

Detection of spice adulteration using spectroscopic fingerprinting techniques

Name of presenter: Bettina Horn

Date: 02/06/2016

Location: Berlin, Germany

Bundesinstitut für Risikobewertung

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n° 312631.

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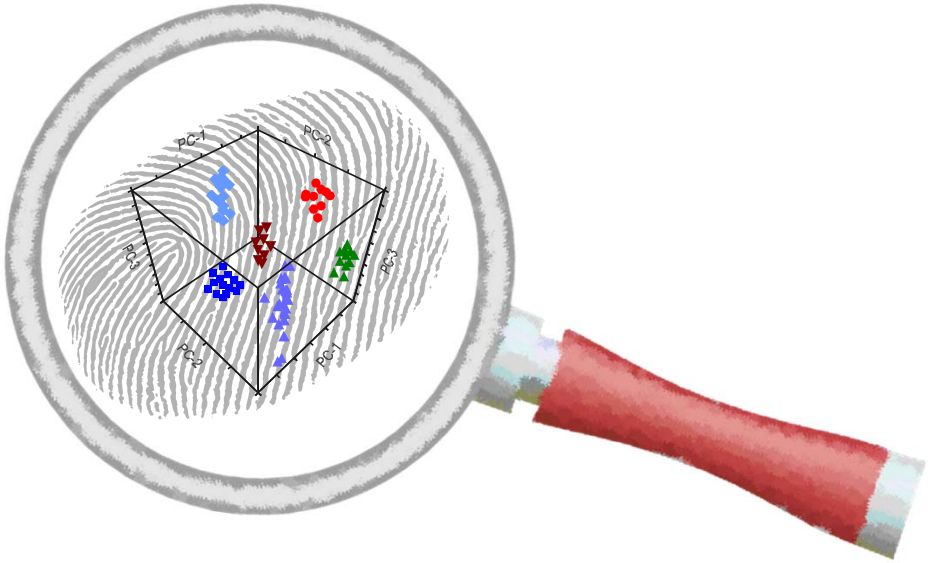
Non-targeted analysis – fingerprinting approach

- combination of spectroscopy/spectrometry and multivariate data analysis



- comprehensive characterization of food matrices
- differentiation of samples due to → botanical origin
  → geographical origin
  …
  → **adulteration**

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Non-targeted analysis – fingerprinting approach

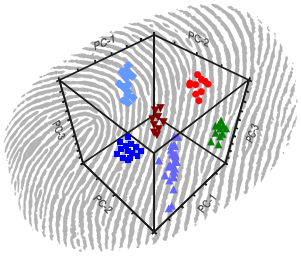
- FTIR spectroscopy

milling

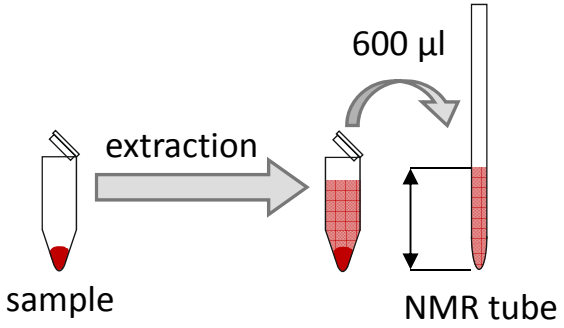
Sample preparation

Spectroscopy

Data analysis



- ^{1}H NMR spectroscopy



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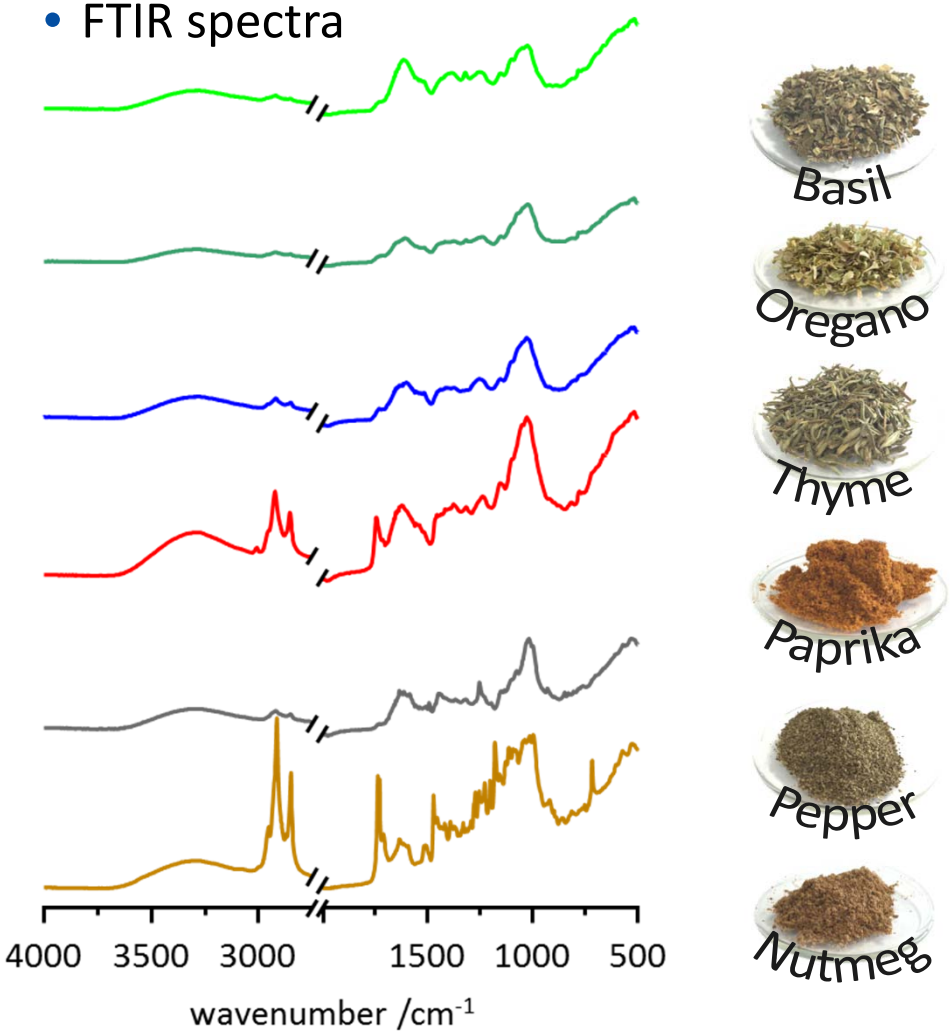
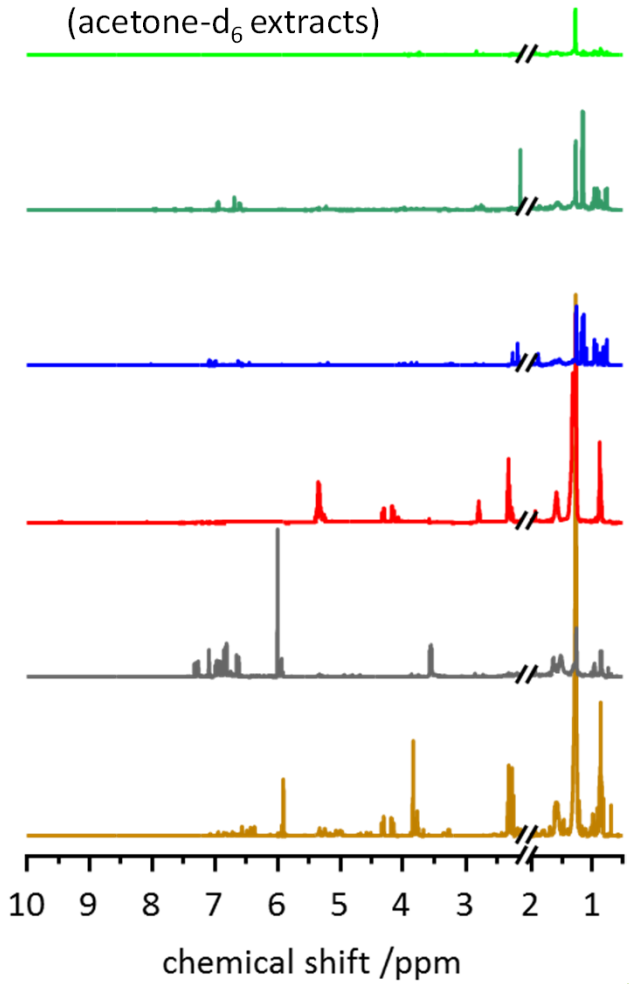
Analysis of spices and herbs

- FTIR spectra



- ^{1}H NMR spectra
  (acetone-d_6 extracts)



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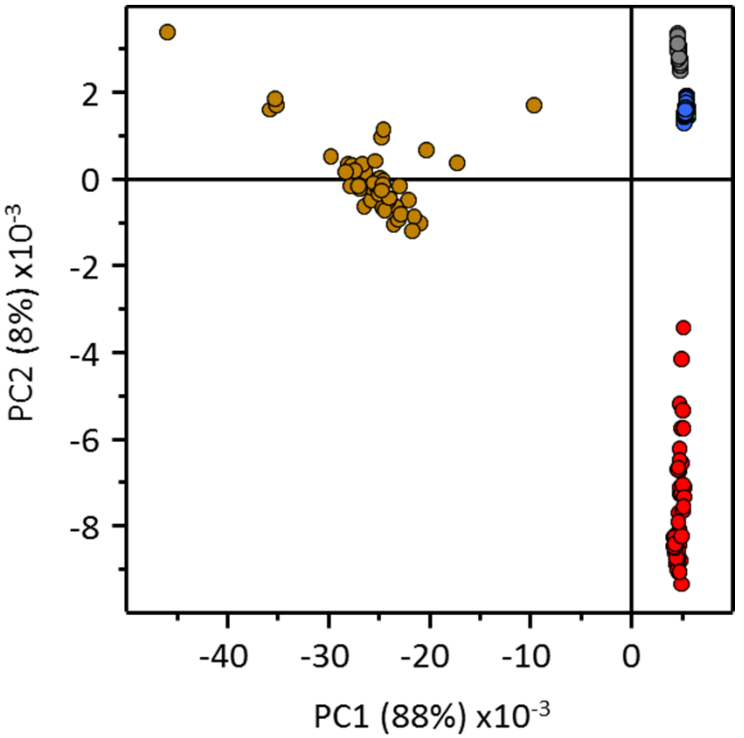
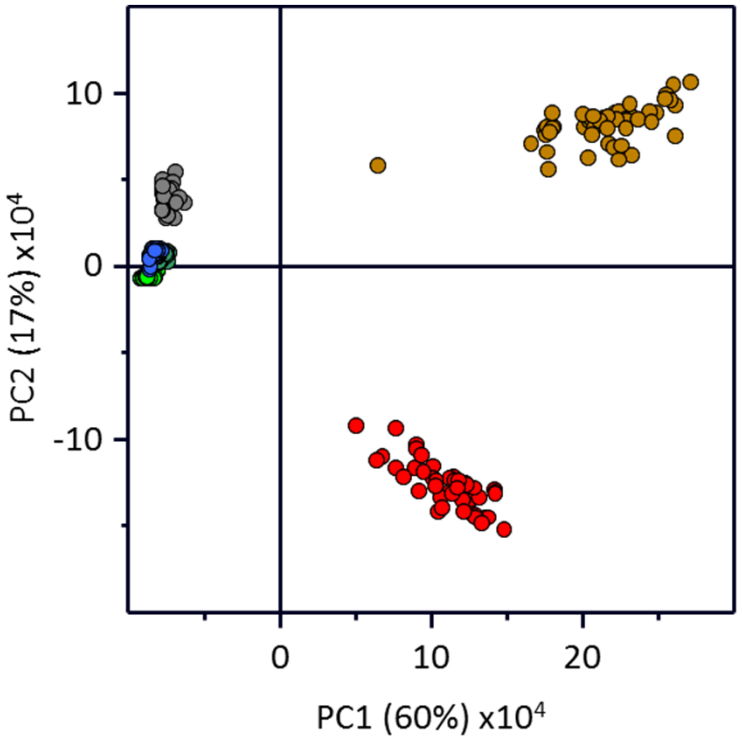
Analysis of spices and herbs

- PCA of FTIR data



- PCA of ^{1}H NMR data



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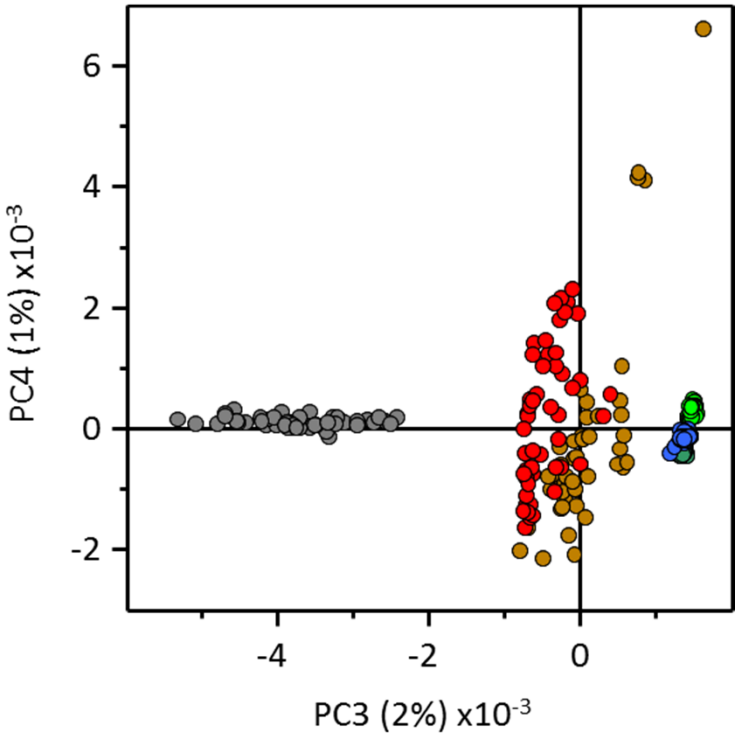
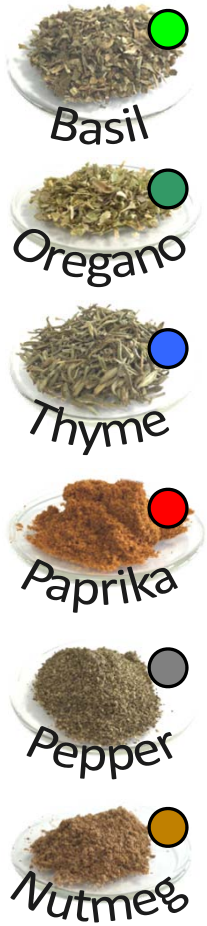
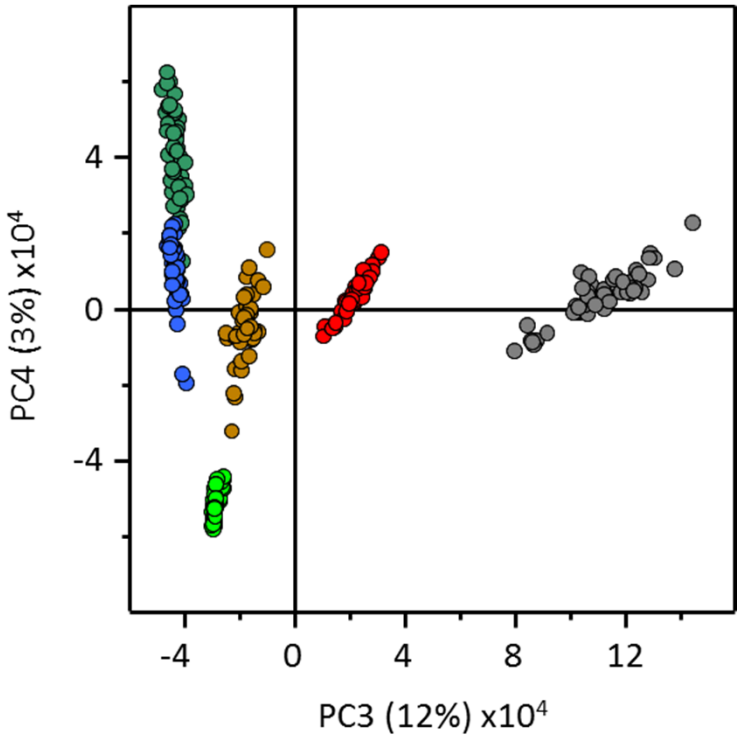




- PCA of ^{1}H NMR data



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Authentication of spices and herbs

- investigations focus on 3 types of adulteration:

(i) product foreign material

(ii) product own material

(iii) chemical additive

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Authentication of spices and herbs

- investigations focus on 3 types of adulteration:

(i) product foreign material

(ii) product own material

(iii) chemical additive:

Sudan (I/IV) dye

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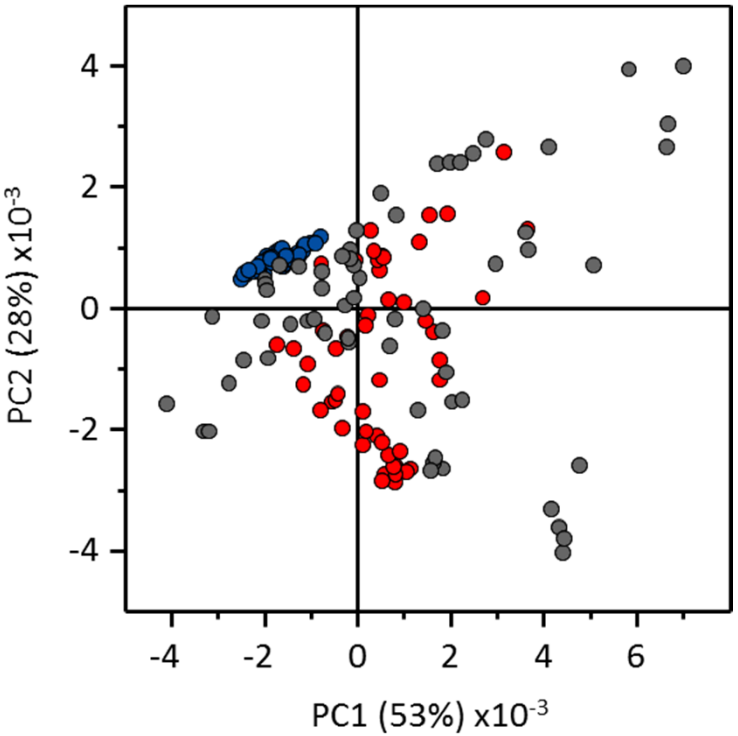
Paprika identification – natural variation

- PCA of FTIR data

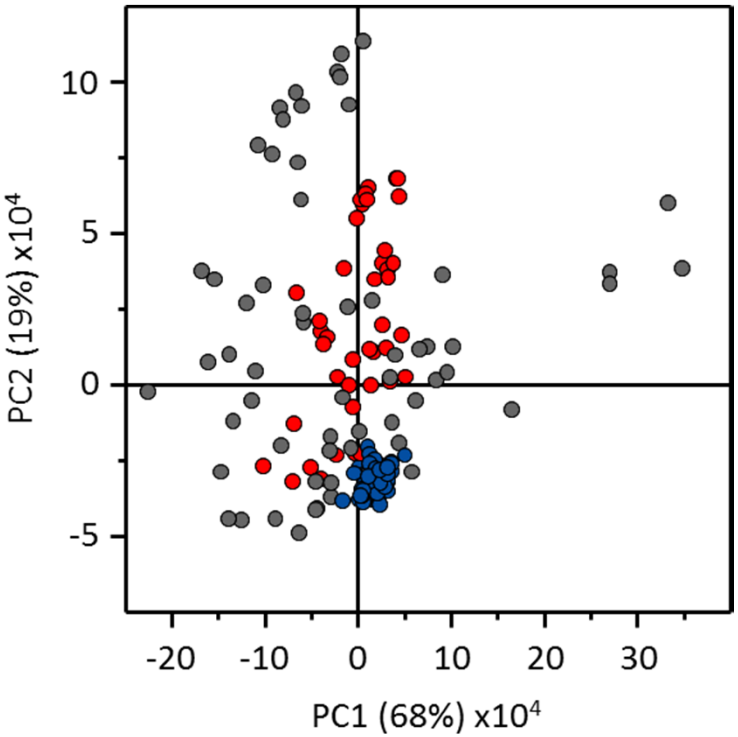


project samples (n=50, p=1)

commercial samples (n=62, p=29)

QC sample (prepared in replicates, n=49)

- PCA of ^{1}H NMR data



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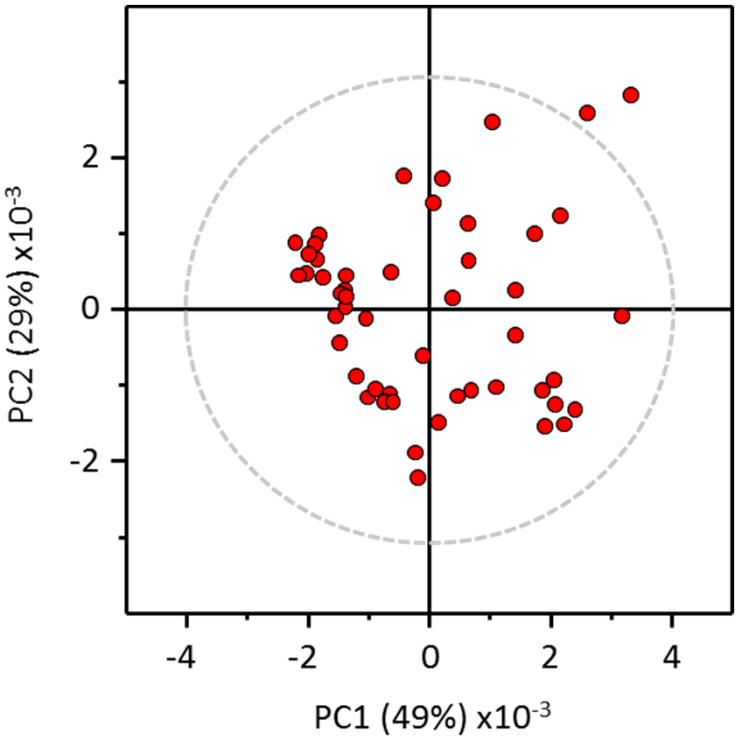
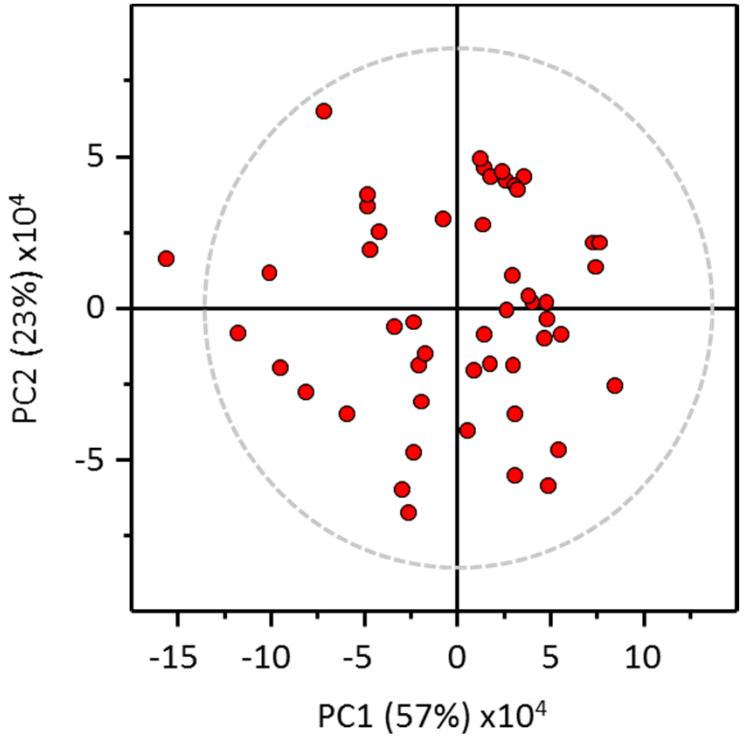
Paprika authentication – detection of adulteration

- PCA of FTIR data



project samples (n=50, p=1)

- PCA of ^{1}H NMR data



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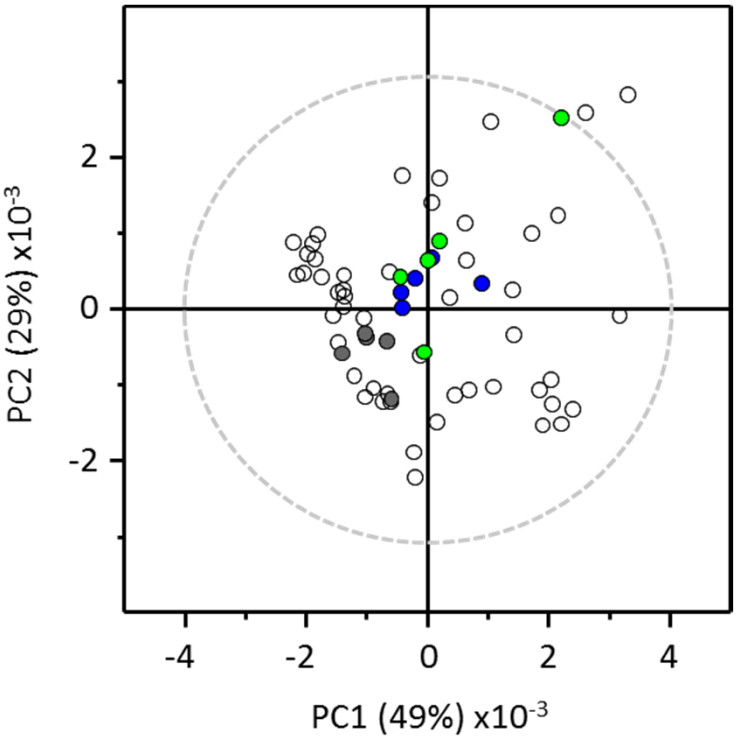
Paprika authentication – detection of adulteration

- PCA of FTIR data, prediction of test set



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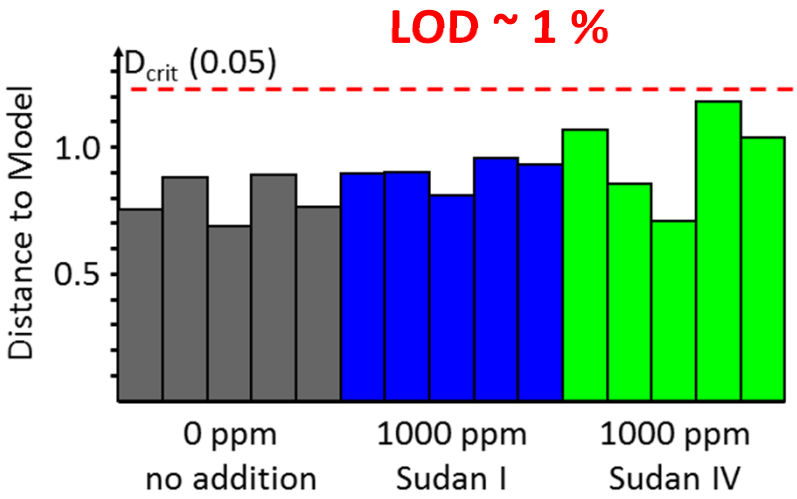

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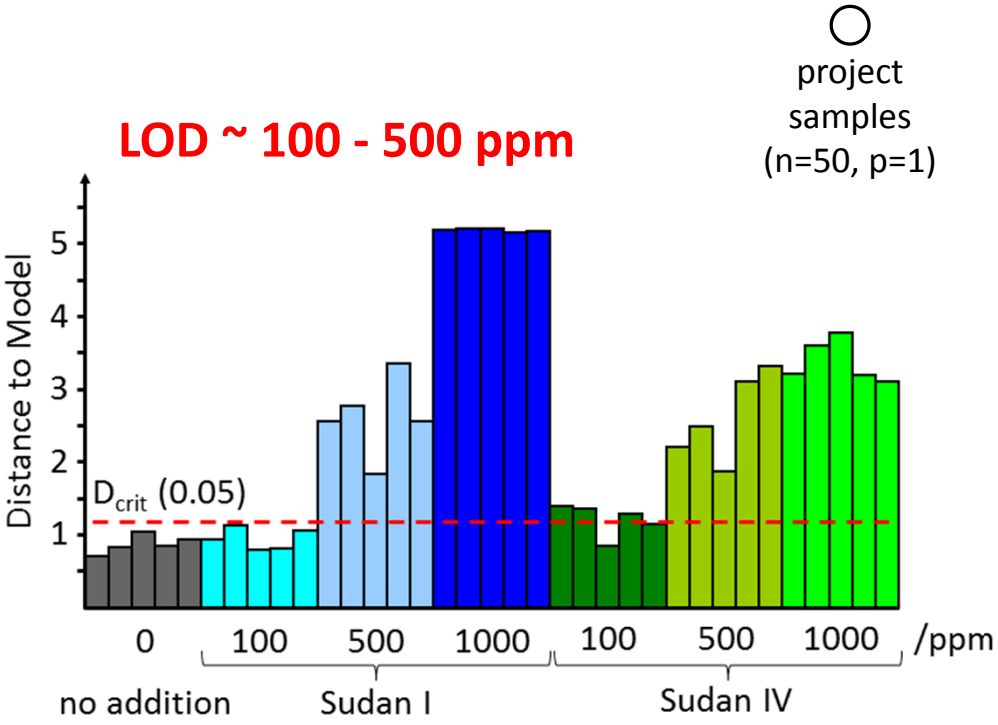
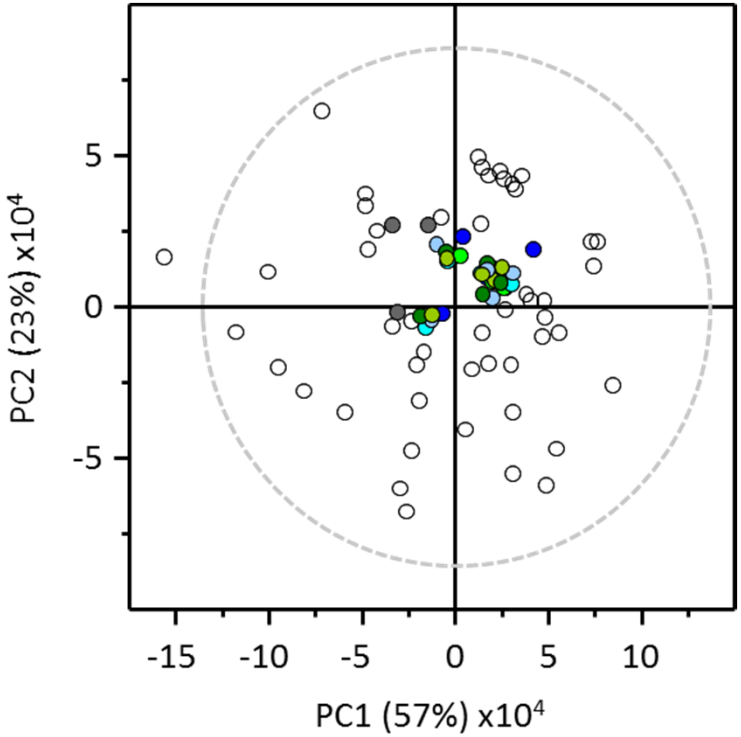
Paprika authentication – detection of adulteration

- PCA of ^{1}H NMR data, prediction of test set

LOD ~ 100 - 500 ppm





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Thanks for your attention.

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