A high-throughput microcultivation protocol for microbial source tracking of fungi by FTIR spectroscopy

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For microbial source tracking of fungi in food industry many different control points need to be checked. Consequently, the number of isolated microorganisms is high and there is a need for microbial methods that are cheap and that have sufficient throughput.

Different FTIR spectroscopic techniques have been used to evaluate their discrimination ability for identification of fungi [1][2]. The aim of the present study was to develop a new protocol for high-throughput cultivation of fungi in liquid medium for FTIR spectroscopy. In the new protocol an automated system, Bioscreen C, was used allowing the simultaneous cultivation of 200 samples in liquid media.

For the study 11 species of in total five different fungal genera (*Alternaria*, *Aspergillus*, *Mucor*, *Paecilomyces*, and *Phoma*) were analyzed by FTIR spectroscopy. All the strains were isolated from trouble shooting incidents in the production of low acid products and from milk. Mycelium was subsequently investigated by high-throughput Fourier Transform Infrared spectroscopy. Three spectral regions, fatty acids + lipids (3200-2800 cm^{-1}, 1300–1000 cm^{-1}), protein - lipids (1800-1200 cm^{-1}) and carbohydrates (1200–700 cm^{-1}) were evaluated for reproducibility and discrimination ability. The results show that all these spectral regions can be used as spectroscopic biomarkers for differentiation of fungi by FTIR. The influence of different growth times on the ability of species discrimination by FTIR spectroscopy was investigated, and an optimal separation of all five genera was observed after five days of growth.

References:

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[2] V. Erukhimovitch, M. Hazanovsky , M. Talyshinsky, I. Mukmanov, Y. Souprun, M. Huleihel, *Journal of Agricultural Technology 1* 1, 145-152 (2005).