Spectroscopy in Agriculture: Fruit Grading and Sorting

Thanks to the work of researchers publishing in Postharvest Biology and Technology and the Journal of Food Quality, the application of spectroscopy in agriculture is finding wider popular use. Monitoring fruit quality during production, throughout the harvest, and while bringing a harvest to market, is likely to become increasingly important to the sustainability of modern food production. During production, key data might include soluble solid content, water content, or firmness. Post-harvest, and from a marketing standpoint, monitoring bruising, scald or frost damage, and rot, allows producers to guarantee uniform quality reaches the consumer, even while maintaining the highest possible yield.

Work with 'Fuji' Apples Improves Production

Researchers employing Near-Infrared Spectrometry (600–1,100 nm) on Fuji apples studied the near-infrared spectra to, first, develop an algorithm correlating fruit characteristics for solid content, water content, and firmness. From this data, the team was able to isolate sensitive wavelengths useful for predicting internal fruit quality. This team went further to discuss the variety of methods for selecting appropriate wavelengths for the purpose of reducing the data set compared to monitoring the entire NIR spectra. This method of selecting key wavelengths to minimize the data set becomes integral to the development of portable and inline sensing systems such as those currently being developed by Avantes' OEM partners.

These researchers relied on the AvaSpec-ULS2048-USB2 spectrometer along with a Tungsten Halogen illumination source (the AvaLight-HAL-S-Mini), fiber optic reflection probes (400-µm diameter, FCR-7IR400-2-ME, Avantes) and power supply (PS-12V/1.0A, Avantes). Since the publication of this article, Avantes released the AvaSpec-ULS2048X16 in our Sensline product family. This spectrometer is ideally suited to diffuse reflection measurements in the 3rd overtone of the NIR due to the superior response and signal to noise of this instrument.

Work on 'Jonagold' Targets Post-Harvest Monitoring

A study published in Post-harvest Biology and Technology analyzed reflectance spectra in the visible/ NIR spectra using a spectrometer and camera system. By comparing the reflectance of damaged and sound tissue, researchers were able to isolate 4 filters that predictably enabled the quantification of apple quality for this bicolor apple variety. Combined with process control systems, this combination of filters encourages innovation in the automation of fruit sorting.

In this study, reflectance spectra were acquired with an early version of the AvaSpec-ULS2048-USB2 spectrometer.

Avantes, OEM partner for the future of Agriculture

At Avantes we are committed to using photonics technologies to make the world a better place, by partnering with innovators to improve agricultural production. With more than 20 years of experience in the production of top quality photonics equipment and close ties to researchers and experts in the photonics field, Avantes is your ideal OEM partner. Contact a distributor today to learn more about demos or feasibility testing for your unique application.