SYMPOSIUM ABSTRACTS

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Beverages and Acid/Acidified Foods

P1-05 Rapid Determination of Lactic Acid Bacteria from Fermented Green Olives Packaged in Modified Atmospheres by Means of FTIR Spectroscopy and Machine Learning

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Introduction: The application of Fourier transform infrared (FTIR) spectroscopy has increased in food studies over the last years and has become a powerful tool in the determination of quality in a variety of food products.

Purpose: To investigate the efficacy of FTIR in the rapid determination of the population of lactic acid bacteria (LAB) in fermented green olives during modified atmosphere packaging.

Methods: Fermented green olives of Halkidiki and Conservolea varieties were packed in multi-laminated pouches under modified atmospheres (100% N_2) and stored at room temperature for 12 months. Every month, FTIR spectra were acquired from the olives together with microbiological analyses for the determination of the population of LAB, yeasts and enterobacteria. PLS-regression (PLS-R) was employed to provide quantitative estimations of microbial counts during storage. The spectra were pre-processed by multi-scatter correction (MSC) followed by 1st derivative (Savitzky-Golay algorithm, 2nd order polynomial and 15-point moving window). The spectra were divided into calibration set (80%) and prediction set (20%) according to the Kennard-Stone method.

Results: No enterobacteria could be detected throughout storage in both varieties, whereas yeasts could be enumerated only at the beginning of fermentation in populations ranging from 5.2-5.5 log CFU/g. LAB were enumerated systematically during storage of olives and thus FTIR spectra were associated with LAB counts to provide quantitative estimations. The PLS-R model developed with spectral data in the region 900-2,000 cm^{-1} was able to provide satisfactory predictions of LAB counts with root mean squared error of calibration (RMSEC), cross-validation (RMSECV) and prediction (RMSEP) of 0.281, 0.408, and 0.479 log CFU/g, respectively.

Significance: Spectroscopic data in tandem with appropriate algorithms exhibit promising potential for the rapid detection of LAB in packaged green olives.

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