

MATURE INSTRUMENT, IMMATURE TECHNOLOGY : IS NIR ANALYSIS OF HIGH MOISTURE MATERIALS A SERIOUS PROPOSITION?

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The development and evolution of near infra-red spectroscopic (NIS) calibrations for high-moisture materials is an expensive proposition. Such investment is suspect unless the instrument, or instruments, on which calibrations were developed can be preserved intact or re-standardized as component replacements occurs. The objective of this paper is to detail the changes in performance of a six-year old instrument after maintenance in years five and six resulted in collection of spectral data that was increasingly removed from the calibration population. Calibrations for the analysis of mature sugarcane stalks, a high-moisture material, were developed successfully in 1995 using a broad sample population in terms of genetics, and spectral and temporal variation. The spectral library was further broadened in 1996. In 1997, 1998, 1999, and 2000, additional samples constituting 10% of the laboratorys throughput were subjected to full component analyses using routine laboratory techniques. These samples were primarily random samples, but were complemented with samples that were significant for the spectral H statistic or for the component t statistic. In 1998, an additional calibration was developed for populations consisting of samples of either mature stalks (culms) or sucker culms. Substantial additional samples numbers were collected for this calibration in 1999 and 2000. Attempts to standardize the scanning spectrophotometer used for these calibrations with a second similar instrument in 1999 failed because the instruments were optically different, and standardization could not account for this. Maintenance adjustments were made to the remote reflectance probe of the original instrument in 1999, and replacement of its PbS detectors was done in 2000. Spectral data collected in 1999 and 2000 yielded spectral populations that were increasingly removed from the respective spectral populations on which the calibrations were developed. The mature stalk calibrations benefited marginally from evolutionary calib