# Australian Manuka Honey - 2020

— Target species; Best Storage; How it Matures; How to Sample; Blending to an Activity and the Numbers?

Beekeepers often ask researchers at the University of the Sunshine Coast Honey Lab about the best ways to store, mature and collect honey samples for testing. The following information is to help Beekeepers successfully manage Australian Manuka Honey.

The commercial value of Manuka Honeys is due to special antibacterial properties, sometimes referred to as non-peroxide activity or NPA. This activity is due to a naturally occurring component in Manuka honeys called Methylglyoxal (MGO). It develops when bees forage on some species of *Leptospermum*. Since MGO is not present in the flowers, we tested floral nectar for dihydroxyacetone (DHA) which bees convert into MGO during honey making.

**Target species:** Not all species of *Leptospermum* produce DHA so, it is important that beekeepers know which species produce DHA and therefore the more valuable honey product. The activity and identification guide of many species studied by Dr Simon Williams during his PhD at the University of the Sunshine Coast can be found at the AgriFutures URL below. Examples of some common species and their average DHA in nectar content are also listed below:

https://www.agrifutures.com.au/product/a-beekeepers-guide-to-australian-leptospermum-trees-and-honey/

| Species | Average DHA (ppm) | Species | Average DHA (ppm) |
|---|---|---|---|
| *L. coriaceum* | 0 | *L. polygalifolium* | 8883 |
| *L. laevigatum* | 0 | *L. scoparium* | 2360 |
| *L. lanigerum* | 3433 | *L. speciosum* | 15021 |
| *L. liversidgei* | 6712 | *L. trinervium* | 0 |
| *L. nitens* | 9579 | *L. whitei* | 16568 |

**Storage:** Over time DHA converts to MGO as honey matures. Maximising the value of honey involves optimising conditions for conversion of DHA to MGO as honeys mature. The following is general advice. Note that honey composition varies, with species and co-flowering blends, acidity, water content and pollen content. All have effects on the conversion of DHA into MGO.

The rate of this conversion and the quality of the honey is influenced by storage conditions. In trials at the USC Honey Lab, young honeys with high measurements of DHA were stored at 5°C, 22°C and 37°C and tested periodically over one year to track this conversion:

- **At 5°C** there was **little change**, cool storage maintains the honey (i.e. MGO does not develop, nor does DHA decrease).
- **At 22°C** initial DHA decreased and importantly **MGO developed (increased)**
- **At 37°C** DHA decreased rapidly but, MGO after an initial small rise, **MGO levels fell**.

**Maturing:** The prolonged heating of this type of honey destroys its value. There is a point where the net conversion of DHA to MGO ceases. When the ratio of DHA to MGO falls below a ratio of 2:1, the system occurring in honey no longer supports the development and maintenance of MGO. Most honeys reach their peak value in 12-18 months with proper storage. After this, the production of new MGO is outstripped by decomposition of existing MGO, and the activity levels slowly fall. So not all DHA converts to MGO. Another consequence of prolonged heating is high 5-Hydroxymethylfurfural (HMF) levels. The take home message is: - leaving honey drums outside in the sun, or prolonged heating destroys the honey's value.

To assist in estimating the maturing of a honey, the Honey Lab produced an Activity Estimator. In this spreadsheet, the current DHA, MGO and HMF are inserted at either 22°, 37° or 65°C to see the approximate predictions out to 52, 26 weeks or 10 days respectively. Generally, when the level of MGO reaches about half the DHA level, then your honey is close to the point when MGO begins to fall. In general, is less than double the MGO, then MGO has peaked.

**Sample preparation: —** *A test result is only as accurate as the sample submitted for testing*. Knowing which honey has the potential to develop MGO means that young potentially active honey should be tested for DHA and MGO. Unless sampled correctly, the numbers generated by any testing laboratory will not represent the true value of the honey. Our lab often tests honey for a seller, then later the same honey for the buyer, only to find different results. Poor mixing before sampling is mostly the problem.

- **Use clean plastic sample containers** with a secure screw top.
- **Provide clean, well-mixed samples** — *Remove bee bits and wax from the sample*. Honey from different hives or frames vary and honey extracted into storage drums may layer from top to bottom and from the centre to the sides. Mix these layers throughout the storage drum prior to sample collection. Alternatively, use a pipe to take a diagonal core sample from the opening to the bottom of the opposite side of the drum. Collect this, mix well and then subsample to provide an average of the drum. Off-the-top-or-bottom sampling does not represent the whole drum or IBC.
- **Provide enough sample** for testing — Please **provide 50 g honey** for DHA, HMF and MGO analysis to the USC Honey Lab. In 2020, the CRC for HoneyBee Products (http://www.crchoneybeeproducts.com) continues our part of research until the end of June. The USC Honey lab will continue to test at a fee for service after June 2020.
- **Assign a unique sample code** to each sample you send in. *Clearly label this code in 3 places: - **the lid, side of sample jar and on a list**.* Check the list and labels for accuracy.
- **Include the sample list in the box of samples sent**, **include your full contact details (email address is essential)**. Keep a copy of the list for your records.

**Blending to an Activity.**

It is always best to aim for 5-10% over the desired MGO levels, and not to go below 2:1 DHA: MGO. To estimate mixing two honey is a weighted average. The final MGO is (kgs times MGO of honey1) + (kgs of MGO of honey2), all divided by the total kgs.

Eg. 350kg of MGO 263ppm+ could be blended from 150kg of 550ppm and 200kg of 85ppm: (150 x 550ppm) + (200 x 85ppm)/350 = 284ppm

**Interpreting the Honey Analysis Report**

The lab provides a report on a 3-in-1 chemical test performed on the sample provided. DHA, HMF and MGO are in ppm (parts per million). HMF (5-Hydroxymethylfurfural) is an indicator of age or heat treatment of honey and is in ppm. This helps beekeepers show that their honey has not been mistreated. Note that HMF above or near 40ppm is not accepted for import into some countries/ regions. DHA converts naturally in Manuka honeys to MGO which is the active component. The MGO value is mathematically converted to an NPA number between 0 and 25.

Estimation of NPA from MGO values

| MGO in ppm | NPA |
|---|---|
| 85 | 5 |
| 263 | 10 |
| 515 | 15 |
| 830 | 20 |
| 1200 | 25 |

This information has been provided by the team at the USC Honey Lab.

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