

**Title** Evaluation of fruit authenticity and determination of the fruit content of fruit products using FT-NIR spectroscopy of cell wall components

**Author** Christina Kurz, Martin Leitenberger, Reinhold Carle and Andreas Schieber

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### **Abstract**

An analytical procedure using Fourier transform near infrared (FT-NIR) spectroscopy and chemometrics with multivariate techniques for the rapid determination of the fruit authenticity and for the quantification of the fruit content was developed, based on the cell wall constituents (alcohol-insoluble residue, AIR, and hemicellulose, HC). The contents of rhamnose, fucose, arabinose, xylose, mannose, galactose, and glucose in the hemicellulose fraction of apricots, peaches, and pumpkins determined by gas chromatography were used as references. Furthermore, spectral information was correlated with the fruit content and the gravimetric data obtained from sequential fractionation of the alcohol-insoluble residue. Samples of self-made and commercial apricot and peach fruit preparations, jams, and spreads were included in the investigations. Hemicellulose from 109 samples and AIR from 92 samples was recorded, and principal component regression was used to create calibration models relating chemical and gravimetric reference values to spectral data. The calibration models provided a good predictability in comparison with the results obtained by reference methods. Good agreement was also obtained for the prediction of the neutral sugar composition of the HC and the fruit content from the AIR. FT-NIR spectroscopy allowed a rapid, accurate and non-destructive assignment of specified fruit from spectral data of the HC fraction and the AIR. Thus, FT-NIR could be applied for investigations on quality control complementing, or even replacing, gas chromatography as the most widespread method for the determination of neutral sugars. Furthermore, preliminary investigation on classification of fruit blends was performed. The probability of belonging to a specific fruit was significantly lowered or precluded for samples with fraudulent admixture like peach or pumpkin to apricot, or pumpkin to peach.