Application Note 56: Analysis of Potatoes.

Introduction:

Near Infrared Spectroscopy, NIRS) measures fat, protein, sugars and water based on the presence of C-H(fat), N-H(protein), C-O-H(sugars) and O-H(water) bonds in food and agricultural products. Potatoes are high in starch(a sugar) and water with some protein and other components. This simple study has been undertaken to assess the feasibility of measuring starch in potatoes.

Description:

Clean Idaho Potatoes were cut into 10mm thick slices and placed into a Squeeze Cell. The cell was placed into a NIT-38 Near Infrared Transmission Spectrometer scanning the wavelength range from 720-1100nm. Figure 1. shows the NIT spectra of potatoes.

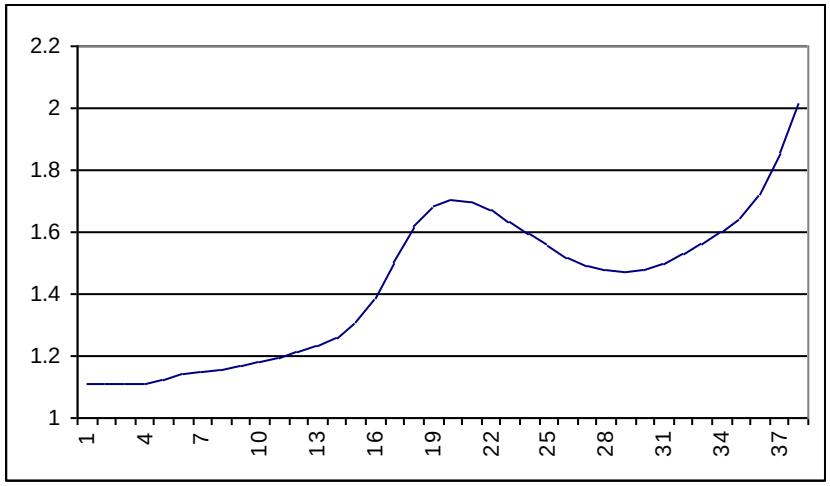

Figure 1. Near Infrared Transmission spectra through 10mm of potato.

Whole clean potatoes were scanned using a FOP-38 Fibre Optic Probe Analyser and a Diffuse Reflectance Probe. Two sets of 6 of spectra were collected around a whole potato. The first set, figure 2. used an integration time of 78microseconds per pixel fro both the 100% reference and the diffuse reflectance scans off the potato. The second set, figure 3, used a 10000 microsecond integration time for both the 100% reference and the diffuse reflectance scan off the potato.

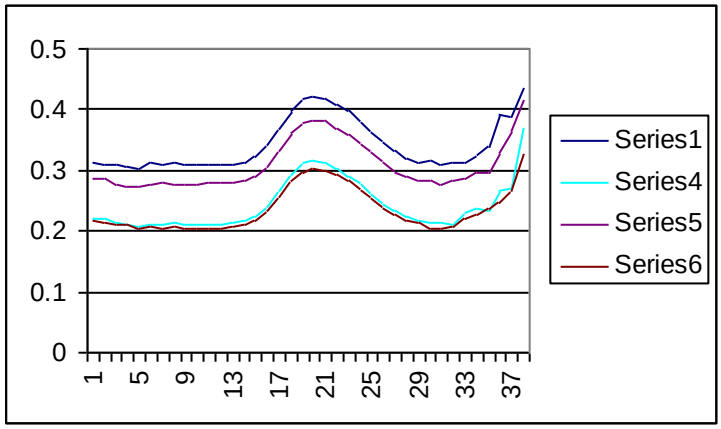

Figure 2. 78 microsecond integration time diffuse reflectance spectra.

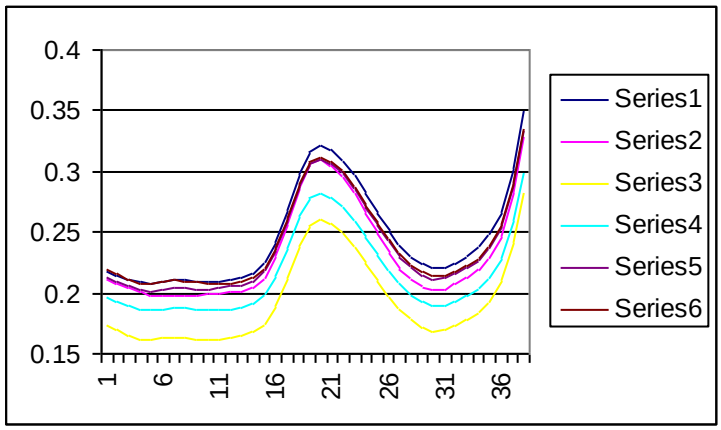

Figure 3. 10000 microsecond integration time diffuse reflectance spectra.

Discussion:

The spectra shown in figures 1, 2 and 3, illustrate that both transmission and diffuse reflectance spectra can be used to analyses moisture and starch. The starch absorption band is at approximately pixel 9 and the water band is at approximately pixel 21. The water band absorbs very strongly as would be expected.

Figure 3. shows a far better spectra than figure 2. The spectra in figure 2 are relatively noisy due to the very short integration time. By taking more scans off the potato then the spectra becomes less noisy and will provide better data. However the speed of scanning may be important and as such, a short integration time may be required. By further experimentation, the optimum integration time could be determined.
No attempt has been made to collect spectra of different types of potatoes and dirty potatoes. It would be expected that red skinned potatoes would be different to white skinned potatoes. However the dirt on the potato would be a more critical factor to the measurement.

Overall, it is not possible to assess the accuracy of the method without scanning different potatoes with known levels of starch and moisture. But it is considered that diffuse reflectance spectra collected using the FOP-38 would be suitable for this application.

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