Australian *Leptospermum* Honey

— Target species; Best Storage; How it Matures; How to Sample 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 their *Leptospermum* Honey.

The commercial value of *Leptospermum* 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 *Leptospermum* 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. Some common species and their average DHA in nectar content are listed below:

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: 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.

Over time DHA converts to MGO as honey matures. 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 35°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 35°C** DHA decreased rapidly but, MGO after an initial small rise, **MGO levels fell**.

This means that 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 of 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.

Maturing: Most honeys reach their peak value in 12-18 months with proper storage. Stored correctly, a young honey is estimated to lose about 40% of initial DHA over a year and only about 40% of the DHA that is lost, converts to MGO so, *projected MGO = initial MGO + (0.16 x initial DHA)*. 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.

It is useful to predict when your honey is at maximum MGO levels before losses occur. 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, if DHA ÷ MGO is below 2, then MGO has peaked.

Knowing which honey has the potential to develop MGO means that honey should be tested for DHA and MGO. Unless sampled correctly the numbers generated by any testing laboratory may not represent the true value of the honey.

Sample preparation: — A test result is only as good as the sample submitted for testing.

- **Use clean plastic sample containers** with a secure screw top.
- **Provide clean, well-mixed samples** — Remove bee bits and wax. 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. Stir 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.
- **Provide sufficient sample** for testing — In 2018, the CRC for Honey Bee Products continues further research. Please provide 50 g for DHA, HMF and MGO analysis at USC; (http://www.crchoneybeeproducts.com).
- **Assign a unique sample code** to each sample you send in. Clearly label this on the lid and sample jar. Make a list of these sample codes samples you send for analysis.
- **Include the sample list in the box of samples sent**, **include your full contact details**.

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. DHA converts naturally in *Leptospermum* 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
260	10
515	15
830	20
1200	25

Contact

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CRC for Honey Bee Products – Honey Sample Form

The CRC for Honey Bee Products is supporting the Australian *Leptospermum* honey industry by providing Five free honey tests per annum to beekeepers determining the viability of apiary sites for the medicinal honey production. The testing will be undertaken by the University of the Sunshine Coast and shall provide a report of the parts per million DHA, HMF and MGO levels in the honeys.

If the five free tests are exceeded, additional honeys will be charged at cost recovery rates.

Testing requires 30-100g of well mixed honey sample in clearly labelled containers with the sample name and beekeepers name on each container with the Sample Form included.

Our postal address

Attn: Dr Peter Brooks c/o Science & Engineering University of the Sunshine Coast 90 Sippy Downs Dr, Sippy Downs, QLD 4556.

Beekeeper contact details

Name
Phone number
Address
Email address

Sample information

Sample Code	Suspected floral Sources	Location of floral source (please be as accurate as possible)	Date collected from the Hive	Approximate length of time on Hive

Note: When we report on our findings, the data we generate will be pooled without identifying specifics of your sample(s). All of the information you supply will be in confidence and will not be available to anyone outside of our research group without your permission.

For project info and honey samples, please contact: Dr Peter Brooks, pbrooks@usc.edu.au, 07 5430 2828