

Title:

NMR-based Multi Parametric Quality Control of Fruit Juices

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Introduction:

The quality control of fruit juices is based on many parameters, that so far have to be assessed in multiple analytical and chemical tests. Here we introduce a high resolution NMR based method, allowing to quantify multiple relevant compounds and to draw statistical conclusions on a single NMR measurement.

Material and Methods:

Authentic juices of the most important fruit types on a world wide basis have been measured by 400 MHz NMR to build a reference database, that is used for statistical evaluation of new juices. A knowledge base has been built to allow quantification of relevant compounds out of complex NMR juice spectra.

Results and Discussion:

It is shown, that an authentic fruit juice spectral database can be used reliably to assess the following juice properties by statistical means:

- type of fruit like orange, tangerine, bloodorange
- Direct juice versus rediluted concentrate
- Geographical Origin
- Mixing of different fruit types
- Fruit content

In addition relevant molecules for quality of the juices are quantified by the NMR-method using optimized 1-dimensional and a fast 2-dimensional experiment.

Due to the statistical analysis done, also frauds and problems can be detected, that the system is not trained for like the addition of whole fruit to the juice. It is explained how the statistics is used to guide to signals indicating outliers and how to establish the analysis of so far unknown signals using a reference compound database for biological fluids and food material.

NMR within one measurement can generate many quality control parameters that so far were not available or required multiple conventional tests. Such more efficient screening can be applied.