

NIR imaging and chemometrics in support to the detection at the single kernel level of GMO

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Since 2000, the Walloon Agricultural Research Centre (CRA-W) has acquired expertise in the development of analytical methods based on NIR hyperspectral imaging for particles and single kernel analysis. The instrument used is a MatrixNIR® Chemical Imaging System (Malvern instruments Ltd) recording sequential images with an InGaAs array detector (240x320 pixels) active in the 900-1700 nm range, that means 76 800 spectra per image.

In the framework of the [COEXTRA FP6 project](#) (GM and non-GM supply chains: their CO-EXistence and TRAcability), the CRA-W is in charge to investigate the potential of NIR hyperspectral imaging together with chemometrics for GMO (Genetically modified organisms) detection. Soybean and barley samples coming from different origins and some being transgenic have been analysed for this purpose.

The aim is to produce a methodology in order to investigate the potential of NIR imaging together with chemometrics for GMO (Genetically modified organisms) detection. The data treatment of the spectral data collected corresponds to unsupervised (PCA) and supervised (PLS-DA) techniques. In all data sets the results have shown that a good discrimination could be performed according to the variety and the presence of GM. From the pattern recognition point of view, more interesting approaches in order to make estimations of the statistical properties based on the images combined with the spectral information has been identified. From the results obtained it appears that next to a merely a qualitative detection, there might be a potential to quantify the GM content in Roundup Ready soybean at the kernel level. There is at least a correlation but more work is being done to document this completely and to improve the correlation.

Keywords: *grain, kernel, GMO, NIR, NIR imaging, chemometrics, discriminant models*