

## Mannose – Marker for honey adulteration?

Authenticity and quality of honey pose a tremendous challenge for the honey industry worldwide. The goods are (un)intentionally manipulated, i.e. geographical origins are changed to prevent high taxes or cheap substitutes like sugar syrups are added. Consumers get deceived, because they are expecting a fully natural product without any additives and of declared origin. But not only consumers get tricked, also importers do not always get the honey they ordered but rather an adulterated low quality product.

HoneyProfiling™ allows for the detection of addition of sugars and syrups as well as quantification of numerous parameters specific for honey, for example markers characteristic for adulteration. Additionally, a verification of botanical and geographical origins is possible.

Comprehensive knowledge on honey is essential for proper interpretation of NMR data. Several decades of experience in this field enable us to further develop HoneyProfiling™ and the associated chemometric models, taking it to the next level of detection of adulteration.

We analyse honeys of various geographical and botanical origins on a daily basis and further extend our worldwide unique database with every single sample. Only authentic samples are included in the database. Authenticity of these samples is checked by means of a number of “classical” analyses. For the first release of the database 3600 samples are already included, which were checked for authenticity performing more than 35 000 “classical” analyses.

So how can HoneyProfiling™ help detecting adulteration?

Mannose is one specific marker amongst others for the addition of syrup to floral honey. This sugar is structurally very similar to glucose and can be found in many (high end) syrups (fig. 1).

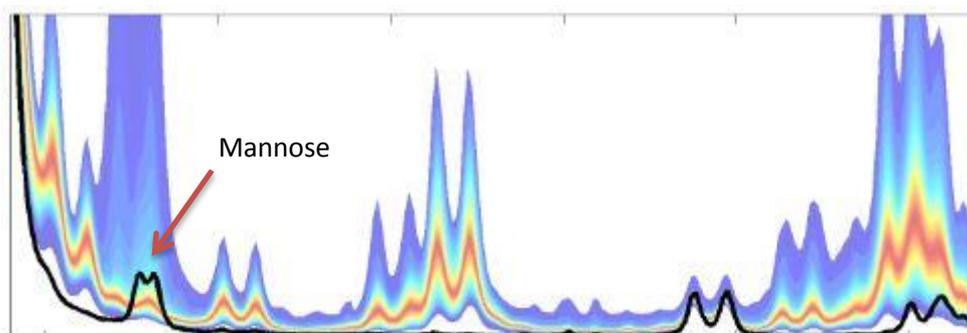


Figure 1: Chinese Syrup (bold black line) in comparison to our honey database (colored band)

Mannose is generally produced through hydrolysis of plant-derived polysaccharides (glycomannane). It occurs naturally, for example in cranberries, red and black currants, *Aloe vera* and peaches.

Mannose might be formed by the transformation of fructose and/or glucose. This process can be observed in alkaline conditions. Honey is naturally acidic, consequently this reaction will not take place in natural honey if harvested the traditional way. Own experiments with honeys, syrups, glucose and fructose conducted in our lab in Bremen, Germany, confirmed that this reaction takes place in alkaline conditions, as commonly used for treatment with ion exchange resin.

If occurrence of mannose in floral honey is evident (fig. 2), this honey is considered adulterated, as mannose could only form in natural honey through above mentioned treatment resulting in a product which is not in accordance with the EU honey directive (Council Directive 2001/110/EC of 20 December 2001 relating to honey).

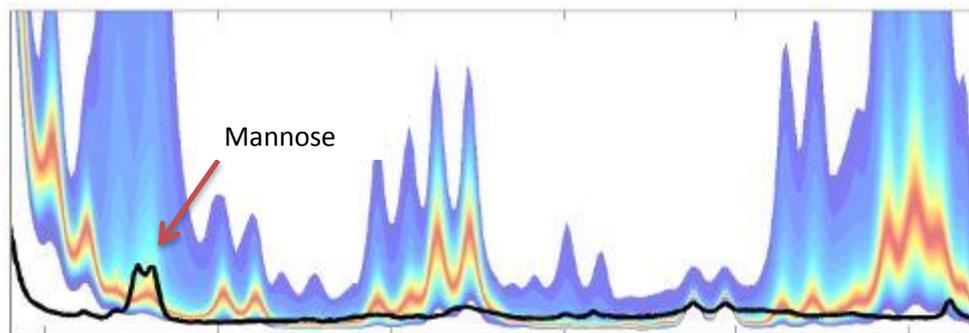


Figure 2: Chinese floral honey adulterated with syrup (bold black line) in comparison to our honey database (colored band). The spectrum of a pure natural honey usually follows the red band. The spectrum of this adulterated honey shows significantly lower signals compared to authentic honey. Additionally, a strong signal of mannose is detected.

There is one exception concerning the natural occurrence of mannose in honey. Honey dew sometimes contains low amounts of mannose. Mannose can be found in honey dew honeys originating from aphids exudates collected by honey bees. About 8% of the samples in our database contain mannose and 1% are verified as authentic honey dew honeys with mannose contents from 0.3 to 0.9 g/100g.

It is important to point out that for the above mentioned reasons mannose should not be used as single parameter as it does not always point to an adulteration. Analysis of mannose alone is not sufficient. HoneyProfiling™ instead does not rely on only one single marker. It rather uses a variety of parameters which enable us to still detect adulterations and prevent false positive results.

We strongly recommend to evaluate the mannose content only in conjunction with HoneyProfiling™. To prevent false interpretations, we do not offer an assessment of mannose only.

Please do not hesitate to contact us in case of further questions concerning mannose or the adulteration of honey in general.