

NON-DESTRUCTIVE RIPENESS DETECTION OF GOLDEN TAIWAN MANGOES USING VISIBLE NEAR INFRARED SPECTROSCOPY



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Abstract:

Visible-Near Infrared (Vis-NIR) Spectroscopy is a non-destructive technique widely used by researchers in agriculture to determine fruit quality, especially fruit ripeness. The researcher can determine fruit ripeness by analysing light reflectance and correlating it with biochemical fruit properties. The traditional method for determining fruit ripeness is destructive, subjective, and inefficient. The objective of this research is to develop a non-destructive prediction model for the ripeness of Golden Taiwan Mangoes by using Vis-NIR Spectroscopy at 780 nm. The study also evaluates the relationship between reflectance and destructive measurements over 7 days of ripening. 24 mango samples were analysed using Vis-NIR Spectroscopy and destructive methods, including soluble solids content (SSC) and firmness. The procedure included calibration of spectroscopy and data collection of spectral and reflectance measurements in a controlled dark room. Reflectance at 780 nm showed strong correlation with SSC ($R^2 = 0.9625$), shelf days ($R^2 = 0.9626$), and a moderate correlation with firmness ($R^2 = 0.5905$). This suggests that Vis-NIR Spectroscopy is an accurate and reliable non-destructive method for determining the ripeness of Golden Taiwan Mangoes, particularly at 780 nm. This method can enhance the efficiency of the supply chain, reduce fruit waste, and promote sustainable farming practices.

Keywords:

Vis-NIR Spectroscopy, *Mangifera indica* (Golden Taiwan Mango), Reflectance Measurement, Fruit Ripeness Prediction, Postharvest

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