

Simultaneous detection of quality and safety in spinach plants using a new generation of NIRS sensors

José-Antonio Entrenas, Dolores Pérez-Marín, Irina Torres, Ana Garrido-Varo and María-Teresa Sánchez

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Abstract

Near infrared (NIR) spectrophotometers require study of the spectral acquisition process, so that they can be used for quality and safety assessment of horticultural products. The aim of this work was to optimize the use of two NIR spectrophotometers for analysing spinach plants *in situ* and online: a manual, portable instrument based on Linear Variable Filter (LVF) technology (MicroNIR™ 1700), suitable for analysis in the field, and during harvest and storage; and a Fourier Transform (FT)-NIR instrument (Matrix-F) suitable for the online analysis in the sorting lines. 195 spinach plants were used to predict the quality (texture, dry matter and soluble solid contents) and safety (nitrate content) parameters. Using the MicroNIR™ 1700 to take 6 spectra per spinach leaf resulted in NIRS models of predictive capacity which enable to screen spinach plants *in situ* and decide on their industrial destination according to their nitrate content. For the Matrix-F instrument, a single spectrum taken online for the intact product (either moving or not) on the conveyor belt was sufficient to establish product quality and safety during industrial processing. The results also showed that the use of both instruments could form a complementary strategy for global monitoring, allowing spinach plants to be analysed throughout the food supply chain.