

Prediction of Arabica Content from Ground Roasted Coffee Blends by Near Infrared Spectroscopy

F. DAVRIEUX*, S. LABERTHE, B. GUYOT, JC. MANEZ

CIRAD-CP, 73 rue J.F. Breton, Maison de la Technologie, TA 80/16,
F-34398 Montpellier Cedex 5, France

*corresponding author

SUMMARY

Determination of the arabica and robusta composition of roasted coffee blends is an important aim for various reasons: difference in price between robusta and arabica, particular organoleptic characteristics. Chemical analysis is long, costly and not very reliable. Near infrared spectrometry (NIRS) could be a rapid, non-destructive alternative method for determining the arabica content of ground roasted coffee blends.

The study was carried out using a spectral base comprising 352 samples of ground roasted coffee; the range of wavelengths studied was between 400 nm and 2500 nm (visible and near infrared). The samples chosen for this study came from several arabica and robusta coffee varieties of different geographical origins, for which the various post-harvest treatments and roasting parameters were representative of production conditions. This base was representative of the spectral variability seen in commercial coffees.

A principal components analysis was carried out on the matrix of spectral data. Based on the principal components extracted, the Mahalanobis distance from the mean spectrum was calculated for each spectrum. Limits of belonging to the spectral population were thus defined and the neighbourhood distances were calculated.

A mathematical model using multivariate regression methods (PLS) was developed to predict the arabica content of blends from the spectral data.

The model was validated by predicting a set of samples (23) independent from the established base. The standard error of prediction (SEP) was estimated to be 2.20% (W/W), the coefficient of determination (R^2) of the regression was equal to 0.99; these statistical criteria clearly indicate the potential of this method for use in the quality control of industrial products.