Images supplied.

TECHNICAL SUMMARY

Tutin from a lab's perspective

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All New Zealand beekeepers will know about the infamous tutin due to the strict food safety rules introduced by the Ministry of Primary Industries in 2010. When your honey is sent away to be tested for tutin, what is it laboratories are looking for and what do the numbers tell you?

HOW TO ANALYSE POLLEN BACKGROUND

Tutin is a neurotoxin that makes its way into our honey when bees collect honeydew from the native tutu bush. The tutu bush is found all throughout New Zealand and our bees happily collect its *pollen*, just as they would any other pollinating plant. A bee collecting pollen from the tutu bush will not introduce tutin into the honey as the tutin comes from the sap of the bush rather than the nectar.

HOW DOES TUTIN GET INTO OUR HONEY?

Honeydew is secreted from an insect called the passion vine hopper (*Scolypopa australis*). Passion vine hoppers will feed on the sap of the tutu bush and then leave sweet honeydew secretions on the leaves of the tutu bush, which the bees forage and then take back to the hive. Most New Zealanders will know a passion vine hopper when they see one as they are everywhere!

High-risk areas for tutin are places where there are lots of tutu bushes or lots of passion vine hoppers. Places like the Coromandel, Eastern Bay of Plenty and Marlborough are specific areas of risk. The general rule to follow is to be cautious with honey collected from January to July, as this is when passion vine hoppers are most active.

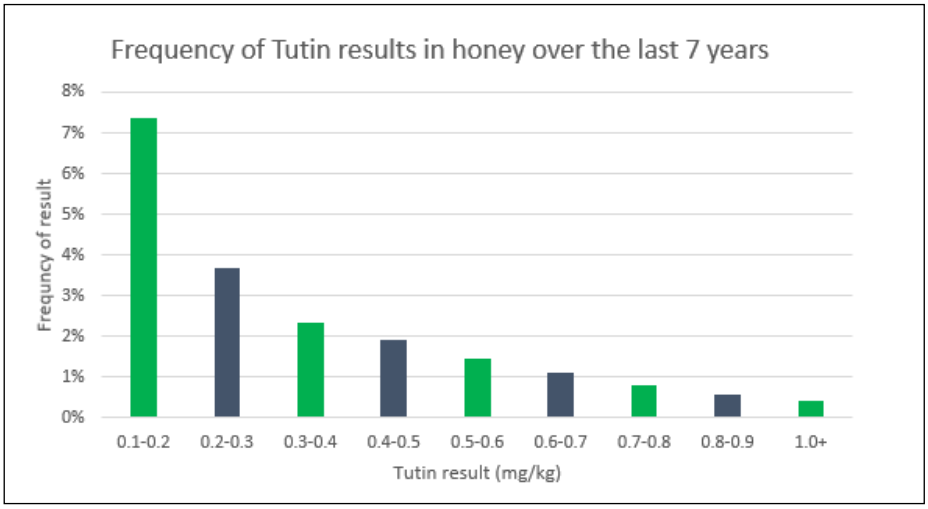
WHAT HAPPENS IF YOU GET TUTIN POISONING?

Tutin does not affect bees, but in mammals, tutin poisoning can range from mild symptoms like dizziness, all the way to seizures and even death. In 2008, a hospital in the Waikato admitted a family who were poisoned by tutin: the family experienced seizures and vomiting in response to eating comb honey with tutin present.

Tutin poisoning has even been seen to cause seizures in elephants that have indulged in the leaves of the tutu! Because of this, MPI have implemented a food safety standard for tutin, which now limits honey to having a maximum residue limit (MRL) of 0.7mg per kg for any honey that is being traded or sold. This means that all honey needs the relevant proof that it is free of tutin.

WHY DO WE TREAT HONEYCOMB DIFFERENTLY WHEN IT COMES TO TUTIN TESTING?

Testing tutin in honeycomb can be tricky. Each cell in the comb can have



different amounts of tutin. One cell could have a toxic amount of tutin in it, and the cell next to it could have none. Because of the higher risk of tutin poisoning in comb honey, the detection limit for drippings is 0.01 mg/kg. The way to submit a honeycomb sample is to send in the drippings from that frame. This allows us to get honey from each cell in that frame.

WHAT HAVE THE LAB RESULTS SHOWN US?

Thankfully, over 80 per cent of the honey we have tested for tutin has returned a result of less than 0.1mg/kg of tutin. This is seven times lower than the limit set by MPI. In the graph opposite, you can see how rarely we tend to get honey that has a tutin result higher than 0.1mg/kg, but even though it is rare, we have seen our fair share of high results. The highest tutin result we have recorded in our system is a result of 74mg/kg, and I think most beekeepers would agree that this honey would be best fed back to the bees!

CONFIDENCE IN TEST RESULTS

Analytica will not report any result that we are not confident in. As with other Recognised Laboratories, we have many quality controls and checks in place which minimise the risk of human error and make for a reliable test method. In order for us to perform our tutin test, we must be regularly audited by International Accreditation New Zealand (IANZ) on behalf of MPI. MPI must also confirm that we are authorised as a Recognised Laboratory. Carrying out the test under the requirements of the Recognised Laboratory Programme gives our clients and MPI confidence that this test result has been performed to a market standard.

Analytica has also gone the extra step and introduced a "may not comply" result. A "may not comply" on your test report means that your result is so close to the MRL of 0.7mg/kg, that with the natural variability of chemistry tests, the **true** result could be above the MRL. To give an example, if the tutin test had a variability of 16 per cent, and we provided a result of 0.65mg/kg of tutin, we would report this as a "may not comply" rather than a pass. This is because the **true** result could be anywhere between 0.55-0.75mg/kg.

HEALTH AND SAFETY

Managing risks of tutin poisoning

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

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.

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. 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.

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 information: https://www.mpi.govt.nz/dmsdocument/11137-Food-Standard-Tutin-in-Honey-

WHAT IS NEW ZEALAND FOOD SAFETY DOING ABOUT THE RISKS OF TUTIN?

New Zealand Food Safety began research in 2020 investigating the potential impact that climate change will have on the life cycle and the distribution of passion vine hoppers (*Scolypopa australis*). This work was delayed by the COVID-19 response, but we will soon be able to publish the findings.

The indication from the investigation so far is that a warming climate is likely to have an effect on the distribution and seasonal emergence of passion vine hoppers. We now want to investigate whether we are likely to see an earlier appearance of nymphs, and whether PVH may spread to areas outside their main range.

New Zealand Food Safety is currently developing the next stage of research, which will involve field research with a focus on the life cycle of passion vine hoppers and their current range. We envisage that the data we collect will assist with determining if the Food Standard: Tutin in Honey 2016 needs to be reviewed. Any review will focus on options two and four, of the five options for tutin management, which are related to the life cycle and distribution of the PVH. We will be providing updates to industry as this work progresses.