

APPLICATION OF HANDHELD NEAR INFRARED SPECTROMETER FOR THE CHARACTERIZATION AND VIABILITY PREDICTION OF COMMERCIAL PROBIOTIC SUPPLEMENT

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ABSTRACT

The growing evidences of health claims related to the consumption of probiotics have lead to the rise of probiotic based products in the market. However, one of the major concerns in the development of such products is the sustainability of viable cells at time of consumption and their stability against conditioning factors. Recently, researchers have explored the potential of near infrared spectroscopy method (NIRS) as a rapid technique to ensure that consumers receive the adequate dose of probiotics at the time of consumption. The aim of our study was to evaluate the applicability of the handheld near infrared spectrometer combined with chemometrics to characterize and predict the viability of commercial probiotic supplement subjected to concentration and temperature conditioning factors. According to the product label recommendations, three different concentrations (2g/125 ml, 2.5 g/125ml and 3g/125ml) were considered . Water heated at 60°C or 90 °C was added to probiotic powder and the obtained samples were left to cool down until reaching room temperature. Control samples prepared at 25 °C were also measured. The samples were analysed using handheld spectrometer in transmittance mode and chemometrics based analysis was performed on the obtained spectra. Principal component analysis based linear discriminant analysis (PCA-LDA) classification models, according to temperature and concentration levels, showed high accuracies. Average recognition and prediction abilities of 90% and 74.39%, respectively were found for the classification of the different concentration levels. Meanwhile, according to temperature level both the recognition and prediction accuracies were 100%. Moreover, PLSR showed a high ability of accurately predicting the viable counts (log CFU/g) of probiotic samples. Our study showed that handheld near infrared spectrophotometer have proven to be an effective and rapid tool which when coupled with chemometrics is able to predict the viability of probiotics strains under different conditions. Overall, NIRS showed good potentials for the characterization of probiotic food supplements that could be explored for quality control purposes.

Keywords: probiotics; NIRS, chemometrics; PCA-LDA; PLSR; food supplements; heat treatment