6.12 RYAD BENDOULA[1], ALEXIA GOBRECHT[1], ARNAUD DUCANCHEZ[2], ANA HERRERO-LANGERO[1], PABLO GUERRERO-CASTRO[1], JEAN-MICHEL ROGER[1]

[1] Irstea, UMR ITAP, 361 rue J-F Breton, F – 34196 Montpellier
[2] SupAgro Montpellier, UMR ITAP, 2 Place Pierre Viala, F – 34060 Montpellier

THE POTENTIAL OF AN INVASIVE BUT NON-DESTRUCTIVE FIBER-OPTIC PROBE FOR SOLUBLE SOLIDS CONTENT IN WHOLE SUGAR BEETS

ABSTRACT

Sugar beet is the second biggest world contributor to sugar production and the only one grown in Europe. Great efforts are currently being made to preserve and enhance its competitiveness. Within this context, one of the main bottlenecks identified is the lack of effective tools for assessing sugar content in unprocessed sugar beet roots. In the sugar industry, Near Infrared Spectroscopy (NIRS) is an approved method that has long been used to control product quality on sugar processing lines in both sugar beet and cane industrial processes. In sugar beet, the main work has been performed on beet brei samples although some authors studied the feasibility of predicting sucrose content of intact and sliced beets. Even though the results are relatively good, the beet peel is still a real problem to acquire signals of sufficient quality. Within the framework of AKER project, the objective of this work was to evaluate the use of a self-designed fiber-optic probe for the estimation of Soluble Solid Content (SSC) in intact sugar beets. Two geometries were tested: a single-fiber probe and a multiple-fiber probe. Total reflectance over the 400 – 2500 nm spectral range of 180 sugar beet samples were measured with both probes geometries. Immediately after spectrum acquisition, SSC measurements were achieved for each sample. Partial Least Square (PLS) algorithm was used to calibrate the SSC estimation of the sugar beets. Whereas the results with the single-fiber probes were not satisfactory, PLS regression models showed good performance in the estimation of SSC with the multiple-fiber probes. Results demonstrated good correlation between SSC and reflectance spectra for intact sugar beets with R2 values higher than 0.9 and a RPD higher than 3.30 Hence, these first results are very promising but further improvements are needed in order to achieve a satisfactory accuracy.