

## Near-Infrared Spectroscopy

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## Analysis of Olive Paste and Olive Pomace Using the DA 6200 NIR Analyzer

### Introduction

For the olive industry it is important to be able to rapidly and accurately determine fat and moisture in the purchased olives and olive pomace after crushing. To ensure fair payment of raw materials, know potential oil yield and optimize extraction to retain as much high value oil as possible.

The Near Infrared Reflectance (NIR) technology is highly suitable for these measurement purposes. 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 without use of any chemicals or consumables.



### DA 6200 NIR Analyzer

The DA 6200™ is a new NIR instrument making routine olive analysis easier than ever. It is based on transmission Diode Array NIR technology with the measurement light transmitted through the sample. This means a very large and representative sample volume is analyzed in each measurement. The multi-component analysis is done in 30 seconds using easy to handle magnetic coupled plastic sample cups.

The instrument is operated through a touch screen interface. Measurement auto-start is also possible with measurement started as soon as sample cover is closed.

A light weight design with battery operation allows the analyzer to be easily moved between sampling points.

## Method

More than 2000 Olive and 1000 pomace samples were collected and analyzed on DA 6200 analyzers in cooperation with a reference laboratory in Spain. Olives were milled to olive paste using a hammer mill prior to measurement. Pomace samples were measured as taken from mill. Olive paste and pomace samples were analyzed using magnetic coupled plastic sample cups in 5 mm depth.

Reference values were determined using oven drying moisture method and Soxhlet oil extraction reference methods. Several multivariate regression techniques were evaluated for calibration development, including ANN and PLS.



## Results and Discussion

Developed calibrations showed high correlation and low error. Statistics of developed calibrations are summarized in table 1 and 2 below. N is number of calibration samples, correlation strength is denoted R and range the variability of each parameter. Calibrations graphs for fat and moisture are displayed to the right. The differences between the DA 6200 and the reference method were of similar magnitude as typical differences between two different reference labs.

Table 1. Statistics of olive paste calibrations.

Parameter	N	Range	R
Fat % <sub>asis</sub>	2200+	10.4 – 27.8	0.90
Moisture %	2200+	39.6 – 66.3	0.94

Table 2. Statistics of olive pomace calibrations.

Parameter	N	Range	R
Fat % <sub>asis</sub>	1000+	1 – 4.5	0.89
Moisture %	1000+	54 – 74.5	0.91

In summary it is concluded that the DA 6200 can analyze fat and moisture in olives paste and pomace with high accuracy.

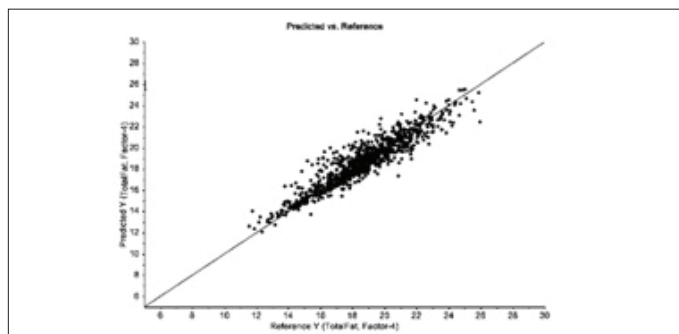


Figure 1. NIR vs reference graph for fat paste calibration.

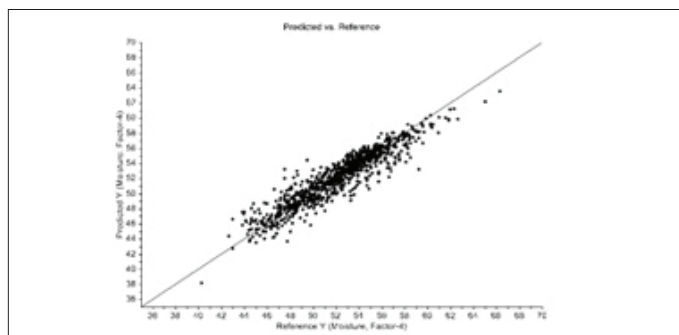


Figure 2. NIR vs reference graphs for moisture paste calibration.

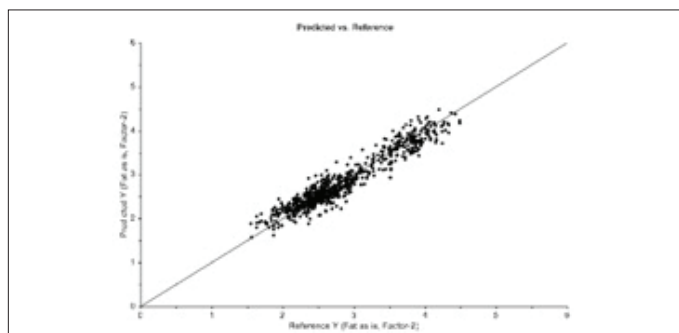


Figure 3. NIR vs reference graphs for fat pomace calibration.

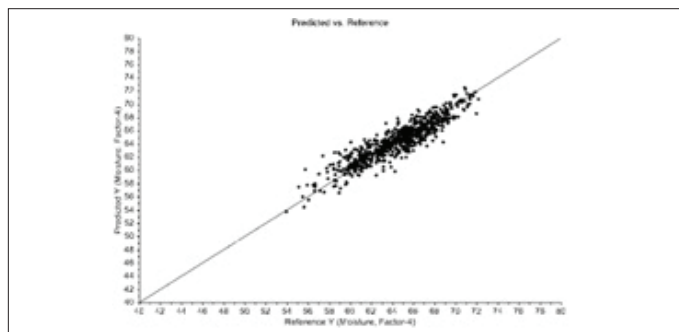


Figure 4. NIR vs reference graph for moisture pomace calibration.

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