TECHNICAL SUMMARY

Mānuka's unique antimicrobial activity—where does it come from?

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All honey is active, and activity is known to inhibit microbial growth (Blair, Cokcetin, Harry, & Carter, 2009). In most honeys, the antimicrobial activity comes from the hydrogen peroxide content that is produced by the enzyme glucose oxidase (Mandal & Mandal, 2011). But with honeys like mānuka, we know there is another activity source that does not come from hydrogen peroxide. This activity is called non-peroxide activity (NPA).

The reason non-peroxide activity is so special is because, unlike peroxide activity, it does not break down in the presence of catalases. Catalases are found abundantly in your blood and tissues, which means mānuka honey is able to continue inhibiting bacterial growth when applied topically to wounds (Allan, Molan, & Reid, 1991).

The mānuka plant has been a part of Aotearoa New Zealand's history since long before we started producing mānuka honey commercially. Māori call the native mānuka bush a taonga or 'treasure' and have used its bark, gum and leaves for medicinal purposes for centuries (New Zealand Story, n.d.).

HOW DO WE TEST FOR ACTIVITY IN HONEY?

Total activity test

The total activity test is a basic microbiology test that will measure the total antibacterial properties in your honey. This will not distinguish between non-peroxide and peroxide activity; it will just tell you how well your honey was able to inhibit the growth of the bacteria. The bacteria that Analytica Laboratories will test your honey against is the *Staphylococcus aureus* bacteria.

Non-peroxide activity test

The non-peroxide activity test is almost identical to the total activity test, but before we introduce the bacteria, we will use catalase to remove the peroxide activity. This will leave only non-peroxide activity to inhibit the bacterial growth.

DHA and MG/MGO™ testing

For mānuka honey, Analytica Laboratories has developed testing for the phytochemicals dihydroxyacetone (DHA) and methylglyoxal (MG) that give mānuka honey its non-peroxide activity. By testing for these two analytes, we can calculate what the non-peroxide activity would be if the sample was run through the above non-peroxide activity test. We have also created a forecasting tool which allows you to forecast how the honey will mature over time in respect to DHA, MG and hydroxymethylfurfural (HMF) if stored at certain controlled temperatures.

HOW ARE ACTIVITY LEVELS MARKETED IN THE INDUSTRY?

For high-peroxide activity honey, it is common to see the total activity rating marketed on the honey pot. Examples of this include the jarrah (*Eucalyptus marginata*), marri (*Corymbia calophylla*), and kānuka (*Kunzea ericoides*) bush honeys.

Kānuka flower.

Jarrah flower.

Marri flower.

Mānuka honey will be marketed in two main ways, and it is usually based around what the market is accustomed to. Some markets understand and respond more to the **UMF™ rating**, and others the **MG/MGO™ rating**, so it really depends on where you are intending the honey to be sold.

The UMF™ rating

Mānuka honey will often be marketed with a UMF™ rating. This UMF™ number of 5+, 10+, 15+, 20+ and 25+ corresponds with its non-peroxide activity level. But the UMF™ rating is not only a proof of activity level, it is also proof that the mānuka honey has been through authenticity testing to ensure that the honey is true, monofloral mānuka and not a 'fake mānuka'.

Honey labelled with the UMFHA™ certification. All photos supplied.

MG/MGO™ rating

Commonly you will see mānuka with an MG or MGO™ rating as the higher the MG/MGO™ rating, the more non-peroxide activity the honey has. If you are concerned about the authenticity of your mānuka honey, one way to ensure this is to see if the honey was

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packed and labelled in New Zealand. New Zealand's government has strict requirements in place to prevent honey that does not meet specific mānuka chemical and DNA markers from being marketed and exported as 'mānuka'. To read more about this, visit our government's website here: https://www.mpi.govt.nz/food-business/honey-bee-products-processing-requirements/manuka-honey-testing/

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BEEKEEPING

Managing risks of tutin poisoning

Food Regulation, New Zealand Food Safety (part of the Ministry for Primary Industries) in partnership with Apiculture New Zealand

Passion vine hopper adult and nymphs. Photo: Wikimedia.

WHAT IS TUTIN AND WHAT DO I NEED TO KNOW?

Tutin is a toxin found in tutu plants which requires careful management by the honey industry.

To ensure that no one gets sick, there is a food safety limit for tutin that must be met by all beekeepers who sell honey. The Australia New Zealand Food Standards Code sets the maximum level for tutin in both honey and honeycomb. The maximum level of tutin allowed is 0.7 mg/kg.

Beekeepers need to keep a record to show how they manage tutin in their honey and provide this information to anyone extracting and packing their honey as per the Food (Tutin in Honey) Standard 2016. There are five options for showing how tutin is managed, and beekeepers can choose the option most appropriate for them.

These are:

- sending samples of all honey produced to a certified laboratory for testing before selling or distributing
- harvesting honey early. Honey from supers put into hives on or after 1 July does not need testing if it's harvested no later than 31 December, which is before the main risk period
- running the hives in a low-risk geographical zone, situating hives in the bottom two-thirds of the South Island (below 42 degrees South)
- demonstrating that tutu is not significantly present within the predictable range of bee foraging
- demonstrating how they operate in a low-risk area with a targeted testing regime.

The last person to pack the honey is responsible for ensuring that one of the options in the tutin standard has been met. It is illegal for anyone to sell honey with more than 0.7 mg/kg tutin.

New Zealand Food Safety also recommends that hobbyist beekeepers (who only produce honey for their own use) ensure their honey is safe to eat by using one of these options to show how tutin is managed. Hobbyist beekeepers may be able to join with other beekeepers to get their honey tested in a composite sample, which can save on testing costs. Beekeeping clubs may be able to assist with this.

For more information, refer to the MPI food standard Food (Tutin in Honey) Standard (mpi.govt.nz) or visit www.mpi.govt.nz/managing-tutin-contamination-in-honey/

Tutu plant. Photo: Duncan Lash, MPI.

TUTIN TESTING SAVINGS

ApiNZ members can access savings on tutin testing and other laboratory tests as part of their membership benefits. For more details, contact memberships@apinz.org.nz