Single-Kernel Corn Analysis by Hyperspectral Imaging

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The objective of the research being presented was to construct and calibrate a spectrometer for the analysis of single kernels of corn. In light of the difficulties associated with capturing the spatial variability in composition of corn kernels by single-beam spectrometry, a hyperspectral imaging spectrometer was constructed with the intention that it would be used to analyze single kernels of corn for the prediction of moisture and oil content. The spectrometer operated in the range of 750 – 1090 nanometers. After evaluating four methods of standardizing the output from the spectrometer, calibrations were made to predict whole-kernel moisture and oil content from the hyperspectral image data. A genetic algorithm was employed to reduce the number of wavelengths imaged and to optimize the calibrations. The final standard errors of prediction during cross-validation (SEPCV) were 1.22% and 1.25% for moisture and oil content, respectively. It was determined, by analysis of variance, that the accuracy and precision of single-kernel corn analysis by hyperspectral imaging is superior to the single kernel reference chemistry method (as tested).