Title	Detection of heterogeneous wheat samples using near infrared spectroscopy
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Abstract

An homogeneity check using Near Infrared (NIR) Spectroscopy has been developed for agricultural and agrofood samples prepared for Proficiency Testing Schemes (PTS) at Bipea. To evaluate the homogeneity among samples, the procedure involves a comparison of NIR spectra, the determination of global homogeneity criteria and the use of control charts. To study the performance of the method, "heterogeneous" wheat samples were artificially prepared and several methods tested to detect them. Wheat samples were analysed by diffuse reflection in the 10,500 to 3800 cm⁻¹ spectral range (or 952 to 2631 nm). To detect the "heterogeneous" samples among the "homogeneous" samples, a classical outlier detection (Grubbs'test) applied to quantitative results obtained with NIR calibrations (protein and moisture contents) was first performed. A second, qualitative, approach was also used, based on the processing f the spectra with: the calculations of "standard deviation spectra" and the "difference" spectra; the application of the Grubbs'test directly on spectra; and the computations of Euclidian distances. The results confirm that the NIR technique is well adapted and outstanding for checking homogeneity among samples prepared for PTS and that the processing of the whole spectra is more efficient than simply the processing of the protein and moisture contents (obtained from NIR calibrations). "Heterogeneous" wheat samples only slightly different in their protein and moisture contents compared to "Homogeneous" wheat samples could be detected (deviation among samples down to 0.03% of protein and 0.08% of moisture content).