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Sensing fifty shades of spice fraud

Spices are high on the list of fraud reports world-wide. Various kinds of adulterations have surfaced: adulterations with foreign material, e.g. starch, look-a-likes, brick powder, sawdust, etc. On the other hand, we also come across adulterations with low grade own material, e.g., leaves and branches, extracted material, peel, pulp, etc. This kind of adulterations is usually analytically far more challenging. Some international standards focus on key compounds or characteristics. There are some available for black pepper and saffron for instance. However, because there are so many shades of fraud, adding method to method will make the analytical checks much costly. Therefore, we developed broad Figure-1: Genuine and adulterated paprika anomaly methods, which discriminate the good from the bad guys based on powder'.



analytical fingerprints. Large sets of various grades of black/white pepper, paprika powder, nutmeg and saffron were collected. They were analyzed by Proton Transfer Reaction Mass Spectrometry, a very rapid and non-destructive analytical technique. The analyses resulted in defined analytical signatures of the various spices. Using multivariate statistics, the signatures of normal, genuine products and their natural variation were separated from adulterated materials. The methods were subsequently successfully validated with a new set of samples and tested in practice on industry and retail samples. The methods reveal that for some spices, 20-30% of those on the market are adulterated and indeed these adulterations come in many shades of grey.

Recent Publications

1. Erasmus S W, Muller M, Alewijn M, Koot A H, van Ruth S M, Hoffman L C (2017) Proton-transfer reaction mass spectrometry (PTR-MS) for the authentication of regionally unique South African lamb. Food Chemistry; 233: 331-342.

2. Alewijn M, van der Voet H and van Ruth S M (2017) New approach for the validation of multivariate classification methods for product authentication by analytical fingerprints - concept and case study on organic feed. Journal of Food Composition and Analysis; 51: 15-23.

Biography

Saskia van Ruth heads the research group on Food Authenticity and Nutrients at Wageningen University and Research Centre, Netherlands. She is also a Professor of Food Authenticity and Integrity both in Wageningen and in University College Cork, Ireland. She received her PhD in Food Chemistry from the Wageningen University and worked for Industry and in the academic world since. Her present research deals with fraud risks, i.e. factors impacting on the risk of food fraud in supply chain networks. Furthermore, she is active in research on novel methodology for fraud detection, both in and beyond the laboratory. She has published more than 250 scientific papers.

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