

Coffee Adulteration and a Multivariate Approach to Quality Control

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ABSTRACT

Coffee adulteration issues are complicated by the fact that most commercial coffees are blends of *Coffea arabica* (arabica) and *C. canephora* (robusta). *Arabicas* command a higher price and are considered to be of better quality than *robustas*. Furthermore, coffees are processed, prepared, and consumed in a variety of ways according to local practices. Examples are “French” coffees that contain added chicory, or “Viennese” coffees containing fig. Green coffee quality, processing, the level of defects, roasting, and grinding all influence the final product. Soluble (Instant) coffees are further subjected to an assortment of extraction, concentration, and drying processes. Methods for detecting adulteration have focused on extraneous sugars from undeclared chicory, cereals, or other fillers. Quality measures such as the percentage of robusta in a blend, or the levels of defects (coffee parchment, husks, discoloured beans) have also received attention. Multivariate statistical techniques show promise as tools for classification and quality assurance of soluble coffee. Hierarchical Cluster Analysis (HCA) and Principal Components Analysis (PCA) applied to GC-headspace and HPLC data permit grouping of samples according to origin and/or processing conditions. A method of quality control of soluble coffee that utilises PCA compression of multivariate data and examination of residuals is illustrated. Examples of outlier detection and identification of unusual or adulterated samples is given.