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### Untargeted direct mass spectrometry for obtaining base-line fingerprints of authentic herbs and spices

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Due to several recent food fraud scandals there is an increased interest of industry and consumers to obtain relevant and reliable information about the integrity of food products. The food commodity herbs and spices are situated in the top 10 most adulterated products world-wide. Therefore in this study, we explored direct mass spectrometry techniques in analysing authentic spices to create base-line fingerprints of genuine herb and spice material. Untargeted fingerprinting techniques as Direct Injection Mass Spectrometry (DIMS) and Proton Transfer Reaction Mass Spectrometry (PTR-MS) can be used in combination with chemometrics, to determine the suitability of these techniques in authenticity determination. For spice authentication, we developed methods based on these mass spectrometry techniques for the identification of geographical origin. Fifty samples of widely traded spices were analysed: Black pepper, chili paprika, nutmeg, vanilla and saffron. Chemometric analysis was initiated with customized automatic  $m/z$  variable selection for both DIMS and PTR-MS data. Subsequent exploratory analysis was performed by principal component analysis (PCA), in which maximum of variation between the selected variables was expressed. From this PCA, it was possible to distinguish the different spices and to discriminate between authentic and false material. Partial least square discriminant analysis (PLS-DA) on cross-validated data was conducted and provides a good classification rate with an average of 95.3% of efficiency. Unique about this development is that one method for a whole database seems suitable, rather than one model per spice. This paves the way for uniform herb and spice authentication methods in the future.

#### Biography

Isabelle Silvis started her PhD in 2013 RIKILT in the authenticity group of Saskia van Ruth, in which she is conducting research on food fraud of herbs and spices. The focus is on the development of analytical methods for the detection of economically motivated adulterations. In 2013, she obtained her European Master's degree in Food Technology, from Wageningen University. Her international background is quite useful in her current activities as her project is part of SPICED, in which European partners from different universities, institutes and industry build on a strong consortium, to secure the spice and herb chain from primary production to consumer-ready food against major deliberate, accidental or natural CBRN contamination.

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