Study on Non-Destructive Measurements to Predict Sugar Content of Melons Using a DLP Based Miniature Spectrometer

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Spectrometers based on digital light processing (DLP) design replace the traditional linear array detector with a micromirror array for wavelength selection. It has the advantages of lower cost and higher performance through the use of a larger and cheaper single element detector. In this study, a commercially available DLP based spectrometer and mobile phone were used. The former was used as a measurement tool; the latter was used as a control panel with APP. Spectra and sugar content of 151 samples were measured at the different parts of eight melons. Peel and flesh measuring modes had been conducted and one laboratory spectrophotometer (Model: NIRS 6500) was also used to measure the spectra of two modes together with DLP based spectrometer. WinISI spectral analysis software was used to build a cross validation model with MPLSR method. The best DLP spectrometer’s model of SEC, RSQ, SECV, 1-VR for peel and flesh modes were 0.598, 0.786, 0.735, 0.681 when mathematic treatment was done in (1,2,2,1) model and 0.614, 0.781, 0.745, 0.677 when mathematic treatment was done in (1,12,12,1) model, respectively. The best NIRS 6500 spectrophotometer’s model of SEC, RSQ, SECV, 1-VR for peel and flesh modes were 0.544, 0.823, 0.702, 0.705 when mathematic treatment was done in (1,4,1) model and 0.413, 0.898, 0.512, 0.841 when mathematic treatment was done in (1,10,10,1) model, respectively. Observing the two apparatuses model’s result, the performance of DLP spectrometer is worse when compared with NIRS6500 spectrophotometer; but it is enough for industrial applications.