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Near infrared spectroscopy-based modelling for the non-destructive assessment of cherry ripeness

Flora Vitalis[1], Juan-Pablo Aguinaga Bósquez[1], Marietta Fodor[2], Viktória Zsom-Muha[1], Zoltan Gillay[1], Zoltan Kovacs[1]

[1]Department of Measurement and Process Control, Institute of Food Science and Technology, Hungarian University of Agriculture and Life Sciences (MATE), Hungary

[2]Department of Food and Analytical Chemistry, Institute of Food Science and Technology, Hungarian University of Agriculture and Life Sciences (MATE), Hungary

Fruit consumption is an essential element of a healthy diet, providing energy, health, well-being and pleasure. Cherries are one of the culinary and industrially important stone fruits, harvested at different seasons depending on variety and intended use. This investigation aimed to non-invasively assess the ripeness of sweet and sour cherry cultivars to determine the optimal harvest time as opposed to the conventionally used quality control. The fruits were harvested in different stages of maturity and sorted according to their perceived ripeness. The diffuse reflectance spectra were collected on the mature and immature sides of the fruits with a hand-held near infrared (NIR) spectrometer, then colour properties (CIE L*a*b*), dry matter (DMC), soluble solid (SSC), titratable acid and anthocyanin content (AC) were determined. The spectral data was evaluated in the 950–1650 nm range. Principal component analysis-based linear discriminant analysis (PCA-LDA) was applied to classify samples according to their ripeness; partial least squares regression (PLSR) to predict quality traits. PCA-LDA classification accuracies varied between 56–74% and 78–81% during validation for sweet and sour cherries. The best PLSR models were found for L*, b*, SSC and AC with coefficients of determination between 0.6–0.9 during validation. In summary, 20 crucial wavelengths were chosen that may be interpreted as a biomarker of cherry ripening.

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