TECHNICAL SUMMARY

Diastase: you may want to get a test!

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Given current conditions in the honey industry, a lot of people still have honey sitting around and it has likely been sitting there for a lot longer than expected. With the correct storage conditions, honey can be stored for a long time without any issues, but if your honey has been stored in uncontrolled or hot conditions, you may want to get a diastase test.

Photos supplied.

WHAT IS DIASTASE?

Diastase is an enzyme that bees use to turn nectar from a complex sugar to a simple sugar. A simple sugar is better for storage in the hive and better to feed to the larvae. Diastase, otherwise known as α-amylase, does not instantly leave the honey once it has done its job of converting sugar, but over time the enzyme will degrade out. Because this enzyme stays in the honey and degrades over time, people use the diastase activity result as an indicator of honey freshness. Honeys with high methylglyoxal (MG) and 3-Phenyllactic acid (3-PLA) levels have been found to have lower levels of diastase activity, so if you have a high-grade mānuka, you may want to keep a close eye on your diastase activity.

Diastase is often checked by honey buyers around the world, and they will usually refer to CODEX (Codex Alimenarius Commission, 2001). CODEX states that a fresh honey that has not been exposed to excessive heat will have a diastase activity of no less than 8 Schade (DN) units. There are some honeys that have naturally low diastase activity, lemon honey for example, and the minimum DN for these honeys is 3 Schade units. The Schade method and other methods are explained in the next sections.

WHAT ARE THE DIFFERENT METHODS AVAILABLE?

There are three different methods of diastase testing available. All three tests measure diastase activity and produce a result in Schade (DN) units. The tests work by adding a substrate to the honey and then measuring the speed at which that substrate is degraded over a set amount of time. The main difference between the methods is the substrate that is added to the honey (QSI Germany).

THE SCHADE METHOD, ESTABLISHED 1958

The Schade method was the first method developed for testing diastase activity and continues to be the recommended method in some laboratories. This method is quite hands on; that is, it requires more manual handling compared to the Phadebas and the nitrophenol methods. This method adds a starch substrate which is not only broken down by α-amylases, but also by β- and γ-amylases which are naturally found in honey at low levels. β- and γ-amylases are therefore measured in the Schade method.

THE PHADEBAS METHOD, ESTABLISHED 1975

The Phadebas method is the method that Analytica Laboratories provides in-house and is the method that most mānuka honey is tested with. This method is great for our commercial lab since it allows us to quickly test hundreds of samples for diastase a week. This test works by adding a modified starch to the honey solution which targets *mainly* α-amylase. This method was created by the team at Phadebas AB in Sweden and uses a pill-like substrate that has better precision, fewer steps, and is less time consuming than the Schade method.

THE NITROPHENOL METHOD, ESTABLISHED 1998

The nitrophenol method is the newest method and this test works by adding the substrate *4,6-Ethyliden(G7)-*

1[4-nitrophenyl(G1)]-1,4-α-D-maltoheptaoside, or 4-nitrophenyl for short. This compound is highly selective and will only be broken down by the honey specific α-amylase.

WHY WOULD YOU CHOOSE BETWEEN THE METHODS?

This is completely up to the agreement between the honey owner and the buyer. New Zealand laboratories only offer the Phadebas method, so this method will be both cost- and time-effective for New Zealand-based owners. Laboratories in other parts of the world offer a different method as their standard diastase method. Some labs offer a honey-foreign diastase test that will allow people to know if their honey has been adulterated with honey-foreign amylases. This could be an option if you think your honey has had amylase added to increase the 'freshness' on paper.

THE RELATIONSHIP BETWEEN MĀNUKA HONEY AND DIASTASE ACTIVITY

The relationship between mānuka honey and diastase activity is important to understand, as mānuka honey usually gets stored for a decent period of time before it is processed and sold. Mānuka honey owners should keep a close eye on their honey's diastase levels while it is in storage because high MG and high 3-PLA honey has been shown to degrade faster than other honeys, for a reason we have not yet determined.

REFERENCES

Bell, Amber. Research poster: A Sticky Situation: Low diastase activity in mānuka honey.

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Science Symposium continues to grow

Ashley Mortensen, Evan Brenton-Rule, John Mackay and Phil Lester

A broad range of information was shared at the 2022 Science Symposium: from research on controlling varroa to biological control agents for wasps to breeding better bees.

June 2022 saw the first Matariki public holiday, the annual ApiNZ Conference, and the third New Zealand Science Symposium.

The symposium, supported by MPI, Victoria University, dnature, Plant and Food Research, and ApiNZ, was an exciting time for 100+ beekeepers and researchers to connect and discuss bee research across the motu. There were 24 presentations, 14 of which were given by graduate students, representing the tremendous growth in diversity and expertise that we are seeing in the field.

The breadth of information shared ranged from a new tool called the "New Zealand Bee Pollen Catalogue," to the release of biological control agents for wasps, and the genetic heredity patterns in honey bees.

Damien Fèvre from AbacusBio Ltd talked about how the nutritional status and the genetic effects are of primary importance for 'breeding a better bee' in New Zealand. Damien was a runner-up for the Best Student Talk award. Amber Bell from the University of Waikato also gave a prize-winning talk on her work on investigating low diastase activity in mānuka honey.

The Best Student Talk award went to Rose McGruddy from Victoria University of Wellington. Her talk was on the use of RNAi as a novel control method for the honey bee parasite varroa. Rose's data indicated that this approach can substantially reduce mite reproduction within beehives. Field trials for this control approach are being planned.

The symposium ended with a new element: the *Industry Insights* session, where beekeepers shared perspectives on industry concerns, needs and aspirations. As expected, varroa was front of mind and presentations earlier in the day spurred ideas such as controlling varroa with viruses that kill varroa but not bees. There were also discussions about how industry could increase the direct benefits realised from research.

The key themes and topics of the Industry Insights section are highlighted in the following table.

Theme	Topic
Varroa	Investigate colony death after seemingly successful varroa treatment
	Identify/remove barriers to beekeepers providing effective varroa control
	Evaluate the efficacy of commercially available miticides
	Alternative controls (are there viruses that kill varroa but not bees?)
	Regional coordination of varroa monitoring and control
Other	Improved genetics for queens/breeding
	Profile the toxicology of surfactants
	Understand patterns of viral transmission between bees
Collective Action for Industry	Establish research priorities
	Co-funding for applied research (NZ Honey Industry Trust) available
	Increase connectivity/communication within the industry

The New Zealand Science Symposium has grown each year and we are already looking forward to next year. One suggestion was to incorporate the Science Symposium as a registration option alongside the main industry conference. Poster presentations are expected to be added to the symposium programme next year to maintain accessibility and opportunity for anyone eager to share their bee-related research.

Thank you again to all attendees, presenters, organisers, and supporters of the third New Zealand Science Symposium.