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Detection of melamine using hyperspectral imaging spectroscopy

J.A. Fernandez Pierna¹, Z. Yang², L. Han², P. Dardenne¹, V. Baeten¹

¹Walloon Agricultural Research Centre (CRA-W), Gembloux, Belgium

²China Agricultural University, Beijing, China

E-mail: fernandez@cra.wallonie.be

Abstract In the last years, new areas of work based on the Near Infrared Spectroscopy (NIRS) technology have been studied and developed, mainly methods based on the combination of techniques. In that direction, the NIR technology has been coupled to the imaging technology to create what is now called Hyperspectral Imaging Spectroscopy (HIS), which is something of a revolution with hundreds or thousands of spectra (including tens or hundreds of variables) being collected for each sample, instead of the unique average spectrum typically collected with classical spectroscopic instrumentation. The HIS technology has been selected in this work for the detection and quantification of melamine contamination in soybean meal. Soybean meal is the material remaining after solvent extraction of oil from soybean flakes; it consists of more than 36% protein, 30% carbohydrates, and excellent amounts of dietary fiber, vitamins, and minerals. It also consists of 20% oil, which makes it the most important crop for producing edible oil. Soy protein products are usually substitutes for animal products because it offers a complete protein profile. In recent cases, soybean meal has been found to be adulterated with melamine as a protein substitute for animal feed, which can be quite toxic at constant exposure. The aim of this work comprises the development of a standardized methodology and algorithm based on NIR Hyperspectral imaging spectroscopy for the acquisition, treatment and interpretation of the images and the spectra as well as for the production of appropriate and optimized answers to the detection of the presence of melamine in soybean meal.



Keywords melamine;hyperspectral;imaging;chemometrics

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