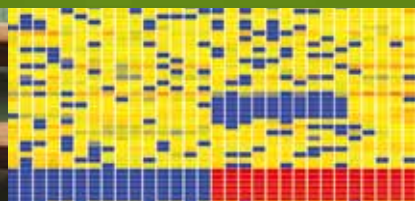
Agilent Food Profiling Solutions

ASSESS FOOD QUALITY AND POINT OF ORIGIN

The Measure of Confidence



Agilent Technologies

ACHIEVE RELIABLE, HIGH-THROUGHPUT FOOD QUALITY AND AUTHENTICITY TESTING

Testing food for the presence of known pesticides, adulterants, and other non-native chemical compounds is a familiar topic for food safety scientists, but there are food quality and authenticity factors that cannot be detected using the same standard methods.

Agilent Technologies offers a powerful suite of instruments and analysis software that addresses these challenges by profiling naturally occurring compounds found in food samples. When you compare food profiles to predefined models and high-quality standards, you can make sure that the foods you are using match their described composition and point of origin. Now you can ensure food quality and authenticity by detecting, identifying, and classifying unexpected adulterations during food testing.

Make Sure Your Components are Authentic

Food products are sometimes blended, diluted, or substituted with lower quality or lower cost ingredients to save money. Even if these differences are subtle, Agilent's integrated software and hardware can quickly pinpoint whether a food product has been altered or substituted.

With regionally or religiously significant foods, such as wine, rice, or Halal products, food profiling can identify and confirm the point of origin. Now you can avoid substitutions that result in offering lower quality food products at premium prices.

Simplify Food Product Development

Food researchers work hard to improve the product characteristics using genetic modifications and cross breeding. With Agilent food profiling methods, you can quickly analyze the effects of a genetic modification and improve quality more efficiently.

Take the analysis one step further by identifying compounds associated with desired attributes (flavor or quality) and link them to the biological pathways that create the positive effect. Agilent Pathway Architect software offers a wealth of useful information with a few mouse clicks.

Identify Food Degradation Early

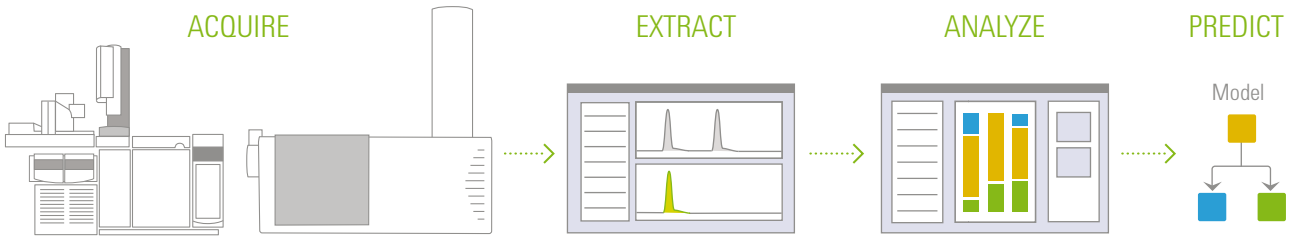
Environmental conditions during storage and transport can cause food products to degrade prematurely and affect their quality. With food profiling, you can test raw food products to identify the unique pattern of chemical compounds that determine quality before taste is affected. Now you can be confident that your high standards will be upheld in finished products.

OPTIMIZE YOUR FOOD PROFILING WORKFLOW

Agilent has developed a software workflow that is fully automated from acquisition to reporting, so you can profile food products in two easy steps.

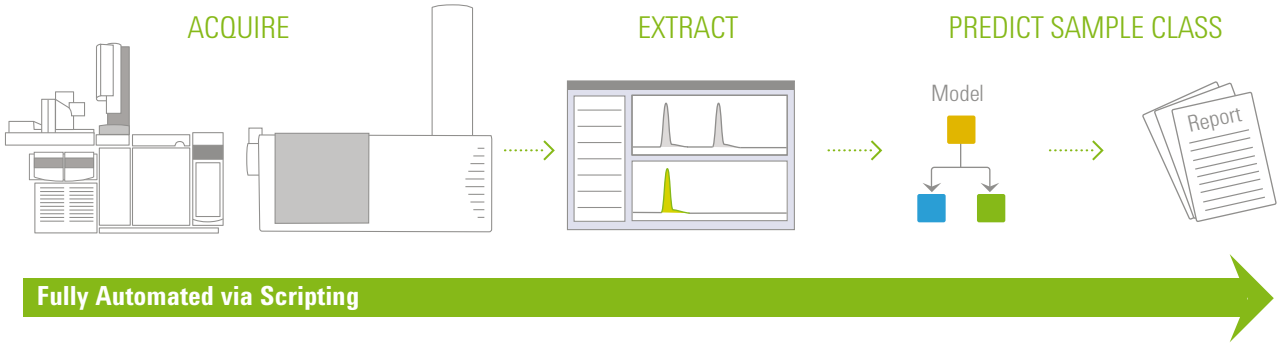
Step 1. Develop a Prediction Model

Simply test a range of samples of known origin or quality, and use these to create a prediction model. Your samples should represent the desired product and key related comparison points, such as foods from different regions.



Step 2. Run Samples Against Prediction Model

Use your prediction model as a standard point of comparison as you repeatedly process and analyze unknown samples in an automated, high-throughput manner.



The Agilent software workflow is fully automated from acquisition to reporting.

Agilent Food Fingerprinting Solutions

Agilent offers a complete portfolio of hardware and software products ideally suited for a wide range food profiling applications.

Effective Identification

The new Agilent GC/Q-TOF offers accurate mass MS and MS/MS capabilities for difficult compound identification challenges. You can also choose the cost-effective Agilent GC/MSD system which is ideal for fast and effective high-throughput food profiling analyses.

Agilent 7200 Series GC/Q-TOF

Rapid Analysis

Agilent ICP-MS instruments are the new standard for high productivity elemental analysis. They offer rapid multi-element analysis at trace levels, with unmatched matrix tolerance and the ability to remove interference.

Agilent 7700 ICP-MS

Accurate Results

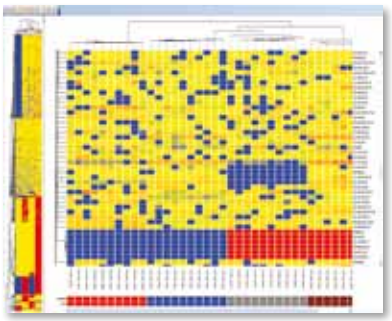
The high performance Agilent LC/Q-TOF and cost effective LC/TOF are ideally suited for food profiling workflows, offering high sensitivity, wide dynamic range, and accurate mass capabilities. These well-designed instrument families can meet the varying needs of food safety researchers.

Agilent 6500 Series Q-TOF LC/MS

Automated Workflows

Agilent offers a suite of software tools with automated workflows from acquisition to reporting that make food fingerprinting workflows fast, simple, and powerful.

- ChemStation
- MassHunter Qualitative Analysis
- Mass Profiler Professional (MPP)
- Databases and libraries



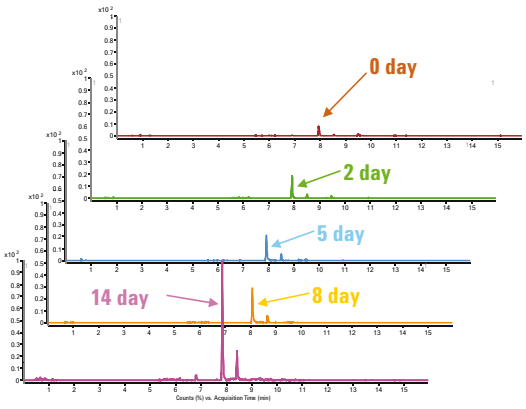
Agilent Mass Profiler Professional

COMPREHENSIVE FOOD PROFILING APPLICATIONS

Quality: Analyzing Beer Using LC/MS

Beer has complex properties that are dependent upon ingredients, production factors, and the post-production storage environment. By analyzing four different commercial beers it was possible to identify compounds which play an important role in creating the unique properties of beer as it ages.

Extracted ion chromatograms (EIC) based on the analysis results showed a change in target compound intensity with aging. After fourteen days, this compound was present at a 10-fold greater level as compared to fresh beer.

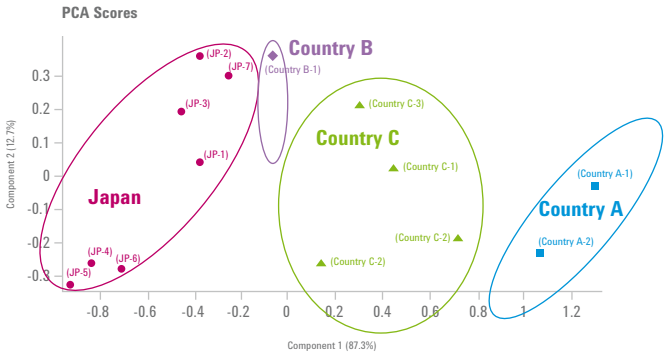


Comparison of EIC from beer aged 0-14 days. Poster presented at ASMS 2008.

Authenticity: Testing Rice Origin with ICP-MS

Food labeling is an important and highly regulated aspect of the food industry. In Japan, identifying the geographic origin of foods such as rice has been a legal requirement since 2000.

ICP-MS can be used to support these regulations by identifying metals that are absorbed from the soil in characteristic patterns unique to each region. Samples of rice known to originate from particular geographic regions were analyzed and a prediction model was created using MPP software. The plot below shows a characteristic grouping of rice based on the combined elemental compositions of seventy-five distinguishing features in these samples.



Analysis of rice from 4 countries with differing elemental compostion.

Classification: Checking Olive Oil by GC/MS

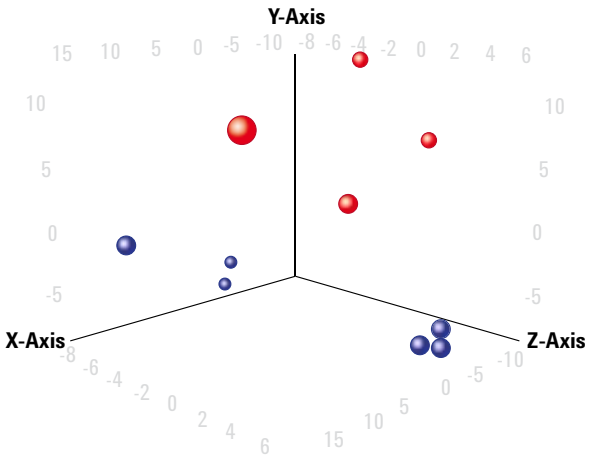
The demand for extra virgin olive oil (EVOO) is growing rapidly worldwide due to its general health benefits and specific anti-inflammatory properties. The International Olive Council and USDA have established standards for EVOO classification. However, these tests include expensive, subjective sensory tests which have been unsuccessful in classifying genuine EVOO.

Instead, an objective, robust, and accurate pass/fail test can be performed using Agilent GC/MS instrumentation and MassHunter MPP software. In the example below, it is easy to distinguish failing olive oil samples which are marked in red from genuine ones which are marked in blue.

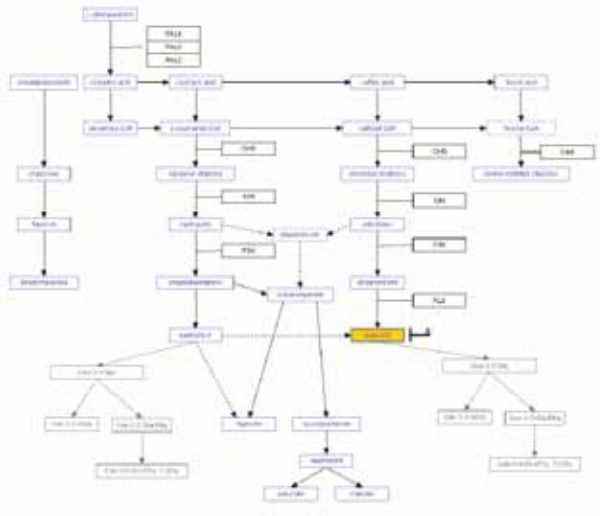
Development: Comparing Rice Varieties by LC/MS

To better clarify the small molecule differences that exist between staple and medicinal rice, six rice varieties from the south Indian state of Kerala were selected for analysis. Varieties tested were Njavara and Chennellu rice, used in Ayurvedic medicine to treat various inflammatory related diseases, and Jyothi, commercial Matta, and Chennellu cultivated for staple food consumption.

The samples were analyzed to determine how genetic differences were manifested in the small molecule profiles. Principal component analysis (PCA) carried out using Mass Hunter MPP showed that all six varieties have very different small molecule profiles, reflecting their genetic differences. The identified, statistically different metabolites contributing to the PCA separation were submitted to Agilent Pathway Architect to examine the active pathways and better understand the implied biological mechanism.



After detecting ~ 150 compounds by GC/MS, MassHunter MPP software was used to identify whether the EVOO samples passed (red) or failed (blue). Agilent publication 5991-0106EN.



A Pathway Architect display of the flavonoid biosynthesis pathway with an orange colored box highlighting the detected differential metabolite visualized on the pathway.

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