

Discrimination Between Bacillus and Alicyclobacillus Isolates in Apple Juice by Fourier Transform Infrared Spectroscopy and Multivariate Analysis

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Abstract : Alicyclobacillus is a causative agent of spoilage in pasteurized and heat-treated apple juice products. Differentiating between this genus and the closely related Bacillus is crucially important. In this study, Fourier transform infrared spectroscopy (FT-IR) was used to identify and discriminate between four Alicyclobacillus strains and four Bacillus isolates inoculated individually into apple juice. Loading plots over the range of 1350 and 1700 cm⁻¹ reflected the most distinctive biochemical features of Bacillus and Alicyclobacillus. Multivariate statistical methods (e.g. principal component analysis (PCA) and soft independent modeling of class analogy (SIMCA)) were used to analyze the spectral data. Distinctive separation of spectral samples was observed. This study demonstrates that FT-IR spectroscopy in combination with multivariate analysis could serve as a rapid and effective tool for fruit juice industry to differentiate between Bacillus and Alicyclobacillus and to distinguish between species belonging to these two genera.

Keywords : alicyclobacillus, bacillus, FT-IR, spectroscopy, PCA

Conference Title : ICFMS 2016 : International Conference on Food Manufacturing and Safety

Conference Location : Istanbul, Türkiye

Conference Dates : January 25-26, 2016