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Apiarist's Advocate

News, Views & Promotions – for Beekeepers – by Beekeepers

Adulteration Investigation

Why New Zealand honey is being deemed "suspicious" in international markets & is it fair?

Can Mānuka Honey Avoid the Tait of 'Adulteration'?

Honey adulteration, usually through the addition of sugar syrups, is a major threat to honey producers all around the world, including Kiwi beekeepers. Recently a project by the European Union (EU) identified 46% of honey samples imported, from 21 different countries, as suspected to have been adulterated, seemingly putting a figure on just how bad the problem is. Included in the testing were five New Zealand honeys, three of which failed the EU regulations. So, is New Zealand honey part of the problem or the solution? And why does one leading scientist think our honey industry could be doing much more to help itself.

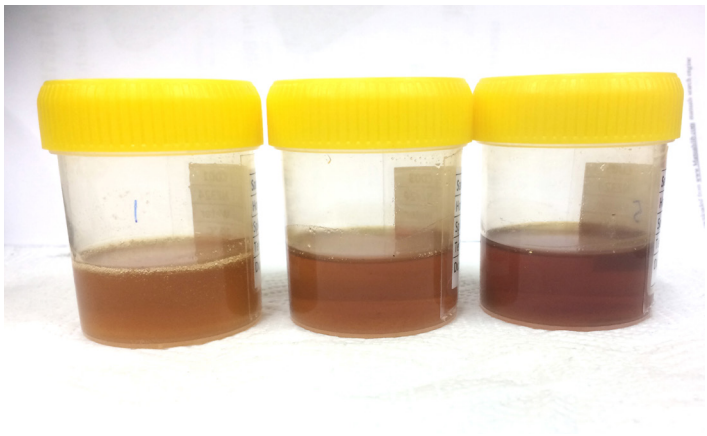
In total 320 samples were tested by the European Commission as part of their 'From the Hives' multi-year action into honey fraud. Of them, 147 (46%) failed to meet the requirements of the EU Honey Directive and thus were deemed "suspicious". Those behind the investigation say, for the most part, adulteration with sugar syrup to extend the 'honey' was believed to be the most frequent type of fraud, but there were instances of "false origin" on labels too.

By far the most samples tested were said to originate in China or the Ukraine. Three-quarters (66 of 89 samples) of the Chinese honey was deemed suspicious, while 74 Ukraine samples were tested, with a much lower rate of 13 suspicious. All 10 United Kingdom honeys failed.

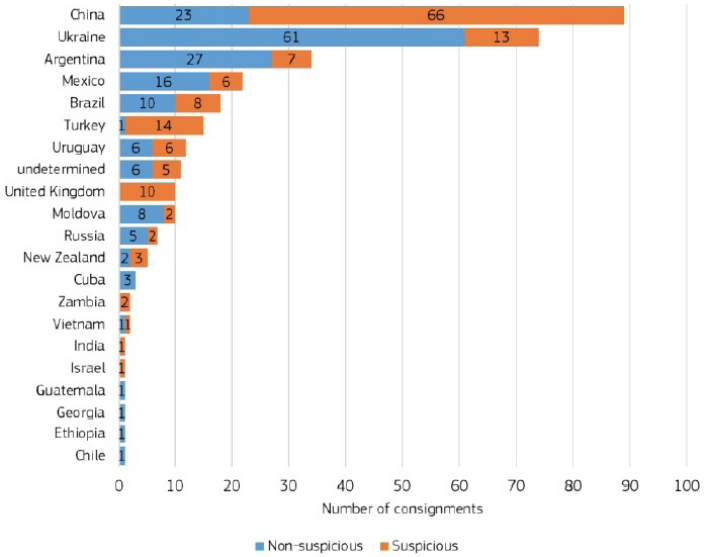
While the sample size of honey tested from New Zealand is small, with three of five failing, it's the sort of publicity that is best avoided, says long-time exporter to the EU, John Hartnell of Hartnell and Associates.

"It would obviously be good if we didn't appear on this list, but New Zealand sells a lot of manuka honey in to Europe and that is where the potential issue is," Hartnell says.

The global issue of honey adulteration has been in the spotlight for a number of years now and New Zealand mānuka honey was even highlighted as having elevated C4 sugar levels in a Hong Kong Consumers Council sting as far back as 2013.



New Zealand mānuka honey is failing the EU's AOAC C4 sugar screening test – but can they be convinced the method is not an accurate sign of adulteration? Or, will Kiwi honeys continue to fall foul of stings such as the recent From the Hives study and suffer the resulting bad publicity?



The results from the European Commission's From the Hives project to detect suspected honey adulteration.

Therefore, Apiculture New Zealand (ApiNZ) chief executive Karin Kos says they have not been surprised to see such a study as performed by the EU.

"We are concerned if we see NZ honey pop up in a list concerning adulteration, but there are other factors at play and we shouldn't read too much into it or draw any conclusions from it" Kos says.

WHY THE SUSPICION?

While the EU study does not offer details on where in the Honey Directive samples failed, Hartnell believes in all likelihood it will be the C4 sugars test – but in manuka honey's case that doesn't mean it has been adulterated. There is a long held belief in New Zealand that mānuka honey has naturally elevated levels of C4 sugars and returns 'false positive' results to the common C4 test, with Waikato University's Dr Megan Grainger authoring a study in 2014 titled *The Unique Manuka Effect: Why New Zealand Manuka Honey Fails the AOAC 998.12 C-4 Sugar Method.*

"My recommendation is that evidence points to the fact that there is something seemingly unique going on with mānuka honey and the current AOAC C4 method is not a good indication as to authenticity," Grainger says.

"This survey just says they are 'adulterated', but I would assume they are testing C4 using the AOAC test. Those honeys would have been tested off the shelf and could be six or 12 months old. In that circumstance, we know mānuka will naturally have elevated C4 levels. Our research suggests there is a chemical rection occurring, so it will keep changing."

Grainger, who also sits on ApiNZ's Science, Research and Focus Group, conducted a literature review for the Ministry for Primary Industries (MPI) into understanding the relationship between mānuka honey and elevated C4 sugar levels last year. Her review suggested the New Zealand honey industry would be best served by promoting alternate testing methods for their honeys, such as chemical profiling.

"If New Zealand goes to a chemical method of testing, unless everyone around the world, including the EU, accepts it, then we are still going to get caught up in stings like this latest release," Grainger points out though.

And C4 sugars might be the major area of concern, but New Zealand honeys, and notably mānuka, also struggle to meet standards for the enzyme diastase in the EU as well. That issue was highlighted on the world stage when nationally award-winning Kaimai Range Honey samples from New Zealand were red carded from the Apimondia World Honey Awards in 2019 (as detailed in the October 2019 issue of *Apiarist's Advocate*).

Dr Megan Grainger. The Waikato University scientist believes the New Zealand honey industry should be doing more to try to improve the perception of mānuka honey internationally.

Grainger is also seeking to tackle the diastase issue for New Zealand honeys with her research, and is nearing completion of a study, funded by The Experiment Company and Callaghan Innovation, she says proves that mānuka honey more readily fails diastase tests as the diastase disappears faster in mānuka than other honeys.

"It looks to be a combination of the 3-phenyllactic acid (3-PLA) in mānuka initially and then, over time, the MGO also contributes. It makes perfect sense, because MGO cross-links to proteins and, guess what enzymes such as diastase are – proteins.

"The MPI mānuka honey standard requires at least 400mg/kg of 3-PLA, but if that is driving the diastase to decrease, then what chance do we have? The international methods are flawed for New Zealand honey."

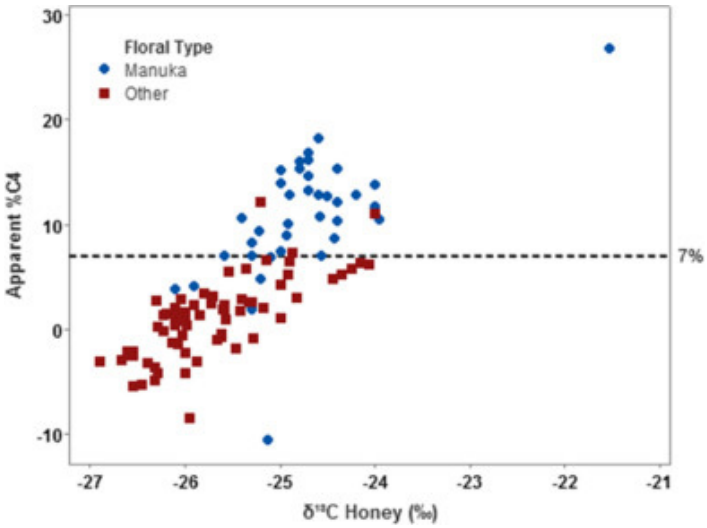
IS THERE A SOLUTION?

Grainger says, at this stage, she is sceptical the likes of the EU are going to adjust their standards for "a little country at the bottom of the world who claims their honey is special", but one exception has been made to the international food standard 'CODEX' to allow a citrus honey, which has a naturally low diastase.

"The C4 testing doesn't work, the diastase testing doesn't work, but this is just for mānuka. How are we going to convince the rest of the world that, actually, we are not bad beekeepers, there is merit to what we are saying, and they need to change their regulations to support what we see in our honey? It's a tough one, because it is hurting our industry," the Waikato University scientist says.

Tough it may be to overturn the regulations of a behemoth of a trade block like the EU, but if the New Zealand honey industry is to have any chance there are some things that could be done, Grainger believes.

"In these kinds of cases, we all have to be publishing. It's no good only myself, Karyne Rogers, Merilyn Manley-Harris, Terry Braggins and Russel Frew publishing. Overseas they will think we have an agenda. It needs to be picked up by as many people, showing the same results, as possible from a large number of samples."



Results of manuka honey (blue) against NZ non-mānuka honey in C4 lab testing, with the dotted line the 7% limit to pass the test, showing only five of 38 mānuka samples passed, compared to 67 of 73 non-mānuka. Source: C4 sugar adulteration methodology: Understanding false-positive results for mānuka honey (M Grainger).

One study that could assist New Zealand's argument is research into diastase levels in New Zealand honey led by Braggins in 2020. Members of ApiNZ and the Unique Manuka Factor Honey Association helped fund that work, but it is yet to be published, limiting its credibility.

Kos says the fact that work is there provides some credibility, but the aim is to have it published. As far as more research goes, she believes, industry needs to take responsibility.

"Diastase and C4 sugars have been on the radar for a while now. They deserve some research, which requires funding, which requires an industry-wide commitment. Even getting the funding for the diastase research took quite some time and effort," Kos says.

The ApiNZ chief executive has an ally in Grainger there too.

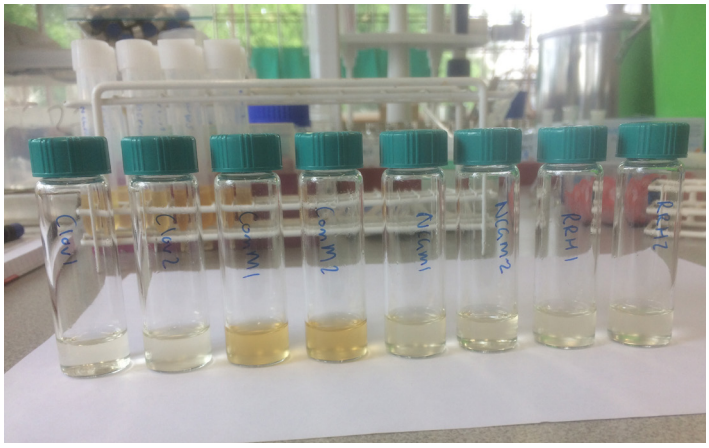
"I don't think there has been enough done and, I hate to bring this up again, but we don't have a levy to help fund this research. I am funding some of this work from my own research account," the Waikato scientist says.

Further to that, there is more the honey industry could be doing to aid research and improve the international reputation of New Zealand honey, simply by being more open with data to assist researchers.

"The more data from numerous beekeeping operations, the better. That starts with the big guys, who are testing every single batch and collecting harvest dates, mānuka markers to prove it's mānuka, HMF to prove it is fresh, then the diastase levels to show how variable it is," Grainger says.

"It is important to have a wide range of data to analyse, to determine trends. The more data points you have, the nearer to the true value you end up. I think it would then be a powerful document to show to the EU if we could pull together all the data that is out there in New Zealand.

"Right now, we are saying 'we have a problem'. But until we get the collective might to prove it is not just a dodgy beekeeper, the EU will think the later."



Honey samples awaiting diastase testing in research at Waikato University funded in large part by The Experiment Company – one of few private backers to New Zealand honey research.

So, while the explanation of 'false positive' is given for three out of five New Zealand honey samples being deemed suspicious in the EU study, that cry has now been made for over 10 years without carrying weight in the international market place. That fact is something Grainger's 2022 report to MPI makes clear.

'Firstly, the reputation of the industry may be threatened due to the implications of media coverage when failed batches are exposed,' the report states, adding, 'This could have a flow on effect that impacts demand for mānuka honey overseas, and result in a decrease in the value of the honey.'

Through Good and Bad – The Rawsons' Five Generations of Beekeeping, Business Survival and Diversification

To survive and evolve through beekeeping for over 100 years and now into a fifth generation a business must be adaptable, reacting accordingly to their environment. Whitestone Honey Ltd has proved that and, in the face of depressed honey prices, they are heeding the issue and undertaking pollen production, bees for live export, pollination, queen sales and even venom harvesting. Maggie James looks around the 3640-hive Oamaru-based operation with owner Shane Rawson and chats with his skilled team about their varied tasks.

BY MAGGIE JAMES

Shane Rawson is a hands-on owner-operator, and there is plenty to do. Whitestone Honey has plant based at Oamaru in North Otago and 46km further north in Waimate, South Canterbury. Will Sillibourne has been with the business for eight years and recently became a shareholder. Together they head a tight-knit staff of five at the Oamaru base, with Shane's brother, Craig Rawson, overseeing Waimate operations.

The Oamaru team expands to eight – usually with the help of backpacker labour – during peak-season. But, for the most part, it's a team of Shane Rawson and two daughters, Madisyn (19 years-old) full-time and Skyla (16) part-time, Sillibourne, Tim Burton and Graham Selman getting around the hives, which span South, Central and North Otago to South Canterbury.

Key members of the Whitestone Honey team in Oamaru. From left, Tim Burton, Will Sillibourne and Shane Rawson. Photo: Maggie James.

"We have always sold honey, we have never had high prices, but I pride myself on running a family business well," Shane Rawson says.

"We must be a positive forward-thinking company, always thinking as to how we can make things financially better and sustainable. Unfortunately, with the challenges we face today, it is touch and go whether the beekeeping industry is financially viable."

GENERATIONS IN THE MAKING

For the past 22 years, Rawson has headed his own beekeeping business and rode the highs and lows of the industry. The skills and knowledge to do that may just be in the blood though, with Shane the fourth consecutive generation of his family to keep bees in the region and now passing on knowledge to his children. Shane's great-grandfather Alfred Rawson, having been gifted four or five hives as a wedding present in 1920, worked bees in the weekends and eventually built up to around 45 hives.

Alfred gained employment at an iconic local project – the building of the Waitaki Dam for hydroelectric generation. The project provided employment for 1200 men, using picks, shovels and wheelbarrows in the era of the Great Depression, between 1928 and 1934.

Alfred's son, Jack Rawson, grandfather of Shane, also kept bees and his business survived through some tough beekeeping years in the '50s and '60s when government restrictions on honey sales crippled many operations.

By the time of the late 1960s and early '70s, Jack's sons Allan, Bob and Bruce had got hives of their own and, merging with their father's 300, they took the family beekeeping business to the next level. As a trio they ran 3000 hives, 1000 in South Canterbury, 1000 in North Otago and another 1000 further south in Heriot, the site of disaster for the business in the '70s.

The Heriot honey house succumbed to fire with the effect worsened by the industry having suffered low honey prices for the past three years at the time. The outcome, 1000 hives in South

Canterbury were sold and Allan began work as a coach mechanic, while brothers Bob and Bruce managed the remaining 2000 hives.

The beekeeping-urge clearly never left Allan though, and 25 years later, in the 1990s when clover honey was paying $2.95/kg, he bought out an Oamaru beekeeper with 400 hives and Shane Rawson's father was back in business.

In 2001 Shane and his cousin Grant would become the fourth generation of their family to tend hives in the district when, at a local meeting of the National Beekeepers' Association, the branch president announced that, now varroa had arrived in Auckland, he would exit the industry. There and then the cousins took on half of the fleeing beekeeper's business each. As recently as last year Grant was still running 700 hives as Ardgowan Apiaries but, when a vehicle accident tragically took his life, Whitestone Honey took over the hives.

COME IN WILL

For the past eight years Will Sillibourne has worked with the Rawsons. He came to the region with extensive experience, having started out in the industry in Te Puke helping with honey extraction outside of school hours. For 16 years his family held a half share in a business there, before a move to Southland and now Oamaru, where he recounts an early meeting with Rawson.

"When I first met Shane, he said he had some good sites he could give up to me straight away! My query was, 'why are you giving up sites?'. And the reply? … 'argh, because they're no good'!"

The sense of humour was obviously not lost on Sillibourne and now he counts himself a shareholder in Whitestone Honey and a key cog in making the multi-faceted business tick.

Beekeeper Will Sillibourne has been with Whitestone Honey in Oamaru for the past eight years, following extensive beekeeping experience in Bay of Plenty and Southland.

HIVE SETUP

Rawson and his team are clearly passionate about what they do and speak freely about some of the techniques and tactics they use to make their hives as productive as possible.

Single brood boxes are preferred, to make AFB checks quicker and easier. Hives are four per pallet, to assist hive movements – which are mainly required for cherry pollination in spring. Inside the hive, they are moving away from wooden frames towards plastic.

HONEY PRODUCTION AND DAY TRIPPING

Honey varietals produced comprise mainly clover, pasture, kanuka and canola. The honey is sold in bulk, with canola kept back to support live bee shipments.

This past season, due to costs and the sporadic Westland rata and kamahi flows of the previous three seasons, Whitestone decided not to move hives that far west. Murphy's Law prevailed though and there was a good kamahi flowering not taken advantage of.

Hives traditionally moved into South Westland are those which have been pulled off cherry pollination. At this time of year (late spring) the 'migratory team' of Rawson and Sillibourne get a day trip to Haast – six hours there and six back, with eight hours work in the middle!

They also produce some comb honey, which is trucked to a Mid Canterbury beekeeper for cutting and packing.

CHERRY POLLINATION

The growth of cherry orchards in Otago in recent years has been extensive and Whitestone Honey play a key role in the flourishing industry. Yearly, in the second half of September, 500 full depth double brood-box hives are moved to Cromwell, Central Otago, for cherry pollination – the only time of the year double brood boxes are used. The aim is for a 14 day stay, but in the last two years, due to weather not suitable for bee flights, these have been 21-day contracts.

Cherries are a poor source of pollen and nectar and, combined with net cover for about half the hives, the colonies must be extremely strong. They go in with a supplemented liquid protein as well as a pollen patty, having previously foraged on excellent pussy willow nectar and pollen. During this contract the landowner does not mow grass, which is under run with dandelion to provide highly nutritious pollen and nectar towards contract end. The hives do come out strong, but not as strong as they went in, Rawson says.

Once off the cherries the double brood boxes are split. The old queen is knocked on the head and both boxes are requeened with Italian stock, one with an emerging queen cell, the other a mated laying caged queen. If honey production in Westland is to be undertaken, these split hives will be utilised in that region.

LIVE BEE SUPPLY FOR EXPORT

During the current honey industry recession the live bee export market has been a Godsend to Whitestone, who supply live bee exporter SJA Honey, based in Northern Auckland.

"In January we start sending caged mated laying queens, via NZ Post, to our bulk bee buyer who banks our stock. Then from 20 February to 20 April our bulk bees are sent. The weekly goal is 150-200 kg. From all hives, bar 800 odd, we start pulling as much as

Another 15kgs of bulk bees set to go for export to Canada. Bulk bee supply, undertaken from February to April, has provided an important revenue stream for Whitestone Honey during the current honey industry downturn.

2kg per hive. Two days prior, miticide strips have been put in these 'donor' hives," Rawson explains.

Generally, Whitestone rely on visual inspection to assess varroa. However, when it comes to their export bulk bees, donor hives undergo alcohol washes at the time of bee-harvest, and levels are recorded.

The bees are transferred to brand new "bins", the equivalent size of three full-depth honey supers, in which they will ultimately travel with miticide strips. Each hold 15kg of bees, which must be kept alive for their 96-hour journey, first via road and ferry to Auckland, then aeroplane flight to Canada. The middle box also holds three or four full-depth frames of canola honey, and four bins fit to a pallet. Until the bins are transferred to a chiller truck in Christchurch, they are sprayed twice daily with water to cool them off.

POLLEN PRODUCTION

As if the honey and bulk bee harvest wasn't enough to keep the hard-working Whitestone Honey team busy, they are also one of New Zealand's major pollen producers. From 1500 of their hives they can produce 15-20 tonne of pollen a year to a buyer who supplies health foods, with lower grades going into bird feed mixes.

Pollen trapping and collection is an important part of the diverse Whitestone Honey operation and nearly half of their 3640 hives are fitted with traps each season.

"This production does impact on our honey crop. We trap all season with a diverse continuous supply of pollen," Rawson says.

About thirty years ago, when Shane's father got back into beekeeping he designed a trapping system which he honed over the next 10 years, still in use by his sons today.

Twice weekly, in season, the pollen team of Tim Burton and Graham Selman will empty the traps, colour coding the pollen as they go. Once dried and cleaned it is poured into cardboard A4 storage boxes, simply marked with a pen 'B' (for brown), 'Y' for yellow, etc, and sent in batches of one tonne so the packer can colour and homogenise to their preference.

With valuable pollen being taken away from the bee colonies, in May the hives receive outsourced high protein pollen supplements to prepare them for winter.

BEE VENOM

In the past more extensive bee venom harvesting has been undertaken by Sillibourne to be sold for use in beauty products. However, currently only 5-10gm per year is produced.

VARROA LESSONS

Varroa was first detected in New Zealand in 2000, but it wasn't until 2010 that it reared its ugly head in North Otago. At the time Rawson found himself with difficulty attempting to obtain information on the mite. Fortunately, Whitestone had been supplying nuc colonies for kiwifruit pollination to Mark and Sheree Silson, KiwiCoast Apiaries, at Katikati, to whom Rawson is grateful.

"Without this couple we would not be here today," he says frankly.

"The Silsons taught me the beekeepers' side of varroa and treatment, and I was able to learn about the difficulties they had faced."

Over a decade on, Whitestone use only proprietary manufactured miticide strips and, to date, they have done the job well. This is aided by minimal migratory beekeeping, plus their queen bee rearing operation having brood breaks. Due to the broodless period, they find that their hives do not have virus overloads.

Conditions appear to work in their favour regarding other pests too.

"We don't get giant wax moth – it's too cold here, particularly with the southern Pacific Ocean wind, and when small hive beetle arrives in New Zealand, I hope that it will also dislike our climate!" Rawson says.

While that may be the case, it is obviously a climate the Rawson family have found to their liking, for seven generations since 1862, and there's more to their beekeeping story too. So, next month we head 46km north to Waimate, to visit Craig Rawson and the Whitestone Honey extraction plant and queen bee rearing operation.

To discuss any aspect of this story with Shane Rawson email shane@whitestonehoney.co.nz

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Beekeepers Invited to Have a 'Day Out' in Canterbury

While Apiculture New Zealand's (ApiNZ) national conference in Rotorua in June is once again set to be the most well attended event on the New Zealand beekeeping calendar, South Island beekeepers will have the option of getting together closer to home this month in a similarly-shaped gathering.

Following successful events in previous years, the ApiNZ Canterbury Hub is once again hosting their Beekeeper's Day Out at Lincoln University in Canterbury, Sunday May 21, and inviting all beekeepers, with many hives or few, to attend. With finances pinching many beekeepers, it will likely prove a welcome alternative to travelling north to the national conference for some.

The one-day event in the Stewart building of the university will act as a type of mini-conference, with a trade display area, spot prizes, silent auction and a programme of presentations and speakers across a range of topics including; honey bee health, honey market updates, sustainability in beekeeping, American foulbrood (AFB) management and even beekeeper health.

"With the national conference being held in Christchurch last year, we didn't hold the Beekeepers' Day Out," organising committee member Carolyn McMahon says.

Attendees to the 2021 Beekeepers' Day Out at Lincoln University gather in the trade display area. This year's event, May 21, will follow a similar structure of expert presentations, industry updates, trade displays, catered food and spot prizes.

Dr Phil Lester of Victoria University of Wellington will update beekeepers on some of their latest work on controlling varroa populations using 'gene silencing' on May 21 at Lincoln University.

"So, it's been a few years and we are hoping for a good turnout. The interest certainly seems to be out there, driven by some major issues affecting our industry – honey prices, varroa management and bee health, in general, being at the forefront of beekeepers' minds."

Similar events in previous years at Lincoln have been well attended, with about 120 people attending the Beekeepers Day Out in 2021. So, the structure of this winter's event will be much the same as those before.

Among the speakers at the May 21 gathering will be Dr Phil Lester, who will detail one of Victoria University of Wellington's latest research projects.

"We have been working on a new approach to varroa control in beehives," Lester explains.

"Our approach uses a technique called 'gene silencing', which in this case targets and inhibits mite reproduction. I'll discuss results from our laboratory and field trials where our results are encouraging."

Canterbury beekeeper James Malcolm is also scheduled to speak about his Natural New Zealand Honey business's efforts towards sustainability and what beekeepers can do to operate more sustainably. ApiNZ policy analyst Phil Edmonds will provide an update on the Honey Market Strategy programme which is nearing a conclusion, while industry groups Trees for Bees, Betta Bees, the Christchurch Hobbyist Beekeepers' Club and the AFB Management Agency are also be on the 'bill', amongst others

One of those others is Josh Komen, a former top New Zealand middle-distance runner and cancer survivor, now motivational speaker, who will address attendees about embracing challenges and "sparking hope".

"Mike King was well received at the national conference last year when he spoke about mental health. So, with Josh, we will break up some of the beekeeping presentations with something a bit different, but still of benefit," McMahon says.

The event will appeal to anyone with an interest in beekeeping, both commercial and hobby beekeepers, the organiser believes, and she encourages the beekeeping community to attend, learn and be heard.

The Beekeepers' Day Out runs from 8.30am to 5pm, tickets are $75 for ApiNZ members, $85 for non-members, and include catered morning and afternoon tea and lunch. More details and tickets available at www.apinz.org.nz/clubs-and-hubs/canterbury-hub.

MPI Seek Extended Use of Neonicotinoid

An application by the Ministry for Primary Industries (MPI) to extend the use of a neonicotinoid insecticide fatal to honey bees has drawn opposition from New Zealand Beekeeping Inc (NZBI), who cite concerns to both honey bees and native insects.

Brown marmorated stink bug, a serious biosecurity threat, and one MPI wants to have greater resource to fight in the case of incursion.

Brown marmorated sting bug (BMSB) is one of the highest-risk biosecurity threats currently facing New Zealand, as it can cause significant damage to many important horticultural crops. It is also a significant social nuisance pest that can adversely impact personal wellbeing. Therefore, MPI is looking to beef-up its incursion response with an application to the Environmental Protection Authority (EPA) to reassess the use of Actara®, a registered insecticide with the active ingredient thiamethoxam.

The application seeks approval to make changes to its use in biosecurity emergency situations, by increasing the number of applications allowed per year from four to 19 and allowing the use of Actara where bees are foraging on plants that are in flower or likely to flower within an incursion response scenario.

NZBI, among others, has opposed the application, citing concerns for the beekeeping environment.

"Indiscriminate application of chemicals is likely to have a detrimental effect of bees it contacts or bees that forage on the plants the spray contacts … We also consider the use of Actara in the manner envisaged by this application will have detrimental effects on other insect life, including native and endangered insects," an NZBI submission to the EPA states.

Fellow industry body Apiculture New Zealand (ApiNZ) met with MPI in 2018, prior to the application being made, and recognised the need for an effective incursion response against BDSM. During that meeting, potential mitigation options, such as moving managed colonies away from areas of Actara application, were discussed.

During a panel discussion on the application on March 30, MPI noted there are no known established populations of BMSB within New Zealand. However, it is intercepted at the border on a "very regular basis" and thus an organised incursion response plan, including wider use of Actara, will likely be needed in future.

NZBI have also recognised the need for the best possible response, but requested that any extended use of Actara be limited to areas of identified incursion only, and that if hives are required to be moved out of such zones, then there be a plan put in place to provide compensation to beekeepers and potentially growers if pollination is compromised. They are also concerned the extended use of Actara would amount to "certain damage" to honey bees, while providing "uncertain success" in containing BMSB.

Actara, a neonicotinoid insecticide with the active ingredient thiamethoxam, already registered for use in New Zealand, but under constraints which MPI want lifted in times of emergency biosecurity response.

A decision making committee of scientists Dr Andrea Forde, Dr Phil Lester and Dr Kerry Laing is considering the application. No timeline for a decision is in place.

MPI's application has been supported by Horticulture New Zealand, Federated Farmers, New Zealand Winegrowers and Ngāi Tahu, and was opposed by GE Free New Zealand as well as NZBI.

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The Problem with MPI

Following honey industry complaints about the Ministry for Primary Industries' (MPI) processes last month, experienced bureaucrat and apiculture industry advisor Ian Fletcher explores some of the workings of MPI. He explains, while the government department may have its shortcomings, it's not alone in the world of such organisations, be they publicly or privately run.

BY IAN FLETCHER

This week I was planning to write about an aspect of beekeeping (a topic I usually shy away from, as I'm not a beekeeper, and I assume most of you are). NZ Beekeeping Inc, which I help on government stuff, has been waging a long campaign on behalf of those smaller beekeepers who only extract part-year to be able to have their RMP audits conducted annually rather than six monthly – cost saving and time saving too. It's been largely unsuccessful so far (although everyone agrees it's a good idea). Frustratingly, beekeepers are often told they must complete various training courses to qualify, as well as having a good RMP history. Courses are not compulsory, we are told, it's just they're always required.

As part of this protracted campaign MPI recently answered an OIA request on RMPs, levels, and non-conformances. It showed that most Beekeeping RMP holders are on step 6 (ie the top level still requiring six-monthly inspections), with only two on step 7 in one year, and commendably, vanishingly low levels of non-conformances. So almost everyone gets an A minus, almost no-one gets an A plus, and very few get a B. Curious.

So, I looked at the MPI annual report. I'm sure you've all read it (I was waiting for the movie). It shows that MPI is hugely dependent on cost recovery income to balance its budget. So, anything that cuts beekeeper compliance costs risks also cutting MPI's budget. For a regulator, that's what economists call a moral hazard. That might explain the everyone-gets-an-A-minus but no-one gets a saving outcome on RMP audits. I suspect AsureQuality (who conducts audits), is in the same place. The report also showed MPI performing astonishingly well against a plethora of largely pointless process targets. It was such a positive self-report that it looked like a Stalinist five-year plan – really, just self-congratulation.

Which led me to the question why government organisations (and actually large private ones too, often) are so bad at understanding, let alone meeting, their customers' needs. MPI has problems, but so do the health, education, justice and national security systems. Why? What can be done?

COMPLEX, 'CHAOTIC' AND SELF-ORGANISING

The research shows that these organisations can best be understood as complex systems – a term that means they have multiple feedback loops, and may offer their bosses the illusion of control, while they actually self-organise at lower levels. In 2001 the Journal of the Royal Society of Medicine published a thoughtful analysis showing that the UK's National Health Service could be described mathematically as a complex adaptive system at the edge of chaos – chaos in the mathematical, not political sense.

The result was the inevitable political storm, as the opposition seized on the word "chaos" and left the mathematical insights out (politicians and complex maths rarely intersect meaningfully). So, the valuable insight was lost. Big systems are not managed from the top – they self-organise. The CEO reigns, but does not rule. And – crucially – they are deeply and effectively resistant to change (look at how 'restructuring' in New Zealand organisations is used to get rid of the awkward squad, and provides a perennial excuse for the rest).

Jack Welch, of GE (General Electric) fame, once allegedly said: "it's not that public servants don't care about their customers, it's just that they find themselves so much more fascinating". Those insights apply to MPI, to the health system, and more. It's a pity those running these systems don't bother to stop and learn. The other point is that the cult of the CEO, with its bizarre belief that one person can be both omniscient and omnipotent in and over an organisation is actually disempowering – the CEO ends up like the customer, kept in the dark and fed nonsense, until ritually sacrificed when the media Gods need to be placated. A classic scapegoat role.

THE INDIVIDUAL'S THINKING

Turning the telescope round, what about individuals in big organisations? Here the work of sociologists and psychologists can be helpful, shedding light on behaviour. I am re-reading the thoughtful work of Francois Dupuy on this (full disclosure: he taught me at business school INSEAD). Dupuy describes a world where individuals read the organisation well, and adjust their behaviour to get the boss off their back, do what they want, and often side with the customer against the organisation.

What does this mean for MPI? The department's management should stop, look, listen and learn. Primary industry supply chains are complex, finely balanced, face major challenges on the production side (climate) and on the export side (think geopolitics). MPI ought to be able to describe those complexities, interact with and influence the processes, so as to magnify New Zealand's advantages and minimising adverse pressures and so help us all. Sadly, no sign of that. I think it was Douglas Adams who commented that people talk to avoid thinking. MPI's annual report is proof enough.

Ian Fletcher is a former head of New Zealand's security agency, the GCSB, chief executive of the UK Patents Office, free trade negotiator with the European Commission and biosecurity expert for the Queensland government. These days he is a commercial flower grower in the Wairarapa and consultant to the apiculture industry with NZ Beekeeping Inc.

Hawke's Bay Beekeepers Gather Post-Cyclone

Two months on from Cyclone Gabrielle having its way with the east coast of the North Island, Beekeepers Hawke's Bay have held their first post-cyclone meeting, a gathering describe as a "very sombre" affair.

While the turnout of around 20 people on April 6 was only about half of pre-cyclone meetings, the impact of Gabrielle was detailed by those present.

"You felt like crying at some of the stories," says club president Graham Heaven.

"Some of the members are home-grown beekeepers with only a half dozen hives and they have had then wiped out completely. Yes, it was a sombre meeting."

One member even had their house destroyed and is living in a caravan.

Heaven says the club has been heartened by an offer from Wanganui Beekeepers Club to supply some nuc colonies in spring to get club members started up again, but he expects many will decide the investment in hive equipment is simply not worth it to pursue their hobby again.

A club email to float the idea of a combined equipment order to help members start again was met with no replies.

Difficulty accessing the venue for the meeting may have contributed to the lower-than-usual turnout too, with the regular club venue of Pakowhai Community Hall in use as a civil defence base the gathering was moved up the road to an Eastern Institute of Technology training room in Napier. The club has not only seen disruption to their meeting place, but the Beekeepers Hawke's Bay honey extraction facility in Bay View, north of Napier, also had flood waters pass through. The damage to equipment was minimal, but silt left behind took around a dozen members three hours to remove.

For commercial operators who have suffered losses, gaining insurance or government relief funding is proving challenging the club president reports. The Ministry for Primary Industries has made available $250,000 for beekeepers, but restrictions on what that money can be used for has limited some applications. In several cases insurance is not paying out either.

"A lot of people are in limbo while trying to claim insurance. If hives are off their property, such as for pollination, and the insurance company hasn't been notified of the move, then it looks as if there will be no insurance," Heaven says.

He is aware of pay-outs that have been made, but that was for equipment stored on site.

"To make matters worse, some hives didn't actually get flooded out, but so much rain has fallen – our wettest year on record – it has made for no feed for the bees and starved hives. Sugar syrup was hard to get at one point as Farmlands had two containers' worth contaminated."

On top of those cyclone issues are a "non-existent mānuka honey season", the constant threat of varroa, and honey prices putting the pinch on beekeepers. That seems enough to bring a sombre mood to any beekeeper.

Beekeepers Hawke's Bay club members clean out silt left behind when the club extraction facility in Napier was flooded during Cyclone Gabrielle in February.

Lessons from the Road – CrystechNZ

It's no secret, the fortunes of the honey industry have taken a dramatic swing in recent seasons. Gone are the halcyon days of the 2010s and in have come five years of non-mānuka prices below cost of production, and now a season or two of depressed mānuka honey prices really putting the squeeze on beekeepers.

Jamie Grainger, CrystechNZ manager

In my role as manager of CrystechNZ and as a technician, I spend, on average, a week each month travelling the country and visiting honey extraction and packing plants, be it for new fit-outs or maintenance work. Therefore, I have seen first-hand the impact of the downturn, not to mention in our own business, which has naturally seen a slowdown as less honey-money flows into the industry. That said, there are still those beekeepers and/or packers committed to the industry and sticking it out beyond the current tough times. If you're still in the industry now and reading this – I guess that's you!

With that in mind, I want to take this opportunity to reinforce CrystechNZ's commitment to beekeepers and elaborate on what I'm seeing in the honey sheds around the country. It's also a chance to explain how CrystechNZ continues to provide a valuable service, and cost savings in the long run, to those 'sticking it out'...

Jamie Grainger, CrystechNZ manager, shares lessons learned from his travels around the honey sheds of New Zealand.

There might be an increased supply of used honey processing gear on the market, but there is nothing like new equipment from CrystechNZ, such as this, for those who plan to be in the industry for the long haul.

NEW VERSUS OLD

It won't surprise anyone to learn that we, like other suppliers to the industry, are competing against a growing supply of used honey processing equipment for sale. For beekeepers, the price of used equipment might be appealing, but it is often far from the best return for the new owner.

Reliability is essential in honey processing – once those honey supers are in the shed/hot room they need to be spun out ASAP. The same usually goes for packing honey and meeting orders. Too often we are left to try and get used equipment up and running again after a breakdown in the middle of 'honey season', because of a history of less than adequate maintenance from a previous owner, and/or replacement parts have become hard to source due to the age of the equipment. There is nothing like the reliability of new equipment – built specifically for your shed – to keep the honey flowing and prevent costly delays.

PRIORITY SERVICING

Those with Crystech gear also get the benefit of priority servicing and break down support from our team of technicians. Most beekeepers, up and down the country, are 'firing up' their honey plants at the same time of year. Therefore, being at the top of queue when an expert hand is needed means we can get you up and running while others may have to wait. We have our home base in Tauranga, plus a vehicle and equipment stored in Christchurch, so help is never far away for our clients.

MIS-MATCHES

A regular occurrence for me in my travels is visiting sheds with a mis-match of equipment makes and models, and it can make for more complicated fixes, servicing and plant adaptations. We always find a way around these issues, but it is often more costly to the client than if our plant-design expertise was consulted from the get-go. Or, if purchasing used equipment

CrystechNZ are supportive of the apiculture industry and they will once again have an exhibitor's booth and the Apiculture New Zealand Conference in Rotorua this June.

is imperative, it makes the technicians job a lot easier to diagnose any issues if it is Crystech-built gear.

LONG TERM WINS

So, add it all up:

+ Less money out the door in repairs.
+ Fewer breakdowns at critical periods, saving you time and production.
+ Service technicians on hand when you need them wherever you are based, to keep the honey flowing.
+ Faster and more cost-effective plant servicing because your gear is a known quantity.
+ An adaptive honey processing plant that is set up to not only take care of your business's needs now, but can easily be fitted with any variations when the time comes.

= Greater productivity ... Less stress and ... Cost savings in the long run.

That's what I have witnessed, in a nutshell, in my travels around the 'honey sheds' of New Zealand. For some operators, the second-hand market will still be too tempting to ignore, but I recommend really weighing up the longer-term risk and price paid. After all, those of us who are sticking it out now are obviously in this for the long run.

On that note...

CRYSTECHNZ – HERE FOR YOUR HONEY PROCESSING NEEDS

Despite the downturn in honey prices, CrystechNZ ain't going anywhere. We were formed by NZ Manufacturing in 2009, with a commitment to providing high quality equipment for high quality honey. No matter the price of the honey garnered, that is still or objective. So, you will still see plenty of CrystechNZ around the apiculture industry – including at the Apiculture New Zealand conference next month ... pop by for a yarn. ■

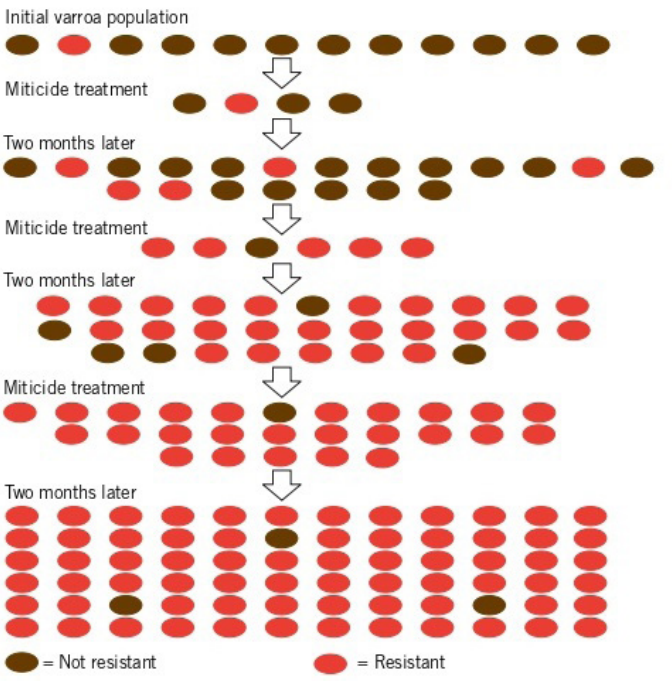
Advances in Varroa Control and How Beekeepers Can Help

Miticide resistance is a hot topic among Kiwi beekeepers. So, in the second of three articles looking at varroa and best management practices, Sebastian Owen, commercial director of Vita Bee Health, considers the success of first-generation treatments and the necessity of alternating treatments in an integrated pest management regime to avoid the development of resistance.

BY SEBASTIAN OWEN

When varroa first invaded countries in Europe, no treatments were available and the parasite quickly took a toll, killing colonies once mite levels had reached a dangerous threshold. Previously benign viruses became killers as their transfer within the colony became quicker and more impactful because the mite opened up new transfer pathways by biting into the fat body of the bee. Before varroa, the pathogen transfer was from bee to bee and was much slower, occurring perhaps through feeding. With varroa present, the transfer was, in effect, by inoculation by the mite biting the fat body of the bee.

Figure 7.1 Development of chemical resistance



The Control of Varroa handbook for New Zealand beekeepers explains how chemical resistance builds up within varroa mites over several generations.

First-generation treatments usually contained synthetic chemicals, such as pyrethroids, as the active ingredient and were generally very effective in controlling varroa populations, although there was never any possibility that varroa could be totally eradicated in this way.

THE EVER-PRESENT RISK OF DEVELOPING RESISTANCE

However, as with any medication, the development of resistance to the treatment was an inevitable threat. Mites surviving the treatments would breed and pass on their particular genetic traits which meant that the treatment they had survived would be less effective against their future generations. So, a population of mites resistant to a specific medication would over time multiply and thwart beekeeper attempts to control varroa populations.

The time taken for resistance to develop could have been very long. Unfortunately, because beekeepers did not always follow manufacturers' treatment instructions precisely, in some areas resistance developed much faster than could have been the case. Entire regions were sometimes affected by resistant mites while in other areas resistance appeared only in relatively small pockets. In some areas, evidence of resistance has yet to be recorded, but this should never lead to complacency.

To delay or even avoid the build-up of resistant mites, it is necessary for beekeepers to follow instructions precisely and to look to alternative treatments so that one class of active ingredient is not used year after year.

SECOND-GENERATION TREATMENTS AND IPM

As approved and greener second-generation treatments with different active ingredients began to appear, the possibility of alternating treatments become feasible and beekeepers soon became accustomed to a term, long established in other arenas – integrated pest management (IPM).

Today, IPM is widely practised with varroa treatments in Europe and North America and is proving to be the best way of keeping mite populations under control. Any IPM strategy must involve rotation of treatments with active ingredients from

different chemical classes. Tau-fluvalinate (Apistan) and flumethrin (Bayvarol), for example, are both pyrethroids and there is evidence of cross-resistance to the two active ingredients. A successful IPM strategy must therefore alternate between one active ingredient and another of a different class. So, for example, alternating Apistan or Bayvarol with alternative treatments such as those containing amitraz (a different chemical class) or thymol is necessary to avoid resistance.

Often the second-generation treatments require more careful application, but nothing that should prove too onerous to beekeepers. For example, timing of treatments and ambient temperatures often become significant at the time of treatment. The benefits of using many of these second-generation treatments are considerable, however.

IS RESISTANCE FOREVER?

Even when resistance to a treatment does develop in mites, that need not be the end of the line for that particular treatment. A break of several seasons from a particular treatment can rectify the situation and make the mites vulnerable to the treatment once more. This has been demonstrated in the case of Apistan in Italy. Over use of the product had allowed resistance to develop over a wide area but, after the product has been withdrawn for a few seasons, it became effective once more. Even today it remains effective through IPM techniques which ensure that the product is alternated with others.

TREATMENT PLANNING FOR NEW ZEALAND

In New Zealand, where first-generation treatments have been very effective and popular for many years (and still are), resistance can be expected to develop unless IPM practices are adopted promptly. As suppliers of varroa-control treatments, Vita Bee Health strongly recommends that New Zealand beekeepers review their treatment strategies and consult with experienced beekeepers and product suppliers, including Vita Bee Health distributors.

Second-generation varroa treatments include Apiguard, a thymol-based product, applied to a beehive here.

Readers Can Get on the List for a Winter Print Magazine Now

Ordering multiple copies of Print Reads activates discounted prices, so employers can place magazines in several offices, sheds, or smoko rooms for staff's enjoyment and education.

With the winter days come respite for beekeepers – less hours in the hives (if any at all) and more time for those jobs that "we'll do over winter". I also hope it makes for more time for leisure activities – including reading *Apiarist's Advocate*! With that in mind, we have our winter printed bi-annual magazine set to go for June, and you can get your name on the list for delivery now.

This will be our third edition of *Print Reads* and Winter '23 will once again compile the best of *Apiarist's Advocate*'s stories from the last six months, this time the first half of 2023. The 50-page magazine offers readers another way to access our stories and provides:

- A chance to catch up on any stories missed during the hustle and bustle of the beekeeping season.
- A physical copy of the goings on in New Zealand apiculture for review, and to keep for posterity.
- A highly-pertinent magazine for staff in both the office and/or smoko rooms of beekeeping/honey businesses.
- Your chance to support our otherwise free, yet wide-ranging, coverage of the industry.

Among the stories featured will be our analysis of the state of the business of beekeeping, Quarterly Honey Market Chats, coverage of Cyclone Gabrielle's impact on apiculture, beekeeping profiles, plus selections of our regular features such as Dave Black's science insights and Ian Fletcher's excellent *Views from Outside the Apiary*, plus *Club Catch-Ups*.

Individual orders are $29 (which includes GST) while orders of two or more magazines are $25 each.

So how do you get on the list for June delivery? Jump on **our website** and fill in the form with your email and delivery address. Happy reading, happy beekeeping!

– Patrick Dawkins (editor)

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What Price? The Science of Bee Vaccines

Vaccines have been a 'hot' topic around the globe in light of the Covid-19 pandemic, and in the apiculture world research towards American foulbrood (AFB) 'vaccines' has piqued beekeeper interest. Science writer Dave Black looks at the cutting-edge science involved in developing honey bee vaccines.

BY DAVE BLACK

Covid19 has been credited with ushering a 'new age' of vaccines by companies including Moderna recently. The mRNA (messenger ribonucleic acid) vaccines that were developed at impressive speed might be a tribute to the focus a pandemic and government's blank cheques can achieve, but it has also enlarged the concept of 'vaccines', as commonly understood, to the point where they are no longer just about preventing infectious diseases.

Moderna are promoting the idea that by the end of the decade (!) 'vaccines' will be in use treating cancers, cardiovascular disease, and autoimmune disease, and who knows what else[1]. These treatments will effectively retrain our immune system to detect and respond to entirely novel threats it knows nothing about. Given the number of trials, the amount of money involved, and results that inspired the US FDA to take notice, the hype isn't completely unjustified.

Dalan Animal Health have gained a conditional licence to use their Paenibacillus larvae bacterin vaccine against AFB in honey bee colonies in the USA, bringing the concept of 'bee vaccines' to prominence.

IN BEEKEEPING

For Beekeepers, the promise of an 'AFB vaccine' has surfaced, with Dalan's product enjoying 'conditional' release in the US, but hardly universal approval in the apiaries. Some of the limitations from a New Zealand perspective were discussed in this magazine in February, and there are also issues that arise in a global trading environment where money and not health complicates the regulatory setting. While the AFB vaccine benefits from the general excitement around vaccines at the moment, the examples of Avian bird-flu and Foot & Mouth disease illustrate the complexity of the international commercial circumstances when it comes to introducing animal and not human vaccines.

Back in January I had a look at insect immune systems and made the most cursory mention of 'immune priming' which is the sort of idea that lies at the heart of new invertebrate treatments. As we don't really know how it works it's described as 'priming' the immune response in a very general sense, and while insects don't produce antibodies that can be transferred to their offspring there is also evidence of a kind of 'memory' of infection being passed from one generation to the next.

HOW'D YA KNOW THAT?

Trans-Generational Immune Priming (or TGIP) is simply the transfer of a parent's immunological 'experience' to its progeny. So, for honey bees, some knowledge about the pathogens in the environment the queen and or drone had to survive is being passed to their offspring. So far, in 'bees, TGIP has been studied with bacteria (including both American and European foulbroods), and viruses (deformed wing virus). It isn't clear if some immunologically active compound (like an antibody, but not) can be transferred, or whether it's merely a 'signal' that elicits a response, or whether it's both. One implication is that TGIP is going on all the time naturally, unassisted and, until now, un-noticed.

The first evidence for the idea was only published in 1999 and most studies (there aren't many) date from the last ten years or so. They are all very different, and not just different invertebrates and different pathogens. Comparisons are difficult to make. There are some things to think about when you hear the topic come up. We have to wonder

if the infection route was relevant or just convenient, about the infectious material used, how much and does it matter if it was dead or alive? Which parent was doing the 'priming'? and how the effect, if any, was demonstrated?

In the first honey bee/AFB study[2] the researchers decided to use an ERIC-II strain of the bacteria (because it kills larvae faster), although it is arguable that the ERIC-I strain might be more important, as it's more widespread (New Zealand has both). Physiologically the strains might be similar, epidemiologically they are not. The queens had been injected with a solution containing vegetative bacteria (not spores) that had been killed by heating them, and that (the injection) might raise an eyebrow too. The results suggested a 26% improvement in the survival of 'primed' larva when exposed to a diet containing 20 spores and suggested that was correlated with an increase in the production of a particular type of immune cell. A similar study, using EFB bacteria more recently, was unable to find any effect on larval survival at all, so we are left wondering why the studies differ.

THE GREAT UNKNOWNS

But beyond individual studies, besides the mechanism being unknown, we also don't understand what effect it has on the epidemiology of any disease, or how TGIP evolved and will continue to evolve. The parental 'ability' must be one expressed by genes, so we'd expect that it would vary among individuals, and be subject to natural selection. Some individuals may be better at 'priming' than others. If the priming has a variable effect what does that mean for the virulence of the pathogen. How does the pathogen evolve given the arms race between pathogen and 'primed' host?

There are questions about costs and benefits. In what circumstances is it good that the offspring are 'educated' about threats from the parent's environment, when that 'education' must come at a cost incurred whether or not the pathogen turns up? A study involving *Bombus terrestris* (buff-tailed bumble bee) appears to show immune priming was effective for a bacterial infection, but it reduced immunity to another parasite, *Crithida bombi*. What circumstances drive TGIP selection if it is costly?

While immune priming, and Trans-Generational Immune Priming, promises to be a thought-provoking and lucrative field of study about a previously unsuspected aspect of biology, it might be worth asking if applying the emergent science in our apiaries is any more than a premature proof-of-concept. If an AFB vaccine is possible, why is that a 'good thing'?

Dave Black is a commercial-beekeeper-turned-hobbyist, now working in the kiwifruit industry. He is a regular science writer providing commentary on "what the books don't tell you", via his Substack Beyond Bee Books, to which you can subscribe here.

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A Regular Insight Into Beekeeping Operations

BY PATRICK DAWKINS

Welcome to a new column for *Apiarist's Advocate – Inside Pyramid Apiaries.* We want to give readers, who will be a mix of large and small commercial beekeepers, hobbyists, or just those with ties to the apiculture industry, an opportunity to follow along with the regular goings on of a beekeeping operation. I think our own beekeeping business, Pyramid Apiaries, is well suited as providing a middle ground for our industry...

BACKGROUND

We are based in Marlborough, at the top of the South Island, so literally about as 'middle ground' in New Zealand as one can get. We run 400 production hives in the honey season, and 500 mating units come spring to supply mated queens to fellow beekeepers and for our own production hives. So, size-wise, we are fairly well middle of the road too.

Since our inception as a business in 2018, we have provided pollination services to growers in Marlborough (mainly cherry orchards, but some small seed) and we launched our breeding programme then too. Therefore, ours is a young business, but between my wife Laura and I we had a combined five seasons of commercial beekeeping experience prior to formation of Pyramid Apiaries. So, we are a young business compared to many, but have probably seen through more hives than most.

While we are not as diverse operators as some (see the story on Whitestone Honey!), we are a lot more than honey producers – and that's a good thing right now. So, again, we straddle a middle ground in terms of the products and services we offer, while being in a prime position to learn of new options through this publication.

Pyramid Apiaries mating-units watch the sun set on another beekeeping season, heavy with 'honey' stores gathered from grape sugar residues in the vineyard-laden Marlborough region, and set to supply queen bees to beekeepers in the coming spring.

Anyway, that's a quick background and why I think an insight into our operations may be relevant to you, the reader. Let's move into a bit about what we have been up to lately.

APRIL – WINTERING DOWN

To give ourselves a decent winter break, we aim to stay out of our hives from May to early August, at which point we begin checks on the status of mating units and begin to prepare hives for cherry pollination. In saying this, that pesky parasite varroa means we are having to monitor and potentially treat hives in some of those winter months.

So, we make sure we conduct mite counts going into winter (we use a soapy wash) as we pull Bayvarol out. All hives get an oxalic acid staple treatment and any apiaries that still have high infestations (>9 mites/300 bees) get a follow up of formic acid or amitraz.

As for feeding, Marlborough has about 30,000 hectares of planted vineyard (keep drinking that sav' blanc people!) and while the grapes are self-pollinating and don't require our honey bees, they do offer a timely boost going into winter…

Every March and April you can't help but witness an army of grape harvesters (both machines and humans for hand-picking) and tractors towing 'gondalas' (chaser bins) that emerge around our province. Between 300,000 and 400,000 tonnes of high-sugar content grapes come off the vines. Luckily for the bees and the beekeepers, they leave behind a sticky residue on the leaves and canopy, which honey bees are quick to find and pack out the brood nest with, just in time for winter.

Many of our mating yards are located in vineyards, so the 3-way mating units or nucs have little trouble filling up with 'honey' stores. So, as you sip your Marlborough sauvignon blanc this winter, enjoy it knowing that, if you need mated queens this spring, you are already helping out!

For more info on Pyramid Apiaries or to order over-wintered or spring-mated queens visit www.pyramidapiaries.co.nz.

Patrick Dawkins is owner-beekeeper at Pyramid Apiaries and publisher of Apiarist's Advocate.

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Discussing Varroa Resistance

BY JOHN MACKAY

Varroa continues to be a challenge – both nationally (varroa-attributed losses increased in the latest Colony Loss Survey) and regionally here in Gisborne/Tairawhiti. Beekeepers have struggled to keep varroa levels down here and, as such, many participated in an online meeting in late April to share experiences. Due to the weather events and cyclone destruction, treatments have often been delayed leading to hives crashing before the varroa (and their viruses) can be knocked down to safer levels.

In this region we typically use amitraz as the varroa treatment at this time of year – counter-seasonal to many other regions.

Following on from Michelle Taylor's presentation at the Apiculture New Zealand conference last year, as well as the Martin Laas/Rae Butler MiteMonitor program, information is available as many beekeepers are measuring their mite loadings during a treatment to check that numbers are reducing as expected.

If a synthetic pyrethroid (Apistan/Bayvarol) doesn't work as expected then often the first claim is resistance – that is, the varroa now has a genetic change that means the chemical doesn't affect it. However, often there is the similar claim that 'I had resistance last year but it worked well this year'. Resistance is longer-lived than a single season – in the USA and Spain it has been found the genetic resistance markers remain in varroa for some years following the last pyrethroid treatment due to wax residues 'selecting' for resistance[1].

However, possible resistance mutations in one of the varroa targets for amitraz (Apivar/Apitraz) have now been characterised, in both French and USA populations of varroa. The authors first worked out the DNA sequences that amitraz targeted in varroa – while the general targets of amitraz are known (specific receptors for cell signalling) the specific varroa sequences responsible were not previously known. Once the DNA sequences had been identified, then the authors analysed these sequences from varroa where amitraz had worked, from those where it hadn't been successful.

The authors found two mutations in one of the three DNA sequences analysed that were associated with treatment failure. One was associated with failure in the French varroa population, and the other mutation was associated with USA populations[2]. Unlike the mutations associated with pyrethroid treatment (all within a very tight region on the target gene), these two mutations were in different regions of a single target gene for amitraz. This may mean that other mutations in the gene will similarly reduce the efficacy of amitraz. Further work since this paper in 2021 has found that the USA mutation is a confirmed marker of amitraz resistance[3].

What do we take from it all? The benefits of communication cannot be understated – discussion among beekeepers in a region is essential. Varroa does not care if neighbouring beekeepers compete or not – hives may collapse despite individual best attempts. A wider discussion indicated that resistance was unlikely with respect to treatments and that reinvasion was the likely pressure. That said, resistance to our commonly used synthetic treatments is now confirmed – but not currently in New Zealand. Recent data from Victoria University suggests increased tolerance to pyrethroids – but the authors did not make any claims about particular treatment performance, or lack thereof.

Monitoring varroa levels is now crucial and, if you suspect resistance, keep the contents of your sugar shake/alcohol wash. Dead men tell no tales – dead varroa can tell plenty.

John Mackay is a molecular biologist and the technical director of Gisborne-based lab dnature diagnostics and logistics, as well as a hobby beekeeper.

"Dead men tell no tales – dead varroa can tell plenty", says John Mackay. So, if you suspect treatment resistance, save those mites for analysis.

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