

Agriculture, Fisheries and Biosecurity

Department of Industry, Tourism and Trade

Cucumber green mottle mosaic virus (CGMMV) and honey bees

THE
TERRITORY



VM18008: Understanding and managing the role
of honey bees in CGMMV epidemiology

In Australia, honey bees are regularly used to provide managed pollination services to broadacre watermelon cropping.

Epidemiology and management

Cucumber green mottle mosaic virus (CGMMV) is a plant disease of cucurbits (such as watermelon, cucumber and pumpkin). CGMMV can cause substantial crop losses. As a trade sensitive pest, there is a national plan for managing CGMMV in Australia to prevent spread and reduce impacts on currently affected regions to mitigate trade impacts.

CGMMV is most likely to be introduced into a crop through infected planting material (soil, seed or seedlings) and can be mechanically transmitted - by something as small as using secateurs to prune plants, or something as large as driving a tractor through a crop.

Cucurbit crops are almost 100% pollinator-dependent, requiring insect pollination for successful fruit set and production. Honey bees come into contact with CGMMV when collecting pollen and nectar through their regular foraging activities. Although live CGMMV has been identified in bee hives, there is no evidence that CGMMV affects the health of bee hives.

How do honey bees transmit CGMMV?

Honey bees are a vector for CGMMV when it is present in plants.

- Bees vector CGMMV in the field when pollinating both infected and healthy plants at the same time.
- Early detection and removal of CGMMV-positive plants is crucial to control or stop further spread of the virus via mechanical transmission, including by honey bees.
- The infection rate (percentage of healthy plants infected by pollinating bees) is likely to depend on the number of infected plants present at the site.

Honey bees recently exposed to CGMMV are capable of transmitting the virus to healthy plants if their hive is moved to a new site.

- CGMMV was detected in cucumbers and watermelons that had been visited by bees from CGMMV-positive hives. These hives were recently exposed to CGMMV-positive plants.

Cucumber green mottle mosaic virus (CGMMV) is a Tobamovirus.

This group of viruses is not commonly known to be insect transmitted.

- First detected in Australia in 2014.
- Now considered established in the Northern Territory and Western Australia, and under management in Queensland, South Australia and New South Wales.
- Causes leaf mottling and mosaic, yellowing and distortion.
- Affected fruit is unmarketable.



Honey bees are able to transmit CGMMV during pollination activities and cause infection in healthy plants.

When the hive had been away from CGMMV-positive plants for more than 24 hours, we did not detect CGMMV transmission to cucurbit plants. However, we were still able to detect CGMMV on bees from within the hive up to one month after the hive had been exposed to CGMMV-positive plants.

CGMMV in honey is detectable, but not viable, 12 months after the original exposure to CGMMV positive plants.

- We do not know exactly when CGMMV in bee hives becomes non-viable. At 6 months after exposure to CGMMV-positive plants, viable CGMMV can still be detected in honey. Removing this honey from the hive and physically rubbing it onto a cucurbit plant could infect the plant.
- To avoid human-assisted CGMMV transmission, do not conduct any bee hive maintenance, such as bee hive cleaning, splitting, honey and pollen extraction on cucurbit production sites.

CGMMV load in positive bee hives can be reduced by removing most of honey and pollen from the hives and placing them in an area without any CGMMV host plants.

- This can be an agricultural production site as long as the plants being grown are not CGMMV hosts. CGMMV non-hosts include sweetcorn, snake bean, okra, capsicum and peanuts.

How do I know if my hives have been exposed to CGMMV?

The most likely place for bee hives to come in contact with CGMMV is from bees visiting flowers of CGMMV-positive plants. In Australia, as well as being found in melons, zucchinis and other plants, it has also been found in several weedy cucurbit species and in several non-cucurbit species, including amaranth (*Amaranthus viridis*) and black nightshade (*Solanum nigrum*). Their importance in the disease cycle has not been fully determined.

If honey bees have been visiting CGMMV-positive plants it is very likely they will have picked up the virus and it will be detectable in the honey and pollen in the hives as well as on the bees themselves.



How do I know if hives contain CGMMV?

There will be no symptoms or indications that a bee hive contains CGMMV. CGMMV is a plant virus. In plants, it can cause leaf mottling and deformation, and soft fruit with rotten flesh. The only way to confirm if honey bee hives contain CGMMV is to test them in the laboratory using a series of molecular tests.

Management recommendations

Management practices for CGMMV require continuous implementation of biosecurity measures.

VISITORS

**PLEASE RESPECT
FARM BIOSECURITY**

Please phone or visit the office before entering

Do not enter property without prior approval
Vehicles, people and equipment can carry weed seeds,
pests and diseases

For growers

- Manage your farm biosecurity.
- Discuss the CGMMV status of your crop with your apiarist.
- Discuss the CGMMV status of any bee hives that you bring onto your property.
- Ensure hives used on your property have not been exposed to CGMMV within the past month.
- Ensure that hive materials (wax frames, honey) are not discarded in your cucurbit production areas.

For apiarists

- CGMMV is not known to affect bee health or hive strength.
- Manage your apiary's exposure to CGMMV by knowing the status of the cucurbit crops you service.
- If a hive has been exposed to CGMMV within the past month, the bees may be able to transfer CGMMV to other cucurbit plants when visiting flowers.
- If a hive has been exposed to CGMMV do not conduct hive maintenance on that hive in a cucurbit production area.



For more information, go to horticulture.com.au:

- Factsheet: Virus diseases of cucurbits in Australia (VG16086)
- VG15013 factsheets

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