

Perten Instruments Application Note

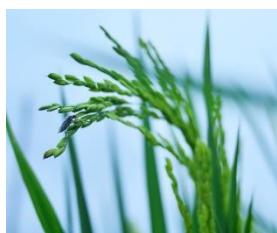
DA 7250 Analysis of Rice

Analysis of Moisture, Protein, Starch, and Amylose in Rice using the Diode Array 7250 Analyzer

Introduction

In the rice industry moisture, protein, starch and amylose are important quality parameters. For traders and processors it is important to be able to rapidly and accurately determine these parameters.

The Near Infrared Reflectance (NIR) technology is highly suitable for this purpose. NIR is an indirect analytical method, where the relationship between reference values and the spectra of the samples are related using multivariate calibrations. Instead of the time consuming and labor intensive traditional wet chemistry methods, with NIR the multi component analysis is done in seconds. The latest technology and software developments allows the benefits to be even further exploited with easy to use instruments, operation handling and web based instrument networking.



DA 7250 NIR Analyzer

The DA 7250 is a Near Infrared Reflectance (NIR) instrument designed for optimal use on agricultural products. Using novel Diode Array technology, the DA 7250 is unique in its measurement speed, versatility and accuracy.

The instrument is handled by an intuitive touch screen interface and in only 6 seconds samples are measured in flexible open dishes. Most sample types can be measured as they are without any preparation or as an alternative be grinded and measured as powder or coarse meal.



Pre-installed NIR Calibration models are available for a wide range of products and parameters.

The DA 7250 instrument is IP 65 rated and available in sanitary design version, allowing it to be used in the lab as well as in the production environment.

Method

About 800 rice samples from China, South Korea, Thailand and Turkey were measured on multiple DA 7250 instruments. The samples were analyzed without grinding or other sample preparation.

The samples compositions of moisture, protein, starch, and amylose were determined using wet chemistry reference methods. Using the moisture values results were displayed on dry basis. Calibration algorithms were developed to model the relationships between the instruments NIR spectra and the reference chemistry results. Model development were done using scatter correcting spectra pre-treatments and multivariate regression.



Results and Discussion

Table 1 summarizes statistics of developed calibrations. Calibrations were developed expressing results on dry basis. Correlation strength is denoted R and range the chemical variability of each parameter. Figure 1 and figure 2 displays the Reference vs NIR calibration graph for moisture and protein. The accuracy of measurements using the DA 7250 were similar to the reproducibility of the reference methods.

Repeatability of measurements using the DA 7250 instrument was generally lower than reference method repeatability. Results can be displayed both as is and dry based on instrument based on automatic moisture correction calculation.

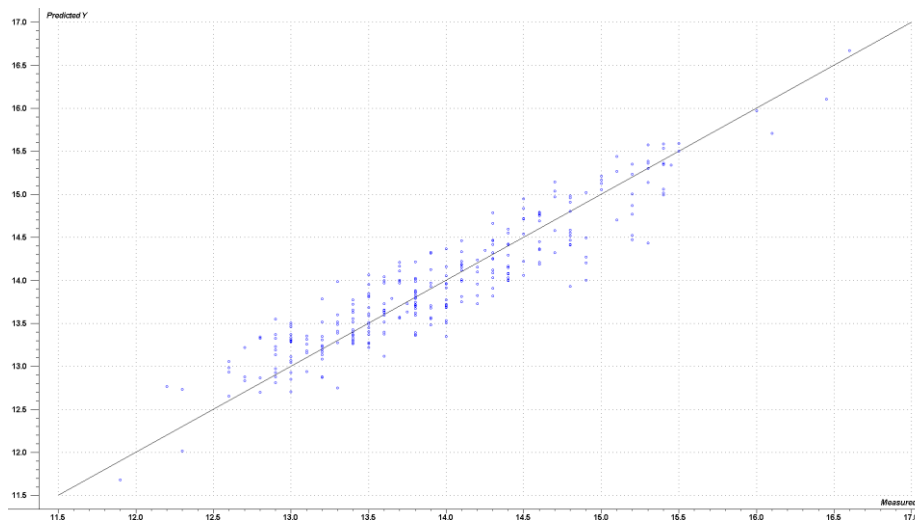
In summary, it is concluded that the DA 7250 accurately can analyze rice in a few seconds using large open rotating sample dishes

Parameter	Range %	Samples	R
Moisture	11.9-16.6	280+	0.93
Protein, db	5.7-13.8	800+	0.98
Starch, db	51.5-73.5	60+	0.93
Amylose, db	12.4 – 27.6	140+	0.80

Table 1

Moisture

The DA 7250 is highly accurate. Even though most of the samples are found in the middle of the range, the calibration performs very well also for the very high and very low moisture samples.



Protein

The DA 7250 measurement performance on protein is very good. The samples are well spread across the range and the calibration predicts well on high as well as low-protein samples.

