Title Testing of a local approach for the prediction of quality parameters in intact nectarines using a portable NIRS instrument

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Abstract

The nectarine sector requires rapid, economical and non-destructive methods for monitoring physical–chemical quality changes taking place not only during fruit development and at harvest, but also postharvest, thus allowing fruit quality to be evaluated at any stage in the commercial chain from grower to consumer. The use of sensors based on Near Infrared Spectroscopy (NIRS) technology, in conjunction with chemometric data treatment models, has already been studied for this quality-control purpose in nectarines. The critical challenge is to develop robust and accurate mathematic models based on hundreds of highly heterogeneous nectarine samples in order to represent the large natural variability of the fruit. This paper evaluates and compares the performance of MPLS regression and a local regression method for the prediction of major quality parameters including size (weight and diameter), flesh firmness and soluble solids content (SSC), in nectarines representing different harvests and crop practices. The results showed that the LOCAL algorithm offered no advantages over MPLS regression for the prediction of SSC and diameter, and only slight benefits in weight determination. For firmness evaluation, however, application of the LOCAL algorithm yielded a major improvement, reducing the standard error of prediction (SEP) by 27%, increasing the coefficient of determination (r^2) by 44% (from 0.47 to 0.68), and reducing bias by 88.5% (from 6.95 N to 0.80 N). Thus, use of the LOCAL algorithm proved to be valuable in minimizing the error in NIRS models for predicting a parameter as complex as firmness.