an unknown beer spoilage organism.

Beer is a beverage with high 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. In breweries nowadays the hop-resistant lactic acid bacteria *Lactobacillus 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. Due to improved process technology the importance of aerobic bacteria has decreased. In

contrast the strictly anaerobic Gram negative bacteria are apparently increasing in importance. These include obligate beer spoilage bacteria such as *Pectinatus cerevisiophilus*, *P. frisingensis*, *Selenomonas lactificex*, *Megasphaera cerevisiae* and *Zymomonas mobilis*. Beer spoilage bacteria are a common risk in the brewing industry and typically cause visible turbidity, acidity and off-flavours. Hence, spoilage bacteria are a source of concern for the brewing industry worldwide.

The extensive database of MALDI-TOF MS profiles of beer spoilage bacteria and contaminants will be the start for the exploration of MALDI-TOF MS as a fast identification tool for other food spoilage bacteria.