



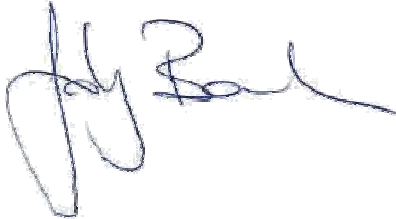
Compliance Guide to the  
Food (Tutin in Honey)  
Standard 2008

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## Explanatory Note

This guide has been published to assist beekeepers, packers and exporters of honey to comply with the Food (Tutin in Honey) Standard 2008. The standard has been developed to ensure that dangerous levels of tutin do not occur in honey sold in New Zealand or exported.



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## Disclaimer

### ***IMPORTANT DISCLAIMER***

Every effort has been made to ensure the information in this guide is accurate.

NZFSA does not accept any responsibility or liability whatsoever for any error of fact, omission, interpretation or opinion that may be present, however it may have occurred.

### ***Website***

A copy of this document can be found at: <http://www.nzfsa.govt.nz/animalproducts/index.htm>

# 1 Background

## 1.1 What is Toxic Honey?

There are a number of plants world-wide that can lead to toxicity in honey when bees forage either directly on the nectar or pollen of the plant or on honeydew on the foliage.

Rhododendrons, for example, have been recognised as a source of toxic honey for centuries.

Toxicity in New Zealand honey has only been associated with bees collecting honeydew from tutu (*Coriaria arborea*) bushes. Tutu bushes contain a toxin called tutin. The honeydew is present as an excretion from passion vine hoppers (*Scolytopa australis*) that feed on tutu sap. Tutu honeydew honey is chemically very similar to floral honey and cannot be distinguished by taste, sight or smell from other non-toxic honeys.

To produce toxic honey, all of the following conditions are required:

- significant concentrations of tutu bushes; and
- high numbers of vine hoppers; and
- hot dry weather to allow the honeydew to build up on the tutu (rain can wash it off); and
- the presence of honey bees (*Apis mellifera*)

A number of people have been killed, incapacitated and hospitalised over the years from eating toxic honey. The most recent case from commercial honey was in 2008 involving 22 people, some of whom showed severe clinical symptoms. Most poisonings have been associated with consumption of comb honey.

Both comb honey and extracted honey can be poisonous. Comb honey poses a greater risk because it is eaten directly off the comb, increasing the chance of consuming honey with a high concentration of tutin. Extracted honey is often bulked or blended with other honey which reduces the concentration of toxin.

## 1.2 Tutu – The Plant

Tutu (*Coriaria arborea*) is a widely distributed native plant species found throughout New Zealand, particularly along stream banks, sheltered road verges and in regenerating native bush. The sap of the plant contains a toxin called tutin which can be fatal when ingested. Livestock deaths from eating tutu were common and early settlers in New Zealand also

suffered illness and death from consuming the plant or its berries. Photos of tutu are found in Appendix 2.

There are a number of *Coriaria* species found in New Zealand. While all contain tutin, it is unclear whether passion vine hoppers infest species other than *Coriaria arborea*.

### 1.3 Tutin – The Toxin

Tutin is a member of the picrotoxin group and affects mammals. It seemingly has no effect on bees and cannot be degraded by heating or processing of honey. Tutin is believed to be very stable, and poisoning cases have resulted from people eating honey that was several years old.

Ingestion of tutin can be lethal, or make a person very unwell. It is generally accepted that as little as 1 teaspoon (approximately 10 ml) of toxic honey can have a severe effect on the human nervous system. Symptoms include vomiting, delirium, giddiness, increased excitability, stupor, coma and violent convulsions.

### 1.4 Passion Vine Hoppers

Passion vine hoppers (*Scolypopa sp*) are found on a wide variety of plants including tutu. They exude honeydew (a sweet exudate) as a by-product of feeding on the sap of plants.

Passion vine hoppers are found throughout the North Island and in the Nelson/Marlborough area. Further research needs to be done to better refine their distribution. This may result in changes to the standard in terms of areas subject to controls. Photos of passion vine hoppers and Tutu are found in Appendix 2.

Passion vine hoppers over-winter as eggs. There is only one generation each year. The white fluffy nymphs generally emerge between October and December and take nearly 3 months to develop. Adults are present from January to March, but in the far north some may appear in late December and a few may survive until late May.

### 1.5 Honeydew

Honeydew is a sticky sugary substance exuded by a variety of insects. When present it may make the leaves of the tutu plant sticky to touch and once it has been there in significant quantity for a few weeks will grow a black sooty mould which will be very obvious on the foliage of the plant. Any honey collected from an area where honeydew is present on the leaves of any significant amount of tutu needs to be blended and tested for the presence of tutin.

## 2 Limits for Tutin in Honey

### 2.1 Limit for Honey (Except Comb Honey)

The limit for tutin in honey has been set at 2.0mg/kg. This limit applies to retail packs or honey for export sampled at any point in the food chain. It can therefore be used as a limit for testing of honey at any point in the production chain up to and including the packer, provided the honey sampled has been thoroughly blended so it is homogenous.

To determine the appropriate maximum level for tutin in honey, NZFSA estimated the acute reference dose for tutin from the results of acute toxicity testing carried out at AgResearch using the OECD Guideline 425 Up-and-Down Procedure. The “no observable adverse effect level” (NOAEL) in the AgResearch Study was found to be 0.25mg/kg body weight. Applying the standard uncertainty factor<sup>1</sup> of 100 to the NOAEL leads to an acute reference dose (the highest dose agreed internationally to be not likely to lead to any ill health) of 2.5 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) body weight. Assuming an average body weight for adults in New Zealand of 70kg, this is equivalent to 175 $\mu\text{g}/\text{day}$  of tutin.

The most recent adult National Nutrition Survey in 1997 showed that the 97.5th percentile honey consumer eats 58.9g of honey per day (in other words, approximately one in forty adults in New Zealand eats 58.9g of honey per day). This figure is appropriate as the basis for establishing a food standard for tutin provided the toxic effect is acute only, and because the figure is likely to represent the largest daily intake of honey for most consumers. The residue of tutin that would lead a high consumer to equal the acute reference dose is 2.9mg/kg.

While further studies are underway to examine the mode of action of tutin, there is no evidence to suggest its effects are anything other than short-term. However, as NZFSA does not have sufficient data to be certain of this it has decided to adopt a conservative approach and round this figure down to 2mg/kg while further studies are undertaken.

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<sup>1</sup> A 10x safety factor is applied to account for differences between animals and humans as humans may be more sensitive to some substances than animals. An additional 10x safety factor is applied to account for the differences in body weight of consumers (eg children) and to allow for the effect, for example, on immune compromised people.

## 2.2 Limit for Comb Honey

The limit for comb honey has been set at 0.1 mg/kg. Tutin is not evenly distributed in comb honey and may be concentrated into a few cells within the comb. When honey is extracted and blended uncontaminated honey will dilute the tutin. The limit for tutin in comb honey is based on the consequences of a child ingesting a portion of comb where the 2.0mg/kg in a 375g pack of comb honey is concentrated into a few adjacent honey cells. This ensures that any single serving of comb honey should not have a tutin concentration above 2.0mg/kg.

This limit applies to any individual portion of comb honey sampled.

# 3 General Requirements of the Standard

The standard places responsibilities on:

- All beekeepers who supply honey (sale and sell is defined in section 4 of the Food Act 1981 and includes barter); and
- People and businesses that sell honey; and
- The last person to pack honey for retail sale; and
- Any person that exports honey

## 3.1 Application to Hobbyists

Any hobbyist beekeeper that sells honey (sale includes barter) is covered by this standard. Where a hobbyist beekeeper collects honey only for his or her own use, this standard does not apply. This includes where honey is gifted to friends and family provided that is not in exchange for goods or services. However, it is strongly recommended that you take the precautions required of beekeepers selling honey as set out in this standard (Only harvest honey produced July to December or Options 4, 5, 6) to avoid poisoning yourself, your friends and your family.

## 3.2 Beekeepers' Responsibilities

Beekeepers are primarily responsible for ensuring that tutin does not get into honey. They can do this by either:

1. Placing honey supers on hives after 1 July and removing them by 31 December of any year (This should avoid any risk as vine hopper numbers do not build up until late summer. Beekeepers must maintain records necessary to enable any person they are

supplying to be able to demonstrate compliance with this standard including holding records that specify hive locations, dates supers were placed on and dates supers were taken off. Hive diaries or similar may be sufficient for this purpose.); or

2. Undertaking at least one of the six options in the standard to ensure that honey produced between 1 January and 30 June of any year is safe.

Beekeepers need to keep records that support the compliance option(s) taken and provide a written statement that attests to the fact that they hold such records.

At a minimum this includes recording where their beehives are at all times, including all temporary holding sites, and whether honey supers were put on and when they were taken off. These records could be in the form of a hive diary or more formal paper or electronic records.

Records need to be sufficiently detailed so that it is possible to work out the dates and locations where any resulting honey was collected from. Otherwise it will not be possible for beekeepers to be able to demonstrate they are operating in compliance with the standard.

Some of the compliance options require additional records to be kept. These are detailed under each of the compliance options.

Beekeepers must supply written documentation to any packer or exporter they sell their honey to. This documentation must identify which of the options in the standard they have complied with. If the business being supplied has a registered risk management programme for secondary processing under the Animal Products Act 1999, this information will be required in the form of a harvest declaration.

Where beekeepers pack their own honey for sale they will need to ensure that they have full records available for inspection by an officer appointed under the Food Act 1981 (or Animal Products Act Officer/Animal Products Act Verifier for businesses operating under risk management programmes) should this be required.

In the event that records are not sufficient to demonstrate that one of the options has been complied with, an officer may take action including requiring all honey to be blended and tested before sale or seizure and destruction of product. Product recalls may also be required if beekeepers cannot prove their product is safe.

### **3.3 Packer's Responsibilities**

Anyone who packs honey for sale needs to ensure that it has been harvested in accordance with the provisions of the standard and hold documentation to demonstrate this. Signed statements from suppliers that they are complying with one or more of the options in the

standard are sufficient. The standard does not require the packer to hold copies of all of the beekeeper's documentation as some of this (for example specific hive locations) is commercially sensitive.

The Food Act 1981 provides for people to be entitled to rely on guarantees from suppliers. However, if a packer has any doubt about the documentation or product supplied, the packer should ensure that the product is tested before sale to ensure it is safe.

### **3.4 Honey for Export**

All honey for export is covered by the standard, whether or not it is required to be exported under official assurances (Government certification).

Honey that is packed for export to countries requiring official assurances needs to be handled through secondary processing premises operating under a registered risk management programme under the Animal Products Act. Beekeepers supplying such premises will be required to complete harvest declarations which, amongst other matters, require them to attest to compliance with the Food (Tutin in Honey) Standard 2008 and which compliance option has been selected.

All persons involved in the production of honey for export need to ensure that any relevant General Requirements for Export (GREX) and Overseas Market Access Requirements (OMARS) provided under the Animal Products Act 1999 are complied with. Government certification may be refused for non-compliant export consignments.

Businesses involved in the export sector are advised that at the date of publication of this guide no agreements have been made with overseas countries regarding recognition of the New Zealand limit for tutin in honey.

NZFSA will provide official assurances for exported honey on the basis of compliance with the Food (Tutin in Honey) Standard 2008 and the limits notified therein. However this cannot be regarded as a guarantee that the honey complies with importing country regulations concerning contaminants in honey. Many countries have default limits for contaminants, or they may have zero tolerance for contaminants where a level has not been specified in their own regulations. NZFSA will not be able to issue official assurances for honey where the official assurance contains attestations about compliance with importing country contaminant regulations, except where the contaminant requirements have been notified in an NZFSA OMAR, and the product has been shown to comply.

There is a risk of product rejection in markets that have not officially recognised the New Zealand tutin limit. Should honey be tested at the border for tutin in such countries, and there is a detection which exceeds the importing country's [default] standard, NZFSA will not be in a position to negotiate clearance for that consignment.

## 4 Compliance Options

These options apply to honey produced by bees or harvested by beekeepers during the period 1 January to 30 June of any year (apart from 2009 where the period is from 25 January to 30 June). This includes where honey is harvested from bottom boxes that have been part of hives for any of this period.

### 4.1 Option 1: Holding Test Results

The standard only requires testing where honey has been harvested in a situation where it is likely to have some tutin in it or where none of the other compliance options is possible. Because the honey may contain tutin it is essential that honey harvested in this situation is thoroughly blended before testing and sale to ensure any toxin present is spread evenly through the product at a safe level.

Some honey is packed directly into containers (for example, drums, pallets, retail packs) after it has been extracted. Testing of honey after this has been done does not constitute compliance with this standard. This is because the honey is not homogeneous and sampling is unlikely to be representative.

Testing is an option available for extracted honey only. It is not possible to take samples from comb honey in a sufficiently representative way to ensure that no individual piece of comb will exceed the limit of 0.1mg/kg. Comb honey has to be harvested only from areas where no risk of tutin contamination exists (Options 4, 5 or 6).

Some businesses may wish to test product whether required to or not, as an added precaution to ensure product safety.

Honey must be batched for testing and batches must be homogeneous. The recommended way to achieve a homogeneous batch is to have the entire batch in a single bulk holding tank with a stirring device with sufficient stirring done to ensure the honey is thoroughly blended before drumming off or sending to a packing line.

Other ways of batching honey so it is homogeneous may be possible – Premises with RMPs should check proposals for any variation from the above with their verifier.

The product should be packed as soon as possible after blending to avoid any risk of tutin settling out into more concentrated layers in the tank.

Testing has to be done in a laboratory accredited to ISO 17025. NZFSA does not endorse any particular laboratory for undertaking this testing. However laboratories involved in testing honey for export have to be approved under NZFSA's Laboratory Approval System (LAS).

More information about LAS laboratories can be found at

<http://www.nzfsa.govt.nz/animalproducts/registers-lists/milab/index.htm>

Laboratories that undertake testing may composite samples for analysis. The number of samples that may be composited for analysis will vary depending on the sensitivity of the methods used for analysis. Compositing of samples for analysis may not be done prior to submission of samples to laboratories as this must be done under controlled conditions.

#### **4.2 Option 2: Holding Records Confirming Risk Managed in RMP**

This option is available to beekeepers who wish to operate under the Animal Products Act regime. Risk management programmes will need to address all aspects of tutin risk as well as other aspects relevant to ensuring the safety of honey during production and harvesting. They will need to be tailored to specific areas that beekeepers are operating in and will require evaluation by an independent recognised evaluator on a fee for service basis. We recommend that beekeepers wishing to take up this option read the Risk Management Programme Manual found at

<http://www.nzfsa.govt.nz/animalproducts/publications/manualsguides/rmp/rmp-manual/index.htm> and other information on risk management programmes.

<http://www.nzfsa.govt.nz/animalproducts/subject/rmp/index.htm>

Risk management programmes will need to be verified by an independent verifier, again on a fee for service basis.

#### **4.3 Option 3: Holding Records Confirming Risk Managed in FSP**

A Food Safety Programme (FSP) is a written programme designed to manage food safety. It examines all of the steps involved in producing food (from ingredient purchase through to final sale), identifying things with the potential to cause harm to the consumer (the hazards), and implementing controls to eliminate or control such hazards.

For further information or general guidance on developing and implementing a food safety programme in your business contact a Health Protection Officer at your local District Health Board.

Information on food safety programmes is found on the NZFSA web site at <http://www.nzfsa.govt.nz/processed-food-retail-sale/fsp/>

Food safety programmes, once approved, are subject to audit by an independent auditor on a fee for service basis.

#### 4.4 Option 4: Holding Records that Demonstrate an Absence of Tutu

If a thorough check of a 3km radius around beehives does not find a significant quantity of tutu, then documentation about this fact may be used to support a case for no further action to be required to manage for tutin.

Documentation could include topographical maps showing the location of beehives together with detailed notes or photographs of areas likely to contain tutu that have been surveyed. Areas likely to contain tutu include road cuttings and river/stream gullies and areas of regenerating bush in an area where these are not clearly either in pasture or mature forest which will shade out the tutu.

Records must be kept of:

- The areas that have been checked.
- Dates areas were checked.
- Numbers and sizes of tutu bushes found.

Where any tutu is present, checks need to be made of these areas annually and records kept of these checks to ensure that the numbers and sizes of plants present have not built up to a point where they may present a risk.

Where changes likely to impact upon the status of an area occur – for example, a forest being felled, checks will need to be made of the felled area on a regular basis (annual should be sufficient) to check for colonising growth of tutu.

“Significant” tutu means more than a few isolated bushes. Dense concentrations of tutu are often found in close proximity to watercourses, road cuttings and in more sheltered areas, especially where bush is regenerating. If a concentration of bushes is found (for example alongside a stream or road cutting for a few hundred metres where tutu bushes are found every 10-20m that is a significant concentration and this option is not available for compliance with this standard).

If in any doubt as to whether a concentration of tutu bushes is ‘significant’ it is better to adopt the cautious approach and check them for honeydew under Option Six.

It is anticipated that very few areas will be able to be surveyed in a sufficiently thorough manner and be found largely free of tutu to be able to rely on this option.

#### 4.5 Option 5: Holding Records that Demonstrate a Low Risk Location

The South Island excluding Marlborough is a low risk location. As honey produced anywhere in New Zealand is required to meet the limits set out in the standard, beekeepers operating in the South Island outside Marlborough should still be vigilant for the presence of vine hoppers on tutu and manage any risks appropriately. Further work is to be done to check whether any significant risk does exist in the South Island outside Marlborough. Routine surveillance sampling and testing for tutin in honey will also be undertaken on honey from the South Island.

#### 4.6 Option 6: Inspecting Tutu for the Presence of Honeydew

It is anticipated most beekeepers in the North Island and Marlborough will utilise this option. This option is similar to the requirement previously in place under the Animal Products Act 1999 for honey supplied to premises processing honey for export.

To comply with this option, you need to start by identifying the significant concentrations of tutu in a 3 kilometre radius around each hive location and mark them on a map.

Representative tutu bushes from at least 3 of the areas identified in a 3km radius of each hive location (or all areas if less than 3) then need to be checked for the presence of passion vine hoppers and honeydew on a weekly basis from 1 January to 30 June or up until the date the honey is harvested. Where possible, sites should be selected in well separated areas surrounding the hives to ensure that the tutu checked is representative of tutu in the area. If more than three areas in a 3km radius of a hive location have significant quantities of tutu, more sites should be included for checking so that you are certain that the tutu checked is sufficiently representative of the tutu present in the vicinity of your hives.

Honey should be harvested before passion vine hopper numbers build up to a point where honeydew is visible or can be felt on the leaves and stems of the tutu plant. Once honeydew is seen or felt on the leaves (the leaves and stems will become sticky to touch and a black sooty mould may also form on the leaves and stems) then honey from hives in the area must be blended and tested before sale as per option 1. Comb honey **cannot** be sold as comb honey once honeydew is present on tutu in an area – it must be extracted, blended and tested before sale.

It is argued that bees forage on tutu honeydew as a last resort. However, the widespread presence of tutin in late season product and its presence in product despite beekeepers being convinced that bees were foraging on other sources of nectar demonstrate that this cannot be relied on as a means of keeping tutin out of honey. This is why testing of product has to be mandatory once honeydew is found on tutu plants near beehives.

Documentation for this option could include topographical maps showing the location of beehives together with detailed notes or photographs of areas likely to contain tutu that have been surveyed. Areas likely to contain tutu include all road cuttings and river/stream gullies in an area where these are not clearly either in pasture or mature forest which will shade out the tutu.

Records must be kept of:

- the location of all areas where tutu is significantly present within a 3 kilometre radius of the beehives from which the honey is harvested for sale for human consumption or export; and
- confirm a weekly visual inspection was done of at least 3 of those areas up until and including the date of harvest of the honey for sale for human consumption or export; and
- specify the location of the tutu inspected; and
- confirm that there is no honeydew present on the tutu inspected.

Sites where tutu bushes are checked should be identified on a topographical map, by GPS or description sufficient that anyone else could easily locate the same site if necessary.

It is recommended that inspection sheets be completed when bushes are checked for vine hoppers and honeydew. An example is found in Appendix 1.

Where changes likely to impact upon the status of an area occur – for example, a forest being felled, checks for new growth of tutu will need to be made on a regular basis (annual should be sufficient).

“Significant” tutu means more than a few isolated bushes. Dense concentrations of tutu are often found in close proximity to watercourses, road cuttings and in more sheltered areas, especially where bush is regenerating. If a concentration of bushes is found (for example alongside a stream or road cutting for a few hundred metres where tutu bushes are found every 10-20m) that is considered significant.

Photos of passion vine hoppers and tutu are included as Appendix 2.

## 5 Honey Produced Before 25 January 2009

Honey produced prior to the date of commencement of this standard is subject to the provisions of the Food Act 1981 requiring food for sale to not be unfit for human consumption.

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Exported honey is required to meet the requirements of the relevant GREX (General Requirements for Export) and any applicable OMARs (Overseas Market Access Requirements) in force prior to 25 January 2009 including the requirements of Specification 108 of the Animal Products (Specifications for Products intended for Human Consumption) Notice 2004.

## 6 Record Keeping

Records must be kept in all cases for four years from the time honey is packed for sale or exported. This ensures that (should a trace-back be necessary) the relevant documentation will be available.

Records for harvest locations and dates may be simple and can be contained in documents such as hive diaries. Records of inspections of tutu bushes may need to be kept separately. An example form is included at Appendix 1.

Sufficient records need to be kept to demonstrate compliance with the standard. Failure to keep such records means that the honey supplied may not be eligible for export. It may also be subject to product recall in the domestic market if it cannot be demonstrated to be safe.



## Appendix II – Passion Vine Hoppers and Tutu

Tutu Bush. Picture - Jim Edwards



Scolytopa Nymph. Picture – HortResearch



Adult Passion Vine. Hopper Picture - Mark Goodwin

