

Determination of the Geographical Origin of Green Coffee by Inductively Coupled Plasma Mass Spectrometry (ICP-MS)

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SUMMARY

It is very important for the purposes of fair trade that an objective method is available to determine the country of origin of green coffee. Although different techniques have already been evaluated, up to now, no reliable fully validated analytical procedure has been reported. In this context, a method based on the determination of the mineral profile was investigated.

The profile of 57 elements was determined by semi-quantitative (TotalQuant) scan ICP-MS in 174 samples of Arabica green coffee originating from 12 countries (Brazil, Columbia, Costa Rica, Ecuador, Ethiopia, Guatemala, Hawaii, Indonesia, Kenya, Mexico, San Salvador, Thailand).

Different multivariate statistical analyses of the data were compared, including linear discriminant analysis, multinomial logistics discrimination, artificial neural network (ANN), k-nearest neighbours. ANN gave the best results for the discrimination of coffees from the 12 countries. Nevertheless, the average misclassification rate, estimated by cross-validation, was about 23%, and therefore an unambiguous identification of green coffee of unknown origin is not yet possible. However, Colombian and Hawaiian coffees could be well discriminated from those of other countries with average misclassification rates of 10 and 2%, respectively. This suggests that the technique has the potential, in very specific cases and given further validation, to correctly classify a green coffee of known but questionable origin.