Authenticity of Honey
Current Issues and Update on New Analytical Trends

Authenticity of Manuka Honey

Conventional Parameters

- Pollen analysis: specific pollen > 70% (problem: manuka – kanuka)
- Electrical conductivity: ≥ 0.5 mS/cm
- F/G ratio: 1.12 – 1.47
- Color: > 70 mm Pfund
- Thixotropy: positive
- Sensory: brown color, slightly sweet, strong, tart, ethereal
- Dihydroxyacetone (unstable, specific for manuka nectar)
- Methylglyoxal (unstable) ← fraudulent addition possible
- HMF (artificial maturing)
- Water insoluble substances
- ^{1}H NMR profiling (MGO, DHA,leptosperin, overall profile)
- ^{13}C EA/LCIRMS (manuka nectar: -26.2 ± 0.5 ‰)


conversion

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New MPI guidelines to identify Manuka honey

"Using chemical and DNA marker analysis to authenticate a high-value food, manuka honey"
(npj Science of Food (2018) 2:9 ; doi:10.1038/s41538-018-0016-6)

Markers for both Mono- and multifloral manuka:

- ≥ 5 mg/kg for 2'-methoxyacetophenone (≥ 1 mg/kg until 12/2017)
- ≥ 1 mg/kg for 2-methoxybenzoic acid and 4-hydroxyphenyllactic acid;
- ≥ 20 mg/kg 3-phenyllactic acid; and
- DNA from manuka pollen (<Cq 36 equivalent of 3.2 fg/µL DNA).

2-MAP and DNA: lack of stability

Fraudulent addition of markers possible

Differentiation of mono- and multifloral manuka:

- Monofloral manuka honey: ≥ 400 mg/kg 3-phenyllactic acid,
- Multifloral manuka honey: ≥ 20 but <400 mg/kg 3-phenyllactic acid.

Blending with kanuka possible

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Research from University of Auckland

"New approach: Chemical and fluorescence profiling of NZ honeys"

(Food Chemistry 267, 2018, 355-367; https://doi.org/10.1016/j.foodchem.2017.07.065)

Specific markers for manuka nectar:

- Leptosperin ≥ 94 mg/kg
- Lepteridine ≥ 2.1 mg/kg
- 2'-methoxyacetophenone ≥ 2.0 mg/kg*
- 2-methoxybenzoic acid*

*unstable

Marker present in manuka and kanuka nectars:

- 3-Phenyllactic acid
- 4-hydroxyphenyllactic acid

Specific markers for kanuka nectar:

- Lumichrome (≥ 4.5 mg/kg)

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<u>Remaining Challenges</u>

- MPI specifications may be manipulated → conventional criteria still necessary
- Seasonal and annual variability of chemical markers, lack of stability of some important chemical markers, influence of processing

  → problems with interpretation (March 30, 2019: 50% of Northern NZ manuka honey crop fails MPI criteria)
- DNA markers (only qualitative but no quantitative statement), lack of stability
- Compliance with EU regulation (excessive HMF and water insoluble solids content, "multifloral manuka" is a term not applicable in respect to EU regulations)
- Prove of fraudulent addition of chemical markers
- Prove of man-made improvement of NPA levels
- No consensus so far on the C4 sugar issue

<u>See also:</u> A Critical Review of the Factors Available for the Identification and Determination of Mānuka Honey (Food Analytical Methods (2018) 11, 1561–1567; https://doi.org/10.1007/s12161-018-1154-9)

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Many thanks for your attention!

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