[Not relevant to request]

From: s 9(2)(a) .co.nz>
Sent: Wednesday, 31 May 2017 5:21 p.m.
To: Manuka Honey
Cc: s 9(2)(a)
Subject: My testing experiences, information requested by s 9(2)(a) at Wellington Meeting yesterday.
Attachments: SC55202670 17053118010.pdf; V3 19May2017 A Short Report on theoretical blending Manuka honey.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hi people,

It was an enlightening meeting yesterday, I enjoyed the opportunity to speak with the scientists involved with MPI who are working to define Manuka Honey. I was one of the outspoken Beekeepers in the room and was interviewed by One news as punishment.

I have attached a few lab test reports to this email providing evidence but what I'm trying to get through is as follows: **with the correct mathematical expertise one could nearly blend every KG of NZ honey to meet one of the levels of MPIs Manuka definition (either multi or mono).**

This statement seems to be mirrored by the report by s 9(2)(b)(ii) entitled "Short report on theoretical blending of Manuka Honey" (See attached which was released by the UMFHA today to all members).

Below is a table outlining the results obtained from our own testing, these results show two things:

One: Our Kanuka honey using MPIs criteria is now classified as Monofloral Manuka, produced in an area essentially devoid of Manuka bushes and very definitely not Manuka.
Two: The second conclusion is that by adding non-Manuka bush honey to this Kanuka we end up with twice the volume of Monofloral Manuka.

These tests were carried out on split stream samples that are representative of an entire 3000kg batch of honey. *Neither of these two honeys would have ever been considered as a Manuka prior to testing against MPIs framework.*

Sample ID	4-HPLA	2-MBA	2-MAP	3-PLA	Pollen DNA	MPI Floral Classification	Total KGs in Batch
Kanuka 17 – K – 1	5.95	1.56	4.03	983	31.60	Monofloral Manuka	s 9(2)(a)
Bush 17 – B – 2	1.82	<0.8	1.65	269	29.36	Non Manuka	s 9(2)(a)
Composite of the batches	3.48	1.06	2.86	650	29.60	Monofloral Manuka	s 9(2)(a)

This is a massive problem, I can see that a large honey buyer with a decent inventory of honey available to them could essentially ensure all honey would meet and exceed the required MPI standard. Its set too low and is too easy to achieve, also the markers used are simply not fit for purpose when it comes to defining Manuka honey, they are not unique to Manuka. This, in itself is a joke.

We need industry support in this matter, if this continues we won't have much of an industry left.

I'm not being fatalistic at all, can you imagine how the regulators in China, EU, etc. will feel, if suddenly, we tell them we have managed to find out that all our honey is in-fact Manuka? Not only will it destroy our industry's reputation and that of the NZ inc, not to mention the reputation of our regulators, MPI who are responsible for a lot of other primary production industries and the entire Official Assurance system.

s 9(2)(a)

Test Results for Manuka, Kanuka and Bush Honey

	MPI Manuka Criteria					UMF Criteria			
Sample ID	**4-HPLA** *Min 1*	**2-MBA** *Min 1*	**2-MAP** *Min 1*	**3-PLA** *Min 400*	**Pollen DNA** *Max 36*	**NPA UMF**	**Leptosperin** *Min 100*	**MPI Floral Classification**	**Known Floral Type**
Manuka B18959665	6.97	20.8	14.8	633	33.00	17.6	936	Monofloral Manuka	Manuka
Manuka B18959664	6.65	20.6	14.4	622	33.93	17.4	936	Monofloral Manuka	Manuka
Manuka * 17-M-3 (IsB)	10.6	40.4	13.4	908	27.60	14.6	1490	Monofloral Manuka	Manuka
Manuka HWC (16y)	10.3	48.6	5.97	844	**ND**	19.8 (In Nov 2016) 18.2 (In May 2001)	873	**Not Manuka**	Manuka
Manuka * 17-M-10 (SF)	9.3	6.9	26	1140	25.91	8.9	653	Monofloral Manuka	Manuka
Kanuka * 17-K-1	5.95	1.56	4.03	983	31.60	1.6	27	Monofloral Manuka	Kanuka
Bush * 17-B-2	1.35	<0.8	1.17	248	29.97	2.3	44		Bush
Bush * 17-B-3	1.26	<0.8	1.80	151	29.36	2.4	65		Bush

Samples marked * are split stream samples taken as the honey was being drummed up.

Each split stream sample is representative of 10 x 300kg drums of honey (3,000kg).

Samples prefixed "17" are for honey produced in January 2017

Sample HWC is 16 years old, produced in January 2001

Samples 17-M-3 and HWC are from the same geographical area.

Floral types are the predominant plant flowering in an area in which the hives are located. We have had hives in these areas for over 40 years.
Our kanuka area and our manuka area are two geographically separate areas about 60km away from each other. There is very little kanuka growing in our manuka area and there is very little manuka growing in our kanuka area.

The table in the section "How do we know which plant/honey is manuka and which is kanuka?" lists the features which differentiate manuka from kanuka. These distinctive features enable us to differentiate between the two plants and their honeys.

The bush honey is a mix of Kamahi, Rewarewa, Blackberry honeys taken off the hives just as the manuka in the area was starting to flower. The bush honey would also have a small amount of manuka honey, hence the low level of Leptosperin, as the manuka was just starting to flower.

Stirring prior to Drumming Up:

Prior to drumming up the honey is stirred in the tank overnight (12 hours).
The stirrer has four paddles set at two different levels in the tank – two paddles are near the top and two are towards the bottom of the tank. The moving paddles create a vortex in the centre of the tank which drags the honey further down where it is agitated and is then pushed up the sides of the tank.

Two Blending Experiments: ***Would Kanuka Honey + Bush Honey = Monofloral Manuka Honey?***

Blending experiment 1: 1 part kanuka honey + 2 parts bush honey

Sample ID	4-HPLA	2-MBA	2-MAP	3-PLA	Pollen DNA
Kanuka 17-K-1 (T2)	4.94	1.55	4.48	986	30.05
Bush 17-B-2 (T2)	1.34	<0.8	1.60	253	27.73
Composite Experiment 1 part K-1 + 2 parts B-2	2.92	0.89	2.95	553	28.83

Conclusion:
This particular composite ratio (1:2) failed to be monofloral manuka honey because the level of 2-MBA is 0.89 when it needed to be 1.0 to meet the MPI manuka standard.

Blending experiment 2: 1 part kanuka honey + 1 part bush honey

Sample ID	4-HPLA	2-MBA	2-MAP	3-PLA	Pollen DNA
Kanuka 17-K-1	6.03	1.57	4.53	1,030	31.13
Bush 17-B-2	1.82	<0.8	1.65	269	28.96
Composite experiment 1 part 17-K-1 + 1 part 17-B-2	3.48	1.06	2.86	650	29.60

Conclusion:
The sample of kanuka honey represents 10 drums of honey (3000kg)
The sample of bush honey represents 10 drums of honey (3000kg)
Under MPI criteria this 1:1 blend Kanuka Honey with Bush Honey results in 6000kg Monofloral Manuka Honey.

How do we know which plant/honey is Manuka and which is Kanuka?

Our kanuka area and our manuka area are two geographically separate areas about 60km away from each other. There is very little kanuka growing in our manuka area and there is very little manuka growing in our kanuka area. We have observed the following distinctive features of these two plants:

Distinctive characteristics	Manuka *(Leptospermum scoparium)*	Kanuka *(Kunzea ericiodes)*
Seed pods	Hard woody seed capsules. Remain on plant for a year or more after flowering has finished.	Smaller pods. Fall off plant in late summer soon after flowering has finished.
Foliage	Pointed leaves. Prickly to touch. No aroma.	Softer to touch. When rubbed will leave an oily feel on hands and a distinctive aroma.
Flowers	Larger. Singular.	Creamy colour. Clusters of flowers. Stamen extend beyond petals.
Size	Shrubby bush. Grows to about 4m	Tree. Grows to 7m or more.
Honey	Golden. Thick thixatropic. No aroma. Slower granulation	Lighter colour with green tinge. Distinctive aroma which can even be smelt outside the hives while the bees are working the kanuka flowers. Honey granulates very quickly.

s 9(2)(b)(ii) [redacted]

Certificate of Analysis

s 9(2)(b)(ii) [redacted]

Lab Reference: 17-12935
Submitted by:
Date Received: 26/05/2017
Date Completed:
Order Number:
Reference:

Report Comments

Samples were received by Analytica Laboratories in acceptable condition unless otherwise noted on this report.

Results Summary

Manuka Markers in Honey*

Laboratory ID	Sample ID	4-Hydroxyphenyllactic acid 4-HPLA	2-Methoxybenzoic acid 2-MBA	2-Methoxy acetophenone 2-MAP	3-Phenyllactic acid 3-PLA
	Units / *Reporting Limit*	mg/kg 0.8	mg/kg 0.8	mg/kg 0.8	mg/kg 20
17-12935-1	17-B-2	1.82	<0.8	1.65	269
17-12935-2	17-K-1	6.03	1.57	4.53	1,030
17-12935-3	Sample 3 1:1 Composite of Samples 1 & 2	3.48	1.06	2.86	650

Manuka Markers in Honey* Approver:
s 9(2)(a) [redacted]

Method Summary

Manuka Markers Solvent extraction, LC-MS/MS analysis.
s 9(2)(b)(ii) [redacted] has interim approval from the New Zealand Ministry of Primary Industries to conduct this analysis under the Recognised Laboratory Programme (RLP).

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.

s 9(2)(b)(ii)

Certificate of Analysis

s 9(2)(b)(ii)

Lab Reference: 17-12935
Submitted by:
Date Received: 26/05/2017
Date Completed: 30/05/2017
Order Number:
Reference:

Report Comments

Samples were received by s 9(2)(b)(ii) in acceptable condition unless otherwise noted on this report.

Results Summary

Manuka Pollen DNA*

Laboratory ID	Sample ID	Manuka Pollen DNA
	Units / *Reporting Limit*	Cq
17-12935-1	17-B-2	28.96
17-12935-2	17-K-1	31.13
17-12935-3	Sample 3 1:1 Composite of Samples 1 & 2	29.60

Manuka Pollen DNA* Approver:
s 9(2)(a)

Method Summary

Manuka Pollen DNA

Samples were analysed as received by the Laboratory for Manuka Pollen DNA by pollen DNA extraction followed by qPCR.

The DNA component of the MPI Manuka Honey Definition requires a Cq value of less than 36 to qualify for either a monofloral or multifloral Manuka honey.

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.

Proposed General Export Requirements for Bee Products

For all exporters of bee products from New Zealand

SUBMISSION FORM

Consultation document 2017

The Ministry for Primary Industries (MPI) proposes to consolidate, clarify, and introduce export requirements for all bee products intended for export.

You are invited to have your say on the proposed changes, which are explained in the discussion document and specified in the draft Animal Products Notice: General Export Requirement for Bee Products notice.

Consultation closes on **23 May 2017.**

How to have your say

Have your say by answering the questions in the discussion document, or commenting on any part of the proposals outlined in the draft Animal Products Notice: General Export Requirements for Bee Products. This submission form provides a template for you to enter your answers to the questions in the discussion document and email your submission back to MPI.

Please include the following information in your submission:

☒the title of the discussion document 'Proposed General Export Requirements for Bee Products';

☒your name and title;

☒your organisation's name (if you are submitting on behalf of an organisation), and whether your submission represents the whole organisation or a section of it; and

☒your contact details (such as phone number, address, and email).

MPI encourages you to make your submission electronically if possible. Please email your submission to: manuka.honey@mpi.govt.nz

If you wish to make your submission in writing, these should be posted to the following address:

General Export Requirements for Bee Products Submission
MPI Food Assurance Team
PO Box 2526
Wellington 6140

The following points may be of assistance in preparing comments:

- ☐ where possible, comments should be specific to a particular section in the document. All major sections are numbered and these numbers should be used to link comments to the document;
- ☐ where possible, reasons and/or data to support comments should be provided;
- ☐ the use of examples to illustrate particular points is encouraged; and
- ☐ as a number of copies may be made of your comments, please use a legible font and quality print, or make sure hand-written comments are clear in black or blue ink.

Submissions are public information

Everyone has the right to request information held by government organisations, known as "official information". Under the Official Information Act 1982, information is to be made available to requesters unless there are good or conclusive grounds under the Official Information Act for withholding it.

If you are submitting on this discussion document, you may wish to indicate any grounds for withholding information contained in your submission. Reasons for withholding information could include that information is commercially sensitive, or that the submitters wish personal information such as names or contact details to be withheld. MPI will consider such grounds when deciding whether or not to release information.

Any decision to withhold information requested under the Official Information Act 1982 may be reviewed by the Ombudsman.

For more information please visit http://www.ombudsman.parliament.nz/resources-and-publications/guides/official-information-legislation-guides

Your details

Your name and title:	s 9(2)(a)
Your organisation's name (if you are submitting on behalf of an organisation), and whether your submission represents the whole organisation or a section of it:	s 9(2)(a)
Your contact details (such as phone number, address, and email):	s 9(2)(a)

General questions: getting to know you

1. What part of the supply chain do you operate in:

   ☒beekeeper

   ☒extractor

   ☒processor

   ☒packer

   ☒exporter

   ☒retailer of bee products

   ☐ other – please specify

2. How long have you been involved in the apiculture industry:

   ☐ 0-5 years

   ☐ 5-10 years

   ☒10 + years

   ☐ not applicable

3. Do you operate under:

   ☒an RMP under the Animal Products Act 1999

   ☐ the Food Act 2014 (Food Control Plan or National Programme)

   ☐ the Food Hygiene Regulations

   ☐ none of these

   ☐ not applicable

4. If you are a beekeeper, how many hives do you currently have:

   ☐ 0 – 5

   ☐ 6 – 50

   ☐ 51 – 500

   ☐ 501 – 1000

   ☐ 1001 to 3000

   ☒More than 3000

5. What region of New Zealand do you operate in?

Predominantly in the North Island, but we have some presence now in Canterbury and the Kaikoura regions

6. If you export bee products please tell us a little about your business. How many people do you currently employ?

   ☐ 0

   ☐ 1 – 5

   ☐ 6 – 19

   ☒20 or more

   What are the roles of your employees and how many are:

   ☒beekeepers 112 (plus Apiary support and management staff 33)

   ☒processors 8 permanents, plus seasonal staff

   ☒packers 13

   ☒other –

   Sales and exports and honey buyers team 10

   Corporate management team 14(includes, finance, HR, Health and Safety etc)

   Q&A/Laboratory team 5

Impact of compliance costs for beekeepers, processors and exporters

7. Table 4.1.1 of the Discussion Document provides a summary of the estimated costs of the proposals. What do you think the overall impact of the new proposals will be on your business?

There will be very significant impact of cost and time involved for s 9(2)(a) if the super/unique identifier and super traceability requirement is brought in as proposed under Part 4 clause 4.1. We estimate that as a minimum it will take up to two years to be able to meet the super traceability/unique identifier requirement s 9(2)(a) already operates under an RMP so we do not expect that there will be any overall impact on our business from the proposed requirement under clause 3.2 In terms of Part 6, there will be a very significant impact on the s 9(2)(a) business in terms of the laboratory tests. The bulk of our current laboratory tests are performed in house. We only send out to independent laboratories when we have to, usually to meet our client's expectations.

8. In order to estimate the total cost to industry of the proposals contained in the draft GREX, it would be useful for MPI to understand how many beekeepers, operators and exports of bee products will be affected by the proposals. Please specify which of the proposals listed in the table at 4.1.1 will affect you and how.

The advice that s 9(2)(a) has taken on the impact of clause 4.1 is that it will cost at least $4 per hive for an aluminium barcoding label on each super. We currently have around s 9(2)(b)(ii) with longer term plans to achieve s 9(2)(b) hives in the next 2-3 years. Just to place the aluminium barcodes on each super would cost an estimated s 9(2)(b)(ii) for the barcodes alone and then considerable time and labour to place the barcodes on the hives (estimated to be around another $250,000-500,000). Each team leader beekeeper would need a scanner (anticipated total scanner costs $50,000 – $80,000) and then adapting our database and doing the necessary database development to enable the super tracking would take up to two years at a cost of 500,000-1,000,000. We would also expect to have to employ around 15 additional staff members to roll this out over the next two years. s 9(2)(b)(ii) We have costed this out on a relatively conservative basis and it is possible that the time frames and costs blow out beyond what has been estimated.

We anticipate that at a minimum our laboratory testing costs will increase by a factor of 10. Our current test costs per sample is around $30 (DHA, MGO and HMF). We are currently being charged around $300 per sample for the 4 chemical markers and DNA test. The DHA, MGO and HMF testing will still be required. We anticipate a ten-fold increase in honey testing, which would be a very significant cost increase for s 9(2)(a). The other cost that will be significant for our business is the fact that we won't be able to rely on our own laboratory results. The turnaround time of results from our in-house laboratory can be as little as 12-24 hours. With the backlogs that we are currently experiencing with the independent laboratories we do not get results until 7-10 days after submission. This will greatly impact on our workflows and production processes and likely to extend our lead times for customers.

9. Do you foresee any other costs that will arise from the proposals contained in the draft GREX which are not contained in the table at 4.1.1? If so, how significant do you think these will be (e.g. administration costs such as time to fill in forms, and time to learn about the new requirements)?

Yes, there will be other costs involved, especially if the super traceability requirement comes into effect. There will be more time involved in tracing supers and greater administrative efforts to track everything. Our beekeepers will need to be trained to use new technology. Mistakes inevitably made will involve extra administration time which directly reflects added cost.

The laboratory testing of honey with the new manuka definitions will incur much greater cost and probably more administrative time. It is anticipated that the time and effort and skill required to blend honey will be significantly increased because of the new chemical markers and pollen thresholds. We will be incentivised to maximise our returns from our honey and we will be motivated to blend accordingly. This will lead to more processing time to manage our stock and inventory

No additional substances to be present in New Zealand honey

10. To ensure additional substances are not present in New Zealand honey, MPI proposes to prohibit the feeding of bees when honey supers are present on hives for the purpose of

collecting honey, with an exception if it is necessary for the survival of the bees. Do you agree or disagree with this proposal?

☒I agree because:

s 9(2)(a) agrees in principal with MPI's intention to ensure additional substances are not present in New Zealand honey but

☒I disagree because:

However, we disagree with any restrictive directives regarding beekeeping methodology. It is absolutely essential at times to feed our bees sugar syrup to ensure survival and strength of our hives. This is most critical if the weather is very poor as we have seen in the past season s 9(2)(a) would not want to see any further compliance requirements imposed on us as a business that would require the documentation of the circumstances when bees are fed with anything other than honey. s 9(2)(a) would like to see clause 3.1 (2) deleted from the GREX. We further point out that C4 testing picks up any sugar residues and a beekeeper knows that positive C4 tests will prevent us from supplying our honey internationally. The market entry requirements should be more than sufficient to control bad beekeeping practices.

Please suggest any alternatives to this approach that would ensure additional sugars and synthetic chemicals are not present in the honey:

It is the position of s 9(2)(a) that we practise best beekeeping practices to ensure that we get the maximum returns from the honey produced. We know that if additional sugars are present in our honey that the value of that honey is seriously compromised.

11. To prevent the contamination of honey with varroacide residues, MPI proposes honey is only harvested from honey supers that do not contain honeycomb previously part of a brood nest. Do you agree or disagree with this proposal?

☒I agree because:

Varroacide residues shouldn't end up in honey. s 9(2)(a) manages our hives by ensuring that breeding and brooding is done prior to construction of hives for nectar collection

☐I disagree because:

Please suggest any alternatives to this approach that would ensure varroacide residues are not present in the honey.

Development of bee colonies that are varroa resistant

Processors of bee products to operate under a risk based measure

12. MPI proposes that processors of bee products for export under the Food Hygiene Regulations must move to a risk-based measure (either an RMP under the Animal Products Act 1999, or Food Control Plan or National Programme under the Food Act 2014). Do you agree or disagree with this proposal?

☒I agree because:

We need consumers/customers to have confidence in our products and to know that our products can be traced with confidence too, as well as ensuring that all bee products compliant for export must be processed and remain within an RMP system.

☐ I disagree because:

Please suggest any alternatives to this approach that would provide MPI with oversight of these processors:

Bee products to be sourced from listed beekeepers

13. MPI proposes to extend listing requirements to all beekeepers providing bee products for export. Do you agree or disagree?

☒I agree because:

Beekeepers supplying bee products for export **must** be listed and contactable so they are known to and contactable by both MPI and the RMP operator for traceability and food safety purposes.

☐ I disagree because:

Can you think of any alternatives to this approach that would address this gap in the traceability chain?

Pre-processing traceability requirements

14. MPI proposes beekeepers keep additional records. Do you agree or disagree with this proposal?

☐ I agree because:

☒I disagree because:

Disagree because for s 9(2)(a) a system of indelibly marking and tracing each honey super with a unique marker would be a massive undertaking. Note that all our supers are branded with the AFBPMP number as it is. The effort required to trace every super in our business, which in the 2017/2018 season may amount to 180,000 supers would be phenomenal and probably not achievable.

s 9(2)(a) agrees with the ApiNZ Standards Focus Group suggestion that the same traceability outcome, that the MPI's proposal to indelibly mark each honey super was endeavouring to achieve, will be successfully achieved with the added inclusion of a bullet point within the Guidance section found in PART 3 3.1 - Honey to be fit for purpose.

This bullet point could be written as a requirement pertaining to best industry practice to maintain bee product integrity as related to traceability.
Perhaps this could be written as;

- That beekeepers must maintain the integrity of product traceability by employing a practice that ensures each stack of honey loaded onto the truck at harvest is clearly marked and identified to its originating apiary along with the date of harvest, during both transit and storage through to process.

Can you think of any alternatives to this approach that would address gaps in the traceability chain?

15. The costs for businesses associated with implementing the proposed traceability requirements are likely to vary depending on their existing systems and processes. What impact do you think these proposals are likely to have on your business?

The costs for s 9(2)(b)(ii) if the supers' traceability requirement is implement would be very significant. Refer to the answer given under question 8 above

Traceability from beekeepers to operators – harvest declarations

16. MPI proposes to introduce harvest statement requirements to all beekeepers providing bee products for export. Do you agree or disagree?

☒I agree because:

Yes, s 9(2)(a) believes that all bee product harvested for export must be declared on a Harvest Declaration.

☐ I disagree because:

Can you think of any alternatives to this approach that ensure full traceability through the bee product supply chain?

17. MPI considers, for most businesses, the costs associated with these proposals are unlikely to be onerous. Do you agree or disagree and why?

☐ I agree because:

☒I disagree because:

The costs associated with the proposed traceability of each individual honey super creates huge added compliance costs - see answer to question 8 above.

Traceability between operators – transfer documentation in AP E-Cert and reconciliation

18. MPI proposes to introduce transfer documentation requirements to all bee products intended for export. Do you agree or disagree?

☒I agree because:

Yes, s 9(2)(a) agrees

☐ I disagree because:

Can you think of any alternatives to this approach that ensure full traceability through the bee product supply chain?

Labelling of monofloral and multifloral mānuka honey

19. MPI proposes to implement the mānuka honey definition for export using the GREX. Do you agree or disagree?

☒I agree because:

A fit for purpose manuka honey definition is needed by the industry, subject to the definition being fit for purpose, scientifically robust and internationally accepted

☐ I disagree because:

Can you think of any alternatives to this approach that ensures mānuka honey is true to label?

Yes, there is the well established leptosperrin marker that is widely accepted by industry as providing a scientifically robust and a fit for purpose manuka marker.

20. MPI considers there are likely to be options available to businesses to support compliance with the proposed definition (e.g. relabelling, changes to blending practices etc.). Do you agree with this assessment or do you have concerns about ability of some businesses to comply?

☒I agree because:

Yes, there are going to be significant blending opportunities for businesses. It seems that most honeys if blended carefully could fall within the multifloral definition. Businesses will need to go through a significant relabelling process as well.

☐ I disagree because:

☐ I have concerns because:

21. MPI's proposal may have an impact on existing rights associated with using the word "mānuka" on labels, including registered trademarks. Do you agree with MPI's assessment of the impact on existing rights?

☒I agree because:

Any honey that is to be labelled manuka will need to meet the manuka definition going forward

☐ I disagree because:

22. MPI does not propose to make changes to the current use of grading systems. Do you agree or disagree with this position?

☒I agree because:

The grading system is outside the scope of the authenticity project that MPI has undertaken

☐ I disagree because:

23. What do you think the impact of the mānuka honey definition will be on the current use of grading systems?

There will be nil impact on the grading systems. We will end up with multifloral manuka being graded and monofloral manuka being graded. The grading systems will continue to be how the consumers/honey companies determine value. The manuka definition will simply prove provenance/authenticity.

24. Do you have any comments on the summary science report?

25. Do you have any further comments regarding the definition of mānuka honey?

Unfortunately, the four chemical markers that MPI has chosen are not unique to manuka. The first three markers (2-MBA, 4-HPA, 2-MAP) are found at varying levels in many New Zealand honeys, and the setting at the low 1mg/kg levels makes it easy for an operator to blend (particularly if they have high levels of inventory or stock on hand). The other marker 3-PLA is also found in significant levels in kanuka and ling honeys. Most honey currently traded as manuka or manuka blend will have enough of the first three markers to meet the definition.
MPI will argue that the combination of the 4 markers plus the DNA is unique to Manuka and the thresholds are important. s 9(2)(a) has had quite a few honeys falling under the 400 mg/kg 3PLA threshold meaning that some of our traditionally labelled 5+, 8+ and 10+ honeys would not be able to be labelled as monofloral. This honey that fails could be further blended with a kanuka honey and still called Manuka Multifloral. This is troubling the industry because it is a step backwards – why should a honey that has a significant component of kanuka be labelled as Manuka multifloral? This problem could be easily addressed if there was a minimum threshold of MGO that also had to be present in the honey. It is generally accepted by industry that DHA or MGO is not present in kanuka honey. [*Adams, C. J., Manley-Harris, M., & Molan, P. C. (2009). The origin of methylglyoxal in New Zealand manuka (Leptospermum scoparium) honey. Carbohydrate research, 344(8), 1050-1053.*]

However, the major issue that s 9(2)(a) has at the moment is around the DNA testing. If there is the presence of manuka pollen in the honey it should test positive to the DNA test and it needs to do so in less than 36 cycles of the DNA test. The 36 cycles is a relatively low threshold. A good manuka honey should test positive in say 20-25 cycles of the DNA test. What we have found is that some of our best manuka honey is failing the DNA test (see the table below) and further that these samples when sent to s 9(2) clearly showed the presence of manuka pollen (one sample in fact was analysed by s 9(2) to have 86% manuka pollen). Manuka blend and multifloral honeys pass the DNA test in relatively low cycle numbers whereas monofloral and premium manuka honeys take closer to 35 cycles or more, which doesn't make any sensible correlation. We are not alone in the industry with this problem. This is premium and almost pure manuka failing. We are concerned that MPI has only tested relatively young manuka honeys, fresh off extraction and at

relatively low levels of MGO. It is the view of s 9(2)(a) that both age of honey, storage conditions of honey and MGO concentrations in honey will affect the DNA test. (Data presented as snapshot in Appendix 1). It can be observed that the internal control sample values are also relatively high in older manuka samples.

Possible solution – if the MGO rating of the honey is above a certain threshold (eg 300) then a DNA test should not be required. We still have some lower MGO levels failing the DNA test too. Below is a list of s 9(2)(a) honeys that have failed the DNA test.

MGO	4-HPLA	3-PLA*	2-MBA	2-MAP	Cq
320	4.4	869	15.1	16	>36
327	4.2	531	4.6	10.9	>36
337	3.62	516	5.43	7.76	>36
392	4.7	631	7	19.2	>36
404	7.6	597	8.1	14.6	>36
417	7.2	600	12.2	11	>36
529	5.8	660	4.4	20	>36
548	7.55	728	9.77	16.6	>36
559	8.1	797	9.96	14.7	>36
559	7.98	790	9.35	15.1	>36
560	7.29	834	12.9	16.9	>36
561	9.6	763	11.2	16.9	>36
561	7.65	830	13.5	15	>36
567	9.76	667	12.4	12.1	>36
568	10.3	803	11.3	16.1	>36
568	8.96	831	10.7	14.7	>36
569	9.16	758	12.1	13.5	>36
571	8.6	731	9.66	16.7	>36
578	10.6	774	13.3	14	>36
578	5.5	629	12.8	15.5	>36
620	10.5	682	12.3	14.1	>36
620	5.9	1000	13.5	9.1	>36
637	9.8	910	25	12.6	>36
653	9.47	702	15.3	13.5	>36
660	8.1	917	6.9	16.6	>36
660	8.3	935	8.6	12.4	>36
1041	10.1	1830	143	7.8	>36
1135	8.2	755	50	24	>36

All are monofloral manuka according to the 400 mg/kg threshold for 3PLA and meeting the 1mg/kg thresholds for the other three markers

Business/Industry Impact

The impact of this new definition on our business will be significant with some of our very best high MGO honeys failing the DNA test. Of other concern is the fact that just about any NZ honey could be blended with some manuka, kanuka and/or rewarewa to be brought up to the Manuka multifloral standard. This is a widespread industry concern. The whole purpose of the work undertaken by MPI was to define what Manuka honey is and we don't believe the definition is sound enough to do this.

The other pressing impact we are facing right now is that the market has already moved to wanting honey that meets the new definition. There are only two accredited labs that can

do either the DNA testing or the chemical marker testing and there is significant pressure on these labs at the moment. We note that only one of the DNA testing laboratories is providing the testing commercially. Our ability to quickly pack and ship honey has really slowed as a result of this.

List of accredited labs As at 16 May, the accredited labs are:

DNA testing

- Eurofins NZ Laboratory Services Limited (not yet providing the test commercially)
- R J Hill Laboratories Limited

Chemical testing

- R J Hill Laboratories Limited
- Analytica Laboratories Limited

Laboratory Tests

26. Do you support the proposed requirements for sampling and testing mānuka honey set out in Part 6 of the draft GREX?

☒I agree because:

☐ I disagree because:

27. The costs associated with these proposals are likely to vary depending on the size and volume of samples being tested. What impact do you consider these proposals will have on your business?

s 9(2)(a) expects that we will see a 10 fold increase in testing costs associated with the current MPI proposals. If the DNA test were to be dropped, the cost impact would be about 4 fold. Given the cost impact, we will try and minimise the amount of testing that we send to the recognised laboratories and we will continue to do as much testing in-house as possible.

Do you have any suggestions for minimising any impacts?

Drop the DNA test – it's really questionable what value it adds, when it cannot distinguish overseas honey in the first place. It seems to erode value at the present time with the false negatives. **Dropping the DNA test would accelerate the testing lead times and cuts cost by 50%**. Adding an MGO test to replace DNA marker test would solve the problem relatively easily.

Transitional provisions

28. MPI proposes a lead in time of **six weeks** between when the GREX is notified and when it comes into effect. Do you agree or disagree with this proposal?

☒I agree because:

The markets are already requiring the definition to be met and this has effectively slowed down our ability to sell honey. What is really problematic for us is that we can't get the testing of samples with the accredited laboratories turned around fast enough. A six week time frame is only going to exacerbate the squeeze on the accredited laboratories.

☐I disagree and propose an alternative timeframe:

29. MPI proposes stock in trade provisions for honey exported between the date of commencement until six months after the date of commencement. Do you agree or disagree with this proposal?

☐I agree because:

☒I disagree because:

We disagree, we think a 12 month time frame would have been better. Many of the large companies are sitting on significant stocks of honey.

Any other feedback

30. Are there any other parts of this discussion document or the draft GREX that you would like to provide feedback on? (Please indicate which part of the discussion document or draft GREX you are providing feedback on).

MPI has recently verbally stated that it would drop the super unique identifier requirement. Notwithstanding this verbal statement, we have prepared these submissions on the basis of the original document that MPI sought submission feedback.

In terms of the requirements relating to traceability section we have read the APINZ submission, which includes a redrafted Part 4. s 9(2)(a) supports the redraft of that part 4 in line with what has been proposed by APINZ.

With the traceability requirements, the fundamental driver behind significant changes should be whether the honey companies can use technology to bring about costs savings and efficiency and not be forced to adopt changes simply because MPI thinks a change is a good idea. There has to be some business motivation to bring about significant practice changes otherwise compliance and uptake will be very poor.

Appendix 1

Testing done on s 9(2)(b)(ii) – (1 to 4 years old). Results obtained from s 9(2)(b)(ii) for new GREX markers and DNA marker. Pollen analysis by microscopy performed by s 9(2)(b)(ii). All other chemical markers are reported from IANZ accredited labs.

Sample Characteristics				Existing		GREX chemical markers				DNA Marker Method			Classification	Pollen by Microscopy s 9(2)(b)(ii)		
Sample	Season	Drum / Finished Batch	Age when tested	MGO	DHA	4-HPA	2-MB	2-MAP	3-PLA	Manuka DNA (Cq)	Kanuka DNA (Cq)	Internal DNA (Cq)	GREX Classification	Pollen - Manuka %	Pollen - Kanuka %	Classification
1	2014/2015	Drum	2 years	1071	2545	8.2	50	24	755	36.45	31.62	31.17	Non-manuka	10.1	50.8	Manuka/Kanuka Multifloral
2	2015/2016	Drum	1 year	975	2238	10.1	143	7.8	1830	38.13	40	31.59	Non-manuka	86	1.2	Manuka Monofloral
3	2015/2016	Finished Batch	2 years	578	733	5.5	12.8	15.5	629	40	34.55	36.86	Non-manuka	52.9	37	Manuka/Kanuka Monofloral
4	2013/2014	Drum	3 years	660		8.3	8.6	12.4	935	40	37.69	37.55	Non-manuka	73.9	12.8	Manuka Monofloral
5	2016/2017	Finished Batch	2 years	603	1409	9.8	25	12.6	910	>36			Non-manuka	89.5	1.1	Manuka Monofloral
6	2013/2014	Drum	3 years	620		10.5	12.3	14.1	682	38.36	34.53	34.25	Non-manuka	82.1	7.5	Manuka Monofloral
7	2016/2017	Finished Batch	2 years	397	915	7.2	12.2	11	600	>36			Non-manuka	39.6	7.3	Manuka/Kanuka Multifloral
8	2012/2013	Finished Batch	4 years	320		4.4	15.1	16	869	40	32.83	34.22	Non-manuka	53.5	25.1	Manuka/Kanuka Monofloral
9	2012/2013	Finished Batch	4 years	620		5.9	13.5	9.1	1000	40	40	37.77	Non-manuka	51.7	6.4	Manuka Multifloral
10	2012/2013	Finished Batch	4 years	720		6	13.5	9.1	1370	40	40	36.10	Non-manuka	28.7	41.3	Manuka/Kanuka Monofloral
11	2015/2016	Finished Batch	2 years	402	733	7.6	8.1	14.6	597	40	35.3	35.27	Non-manuka	51.2	40	Manuka/Kanuka Monofloral
12	2015/2016	Finished Batch	2 years	357	954	4.7	7	19.2	631	40	35.25	32.59	Non-manuka	51.4	23.9	Manuka/Kanuka Monofloral
13	2015/2016	Finished Batch	2 years	136		3.5	3.7	3.7	280	40	29.94	31.15	Non-manuka	NA	NA	NA

Proposed General Export Requirements for Bee Products

For all exporters of bee products from New Zealand

SUBMISSION FORM

Consultation document 2017

The Ministry for Primary Industries (MPI) proposes to consolidate, clarify, and introduce export requirements for all bee products intended for export.

You are invited to have your say on the proposed changes, which are explained in the discussion document and specified in the draft Animal Products Notice: General Export Requirement for Bee Products notice.

Consultation closes on **13 June 2017.**

How to have your say

Have your say by answering the questions in the discussion document, or commenting on any part of the proposals outlined in the draft Animal Products Notice: General Export Requirements for Bee Products. This submission form provides a template for you to enter your answers to the questions in the discussion document and email your submission back to MPI.

Please include the following information in your submission:

☐ the title of the discussion document 'Proposed General Export Requirements for Bee Products';

☐ your name and title;

☐ your organisation's name (if you are submitting on behalf of an organisation), and whether your submission represents the whole organisation or a section of it; and ☐ your contact details (such as phone number, address, and email).

MPI encourages you to make your submission electronically if possible. Please email your submission to: manuka.honey@mpi.govt.nz

If you wish to make your submission in writing, these should be posted to the following address:

General Export Requirements for Bee Products Submission
MPI Food Assurance Team
PO Box 2526
Wellington 6140

The following points may be of assistance in preparing comments:

☐ where possible, comments should be specific to a particular section in the document. All major sections are numbered and these numbers should be used to link comments to the document;

☐ where possible, reasons and/or data to support comments should be provided;

☐ the use of examples to illustrate particular points is encouraged; and

☐ as a number of copies may be made of your comments, please use a legible font and quality print, or make sure hand-written comments are clear in black or blue ink.

Submissions are public information

Everyone has the right to request information held by government organisations, known as "official information". Under the Official Information Act 1982, information is to be made available to requesters unless there are good or conclusive grounds under the Official Information Act for withholding it.

If you are submitting on this discussion document, you may wish to indicate any grounds for withholding information contained in your submission. Reasons for withholding information could include that information is commercially sensitive, or that the submitters wish personal information such as names or contact details to be withheld. MPI will consider such grounds when deciding whether or not to release information.

Any decision to withhold information requested under the Official Information Act 1982 may be reviewed by the Ombudsman.

For more information please visit http://www.ombudsman.parliament.nz/resources-andpublications/guides/official-information-legislation-guides

Your details

Your name and title:	s 9(2)(a)
Your organisation's name (if you are submitting on behalf of an organisation), and whether your submission represents the whole organisation or a section of it:	s 9(2)(a)
Your contact details (such as phone number, address, and email):	s 9(2)(a)

General questions: getting to know you

1. What part of the supply chain do you operate in:

☒ beekeeper

☐ extractor

☒ processor

☒ packer

☒ exporter

☒ retailer of bee products

☐ other – please specify

2. How long have you been involved in the apiculture industry:

☐ 0-5 years

☐ 5-10 years

☒ 10 + years

☐ not applicable

3. Do you operate under:

☒ an RMP under the Animal Products Act 1999

☐ the Food Act 2014 (Food Control Plan or National Programme)

☐ the Food Hygiene Regulations

☐ none of these

☐ not applicable

4. If you are a beekeeper, how many hives do you currently have:

☐ 0 – 5

☐ 6 – 50

☐ 51 – 500

☐ 501 – 1000

☒ 1001 to 3000

☐ More than 3000

5. What region of New Zealand do you operate in?

Te Awamutu- Apiary base Rangiora- Processing/Packing plant

6. If you export bee products please tell us a little about your business. How many people do you currently employ?

☐ 0

☐ 1 – 5

☒ 6 – 19

☐ 20 or more

What are the roles of your employees and how many are:

☒ beekeepers, 4

☒ processors, 2

☒ packers, 8

☒ other – please specify, 3 (GM, Compliance, Inventory control)

Impact of compliance costs for beekeepers, processors and exporters

7. Table 4.1.1 of the Discussion Document provides a summary of the estimated costs of the proposals. What do you think the overall impact of the new proposals will be on your business?

The cost impact outside of super traceability set-up and maintenance would be relatively low to our business as we employee a full time compliance manager whose responsibility it is to achieve and maintain all required compliance systems for our business.

We sympathise that this is not an industry norm, and can appreciate the compliance requirements and administration of such would greatly add to the workload of many industry businesses.

8. In order to estimate the total cost to industry of the proposals contained in the draft GREX, it would be useful for MPI to understand how many beekeepers, operators and exports of bee products will be affected by the proposals. Please specify which of the proposals listed in the table at 4.1.1 will affect you and how.

Part 4- The implementation of the pre-processing traceability requirements would be the greatest immediate industry cost.

Anodised aluminium tags with barcodes or VR codes are similar cost to RFIDS but far more durable. This would need to be coupled with an NZ-developed field record-keeping software/app. Examples already exist, which costs about $1100 per year (this cost element will not grow with hive numbers). Labour is an additional cost, but tagging supers is a perfect way to utilise staff in the winter months. This software can be allied with smartphones to use in the field, and for many are already an existing business cost.

Most importantly, all these costs and the additional time spent capturing data in the field, would provide businesses with not only traceability, but a raft of unrelated but highly useful hive and production data, to a forensic level. It will also provide quality records of all supplementary hive feeding related to the C4 issues raised elsewhere. Better traceability will be just one of several significant benefits to the business that additional field technology is likely to bring.

Clause 5.4 The test results required for the export certification are twice as much as current costs for pollen count undertaken for each batch.

9. Do you foresee any other costs that will arise from the proposals contained in the draft GREX which are not contained in the table at 4.1.1? If so, how significant do you think these will be

(e.g. administration costs such as time to fill in forms, and time to learn about the new requirements)?

Hidden costs from Clause 5.4 include the requirements of having the test results before packing/labelling product. With laboratory tests taking up to a week currently, this time could increase with regular testing being undertaken and a small number of laboratories accredited to conduct the test. As it stands, a week turnaround means lost production time due to holding product in tanks or double handling to label after results received. A week stand-down is over s 9(2)(b)(ii) in retail sales lost, not inclusive of wages and other operational expenses. Especially as most facilities do not have the space/capacity to hold multiple tanks of finished product to await results to allow for uninterrupted packing based on the proposals in the GREX.

The laboratory test results have been inconsistent to expectations based on pollen count, so theoretical batching is not currently possible.

No additional substances to be present in New Zealand honey

10. To ensure additional substances are not present in New Zealand honey, MPI proposes to prohibit the feeding of bees when honey supers are present on hives for the purpose of collecting honey, with an exception if it is necessary for the survival of the bees. Do you agree or disagree with this proposal?

☒ I agree because:

Food defence is a major consideration of market access and international food safety standards. Measures need to be taken to prevent adulteration of honey, whether accidental or intentional.

Beekeepers have any number of options in the way that they manage their hives. If they accept the benefits of keeping brood frames out of honey supers, they will find ways to adjust their beekeeping to do so. This proposal is not restrictive, and is not a directive as to how beekeepers keep their bees.

☐ I disagree because:

Please suggest any alternatives to this approach that would ensure additional sugars and synthetic chemicals are not present in the honey:

11. To prevent the contamination of honey with varroacide residues, MPI proposes honey is only harvested from honey supers that do not contain honeycomb previously part of a brood nest. Do you agree or disagree with this proposal?

☒ I agree because:

We agree in principle, but believe the wording should be that honey should not harvested from frames with live brood.

☒ I disagree because:

It is impractical to only use comb that has never had brood, as new comb requiring drawing out for honey production greatly reduces the honey yield.

Please suggest any alternatives to this approach that would ensure varroacide residues are not present in the honey.

Best practice guidelines should be established as a reference of what would be acceptable for using currently retired brood frames in honey production (i.e. stand down time where applicable).

Processors of bee products to operate under a risk based measure

12. MPI proposes that processors of bee products for export under the Food Hygiene Regulations must move to a risk-based measure (either an RMP under the Animal Products Act 1999, or Food Control Plan or National Programme under the Food Act 2014). Do you agree or disagree with this proposal?

☒ I agree because:

This ensures best practices are being used and allows for domestic and international confidence in the product.

Comment from overseas partners is that they believe the RMP system to be more robust and prefer this over a facility that is FCP or NP .

☐ I disagree because:

We feel that facilities that export should be RMP, with the Food Control Plans or the National Programme under the Food Act 2014 should be reserved for domestic products.

Please suggest any alternatives to this approach that would provide MPI with oversight of these processors:

If a facility has an external quality system/food safety system certification from an independent 3rd party, their systems will meet the requirements set out in the RMP as they are based upon HACCP.

For those facilities, a reduction of RMP audit frequency could be warranted where evidence of a current certification is held.

Propose for ISO level (9001/22000) that is reduces to a yearly audit, and for GFSI level certification a two yearly audit, as these audit (for all levels) are an annual audit. If a facility fails, then they revert to a six monthly RMP audit until such time as they are recertified.

Bee products to be sourced from listed beekeepers

13. MPI proposes to extend listing requirements to all beekeepers providing bee products for export. Do you agree or disagree?

☒ I agree because:

This is critically important to traceability of honey and assurances of eligibility.

☐ I disagree because:

Can you think of any alternatives to this approach that would address this gap in the traceability chain?

As per the APINZ submission, a revamp of the AFB PMP system could be utilised for this, or this integrated within the E-Cert system (as well as harvest declarations within the system). It could also include the definition test results that labs could report into to reduce administration, and incorrect results being loaded to the ED. Where requirements can be integrated, this makes it easier to manage, reduce administration, and reduces confusion on requirements. Multiple systems with different requirements/technologies can be very confusing to the end users.

Pre-processing traceability requirements

14. MPI proposes beekeepers keep additional records. Do you agree or disagree with this proposal?

☒ I agree because:

We agree in principle as we understand the increasing requirements of market access and steps required within the food chain for food defence as prescribed by international standards.

☒ I disagree because:

The timeframe for implementation is unrealistic, especially at this time of the season. A large operator would require 2-3 years before all supers have been touched (and presume to put identification in place when visited, removed from storage, etc).

Can you think of any alternatives to this approach that would address gaps in the traceability chain?

A staged approach based on hives numbers to implement traceability would be more realistic. Additionally, a template for operators to work to would be helpful for smaller operations.

15. The costs for businesses associated with implementing the proposed traceability requirements are likely to vary depending on their existing systems and processes. What impact do you think these proposals are likely to have on your business?

A system that would minimise the in the field impact requires the use of technology. A database/application to house this would need to be developed and this requires significant cost and time to attract the required experience and expertise to create a system that collects the required information, is simple to use in the field and user friendly.

Traceability from beekeepers to operators – harvest declarations

16. MPI proposes to introduce harvest statement requirements to all beekeepers providing bee products for export. Do you agree or disagree?

☒ I agree because:

The markets we currently supply require us to hold harvest declaration for product. Having this standardised across the industry makes it simpler for everyone.

☐ I disagree because:

Can you think of any alternatives to this approach that ensure full traceability through the bee product supply chain?

An integrated system where this can be raised electronically (and follows each subsequent supply step), would better allow for traceability, and simplify records needing to be held at each individual step in the supply chain.

17. MPI considers, for most businesses, the costs associated with these proposals are unlikely to be onerous. Do you agree or disagree and why?

☐ I agree because:

☒ I disagree because:

To put in place the requirements and not impede hive operations, a robust, but simple system need to be developed. This system is not in existence, and without a central agency (be it MPI or APINZ) developing one, the onus is on each RMP holder to develop/purchase their own system. This is a cost that business will either have to absorb, or develop manually intensive systems that inherently add cost.

Traceability between operators – transfer documentation in AP E-Cert and reconciliation

18. MPI proposes to introduce transfer documentation requirements to all bee products intended for export. Do you agree or disagree?

☒ I agree because:

We understand the overseas market requirements and international quality and food safety system requirements around traceability across the supply chain.

☐ I disagree because:

Can you think of any alternatives to this approach that ensure full traceability through the bee product supply chain?

As suggested by APINZ, do not differentiate between countries requiring official assurance and those that do not. Using the highest standard as the normal simplifies requirements and understanding.

Labelling of monofloral and multifloral mānuka honey

19. MPI proposes to implement the mānuka honey definition for export using the GREX. Do you agree or disagree?

☒ I agree because:

There needs to be a standard that all NZ exporters are held to across the markets. However, this needs to be clearly communicated that this is the government sanctioned definition, as we receive numerous consumer enquiries regarding other company grading systems with the presumption that these are the only government sanctioned “definition” and that other marketed grading systems (whether MPI approved or not) are “fake” Manuka honey.

☐ I disagree because:

Can you think of any alternatives to this approach that ensures mānuka honey is true to label?

We believe that the MPI should have a seal of approval for product that is packaged and labelled in New Zealand under the manuka definition. If a company is found to have adulterated or manipulated honey that does not qualify for the definition, they lose the

ability to use that seal of approval (or to export honey) for a robust period of time, such as 3-5 years, before reapplying for use of the seal.

20. MPI considers there are likely to be options available to businesses to support compliance with the proposed definition (e.g. relabelling, changes to blending practices etc.). Do you agree with this assessment or do you have concerns about ability of some businesses to comply?

☒ I agree because:

We believe that most companies can comply.

☒ I disagree because:

The timeframe to update labels and flush them through the distribution system is 9-12 months.

☒ I have concerns because:

We have concerns regarding the reality of test results in real time processing environments as previously outlined.

21. MPI's proposal may have an impact on existing rights associated with using the word "mānuka" on labels, including registered trademarks. Do you agree with MPI's assessment of the impact on existing rights?

☒ I agree because:

The product should not be part of a company's trademark. A type of product cannot be trademarked.

☐ I disagree because:

22. MPI does not propose to make changes to the current use of grading systems. Do you agree or disagree with this position?

☒ I agree because:

As long as each of the grading systems use outside labs and can produce testing results to back up their claims, they should be allowed to sell them.

☐ I disagree because:

23. What do you think the impact of the mānuka honey definition will be on the current use of grading systems?

It has little impact on our current grading system

24. Do you have any comments on the summary science report?

We have concerns on the measurement of uncertainty, specifically on the 3-PLA. We have received results with a MoU in excess of 20%. We have been informed that 20% is the acceptable MoU for all the chemical markers.
For such a large numerical quantity, and its importance in defining mono vs multi, having a result that has a + or – that can move it into the other category does not provide assurance that either the accuracy is correct on the test or the product is as described.

25. Do you have any further comments regarding the definition of mānuka honey?

We have already received pushback from overseas consumers regarding the validity of the MPI definition. Some of this is as a result of NZ media and industry spokespeople. It is very important that when the definition is complete, that the international media cover it as "The New Zealand Standard for Manuka" and that brands are able to market their products as following this standard, if they follow the tests and pack in NZ. If they do not pack jars in NZ, there is no way for them to test final product at accredited labs that can substantiate that they pass the monofloral test.

Laboratory Tests

26. Do you support the proposed requirements for sampling and testing mānuka honey set out in Part 6 of the draft GREX?

☒ I agree because:

Tests are required to verify adherence to the definition

☒ I disagree because:

The practicalities of testing in real time has not been tested, and the implications of holding a batch to await test results are very costly. As noted above, the MoU does not instil confidence on a theoretical result should one take individual supplied results for a final blended batch.

27. The costs associated with these proposals are likely to vary depending on the size and volume of samples being tested. What impact do you consider these proposals will have on your business?

As outlined, these double the costs per batch already experienced, and as previously voiced, there are hidden costs involved regarding the practicalities of testing in real time.

Do you have any suggestions for minimising any impacts?

Reviewing the MoU for 3-PLA would provide more confidence when creating batches of finished product. Additionally, whilst the final product should be tested, apiaries should provide a test result upon sale (as they do currently for pollen or activity based on how sold), so that processors/packers are not buying on "speculation" that what they are buying meets one definition when it meets the other (or does not comply at all).

Transitional provisions

28. MPI proposes a lead in time of **six weeks** between when the GREX is notified and when it comes into effect. Do you agree or disagree with this proposal?

☐ I agree because:

☒ I disagree and propose an alternative timeframe:

This is impractical from an operations standpoint, and additionally for associated industries, such as printing industry who work on a 2-4 weeks leadtime. Any changes required are greatly inhibited by a 6 week timeframe.

The short time frame adds unnecessary cost to businesses that will already have the impact of other added costs as noted in the requirements. This also does not allow for a full testing of bulk stock onhand against the definition.

Either a 12 month transition period across the industry, or grandfathering bulk product already on hand to the current standards with product transferred/sold to a facility after a later specified date must meet the new definitions. It would not hinder businesses to do an earlier uptake if able, but not penalise those with large stock holdings.

29. MPI proposes stock in trade provisions for honey exported between the date of commencement until six months after the date of commencement. Do you agree or disagree with this proposal?

☒ I agree because:

There needs to be a definitive changeover, but see previous statement regarding lead in time (especially for large bulk stock holdings)

☐ I disagree because:

Any other feedback

30. Are there any other parts of this discussion document or the draft GREX that you would like to provide feedback on? (Please indicate which part of the discussion document or draft GREX you are providing feedback on).

As stated in other areas of this form, there is an erroneous assumption in the overseas markets regarding grading systems as approved/sanctioned NZ governmental definition, and other approved grading systems being fraudulent. Whilst we try to educate that MPI has approved different grading systems for multiple companies, this perception at the consumer level is very difficult to dissuade.

Additionally, feedback already received from publications overseas and their laboratories has been very dismissive. Industry needs assurance that overseas regulators will accept the MPI definition, and have a communication plan through retail/consumer level as having product compared to a very different grading system is reputation damaging. This damages not only the individual business, but the industry as a whole and the image of NZ Inc.

Finally, we want to thank everyone involved for the sheer amount of work put into this. It is a great step forward, as we need a firm definition to protect the identity of Manuka honey. We look forward to working with MPI to move forward with an amended GREX for the best interest of the industry. Please feel free to make contact regarding our opinions and ideas we have put forward in this document.

s 9(2)(a), [Not relevant to request]

From: s 9(2)(a) .com>
Sent: Tuesday, 13 June 2017 12:26 p.m.
To: Manuka Honey
Cc: s 9(2)(a)
Subject: Alternative Manuka honey authentication test method from Eurofins - Proposed general export requirements for bee products
Attachments: Honey_Authenticity_Testing - s 9(2)(a) .pdf; Advantages - s 9(2)(a) .pdf; Publication_1HNMR_ManukaHoney.pdf; Publication_Honey profiling.pdf

Dear MPI,

With the recent public concerns raised regarding the new Mānuka Honey Science Programme, we'd like to propose/suggest an alternative method for Manuka honey authenticity testing for your consideration.

Some tests have already gained ISO17025 accreditation and published in an international peer-reviewed journal. The proposed alternative methods are still measuring the industry accepted Manuka Honey standards including DHA, MGO and leptosperin, by combining the information from these three markers an estimate of the proportion of Manuka can be identified in any given honey.

Please find attached a comprehensive description of the alternative method proposed, Honey: Authenticity Testing, currently offered by s 9(2)(a) and a brief description of its advantages over the proposed new MPI method.

The testing is competitively and comparably priced to the new Mānuka Honey Science Programme, the testing could easily be established in New Zealand laboratories.

We are happy to facilitate a project to trial this methodology on any honey samples in collaboration with MPI, the standard TAT is 7 to 10 days and the quantity of sample required could be as low as one gram.

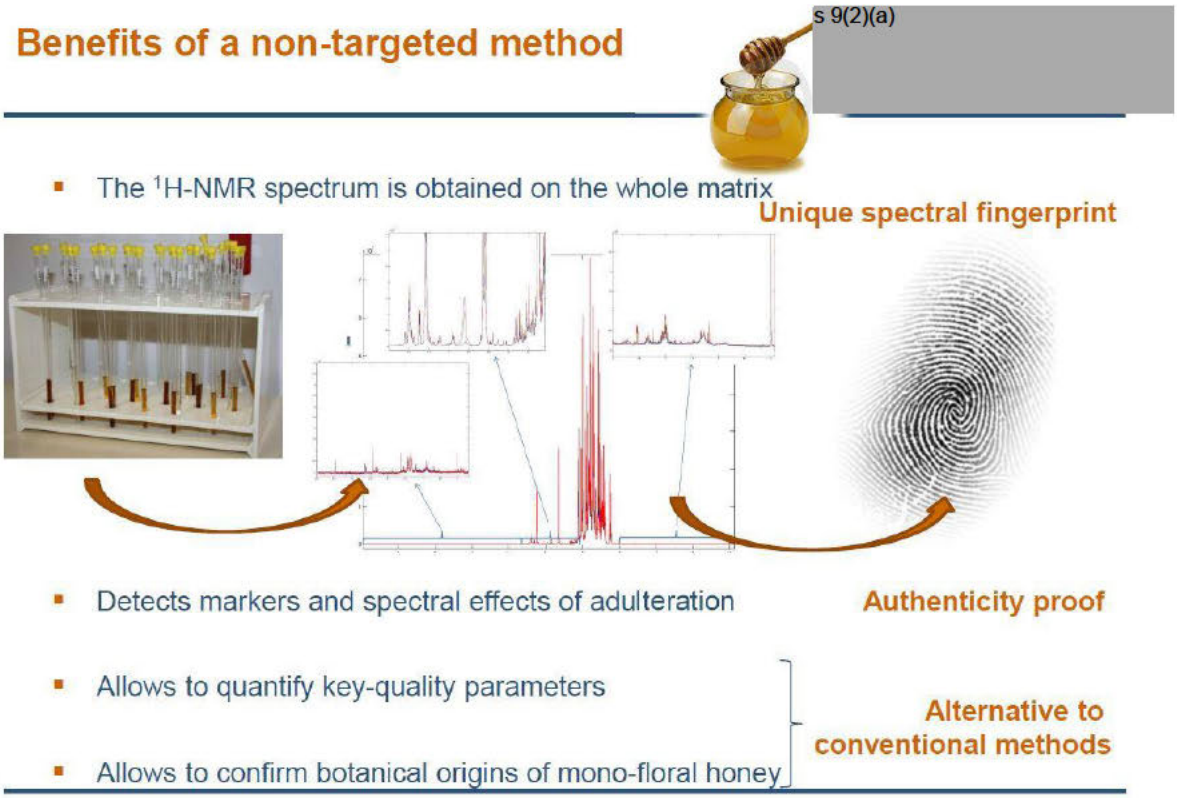
If you are interested in taking this further we can facilitate further contact with the experts from s 9(2)(b)(ii)

Regards,

s 9(2)(a)

s 9(2)(a)

Alternative Manuka honey test method: High Resolution ^{1}H NMR Profiling

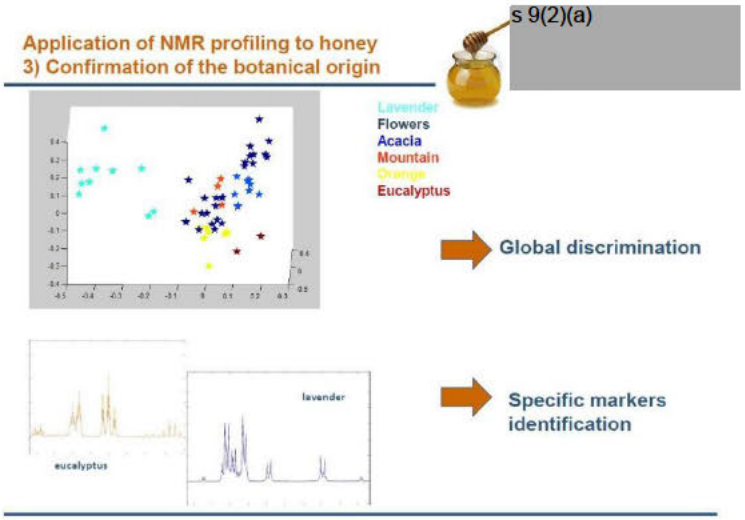


Advantage

Confirmation of the botanical origin

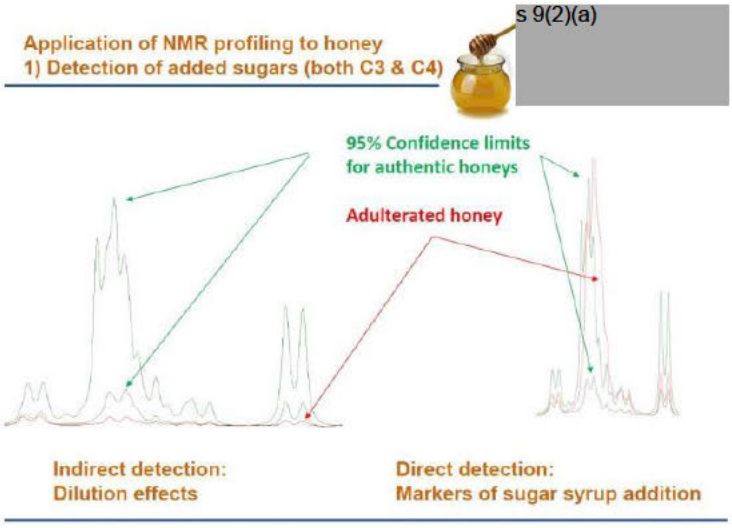
By identifying specific markers, it allows:

- Confirmation of botanical origins of mono-floral honey
- Clear discrimination between Manuka honey sourced from Australia and New Zealand due to the co-occurring signals in the former that were identified as markers of eucalyptus honeys
- Confirmation of the presence of *Leptospermum scoparium* honey
- Differentiating mono-floral Manuka from blends
- Independent from potential pollen manipulations



Authenticity

Global discrimination – detects specific markers and spectral effects of adulteration (e.g. C3 & C4 sugar addition)



Quantification

Allows quantification of key-quality parameters (e.g. DHA, MGO, leptosperin, 5-HMF, glucose, fructose etc)

Access to a global authentic honey database

Over 4000 reference samples from over 100 different botanical families, collected from > 50 countries over 10 years

Identify common spectral characteristics as well as unique spectral fingerprints specific to botanical/geographical origin

High throughput, high reproducibility and accurate results

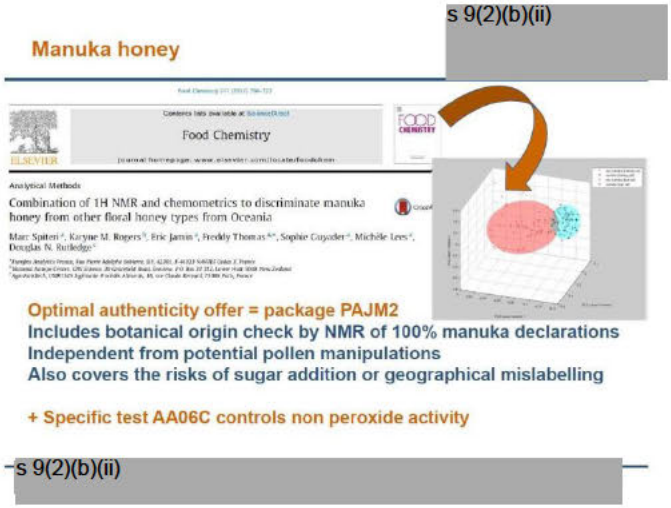
What Eurofins can offer:

1) Test AA06C– non-peroxide antiseptic activity through MGO determination (parameter: DHA, MGO)
2) Test AA0SG – Differentiation of pure Manuka from blends < ISO17025 accreditation>
3) Test PAJM – C13-IRMS (AOAC method) < ISO17025 accreditation>
4) Test A1027 – humidity by refractometer < ISO17025 accreditation>
5) Optimal authenticity Package offer PAJM2 – 3 tests in 1 (test #2-4)

References:

Combination of 1H NMR and chemometrics to discriminate manuka honey from other floral honey types from Oceania. *Food Chemistry* 2017 (217):766-772

Fast and global authenticity screening of honey using ^{1}H-NMR profiling. *Food Chemistry* 2015 (189): 60-66



Update June 2017

s 9(2)(a)

HONEY:
Authenticity testing

Authenticity Competence Centre

s 9(2)(b)(ii)

Contact: s 9(2)(b)(ii)

Context

s 9(2)(a)

- **Honey is one of the « top 10 » products regarding the risk of food fraud, according to an EU report dated 8/10/2013:**

Draft report on the food crisis, fraud in the food chain and the control thereof 2013/2091 (INI)

- **Fewer bee hive survival & lower yields worldwide, but yet global production increase, with large differences in price**

- **The main fraud encountered in honey is sugar addition**

- **Other frauds may concern mislabelling of the botanical and/or geographic origin**

➢ **This slide show aims to describe the state-of-the-art and** s 9(2)(b)(ii) **analytical offer, including recent developments**

Regulatory aspects

s 9(2)(a)

According to the European Honey directive 2001/110/EC:

"Honey is the natural sweet substance produced by Apis mellifera bees from the nectar of plants or from secretions of living parts of plants or excretions of plant-sucking insects on the living parts of plants, which the bees collect, transform by combining with specific substances of their own, deposit, dehydrate, store and leave in honeycombs to ripen and mature.

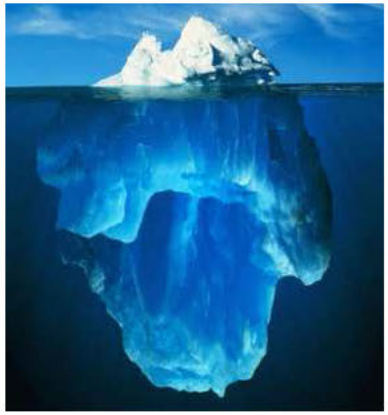
- **Apis Cerena honey not allowed in Europe**
- **Immature honey not allowed**
  (also required by Codex alimentarius)

Our vision of honey market needs

s 9(2)(a)

Analyses must help to enforce regulations & protect brands but:

- Need for a high number of parameters
- Often limited time, and
- Always a limited budget



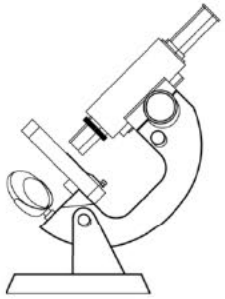
- Targeted analysis efficiency is limited
- A large part of adulterations are still undetectable (e.g. C3 sugar)

Targeted methods…
and ways to circumvent them

s 9(2)(a)

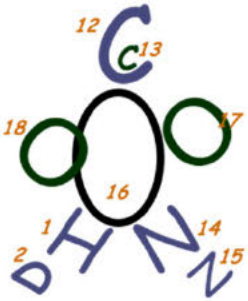
Composition, Physical properties
(exogenous) Enzymatic activities
(sugar) Markers

Ajustables
Inactivation
Elimination



Pollen analysis

Filtration
Mixtrures



Isotopic analysis

« C3 » plants sugar
(rice, wheat, beet)

Need for a more efficient screening tool,
applicable to a large range of potential adulterations

Is LC-IRMS really useful?

s 9(2)(a)

Measures individual isotopic deviations
(delta ^{13}C of major sugars: glucose, fructose, sucrose)

Benefit:
lowers the influence of environmental factors on isotopes

BUT:

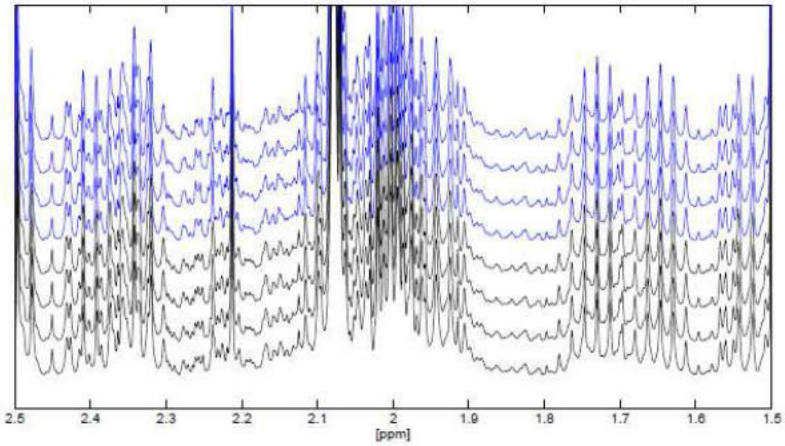
- **The AOAC 13C-IRMS method already includes an internal reference**
  - ➢ **no significant advantage of LC-IRMS for detecting C4 sugar**

- **LC-IRMS does not allow the detection of C3 plant sugar:**
  - ➢ **isotopic deviations of C3 sugar overlap those of honey**
  - ➢ **The ^{13}C values of individual sugars are easily adjustable**

High Resolution ^{1}H NMR

s 9(2)(a)

Observation domain:
from ppm to %



Key Strengths:

- High throughput
- Short Turn-Around Time
- High Reproducibility
- Discrimination power

s 9(2)(b)(ii)

initial publication

Lab 1
Lab 2

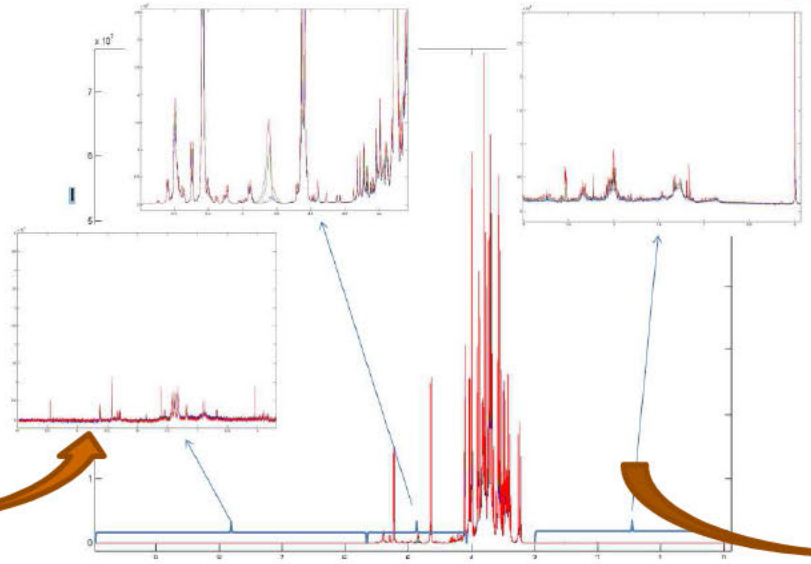
Fast and global authenticity screening of honey using 1H-NMR profiling,
Food Chemistry 2014
DOI: 10.1016/j.foodchem.2014.11.099

Benefits of a non-targeted method

s 9(2)(a)

- The ^{1}H-NMR spectrum is obtained on the whole matrix

Unique spectral fingerprint



- Detects markers and spectral effects of adulteration

Authenticity proof

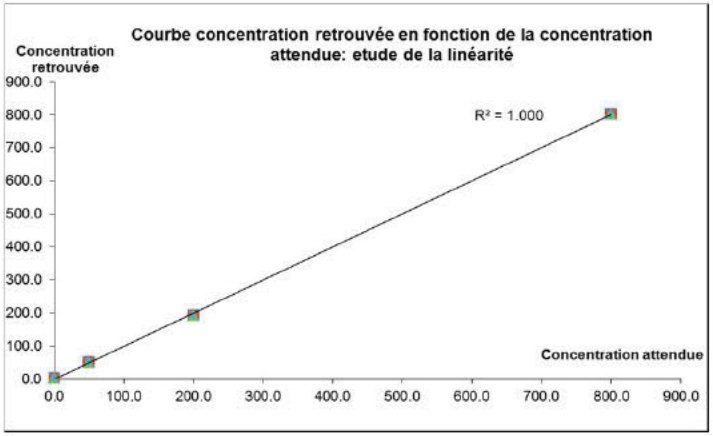
- Allows to quantify key-quality parameters
- Allows to confirm botanical origins of mono-floral honey

Alternative to conventional methods

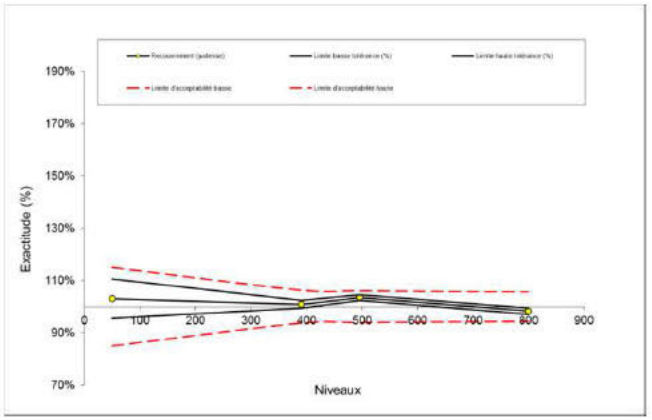
Validation of analytical characteristics according to NF VO3-110

s 9(2)(a)

1. Linearity



2. Accuracy profile



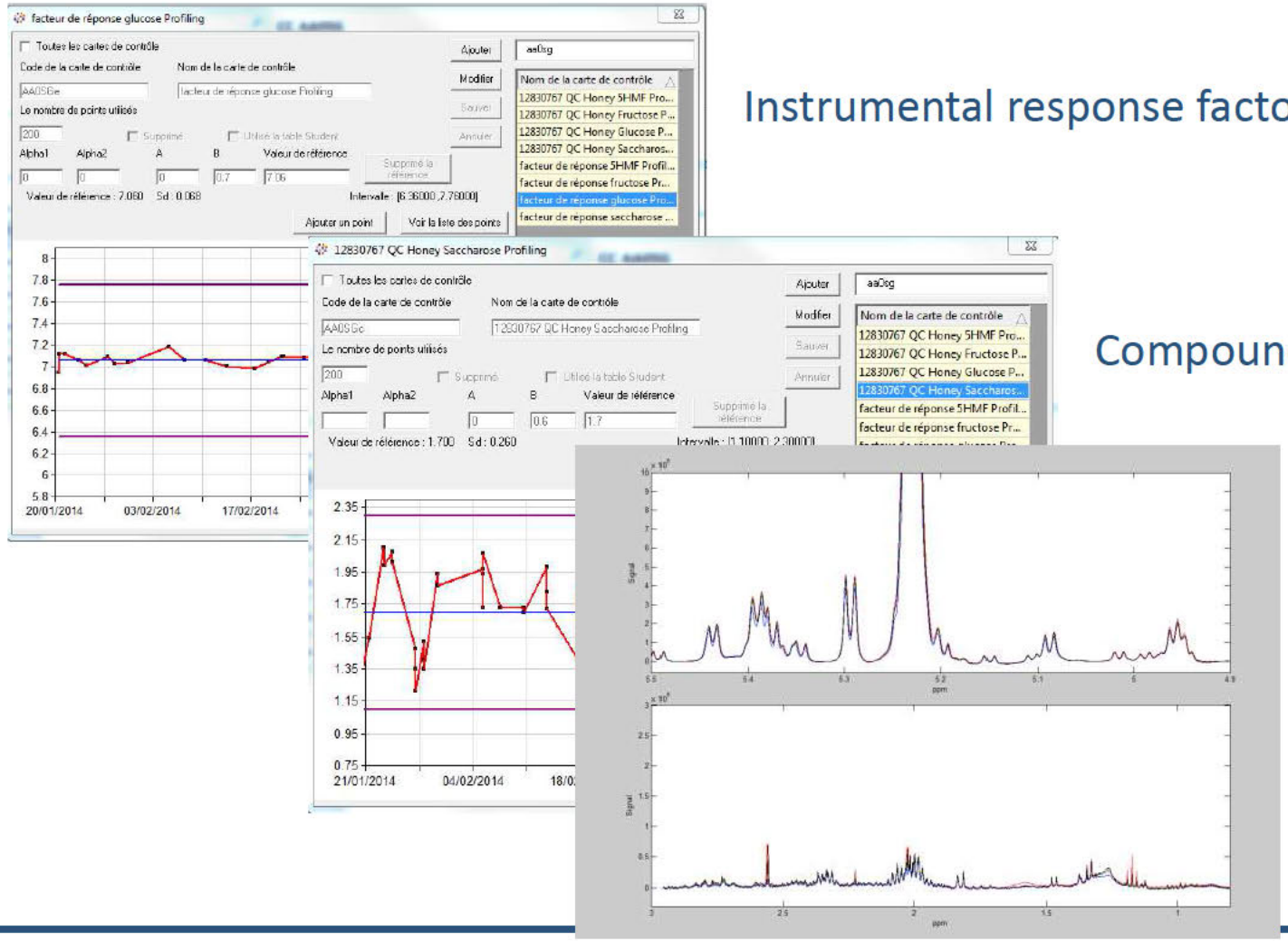
3. Proficiency testing

Sample N°	s 9(2)(b)(ii) results expressed in g/kg	Reference value expressed in g/kg	Z-score
1	335.8	338	-0.22
2	314.7	307	0.77
3	307.3	315	-0.77
4	261.7	257	0.47

Quality Control

s 9(2)(a)

QC charts have been put in place to cover:



Quantified parameters upgrade (June 2015):

s 9(2)(a)

[redacted]

ISO17025 Accreditation*

Test code	Parameter	
AA0SG	Glucose	Compared to statutory limits (EC directive, Codex Alim.)
	Fructose	
	Glucose+Fructose	
	Sucrose	
	5-HMF	
	Fructose/Glucose	Compared to Litterature & databases
	Turanose	
	Citric acid	
	Ethanol	
	Acetic acid	
	Lactic acid	
	Succinic acid	
AA06C	Dihydroxyacetone (DHA)	
	Methylglyoxal (MGO)	

Manuka honey

s 9(2)(b)(ii)

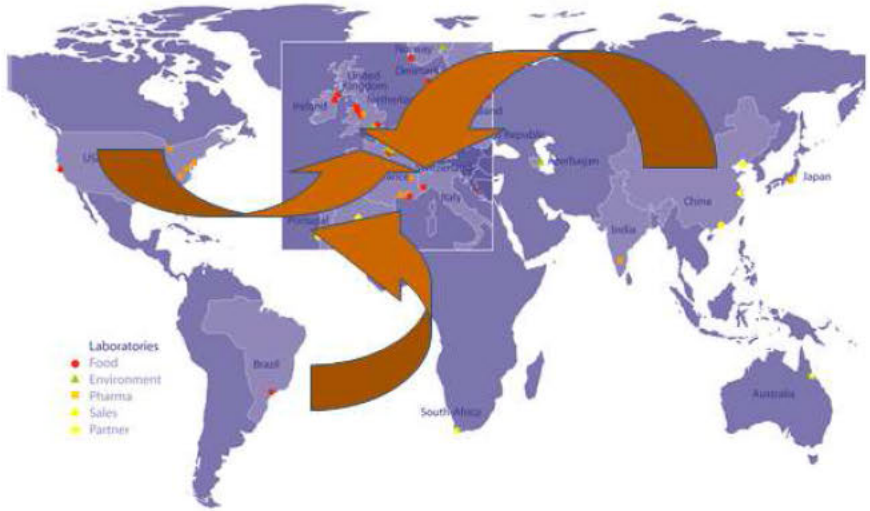
[redacted]

Building a worldwide authentic honey database

s 9(2)(a)

Reference samples : > 4000
>100 different botanical « families »

Collected from local producers
In more than 50 countries worldwide
over more than 10 years (for Europe)

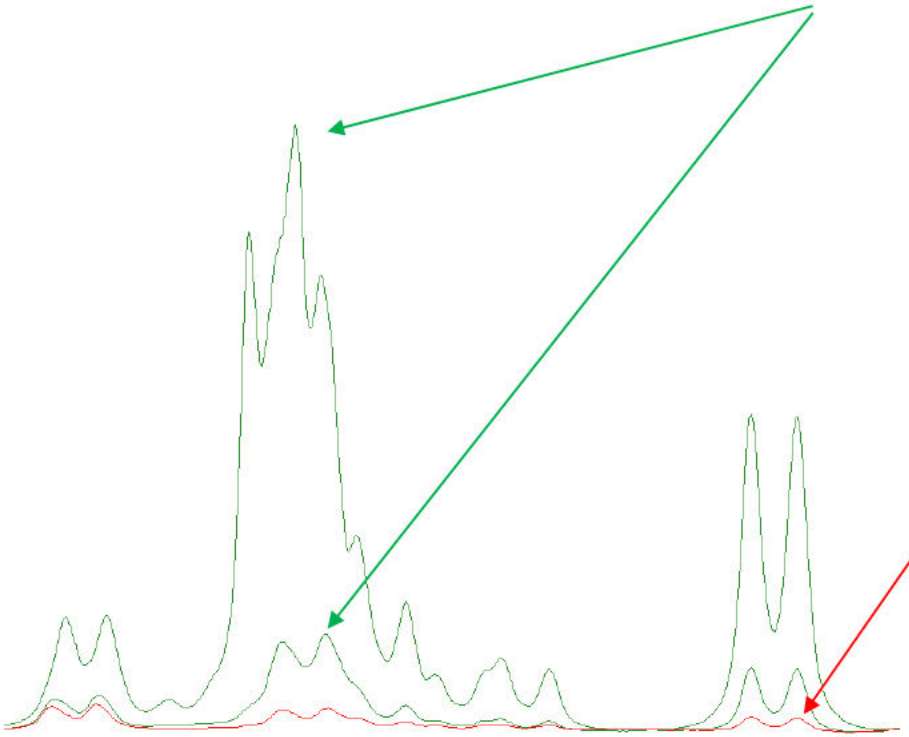


In spite of the diversity of all sources, which allows to differentiate them, honey spectra also possess common spectral characteristics

Our criteria for detecting sugar addition are very conservative and robust across all botanical / geographical origin, thus avoiding false positives

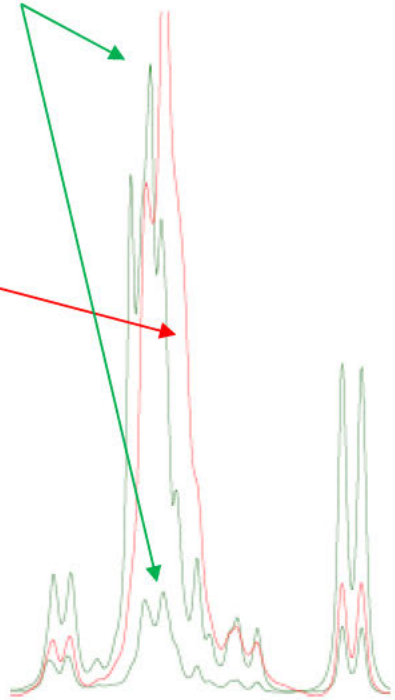
Application of NMR profiling to honey
1) Detection of added sugars (both C3 & C4)

s 9(2)(a)



95% Confidence limits
for authentic honeys

Adulterated honey



Indirect detection:
Dilution effects

Direct detection:
Markers of sugar syrup addition

13

s 9(2)(a)

Comparison of NMR with conventional methods

Spiked samples (addition of a C3 plant sugar syrup):

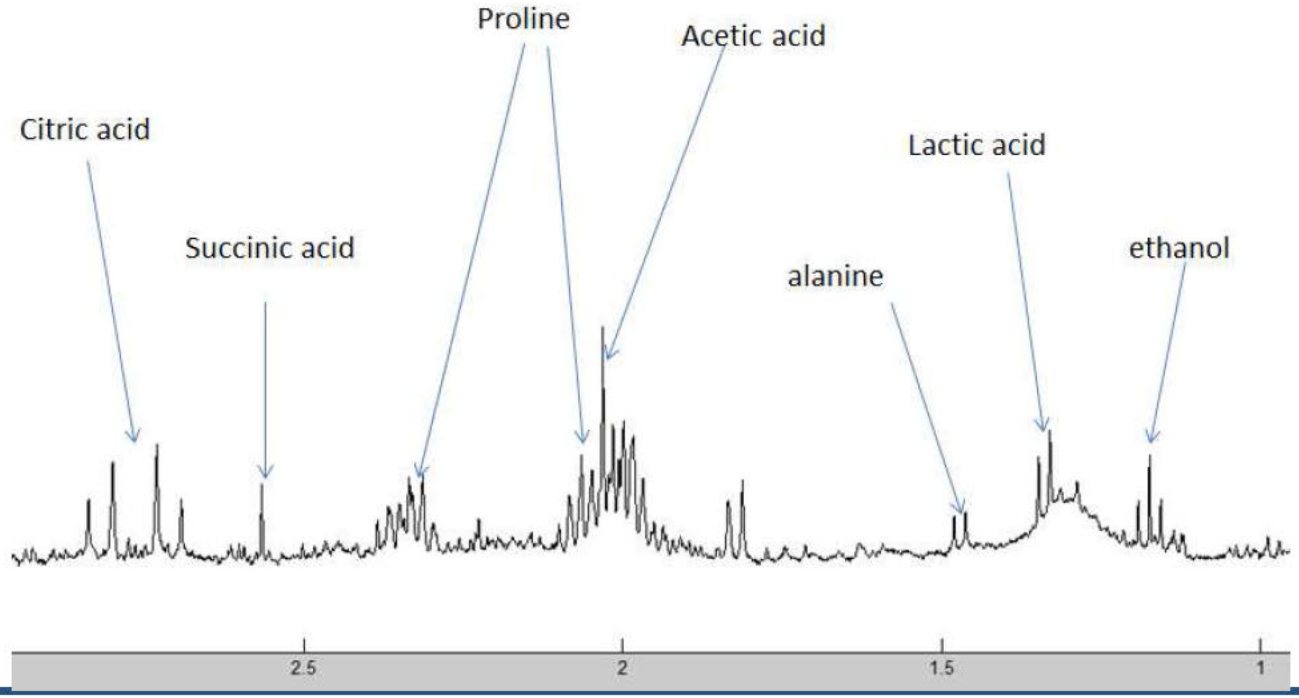
Sample type	Spiked amount (added / total sugar)	Conclusion from NMR profiling s 9(2)(b)(ii)	Conclusion from LC-IRMS (lab X)	Conclusion from foreign enzyme (lab X)	Conclusion from oligosaccharides (lab X)
Acacia (Austria)	**0%**	No added sugar	No added sugar	No added sugar	Oligosaccharides traces, could be due to feeding
Fir (France)	**0%**	No added sugar	No added sugar	No added sugar	No added sugar
Sunflower (Austria)	**10%**	**added sugar**	No added sugar	No added sugar	No added sugar
All flowers (Gatinais, France)	**20%**	**added sugar**	No added sugar	No added sugar	No added sugar
Oak (Spain)	**30%**	**added sugar**	No added sugar	No added sugar	No added sugar

NMR is usually more sensitive, especially when C3 sugar is used

Application of NMR profiling to honey
2) Miscellanous discrepancies

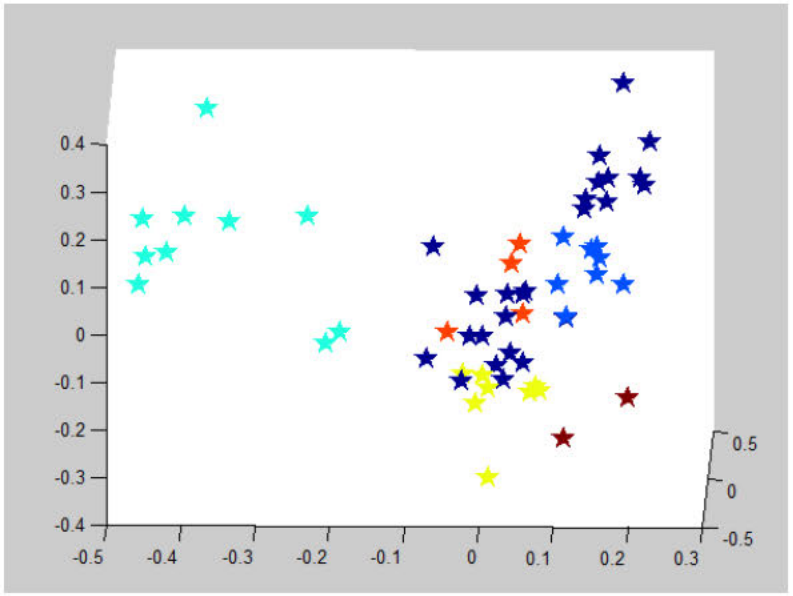
s 9(2)(a)

- Acidification (high citric acid)
- fermentation markers (high acetic, succinic, and/or lactic acid, high ethanol)
- overheating (High 5-HMF)
- Caramel colouring addition



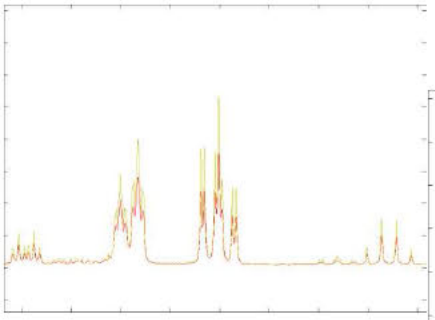
Application of NMR profiling to honey
3) Confirmation of the botanical origin

s 9(2)(a)

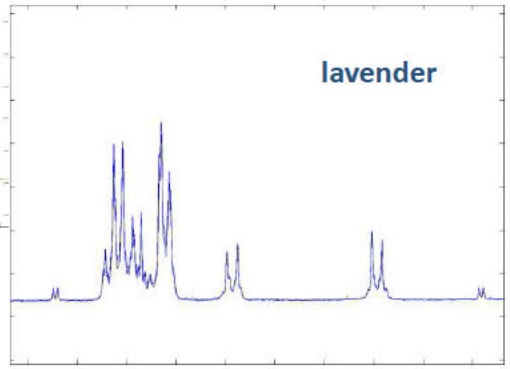


Lavender
Flowers
Acacia
Mountain
Orange
Eucalyptus

→ **Global discrimination**



eucalyptus



→ **Specific markers identification**

Optimal offer = package PAJM2

s 9(2)(a)

Tests included:

- AA0SG (NMR profiling)
- PAJM (C13-IRMS, AOAC method)
- A1027 (Humidity by refractometry)

ISO17025 Accreditation*

Parameters:

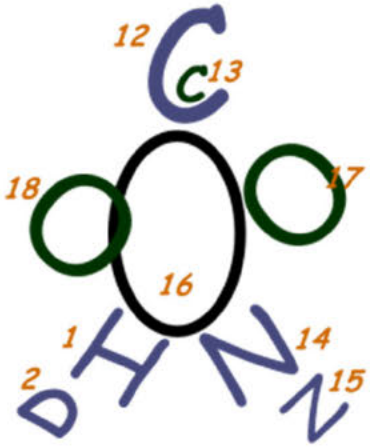
- Composition: Humidity, Glucose, Fructose, Sucrose and 5 HMF
- Isotopes: 13C Honey, proteins and %C4 sugar estimation
- Conclusion regarding the presence of exogenous sugar and/or other discrepancies
- In the case of monofloral honeys: botanical origin control

COVERS the main potential fraud risks

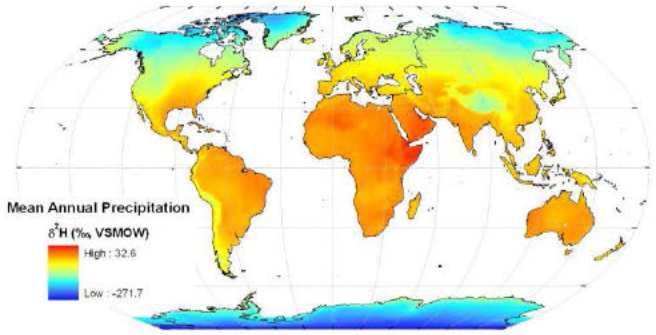
Geographical origin check (Multi-isotope analysis):

s 9(2)(a)

Isotopic fingerprint



Place of production



- Package : PAA4W (^{13}C, ^{15}N, ^{2}H)

ISO17025 Accreditation*

s 9(2)(b)(ii)

Manuka honey

s 9(2)(a)

Food Chemistry 217 (2017) 766–772

Contents lists available at ScienceDirect

Food Chemistry

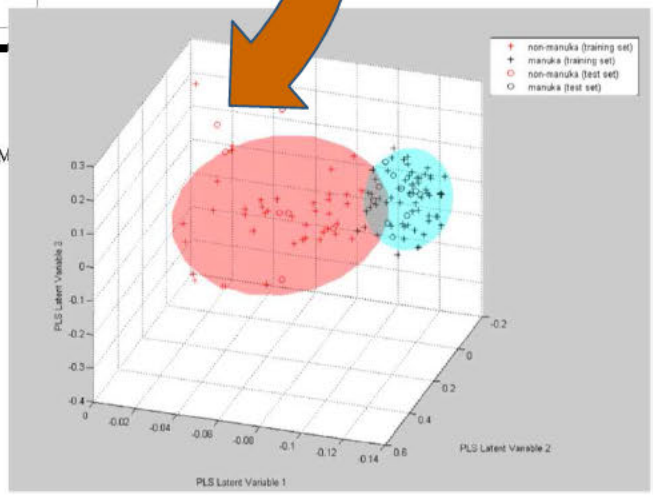
journal homepage: www.elsevier.com/locate/foodchem

Analytical Methods

Combination of 1H NMR and chemometrics to discriminate manuka honey from other floral honey types from Oceania

Marc Spiteri [a], Karyne M. Rogers [b], Eric Jamin [a], Freddy Thomas [a,*], Sophie Guyader [a], Michèle Lees [a], Douglas N. Rutledge [c]

[a] Eurofins Analytics France, Rue Pierre Adolphe Bobierre, B.P. 42301, F-44323 NANTES Cedex 3, France
[b] National Isotope Center, GNS Science, 30 Gracefield Road, Seaview, P O Box 31 312, Lower Hutt 5040, New Zealand
[c] AgroParisTech, UMR1145 Ingénierie Procédés Aliments, 16, rue Claude Bernard, 75005 Paris, France



Optimal authenticity offer = package PAJM2

Includes botanical origin check by NMR of 100% manuka declarations

Independent from potential pollen manipulations

Also covers the risks of sugar addition or geographical mislabelling

+ Specific test AA06C controls non peroxide activity

s 9(2)(b)(ii)

Frequently asked Questions

s 9(2)(a)

1. **Is the detection of added sugars quantitative?**
   - No, because of the variability of adulterants and the fact that the expected result is a spectral range, not a fixed spectrum

2. **Is it possible to identify the source of added sugar**
   - Usually no, because several sources may produce similar effects. When no C4 plant sugar is found by IRMS one can infer the use of C3 plant sugar

3. **Why would people add citric acid to honey?**
   - Citric acid is not deliberately added, but can come as a by-product of sugar syrup processing

4. **Does the occurrence of fermentation markers influence the detection of added sugars?**
   - No, because different parts of the spectrum are used to evaluate these two aspects
   - Similarly ageing, storage & transportation have no effect on these criteria

5. **Why is C13-IRMS still recommended?**
   - Because it has been shown that this test may sometimes be more sensitive than NMR to detect C4 sugar addition, in specific and rare cases

6. **Does winter feeding of bees influence the results?**
   - No it has been demonstrated that the metabolic turnover eliminates the exogenous sugar before the harvest, which must take place during the honey production season

Key take-away messages

s 9(2)(a)

^{1}H NMR technique for routine honey testing

Advantages

- A rapid screening tool
- High reliability
- A lot of information in one analysis
- Increased sensitivity

Limitations

- Matrix/adulterant – dependent detection limit
- Not suitable for minerals, heavy metals, trace contaminants

Recommendations

- Combine NMR and IRMS approaches for optimum authenticity control
- Associate to monitoring plan for suspected contaminants

s 9(2)(b)(ii)

DIVISION,

THIS SUBMISSION REPRESENTS THE VIEWS OF THE s 9(2)(b)(ii) WHICH

EMPLOYS 40 BEEKEEPERS

FARMS 17,000 BEEHIVES

PACKS 500 TONNES OF HONEY FOR THE NZ & EXPORT MARKETS

PLACES 7,000 BEEHIVES INTO KIWIFRUIT ORCHARDS FOR POLLINATION

RAISES UP TO 30,000 QUEEN BEES FOR SALE, MAINLY FOR EXPORT

EXPORTS UP TO 20,000 BEEHIVES IN THE FORM OF PACKAGE BEES EACH YEAR

PROVIDES FREE POLLINATION TO VAST AREAS OF CLOVER

SUBMISSION TO:

MPI CONSULTATION ON MANUKA HONEY DEFINITION
AND PROPOSED GENERAL EXPORT REQUIREMENTS FOR BEE PRODUCTS

General

s 9(2)(b)(ii) agrees with the New Zealand Beekeeping Inc submissions.

Please remember

- Bees in New Zealand, now that we have Varroa mites, rely on NZ beekeepers to keep them alive.
- New Zealand people rely on bees for pollination of most of their food crops.
- New Zealand farmers rely on bees to pollinate their clover to reduce the application of nitrogen fertiliser, which pollutes our environment.
- Bees produce 5 billion dollars to New Zealand's economy in pollination services.
- New Zealand beekeeping must be kept viable.
- Keep new bee diseases out of New Zealand, this will help keep New Zealand beekeeping viable.

Specific comments

Any reference to not extracting from brood combs to be removed. Not the cause of contamination - any restriction on producing honey from brood combs would be very, very, damaging to the Beekeeping Industry. It would greatly effect normal manipulation of beehives and would cost s 9(2)(b)(ii) alone millions of dollars per year.

No marking of honey supers with individual identification. Absolutely no benefit. It can be compared with putting 50 cows in a paddock, milking the cows and putting milk into a vat. We put 50 hives into an area, extract the honey and put it into a tank. The tank becomes the Batch. You cannot trace honey back to a particular hive. You can only trace it back to an apiary or a number of apiaries. The bigger the Batch, the bigger the risk the beekeeper runs, because you test the Batch. If any non-compliant impurities found, then the Batch has to be kept from the market place.

Harvest Declarations are sometimes replaced by internal records which give the appropriate information of being able to trace back any Batch to the apiaries the honey comes from. No change is required in the current controls, they all work well, including the Tutin testing. So making Harvest Declarations the only option adds to beekeepers' administrative costs with no benefit

Suggestions on registering apiaries when they have not been in a location for more than 30 days - this should not apply to paid pollination. It is impossible and very expensive to do with no gain.

Sugar Feeding must be allowed when honey supers are on hives and when there is a honey flow on. E.g. hives in kiwifruit orchards, bush flow on. Hives must be fed to maintain bees on kiwifruit flowers.

Solution: End product to be subject to checking for sugar before sale to the overseas or New Zealand markets. If product fails the sugar test, to be Producers or Packers loss. Likewise, for any other contaminants, in particular Varroa mite treatments.

Do not use the AFB register for anything other than the elimination of AFB

Export assurances

The following countries currently require NZ to provide official assurances:

- China
- Japan
- European Union
- United Arab Emirates
- Korea

Do not increase this list. MPI, please do not be driven by China's or Europe's import requests. Be driven by what is best for New Zealand beekeepers and New Zealand's people and the consumers of our products.

Manuka Honey

Remove pollen analysis completely in determining Manuka Honey, including Pollen DNA.

Marry together information from Ministry for Primary Industries' scientists research and the Unique Manuka Factor Honey Association Inc scientists' research and other world researchers, to come up with a solution to determine what is Manuka Honey and what quality Manuka Honey it is i.e. %. It is important to put markers in place to make sure the consumer gets Product true to label. The markers are to prevent the addition of anything which will turn Manuka honey into Active Manuka honey, or the blending of e.g. Kanuka with other honeys and to be able to call them Manuka. But it is also important to allow the inclusion of some other nectar sources up to a percentage and still be able to call it Manuka honey — see CODEX definition. For example, Kanuka and Manuka often flower at the same time.

What MPI has come up with so far in their proposals, will not be satisfactory to the producers of genuine Manuka honey as some of it will not pass the test and will also allow fraud to take place as it will allow non-Manuka honeys to be sold as Manuka honey. This is not acceptable and will not be acceptable to our world marketers and consumers of Manuka honey. It will cause considerable loss of mana to New Zealand and the New Zealand Beekeeping Industry. There must be a bringing together of all current scientific experts in the world to overcome this problem. At the present moment, a good honey grader (person) could do a far more reliable job of determining Manuka honey than MPI's proposal. Prosecute anybody who is found to be adulterating Manuka Honey to increase its activity.

Overall

The overall approach should be to keep administration costs down, allow the family business to survive by more end point testing and placing the responsibility on the beekeeper if contamination is found in the honey, above the acceptable limit.

Correct traceback, end point testing and beekeepers and packers accepting their responsibility for any product that does not meet legal guidelines, not spending a lot of time operating expensive controls.

Many of MPI's proposals are very onerous and will drive many beekeepers into receivership. Do not enforce your current proposals.

s 9(2)(a)


s 9(2)(a)

Proposed General Export Requirements for Bee Products

For all exporters of bee products from New Zealand

SUBMISSION FORM

Consultation document 2017

The Ministry for Primary Industries (MPI) proposes to consolidate, clarify, and introduce export requirements for all bee products intended for export.

You are invited to have your say on the proposed changes, which are explained in the discussion document and specified in the draft Animal Products Notice: General Export Requirement for Bee Products notice.

Consultation closes on **23 May 2017.**

How to have your say

Have your say by answering the questions in the discussion document, or commenting on any part of the proposals outlined in the draft Animal Products Notice: General Export Requirements for Bee Products. This submission form provides a template for you to enter your answers to the questions in the discussion document and email your submission back to MPI.

Please include the following information in your submission:

☐ the title of the discussion document 'Proposed General Export Requirements for Bee Products';

☐ your name and title;

☐ your organisation's name (if you are submitting on behalf of an organisation), and whether your submission represents the whole organisation or a section of it; and

☐ your contact details (such as phone number, address, and email).

MPI encourages you to make your submission electronically if possible. Please email your submission to: manuka.honey@mpi.govt.nz

If you wish to make your submission in writing, these should be posted to the following address:

General Export Requirements for Bee Products Submission
MPI Food Assurance Team
PO Box 2526
Wellington 6140

The following points may be of assistance in preparing comments:

☐ where possible, comments should be specific to a particular section in the document. All major sections are numbered and these numbers should be used to link comments to the document;

☐ where possible, reasons and/or data to support comments should be provided;

☐ the use of examples to illustrate particular points is encouraged; and

☐ as a number of copies may be made of your comments, please use a legible font and quality print, or make sure hand-written comments are clear in black or blue ink.

Submissions are public information

Everyone has the right to request information held by government organisations, known as "official information". Under the Official Information Act 1982, information is to be made available to requesters unless there are good or conclusive grounds under the Official Information Act for withholding it.

If you are submitting on this discussion document, you may wish to indicate any grounds for withholding information contained in your submission. Reasons for withholding information could include that information is commercially sensitive, or that the submitters wish personal information such as names or contact details to be withheld. MPI will consider such grounds when deciding whether or not to release information.

Any decision to withhold information requested under the Official Information Act 1982 may be reviewed by the Ombudsman.

For more information please visit http://www.ombudsman.parliament.nz/resources-and-publications/guides/official-information-legislation-guides

Your details

Your name and title:	s 9(2)(a)
Your organisation's name (if you are submitting on behalf of an organisation), and whether your submission represents the whole organisation or a section of it:	s 9(2)(a)
Your contact details (such as phone number, address, and email):	s 9(2)(a)

General questions: getting to know you

1. What part of the supply chain do you operate in:

   ☒ beekeeper

   ☐ extractor

   ☐ processor

   ☒ packer

   ☒ exporter

   ☒ retailer of bee products

   ☐ other – please specify

2. How long have you been involved in the apiculture industry:

   ☐ 0-5 years

   ☒ 5-10 years

   ☐ 10 + years

   ☐ not applicable

3. Do you operate under:

   ☐ an RMP under the Animal Products Act 1999

   ☒ the Food Act 2014 (Food Control Plan or National Programme)

   ☒ the Food Hygiene Regulations

   ☐ none of these

   ☐ not applicable

4. If you are a beekeeper, how many hives do you currently have:

   ☐ 0 – 5

   ☐ 6 – 50

   ☒ 51 – 500

   ☒ 501 – 1000

   ☐ 1001 to 3000

   ☐ More than 3000

5. What region of New Zealand do you operate in?

Northland

6. If you export bee products please tell us a little about your business. How many people do you currently employ?

   ☐ 0

   ☒ 1 – 5

   ☐ 6 – 19

   ☐ 20 or more

   What are the roles of your employees and how many are:

   ☒ beekeepers

   ☐ processors

   ☐ packers

   ☒ other – please specify

Impact of compliance costs for beekeepers, processors and exporters

7. Table 4.1.1 of the Discussion Document provides a summary of the estimated costs of the proposals. What do you think the overall impact of the new proposals will be on your business?

Already registered as a beekeeper proving bee products for export

8. In order to estimate the total cost to industry of the proposals contained in the draft GREX, it would be useful for MPI to understand how many beekeepers, operators and exports of bee products will be affected by the proposals. Please specify which of the proposals listed in the table at 4.1.1 will affect you and how.

Clause 3.3

9. Do you foresee any other costs that will arise from the proposals contained in the draft GREX which are not contained in the table at 4.1.1? If so, how significant do you think these will be (e.g. administration costs such as time to fill in forms, and time to learn about the new requirements)?

Cost of testing will increase drastically for us

No additional substances to be present in New Zealand honey

10. To ensure additional substances are not present in New Zealand honey, MPI proposes to prohibit the feeding of bees when honey supers are present on hives for the purpose of collecting honey, with an exception if it is necessary for the survival of the bees. Do you agree or disagree with this proposal?

☒ I agree because:

I fully agree, absolutely no feeding should happen once the honey supers are present.

☒ I disagree because:

However, for Pollinators they have to feed their bees in order to stimulate brood rearing and increase the number of bees ready for pollination.

Please suggest any alternatives to this approach that would ensure additional sugars and synthetic chemicals are not present in the honey:

I am really not sure how MPI could manage the supervision and the prohibition of feeding bees. There is however a test (C4) to calculate the amount of sugar in the honey.

11. To prevent the contamination of honey with varroacide residues, MPI proposes honey is only harvested from honey supers that do not contain honeycomb previously part of a brood nest. Do you agree or disagree with this proposal?

☒ I agree because:

☐ I disagree because:

Please suggest any alternatives to this approach that would ensure varroacide residues are not present in the honey.

We have been using treatments that are engineered for another environment and not adequate for our environment. New Zealand Apiculture Industry should be leading in that front, in term of research and finding a suitable verroa treatment that takes into account our unique eco-system.

We need to find either, a way to eliminate the verroa collectively through education and regional treatment calendar, or find an alternative organic way.
.

Processors of bee products to operate under a risk based measure

12. MPI proposes that processors of bee products for export under the Food Hygiene Regulations must move to a risk-based measure (either an RMP under the Animal Products Act 1999, or Food Control Plan or National Programme under the Food Act 2014). Do you agree or disagree with this proposal?

☐ I agree because:

☐ I disagree because:

Please suggest any alternatives to this approach that would provide MPI with oversight of these processors:

Bee products to be sourced from listed beekeepers

13. MPI proposes to extend listing requirements to all beekeepers providing bee products for export. Do you agree or disagree?

☒ I agree because:

☐ I disagree because:

Can you think of any alternatives to this approach that would address this gap in the traceability chain?

Pre-processing traceability requirements

14. MPI proposes beekeepers keep additional records. Do you agree or disagree with this proposal?

☒ I agree because:

☒ I disagree because:

Depends how far this pre-processing tracebility goes. Super level? Frame level? Every hive contain history of its creation until it dies. However, the traceability of honey from supers really depend so many variables and stakeholders that are just outside the beekeeper control. Unless if the beekeeper owns the whole supply chain from supers/extraction/p[packaging/ to export, it is a logistical nightmare.

Can you think of any alternatives to this approach that would address gaps in the traceability chain?

We already have declaration forms on traceability of honey from sites pre-and post processing of the honey.

15. The costs for businesses associated with implementing the proposed traceability requirements are likely to vary depending on their existing systems and processes. What impact do you think these proposals are likely to have on your business?

Huge cost will be involved. We already have a system in place to trace every hive and every site. However , the traceability of honey from super depend on many other variables and stakeholders.

Traceability from beekeepers to operators – harvest declarations

16. MPI proposes to introduce harvest statement requirements to all beekeepers providing bee products for export. Do you agree or disagree?

☒ I agree because:

☐ I disagree because:

Can you think of any alternatives to this approach that ensure full traceability through the bee product supply chain?

17. MPI considers, for most businesses, the costs associated with these proposals are unlikely to be onerous. Do you agree or disagree and why?

☐ I agree because:

☒ I disagree because:

Honestly, the cost of beekeeping sky rocketed in the last three years to even maintaining the hives, if these cost increase further by purely administrative purposes, we won't have any industry and will be operated by few big international corporates. It will affect dramatically the hobbyists and small commercial beekeepers, these are the backbone of the industry in New Zealand.

Traceability between operators – transfer documentation in AP E-Cert and reconciliation

18. MPI proposes to introduce transfer documentation requirements to all bee products intended for export. Do you agree or disagree?

☒ I agree because:

☐ I disagree because:

Can you think of any alternatives to this approach that ensure full traceability through the bee product supply chain?

Labelling of monofloral and multifloral mānuka honey

19. MPI proposes to implement the mānuka honey definition for export using the GREX. Do you agree or disagree?

☒ I agree because:

I fully understand the need and importance to separate the two, however I disagree,

☐ I disagree because:

The level of MG present in the honey and its benefits made the Manuka a high premium product. Manuka honey without any sufficient MG content is just like other honey. I am not sure if we looking at the right solution to protect our industry.

Can you think of any alternatives to this approach that ensures mānuka honey is true to label?

20. MPI considers there are likely to be options available to businesses to support compliance with the proposed definition (e.g. relabelling, changes to blending practices etc.). Do you agree with this assessment or do you have concerns about ability of some businesses to comply?

☐ I agree because:

☐ I disagree because:

☒ I have concerns because:

Yes it will affect beekeepers producing honey and make it ready for export and maybe less so if just buying honey and exporting it. Two different category, we fit in the first one, and will have huge impact on us financially.

21. MPI's proposal may have an impact on existing rights associated with using the word "mānuka" on labels, including registered trademarks. Do you agree with MPI's assessment of the impact on existing rights?

☐ I agree because:

☐ I disagree because:

22. MPI does not propose to make changes to the current use of grading systems. Do you agree or disagree with this position?

☐ I agree because:

☒ I disagree because:

Separating the main ingredient (MG Content) that makes the Manuka so popular and premium. Manuka without its rating is just like any other honey from any other country.

23. What do you think the impact of the mānuka honey definition will be on the current use of grading systems?

It will have a huge impact on honey produced in New Zealand as export. I am expecting export revenue to drop dramatically, and less investments and hence fewer jobs, and more administrate, you separating the main ingredient that makes the Manuka so popular and premium. Manuka without its rating is just like any other honey from any other country.

24. Do you have any comments on the summary science report?

25. Do you have any further comments regarding the definition of mānuka honey?

Laboratory Tests

26. Do you support the proposed requirements for sampling and testing mānuka honey set out in Part 6 of the draft GREX?

☒ I agree because:

Yes I agree for the need something has to be carried out to protect our value product however I disagree

☒ I disagree because:

This is new research. I really believe it is too soon to be a decisive scientific finding. Any research should be allowed to be cited first and undertaken by new researchers and scientist in the field to have any merits.

I am sure you are aware that all these chemical requirements could be artificially replicated. In my humble opinion, it is a very short lived solution.

27. The costs associated with these proposals are likely to vary depending on the size and volume of samples being tested. What impact do you consider these proposals will have on your business?

We are small commercial beekeepers, we roughly test just between 100-150 tests a year. The cost of beekeeping in general and compliance is already sky high and we feel we are being squeezed out from the industry.

Do you have any suggestions for minimising any impacts?

All this hard work and energy spend to make our industry accountable and trustworthy, will be undermined by some exporters wishing to export their bulk honey in drums. In my simple opinion, it would be better for MPI to encourage exporter to export honey packed in NZ, and introduce restrictions on exporting honey in drums. I believe this is where trust problem arises. Where honey drums from NZ, after successfully passing the stringent of tests in this planet end up blended with local honey and sold a Pure New Zealand Manuka Honey.

In addition to this problem, we noticed in the last few years that not only some large company exclusively employ foreigners as beekeepers in NZ, but now, a simple job creation is being hampered by company wishing to export as bulk. Maybe one day New Zealand will be importing our Manuka!

Transitional provisions

28. MPI proposes a lead in time of **six weeks** between when the GREX is notified and when it comes into effect. Do you agree or disagree with this proposal?

☐ I agree because:

☒ I disagree and propose an alternative timeframe:

The Proposal affected so many of us in term of selling or buying honey. And we have invested our budget to see the year through with testing/packaging and labelling. 6 weeks, is really not enough. Ideally it should always coincide with the financial year to allow company for budgeting and planning ahead. Maybe at the half financial year. Maybe September? Or six months.

29. MPI proposes stock in trade provisions for honey exported between the date of commencement until six months after the date of commencement. Do you agree or disagree with this proposal?

☒ I agree because:

This should be the same period for as question 28.

☐ I disagree because:

Any other feedback

30. Are there any other parts of this discussion document or the draft GREX that you would like to provide feedback on? (Please indicate which part of the discussion document or draft GREX you are providing feedback on).

SUBMISSION

From	Unique Mānuka Factor Honey Association Inc (UMFHA)
Date	13/06/2017
Contact	enquiry@umf.org.nz
Subject	This document from the UMFHA responds to the call for submissions by the Ministry for Primary Industries (MPI) regarding its proposed definition and export requirements for Mānuka honey.
To	General Export Requirements for Bee Products Submission MPI Food Assurance Team PO Box 2526 Wellington 6140 mānuka.honey@mpi.govt.nz

Key Principles

Consumers, customers, in-market regulators and the wider industry all support the introduction of a robust, science-based definition to identify and verify authentic, genuine Mānuka honey – as being sourced from the nectar of Leptospermum scoparium.

Ultimately, consumers need to be able to make an informed choice, confident in the authenticity and integrity of the product as described, and that it is 'true to label'.

Best practice science, together with the accumulated expertise, knowledge and experience available within the industry has identified effective and efficient technologies, and methodologies to achieve a robust science-based definition.

The UMFHA fully supports MPI's goal to define what is Mānuka honey and recognises the importance of the Ministry as being the competent authority in this regard.

Executive summary

1) MPI has not delivered a robust, science-based definition and, accordingly, has not delivered against its own mandate in the first instance. Nor has it effectively taken the opportunity to provide a platform for growth and protection of this iconic New Zealand taonga.
2) MPI did not undertake an effective consultative process with industry or internationally recognised researchers. Furthermore, the science underpinning the proposed definition and standard is still not available to interested and affected parties, compromising the potential value of public submissions requested for consideration.
3) The MPI science team have introduced fundamental flaws into their science programme – inherent in their sampling plan, methodology, use of samples for the modelling, and selection of markers that require the current proposed model to be reworked.
4) The definition and standard being proposed is not in line with consumers' expectations and the growing body of evidence held by internationally recognised researchers.
5) The definition and standard being proposed encourages and facilitates opportunistic blending and/or supplementing blending by adding chemicals and/or protein to meet the proposed definition. This has the effect of increasing the amount of honey that is then able to be defined and sold as Mānuka, according to MPI's specifications.
6) The proposed definition and standard nominates chemical markers which are abundant and characteristic in multiple other native mono-floral honey types. As a result, it measures components from more than just Mānuka, therefore, placing the New Zealand industry at risk in terms of integrity and potentially accusations of food fraud.

Executive Summary Explained

1. **Growth and Protection**

    a. **Not delivering a robust science-based definition (more than Mānuka)**

    The scope of the MPI science programme was specifically stated as Mānuka honey as derived from Leptospermum scoparium, and Mānuka honey from New Zealand when sold as a food. **Appendix A** clearly expresses that the outcome of the MPI science programme and, accordingly, the proposed definition and standard is not in line with the scope, in that the definition and standard can include other monofloral honeys. This must be reworked before release. As per Codex discussions:

    "*The EUMS believe that the potential for misleading the consumer is greatly increased by this proposed manipulation of food names and that attempts to manipulate food names for the purpose of marketing are not in the interest of consumers and a waste of resources. The EUMS is of the opinion that such an approach would go against the objective of Codex to promote fair practices in the food trade"*[i].

    b. **Grading**

    Focusing only on the science and excluding wider industry and economic strategic initiatives has resulted in a definition that is out of touch with the Government's own productivity and growth programmes. Examples of this include the PGP scheme and the Maori Agribusiness Mangapapa B2 Mānuka Honey Project. These projects are based on financial modelling that assumes market returns for Mānuka honey which is effectively graded and sold on a level playing field in market. Failure to take the opportunity to underpin these projects within the definition severely undermines these opportunities and investments by the Government and those people and organisations that it is in partnership with. The Association would see it as appropriate that MPI, although not managing grading systems, provides some basic guidelines e.g. that the grading is unique and specific to the monofloral honey, is measurable, and remains true for the stated shelf life of the product.

2. Consultative process

To undertake any scientific programme, especially one that is intended to have direct outcomes on an industry, regional economies and communities, without making the science available for open to consultation is a fundamental shortcoming and flaw in the process. The wider New Zealand industry, along with stakeholders in key territories, has collectively worked on 'what is Mānuka' over decades. Of particular significance is the work done over the past five years by the UMFHA as part of its 'Mānuka ID' project. This project provides a model for international collaboration, and has produced a significant body of knowledge and published outcomes that were not given proper consideration by the MPI science team. Genuine consultation is a two-way process – it does not involve dismissing alternative options. Instead it aims to engage fully in discussion, is open to counter-arguments and engages in constructive dialogue. A clear failure of the MPI programme has been explicitly excluding external knowledge such as help with sense-testing results within its own data (see appendix). As an example, the false negatives for high DHA/MGO honey should have served as an early warning that there were inherent errors in the DNA test method.

To the best of our knowledge, no Economic Impact Assessment has been undertaken in respect of the proposed definition and standard.

3. Scientific flaws

Sampling programme

Upon review, MPI's sampling programme has many flaws. It has not accounted for the variation in 3-PLA by region, while some regions are not represented sufficiently and some others are missing entirely. MPI has freely admitted that it did not have enough Kānuka samples. This is clearly problematic, as it is one of the most dominant contaminants of Mānuka honey.

This sampling issue could easily be solved by combining the data sets from MPI and the UMFHA, which we have previously offered to supply.

Samples used for the CART model

The CART peer review paper released to industry states:

> *"Ideally, the level of misidentification of honey samples in the training dataset could be quantified, but this is not practical or possible given the variety of approaches used by suppliers to identify the floral source of a honey sample. This would need to be the aim of an entirely independent research project as the misidentification of honey samples would be dependent on supplier, honey type and region."*

We do not agree with the above that it is impractical or impossible. The UMFHA and others have the necessary experience to assist in this regard, and do not agree with MPI's view that: *"The peer reviewers did not identify any major causes of concern".* The potential misidentification of samples included in the training set is a major cause for concern, especially when the attributes MPI have chosen are likely to result in Kānuka honey being wrongly classified as monofloral Mānuka honey.

Use of markers

The use of chemical markers that are present in honeys of multiple floral sources, particularly 3-PLA, does not provide a robust definition of Mānuka. There are multiple other characteristic markers that are unique to and abundant in Mānuka that can and should be used to effectively and cost efficiently differentiate Mānuka from other honeys.

The CART model

Independent, expert external review:

> "*…as far as discriminating between monofloral and multifloral goes, the results look pretty rubbish, with only 23% of multifloral honey correctly classified and more than half classified as monofloral. The report claims this as something to be proud of: "Importantly, 56 percent of honey classified as multifloral mānuka by the supplier was identified as monofloral mānuka using the criteria."*

They seem to be saying that their model is better than the suppliers' original identification. If this was the case then the data they have used for training is unreliable, and wouldn't it actually be far more likely that a supplier would claim monofloral when it was in fact multifloral rather than the other way around? ...I think they have shown that it is NOT possible to separate monofloral and multifloral Mānuka honey using their criteria".

Use of DNA

The use of DNA has proven problematic. It currently is at the limit of detection, the validation required for testing is complex and costly, and it adds very little to the CART model. By removing this and adding more appropriate chemical markers the model will be strengthened. There is evidence in published papers that the DNA will denature in honeys with high MGO. MPI's failure to provide evidence via stability trials to the contrary is a major weakness of its scientific programme.

4. Consumer expectations

The Ministry's definition and standard is a shift away from consumer and industry expectations. It is clear that the Ministry has focused on specific elements of the science. However, the growth of the industry has been based on the unique properties that are inherent in Mānuka that the consumer has come to know, value, and expect, and accordingly is prepared to pay more for. The disconnect between consumer expectations and current general grading, particularly where the markers used are abundant in other honeys, will more than likely continue the misrepresentation of various grading systems. Article 7 (c) of EU FIC states that: "*Food information shall not be misleading, particularly: (c) by suggesting that the food possesses special characteristics when, in fact, all similar foods possess such characteristics in particular by specifically emphasising the presence or absence of certain ingredients and/or nutrients".*

5. Opportunistic blending /adulteration

Blending

Testing undertaken in MPI accredited laboratories according to the proposed definition and standard confirms that when, for example, two different honey samples duly assayed individually as being non-Mānuka products are blended the resultant single sample is confirmed as being mono-floral Mānuka. This outcome will clearly be indefensible in international markets.

The Association contracted approved laboratories to test samples, according to the proposed definition and standard, held at Global Proficiency and which have a clear chain of evidence. We tested two independent samples and they both come back as non-Mānuka. We then mixed the two samples at Global Proficiency (who are very experienced in creating a homogenous blend) and sent them to an approved laboratory. Both samples came back as being confirmed Mānuka honey. This affirms the work done by Dr Jonathan Stephens on the effect of blending[ii]. The UMFHA has a strongly held view that the use of markers that are not dominantly characteristic of Mānuka encourages opportunistic blending. This is a fundamental flaw of MPI's science programme which is why the proposed definition and standard must not proceed. As a result, the negative economic exposure this could create for not only the honey industry but all New Zealand primary products is high.

Protection Against Adulteration

The proposed set of chemical markers and DNA testing creates an 'open-door' opportunity for adulteration by unscrupulous individuals. Of particular concern is the use of 3-PLA which, as the dominant marker in the proposed definition, can easily be added to shift a honey from being defined as non-Mānuka to either multi-floral or monofloral Mānuka or from multi-floral to mono-floral Mānuka. MPI has stated that it will be screening for the importation of such potential adulterants. This is an 'ambulance at the bottom of the cliff' approach and would have the effect of wasting taxpayers' funds and tying up valuable Government staff resources. Furthermore, there is the potential for some key markets to be closed and the reputation of the industry severely damaged should it be reported that anyone is found adding chemical markers into honey products.

The industry has already identified and established the efficacy of several markers that are unique, characteristic and abundant. They are also complex and difficult to synthesise and can be protected for the wider industry. Having focussed only on readily available markers, MPI should examine using scientifically proven robust markers that provide better scope for protection when finalising its definition and standard for Mānuka.

The Request

The UMF Honey Association strongly believes that the proposed definition and standard should not be introduced in its current format.

In the interim and given the imposed time constraints for submissions, the UMFHA strongly advises that the Ministry should include:

a) the current available data from controlled selected samples the industry holds
b) review those samples in line with the Ministry's peer review to verify that they are not mislabelled
c) review the key markers that are proposed to be used, in-line with achieving a more robust definition, with a view to achieving outcomes that offer greater protection from adulteration and support the NZ Inc. position
d) rework the CART model to ensure that the mono-floral definition meets Codex standards

Equivalency

The UMFHA used three contracted service-providers and worked collaboratively with overseas researchers and statisticians, when developing its Mānuka ID programme. The outcome of the various independent modelling exercises and chemical profiling led to similar outcomes. The UMFHA then selected from those available the most accurate model and robust, fit for purpose markers. One of the major concerns in relation to MPI's definition and standard is that it provides a far wider definition than all the other models available. If the chosen markers are unique or strongly representative of Mānuka and are

relatively stable, then several statistical models can be used to define what is Mānuka. Unfortunately, the markers MPI has chosen do not support this approach, therefore, a number of non-representative modelling options can be used. As a result, those entities which provide product that is in line with a more robust definition are economically disadvantaged.

New science and advancing technologies continue to emerge which purport to more accurately define Mānuka honey e.g. an Otago University geneticist creates a Mānuka honey test to prove it's the genuine article 1 June 2017. To achieve a process where equivalency can be supported is critical for the credibility of the Government, New Zealand Inc, consumers and investors in the Mānuka honey industry. Having a credible Mānuka definition and standard in place will support a process that facilitates the introduction of more efficient and effective tools for testing as they emerge. The industry also needs to be given more cost-effective testing options, as well as greater transparency and pathways for contesting regulatory requirements.

It has become abundantly clear that by pursuing the science programme in isolation, MPI has caused parties to become over positioned. This has the potential to be misconstrued as anti-competitive, potentially providing what could be viewed as an unfair level of input and biased consultation involving preferred members of the industry. The outcome of this is that the level of dialogue and constructive consultation to achieve optimal outcomes is not occurring. If this continues it will place both the New Zealand honey industry and perception of New Zealand primary industry at risk internationally. An independent reviewer, universally acknowledged for their expertise, knowledge and intellectual rigour, urgently needs to be appointed to oversee the science from both the Ministry and the industry. Through that process, a model of continuous improvement should be developed which involves agreed key industry players. This will go a long way towards ensuring that there is openness towards equivalency and that the Mānuka honey industry can evolve and continue to take responsibility for what it sells, based on the foundation of a solid Ministry definition and standard.

Market Acceptance

The 2014 interim Labelling Guideline promised that overseas markets would follow MPI's lead specifically on claims that Total Activity, Activity and NPA, etc., would be removed. This has not occurred. Following a successful legal challenge, the Court of Appeal upheld Honey New Zealand's case declaring that the trademark it used on its exported honey products was not in breach of the foods standards rules and was not making a health claim. SUSAN EDMUNDS Last updated 14:34, April 20 2016. The UMFHA strongly contends that the MPI proposed definition and standard is not fit for purpose and will place the industry at risk. As a minimum, it should pre-test the proposed standard with reference and research laboratories in key markets.

Opportunity – "Size of the Prize"

A series of reports by CORIOLIS RESEARCH as part of the Food & Beverage Information Project May 2012 and ANZ NEW ZEALAND ECONOMICS ANZ AGRI FOCUS 2015 provide authoritative insights into the "size of the prize"

These reports provide an outline for growth in exports for Mānuka honey and note key to this is:

Defining and protecting the Mānuka definition and ensuring the development of meaningful grading systems.

- The ANZ NEW ZEALAND ECONOMICS ANZ AGRI FOCUS 2015, projected growth for the New Zealand Mānuka honey industry is predicted to rise from an estimated $75 million in 2010 to $1.2 billion by 2028.

  Additional growth is heralded through the emergence of new brand stories around a true New Zealand mono-floral product e.g. Kānuka, Pohutakawa, Rewarewa, Kamahi, etc.
- Future-proofing the MPI definition and standard so that it takes into consideration emerging models that not only define Mānuka but also the various types of honeys is paramount. This form of modelling helps to support the correct and appropriate representation of all honey types as apicultural harvest.

- The current broad MPI definition and standard undermines the sustainable and long-term growth of the New Zealand honey industry, by redefining and certifying non-Mānuka as Mānuka.
- Other benefits from a strong New Zealand honey industry that has robust mono-floral definitions in place include:
- More effective use of marginal land and better erosion control through plantings that support honey collection. In many instances there are limited other economically viable options for erosion control outside of forestry.
- Riparian options that help support income generation, given that many regional councils have or are bringing in mandatory stock exclusion rules for rivers and water bodies.
- Improved water quality from better environmental outcomes.
- Improved aesthetic value of the landscape.
- Support of original biodiversity in areas where Mānuka (and other monofloral species) were once the resident species.
- Generally providing a wider range of land use options in areas where regional council rules have tightened up sediment run-off and water quality requirements.

Introduction to The Unique Mānuka Factor Honey Association

The Unique Mānuka Factor Honey Association (UMFHA) welcomes, in principle, the introduction of a robust government-led regulatory definition to underpin the export requirements for Mānuka honey. The UMFHA supports the implementation of an industry-wide regulatory definition and standard, as a means of helping to protect an iconic and important New Zealand product which is highly valued internationally.

It is important to acknowledge that there is clear agreement with and support for MPI's definition of Mānuka honey as being derived from *Leptospermum scoparium*, and the standard requiring that the honey be wholly or mainly deriving from the nectar of this plant. The area of greatest concern for the UMFHA relates to the use of 'best practice' methodologies and tools to effectively measure to this definition and standard.

About the UMFHA

The UMFHA began more than 20 years ago with the establishment of an industry group then known as the AMHIG (Active Mānuka Honey Industry Group). This was achieved with the support and assistance of NZ Trade & Enterprise. AMHIG later went on to be named AMHA (Active Mānuka Honey Association) and, more recently, the UMFHA.

At the inaugural AMHIG meeting, Dr Peter Molan of Waikato University and Bill Floyd were commissioned to identify and secure a name for the special property of Mānuka honey. In May 1998, the name 'Unique Mānuka Factor' (UMF) was announced. As exports of Mānuka honey continued to soar, and membership of the organisation grew, the UMF trademark was registered in key consumer markets around the world, as a way of enabling greater protection to the industry for this extraordinary and important New Zealand product.

Membership of the UMFHA has grown to include more than 100 small to large entities that are involved in exporting approximately 80% of all Mānuka honey products from New Zealand. Members contract into the requirements and disciplines of the UMF quality trademark licence, to ensure that customers and consumers can purchase Mānuka honey from New Zealand confident that it is genuine and 'true to label'.

Mānuka honey from New Zealand continues to increase in popularity amongst consumers, due to it being a premium natural product. Consumers worldwide are demanding both a way of accurately determining whether a product is genuine Mānuka honey and a grading system which is meaningful and able to be verified.

What we do

The UMFHA has key activities in place which are aimed at supporting the industry and consumers. These include:

- Managing the use of the UMF quality trademark for the benefit of all stakeholders
- Research and development
- Supporting licensees and consumers via generic, industry-based communication programmes and marketing activities.
- Independent verification. The UMFHA appoints independent auditors to regularly source and analyse samples from the marketplace. This helps protect consumers from counterfeit products.

Mānuka ID project

The Association's members have invested heavily in robust science to establish an agreed definition of Mānuka honey, as a way of future-proofing the industry. One such research programme is the Mānuka ID project.

Overview:

March 2013

A foundation meeting is held with international experts on chemical profiling and honey. The Association works closely with acknowledged international experts and uses the best technology available to accurately profile the mono-floral characteristics and attributes of genuine Mānuka honey.

July 2013 UMFHA AGM

Members vote unanimously to support and fund the Mānuka ID Project.

November 2014 - March 2015

The first-ever wide scale collection of nectar from New Zealand mono-floral plants is carried out. This is a controlled collection from Mānuka bush located near beehive sites.

March 2015

Research is undertaken comparing the compounds present in the nectar collected from the Mānuka bush samples. More than 200 'signature compounds' were confirmed. These signature compounds, either individually and/or in combination, are unique to Mānuka honey. Further tests were carried out on the most distinctive compounds, leading the research team to single out three key signature compounds – Leptosperin (LS), Dihydroxyacetone (DHA) and Methylglyoxal (MG) - which can be used to confirm whether a product is genuine Mānuka honey. The discovery of LS - a newly identified compound unique to Mānuka honey - was particularly important as it is both a complex molecule, meaning that it is difficult to make synthetically, and stable. This makes it an ideal marker of authenticity and is what currently sets the UMF grading system apart from anything else.

August 2016

An international symposium called 'This is Mānuka' is held in Auckland. It is the culmination of over five years of industry commitment to supporting an international research programme that utilised cutting-edge technology. The outcome was the development of a classification system that conclusively identifies whether a product is genuine Mānuka honey. The classification method identifies the unique properties of Mānuka honey through chemical profiling. The test can be applied to any honey to verify that it is true to label. The primary focus of the industry-led research was identifying the unique signature compounds found in genuine Mānuka honey and ultimately protecting an important natural New Zealand product for generations to come. Leading scientific figures from Australia, the United Kingdom, Europe and Japan presented at the event, which attracted a delegation from China's regulatory authority the JSCIQ.

Keynote speakers included:

- Professor Yoji Kato, Principal Investigator, University of Hyogo, Japan, RINZ Japan

- Dr Adrian Charlton, Principal Scientist, FERA, UK
- Professor Stephan Schwarzinger, University of Bayreuth, CEO ALNuMED Germany
- Dr Peter Brooks, Chemistry Senior Lecturer, University of the Sunshine Coast, Australia
- Tony Wright, General Manager Technical, Comvita New Zealand Limited
- Dr Terry Braggins, Executive Director, Analytica Laboratories
- Dr Jonathan Stephens, Senior Research Manager, Comvita Innovation
- Dr Merilyn Manley-Harris, Associate Professor, School of Science University of Waikato
- Dr Kiri McComb, Director for Innovation, Research and Development, Oritain Group Limited

Outcomes

Key outcomes from the UMFHA Mānuka ID project are significant and have included the following:

- **Industry taking responsibility for what it sells**

UMFHA members proactively establishing and implementing a means of ensuring that they were meeting their obligation to consumers that Mānuka honey products were 'true to label'. When the Mānuka ID project started, no other independent body could provide a robust science-based definition of what constituted genuine Mānuka honey.

- **New and targeted methods for assessing Mānuka honey developed**

New techniques and processes were identified and implemented to address the previous inadequate and outdated methods for accurately defining Mānuka honey.

- **Measuring the product – 'the nectar'**

Traditional methods for identifying Mānuka honey had focused on taste and colour or pollen, but not on the intrinsic and distinctive elements of this unique product. Nothing had been developed for measuring the whole product and relating that back to the original source of the honey – the nectar itself.

As one truly great scientist and philosopher said:
"*Look deep into nature and you will understand everything better*" – **Albert Einstein**

- **Advanced understanding of this unique product**

More comprehensive research into what was unique about Mānuka honey had been stalled due to a focus on non-peroxide activity (NPA) compared with peroxide-based activity (PA) which is found in most honeys and is not a key differentiator of Mānuka honey.

- **Created a meaningful grading system**

MPI introduced its 'Interim Labelling Guidelines' in July 2014, which prohibited referencing NPA which MPI interpreted as a claim. It promoted the need for introducing a new definition and grading regime for Mānuka honey.

- **Enabled New Zealand control of key signature markers**

The UMFHA science programme took an holistic approach to the identification, verification and grading of Mānuka honey. This helped the Association to successfully negotiate exclusive rights and control of a key signature marker LS for New Zealand.

- **Advanced and protected the science behind the Mānuka honey classification system**

The New Zealand industry had, by default, become increasingly reliant on overseas research for advancing understanding of what is a quintessential New Zealand product. The Mānuka ID project enabled the development of collaborative research models whereby New Zealand researchers could again take the lead in better understanding this unique New Zealand product. This headed off initiatives by different overseas-based laboratories to introduce their own criteria and definitions for Mānuka honey. If this had occurred, it could have potentially seen a range of different criteria imposed by customers and/or regulators in individual markets and jurisdictions.

- **Enabled identification of Mānuka honey in other products**

Emerging research around some of the key markers found in Mānuka honey is assisting with the identification of Mānuka as an ingredient in a wide range of health and well-being products, nutraceuticals and pharmaceuticals.

- **Supported New Zealand-led research**

A unique approach was developed in New Zealand to enable the collection and identification of signature markers from the nectar of the Mānuka bush. This was a joint effort involving New Zealand researchers Dr Jonathan Stephens and Dr Terry Braggins. Together, they have established a new international standard around the development and application of techniques for more effectively identifying mono-floral honeys. The Mānuka ID project also provides a solid platform of science which supports the development of future research.

- **Development of technology for in-field use**

It was identified that the practical application of chemical profiling could also enable the development of a more convenient and cost-effective method for the industry and everyone along the supply chain to identify Mānuka honey. This initiative involved using a portable indicator-based test for confirming the presence of Mānuka honey in products. A prototype 'Mānuka meter' unit has also been developed for infield use by Dr Terry Braggins.

- **Provided a science-based method of validation for consumers**

The networking of laboratories in key markets and use of the UMFHA's science-based definition for Mānuka honey has provided customers, retailers and consumers with a way of verifying whether a product is true to label.

MPI's proposed definition – opportunities for improvement

Outcomes from the MPI science programme.

Key points:

1. The Ministry could have achieved its requirement of independence, provided an oversight and validation of an industry initiative, and achieved a far more cost-effective result, by working in parallel with and not in isolation from the industry. By following a path of exclusion, the Ministry has not achieved its desired outcomes.
2. The current position is, if MPI were to implement its programme it would put the New Zealand Mānuka honey industry at significant risk. There are fundamental flaws in its model which can be addressed with input from the industry.
3. The opportunity to utilise what the industry has to offer, in terms of intellectual property and the work already done to protect the term 'Mānuka honey', also needs to be considered in tandem with MPI's science programme.
4. Processes and models of continuous improvement and recognition of equivalency need to be set up that take into account lessons learnt from what has occurred to date.

in collaboration with

Differentiating Manuka and Kanuka Honey/Nectar from other Honeys by NMR

Prof. Dr. Stephan Schwarzinger (s.schwarzinger@alnumed.com)
Research Center for Biomacromolecules (BIOmac), University of Bayreuth
ALNuMed GmbH (Founder & Shareholder)

Felix Brauer, MSc. (ALNuMed),
Dr. Karyne Rogers (GNS),
John Rawcliff (UMFHA)
Dipl.-Ing (FH) Bernd Kämpf (FoodQS),
Prof. Dr. Paul Rösch (BIOmac, ALNuMed)

Status: June 2017

ALNuMed GmbH (www.alnumed.com) is a
spin-off from the RC BIOmac of the University Bayreuth

NMR-Profiling of Food
One Measurement – Many Answers

NMR (nuclear magnec resonance) spectroscopy is a

- primary quantitative analysis method with
- high resolu] on (>> hunderet compouds per spectrum)
- outstanding dynamic bandwidth (hunderets of g/kg to mg/kg within same run)
- unmatched reproducibility allowing production of quantitative fingerprint databases

NMR spectroscopy provides

- quantitative ingredient fingerprints of foods within a few minutes of measurement time
- informaon about general quality of a food (compliance with guidelines, identification of premium qualies)
- proof of authencity of a product (species, variety, purity/diluon , geographic origin, adulteraon , and illegal manipulaon)

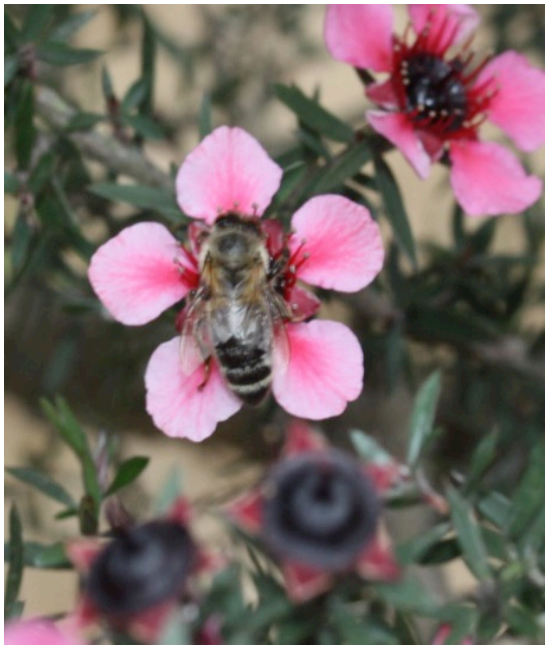
NMR spectroscopy adds traceability through a mul-p arameter fingerprint (ALNuMed BatchCheck – helps ba ling product piracy)

NMR spectroscopy is already successfully applied for several years in roun e tes ng of fruit juices, fruit purees, wines and musts, *honeys*, edible oils

Honey-Profiling™ – Why a Single Parameter Is Not Enough

Development of the Honey Profiling data base is a collabora ve effort of Bruker BioSpin, QSI, and ALNuMed with FoodQS.

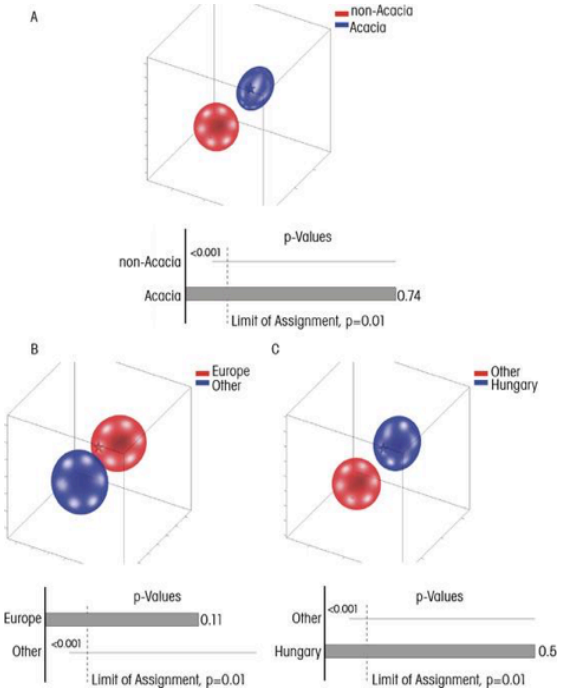
Verificao n of provenience and variety (product label) are part of authenci ty tesn g



Authen' c Food – Why a single analyca l parameter is not enough

(Schwarzinger *et al.*, Q&More 1/2016)

Compound	Value	Unit	LOQ	Official Reference min	Official Reference max	Official Reference Flag	Honey-Profiling™ NMR Distribution
glucose + fructose	75.5	g/100g	20.0	60.0	-	●	59.2 80.0
fructose / glucose	1.22	-	-	-	-	○	0.97 1.55
fructose	41.4	g/100g	10.0	-	-	○	32.3 44.2
glucose	34.1	g/100g	10.0	-	-	○	23.7 39.1
sucrose	<LOQ	g/100g	0.5	-	5.0	●	<0.5 2.8
turanose	1.5	g/100g	0.2	-	-	○	0.6 2.5
maltose	1.3	g/100g	0.5	-	-	○	<0.5 6.3
melezitose	1.0	g/100g	1.0	-	-	○	<1.0 3.1
~							~
citric acid	93	mg/kg	50	-	-	○	<50 564
malic acid	160	mg/kg	100	-	-	○	<100 721
~							~
5-hydroxymethylfurfural	10	mg/kg	5	-	40	●	<5 52
acetic acid	18	mg/kg	10	-	-	○	<10 132
acetoin	<LOQ	mg/kg	20	-	-	○	<20 mg/kg in reference dataset
ethanol	45	mg/kg	5	-	-	○	9 1420
~							~
3-phenyllactic acid	526	mg/kg	300	-	-	○	<300 1202
dihydroxyacetone	870	mg/kg	20	-	-	○	<20 1934
kynurenic acid	<LOQ	mg/kg	60	-	-	○	<60 mg/kg in reference dataset
methylglyoxal	346	mg/kg	30	-	-	○	<30 1486
shikimic acid	<LOQ	mg/kg	80	-	-	○	<80 114



based on
several thousand
authentic reference honeys
from world-wide origins

screening of quality parameters
non-targeted verifica on
geographical origin (adultera on indicator)
floral variety (removal of pollen!)
→ **Only sum of parameters allows judgement of authenci ty**

hp: //q-more.chemeurope.com/q-more-ar] cles/234/authen] c-food.html

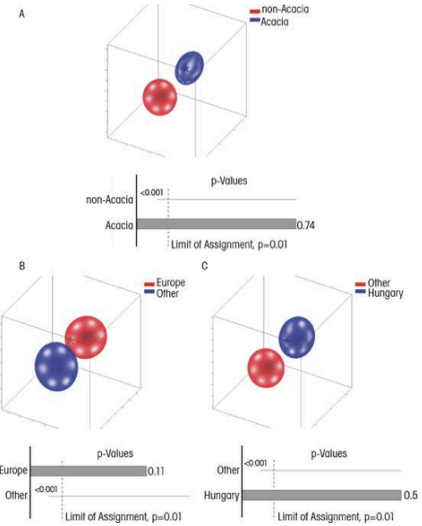
Honey-Profiling™ – Why a Single Parameter Is Not Enough

Development of the Honey Profiling data base is a collabora ve effort of Bruker BioSpin, QSI, and ALNuMed with FoodQS.

Honey Profiling generates a spectral fingerprint of a honey sample:

- **Informa on of general honey quality**
  - sugar profile, sum of G+F, F/G ra o
  - HMF
  - proline
  - important organic acids
  - ethanol and other degrada on parameters

- **Informa on about Authen' city**
  - specific marker compounds (including DHA, MGO, phenyllac] c acid)
  - targeted tes] ng for adultera on (syrup addi] on)
  - targeted sta s] cal tes] ng for geographic origin
  - targeted sta s] cal tes] ng for variety (i.e. comparison of ingredient concentra on profiles deduced from thousands of reference samples)
  - untargeted univariate and mul] variate comparison with reference profiles → allows detec] on of so far unkown adultera ons and manipula ons



Compound	Value	Unit	LOQ	Official Reference min	Official Reference max	Official Reference Flag	Honey-Profiling™ NMR Distribution
glucose + fructose	75.5	g/100g	20.0	60.0	-	●	59.2 80.0
fructose / glucose	1.22	-	-	-	-	○	0.97 1.35
fructose	41.4	g/100g	10.0	-	-	○	32.3 44.2
glucose	34.1	g/100g	10.0	-	-	○	23.7 30.1
sucrose	<LOQ	g/100g	0.5	-	5.0	●	<0.5 2.8
turanose	1.5	g/100g	0.2	-	-	○	0.6 2.5
maltose	1.3	g/100g	0.5	-	-	○	<0.5 6.3
melezitose	1.0	g/100g	1.0	-	-	○	<1.0 3.3
citric acid	93	mg/kg	50	-	-	○	<50 566
malic acid	160	mg/kg	100	-	-	○	<100 721
5-hydroxymethylfurfural	10	mg/kg	5	-	40	●	<5 52
acetic acid	18	mg/kg	10	-	-	○	<10 132
acetoin	<LOQ	mg/kg	20	-	-	○	<20 mg/kg in reference dataset
ethanol	45	mg/kg	5	-	-	○	9 1420
3-phenyllactic acid	526	mg/kg	300	-	-	○	<300 1202
dihydroxyacetone	870	mg/kg	20	-	-	○	<20 1934
kynurenic acid	<LOQ	mg/kg	60	-	-	○	<60 mg/kg in reference dataset
methylglyoxal	346	mg/kg	30	-	-	○	<30 1496
shikimic acid	<LOQ	mg/kg	80	-	-	○	<80 114

→ Report provides > 35 quan] ta ve results and prints how the respec ve sample compares to the distribu] on in the reference database

Our VAULT of Authen' c Honey Samples:
Large sample numbers are the basis for any fingerprin ng

> 4.900 samples total with

> 60.000 accompanying conven] onal analysis (quality, adultera on)
including pollen analysis, test for honey foreign enzymes and oligosaccharides, syrup markers etc.
>> 100.000 NMR-derived quan] ta ve analysis results for up to 36 substances

> 4.200 authen' c real honey samples covering:

30 proveniences (33 % with more than 100 samples, 50 % more than 50)
covering the most important players in global honey trade, recent harvests
> 30 varie' es
> 1000 monofloral honeys (incl. ~ 200 monofloral Manuka honeys)
> 2500 polyfloral honey samples from worldwide origins

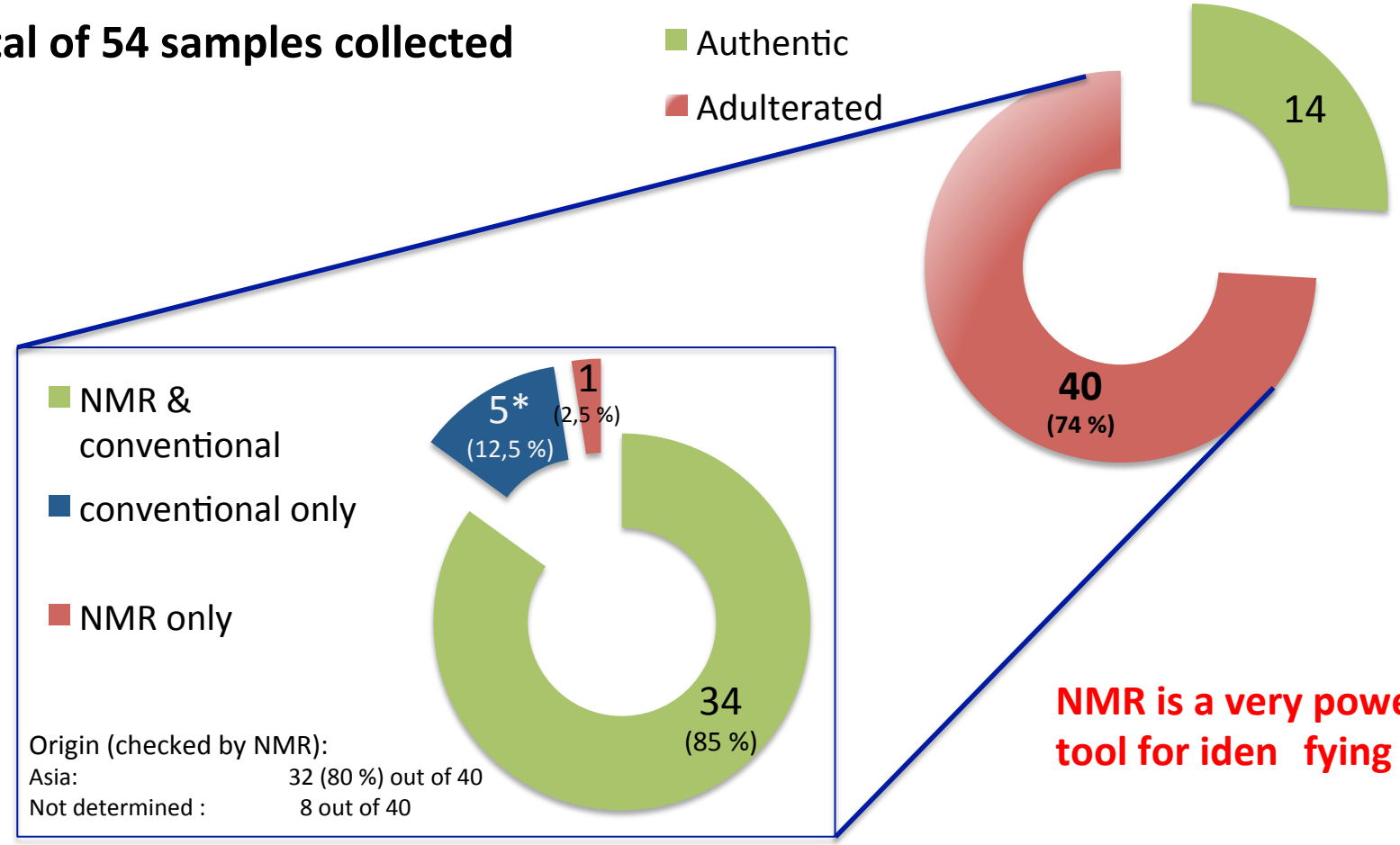
Remaining samples:

- defined adulterated/manipulated samples
- adulterated samples from market
- syrup samples and bee feed

Part of the even larger
Honey-Profiling Database

Recent Case Study on Samples Collected from Supermarket Shelves (Confiden al)

Total of 54 samples collected



NMR is a very powerful tool for iden fying fraud

- one sample identified by NMR to be good for consumption (+ HMF to high, too)
- conventional tests applied include: honey foreign enzymes, syrup specific markers, honey foreign oligosaccharides, and presence of artificial food additives

NMR-research by ALNuMed on Manuka Honey

~ 350 honey samples from New Zealand, including Kanuka
~ 200 monofloral Manuka honey samples (including Australian Manuka)
Nectars taken from Manuka, Kanuka, and other Plants from New Zealand

Samples were self collected from stores (and tested with reference analysis),
as well as provided by Dr. K. Rogers (GNS) and Mr. J. Rawcliff (UMFHA)

NMR-Spectra were collected for all samples

- Samples were compared with thousands of other honeys from world wide origins
- Manuka and Kanuka groups were compared against each other
- Manuka from New Zealand and Australia were compared against each other

Goal: Identification of signals/compounds contributing to discrimination of groups

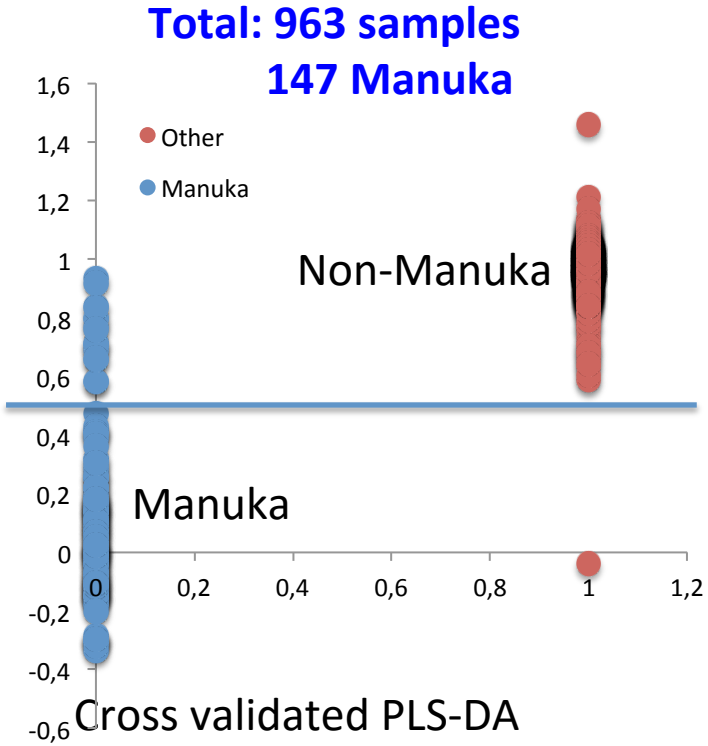
→ Important: aim at signals/substances also correlating with anti-microbial activity
→ Important: aim at several signals contributing to discrimination
→ Important: consider not only absolute concentrations of markers, but also their relative relations with each other and with "standard" ingredients → this gives a robust multi-component marker that is very hard to manipulate by addition of substances!

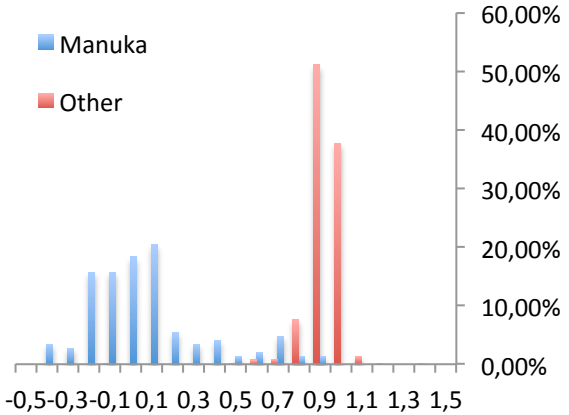
NMR-research by ALNuMed on Manuka Honey
Achievements so far (work in progress)

Other markers/discriminators accessible by NMR:

Leptosperin, 4-methoxyphenyllac] c acid (puta ve assignment), kojic acid
puta ve Manuka marker X (compound already iden] fied)
puta ve Manuka marker Y (signals iden] fied, compound iden] fica on in progress

Considering these substances and other parts from NMR spectra groups can be dis] nguished:





Confusion Matrix

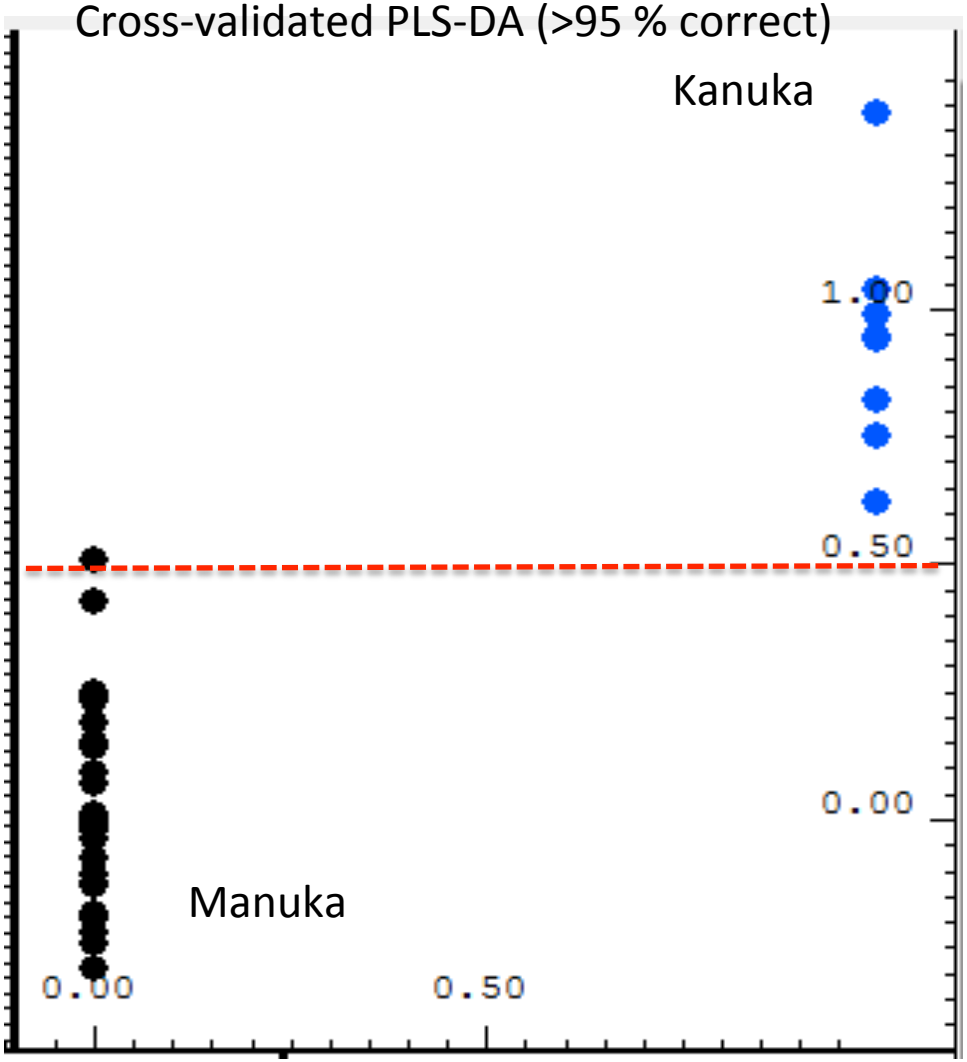
absolute	Manuka	other
Manuka	131	16
other	1	815
%	Manuka	other
Manuka	89,1%	12,2%
other	0,1 %	99,9%

Work in progress: note that PLS-DA is a very conserva ve method
Target: Discrimina on > 95 %, low rates of false nega ves and false posi] ves

NMR-research by ALNuMed on Manuka Honey
Achievements so far (work in progress)

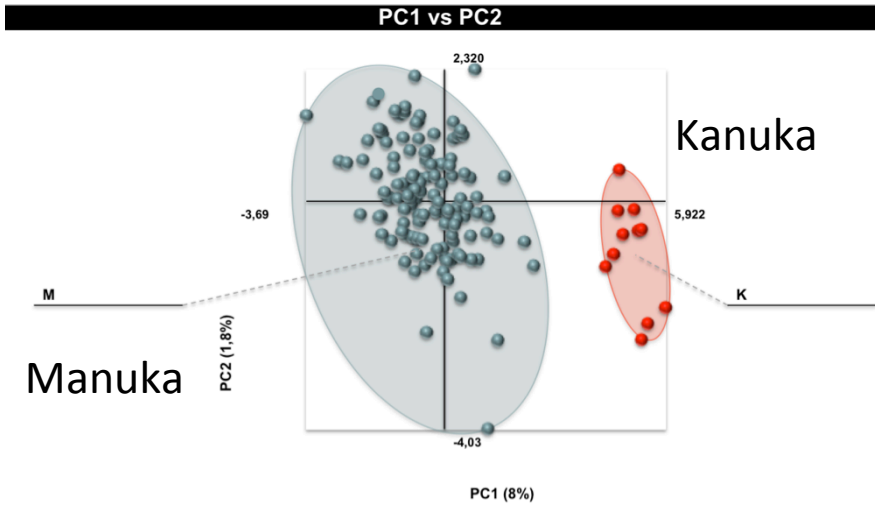
Differentiation of Manuka and Kanuka by NMR spectral data:

Cross-validated PLS-DA (>95 % correct)



or by more powerful PLS-eDA

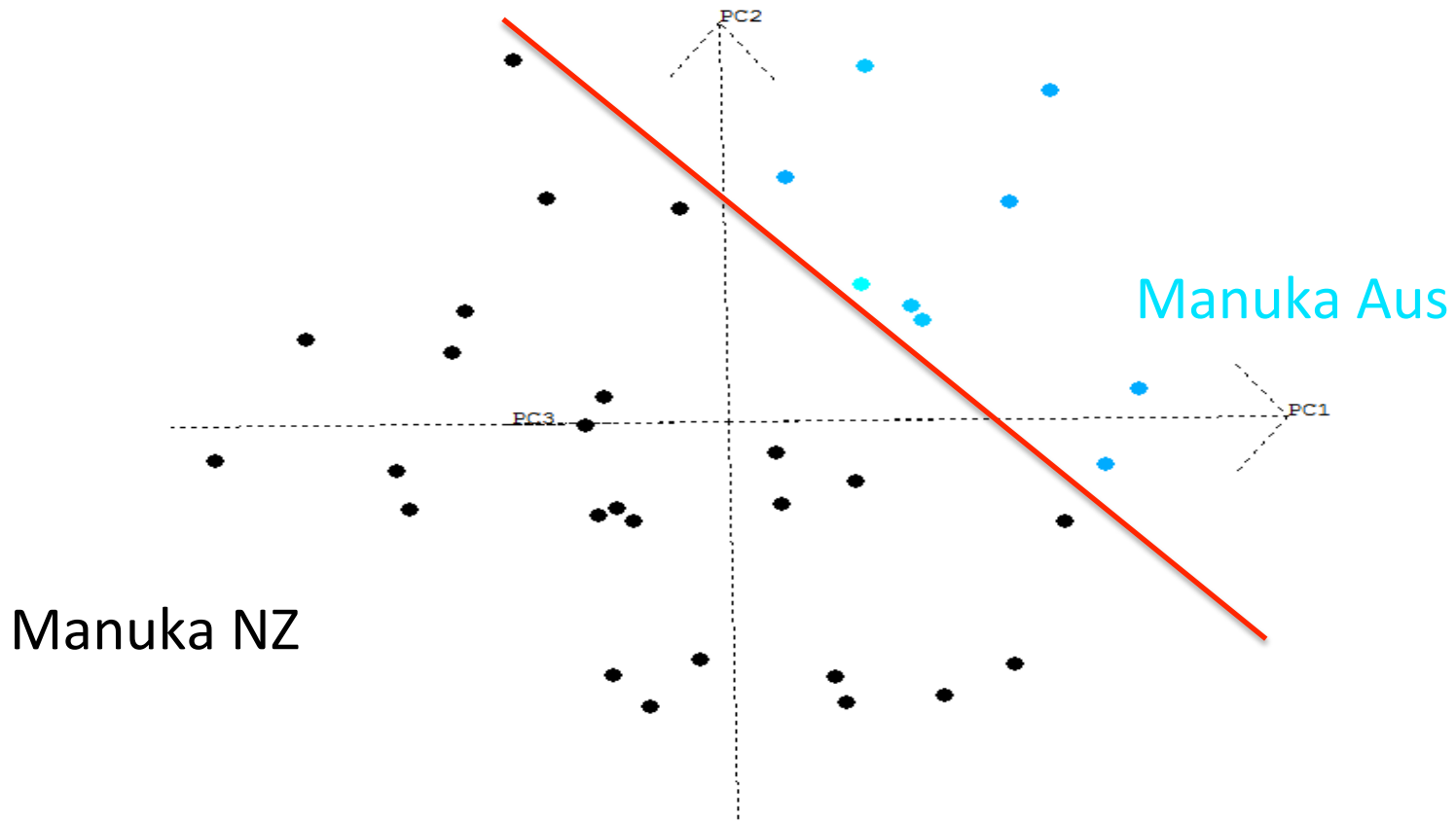
(no cross validation, quantified substances only, experimental)



For PLS-eDA only samples with HMF < 30 mg/kg and no indication of presence of other varieties have been taken into account (work in progress)
Other chemometric methods are tested as well.

NMR-research by ALNuMed on Manuka Honey
Achievements so far (work in progress)

Differena o n of Manuka from New Zealand and Australia by principal component analysis (unsupervised differen a on):



Due to different subspecies of Manuka (*scop. vs. polyg.*)? Substances involved: 2-Methoxybenzoate etc.

NMR-research by ALNuMed on Manuka Honey
Current status and future work plan

- **Con' nuing iden' fica' on of addi' onal puta' ve marker substances**

- **Con' nuing valida' on for quan' fica' on for addi' onal markers/discriminators**

- **Improved sta s cal modelling and data mining:**
  modelling with spectral data (most powerful)
  modelling with quan] fica on data only (for explaining causality)
  establishing new correla ons of substances with DHA & MGO etc.
  modelling withouth typical markers only with honey "standard" ingredients
  to demonstrate these also contribute to discrimina on.

- **Expansion of database of New Zealand honeys and Manuka honey samples & expansion of global reference sample data base to monitor seasonal effects and new developments.**

- **Combina' on of NMR with other methods** (already performed for other foods)

- **Con' nua' on of research on nectar samples (with ultra-high resolu' on NMR)**

- **Contribuo n to Honey-Profiling database (joint venture) and publicao n of results**

in collaboration with

Differentiating Manuka and Kanuka Honey/Nectar from other Honeys by NMR

Prof. Dr. Stephan Schwarzinger (s.schwarzinger@alnumed.com)
Research Center for Biomacromolecules (BIOmac), University of Bayreuth
ALNuMed GmbH (Founder & Shareholder)

Felix Brauer, MSc. (ALNuMed),
Dr. Karyne Rogers (GNS),
John Rawcliff (UMFHA)
Dipl.-Ing (FH) Bernd Kämpf (FoodQS),
Prof. Dr. Paul Rösch (BIOmac, ALNuMed)

Status: June 2017

ALNuMed GmbH (www.alnumed.com) is a
spin-off from the RC BIOmac of the University Bayreuth

Current MPI Proposal for Manuka Honey

Relies on DNA and 4 chemical compounds. Presence of all markers required.

- **DNA**
- **3-phenyllactic acid**
- **4-hydrocxy phenyllac' c acid**
- **2´-methoxyacetophenon**
- **2-methoxybenzoic acid**

Based on evalua on of a large dataset of New Zealand honeys and comparison with a database of honey samples from 16 countries

→ Markers are iden] fied as being stable

→ Discrimina on of monofloral Manuka Honey
polyfloral Manuka Honey
non-Manuka Honey

Crici sm:

\+ Defini] on of a variety based on several markers

\- Selec] on of markers cannot prevent adultera on (no correla ons, ra os etc.)
Discrimina on of mono- and polyfloral honey not conclusive (see next page)
Database of non-New Zealand honey samples not suitable (see next page)

Comment on Weaknesses of Current MPI Proposal for Manuka Honey

Criticism (conn ued):

Selec' on of markers cannot prevent adultera' on

Addi] on of chemicals worth approx. 10 € will turn any honey with some Manuka DNA into a premium product selling for > 200 €/kg.
The compounds select are easily available at low prices, similar to DHA and MGO.

No proposal has been made for judging the value of a par] cular sample.
It is likely that industry will continue proposing own ranking schemes

Discriminao n of mono- and polyfloral honey not conclusive

As polyfloral Manuka is a mixture of monofloral Manuka with other varie] es consequently the concentra on of all parameters must be reduced. Otherwise, any polyfloral Manuka can be turned into monofloral Manuka honey just by addi] on of phenyllac] c acid. Likewise, DNA tes] ng of monofloral Manuka honey should produce a signal with less amplifica on rounds.

Database of non-New Zealand Honey samples not suitable:

Honey varie] es around the world are very diverse, as is the natural variance of ingredients within a given variety. The underlying database is much to small, includes countries not playing a role in global honey trade at all, but lacks most major producers. It is not clear which measures have been made to ensure authen] city of samples (origin, variety, adultera on).

Comment on Weaknesses of Current MPI Proposal for Manuka Honey

Recommandaons :

U lize expanded database of non-Manuka honeys to prove suitability of markers

U lize a general quantitative method, such as NMR
(all signals are quan ta vely recorded, primary quantitative method)

Rely on larger ingredient fingerprints rather than on single markers (spectrum is the marker) and combine with modern chemometric/sta s cal data evaluao n (use combinaons and raonsof concentraons of markers among each other and relative to standard honey ingredients to obtain a robust definion of Manuka honey that cannot be frauded easily).

Note: Statistical evaluaon of ingredient and metabolite fingerprints may make DNA analysis obsolete thereby reducing cost and time required for analysis!

Proposed General Export Requirements for Bee Products

For all exporters of bee products from New Zealand

SUBMISSION FORM

Consultation document 2017

The Ministry for Primary Industries (MPI) proposes to consolidate, clarify, and introduce export requirements for all bee products intended for export.

You are invited to have your say on the proposed changes, which are explained in the discussion document and specified in the draft Animal Products Notice: General Export Requirement for Bee Products notice.

Consultation closes on **23 May 2017.**

How to have your say

Have your say by answering the questions in the discussion document, or commenting on any part of the proposals outlined in the draft Animal Products Notice: General Export Requirements for Bee Products. This submission form provides a template for you to enter your answers to the questions in the discussion document and email your submission back to MPI.

Please include the following information in your submission:

☐ the title of the discussion document 'Proposed General Export Requirements for Bee Products';

☐ your name and title;

☐ your organisation's name (if you are submitting on behalf of an organisation), and whether your submission represents the whole organisation or a section of it; and

☐ your contact details (such as phone number, address, and email).

MPI encourages you to make your submission electronically if possible. Please email your submission to: manuka.honey@mpi.govt.nz

If you wish to make your submission in writing, these should be posted to the following address:

General Export Requirements for Bee Products Submission
MPI Food Assurance Team
PO Box 2526
Wellington 6140

The following points may be of assistance in preparing comments:

☐ where possible, comments should be specific to a particular section in the document. All major sections are numbered and these numbers should be used to link comments to the document;

☐ where possible, reasons and/or data to support comments should be provided;

☐ the use of examples to illustrate particular points is encouraged; and

☐ as a number of copies may be made of your comments, please use a legible font and quality print, or make sure hand-written comments are clear in black or blue ink.

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If you are submitting on this discussion document, you may wish to indicate any grounds for withholding information contained in your submission. Reasons for withholding information could include that information is commercially sensitive, or that the submitters wish personal information such as names or contact details to be withheld. MPI will consider such grounds when deciding whether or not to release information.

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Your details

Your name and title:	s 9(2)(a)
Your organisation's name (if you are submitting on behalf of an organisation), and whether your submission represents the whole organisation or a section of it:	s 9(2)(a)
Your contact details (such as phone number, address, and email):	s 9(2)(a)

General questions: getting to know you

1. What part of the supply chain do you operate in:

   ☒beekeeper

   ☒extractor

   ☒processor

   ☒packer

   ☒exporter

   ☒retailer of bee products

   ☐ other – please specify

2. How long have you been involved in the apiculture industry:

   ☐ 0-5 years

   ☐ 5-10 years

   ☒10 + years

   ☐ not applicable

3. Do you operate under:

   ☒an RMP under the Animal Products Act 1999

   ☐ the Food Act 2014 (Food Control Plan or National Programme)

   ☐ the Food Hygiene Regulations

   ☐ none of these

   ☐ not applicable

4. If you are a beekeeper, how many hives do you currently have:

   ☐ 0 – 5

   ☐ 6 – 50

   ☐ 51 – 500

   ☐ 501 – 1000

   ☐ 1001 to 3000

   ☒More than 3000

5. What region of New Zealand do you operate in?

All over North Island and top of the South Island

6. If you export bee products please tell us a little about your business. How many people do you currently employ?

   ☐ 0

   ☐ 1 – 5

   ☐ 6 – 19

   ☒20 or more

   What are the roles of your employees and how many are:

   ☒beekeepers: 98

   ☐processors

   ☐ packers

   ☒other – please specify: 399 covering all other aspects of the business

Impact of compliance costs for beekeepers, processors and exporters

7. Table 4.1.1 of the Discussion Document provides a summary of the estimated costs of the proposals. What do you think the overall impact of the new proposals will be on your business?

   The DNA test is not something we are likely to do in-house. We test approx. 10,000 samples pa (mostly drum samples), therefore if we screened all raw materials there would be an additional cost to our business of about $600,000 based on quotes we have received.

   s 9(2)(b)(ii)

8. In order to estimate the total cost to industry of the proposals contained in the draft GREX, it would be useful for MPI to understand how many beekeepers, operators and exports of bee products will be affected by the proposals. Please specify which of the proposals listed in the table at 4.1.1 will affect you and how.

   Our primary concerns relate to the testing costs (5.1-5.3) and the failure of high-grade manuka honey as a result of the DNA test failures noted above.

   The traceability requirements are within the capability of our system, however there will be an impact on productivity/efficiency due to the additional labour input to comply. At this stage we do not have a sense of the additional time this will take – this is commented on later in this document.

9. Do you foresee any other costs that will arise from the proposals contained in the draft GREX which are not contained in the table at 4.1.1? If so, how significant do you think these will be (e.g. administration costs such as time to fill in forms, and time to learn about the new requirements)?

Commercially sensitive:

s 9(2)(b)(ii)

No additional substances to be present in New Zealand honey

10. To ensure additional substances are not present in New Zealand honey, MPI proposes to prohibit the feeding of bees when honey supers are present on hives for the purpose of collecting honey, with an exception if it is necessary for the survival of the bees. Do you agree or disagree with this proposal?

☐ I agree because:

N/A

☒I disagree because:

It is not practical to set standards to this level of operating practice. The text below has been supplied by s 9(2)(a)

The proposal to prohibit the feeding of bees when honey supers are present on hives for the purpose of collecting honey (apart from emergency feeding) is almost identical to similar standards used internationally for the production of organic honey. There is therefore at least some precedent for including such a requirement in New Zealand honey production regulations.

However, imposing that requirement as a blanket prohibition for the production of all honey could be seen as over-stepping the bounds for honey production systems that are not based on organic production principles.

There is also a problem with the use of the word "ensure" in this regard. It is now well-substantiated in the literature that the presence of C4 sugars in honey is not limited to instances where the hive was fed sugar during the actual honeyflow. Sugar fed during the spring as a means of either stimulating colony population growth, or to ensure a colony does not starve, can also contribute to the presence of C4 sugar in honey that the colony subsequently produces, even though sugar feeding ceased well before the actual honeyflow.

Honey bee colonies do not always consume all of the sugar they are fed, either immediately, or even weeks later. Colonies often store such sugar in a moisture-reduced and inverted form (called *sugar-honey*). If climatic conditions improve and/or nectar-producing plants begin to flower, natural honey can be placed either next to or directly over cells of sugar-honey. The sugar-honey is then incorporated into the natural honey at time of extraction, and the two products become indistinguishable unless chemically analysed.

That being the case, the proposed requirement as it stands is not likely to "ensure" that additional substances will not be present in New Zealand honey. Even when using more detailed and complex beekeeping management practices than what is being proposed by MPI, such an assurance is difficult to achieve.

However, work carried out by Kiwi Bee Limited has shown that specific types of comb manipulation prior to the honeyflow can work to effectively limit the presence of C4 sugar in extracted honey. The manipulations involve marking and not extracting combs that are present in the colony during spring sugar feeding, as well as putting these combs in positions in the hive so that the bees do not move sugar-honey into subsequent combs placed on the hive for the honey flow. This last point is very important since tests have shown that colonies can in fact move honey stores from one comb to another over time.

The hive manipulations that have been developed are now part of the standard operating procedures for KiwiBee, and have also been recommended to s 9(2)(b)(ii) beekeeper suppliers. They are used in several forms depending on the geographic location of the beehives and the timing of honey production (i.e., honey production in the far North is much earlier than further south, and thus requires different comb manipulation techniques because there is less of a time-gap between colony build-up and honey production).

At the same time, s 9(2)(b)(ii) is well-aware that regardless of the management techniques its honey suppliers employ, honey it processes for sale also requires end-point inspection in the form of batch sample testing for the presence of C4 sugars. If MPI is seeking to provide a similar level of assurance for all honey produced for export from New Zealand, our experience suggests that simply prohibiting the feeding of bees when honey supers are present on hives will not be sufficient.

Please suggest any alternatives to this approach that would ensure additional sugars and synthetic chemicals are not present in the honey:

MPI need only specify the required outcome – leave it up to beekeepers to manage their operation as they need to, while staying within required outcome. s 9(2)(b)(ii) has established methods to comply, as detailed above. This is the best place for the problem to be addressed; i.e. with industry rather than Govt.

11. To prevent the contamination of honey with varroacide residues, MPI proposes honey is only harvested from honey supers that do not contain honeycomb previously part of a brood nest. Do you agree or disagree with this proposal?

☐ I agree because:

N/A

☒I disagree because:

It is not practical to set standards to this level of operating practice. The text below has been supplied by Cliff van Eaton:

We are unsure where MPI received its technical advice regarding the distribution of varroacide residues within honey bee colonies. However, the proposal to prevent such residues by only allowing honey to be harvested from honey supers that do not contain honeycombs that were previously part of a brood nest does not appear to be supported by research internationally.

Chemicals to control varroa work by transfer of those compounds throughout the honey bee colony by the bees themselves. Honey bees move throughout their colony, making physical contact with each other, and also transferring food and pheromones. In so doing they distribute varroacide chemicals, either clinging to their bodies, or in their salvia, to all parts of the colony, including to all comb surfaces.

The wax component of comb has also been shown to be both highly absorptive of chemical compounds, and to retain those chemicals in a form that can retard normal decomposition rates. As a result, while there can sometimes be differences in the levels of varroacides within a colony, in general they are both fully distributed throughout the colony, and remain in the colony after the varroacide application medium (e.g., plastic strip, absorptive pad, etc.) has been removed.

Of course not all chemicals have the same prolonged presence within honey bee colonies, and a major factor in determining whether a chemical compound receives registration for use in varroa control is the length of time the chemical residues persist. Suffice to say, however, that some chemicals used overseas for varroa control, but not currently approved in New Zealand, have residues that persist in colonies for long periods of time.

For instance, studies in South America showed that residues of coumophos used for varroa control are still present in comb, both in the brood nest and in honey supers, as well as in propolis and hive woodenware, for three years or more after the compound was administered.

The specific reasons for this have not been determined, but as explained previously we do know that bees walk over the surfaces of all combs, transferring chemicals in the process. As well, bees can chew wax already present in the colony and then incorporate it into cappings that cover cells of honey once it has been produced. If chewed wax obtained from elsewhere in the hive contains chemical residues, these residues can be transferred to the honey once it is stored in fresh comb.

Taking all these factors into account, we therefore do not believe that limiting the harvest of honey from comb that has not previously been part of a brood nest will ensure that the honey does not contain <u>any</u> varroacide residues.

As well, MPI's proposed prohibition is already covered in existing government regulation. Provided the varroacide is applied according to the label instructions that form part of the registration of the product under the Agricultural Compounds and Veterinary Medicines Act, residues in the resulting honey should be below the maximum allowable level. For all varroacides registered for use in New Zealand, these instructions already include prohibition of use in honey bee colonies during the time honey is produced.

Finally, regardless of any regulations governing the use of varroacides in New Zealand, all honey that s 9(2)(b)(ii) processes for sale undergoes end-point inspection in the form of batch testing of samples for a broad range of compounds, both environmental in origin as well ones used in beekeeping. If MPI is seeking a similar level of assurance for all honey produced in New Zealand, then analysis of that honey would seem to be the only way to effectively ensure it does not contain levels of compounds above the maximum allowable level set out in an importing country's legislation.

Please suggest any alternatives to this approach that would ensure varroacide residues are not present in the honey.

MPI need only specify the required outcome – leave it up to beekeepers to manage their operation as they need to, while staying within required outcome. s 9(2)(b)(ii) has established methods to comply, as detailed above. This is the best place for the problem to be addressed; i.e. with industry rather than Govt.

Processors of bee products to operate under a risk based measure

12. MPI proposes that processors of bee products for export under the Food Hygiene Regulations must move to a risk-based measure (either an RMP under the Animal Products Act 1999, or Food Control Plan or National Programme under the Food Act 2014). Do you agree or disagree with this proposal?

☒I agree because:

We need a verifiable system that provides confidence in the entire supply chain. This should lift standards across the export apiculture sector.

☐ I disagree because:

N/A

Please suggest any alternatives to this approach that would provide MPI with oversight of these processors:

N/A

Bee products to be sourced from listed beekeepers

13. MPI proposes to extend listing requirements to all beekeepers providing bee products for export. Do you agree or disagree?

☒I agree because:

Any additional confidence in the export supply chain is good. This is where important export markets are heading with their expectations so it is better that we do this ahead of being forced to, and therefore under our terms.

☐ I disagree because:

N/A

Can you think of any alternatives to this approach that would address this gap in the traceability chain?

N/A

Pre-processing traceability requirements

14. MPI proposes beekeepers keep additional records. Do you agree or disagree with this proposal?

☐I agree because:

N/A

☒I disagree because:

Although we need to demonstrate confidence in the export supply chain, the proposal goes too far:

- Agree with uniquely identifying each super
- Agree with current provision for apiary site identification
- Disagree with keeping track of all honey super movements throughout the season as any associated risk is best managed by good beekeeping practice to achieve required outcomes, rather imposing a complicated tracking system that does not deal with the perceived risk
- Disagree with relating honey volumes back to honey supers – in practice this would be nearly impossible to achieve

Can you think of any alternatives to this approach that would address gaps in the traceability chain?

It is reasonable to require all honey supers to be identifiable, however it should be left to the operator to determine how they manage traceability back from an identifiable batch of extracted honey. We agree operators need to have systems in place to trace honey back to the hive, however it is not appropriate to prescribe how that should be done. The risks associated with beekeeping are not going to be addressed by elaborate tracking systems, but rather by having in place good beekeeping practice and clear accountability for steps in the supply chain where risk is introduced or managed.

15. The costs for businesses associated with implementing the proposed traceability requirements are likely to vary depending on their existing systems and processes. What impact do you think these proposals are likely to have on your business?

It is difficult to quantify the cost: we have a system that would allow compliance to what has been proposed, however it would be laborious and inefficient to do so. As noted earlier, there is no clear benefit therefore the cost is unjustified.

Traceability from beekeepers to operators – harvest declarations

16. MPI proposes to introduce harvest statement requirements to all beekeepers providing bee products for export. Do you agree or disagree?

☒I agree because:

We need a consistent system for product destined for export. The additional requirements suggested are likely to have minimal impact but provide greater confidence in the integrity of our export supply chain.

☐ I disagree because:

N/A

Can you think of any alternatives to this approach that ensure full traceability through the bee product supply chain?

N/A

17. MPI considers, for most businesses, the costs associated with these proposals are unlikely to be onerous. Do you agree or disagree and why?

☒I agree because:

The systems are well established. Any export focused supplier of consequence is already using this system.

☐ I disagree because:

N/A

Traceability between operators – transfer documentation in AP E-Cert and reconciliation

18. MPI proposes to introduce transfer documentation requirements to all bee products intended for export. Do you agree or disagree?

☒I agree because:

This makes the certification system easier for exporters and improves our credibility with foreign regulators.

☐ I disagree because:

N/A

Can you think of any alternatives to this approach that ensure full traceability through the bee product supply chain?

N/A

Labelling of monofloral and multifloral mānuka honey

19. MPI proposes to implement the mānuka honey definition for export using the GREX. Do you agree or disagree?

☐ I agree because:

N/A

☒I disagree because:

The definition proposed in the GREX is not fit for purpose.

Can you think of any alternatives to this approach that ensures mānuka honey is true to label?

A comprehensive response has been supplied by s 9(2)(b)(ii) as a separate document.

20. MPI considers there are likely to be options available to businesses to support compliance with the proposed definition (e.g. relabelling, changes to blending practices etc.). Do you agree with this assessment or do you have concerns about ability of some businesses to comply?

☐ I agree because:

N/A

☒I disagree because:

The proposed definition is not fit for purpose and requires substantial change. It is therefore not yet appropriate to comment on how businesses will manage the change proposed.

☒I have concerns because:

Our concerns are expressed fully in separate s 9(2)(b)(ii) supplied document

21. MPI's proposal may have an impact on existing rights associated with using the word "mānuka" on labels, including registered trademarks. Do you agree with MPI's assessment of the impact on existing rights?

☒I agree because:

MPI does not appear to have considered the implications for the industry in proposing a definition that would cause businesses to infringe on the patent s 9(2)(b)(ii) holds on honey analysis. A summary of this position has previously been forwarded to MPI.

☐I disagree because:

N/A

22. MPI does not propose to make changes to the current use of grading systems. Do you agree or disagree with this position?

☒I agree because:

MPI have correctly determined that grading systems are out of scope for Standards or other forms of regulation, given the existence of other forms of legislation that may be applied

☐ I disagree because:

N/A

23. What do you think the impact of the mānuka honey definition will be on the current use of grading systems?

Grading systems contribute much of the value obtained from manuka honey. A consumer choosing to buy manuka honey assumes the floral descriptor to be correct, then looks at the grade and decides how much they want to pay.
The manuka definition needs to leave no doubt in the minds of consumers that the product is genuine. Under the proposed definition there is opportunity for other honey types, such as kanuka and heather/ling, to be mislabelled as manuka. If consumers learn of the potential for mislabelling, then much of the value in grading systems will be lost, as the consumer will lose confidence in the category.

24. Do you have any comments on the summary science report?

This has been covered in a separate s 9(2)(b)(ii) supplied document.

25. Do you have any further comments regarding the definition of mānuka honey?

This has been covered in a separate s 9(2)(b)(ii) supplied document.

Laboratory Tests

26. Do you support the proposed requirements for sampling and testing mānuka honey set out in Part 6 of the draft GREX?

☒I agree because:

It is necessary to have criteria for acceptability of test results supporting a standard. However, we would like to see a clear pathway for considering alternative testing methods that provide outcome equivalence.

☐ I disagree because:

N/A

27. The costs associated with these proposals are likely to vary depending on the size and volume of samples being tested. What impact do you consider these proposals will have on your business?

Do you have any suggestions for minimising any impacts?

As explained in the separate s 9(2)(b)(ii) supplied document, we envisage that the DNA test is not necessary and could easily be replaced by a better suite of chemical markers. This will lower cost to the industry and provide more options for testing (testing for chemical markers is much easier than testing for DNA).

Transitional provisions

28. MPI proposes a lead in time of **six weeks** between when the GREX is notified and when it comes into effect. Do you agree or disagree with this proposal?

☐ I agree because:

N/A

☒I disagree and propose an alternative timeframe:

The definition for manuka is still a moving target: issues with the DNA test; substantial concerns with choice of chemical markers that will be contested in the submission phase. It is unrealistic to impose a very short time on the industry when there will be such limited time to prepare for and implement changes. A more realistic timeframe is 6-12 months.

29. MPI proposes stock in trade provisions for honey exported between the date of commencement until six months after the date of commencement. Do you agree or disagree with this proposal?

☐ I agree because:

N/A

☒I disagree because:

As commented in 28, above, there needs to be a more realistic effective date. If the effective date was to be pushed out for, say, 6 months, then the current stock in trade provision would not be required. It would be a lot more realistic, and simpler, to ensure that all product exported to all markets be compliant on the effective/commencement date.

Any other feedback

30. Are there any other parts of this discussion document or the draft GREX that you would like to provide feedback on? (Please indicate which part of the discussion document or draft GREX you are providing feedback on).

Refer separate document supplied by s 9(2)(b)(ii) detailing concerns with the proposed definition.

Submission by s 9(2)(b)(ii) Limited to Ministry for Primary Industries (MPI) on the Proposed General Export Requirements for Bee Products

s 9(2)(b)(ii)

Submission by s 9(2)(b)(ii) to Ministry for Primary Industries (MPI) on the Proposed General Export Requirements for Bee Products

s 9(2)(b)(ii)

1. Executive Summary

s 9(2)(b)(ii) believes that the proposed MPI definition fails in delivering on the intended outcomes, which was to provide consumer and offshore regulatory confidence in authentic Manuka honey.

1.1. Areas of concern

A systematic review of MPI's proposed definition for Manuka honey highlights many areas of concern:

- The DNA test produces false negative results and does not meet MPI's own attribute criteria. Published science has shown that methylglyoxal (naturally abundant in Manuka honey) inhibits DNA replication, and likely irreversibly denatures DNA in situ over the shelf life of the product.
- The DNA test does not add any discernible value to the classification outcome, however it does add considerable cost, inconvenience, testing delays and risk to the industry.
- Two of the proposed chemical attributes, 3-phenyllactic acid (3-PLA) and 4-hydroxyphenyllactic acid, are shared with other species nectars and honeys and are therefore clearly inappropriate to chemically define Manuka honey.
- The 400mg/kg 3-PLA threshold for distinguishing monofloral Manuka from multifloral Manuka is highly questionable given the abundance of 3-PLA in other honey types, regional variation, and a lack of representative samples in the MPI collection.
- The choice of chemical attributes enables monofloral kanuka honey to be sold as monofloral Manuka honey
- Facilitating and endorsing opportunistic blending which will enable honey to be sold as multifloral Manuka honey which does not reasonably resemble Manuka honey.

1.2. What are the process issues?

The concerns noted above are the direct result of a process which was significantly flawed in several key areas:

- The process did not involve industry experts with valuable knowledge, experience, and robust scientific research
- Many critical decisions were made that are inconsistent with the objectives and attribute criteria established by MPI
- Failure to validate the authenticity of the samples used in developing the classification
- Failure to assess all potential attributes in the classification process

1.3. What are the solutions?

To address the major concerns there needs to be a review of the process and significant changes put in place. s 9(2)(b)(ii) envisage the following:

- Stop the current process
- Set up a steering group with representatives from MPI, s 9(2)(b)(ii) and other industry experts
- Revisit the project scope, potential attributes, and the value attributes contribute to the overall objective: maintaining consumer confidence in the product
- Communicate the collaboration plan to the wider industry and make it clear how their input will be considered at each milestone

- Sense-check the proposed outcome with industry before public consultation to gain support and to check for unintended consequences

s 9(2)(b)(ii) will commit to providing the resources necessary to enable the above to happen. As the largest exporter of Manuka honey we clearly have an interest in getting this right. We have a deep understanding of the category, the consumers, and the problem we are trying solve. Over the years, we have invested heavily in research to understand Manuka honey, and we are very willing to share that expertise with MPI to achieve a better outcome.

We want to work closely with MPI on getting this right and ensuring the industry is well placed for the future.

2. Definition Fundamentals

MPI have correctly identified one of the key industry requirements; the lack of a regulatory definition supporting authentic Manuka honey. This requirement has two parts:

- What is the product – the core of the definition
- What set(s) of measurable attributes could be used to support a product classification consistent with the core of the definition.

2.1. What is the Product?

In supporting documents, MPI have confirmed their view that Manuka honey is derived from the nectar of Leptospermum scoparium, however this has not been made clear in the GREX.

One of the criticisms levelled by MPI at the industry has been the inability to reach an agreement on how Manuka honey should be defined. For many years there have been two camps; the majority supporting the view that Manuka honey is derived solely from Leptospermum scoparium, and those who believe that kanuka honey can also be sold as Manuka honey. It would be indefensible in any public forum to support a regulatory definition that enabled one species to be passed off as another, therefore the position MPI have taken is the correct one, but this needs to be more clearly stated.

The GREX does not clearly define the product; instead it only describes a set of attributes. Part 5 could be rewritten along the lines of:

- 5.1 Definition of Manuka Honey: honey derived from the nectar of New Zealand-grown Leptospermum scoparium
- 5.2 Attributes of Monofloral Manuka Honey: (appropriate list)
- 5.3 Attributes of Multifloral Manuka Honey: (appropriate list)

The term New Zealand-grown should be added to avoid this definition being applied to Leptospermum scoparium grown elsewhere in the world, or indeed for Australian competitors to label Leptospermum Polygalifolium (Australian Jellybush honey) as Manuka.

s 9(2)(b)(ii) ***requests that the GREX (Part 5) clearly defines Manuka honey as being derived from the nectar of New Zealand-grown Leptospermum scoparium.***

2.2. What to Measure?

The New Zealand environment has many attractive and competing nectar options for foraging bees. Consequently, completely monofloral honey of any kind is unlikely. A common interpretation of the Codex phrase 'wholly or mainly' is that 'mainly' means ≥50%. This presents a challenge when we don't know what 100% looks like. A practical interpretation of the Codex intent is to arrive at a set of measurable attributes that support the classification of a honey as being more likely to be Manuka honey than any of the other options.

So, the second part of the definition needs to consider measurable attributes which give confidence that the core definition has been met:

- Are the measured attributes able to give confidence that a honey being tested is more likely to be Manuka honey rather than any other honey type?
- Are there other attributes, not included in the assessment, that are likely to support or challenge the assessment? On what basis would these additional attributes be included or excluded?

Importantly, it must be recognised that while the core definition (Part 1) is set in stone, what we measure (Part 2) to demonstrate conformance to that core definition is not. Science will advance and the opportunity for alternative approaches (equivalence) must be preserved within a definition framework.

s 9(2)(b)(ii) ***requests MPI provide clarity on how alternative testing regimes will be approved in satisfying the core definition (our proposed 5.1 above) and therefore able to be used to support official assurances.***

3. Review of MPI Science Programme

3.1. Attributes

MPI have noted the following criteria (MPI Technical Paper No: 2017/28, abbreviated) regarding the selection of attributes:

1. Relationship to the source plant: Are the attributes linked to the nectar and pollen of L. scoparium?
2. Relationship to the source plant: Are the attributes only found in the Manuka plant and/or are they also found in other Leptospermum species or plants involved in New Zealand honey production?
3. Levels found in honey: Do the levels of the attributes enable separation of different honey types?
4. Ease of detection and quantification: Are there suitable laboratory test methods that could be developed and validated to detect and quantify the target attributes?
5. Stability of attributes: Are the attributes influenced by different temperatures over time?
6. Regional and seasonal variation: Are the levels of the attributes consistent or different across regions of New Zealand and seasons?
7. Likelihood of fraud and adulteration: Is it possible for the combination of attributes to be defensible against fraud?
8. Attributes historically used by industry: Are methylglyoxal and dihydroxyacetone suitable attributes?

These are generally good criteria to apply, although Criterion 7 and 8 should be expanded to:

7. Likelihood of fraud, adulteration and misleading practice: Is it possible for the combination of attributes to be defensible against fraud, and to prevent misuse that would lead to consumers being misled or confused?
8. Attributes historically used by industry: Are methylglyoxal, dihydroxyacetone and leptosperin suitable attributes?

The criteria above will be referenced later in this document.

The amendment to Criterion 7 takes account of intellectual property developed within the industry that provides protection for the consumer against misuse of attributes to make claims or position a product in such a way that the consumer is likely to be deceived. Examples of such protection include the patents held on leptosperin and lepteridine. In licencing the use of these compounds in the context of a definition, the industry can more effectively manage outcomes for consumers in the markets.

The amendment to Criterion 8 recognises that the use of leptosperin to define monofloral Manuka honey has become standard practice for most of the industry. There should be every effort made to preserve existing industry practices that are accepted and satisfying the outcomes required by the core definition.

MPI have not considered the inclusion of lepteridine, the discovery of which was published in May 2016. Research conducted by s 9(2)(b)(ii) soon to be published, describes the significance of this compound in supporting a Manuka honey definition. The Abstract for this publication is included in the Appendix, and further details are available on request.

s 9(2)(b)(ii) requests that the criteria for attributes be revisited. Consideration for industry IP should be incorporated into the criteria, thus providing more robust consumer protection.

s 9(2)(b)(ii) requests that leptosperin be included in the final set of attributes.

s 9(2)(b)(ii) requests a review of the evidence supporting lepteridine be carried out, with the intent to include this compound in the final set of attributes.

3.2. Stability of Attributes

MPI conducted a stability trial for the potential chemical marker attributes. Data has been supplied out to 68 days at temperatures of 4°C, 20°C and 35°C.

The stability of the DNA attribute has not been confirmed, and evidence from industry testing indicates that this is a serious problem. This will be covered in more detail later in the Definition Evaluation section of this document.

Leptosperin has been accepted by industry and international experts as the most significant individual attribute in defining authentic Manuka honey.

MPI have formed the view that leptosperin is unstable and therefore unsuitable as an attribute in the definition. Published research (Kato, 2014; Bong/Stephens, 2017) contradicts this view, and has shown leptosperin to be stable at 37°C for up to 444 days. It is surprising that the broader set of data supporting stability was overlooked despite this being in the public domain and clearly communicated to MPI on multiple occasions.

A short report covering the stability of leptosperin and other compounds of interest is included in the Appendix.

s 9(2)(b)(ii) ***request that MPI take into account the published research (Kato, 2014; Bong 2017) supporting the stability of leptosperin and add leptosperin into the final set of attributes.***

3.3. Nectar and Honey Data Supporting Attribute Selection

A review of the MPI nectar data shows good alignment with results reported by s 9(2)(b)(ii) and UMFHA. The clearly dominant chemical markers are dihydroxyacetone (DHA), leptosperin and 3-phenyllactic acid (3-PLA). The results also confirm work by s 9(2)(b)(ii) UMFHA and others showing that 3-PLA is abundant in kanuka nectar.

A summary of the MPI 2014/15 nectar data is shown in *Figure 1* below.

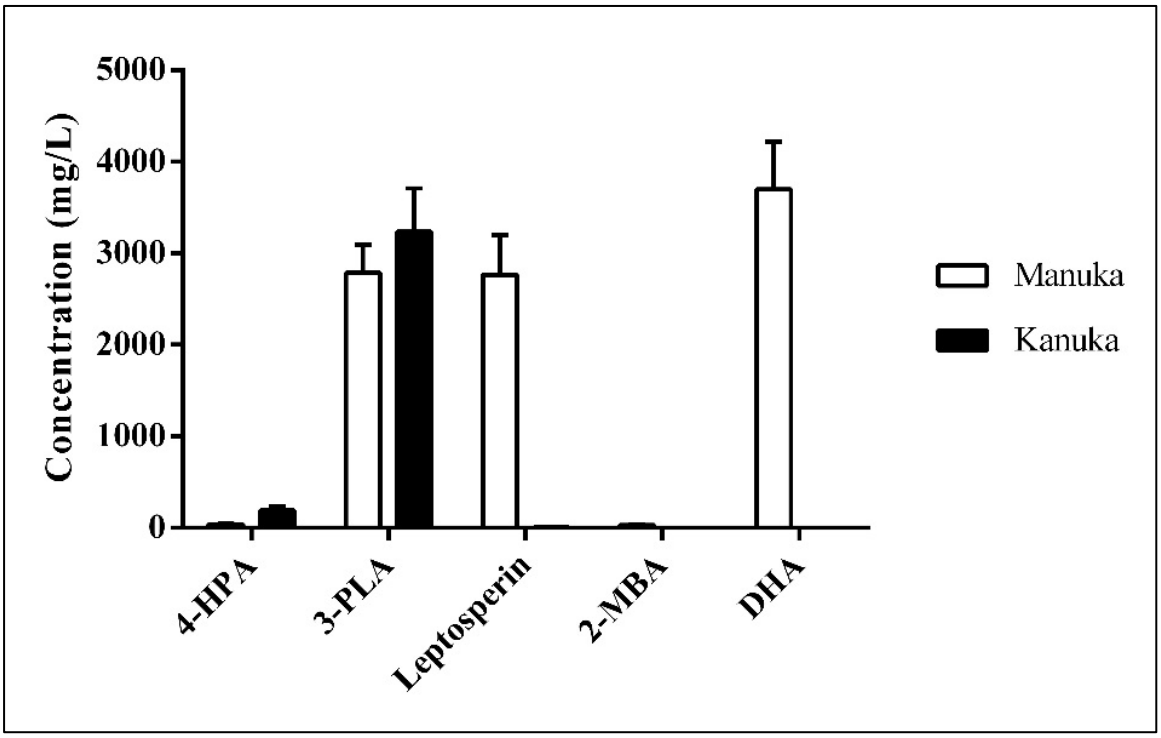


Figure 1. Nectar results from MPI data supplied to industry.

With the situation described above it is very surprising that MPI have chosen to proceed with 3-PLA as the key attribute defining monofloral Manuka honey:

The potential for confusion with kanuka is obvious, and puts this choice of attribute in conflict with Criterion 2 and 3 described earlier:

- 3-PLA is not unique to Manuka;
- it occurs in kanuka and heather/ling honey and therefore it cannot be used as proposed to separate different honey types.

- 3-PLA is also easy to purchase in bulk (fails Criterion 7)
- There is no previous history of use (fails Criterion 8).

Data from the UMFHA Manuka ID project indicates that 3-PLA is quite variable by region, and many regions would fail to meet the 400mg/kg 3-PLA threshold for monofloral honey, as illustrated in *Figure 2*.

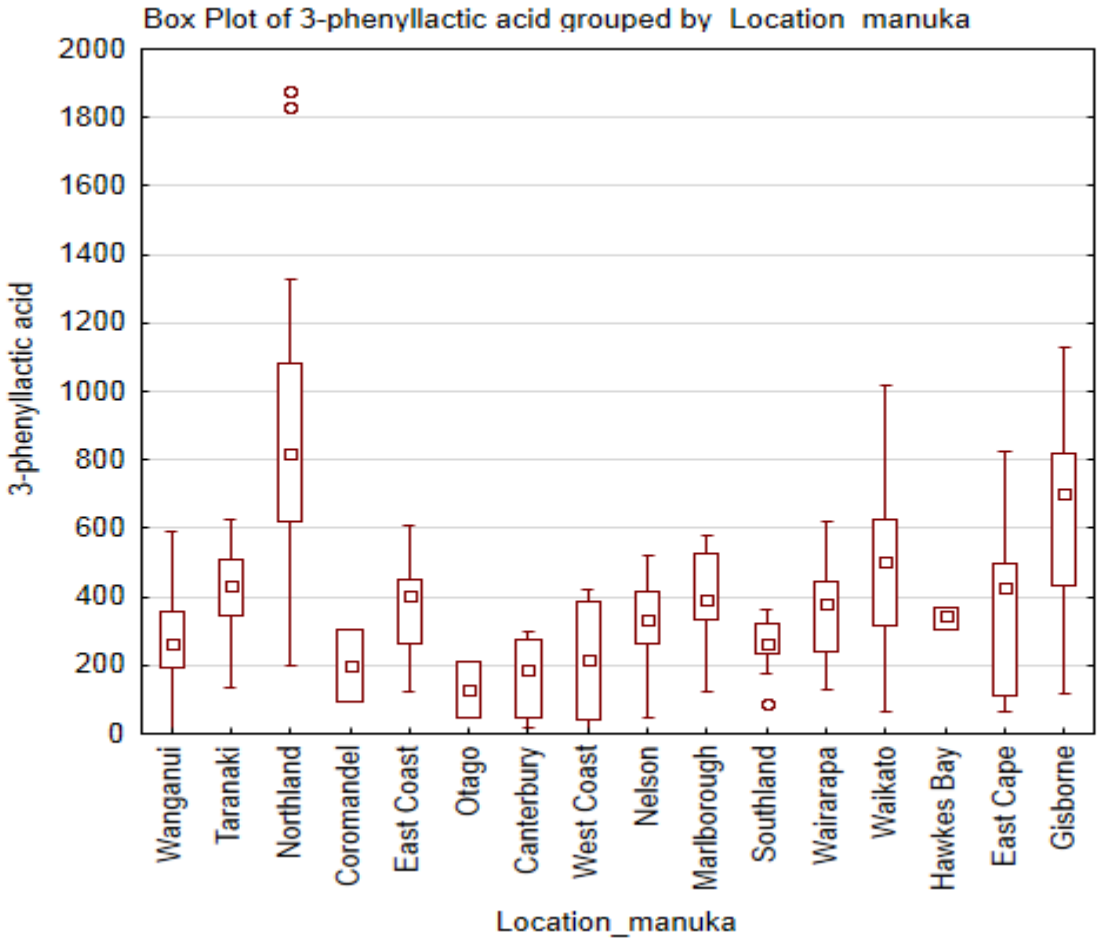


Figure 2. Variation in 3-PLA by region.

The MPI data lacks representative samples from all Manuka producing regions in New Zealand. Regions with higher 3-PLA results are over-represented in the data (Figures 3 and 4), and this has likely skewed the proposed threshold toward an unfairly high level for other regions.

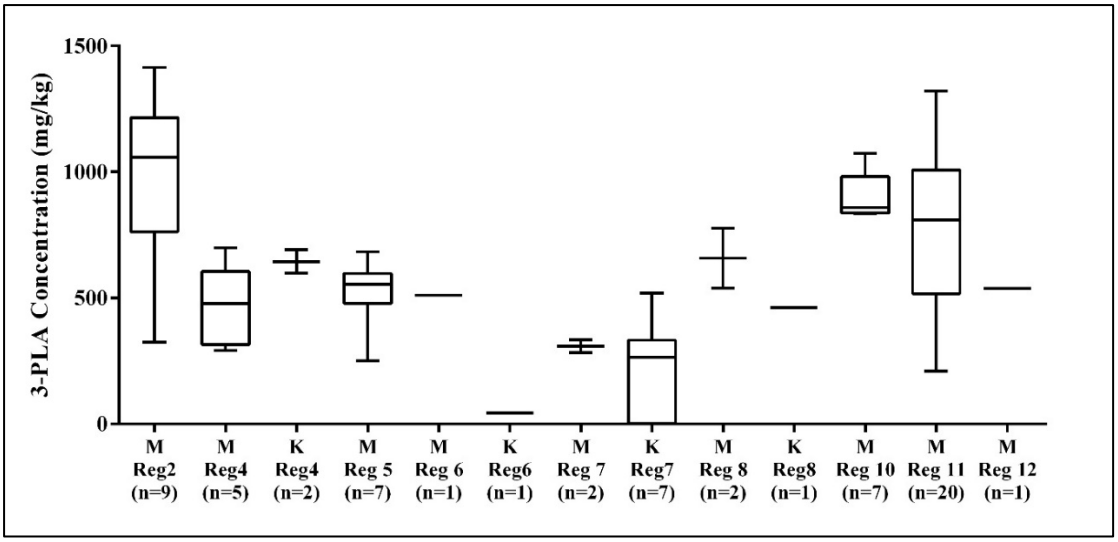


Figure 3. MPI honeys (2014/15 season). 3-PLA concentration for Manuka and kanuka honeys collected, some regions are not represented equally and some are missing.

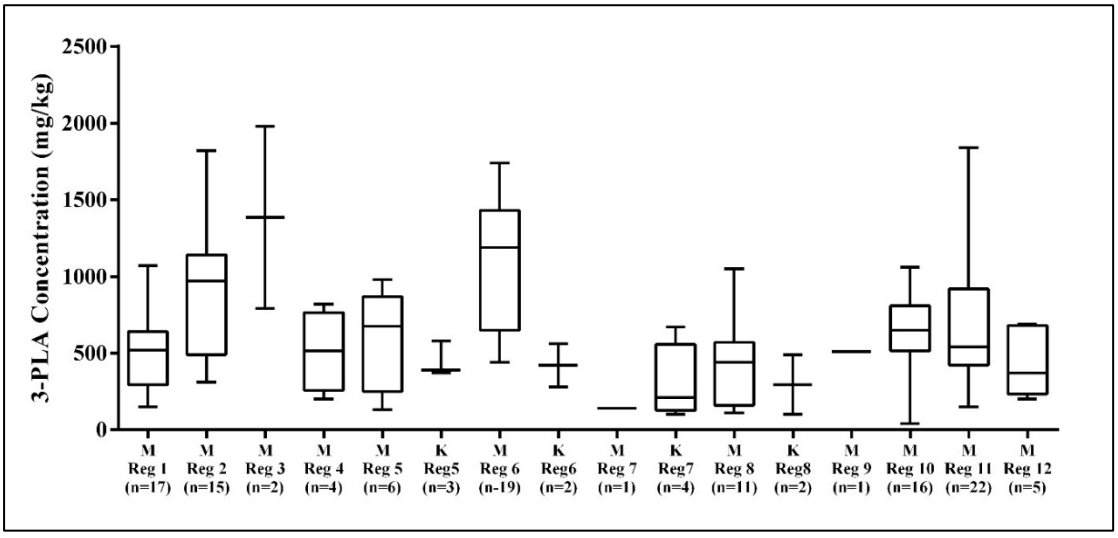


Figure 4. MPI honeys (2015/16 season). 3-PLA concentration for Manuka and kanuka honeys collected, some regions are not represented equally and some are missing.

Given the well-known issue with kanuka being mislabelled as Manuka, it is surprising that there was not a greater effort to source more authentic kanuka samples, especially when the key attribute proposed (3-PLA) is shared by both species. From a conversation held with the Apiculture NZ Standards Focus Group it is understood that MPI were not able to get as many samples as they would have liked due to resource and time constraints. s 9(2)(b)(ii) and UMFHA have samples and data that would help fill this gap.

It is unfortunate that MPI did not obtain any kanuka honey samples from Region 1, which we presume to be Northland. Obtaining a robust and representative set of regional samples is critical. The UMFHA sample collection has shown that kanuka honey from Northland is very high in 3-PLA. Understanding this situation prior to shortlisting attributes may have influenced the choice of attributes, and would likely have caused a closer examination of the sample MPI obtained from Northland that were claimed to be Manuka honey.

In contrast to 3-PLA, letosperin is unique to Manuka, able to separate different honey types (by virtue of being abundant) and stable (as discussed earlier). MPI have suggested that leptosperin is not unique to Manuka, however the examples cited to support this view are not within the context of New Zealand commercial honey production and are therefore not material. Therefore, of all the potential attributes considered, leptosperin is the best candidate.

The MPI nectar data also illustrates the significance of DHA, and therefore methylglyoxal, as a key attribute in Manuka honey. The variation over time in methylglyoxal levels is well understood by the industry and this has been managed successfully for the last 20 years. Dismissing a characteristic attribute based on one criterion alone fails to recognise the importance of all the other criteria that methylglyoxal clearly satisfies. More importantly, wouldn't the absence of methylglyoxal in a honey that satisfies limits for all other attributes be cause for concern?

MPI tested a range for honey samples for the same potential attributes as the nectar samples. The outcome was not surprising and is consistent with similar testing by industry (see short report included in the Appendix). Again, this raises questions around why 3-PLA was included and yet leptosperin and methylglyoxal were excluded.

The decision by MPI to advance with the chosen attributes is inconsistent with the criteria they established, inconsistent with the industry view, and this needs to be revisited in collaboration with industry experts.

s 9(2)(b)(ii) ***request collaboration with MPI to revisit the decisions made about which attributes go through to a classification model. It is*** s 9(2)(b)(ii) ***view that leptosperin and methylglyoxal should not have been cut from the process before being properly assessed against other attributes in the classification step.***

s 9(2)(b)(ii) ***request a review of the proposed 3-PLA threshold given the shortage of representative samples across New Zealand.***

3.4. Classification and Regression Tree (CART) Modelling

Most of the samples included in the classification dataset were submitted by industry. MPI have relied on the floral descriptor as claimed by the supplier being correct. Full testing of all potential attributes across all samples to confirm their descriptor was not done. Unfortunately, this means there has not been an attempt to verify the floral descriptor. By contrast, the approach taken by s 9(2)(b)(ii) and UMFHA has been to measure many attributes and use that information to then determine which attributes to focus on.

The CART peer review paper released to industry states: "Ideally, the level of misidentification of honey samples in the training dataset could be quantified, but this is not practical or possible given the variety of approaches used by suppliers to identify the floral source of a honey sample. This would need to be the aim of entirely independent research project as the misidentification of honey samples would be dependent on supplier, honey type and region."

s 9(2)(b)(ii) do not agree that the above is impractical or impossible. s 9(2)(b)(ii) and s 9(2)(b)(ii) have the necessary experience to assist in this area. s 9(2)(b)(ii) do not agree with MPI's view that "The peer reviewers did not identify any major causes of concern". The potential misidentification of samples included in the training set is a major cause for concern, especially when the attributes MPI have chosen are likely to result in kanuka honey being wrongly classified as monofloral Manuka honey.

If the authenticity of the samples cannot be assured, how can these be used as the basis for a reliable classification? Given the industry issue of kanuka being mislabelled as Manuka the model has likely been trained to see the two as the same.

A missed clue that the above has happened comes from the finding reported by MPI that a significant amount of honey labelled as kanuka turned out to be either multifloral or monofloral Manuka. Beekeepers have no reason to label Manuka as kanuka, so there is a more logical explanation: the honey really is kanuka, but the classification model is relying on a set of attributes that falsely assign it to one of the two possible Manuka categories. This is a consequence of using 3-PLA, abundant in kanuka, and very low levels of other attributes which can easily be met by inadvertent or deliberate blending.

Not fully testing for all potential attributes across all samples also means that the classification was only narrowly modelled on the attributes identified in the proposed definition (MPI did include the kanuka Cq values, but subsequently determined that it didn't help with the classification outcome). It would have been valuable to see the contribution that other potential markers could have made, particularly leptosperin and methylglyoxal. The contribution these compounds make to the classification outcome should have been considered before discarding them based only on the criteria discussed earlier.

s 9(2)(b)(ii) ***request full testing of the approx. 800 honey samples to enable validation of the label claim.***

s 9(2)(b)(ii) ***request that the classification process be repeated using data from other potential attributes, namely: leptosperin, lepteridine and methylglyoxal.***

4. Definition Evaluation

Industry evaluation of the proposed definition has identified many concerns:

- The DNA test produces false negatives, causing monofloral Manuka to be incorrectly classified as non-Manuka honey.
- The contribution the DNA test makes to the classification outcome needs to be properly and robustly assessed alongside the contribution leptosperin, lepteridine and methylglyoxal would make.
- The choice of attributes will lead to blending, either inadvertent or deliberate, resulting in non-Manuka honey being sold as either multifloral or monofloral Manuka honey.
- The threshold set for determining monofloral Manuka honey is based on an attribute abundant in kanuka, Manuka and heather/ling honey and found to have a high degree of regional variation.

- The threshold for multifloral Manuka is too low, enabling product into this category that will not meet established consumer expectations.
- Opportunities to protect the consumer and Manuka honey exporters have not been included in the proposed definition.

4.1. DNA Test

At the time of writing this submission it is known that MPI have acknowledged there is problem with the DNA test producing false negative results and work is underway to address that. It is expected that as part of the investigation and follow-up, the following will take place:

- The root cause of the problem will have been identified and the proposed solution will have been demonstrated to directly address the root cause.
- All the samples used in the CART classification will be retested against the modified methodology.
- The CART classification will be repeated to determine what impact the change has on the threshold Cq value and contribution to the classification.
- The change in test method will be validated in each of the laboratories seeking recognition.

This will take significant time to do properly but is unlikely to address other concerns.

To gain industry and market acceptance the DNA test needs to perform better against the ideal attribute criteria than readily available more cost effective and efficient alternatives. Prime candidates for this are the alternative chemical attributes already discussed above: leptosperin, lepteridine and methylglyoxal.

Even more fundamental is the absence of a clear link to the honey itself. MPI have not been able to demonstrate a clear relationship between the DNA measured and the Manuka pollen present. So, what is the test actually measuring? What causes the DNA result to be higher or lower in one sample versus another?

s 9(2)(b)(ii) have previously provided a summary report to MPI, via s 9(2)(b)(ii), outlining the observations and issues with the DNA test. The full report is included in the Appendix, and the key concerns from that report are copied below:

- Why does monofloral Manuka have less measurable Manuka DNA than multiflora Manuka?
- Has there been any work done to assess the potential to use very small amounts of high-DNA honey to convert non-Manuka honey into multiflora or monofloral honey?
- Why do apparent Manuka honey samples with abundant chemical markers not have any measurable DNA? Did the development of the definition account for the presence of other compounds characteristic of Manuka honey?
- Has there been an assessment of the financial impact on the industry given the tendency of the definition to fail high value honey?
- Why is there an inverse relationship between the amount of Manuka pollen present and the measurable DNA?
- Has the interaction between DNA and other compounds commonly found in Manuka honey been considered?

- Has the stability of the measured Manuka DNA been investigated over the typical shelf life of the product?
- Has the variability in the individual test results for DNA been assessed against MPI's Criterion 4 and 5? In our view this test fails on both counts.
- In s 9(2)(b)(ii) view is there are too many unresolved issues with the DNA test, and poor alignment to MPI's own attribute criteria, to consider including DNA in the final set of attributes.

s 9(2)(b)(ii) ***request the DNA test is removed from the final set of attributes in the proposed definition.***

4.2. *Chemical Markers*

Research conducted by s 9(2)(b)(ii) has identified typical values for potential chemical attributes in Manuka and kanuka honey. These typical values are illustrated in Figures 5 and 6.

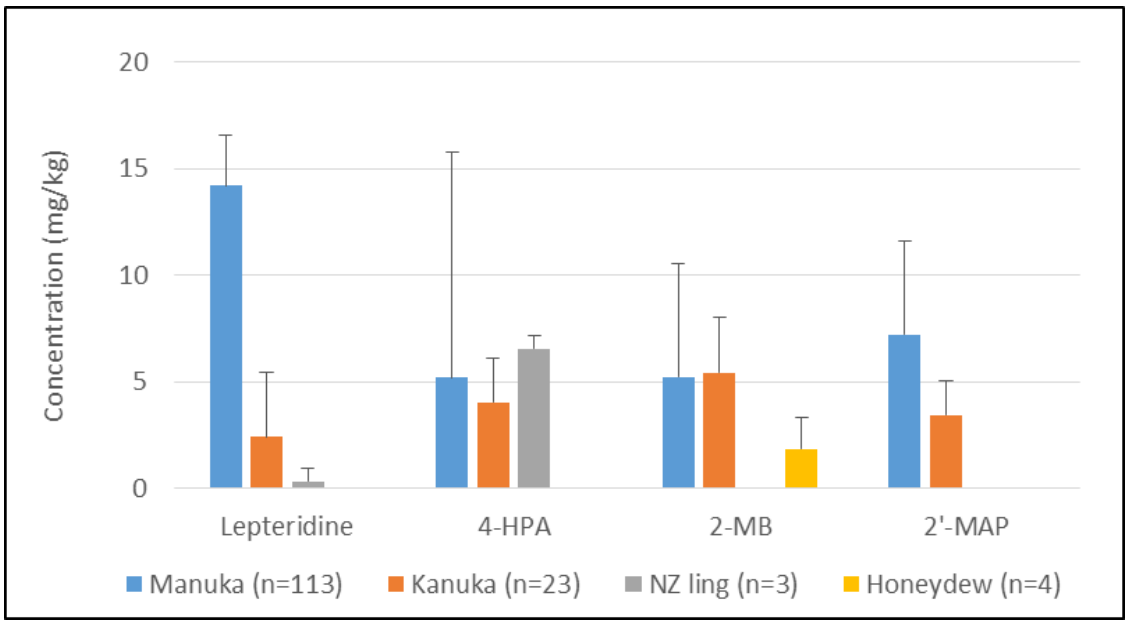


Figure 5. Typical values of attributes.

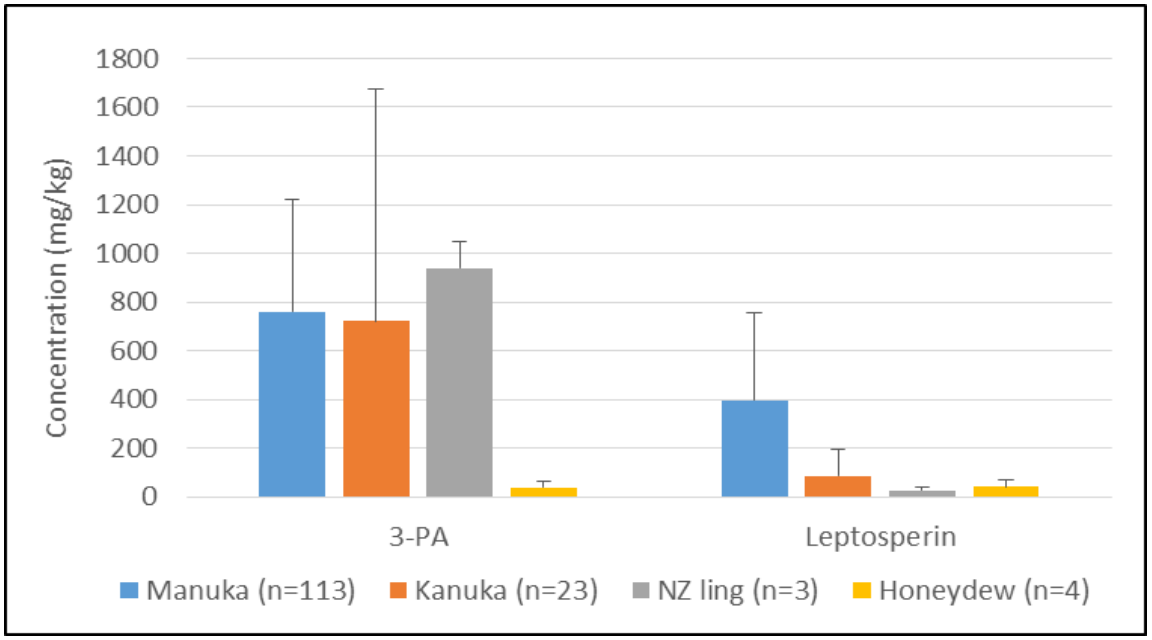


Figure 6. Typical values of attributes.

A typical monofloral kanuka evaluated under MPI's proposed definition will be misclassified as a monofloral Manuka. The equally obvious outcome from the summary data above is that leptosperin and lepteridine could each be used to stop this from happening.

A useful real-world example comes from a beekeeper known to s 9(2)(b)(ii) who has hives placed in a kanuka-dominant environment. A sample of their product was tested and the results summarised in the table below:

Attribute	Result	Interpretation
4-HPLA (mg/kg)	5.95	Under the proposed MPI definition this honey would be classified as monofloral Manuka
2-MBA (mg/kg)	1.56	
2-MAP (mg/kg)	4.03	
3-PLA (mg/kg)	983	
PCR (Cq)	31.6	
Methylglyoxal	13	UMFHA classification: non-Manuka
Leptosperin (mg/kg)	27	

The results above show a clear example of how the proposed definition will enable kanuka to be sold as Manuka. The means to detect this form of food fraud already exist. If the proposed definition is promulgated it will not take long for interested laboratories around the world to find examples like the above and to ask legitimate questions about the integrity of the definition.

The threshold levels of all attributes defining a multifloral Manuka honey are too low. As a consequence, very little genuine Manuka honey is required to convert non-Manuka honey into multifloral Manuka. In public meetings MPI have refuted this as unproven and purely

theoretical. The reality is that industry is very good at formulating and legitimately blending to achieve the desired outcome: if it can be done in a spreadsheet it can be done in practice.

A short paper describing in more detail the opportunity for blending is included in the Appendix. This paper describes scenarios where significant dilution with non-Manuka honey is enabled, which would then be endorsed by MPI in accordance with the proposed definition.

The main concern here is that honey with the physical and sensory properties of other monofloral varieties is going to pass the test for multifloral Manuka. Raising the attribute thresholds is one option, however another option could be a supporting declaration by the manufacturer attesting that the honey is more like Manuka than other monofloral honey types. This recognises the importance of meeting consumer expectations.

s 9(2)(b)(ii) ***request that 3-PLA be removed from the definition and alternative attributes (leptosperin, lepteridine, methylglyoxal) are evaluated as replacements.***

5. Opportunities Not Addressed

s 9(2)(b)(ii) wish to point out opportunities associated with certain attributes that have not been considered by MPI.

5.1. Industry IP

s 9(2)(b)(ii) holds patents in the following areas:

- Lepteridine as a chemical marker to authenticate Manuka honey
- Fluoresence as a means to authenticate Manuka honey
- A broader honey analysis patent based on the presence of phenolic compounds, including those named by MPI, to authenticate Manuka honey

Further to this, UMFHA holds a patent on leptosperin. Collectively this makes leptosperin and lepteridine attractive attributes. With patents in place the industry can apply a licence agreement that limits how these attributes are used (or misused). Rather than blocking honest competition, these patents can be used to manage behaviour and ensure a level playing field for all legitimate participants. An excellent example of this already exists with the use of the UMF trademark. Licencees contract into and are bound by the terms of a licence agreement, with the consequence that a standardised level of product quality is presented to the market. Independent audits by the Association enforce compliance.

The fluorescence patent presents the opportunity to develop hand-held measurement devices that can be used at all stages of the supply chain, and at point of sale, to verify product authenticity. A prototype device has already been built and been tested to provide proof of concept. The development of tools like this should be considered a significant advantage when evaluating each attribute.

5.2. Negative Markers

s 9(2)(b)(ii) has researched and submitted for publication the use of lumichrome in a Manuka definition (the Abstract for this paper is included in the Appendix). Lumichrome is unique to

kanuka and can therefore be used as a negative marker; i.e. set an upper limit beyond which a honey would be deemed more kanuka-like than Manuka-like.

As part of the UMFHA Manuka ID project many other potential negative markers were identified and a prototype decision tree developed that would allow classification of an unknown honey sample into any of the main commercial honey types from New Zealand.

There is extensive expertise sitting within the s 9(2)(b)(ii) UMFHA science network to enable a more robust set of attributes to be identified and applied to the Manuka definition.

s 9(2)(b)(ii) s 9(2)(b)(ii) ***request a review of the attribute selection process to include the work done by and UMFHA on negative markers.***

5.3. Protecting Manuka for New Zealand

The definition and broader GREX document provides an opportunity to protect the term 'Manuka honey' for New Zealand.

One opportunity has been raised earlier: rewording the definition to state that Manuka honey is derived from the nectar of New Zealand-grown Leptospermum scoparium.

Another opportunity is to include a condition in the GREX requiring product to be packed into retail packaging and have final labels applied in New Zealand before the product can be considered eligible for official assurances. This stops bulk honey being exported with the official assurance that it is Manuka honey only to be subjected to potentially fraudulent practice overseas. It also provides another condition in the overall definition that producers in other countries can't meet.

Both opportunities above will help prevent other countries from claiming compliance of product produced in their country to the official New Zealand definition for Manuka honey.

s 9(2)(b)(ii) ***request that MPI work with industry to identify opportunities to protect Manuka honey for New Zealand.***

6. Working Together

This document has outlined many areas of concern with the Manuka definition MPI has proposed, but equally there have been solutions or alternatives offered that s 9(2)(b)(ii) would like to discuss with MPI.

s 9(2)(b)(ii) fully supports the intent to provide a robust definition for Manuka honey. We believe robust regulation is essential for our industry and if done well it should provide a positive platform for growth.

There is the necessary expertise within s 9(2)(b)(ii) and the UMFHA science network to work with MPI in a collaborative and constructive way to achieve the following:

- Redefine the scope of the project to ensure we not only define Manuka honey but also incorporate other measures that support growth of the category

- Communicate the collaboration plan to the wider industry and make it clear how their input will be considered at each milestone
- Revisit potential attributes, criteria for attributes, and performance of all potential attributes against those criteria, including stability
- Combine MPI and s 9(2)(b)(ii) s 9(2)(b)(ii) data and fill in any gaps so we have a fully representative dataset for all honey samples across all potential attributes
- Consider the use of negative markers
- Examine the data to determine if any samples have been mislabelled or are outliers
- Use the cleansed dataset to model which attributes to use and what levels to apply
- Sense-check the proposed outcome with industry before public consultation to gain support and to check for unintended consequences
- Support and acknowledge industry measures that provide additional consumer protection
- Consider a phased approach to implementation in partnership with industry and establish realistic timelines
- Present the final plan to the wider industry in partnership with industry representatives.

s 9(2)(b)(ii) will commit to providing the resources necessary to enable the above to happen. As the largest exporter of Manuka honey we clearly have an interest in getting this right. We have a deep understanding of the category, the consumers, and the problem we are trying solve. Over the years, we have invested heavily in research to understand Manuka honey, and we are very willing to share that expertise.

We want to work closely with MPI on getting this right and ensuring the industry is well placed for the future.

7. Appendix

The Appendix contains several documents referred to in the body of the submission document:

- Short report on stability of various Manuka honey compounds, s 9(2)(a), 15 May 2017
- Short report on abundance and specificity of various Manuka honey compounds using HPLC techniques, s 9(2)(a), 15 May 2017
- DNA Test Implications, s 9(2)(a), 15 May 2017
- Short report on theoretical blending of Manuka honey, s 9(2)(a), 15 May 2017

Pending Publication: New approach: chemical and fluorescence profiling of NZ honeys, s 9(2)(a)

Authors and Affiliations

- s 9(2)(a)
- aSchool of Biological Sciences and Institute for Innovation in Biotechnology, University of Auckland, PB92019 Auckland, New Zealand
- bMaurice Wilkins Centre for Molecular Biodiscovery, PB92019 Auckland, New Zealand
- s 9(2)(b)(ii) NZ Limited, Wilson South Road, Paengaroa, PB1, Te Puke, New Zealand

Abstract

New Zealand Manuka (Leptospermum scoparium) and kanuka (Kunzea ericoides) honeys contain a unique array of chemical markers useful for chemical fingerprinting. We investigated the presence of thirteen potential marker compounds in nectars of the major honey crop species. We confirmed that leptosperin, lepteridine, 2'-methoxyacetophenone, and 2-methoxybenzoic acid are exclusive to Manuka nectar whereas lumichrome is unique to kanuka nectar. 3-phenyllactic acid and 4-hydroxyphenyllactic acid are shared between Manuka and kanuka nectars. Kojic acid is present at elevated concentration in Manuka honey but absent in nectar. Leptosperin, lepteridine, 3-phenyllactic acid, and 4-hydroxyphenyllactic acid are chemically stable over prolonged storage but not 2-methoxybenzoic acid and 2'-methoxyacetophenone. An optimal cut-off was established for the floral source-specific markers: leptosperin (94 mg/kg), lepteridine (2.1 mg/kg), 2'-methoxyacetophenone (2.0 mg/kg) for Manuka honey, and lumichrome (4.5 mg/kg) for kanuka honey. The application of fluorescence marker compounds leptosperin, lepteridine, and 4-methoxyphenyllactic acid to honey screening was also reinforced.

[1] *Corresponding author at: School of Biological Sciences and Institute for Innovation in Biotechnology, University of Auckland, PB92019 Auckland, New Zealand. Tel.:* s 9(2)(a)
E-mail address: s 9(2)(a) s 9(2)(b) *com* s 9(2)(a)

7.1. Short report on stability of various Manuka honey compounds, s 9(2)(a), 15 May 2017

Short Report on Stability of various Manuka honey compounds

s 9(2)(a)

Head of Honey Research

15 May 2017

Affiliations -

s 9(2)(a) s 9(2) NZ Ltd, Paengaroa, NZ
Waikato Innovation Park, Hamilton, NZ
Honorary Research Fellow, Institute for Innovation in Biotechnology,
School of Biological Sciences. University of Auckland, Auckland, NZ

Contact -

Email: s 9(2)(a) s 9(2)(b) com Postal: s 9(2)(a) /s 9(2)(b) Waikato Innovation Park, P O Box 9466, Hamilton 3240, New Zealand. Telephone s 9(2)(a)

Abstract

The relative stability of six compounds present in manuka honey was examined.

The honeys were well-homogenised, stored for the duration of experiment at 37°C, and representative subsamples withdrawn at days 0, 70, 155, and 444. Subsamples were frozen until analysis.

Analysis was completed using RP-HPLC, and the full method is available.

Compounds selected for analysis were Leptosperin, 3-phenyllactic acid, Lepteridine, 2'-methoxyacetophenone, 4-hydroxyphenyllactic acid, and 2-methoxybenzoic acid.

In summary:

The mean Leptosperin, 3-phenyllactic acid, Lepteridine, and 4-hydroxyphenyllactic acid concentrations were not significantly different following 444 days incubation at 37°C.
Interestingly, Leptosperin, 3-phenyllactic acid, and Lepteridine demonstrated a concentration-driven effect, in that honeys that contained a higher concentration of these compounds illustrated a greater decrease.

4-hydroxyphenyllactic acid concentration change did not respond to the concentration of this compound.

2'-methoxyacetophenone concentration was significantly reduced during the incubation and demonstrated a mean loss of approximately 20%. Again, the rate of this loss was elevated in honeys that contained a relatively greater concentration of 2'-methoxyacetophone.

2-methoxybenzoic acid was significantly increased following incubation by approximately 10%. This increase did not correlate with existing concentration strongly.

Leptosperin, 3-phenyllactic acid

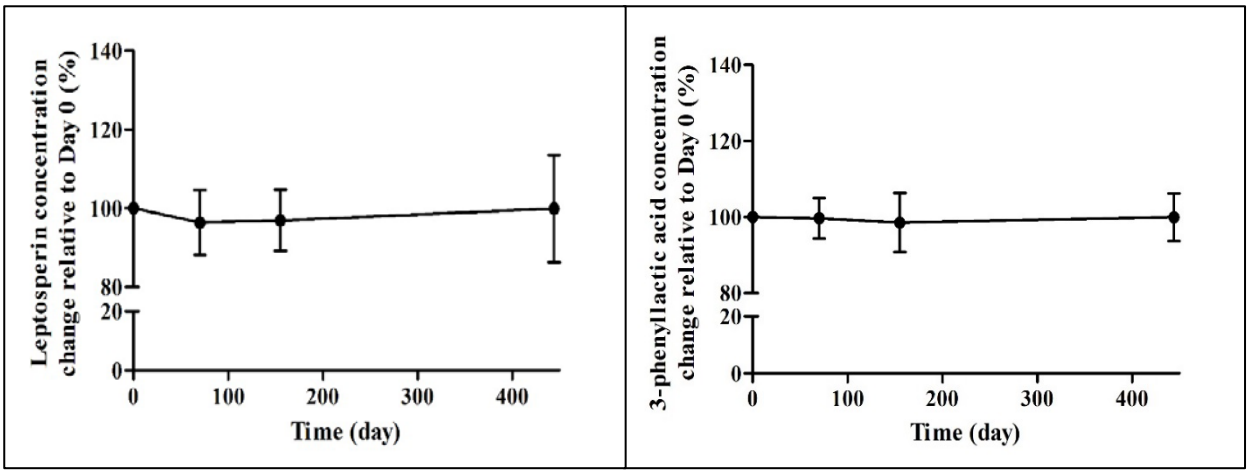
Leptosperin and 3-phenyllactic acid are the predominant phenolic or glycoside compounds in manuka honey.

Interestingly both compounds behave similarly when exposed to elevated temperature storage, and this pattern is often repeated for the other compounds in the honey.
The complete data for both compounds is given below.

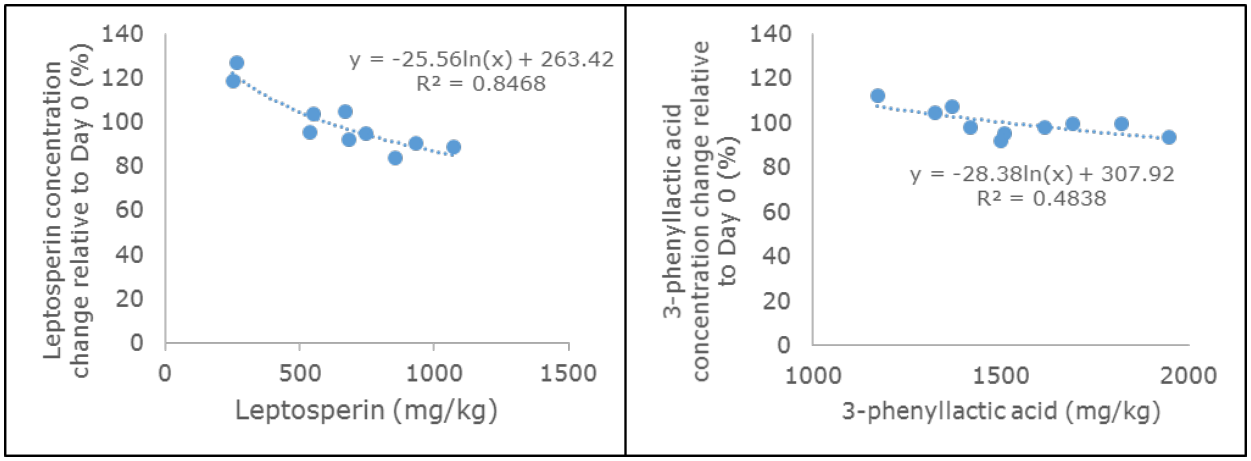
Leptosperin	Concentration (mg/kg)				% relative to Day 0			
	0	70	155	444	0	70	155	444
Drum 31981	933.4	888.9	833.0	845.6	100.0	95.2	89.2	90.6
Drum 31964	857.2	795.7	775.7	719.7	100.0	92.8	90.5	84.0
Drum 31978	746.3	743.7	703.1	708.7	100.0	99.7	94.2	95.0
Drum 31995	1074.4	1043.2	1024.6	954.4	100.0	97.1	95.4	88.8
Drum 31841	538.0	547.7	546.1	511.9	100.0	101.8	101.5	95.2
Drum 31837	550.6	526.4	527.2	570.6	100.0	95.6	95.7	103.6
Drum 31816	250.9	266.6	264.3	297.7	100.0	106.2	105.3	118.6
Drum 31822	268.5	280.3	296.7	339.8	100.0	104.4	110.5	126.6
Drum 31975	671.7	633.8	681.7	704.8	100.0	94.4	101.5	104.9
Drum 31998	685.1	524.7	585.5	631.8	100.0	76.6	85.5	92.2
				Average	100.0	96.4	96.9	99.9

3-PLA	Concentration (mg/kg)				% relative to Day 0			
	0	70	155	444	0	70	155	444
Drum 31981	1947.3	1877.8	1735.9	1827.0	100.0	96.4	89.1	93.8
Drum 31964	1172.0	1175.2	1132.7	1312.1	100.0	100.3	96.6	112.0
Drum 31978	1822.5	1817.1	1717.4	1815.8	100.0	99.7	94.2	99.6
Drum 31995	1417.6	1372.1	1340.9	1386.7	100.0	96.8	94.6	97.8
Drum 31841	1508.6	1515.1	1489.4	1435.9	100.0	100.4	98.7	95.2
Drum 31837	1616.9	1585.5	1564.4	1583.3	100.0	98.1	96.8	97.9
Drum 31816	1369.7	1495.8	1487.8	1469.0	100.0	109.2	108.6	107.3
Drum 31822	1325.4	1427.0	1512.5	1388.1	100.0	107.7	114.1	104.7
Drum 31975	1690.1	1640.9	1719.2	1679.2	100.0	97.1	101.7	99.4
Drum 31998	1499.1	1365.2	1368.6	1379.7	100.0	91.1	91.3	92.0
				Average	100.0	99.7	98.6	100.0

The mean percentage change of the entire sample set demonstrates these compounds are stable and there is no significant difference between time 0 and time 444 days.



Yet both of these compounds decay in a concentration dependent manner in the honey solution; accordingly the honeys containing higher concentrations show greater loss compared to honeys with an inherently lower concentration.

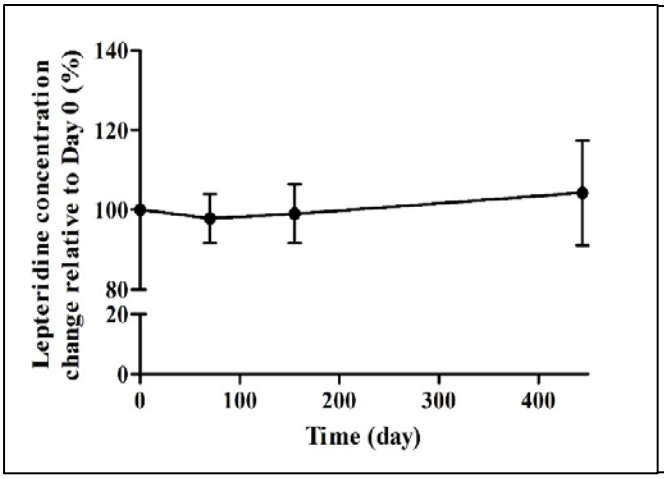


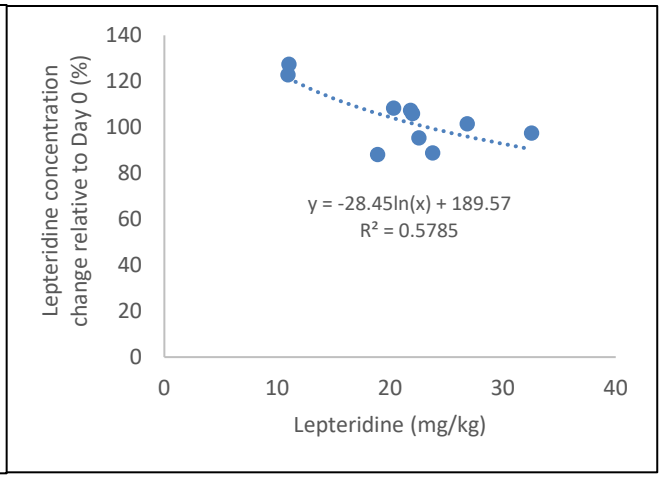
Therefore the conclusion is drawn Leptosperin and 3-phenyllactic exhibit similar stability behaviour in manuka honey solutions. In both cases the apparent concentration-driven changes following elevated temperature storage could be accounted for empirically.

Lepteridine

Lepteridine behaved in a similar manner, the mean change for the entire data set was not significantly different yet there was evidence of the same concentration-driven trend reported above.

Lepteridine	Concentration (mg/kg)				% relative to Day 0			
	0	70	155	444	0	70	155	444
Drum 31981	22.6	21.5	20.4	21.5	100.0	95.4	90.2	95.3
Drum 31964	18.9	17.5	17.1	16.7	100.0	92.4	90.6	88.1
Drum 31978	26.9	26.8	25.5	27.2	100.0	100.0	95.1	101.4
Drum 31995	32.6	31.9	31.5	31.7	100.0	98.0	96.8	97.5
Drum 31841	22.0	22.8	23.0	23.3	100.0	103.6	104.4	106.0
Drum 31837	23.8	22.2	22.8	21.1	100.0	93.3	96.0	88.8
Drum 31816	11.0	11.7	11.8	13.5	100.0	106.7	107.4	122.8
Drum 31822	11.1	11.7	12.4	14.1	100.0	105.5	112.5	127.3
Drum 31975	20.3	19.6	20.9	22.0	100.0	96.2	102.5	108.3
Drum 31998	21.8	19.1	20.7	23.4	100.0	87.3	94.9	107.3
				Average	**100.0**	**97.8**	**99.0**	**104.3**



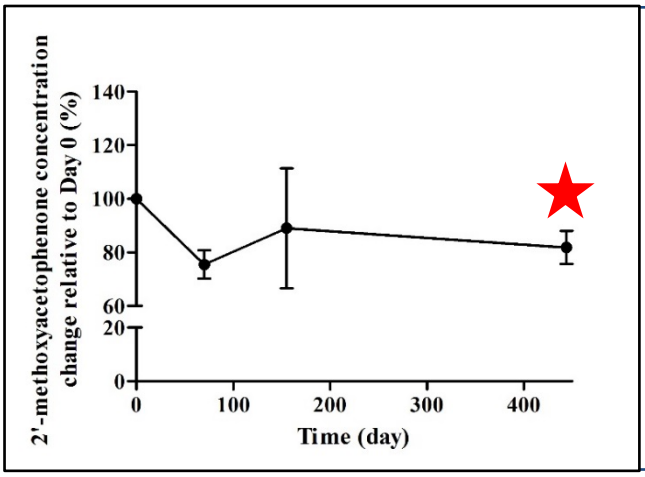


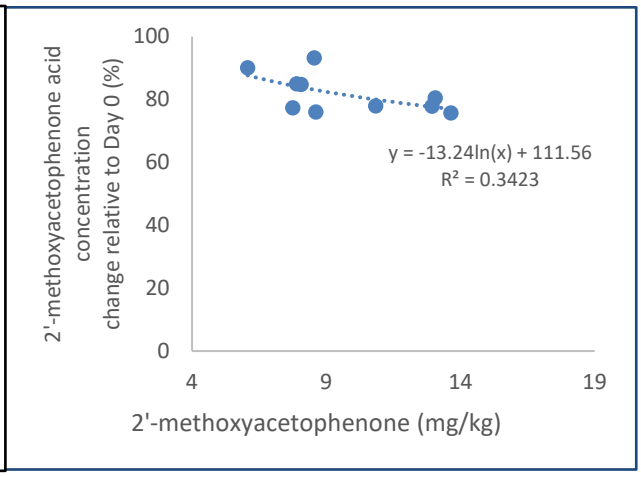
2'-methoxyaetophenone

2'-methoxyaetophenone concentration was significantly reduced ($p<0.05$) following elevated temperature storage, with approximately one-fifth loss during the trial.

2'-MAP	Concentration (mg/kg)				% relative to Day 0			
	0	70	155	444	0	70	155	444
Drum 31981	8.6	7.5	6.3	8.0	100.0	87.4	74.1	93.3
Drum 31964	8.6	6.2	5.3	6.6	100.0	71.7	61.8	76.1
Drum 31978	12.9	9.4	8.2	10.1	100.0	73.0	63.7	77.9
Drum 31995	13.6	9.6	7.8	10.3	100.0	70.4	56.9	75.7
Drum 31841	13.1	10.0	13.2	10.5	100.0	76.4	100.8	80.6
Drum 31837	10.8	8.0	11.3	8.5	100.0	73.5	103.8	78.0
Drum 31816	8.1	6.5	8.4	6.8	100.0	80.7	104.0	84.8
Drum 31822	6.1	4.7	7.1	5.5	100.0	77.6	116.8	90.1
Drum 31975	7.8	5.7	8.6	6.0	100.0	73.3	110.4	77.3
Drum 31998	7.9	5.6	7.8	6.7	100.0	70.9	98.2	85.0
				Average	100.0	75.5	89.0	81.9

Interestingly this compound behaved in a similar concentration driven pattern, honeys with greater concentrations of 2'-methoxyaetophenone before storage lost greater proportions of this compound.



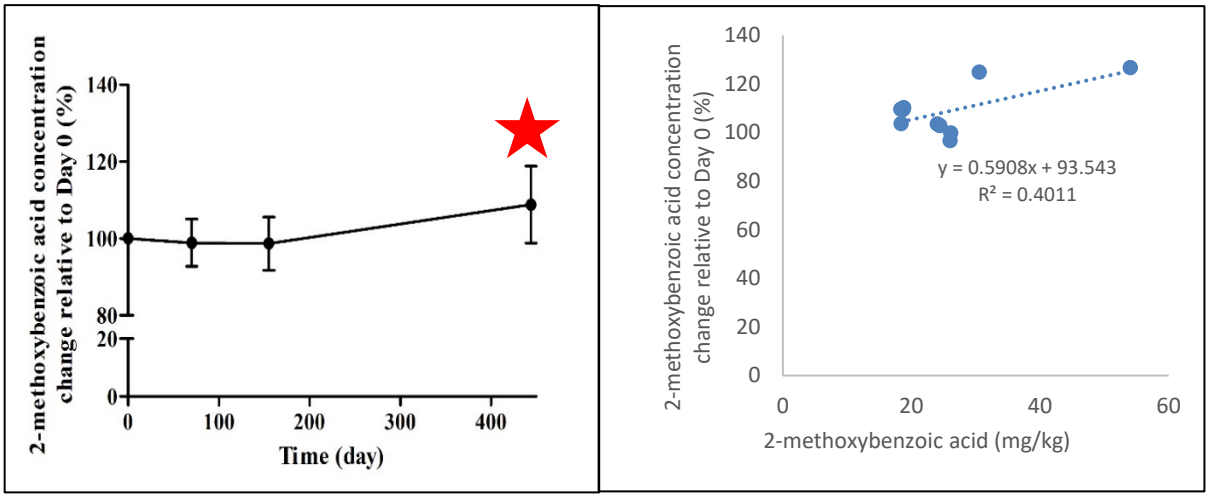


2-methoxybenzoic acid

2-methoxybenzoic acid demonstrated a significant ($p<0.05$) increase in concentration following the storage for 444 days at elevated temperature. The increase was in the order of 10%.

2-MB	Concentration (mg/kg)				% relative to Day 0			
	0	70	155	444	0	70	155	444
Drum 31981	24.4	23.7	21.9	25.1	100.0	97.1	89.7	102.9
Drum 31964	18.4	17.8	17.5	19.1	100.0	96.8	95.1	103.8
Drum 31978	18.3	18.2	17.4	20.1	100.0	99.3	94.9	109.7
Drum 31995	26.1	25.4	25.1	26.1	100.0	97.5	96.4	99.9
Drum 31841	26.0	25.8	25.4	25.1	100.0	99.2	97.8	96.7
Drum 31837	24.0	24.7	24.0	24.9	100.0	102.9	99.9	103.6
Drum 31816	54.0	57.6	58.6	68.4	100.0	106.7	108.5	126.8
Drum 31822	30.5	32.8	34.0	38.1	100.0	107.6	111.4	125.0
Drum 31975	18.7	17.8	18.9	20.5	100.0	95.4	101.3	109.6
Drum 31998	18.8	16.2	17.2	20.7	100.0	86.4	91.8	110.3
				Average	**100.0**	**98.9**	**98.7**	**108.8**

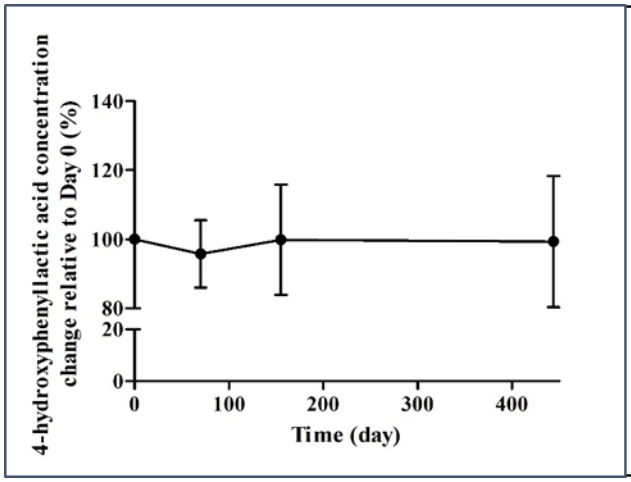
The apparent trend of increasing final concentration with increased initial concentration is weakly correlated and driven by a single data point.

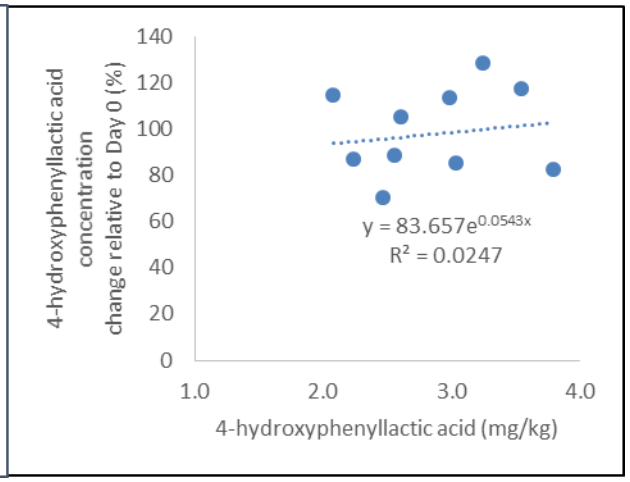


4-hydroxyphenyllactic acid

4-hydroxyphenyllactic acid concentration was not significantly different after storage at elevated temperature, and there were no trends apparent in the data.

4-HPA	Concentration (mg/kg)				% relative to Day 0			
	0	70	155	444	0	70	155	444
Drum 31981	3.8	3.5	3.1	3.1	100.0	91.2	81.4	82.6
Drum 31964	2.1	1.9	2.7	2.4	100.0	89.4	129.6	114.8
Drum 31978	2.6	2.6	2.3	2.3	100.0	100.2	88.8	88.7
Drum 31995	2.6	2.3	2.2	2.7	100.0	88.5	83.9	105.3
Drum 31841	3.0	2.9	3.5	2.6	100.0	96.0	114.2	85.1
Drum 31837	3.5	3.5	3.4	4.2	100.0	99.3	96.5	117.5
Drum 31816	3.2	3.5	3.4	4.2	100.0	107.6	104.9	128.3
Drum 31822	3.0	3.2	3.4	3.4	100.0	107.1	112.6	113.7
Drum 31975	2.2	2.3	2.3	2.0	100.0	102.4	103.5	87.2
Drum 31998	2.5	1.9	2.1	1.7	100.0	75.8	83.2	70.3
				Average	100.0	95.7	99.9	99.4



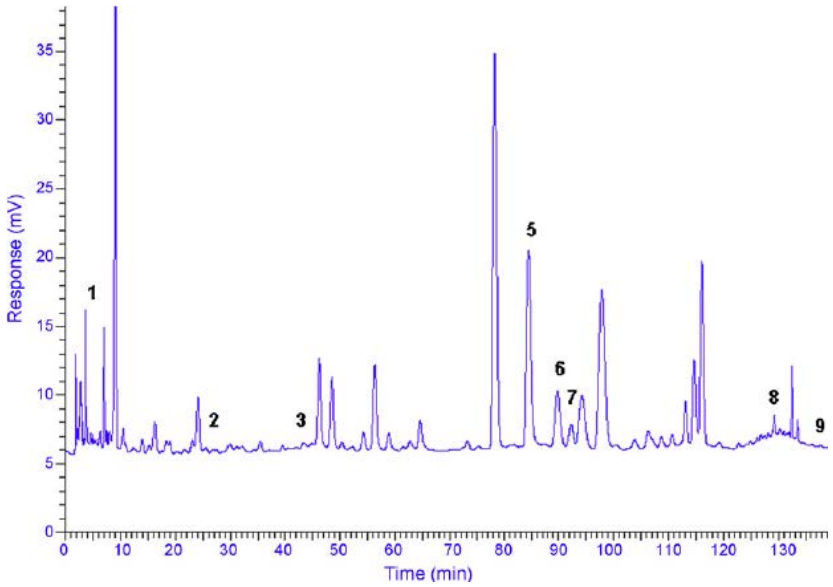


7.2. Short report on abundance and specificity of various Manuka honey compounds using HPLC techniques, s 9(2)(a) *, 15 May 2017*

Short Report on Abundance & Specificity of various Manuka honey compounds using HPLC techniques

s 9(2)(a)

15 May 2017



Affiliations -
s 9(2)(a) s 9(2) NZ Ltd, Paengaroa, NZ
Waikato Innovation Park, Hamilton, NZ
Honorary Research Fellow, Institute for Innovation in Biotechnology,
School of Biological Sciences. University of Auckland, Auckland, NZ

Contact -
Email: Jonathan.Stephens@s 9(2)(b) com Postal: J Stephens, s 9(2)(b) Waikato Innovation Park, P O Box 9466, Hamilton 3240, New Zealand. Telephone s 9(2)(a)

Abstract

The presence and abundance of a number of phenolic compounds in manuka and other honey types was examined. Corresponding nectars were also examined.
Analysis was completed using RP-HPLC, and the full method is available.
The compounds quantified were selected due to their prevalence in literature or are currently under discussion.

In summary:

The most abundant compounds in manuka honey are 3-phenyllactic acid and Leptosperin. However, 3-phenyllactic acid is not unique to manuka honey, and is present in kanuka and NZ ling honeys in elevated concentrations. 3-phenyllactic acid is also present in the nectars of these species.

Of the compounds that are relatively abundant in manuka honey, namely 4-methoxyphenyllactic acid, methyl syringate, kojic acid, and Lepteridine, only Lepteridine is unique to manuka nectar and honey.

Of the less abundant compounds, 2'-methoxyacetophenone and 2-methoxybenzoic acid are unique to manuka nectar and therefore manuka honeys. 4-hydroxyphenyllactic acid is present in manuka and kanuka nectar and honeys.

Consequently, Leptosperin, Lepteridine, 2'-methoxyacetophenone, and 2-methoxybenzoic acid alone are suitable chemical marker compounds, whereas 3-phenyllactic acid and 4-hydroxyphenyllactic acid are shared with other species nectars and honeys and are therefore clearly inappropriate to chemically define manuka honey.

Manuka honey analysis

13 compounds of interest were quantified in 113 manuka honeys. The compounds' abundance varied markedly, with mean values ranging from more than 700 to <2 mg/kg.

The more abundant are 3-phenyllactic acid and Leptosperin, followed by 4-methoxyphenyllactic acid, methyl syringate, kojic acid, Lepteridine, 2'methoxyacetophenone, 4-hydroxyphenyllactic acid, 2-methoxybenzoic acid, lumichrome, gallic acid, 4-methoxybenzoic acid, and syringic acid in decreasing abundance.

Figure 1 also illustrates the chemical standards proposed by MPI.

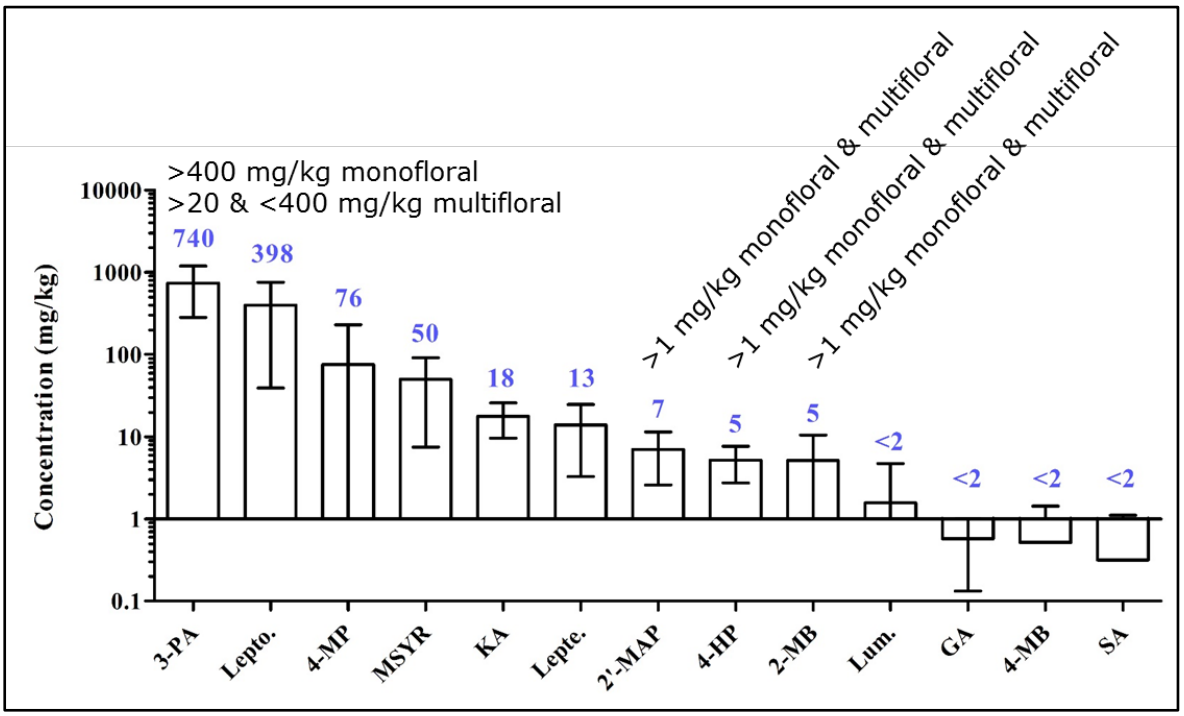


Figure 1. The mean concentration of 13 compounds present in manuka honeys. Error bars represent 1 SD.

Key compounds in manuka & other honeys

The presence these chemicals has been in a range of honey types, and data from a shortlist of six compounds is presented.

Interestingly 3-phenyllactic acid and 4-hydroxyphenyllactic acid are abundant in manuka, kanuka, and ling honeys, Leptosperin and Lepteridine are predominant in manuka honey yet traces are encountered in kanuka, ling and honeydew honeys, 2-methoxybenzoic acid is present in manuka and kanuka in similar concentrations and less so in honeydew, and 2'-methoxyacetophenone is predominant in manuka and reduced in kanuka honey.

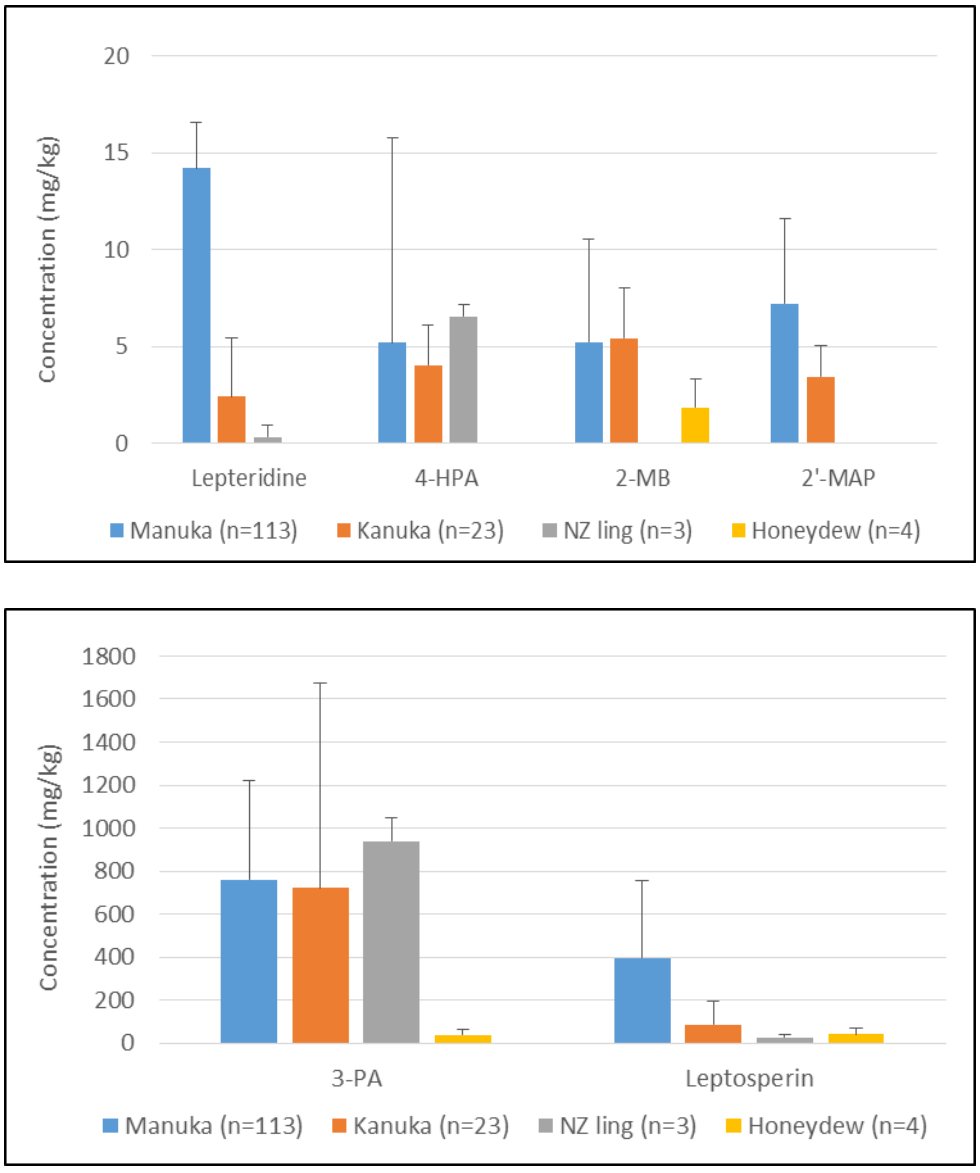


Figure 2. The mean concentration of 6 compounds present in manuka, kanuka, NZ ling, and honeydew honey. Error bars show 1 SD.

Compounds in relevant nectars

In order to examine whether these compounds are unique to a floral honey type, nectars were analysed.

3-phenyllactic acid was found to be prominent in manuka, kanuka, and NZ ling nectars. 4-hydroxyphenyllactic acid was present in manuka and kanuka nectars. Leptosperin, Lepteridine, 2'-methoxyacetophenone, and 2-methoxybenzoic acid were quantified in manuka nectar alone.

Nectar source	Manuka (n=20)	Kanuka (n=4)	NZ ling (n=4)
3-phenyllactic acid	✓	✓	✓
Leptosperin	✓	x	x
Lepteridine	✓	x	x
2'-methoxyacetophenone	✓	x	x
4-hydroxyphenyllactic acid	✓	✓	x
2-methoxybenzoic acid	✓	x	x

7.3. DNA Test Implications, s 9(2)(a) , 15 May 2017

DNA Test Implications

s 9(2)(a) ***, 15/05/2017***

The manuka definition proposed by MPI requires honey to contain sufficient Leptospermum scoparium DNA such that it is detectable within 36 cycles of the prescribed PCR test.
This document outlines the results as reported by the industry, and raises many concerns regarding the proposed manuka definition.

Summary of Results

The industry has had several weeks to submit samples to commercial laboratories and consider the performance of the method. The summary that follows is based on the information that the industry has been able to collate from various members.
DNA data from 217 samples has been combined and plotted relative to 3-phenyllactic acid (Figure 1). Where the Cq value has been reported as >36, the value has been changed to 37 so that it can be plotted.

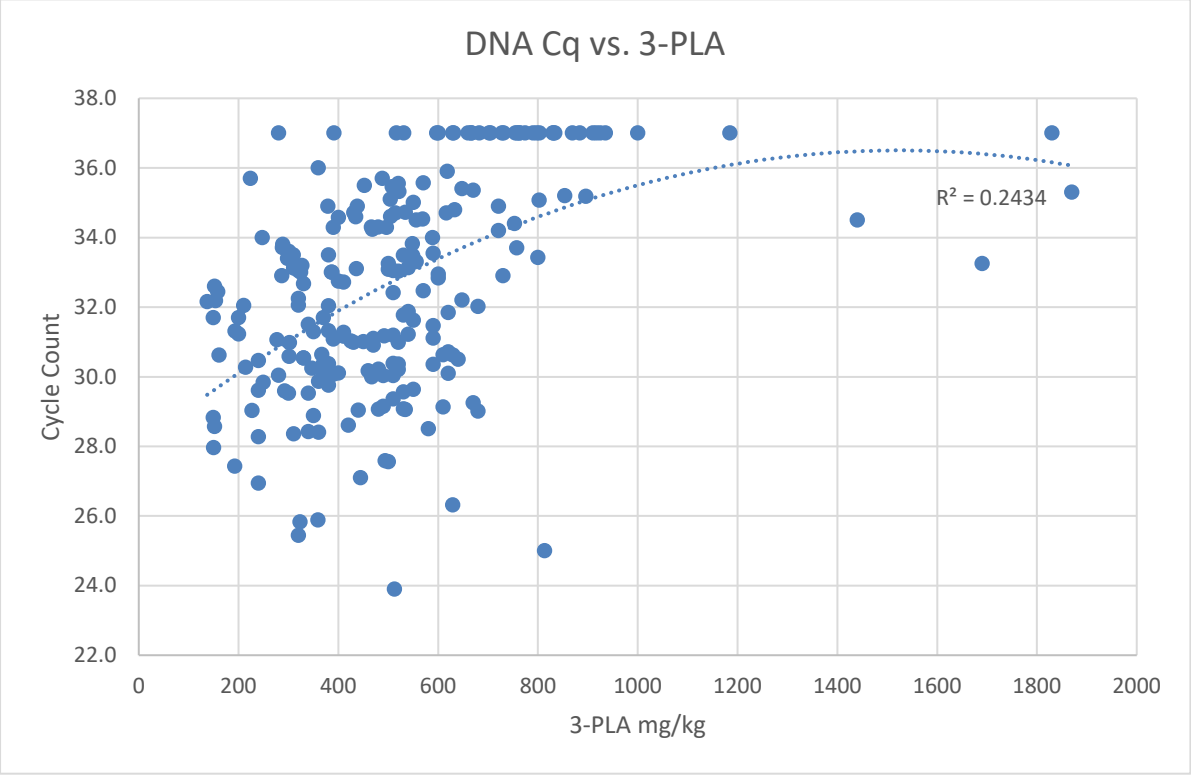


Figure 1.

Initial observations:

- The recoverable DNA in any given honey is not related to the category it sits in:
  - Multifloral manuka (<400mg/kg 3-PLA) has an average Cq of 31 (n=74).
  - Monofloral manuka (>400mg/kg 3-PLA) has an average Cq of 33 (n=131).
- There is a trend toward increasing cycle count as the 3-PLA level increases.
- There are many failures (Cq >36) in the monofloral category.

The observations above were unexpected. Monofloral manuka would be expected to have a lower average cycle count than multifloral manuka, however the difference in cycle counts indicates monofloral manuka has, on average, 4 times less manuka DNA than multifloral manuka.
The picture is similar when expressed in terms of UMF grade rather than 3-PLA level (Figure 2).

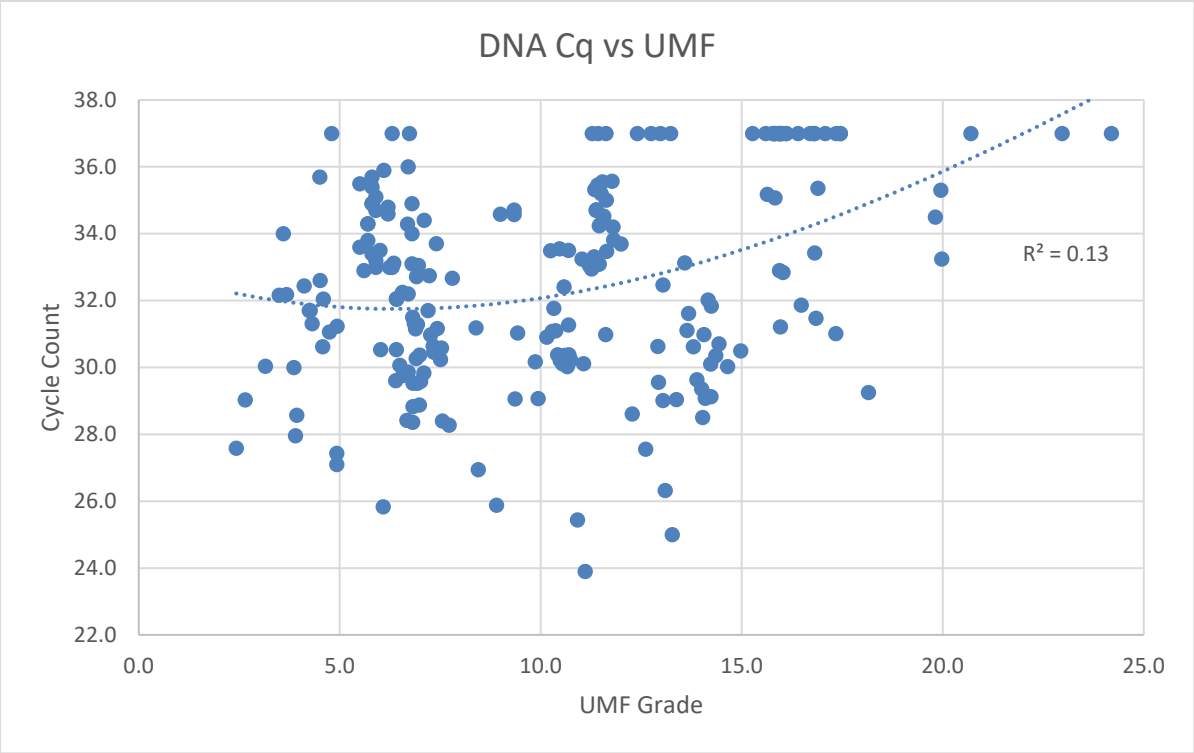


Figure 2.

There is a noticeable trend toward higher cycle counts as the UMF grade increases, and the trend toward product failing at the higher value end is concerning. The reason for this phenomenon is discussed later in this document.

Another aspect to consider is the wide range of results. Within the UMF5-15 range, where most of the manuka honey volume sits, there are Cq values ranging from about 26 to 36. This represents an approximate 1000-fold difference in DNA levels (210 = 1024). In other words, a honey containing high levels of DNA could theoretically be used at a rate of 0.1% in a batch formulation to meet the manuka definition requirements for this parameter. The highest result seen in the sample set (Cq 23.9) corresponds to a manuka DNA level of 4497fg/ul.

By contrast, the span of methylglyoxal levels in the same UMF5-15 range is 83-511mg/kg, representing an approximate 6-fold difference. However, due to the value associated with the UMF grading system there exists a financial disincentive to dilute higher-grade honey in order to increase volume.

The above indicates that the DNA test is not capable of providing a reliable measure of the proportion of manuka nectar within a product claiming to be manuka honey. MPI have also confirmed this verbally during industry meetings. This means the DNA test is a presence/absence or limit test, but as demonstrated above it is a test that could be open to being worked around with careful measurement,

formulation, blending and verification. This would be counter to the shared industry and government objectives of the definition in supporting confidence with consumers and overseas regulators.

Manuka Definition Performance

Over the last few weeks a considerable amount of testing has been conducted through the commercial laboratories. s 9(2)(b)(ii) have constructed a cumulative probability of product classification against UMF grade based on the testing they have performed (Figure 3).

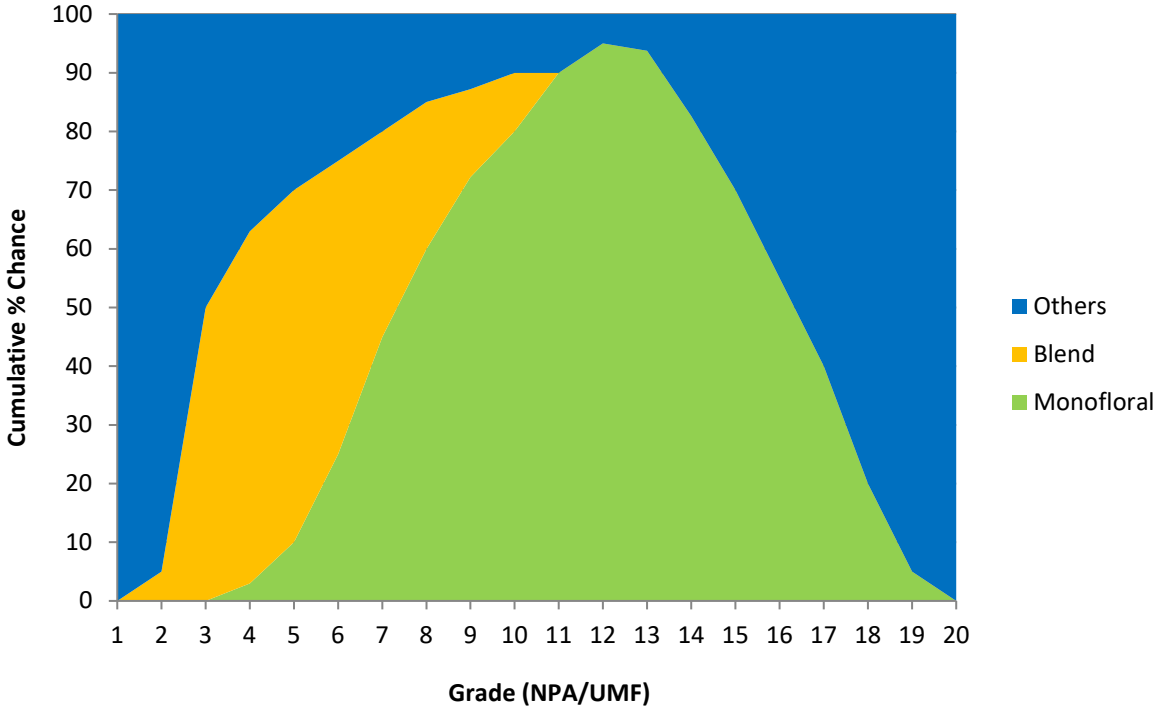


Figure 3.

This shows that product has an increasing probability of being classified as monofloral manuka as the UMF grade increases, however after approx. UMF12 the product becomes increasingly less likely to be classified as monofloral manuka honey. This unusual outcome is entirely due to the failures in the DNA test, which appear to be unjustified. The financial impact of this on the industry will be significant.

DNA Test Failures

This section considers the data supporting the authenticity of monofloral manuka honey that has failed the DNA test, but passed all MPI's chemical markers, and therefore been downgraded to non-manuka honey.

The first example has been supplied by s 9(2)(b)(ii)

UMF	Leptosperin	4-HPLA	3-PLA	2-MBA	2-MAP	Cq
18.4	512	8.2	810	9.1	31	38.9

The latter 4 chemical marker values and Cq value were on the sample summary report returned to s 9(2)(b)(ii) by MPI. It is not clear which lab performed the testing, however we believe the DNA testing was conducted by s 9(2)(b)(ii) The MPI classification of 'non-manuka honey' is at odds with the chemical marker data, all of which point toward this being a strongly monofloral manuka honey.

The results below have been supplied by s 9(2)(b)(ii)

MGO	DHA	4-HPLA	3-PLA	2-MBA	2-MAP	Cq
418	744	5.5	690	9.6	12.3	>36
106	190	2.8	340	2.1	4.2	>36
628	1565	8.2	850	16.4	16.2	>36
513	1300	6.2	650	6.1	12.2	>36
105	139	3.1	420	3.5	4.2	>36

Testing was conducted at s 9(2)(b)(ii) . The chemical markers are well over the definition limits and the levels of MGO and DHA also support a classification of either multifloral or monofloral manuka honey.

Further results showing high levels for key marker compounds are listed below. Where supplied, the results for UMF grade, MGO and DHA are also displayed. Although not specified, it is believed the testing below has been performed at s 9(2)(b)(ii) .

s 9(2)(b)(ii)

UMF	4-HPLA	3-PLA	2-MBA	2-MAP	Cq
16.6	9.69	848	5.44	18.3	>36
20.4	9.26	1160	8.96	21	>36

s 9(2)(b)(ii)

UMF	4-HPLA	3-PLA	2-MBA	2-MAP	Cq
19.4	9.6	1200	7.31	26.8	>36
7.7	6.89	725	1.87	5.04	>36

s 9(2)(b)(ii)

MGO	4-HPLA	3-PLA	2-MBA	2-MAP	Cq
320	4.4	869	15.1	16	>36
327	4.2	531	4.6	10.9	>36
337	3.62	516	5.43	7.76	>36
392	4.7	631	7	19.2	>36
404	7.6	597	8.1	14.6	>36
417	7.2	600	12.2	11	>36
529	5.8	660	4.4	20	>36
548	7.55	728	9.77	16.6	>36
559	8.1	797	9.96	14.7	>36
559	7.98	790	9.35	15.1	>36
560	7.29	834	12.9	16.9	>36
561	9.6	763	11.2	16.9	>36
561	7.65	830	13.5	15	>36
567	9.76	667	12.4	12.1	>36
568	10.3	803	11.3	16.1	>36
568	8.96	831	10.7	14.7	>36
569	9.16	758	12.1	13.5	>36
571	8.6	731	9.66	16.7	>36
578	10.6	774	13.3	14	>36
578	5.5	629	12.8	15.5	>36
620	10.5	682	12.3	14.1	>36
620	5.9	1000	13.5	9.1	>36
637	9.8	910	25	12.6	>36
653	9.47	702	15.3	13.5	>36
660	8.1	917	6.9	16.6	>36
660	8.3	935	8.6	12.4	>36
1041	10.1	1830	143	7.8	>36
1135	8.2	755	50	24	>36

s 9(2)(b)(ii)

MGO	DHA	4-HPLA	3-PLA	2-MBA	2-MAP	Cq
870	1660	13.5	1050	8.5	20.6	>36
1160	2000	9.0	936	9.5	18.0	>36
842	2640	7.1	1110	24.4	6.2	>36
756	982	9.1	848	6.9	13.5	>36
758	987	8.9	849	6.6	13.0	>36
798	1200	8.8	837	7.5	14.1	>36
597	740	8.7	915	4.7	13.4	>36
670	1690	7.1	921	8.4	17.7	>36
537	790	6.7	689	6.8	8.2	>36

The suppliers of the above results are understandably concerned given the honey tested against the proposed definition has significant levels of DHA and MGO (easily meeting established industry criteria) and yet have no detectable levels of manuka DNA.

s 9(2)(b)(ii)

s 9(2)(b)(ii)

DHA	HMF	MGO	4-HPLA	3-PLA	2-MBA	2`-MAP	Lepto	Manuka Cq	Kanuka Cq	Total pollen /10g	Manuka %	Manuka pollen /10g	Kanuka%	Kanuka pollen /10g
300	20.0	121	9.9	391.2	2.9	7.3	198.1	38.2	29.3	348,367	20	68,628	24	83,260
259	10.3	111	8.4	339.2	2.2	3.8	156.5	33.5	29.2	448,605	13	56,076	21	95,104
257	8.6	106	7.5	298.3	2.7	6.1	149.3	33.4	28.2	382,016	9	33,999	23	89,010
257	13.2	99	7	286.7	2	4.0	135.3	32.9	29.5	303,552	13	38,248	25	75,888
986	38.2	596	20.7	883.8	9.1	23.3	544.7	36.9	36.9	369,977	43	159,460	40	147,991
1767	21.4	875	49.1	1,184.7	22.2	25.2	924.2	38.4	34.2	274,408	73	198,946	5	14,544

The above shows similar trends to what has been seen in other samples; abundant levels of manuka chemical markers and yet elevated or failing cycle counts. The pollen testing was performed by s 9(2) and provides another perspective. Whether or not s 9(2) have correctly differentiated manuka and kanuka pollen, there is ample pollen of either present from which to extract DNA. Assuming they are correct, the relationship between pollen and the associated DNA is unusual, as shown in Figure 4. It is counterintuitive to have less extractable DNA when the amount of pollen increases.

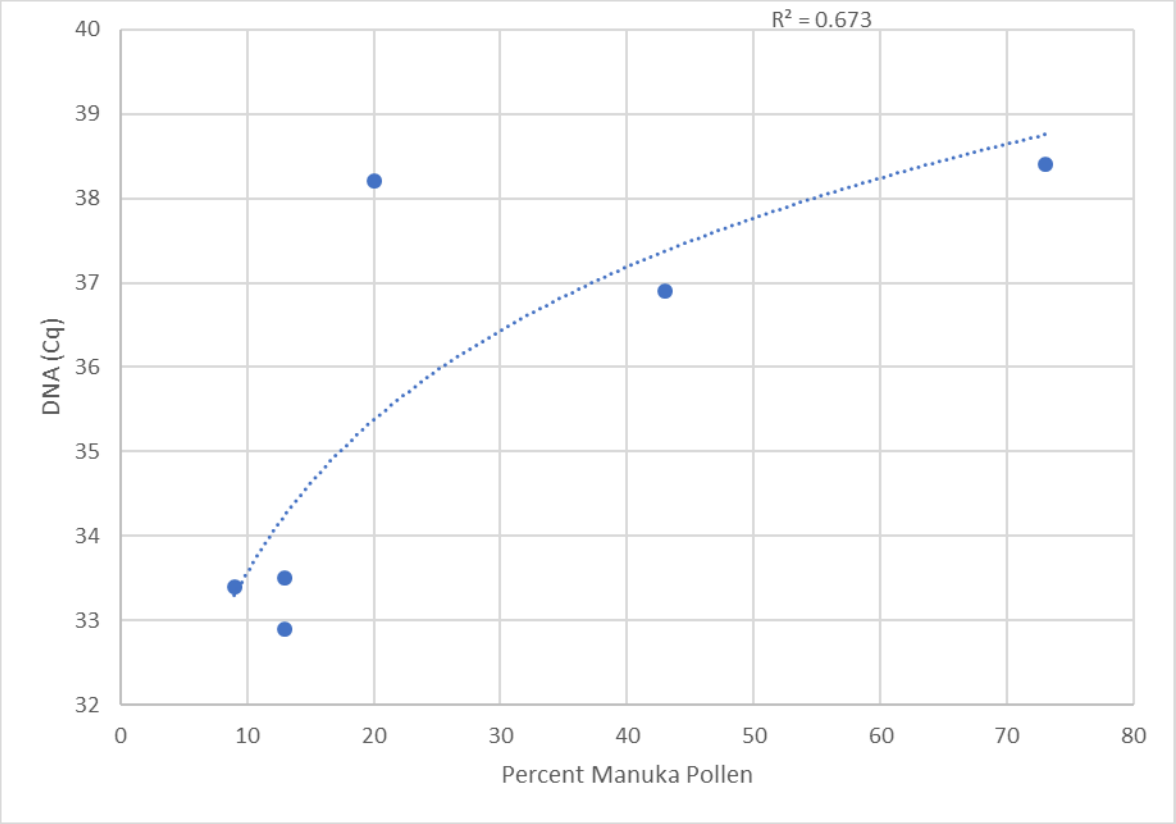


Figure 4.

The final set of results come from the UMF Honey Association sample collection:

UMF	Leptosperin	4-HPLA	3-PLA	2-MBA	2-MAP	Cq
17.1	231	5.94	894	10.3	11	>36
16.6	210	6.93	863	10.3	13.2	>36
14.8	645	8.6	654	3.43	11	>36
19.9	705	7.93	786	6.87	12.9	>36
12.4	441	9.03	958	4.12	6.43	>36
16.9	584	11	1,190	5.56	8.68	>36
21.3	708	9.98	908	8.02	13.4	>36

s 9(2)(b)(ii) have done a considerable amount of testing on the s 9(2)(b)(ii) sample collection beyond what is listed above. When asked how they could be sure that the above really are manuka honey, the response was:

We believe they are false negatives because we have results from orthogonal analyses which support their assignment as monofloral mānuka. For example, consider a series of chemical markers for mānuka honey, variously discovered by expert research groups around the world. We measure the concentration of these markers in the 'false negative' mānuka honeys, and using Z-scores, compare them to all the other mānuka honeys. The following results are obtained:

- They have typical DHA (Z = -0.4)
- They have typical leptosperin (Z = +0.15)
- They have typical 2'-MAP (Z= +0.01)
- They have typical 2-MBA (Z = -0.22)
- They have typical 4-HPLA (Z = +0.36)
- They have typical 3-PLA (Z = +0.10)

- They have typical lepteridine (Z=+0.83)
- They have typical dimethyllumazine (Z=+0.40)
- They have typical hydroxymethoxyphenylpentadione (Z = -0.1)
- Etc. There are many other markers in this category.

This data unequivocally shows the 'false negative' mānuka honeys have chemical profiles consistent with being monofloral mānuka, supported by research from s 9(2)(a) (University of Dresden, Germany), s 9(2)(a) (University of Hyogo, Japan), s 9(2)(a) (University of Auckland), s 9(2)(a) (University of Waikato, NZ), s 9(2)(a) University of Waikato, NZ), and s 9(2)(a) (University of the Sunshine Coast, Australia).

In addition, there are several markers which indirectly reflect that these 'false negative' mānukas are older honeys or have been exposed to a bit of heat:

- They have elevated formylprrole (Z= +2.75 = Manley-Harris et al agree these are manuka) (note the paper reporting this compound says it is a maillard reaction product unique to manuka honeys)
- They have elevated MGO (Z = +2.25),
- They have elevated HMF (Z = +2.90),
- They have elevated colour (Z = +1.57)

The comments above regarding age and/or heating are further addressed in the next section.

Possible Cause of DNA Failures

The relationship between methylglyoxal content and DNA test failures is perhaps not surprising given the existing body of research. By way of example, the following links show published research in this area:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC55850/
https://www.ncbi.nlm.nih.gov/pubmed/14581171
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4133886/

An excerpt from the Abstract of the first paper is copied below:

"These results suggest that methylglyoxal crosslinks a guanine residue of the substrate DNA and lysine and cysteine residues near the binding site of the DNA polymerase during DNA synthesis and that DNA replication is severely inhibited by the methylglyoxal-induced DNA–DNA polymerase crosslink."

Incubation Experiment

Analytica performed an experiment to explore the potential interaction of MGO and DHA on the measurable levels of manuka DNA in honey. The text below is an excerpt from their report.

Methodology

Five honeys that were classified as multi-floral manuka by the MPI chemical test and the DNA test were selected for the incubation experiment (Table 1). These samples were selected because they had high concentrations of manuka DNA which were necessary to observe any changes that may occur in the DNA during incubation with MGO and DHA.

Table 1. Samples used for the incubation experiment and their chemical marker concentrations and DNA Cq values

Sample ID	HPLA (mg/kg)	2MBA (mg/kg)	2MAP (mg/kg)	3PLA (mg/kg)	DNA (Cq)
A	1.6	2.0	2.3	225	29.54
B	2.7	1.4	5.9	360	27.73
C	2.7	1.7	7.4	337	27.94
D	3.1	2.0	7.8	353	26.77
E	3.1	2.3	7.8	376	26.44

Incubation of Honey

A 1.4 ±0.05g sample of each honey was added to 0.9 mL of water containing the equivalent of 0, 100 and 1,000 mg/kg of methylglyoxal (MGO) and 0, 100 and 1,000 mg/kg of dihydroxyacetone (DHA) to mimic typical levels that these chemicals are found in Manuka honey. The mixed samples were then incubated in a forced-air oven at 27 oC for 36 hours. After incubation, the samples were centrifuged at 15,000 rcf for 5 minutes and the pollen washed and processed though the full MPI DNA reference test protocol, and the concentration of DNA was determined against and standard curve of concentration (pg/mL) vs. Cq values. Appropriate negative and positive controls were run to ensure that method performed to an acceptable level.

Results

The honey incubation (Figure 5) showed that as the concentration of MGO and DHA increases, the amount of measurable DNA decreases. Since the pollen was washed before being lysed and the DNA extracted, the probable cause of decreased DNA measurable by the test is not because MGO and DHA are directly affecting the PCR reaction, but rather that the MGO (and possibly DHA) are interacting with the DNA in the pollen.

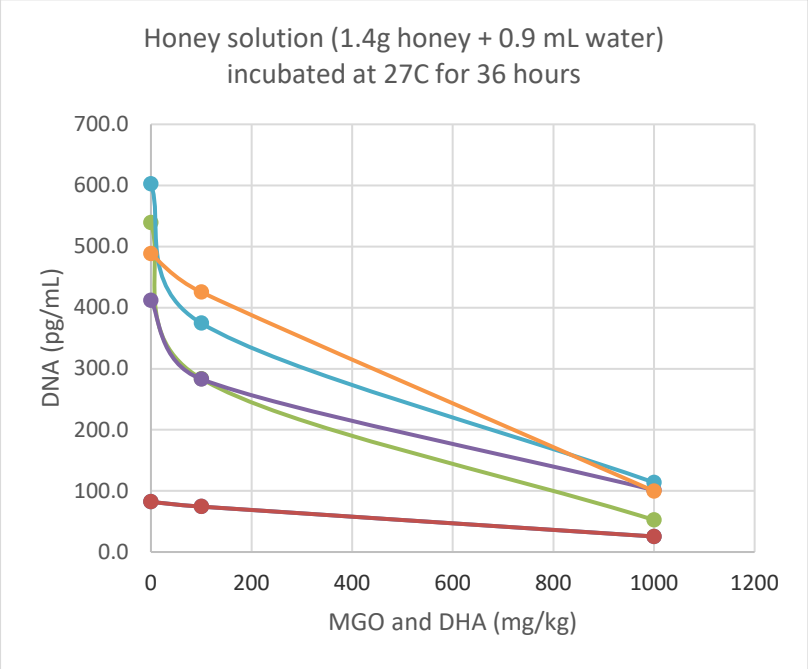


Figure 5.

This shows a dose response relative to the amount of methylglyoxal present, supporting the published research elsewhere.

A further piece of supporting evidence is the apparent relationship with HMF (Figure 6).

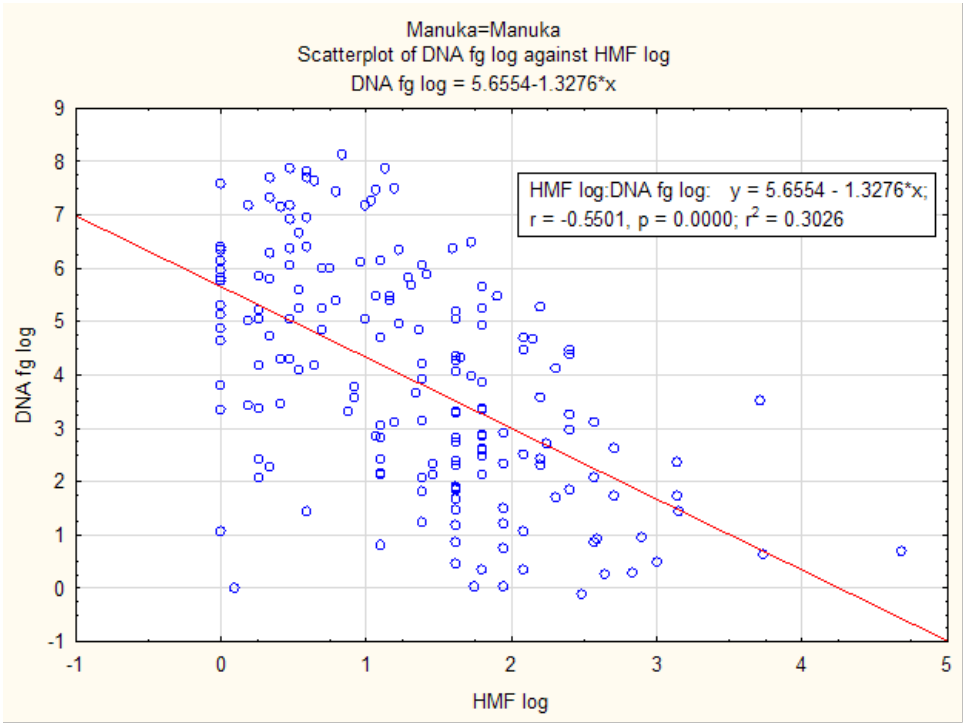


Figure 6.

HMF is an indication of chemical age; either true chronological age or accelerated aging caused by heating. As HMF therefore indicates the time that pollen DNA has been exposed to methylglyoxal it stands to reason that honeys with high HMF values have had longer for methylglyoxal at any level to damage the DNA. HMF, itself, is also a reactive aldehyde and quite possibly reacts with the DNA in its own right. The implications are significant across the spectrum of UMF grades. A high UMF grade manuka honey has a higher probability to fail, but given enough time, even a lower grade manuka honey could suffer the same fate. What this means for the shelf life of manuka honey is not yet clear, but DNA failures post-export appear likely.

Conclusions

The data collected by the industry over the last few weeks has resulted in some unexpected observations that must prompt a more in-depth investigation of the DNA test. For the industry to have confidence in the outcome many questions need to be asked, and there may be a need for more comprehensive research to be conducted.

The concerns that need to be addressed are:

- Why does monofloral manuka have less measurable manuka DNA than multiflora manuka?
- Has there been any work done to assess the potential to use very small amounts of high-DNA honey to convert non-manuka honey into multiflora or monofloral honey?
- Why do apparent manuka honey samples with abundant chemical markers not have any measurable DNA? Did the development of the definition account for the presence of other compounds characteristic of manuka honey?

- Has there been an assessment of the financial impact on the industry given the tendency of the definition to fail high value honey?
- Why is there an inverse relationship between the amount of manuka pollen present and the measurable DNA?
- Has the interaction between DNA and other compounds commonly found in manuka honey been considered?
- Has the stability of the measured manuka DNA been investigated over the typical shelf life of the product?

7.4. Short report on theoretical blending of Manuka honey, s 9(2)(a) , 15 May 2017

Short Report on theoretical blending of Manuka honey

s 9(2)(a)

15 May 2017

Affiliations -
s 9(2)(a) NZ Ltd, Paengaroa, NZ
Waikato Innovation Park, Hamilton, NZ
Honorary Research Fellow, Institute for Innovation in Biotechnology,
School of Biological Sciences. University of Auckland, Auckland, NZ

Contact -
Email: Jonathan.Stephens@s 9(2)(b) com Postal: J Stephens/s 9(2)(b) Waikato Innovation Park, P O Box 9466, Hamilton 3240, New Zealand. Telephone s 9(2)(a)

Abstract

Codex Alimentarius states that for a honey to be attributed to a floral source, the honey should be wholly or predominantly harvested from that particular plant species.

Chemical components of interest in manuka honeys were examined and dilutions calculated with various honey types.

The mean concentrations in each classification of honey (see Appendix), manuka monofloral, manuka multifloral, and other, were used to predict the degree of dilution that was possible in order to manufacture by blending a honey that would be designated as manuka monofloral under the proposed MPI manuka honey standards.

Furthermore, individual honey specimen representing floral types were similarly treated and the degree of dilution of manuka honeys calculated that would allow continued monofloral manuka designation.

In summary

There are a number of other New Zealand honey types which share the compounds that are listed as discriminatory under the MPI standards.

Consequently, honeys can be blended to produce a product that can be defined as monofloral manuka or multifloral manuka. Monofloral manuka is readily extended.

Multifloral manuka can be extended by the addition of other honeys to meet monofloral manuka standards.

Interestingly, yet unsurprisingly, kanuka and ling honeys can be blended under these MPI standards to produce monofloral manuka honey.

These blended product honeys could not be expected to meet the “wholly or predominantly” clause governing honey labelling rules internationally.

These problems are driven primarily by the fact that the compounds selected by MPI and the DNA test are insufficient to define manuka honey and distinguish it from the majority of other New Zealand harvested honeys.

This position could be corrected by the inclusion of chemicals present in manuka nectar and honeys in elevated concentrations, rather than the selection of chemicals shared between honey types.

Dilution of monofloral manuka with other honey classes

In this data, Mmon is manuka monofloral, Mmul is manuka multifloral, and Other is honeys without a significant manuka component. Mean values from each class are used for calculations.

	Compound mg/kg				DNA (Cq)
	4-HPLA	**2-MBA**	**2'-MAP**	**3-PLA**	
Mmon	8.59	11.56	13.05	1005	28.15
Mmul	3.18	3.82	4.68	242	29.7
Other	1.55	0.90	0.96	246	32.3
75%Mmon25%Mmul	7.23	9.62	10.95	814	28.5
50%Mmon50%Mmul	5.88	7.69	8.86	624	28.9
25%Mmon75%Mmul	4.53	5.75	6.77	433	29.3
75%Mmon25%Other	6.83	8.89	10.02	815	29.18
50%Mmon50%Other	5.07	6.23	7.00	625	30.20
25%Mmon75%Other	3.31	3.56	3.98	436	31.23

The monofloral manuka honey class can be diluted up to 1 in 4 by both manuka multifloral grade and the other honey type grade, and the resulting honey blend contains adequate concentrations of the compounds of interest to allow the blended product to be labelled as monofloral manuka. 3-phenyllactic acid concentration appears to be the discriminating factor.

Accordingly, this would mean the manuka monofloral crop could be extended in volume by a factor of four.

It is unlikely that the more extreme dilutions would exhibit the flavour, aroma, and typical characteristics, including bioactivity, of genuine manuka honey.

It is highly probable that this would lead to considerable consumer dissatisfaction and may, in due course, undermine the New Zealand honey industry.

Dilution of multifloral manuka with other honey classes

In this data, Mmon is manuka monofloral, Mmul is manuka multifloral, and Other is honeys without a significant manuka component. Mean values within each class are used for calculations.

	Compound mg/kg				DNA (Cq)
	4-HPLA	**2-MBA**	**2'-MAP**	**3-PLA**	
Mmul	3.18	3.82	4.68	242	29.7
Mmon	8.59	11.56	13.05	1005	28.2
Other	1.55	0.90	0.96	246	32.3
75%Mmul25%Other	2.77	3.09	3.75	243	30.3
50%Mmul50%Other	2.37	2.36	2.82	244	31.0
25%Mmul75%Other	1.96	1.63	1.89	245	31.6
10%Mmul90%Other	1.71	1.19	1.33	246	32.0
5%Mmul95%Other	1.63	1.04	1.15	246	32.1

The multifloral manuka honey class can be diluted up to 1 in 20 by the other honey type grade, and the resulting honey blend contains adequate concentrations of the compounds of interest to allow the blended product to be labelled as multifloral manuka. The concentration of 4-hydroxyphenyllactic acid, 2-methoxybenzoic acid, and 2'-methoxyacetophenone are limiting, and it may be that the PCR cycle count will exclude some harvested other honey types.

However, this would mean the manuka multifloral crop could be extended in volume by blending by a factor of up to twenty.

It is very unlikely that these dilutions would exhibit any characteristics of genuine manuka honey.

These honeys would be highly unsuitable for export even as manuka multifloral.

Examples of dilution of manuka honey with kanuka honey

Five honeys were supplied as kanuka or containing a significant proportion of kanuka honey. The mean value of these honeys' manuka components were used to examine the effect of kanuka dilution on the manuka groups described. Kanuka honey carries elevated concentrations of 3-phenyllactic acid. Manuka categories have been described previously.

	Compound mg/kg				DNA (Cq)
	4-HPLA	2-MBA	2'-MAP	3-PLA	
Kanuka	4.20	2.51	4.09	518	30.58
Mmon	8.59	11.56	13.05	1005	28.2
Mmul	3.18	3.82	4.68	242	29.7
Other	1.55	0.90	0.96	246	32.3
75%Mmon25%Kanuka	7.49	9.30	10.81	883	28.8
50%Mmon50%Kanuka	6.39	7.03	8.57	761	29.4
25%Mmon75%Kanuka	5.30	4.77	6.33	639	30.0
10%Mmon90%Kanuka	4.64	3.41	4.98	566	30.3
5%Mmon95%Kanuka	4.42	2.96	4.54	542	30.5
75%Mmul25%Kanuka	3.43	3.49	4.53	311	29.9
50%Mmul50%Kanuka	3.69	3.16	4.38	380	30.1
25%Mmul75%Kanuka	3.95	2.84	4.24	449	30.4
15%Mmul85%Kanuka	4.05	2.70	4.18	476	30.4
75%Kanuka25%Other	3.54	2.10	3.31	450	31.0
50%Kanuka50%Other	2.88	1.70	2.52	382	31.4
25%Kanuka75%Other	2.21	1.30	1.74	314	31.8
10%Kanuka90%Other	1.82	1.06	1.27	273	32.1
5%Kanuka95%Other	1.68	0.98	1.12	260	32.2

Dilution of monofloral manuka honey with kanuka honey allows considerable extension. Kanuka honey shares many characteristics with manuka honey and is often harvested with a minor proportion of manuka. Consequently, manuka pollen will be found in kanuka honey and vice versa.

It would appear monofloral manuka can be diluted 20-fold with kanuka and the resulting blend can be graded as manuka honey.

Multifloral manuka grade blending with kanuka reveals 3-phenyllactic acid concentration is insufficient to reach monofloral manuka grade until adequate kanuka is added to lift the concentration of this compound. Accordingly, low proportions of multifloral manuka honey mixed with kanuka honey will the resulting blend to a monofloral manuka grade.

Interestingly, kanuka blended with other honey types may reach monofloral manuka grade and is very likely to reach multifloral manuka grade.

Clearly, these honeys are not wholly or predominantly manuka and should not carry that designation.

Examples of dilution of manuka honey with ling honey

Ling honey shares many characteristics with manuka honey, including elevated 3-phenyllactic acid concentrations and thixotropy. One ling honey is analysed. Manuka categories have been described previously.

	Compound mg/kg				DNA (Cq)
	4-HPLA	2-MBA	2'-MAP	3-PLA	
NZ ling	2.97	1.00	0.5	775	27.8
Mmon	8.59	11.56	13.05	1005	28.2
Mmul	3.18	3.82	4.68	242	29.7
Other	1.55	0.90	0.96	246	32.3
Kanuka	4.20	2.51	4.09	518	30.6
75%Mmon25%Ling	7.18	8.92	9.91	947	28.1
50%Mmon50%Ling	5.78	6.28	6.77	890	28.0
25%Mmon75%Ling	4.37	3.64	3.64	832	27.9
10%Mmon90%Ling	3.53	2.06	1.75	798	27.9
5%Mmon95%Ling	3.25	1.53	1.13	786	27.8
75%Mmul25%Ling	3.13	3.11	3.63	376	29.2
50%Mmul50%Ling	3.07	2.41	2.59	509	28.8
25%Mmul75%Ling	3.02	1.70	1.54	642	28.3
15%Mmul85%Ling	3.00	1.42	1.13	695	28.1
75%Ling25%Other	2.62	0.97	0.62	643	28.9
50%Ling50%Other	2.26	0.95	0.73	511	30.0
25%Ling75%Other	1.91	0.92	0.85	378	31.1
10%Ling90%Other	1.69	0.91	0.92	299	31.8
5%Ling95%Other	1.62	0.90	0.94	273	32.0
75%Ling25%Kanuka	3.28	1.38	1.40	711	28.5
50%Ling50%Kanuka	3.59	1.75	2.29	646	29.2
25%Ling75%Kanuka	3.90	2.13	3.19	582	29.9
10%Ling90%Kanuka	4.08	2.36	3.73	543	30.3
5%Ling95%Kanuka	4.14	2.43	3.91	530	30.4

Ling can be used to extend monofloral manuka honey twenty times and the resulting blend may be labelled as monofloral manuka honey. The restricting components appear to be 2-methoxybenzoic acid and 2'-methoxyacetophenone.

Blending of multifloral manuka and ling results in a monofloral manuka grading after more than approximately 40% ling is added; this is driven by the elevated 3-phenyllactic acid concentration in ling honey.

Ling honey does not appear to be able to be diluted with other honey types (excluding kanuka) to generate either grade of manuka honey as the concentrations of 2-methoxybenzoic acid and 2'-methoxyacetophenone are inadequate.

Interestingly, ling and kanuka honeys blend readily to yield monofloral grade manuka. It is impossible that these blends are wholly or predominantly manuka honey as defined in the international food labelling rules to which NZ is a signatory.

Appendix – Details of honeys used in analysis

				Compound mg/kg				DNA (Cq)
Lab Code	**Location**	**Supplied Floral**	**MPI Floral Type**	**4-HPLA**	**2-MBA**	**2-MAP**	**3-PLA**	
141183_218	Southland	Manuka	Mānuka	10.5	9.4	16	724	23.6
141183_082	Southland	Manuka	Mānuka	14	15.6	15.9	560	23.96
141183_115	Waikato	Manuka	Mānuka	8.65	9.12	14.8	823	23.98
141183_116	Waikato	Manuka	Mānuka	8.75	9.07	13.1	836	24.06
141183_118	Waikato	Manuka	Mānuka	8.67	9.77	13.3	820	24.21
141183_217	Southland	Manuka	Mānuka	17.7	17.4	11.2	801	24.21
141183_220	Southland	Manuka	Mānuka	10.1	7.81	19.7	706	24.31
141183_197	Southland	Manuka	Mānuka	9.82	8.16	16.2	620	24.39
141183_137	Northland	Manuka	Mānuka	9.38	52.3	22.4	1,990	24.53
141183_097	Southland	Manuka	Mānuka	10.4	6.51	7.24	409	24.55
141183_117	Waikato	Manuka	Mānuka	7.52	7.56	14.7	756	24.58
141183_215	Southland	Manuka	Mānuka	19	18	16.6	817	24.75
141183_018	Wanganui	Manuka	Mānuka	5.34	5.97	9.36	545	24.87
141183_134	Northland	Manuka	Mānuka	9.74	44.8	24.4	2,180	24.97
141183_216	Southland	Manuka	Mānuka	22.5	19.3	24.7	921	24.97
141183_076	Nelson	Manuka	Mānuka	5.06	7.95	7.27	562	24.99
141183_098	Southland	Manuka	Mānuka	13.4	11	11.5	542	25.01
141183_138	Northland	Manuka	Mānuka	8.75	58.2	11.3	1,830	25.3
141183_232	Northland	Manuka	Mānuka	7.6	15.9	17.3	1,930	25.37
141183_184	Wairarapa	Manuka	Mānuka	7.68	11.3	17.8	782	25.7
141183_228	Waikato	Manuka	Mānuka	6.66	15.5	17	1,090	25.73
141183_132	Northland	Manuka	Mānuka	8.72	59.1	19.4	1,820	25.74
141183_153	Nelson	Manuka	Mānuka	12.6	14.6	24.8	794	25.77
141183_189	Wairarapa	Manuka	Mānuka	5.56	3.47	13.4	583	25.81
141183_160	Wairarapa	Manuka	Mānuka	8.06	10.3	12.6	915	25.85
141183_173	Wairarapa	Manuka	Mānuka	7.91	7.15	18.1	719	25.87
141183_205	Taranaki	Manuka	Mānuka	10.9	8.8	22	1,320	25.95
141183_135	Northland	Manuka	Mānuka	3.89	8.11	9.37	698	25.97
141183_202	Taranaki	Manuka	Mānuka	9.55	4.24	8.86	1,550	26.01
141183_234	Northland	Manuka	Mānuka	6.84	15.7	17.5	1,900	26.09
141183_206	Taranaki	Manuka	Mānuka	9.82	6.76	23.7	1,090	26.1
141183_229	East Cape	Manuka	Mānuka	9.98	15.9	21.8	1,760	26.16
141183_179	Wairarapa	Manuka	Mānuka	9.38	11	21.2	1,090	26.2
141183_233	Northland	Manuka	Mānuka	9.16	13.5	20	1,570	26.2
141183_238	Northland	Manuka	Mānuka	7.55	25.2	19.9	2,080	26.26
141183_159	Wairarapa	Manuka	Mānuka	6.64	3.58	10.5	952	26.32
141183_208	Taranaki	Manuka	Mānuka	11.4	5.17	22.4	1,210	26.49
141183_190	Wairarapa	Manuka	Mānuka	8.62	8.13	30.8	1,030	26.49
141183_065	Canterbury	Manuka	Mānuka	9.49	14.8	14.6	443	26.53
141183_204	Taranaki	Manuka	Mānuka	12	5.1	16.6	1,240	26.54
141183_058	Canterbury	Manuka	Mānuka	6.32	4.77	3.57	692	26.62
141183_237	Northland	Manuka	Mānuka	8.95	28.3	27.8	2,150	26.62
141183_136	Northland	Manuka	Mānuka	5.78	27.8	9.46	1,220	26.7
16-01357_109	West Coast	Mānuka	Mānuka	9.81	12.4	25.6	448	26.7
141183_162	Nelson	Manuka	Mānuka	9.63	9.25	8.04	924	26.71
141183_178	Wairarapa	Manuka	Mānuka	9.06	7.37	20.2	947	26.72
141183_075	Nelson	Manuka	Mānuka	13.8	13.8	5.95	783	26.84
141183_224	Taranaki	Manuka	Mānuka	10.1	6.69	18.8	1,030	26.9
141183_119	Wanganui	Manuka	Mānuka	8.54	4.07	17.6	999	26.92
141183_231	Northland	Manuka	Mānuka	9.25	19.7	24.4	1,730	26.95

				Compound mg/kg				DNA (Cq)
Lab Code	**Location**	**Supplied Floral**	**MPI Floral Type**	**4-HPLA**	**2-MBA**	**2-MAP**	**3-PLA**	
141183_170	Wanganui	Manuka	Mānuka	3.39	1.77	1.2	450	27.02
141183_210	Taranaki	Manuka	Mānuka	8.3	6.24	24.2	897	27.03
16-01357_052	Gisborne	Mānuka	Mānuka	5.35	6.71	13.5	499	27.18
141183_010	Wanganui	Manuka	Mānuka	9.04	8.03	22.4	1,120	27.27
141183_203	Taranaki	Manuka	Mānuka	10.5	4.66	12.7	1,540	27.29
141183_130	Vial 4	Manuka	Mānuka	8.43	67.8	5.72	1,670	27.42
141183_013	Taranaki	Manuka	Mānuka	7.54	8.1	27.9	772	27.45
141183_059	Canterbury	Manuka	Mānuka	4.69	3.02	3.03	655	27.45
141183_182	Wanganui	Manuka	Mānuka	6.12	2.32	6.26	1,330	27.53
141183_121	Wanganui	Manuka	Mānuka	6.47	2.75	11.6	710	27.55
141183_236	Northland	Manuka	Mānuka	10.1	22.3	26.9	1,850	27.61
141183_191	Nelson	Manuka	Mānuka	16.9	12.8	7.37	1,040	27.62
141183_201	Taranaki	Manuka	Mānuka	7.73	4.02	14.1	1,240	27.66
141183_211	Taranaki	Manuka	Mānuka	8.2	6.39	34.6	958	27.7
16-01357_107	West Coast	Mānuka	Mānuka	8.84	10	20.1	425	27.75
141183_085	Marlborough	Manuka	Mānuka	7.71	2.13	2.98	825	27.76
16-01357_053	Gisborne	Mānuka	Mānuka	5.12	6.93	16.4	522	27.78
141183_235	Northland	Manuka	Mānuka	8.52	20.4	21.9	1,940	27.82
16-01357_124	Marlborough	Mānuka	Mānuka	7.13	5.06	6.97	443	27.84
141183_172	Wairarapa	Manuka	Mānuka	6.89	3.58	7.8	1,200	27.92
141183_149	Nelson	Manuka	Mānuka	7.96	7.58	5.99	991	27.94
141183_226	Wanganui	Manuka	Mānuka	7.04	2.93	11.5	629	28.05
141183_212	Wanganui	Manuka	Mānuka	6.88	1.26	3.11	1,420	28.08
16-01357_088	Waikato	Mānuka	Mānuka	8.42	5.41	13.1	794	28.08
141183_223	Wanganui	Manuka	Mānuka	5.4	3.35	14.5	505	28.1
141183_221	Taranaki	Manuka	Mānuka	4.69	3.16	17.7	516	28.21
16-01357_087	Waikato	Mānuka	Mānuka	7.89	5.8	16.2	761	28.24
141183_120	Wanganui	Manuka	Mānuka	6.53	2.99	12.4	766	28.35
16-01357_108	West Coast	Mānuka	Mānuka	9.46	10.6	21.5	436	28.35
141183_200	Wanganui	Manuka	Mānuka	5.83	2.54	5.45	786	28.45
16-01357_068	Waikato	Mānuka	Mānuka	8.92	5.88	19.3	762	28.57
16-01357_080	Northland	Mānuka	Mānuka	7.29	17.6	7.43	1,200	28.57
16-01357_079	Northland	Mānuka	Mānuka	7.55	21.4	10.4	1,180	28.89
16-01357_139	Marlborough	Mānuka	Mānuka	9.31	6.71	15	573	28.91
16-01357_132	Marlborough	Mānuka	Mānuka	11.6	11.6	16.4	654	29.02
16-01357_116	Northland	Mānuka	Mānuka	5.55	10.7	15.4	1,410	29.08
141183_114	Waikato	Manuka	Mānuka	6.78	42.6	11.5	1,520	29.11
141183_225	Wanganui	Manuka	Mānuka	4.04	1.72	2.89	531	29.13
141183_209	Taranaki	Manuka	Mānuka	10.8	4.39	10.4	1,070	29.13
16-01357_118	Northland	Mānuka	Mānuka	5.61	10.6	14.1	1,410	29.19
16-01357_117	Northland	Mānuka	Mānuka	5.31	10.5	15.3	1,400	29.25
141183_152	Wairarapa	Manuka	Mānuka	6.88	1.29	2.57	1,480	29.28
141183_213	Taranaki	Manuka	Mānuka	7.3	2.81	6.97	729	29.3
16-01357_073	Northland	Blend	Mānuka	3.82	13.7	11.2	666	29.43
141183_064	West Coast	Manuka	Mānuka	13.3	12.2	25.3	794	29.43
141183_016	Coromandel	Manuka	Mānuka	4.73	7.61	9.86	784	29.59
141183_169	Wanganui	Manuka	Mānuka	4.14	1.73	5.2	553	29.69
16-01357_075	Northland	Blend	Mānuka	3.63	12.7	11.1	627	29.73
16-01357_101	Northland	Mānuka	Mānuka	10.6	47.2	20.5	2,250	29.77
16-01357_074	Northland	Blend	Mānuka	3.61	13	11.8	633	29.9

s 9(2)(b)(ii)

				Compound mg/kg				DNA (Cq)
Lab Code	**Location**	**Supplied Floral**	**MPI Floral Type**	**4-HPLA**	**2-MBA**	**2-MAP**	**3-PLA**	
141183_112	East Coast	Manuka	Mānuka	4.4	5.2	9.02	684	30.05
141183_111	East Coast	Manuka	Mānuka	9.8	5.58	14	1,460	30.17
16-01357_137	Marlborough	Mānuka	Mānuka	8.52	8.25	16.5	423	30.19
141183_151	East Cape	Manuka	Mānuka	12.9	3.37	4.33	1,140	30.4
16-01357_115	Northland	Mānuka	Mānuka	7.6	14.2	10.1	1,350	30.48
16-01357_050	Gisborne	Mānuka	Mānuka	10.2	6.05	13.8	852	30.48
141183_166	East Cape	Manuka	Mānuka	15.7	3.51	4.18	1,100	30.49
141183_148	Nelson	Manuka	Mānuka	20.2	8.63	7.67	680	30.5
16-01357_114	Northland	Mānuka	Mānuka	8.05	16	12.6	1,350	30.54
16-01357_121	Gisborne	Mānuka	Mānuka	9.35	7.14	14.8	963	30.56
16-01357_122	Gisborne	Mānuka	Mānuka	8.65	6.85	13.8	952	30.59
141183_146	Nelson	Manuka	Mānuka	27.3	8.87	6.27	802	30.59
16-01357_134	Marlborough	Mānuka	Mānuka	6.56	3.78	8.39	552	30.64
141183_113	East Coast	Manuka	Mānuka	6.93	3.14	8.69	1,110	30.84
16-01357_078	Gisborne	Mānuka	Mānuka	5.47	2.14	6.73	1,210	30.93
141183_163	Nelson	Manuka	Mānuka	8.58	3.95	3.1	1,200	31.06
16-01357_143	Marlborough	Mānuka	Mānuka	5.48	2.02	1.99	567	31.17
141183_024	East Coast	Manuka	Mānuka	4.82	1.19	1.88	984	31.22
16-01357_123	Gisborne	Mānuka	Mānuka	7.49	5.79	12.2	852	31.23
16-01357_063	Unknown	Mānuka	Mānuka	6.26	2.13	5.11	859	31.26
16-01357_064	Unknown	Mānuka	Mānuka	6.49	2.06	5.4	861	31.27
16-01357_077	Gisborne	Mānuka	Mānuka	5.3	2.12	6.21	1,220	31.27
16-01357_103	Northland	Mānuka	Mānuka	10.6	45.7	21.4	2,290	31.28
16-01357_102	Northland	Mānuka	Mānuka	11.1	45.5	25	2,260	31.39
141183_063	West Coast	Manuka	Mānuka	8.99	16.4	15.3	701	31.42
16-01357_066	Waikato	Mānuka	Mānuka	6.89	28.9	6.65	586	31.55
16-01357_032	Northland	Mānuka	Mānuka	3.27	8.85	6.69	575	31.56
16-01357_065	Waikato	Mānuka	Mānuka	6.43	28.1	6.77	604	31.62
16-01357_017	Waikato	Mānuka	Mānuka	9.08	44.7	16.3	782	31.72
16-01357_049	Gisborne	Mānuka	Mānuka	11.3	5.08	9.9	877	31.75
16-01357_037	Gisborne	Mānuka	Mānuka	3.36	3.28	5.38	519	31.84
16-01357_147	Marlborough	Mānuka	Mānuka	4.56	1.74	2.59	405	31.87
16-01357_133	Marlborough	Mānuka	Mānuka	5.2	1.83	2.02	566	31.88
141183_108	Hawkes Bay	Manuka	Mānuka	2.73	1.38	2.68	709	31.93
141183_014	Northland	Manuka	Mānuka	6.72	8.72	3.98	2,100	31.97
16-01357_129	Marlborough	Mānuka	Mānuka	10.7	2.59	4.51	593	31.98
16-01357_142	Marlborough	Mānuka	Mānuka	8.67	3.85	8.23	618	32
141183_187	Wairarapa	Manuka	Mānuka	8.14	1.07	2.79	1,500	32.01
16-01357_038	Gisborne	Mānuka	Mānuka	11.1	8.57	12.4	988	32.04
141183_147	Waikato	Kanuka	Mānuka	10.9	6.63	13	850	25.61
141183_133	Waikato	Rewarewa	Mānuka	16.4	2.92	4.67	1,100	28.94
		(n=141)	**Mean Mmon**	**8.59**	**11.56**	**13.05**	**1005**	**28.15**
			1SD	**3.67**	**12.6**	**7.17**	**468**	**2.35**
			SEM	**0.31**	**1.06**	**0.60**	**39.4**	**0.20**

				Compound mg/kg				DNA (Cq)
Lab Code	**Location**	**Supplied Floral T**	**MPI Floral Type**	**4-HPLA**	**2-MBA**	**2-MAP**	**3-PLA**	
16-01357_090	Northland	Blend	Blend	2.25	5.02	4.44	278	30.66
16-01357_089	Northland	Blend	Blend	2.35	5.21	4.54	277	30.79
16-01357_091	Northland	Blend	Blend	2.25	5.12	4.41	276	31.01
141183_099	Otago	Clover	Blend	2.48	3.68	3.04	109	25.75
16-01357_006	Unknown	Clover	Blend	1.19	1.66	1.42	144	31.42
16-01357_023	Otago	Clover	Blend	2.4	2.75	2.04	103	33.16
16-01357_014	South Island	Honeydew	Blend	1.9	2.32	2.06	101	31.51
141183_080	Nelson	Kamahi	Blend	2.98	2.87	2.23	231	27.52
16-01357_135	Marlborough	Kamahi	Blend	1.56	1.96	3.23	110	28.95
141183_067	West Coast	Kamahi	Blend	1.97	1.77	1.33	88	29.04
16-01357_145	Marlborough	Kamahi	Blend	1.42	1.33	1.07	139	30.41
16-01357_126	Canterbury	Kānuka	Blend	3.12	3	4.24	294	31.57
141183_088	Waikato	Manuka	Blend	8.07	12.4	17.5	356	26.16
141183_177	Wairarapa	Manuka	Blend	2.74	2.96	12	279	26.4
141183_214	Southland	Manuka	Blend	6.29	4.81	5.3	237	26.97
141183_086	Canterbury	Manuka	Blend	1.39	1.69	2.48	44	27.16
141183_188	Wairarapa	Manuka	Blend	2.47	2.79	11.4	306	27.35
141183_040	Otago	Manuka	Blend	2.24	2.08	1.64	107	27.54
141183_061	West Coast	Manuka	Blend	5.71	6.76	6.36	390	28.04
141183_077	Nelson	Manuka	Blend	4.33	2.52	1.29	324	28.18
141183_087	West Coast	Manuka	Blend	4.11	3.84	3.99	194	28.51
141183_083	Canterbury	Manuka	Blend	1.77	3.38	2.09	93	28.61
141183_081	Marlborough	Manuka	Blend	4.01	2.64	3.19	310	29.7
141183_222	Wanganui	Manuka	Blend	2.39	1.07	4.13	189	30.36
141183_227	Taranaki	Manuka	Blend	4.07	1.57	1.65	340	30.51
141183_069	Nelson	Manuka	Blend	1.83	1.94	1.66	97	30.55
141183_036	Coromandel	Manuka	Blend	1.4	1.49	1.2	203	33.27
141183_026	East Coast	Manuka	Blend	3.48	4.41	3.52	286	34.02
16-01357_128	Marlborough	Mānuka	Blend	9.62	10.7	30.9	379	27.71
16-01357_119	Wairarapa	Mānuka	Blend	2.93	3.24	7.18	207	28.3
16-01357_120	Wairarapa	Mānuka	Blend	2.75	2.89	5.99	197	28.63
16-01357_140	Marlborough	Mānuka	Blend	3.95	4.1	4.2	250	29.38
16-01357_125	Marlborough	Mānuka	Blend	3.48	2.8	4.05	365	29.46
16-01357_035	Gisborne	Mānuka	Blend	1.53	3.3	2.38	190	29.86
16-01357_011	Otago	Mānuka	Blend	3.96	3.47	4.63	244	30.26
16-01357_033	Gisborne	Mānuka	Blend	4.08	4.05	5.04	352	30.81
16-01357_141	Marlborough	Mānuka	Blend	3.65	1.62	2.78	339	30.86
16-01357_130	Marlborough	Mānuka	Blend	3.52	1.54	2.82	374	31.05
16-01357_039	Gisborne	Mānuka	Blend	3.51	5.5	4.65	376	31.14
16-01357_046	Gisborne	Mānuka	Blend	2.88	2.87	5.1	353	33.98
16-01357_029	Northland	Mānuka	Blend	2.46	19.1	1.36	360	34.94
141183_079	Marlborough	Manuka/Dew	Blend	5.18	4.35	4.58	394	26.97
141183_027	East Coast	Multi-Floral	Blend	1.01	1.68	2	141	28.99
		(n=43)	**Mean Mmul**	**3.18**	**3.82**	**4.68**	**242**	**29.7**
			1SD	**1.75**	**3.27**	**5.16**	**104**	**2.2**
			SEM	**0.27**	**0.50**	**0.79**	**15.8**	**0.34**

				Compound mg/kg				DNA (Cq)
Lab Code	**Location**	**Supplied Floral Type**	**MPI Floral Type**	**4-HPLA**	**2-MBA**	**2-MAP**	**3-PLA**	
141183_110	Central NI	Ling/Heather/Man	Other	2.97	1	0.5	775	27.82
141183_001	Coromandel	Rewarewa	Other	0.5	0.8	0.92	58	29.39
141183_005	Waikato	Kamahi	Other	2.14	0.99	3.25	241	29.89
141183_015	Wairarapa	Manuka/Kanuka	Other	3.64	0.89	1.14	785	30.51
141183_056	Northland	Kamahi	Other	0.5	0.5	0.5	20	30.78
16-01357_013	Otago	Kamahi	Other	0.85	0.5	0.85	48	30.97
141183_051	Waikato	Kamahi	Other	0.5	0.5	0.81	40	31.47
141183_158	East Cape	Manuka	Other	0.95	1.92	0.94	162	31.55
16-01357_012	Otago	Blend	Other	3	0.91	1.48	216	31.64
16-01357_111	Wairarapa	Kānuka	Other	0.84	0.5	1.21	91	31.91
141183_089	BOP	Rewarewa	Other	0.5	0.5	0.99	43	33.06
141183_127	Nth Island	Kanuka	Other	2.52	1.52	0.85	568	33.29
141183_073	West Coast	Kamahi	Other	0.89	0.5	0.5	38	34.39
141183_032	Waikato	Rewarewa	Other	0.88	1.57	0.5	88	34.66
141183_183	East Cape	Manuka	Other	3.96	1.14	0.9	893	35.36
141183_103	South Island	Honeydew	Other	0.89	0.5	0.5	20	35.63
16-01357_004	Waikato	Rewarewa	Other	0.85	0.99	0.5	98	35.97
		(n=17)	**Mean Other**	**1.55**	**0.90**	**0.96**	**246**	**32.3**
			1SD	**1.20**	**0.44**	**0.66**	**304**	**2.36**
			SEM	**0.29**	**0.11**	**0.16**	**73.6**	**0.57**

s 9(2)(b)(ii)

s 9(2)(a)

MPI Food Assurance Team
POBox 2526
Wellington

13 June 2017

Re: Submission on 'Proposed General Export Requirements for Bee Products' April 2017.

Name: s 9(2)(a)
Title: Directors
Organisation: s 9(2)(a)
Phone: s 9(2)(a)
Email: s 9(2)(a)
Address: s 9(2)(a)
Opertions: Beekeeper and Extractor
Involved in industry: 25+ years
Operate under: RMP
Number of Hives: 4000
Region of Operation : Central Otago and the West Coast.
Staff Employed: 10-15

To whom it May Concern;

We would like to note our significant concern over the following aspects of the proposed General Export Requirements.

Part 3.1 Honey to be fit for purpose

The Central Otago climate is unpredictable and during harvest months in some places we often feed sugar due to drought or inclement weather (frequent southerlies) until the honey flow kicks in. Documenting when this is done and requesting exemptions would be a significantly time consuming process for us.

On the west coast we need to feed protein supplement every year during harvest because there is no protein in the food source on the Coast. They are only able to gather one floral

source so are limited in their pollen intake. We would not be able to support these hives in a healthy manner if we were not able to provide the protein to them.

Any requirement to document our protein or sugar feeding would be a great deal extra time and cost when we already have a large number of factors to take into consideration in our hive management program.

What definition do you use to define the 'harvest season'? If this is the time that the bees are on a honey flow then this is acceptable as we would not be feeding them. A honey flow will start at differing times and is often unpredictable. If 'harvest season' is defined as certain months each year then this is unpractical and unrealistic for us.

Part 4.1 Pre-processing traceability requirements.

1a. Strongly disagree with the proposal to have all honey supers marked with a unique form of id. This is a totally unworkable and impractical practice for a number of reasons;

1. Marking each box does not allow for the correct practices of moving frames between boxes and hives so that hive health can be maintained. There would be no point marking a box but not also marking frames. Requiring us to keep frames in the same box would stop us being able to practice good hive managment, but it would also be extremely time consuming, expensive and practically unworkable
2. During extraction frames are processed and may or may not be placed back in the same box. It would at least double our working time in the extracting room to attempt to put frames back in the respective box. It would also greatly increase our work and admin time trying to place back boxes on respective hives, and track these between hives, sites or through processing.
3. The extra time and cost would impact significantly on our business, making the practical, safe and efficient running of the business nearly impossible, and would greatly reduce our profitability.
4. Frames and boxes are being replaced on an ongoing basis due to wear and tear and damage. Marking these with a unique id that would need to be individually replaced and accounted for would be extremely time consuming for next to no value.
5. There would be no actual value in marking boxes with unique id's because the honey gets mixed in the batch according to the harvest declaration, so tracing it back to the box/ hive is impossible.
6. Provides no further traceability that we already have, it would be an enormous amount of work for no benefit.

We understand that some Manuka operators are using unique id's on their boxes, but this practice is to safeguard against theft. Operators who are not gaining the benefit of the inflated manuka honey prices should not have this significant additional cost and time consuming requirement imposed on them.

It is our opinion that the definition of the 'smallest possible unit' in terms of traceability must always be the apiary site. Hives and boxes are constantly changing units in response to

bee/ hive health, weather and environmental conditions. The site is a better descriptor of the product because it describes the area within which the honey has been collected. So long as we know which site the honey came from during harvest, we can know what factors were involved in the honeys production. If all other factors relating to AFB, environmental contaminants, feeding practices etc are managed for every hive in all sites to an acceptable standard, then we can be confident that any hive being placed at the site meets those standards. Therefore tracing of the honey source is best done via 'apiary site'.

We believe the harvest declaration is the best solution for traceability rather than using unique id's which would cripple the industry.

4.2 Traceability from Beekeepers to Operators.

We support the main details noted in this section but would like clause 4.2.2 k removed as we do not believe that the requirement not to feed honey during harvest season is a workable practice.

We appreciate your due consideration on these matters,

s 9(2)(a)