Identification of adulteration in ground roasted coffees using UV – Vis spectroscopy and SPA - LDA

OBJETIVE

Identification of adulterations like husks and sticks, in ground roasted coffees, by ultraviolet – visible spectroscopy and the successive projections algorithm for variable selection association with linear discriminant analysis (SPA-LDA).

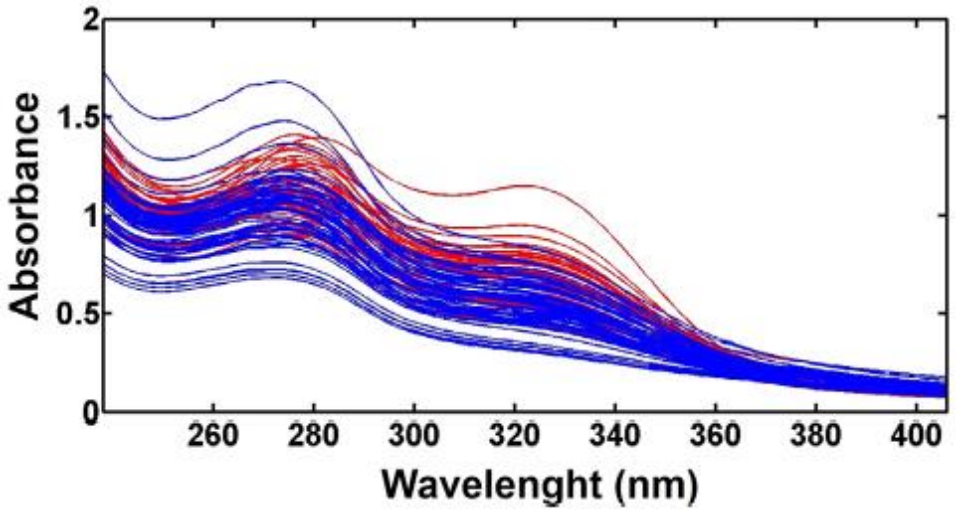
SAMPLE PREPARATION

102 ground roasted coffee samples were collected. 45 non-adulterated and 57 adulterated. An aqueous extraction procedure of the samples was performed. 1.0 g of each sample was placed in a filter funnel containing a 25 mm pore-sized quantitative filter paper coupled with an erlenmeyer. The extractions were performed by using distilled water at 90° - 98°C during 25 min for each sample. After cooling process for 30 min to room temperature, all extracts were diluted in the proportion of 1:20 mL:mL with distilled water.

DATA ACQUISITION

A Hewlett Packard model HP 8453 UV-Vis spectrophotometer was used to triplicate the UV-Vis spectra (239-405 nm). Before the measurements, the same water used in extraction was placed inside of the sample cell to adjust the 100% transmittance signal.

REPRESENTATIVE FIGURE AND RESULT



UV-Vis spectra of 102 studied roasted coffee samples: non-adulterated (in red) and adulterated (in blue). Shows the absorbance between 239 - 405 nm of functional group chromophore (C=O), which is present in the molecules of trigonelline, caffeine, caffeic acid and melanoidins (chemical compounds present in the coffee beans). Differences between chromophore and conjugated olefinic bonds, besides of intermolecular interactions with the water used in the extractions, cause displacement on the maxima electronic absortions of trigonelline from 272 nm to 275 nm, caffeine from 276 nm to 280 nm, caffeic acid from 320 nm to 325 nm, and melanoidins from 400 to 405 nm.

CONCLUSION

This paper demonstrates a new methodology to identify adulteration of ground roasted coffees for husks and sticks using molecular absorption spectroscopy in the UV-Vis region.

REFERENCE

U. T. C. P. Souto et al, "Identification of adulteration in ground roasted coffees using UV – Vis spectroscopy and SPA – LDA," *LWT – Food Science and Technology,* vol. 63, pp. 1037 – 1041, 2015.