

Title Robust prediction models for quality parameters in Japanese plums (*Prunus salicina* L.) using NIR spectroscopy

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Abstract

Fourier-transformed near infrared (FT-NIR) reflectance spectroscopy was used over a spectral range of 800–2700 nm to develop multivariate prediction models for total soluble solids (TSS), total acidity (TA), sugar-to-acid ratio, firmness and weight in three South African plum cultivars (Pioneer, Laetitia and Angeleno) and a multi-cultivar model. Samples were collected for 7 weeks throughout the ripening period and repeated over two seasons. The validation results had mixed success with TSS ($R^2 = 0.817$ – 0.959 ; RMSEP = 0.453–0.610% Brix), TA ($R^2 = 0.608$ – 0.830 ; RMSEP = 0.110–0.194% malic acid), sugar-to-acid ratio ($R^2 = 0.718$ – 0.896 ; RMSEP = 0.608–1.590), firmness ($R^2 = 0.623$ – 0.791 ; RMSEP = 12.459–22.760 N) and weight ($R^2 = 0.577$ – 0.817 ; RMSEP = 7.700–12.800 g). The cultivar-specific models of ‘Pioneer’ and ‘Laetitia’ had a better predictability capacity than the ‘Angeleno’ model on all parameters. Although the multi-cultivar model for TSS, TA and sugar-to-acid ratio outperformed the single-cultivar models on R^2 values, they had higher prediction errors. The robustness of all the TSS, TA and firmness models is high in terms of seasonality and range.