“HarmHoney”

Harmonisation of test methods to determine exogenous sugars in honey

EC Joint Research Centre Unit F4
Knowledge Centre for Food Fraud and Quality

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European Commission

Why the JRC?

- Focus on EU policies
- Independence
- Impartiality
- Scientific expertise
- Competent staff
- Unique equipment

European Commission

Conclusions of the CCP on honey

Need to increase capability of oficial control laboratorios to detect adultereation with tailor-made sugar syrups

- Development of **harmonised** and generally accepted analytical methods
- Identification of appropriate **markers**
- Diagnostic **sensitivity** and **specificity**
- **Inter-laboratory** comparison
- Need of sufficient number of **samples** – genuine honeys, sugar syrups and bee feeding samples

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“HarmHoney” project - Objectives

- JRC to assist the **optimisation** and the **harmonisation** of appropriate analytical methods to detect adulteration of honey with exogenous sugars.

- JRC to **quantify performance criteria** of selected methods and their **diagnostic capability** in view of:
  - Setting reference methods within the EU legislation to verify whether honey is compliant with the provisions of the **EU Honey Directive**
  - Increasing the capability of **official control laboratories**

- JRC to write recommendations towards **standardisation** by Standard Development Organisations (such as CEN, ISO or AOAC International).

Methods - Benchmarks

Method principle	Benchmark values / Markers of adulteration
Elemental Analyser/Liquid Chromatography – Isotope Ratio Mass Spectrometry (EA/LC-IRMS)	Benchmark values for differences between $^{13}C/^{12}C$ stable carbon isotope ratios of protein and sugar compounds as proposed by Elflein and Raezke
Liquid Chromatography - High Resolution Mass Spectrometry (LC-HRMS)	Oligosaccharides with a degree of polymerisation (DP) ≥ 6 and < 10 2-Acetylfuran-3-glucopyranoside (AFGP) Difructose anhydride (DFA)
High-Performance Anion Exchange Chromatography - Pulsed Amperometric Detector (HPAEC-PAD)	Polysaccharides with DP ≥ 10
Proton Nuclear Magnetic Resonance (^{1}H-NMR) Spectroscopy	Mannose Honey-Profiling™

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Project timeline

	M1-3	M4-6	M7-9	M10-12	M13-15	M16-18	M19-21	M22-24	M25-27	M29-30	M31-33	M34-36
Round table with experts												
Sampling			Progress Report 1									
Optimisation												
In-house validation						PR 2						
Editing SOPs												
1st collaborative trial (performance criteria)												
Fine-tuning the methods & SOPs										PR 3		
2nd collaborative trial (diagnostic capacity)												
Interpretation & report												Report

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Conclusions of the technical round table (October 2023)

Markers

Mannose & Honeydew honeys

Generally accepted marker

Need to combine with other markers (as naturally present in some honeydew honeys) – important to consider the type of honey

Oligo-/polysaccharides (as DPs)

Some uncertainties remain, in particular on the type of honey, the time of extraction and environmental conditions

2-Acetylfuran-3-glucopyranoside (AFGP)

In particular for rice syrups

Additional markers

Several additional markers proposed by participants – including from private laboratories

Methods

Common agreement on the appropriateness of the **methods selected** for harmonisation to detect the presence of exogenous sugars in honeys

Need to have **harmonised method**, including sampling, interpretation of results, decision rules and description of instruments

Combination of methods (as for markers)

Important aspects on the **higher sensitivity** by some of the methods

Decision rules

Bee feeding impact - Seems unavoidable, in particular with climate change

A **potential flexibility** would have an mportant impact on the analytical methods, and decision rules

Possibly establishment of ***reference points for action***

Collaboration with MS authorities & stakeholders

Private laboratories – share of information, possibly anonymised, only with JRC

JRC request to have genuine honeys, bee feeding prodcuts and syrups, with full traceability

Contribution with **samples** – not for control purposes

Conclusions

- "HarmHoney" project by JRC, with the support of knowledge of all **stakeholders**
- Apply several **markers** with several **analytical methods**
- Continue the **optimisation** of selected markers (including new ones) and methods in the JRC's lab
- Providing of **samples** – JRC to circulate announcement with needs, procedure and explanation of use of obtained results
- **Private laboratories** possibly to share key parameters of their analytical methods – comparison with JRC protocoles for possible improvements

Thank you & keep in touch

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