Farm Production & Practice

Ministry of Agriculture and Fisheries

Beekeeping
Toxic Honey
From Tutu Honeydew

Keywords: tutu honeydew; honey poisoning; vine hopper — in toxic honey production.

Honey that is toxic to humans can be produced wherever the plant tutu and the vine hopper insect are common. Beekeepers should recognise the source of the poison, the way it becomes incorporated with honey, and how they can reduce the risk of harvesting any toxic honeydew honey that is gathered by bees.

New Zealand honey is almost always safe for human consumption. Since the real causes of toxic honey production were identified in 1946, cases of honey poisoning have not been common. The restriction of beekeeping in certain areas, and the management practices outlined here, mean that the risk of producing toxic honey is not high.

Source of the Poison

The poison comes from tutu, but the bees do not collect it from the plant's nectar. The vine hopper insect feeds on tutu sap, and produces a sweet honeydew which can accumulate on the leaves and stems of the plant. Bees sometimes collect this honeydew and take it back to the hive.

The tutu plant: Tutu ***(Coriaria arborea)*** is a native shrub or small tree found throughout New Zealand. It occurs in scrublands and forest margins up to 1000 m above sea level, particularly on poor-quality soils and pumice deposits.

Fig. 1: Tutu. (Reproduced by kind permission of N.M. Adams).

Tutu is shown in fig. 1. Its most obvious features are the glossy green leaves, the fluted branches, and the hanging racemes of flowers or berries which are 100–250 mm long.

Tutu contains a highly poisonous chemical called tutin. As little as 1 mg of tutin can have a serious effect on humans, and there are many cases of humans and stock being poisoned, sometimes fatally, after eating parts of the tutu plant.

Vine hopper: Toxic honeydew is produced from tutu by an insect called the vine hopper (or sometimes the passion-vine hopper), ***Scolypopa australis.*** The young insects or nymphs (fig. 2) are found from November to March. They are small and wingless, but have a conspicuous tuft of waxy threads on the tail. The nymphs hop large distances when disturbed.

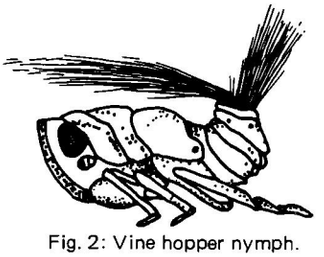

Fig. 2: Vine hopper nymph.

Adult vine hoppers, shown in fig. 3, are found from January to April. They have transparent wings edged in brown, which are held in a triangular or delta shape when at rest. The adult hoppers also jump large distances when disturbed, and are sometimes called "flick moths" or "lacewing moths"

Production of poisonous honey: Vine hoppers feed on many different species of plant, but when they feed on tutu they ingest poison (tutin) along with the plant sap. The tutin has no effect on the hopper, but is excreted along with sugars, water, and other products to form honeydew. The toxic honeydew usually also contains another toxin called hyenanchin, which is a modified form of tutin.

In certain conditions the poisonous honeydew accumulates on the plant, whence it can be collected by honey bees and taken back to the hive. The toxins have no effect on bees, which process the honeydew into honey and store it in the combs.

The poisonous honey is usually light amber in colour, and ***cannot*** be distinguished by taste or sight from other, non-toxic honeys.

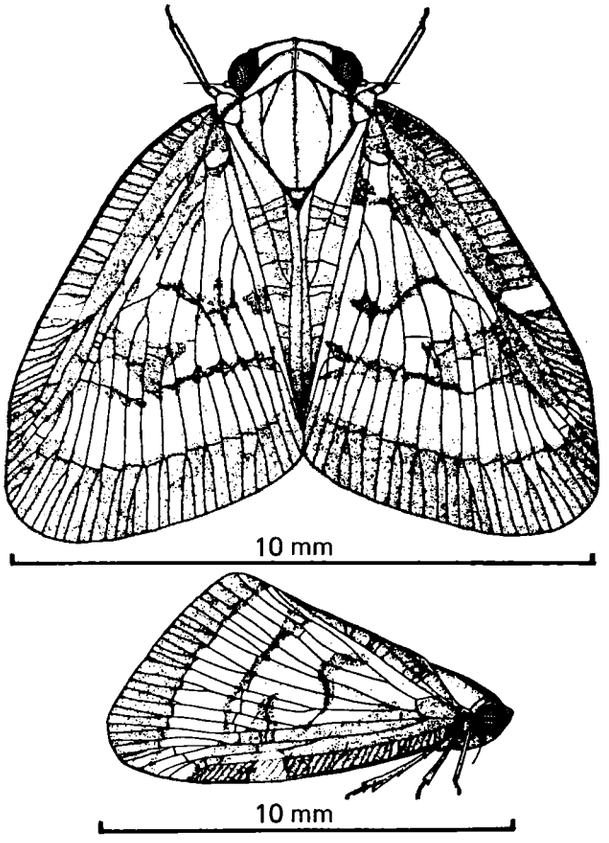

Fig. 3: Vine hopper adult.

Fig. 4: Vine hopper distribution

Both comb honey and extracted honey can be poisonous, although comb honey usually contains higher concentrations of the toxins than does extracted honey. The toxins do not disappear from the honey with time, and cases of poisoning have resulted from people eating honey that is several years old.

Toxic Honey

Distribution: Most toxic honey is found in the eastern Bay of Plenty and the Coromandel Peninsula, but it has also been reported from the Marlborough Sounds and Northland.

Danger period: Several factors are needed before toxic honey is produced:

- the presence of tutu;
- high numbers of the vine hopper;
- dry weather to allow the honeydew to build up on the tutu;
- little else for the bees to forage on.

The vine hopper is present in large numbers from December to the end of April the following year. This is the high-risk period for toxic honey production.

Symptoms of tutu honey poisoning: Tutin and hyenanchin are both extremely toxic compounds, and even small amounts of toxic honey can produce symptoms of poisoning. These may include nausea, vomiting, abdominal pains, diarrhoea, convulsions, unconsciousness, and loss of memory. The amount of honey that must be eaten before poisoning occurs depends on the concentration of tutin and hyenanchin in the honey, but it can be as little as one teaspoonful. Patients do not always recover completely from a case of tutin poisoning.

Reducing the Risk of Toxic Honey Production

In all areas where tutu and the vine hopper are abundant, beekeepers should take precautions to minimise the possibility of toxic honeydew honey being stored in the hive. (The distribution of the vine hopper is shown in fig. 4.)

Bees will forage up to 10 km from their hives, and toxic honeydew may be present in an area even if it is not obvious in the immediate vicinity of an apiary.

Tutu plants should be monitored for the presence of vine hoppers. Honeydew can be seen clearly on the leaves and stems of plants as a wet, sticky area, and where vine hopper numbers are high a black sooty mould can be found growing on the honeydew. Wasps also gather the honeydew, so their activity around the tutu plants can indicate a potential hazard.

Beekeepers in a risk area should take the following precautions to prevent the harvesting of toxic honeydew honey:

- Register all apiaries with MAF.
- Abide strictly by the permit conditions in restricted areas (see below).
- Take all surplus honey off the hives before 31 December each year.
- Do not put supers back on the hive for a winter honey flow until after 1 May.
- When taking surplus honey off in December, take most of the honey out of the brood nest too. Leave no more than three frames, so that the honey gathered during the danger period will be stored in the brood nest. In some areas, and in some years, hives may need feeding to survive the winter if there is no nectar flow after December.
- Never lift frames up from the brood boxes to the honey supers.
- Never eat honey taken from feral ("wild") bee colonies in the eastern Bay of Plenty, Coromandel Peninsula, Marlborough Sounds, or Northland.
- Do not remove and store surplus feed honey that is produced after 31 December. Several poisonings have resulted from unneeded feed honey being extracted later and eaten.

Restricted areas: If it is likely that honey produced in an area may contain a poison, that area can be declared a

"restricted area" by the Minister of Agriculture and Fisheries.

Two areas are currently gazetted as restricted beekeeping areas: the eastern Bay of Plenty and the Coromandel Peninsula (fig. 5).

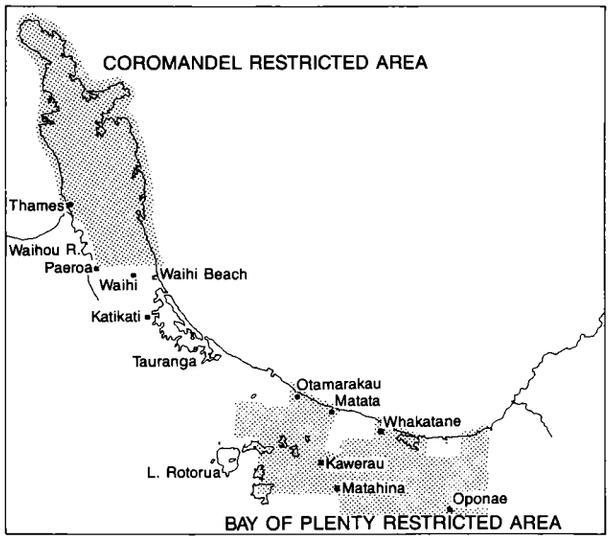

Fig. 5: Bay of Plenty and Coromandel restricted zones

A permit must be issued by MAF's Tauranga office before a beekeeper is allowed to keep bees in these areas. Permit conditions are different for the two restricted areas, and change from time to time, but in general they allow normal beekeeping operations during low risk periods, and specify management practices to be adopted.

MAF administers the Apiaries Act 1969 and thus enforces the permit conditions. Beekeepers who do not observe these conditions may be denied access to the restricted area, and have all surplus honey produced in these areas destroyed.

An Apiaries Advisory Committee has been established, comprising representatives of the beekeeping industry and MAF, to advise the Minister on toxic honey production in the restricted areas.

Anyone planning to keep bees in a restricted area should first consult MAF's Apicultural Advisory Officer in Tauranga to obtain full details of permit conditions and more precise descriptions of the restricted area boundaries.

Sale of toxic honey: It is the beekeeper's responsibility to ensure that toxic honey is not produced or sold. The sale of foods containing toxic substances is prohibited under the Food Act 1981 and the Food Regulations 1984, both of which are administered by the Department of Health.

History of Toxic Honey in New Zealand

Cases of honey poisoning were reported up to a century ago, with several deaths being recorded. Early beekeepers and scientists considered that a toxic nectar or pollen was the cause, and plants under suspicion included rangiora ***(Brachyglottis repanda)*** and buttercup ***(Ranunculus rivularis).***

Honey poisoning became more common during the 1920s, especially near Whakatane in the Bay of Plenty. The cause was still not known until after a serious outbreak in 1945, when the link between tutu, the vine hopper, and bees was firmly established.

A large area of the eastern Bay of Plenty was closed to beekeeping in 1948, and after several poisonings the Coromandel Peninsula was also declared a restricted area in 1974.

In recent years the concept of a "closed area", where no beekeeping is permitted, has been changed to that of a "restricted area", where some beekeeping is allowed subject to certain controls. These changes allow utilisation of the beekeeping resource in these areas, while still endeavouring to prevent the harvesting of toxic honey.

T.G. Bryant
MAF Apicultural Advisory Officer
Tauranga

A.G. Matheson
MAF Apicultural Advisory Officer
Nelson