

Title Robustness of models based on NIR spectra for sugar content prediction in apples
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Abstract

The sugar content of Golden Delicious apples is predicted using near infrared (NIR) spectrometry. The study focuses on the metrological characteristics of the sugar content measurement and external parameters involved in the lack of robustness of the NIR-based model. The external parameters were fruit temperature, spectrometer temperature and ambient light. The first two factors influenced the prediction accuracy: (i) a fruit temperature variation altered the prediction, the relationship seems to be described by a non-linear model within the considered temperature range, (ii) a variation of the spectrometer temperature also altered the prediction, the relationship is described by a linear function for a temperature between 4 and 30°C. Ambient light did not show to have an influence on the NIR-based model. The analysis of the metrological parameters showed a satisfactory repeatability in sugar prediction with a low error, 0.073°Brix. The model reproducibility was good regarding bias-corrected standard error of prediction (*SEP_c*) without significant differences between experiments, on the other hand a bias remained even if the previous parameters were maintained constant. These results will be taken into account in future measurements, in order to improve the robustness of the NIR-based model developed for apple.