SPECTROSCOPIC AND CHEMOMETRIC ANALYSIS OF SW-NIR SPECTRA OF SUGARS AND FRUITS

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Fruit sweetness, as indexed by total soluble solids (TSS), and fruit acidity are key factors in the description of the fruit eating quality. Our group has been using short wave NIR spectroscopy (SW-NIR; 700-1100 nm) in combination with chemometric methods (PLS and MLR) for the non-invasive determination of the fruit eating quality (1,2). In order to further improve calibration performance, we have investigated SW-NIR spectra of sucrose and D-glucose. In previous reports on the band assignment for these sugars in the 1100-2500 nm spectral region (3-7), it has been established that change in concentration, temperature and physical state of sugars reflects on the shape and position of the spectral bands in the whole NIR region (5-7).

The effect of change in concentration and temperature of individual sugar solutions and sugar spiked juice samples was analysed using combined spectroscopic (derivative, difference, 2D spectroscopy) and linear regression chemometric (PLS, MLR) techniques. The results have been compared with the spectral data of a range of fruit types, varying in TSS content and temperature. In the 800-950 nm spectral region, the B-coefficients for apples, peaches and nectarines resemble those generated in a calibration of pure sucrose in water (Fig. 1). As expected, these fruits exhibit better calibration and prediction results than those in which the B-coefficients were poorly related to those for sugar.

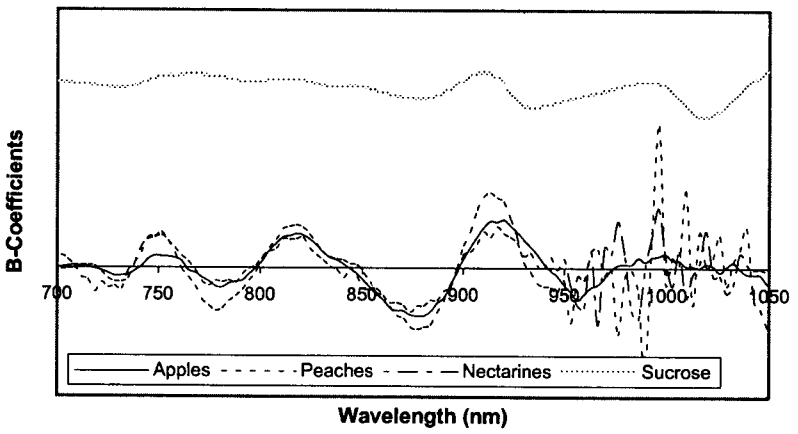

Figure 1. B-coefficients (PLS1, absorbance data) of TSS in apples, peaches and nectarines and B-coefficients (PLS1, temperature included as a point in the spectra) of sucrose solutions.

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