

Honey-Profiling™ 2.0

- Fast, Reliable Authenticity Analysis

Fraud in the Honey Industry

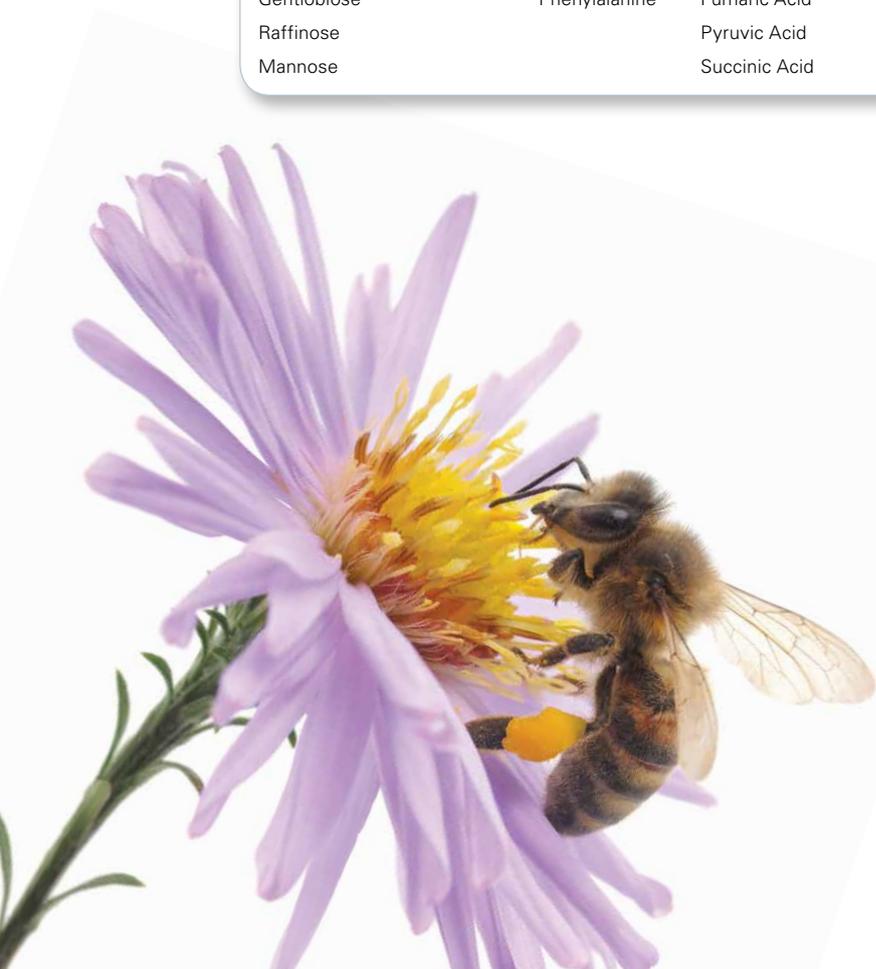
Honey is seen by consumers as a naturally pure, healthy and authentic product. Due to this, consumers are willing to spend more money for it; including industry, as honey is not only used in form of table honey in households, but has also importance as an ingredient in the food and cosmetics industry.

Unfortunately, honey is one of the most frauded food products worldwide and fraud cases continue to hit the headlines. The consequences of food fraud are devastating, as the reputation of food companies, regions or countries is damaged, and consumer confidence erodes.

The most common forms of honey fraud are the deliberate addition of sugar syrups and the false declaration of geographical origin or botanical variety. As fraudulent practices get more and more sophisticated and can elude detection by classical and targeted analytics, there is an increasing need for new and non-targeted techniques for food authenticity control.

List of Parameters that are Quantified in Honey with Honey-Profiling™ 2.0

| Sugars | Acids | Amino Acids | Fermentation | Markers |
|-------------|-------------|---------------|----------------|------------------------|
| Fructose | Citric Acid | Alanine | 2,3-butanediol | 3-phenyllactic acid |
| Glucose | Malic Acid | Aspartic Acid | 5-HMF | Dihydroxyacetone (DHA) |
| Sucrose | Quinic Acid | Glutamine | Acetic Acid | Methylglyoxal (MGO) |
| Turanose | | Leucine | Acetoin | Kynurenic Acid |
| Maltose | | Proline | Ethanol | Shikimic Acid |
| Melezitose | | Valine | Lactic Acid | |
| Maltotriose | | Tyrosine | Formic Acid | |
| Gentiobiose | | Phenylalanine | Fumaric Acid | |
| Raffinose | | | Pyruvic Acid | |
| Mannose | | | Succinic Acid | |



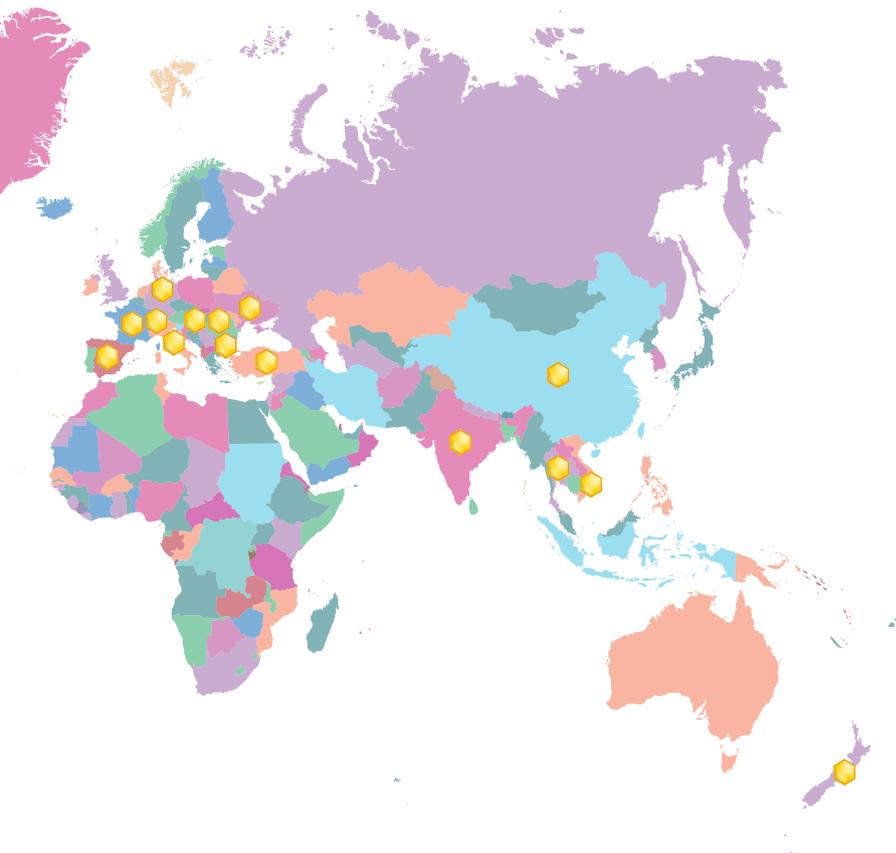
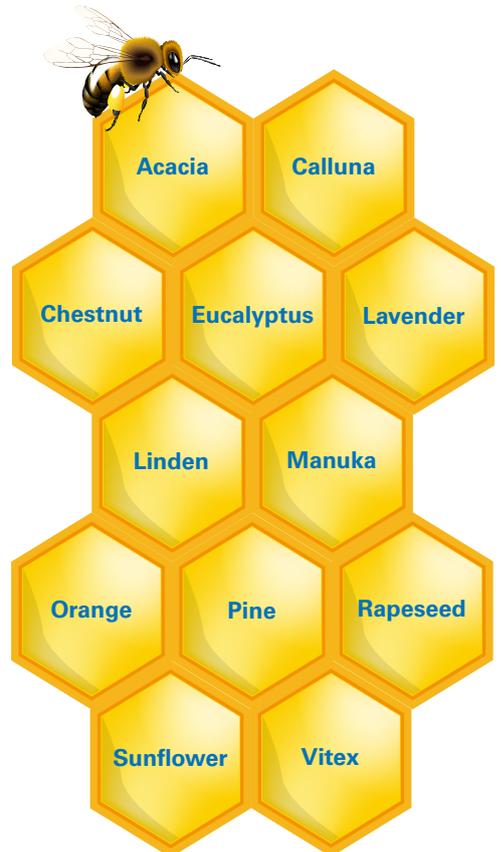
Botanical Varieties that can be Verified with Honey-Profiling 2.0

Due to its unique “all-in-one” capabilities, high-resolution ¹H-NMR (Nuclear Magnetic Resonance) spectroscopy, combined with multivariate statistical chemometrics, is a powerful tool for authenticity and quality of honey.

Honey-Profiling can detect several hundred compounds in a honey sample simultaneously, which are used to characterize the honey through a comprehensive database of reference honeys. The database is routinely updated with new variants for botanical and geographical verification, providing a reliable, up-to-date, reference library.

With Honey-Profiling 2.0 You Can:

- Detect exogenous sugars in any type of honey
- Verify country of origin of honeys
- Verify botanical variety of monofloral honeys
- Analyze composition as well as quality and freshness parameters
- Verify EU-regulated parameters (Council Directive 2001/110/EC)
 - Glucose + fructose
 - Sucrose
 - 5-HMF
- Detect atypical samples by non-targeted screening



Countries of Origin that can be Verified with Honey-Profiling 2.0

| | |
|-----------|-------------|
| Argentina | India |
| Brazil | Mexico |
| Bulgaria | New Zealand |
| Chile | Romania |
| China | Spain |
| Cuba | Thailand |
| France | Turkey |
| Germany | Ukraine |
| Guatemala | Uruguay |
| Hungary | Vietnam |

Advantages of Honey-Profiling 2.0:

- Comprehensive screening of authenticity in one method.
- Analysis takes 20 minutes where combination of other methods require approximately 2 days.
- Cost per sample significantly lower than combining other methods to get similar data.
- Fully automated method, no NMR expertise is required.
- Sophisticated detection of the presence of exogenous sugars by many markers, independent of the sugar source (sugar cane, maize, rice, beet, wheat, etc..).
- Country of origin and botanical variety verification relies on the chemical composition of the honey.
- The comprehensive and robust database of more than 18000 reference honeys, covering more than 50 geographical origins and 100 botanical varieties was developed in partnership with QSI, Alnumed & Famille Michaud.
- ISO17025 accreditation. The Bruker BAS laboratory is accredited for Honey-Profiling 2.0, guaranteeing extensive validation of all the underlying tests.

Bruker's FoodScreener

- Honey-Profiling is a module of the FoodScreener™ platform.
- The FoodScreener is also compatible with Juice and Wine-Profiling analysis modules.

