

1.8 ALAIN TOSSENS, NANCY DEBONTRIDDER

SESVanderHave N.V./S.A., Biotechnology Dept., Soldatenplein 15, B – 3300 Tienen

## **FT-NIRS FOR THE QUANTIFICATION OF PESTICIDES ON COATED SUGAR BEET SEEDS**

**Quantification par FT-NIRS de pesticides sur la graine enrobée de betteraves sucrières / FT-NIRS zur Quantifizierung von Pestiziden auf pilliertem Zuckerrübensaatgut**

### **ABSTRACT**

High-tech treatments are applied to the seeds to ensure the highest seed quality. Pelleting with a designed powder formulation gives the seed an even round shape and allows precise drilling. A chemical coating and colouring is then applied directly on the pellet. This thin coating consists of a mixture of fungicides and pesticides, whose concentrations are currently determined by HPLC. This method is precise and accurate but also slow, expensive and requires specialist lab facilities. FT-NIRS technology could provide an option for pesticide analyses with its improved speed (30 sec/sample), low price and “at-line” utilization.

During the last 10 years, samples were taken in the factory production line and scanned with an FT-NIRS Matrix-I (Bruker) to acquire spectra from 12500-3500  $\text{cm}^{-1}$  at 3-4  $\text{cm}^{-1}$  intervals. The spectra were preprocessed using OPUS software with “first derivative +Vector normalization (SNV). PCA (5 factors) was used to select the calibration and validation data-sets. The reference values were analyzed by HPLC for the pesticides imidacloprid, clothianidine and thiamethoxam, using standard analytical methods for the determination of the active ingredients in pelleted sugar beet seeds (IRS, The Netherlands).

Although some refinements are still required for use in final quality control before delivery of seed to the customers, the quality of the different pesticide calibrations is sufficient for routine monitoring of factory processing. The FT-NIRS could be used to determine the concentrations of imidacloprid, thiamethoxam and clothianidine with good  $R^2$  values of 99.25%, 99.48% and 98.78% respectively. RMSEP (root mean squared error of prediction) values are 3.00, 1.24 and 2.16, and RPD (Residual predictive deviation) values are 11.5, 13.8 and 9.05 in the validation set. An at-line FT-NIRS has been incorporated into the SESVanderHave factory processing line to monitor pesticide contents in seed coatings, a critical step of sugar beet seed processing.

---