INFORMATION SHEET VG15013 Improved Management options for Cucumber Green Mottle Mosaic Virus (CGMMV)

CGMMV AND EUROPEAN HONEY BEES: RESEARCH UPDATE -FEBRUARY 2018

Cucumber green mottle mosaic virus (CGMMV) is a plant disease which was exotic to Australia until September 2014.

There is strong evidence that honey bees can introduce CGMMV into clean cucurbit plants. Trials in Israel have shown that bees are able to transfer CGMMV from infected cucurbit plants to clean cucurbit plants in a shade house under specific conditions (Darzi et al 2017). Two honey bee field trials have been conducted in the Northern Territory and each time, CGMMV was found in the flowers but not the leaves thus suggesting an introduction by pollinators.

Hive products from the Northern Territory and Queensland have been tested for the presence and viability of CGMMV. All hive products (adult bees and brood, honey, pollen, empty cells, propolis) have been shown to contain CGMMV. Of those samples tested pollen, honey and adult bees have the highest prevalence of CGMMV. The viability of CGMMV in hive products has been tested. So far, viable virus (capable of causing infection in plants) has been isolated from pollen, honey and adult bees.

It is not known how long CGMMV remains viable inside bee hives. Viable samples of CGMMV have been collected from bee hives in the Northern Territory and Queensland in 2017, but we suspect that the source of this virus is a recent reintroduction rather than the virus persisting over years. Pollen samples from hive product testing have been reserved for future work to determine what plant species the CGMMV is coming from.

The Hort Innovation VG15013 project team is currently finalising a sampling protocol for the detection of CGMMV in bee hives. It is likely that this protocol will recommend taking small samples (e.g. three bees, three pollen cells) from multiple hives within an apiary.

We do not understand how bees move CGMMV around in the environment. The crucial question is, can honey bees move live virus out of their hive to infect clean plants? This would present a significant risk if managed pollinators are exposed to the virus and then moved between locations. We are pursuing opportunities to continue this work.

Darzi, E., Smith, E., Shargil, D., Lachman, O., Ganot, L., & Dombrovsky, A. (2018). The honeybee *Apis mellifera* contributes to *Cucumber green mottle mosaic virus* spread via pollination. **Plant Pathology** 67(1) 244-251.

For further information please contact:

Project leader: Dr. Lucy Tran-Nguyen Principal Molecular Scientist Department of Primary Industry and Resources E: lucy.tran-nguyen@nt.gov.au P: 08 8999 2235



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CGMMV AND BEE HIVES

Cucumber green mottle mosaic virus (CGMMV) is a plant disease that is found in cucurbits (e.g. watermelon, cucumber and pumpkin) and a number of common weed species.

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 we have no evidence that CGMMV affects the health of bee hives. There is some evidence that bees are able to move CGMMV infective material from CGMMV positive plants to healthy plants and thus transmit the virus.

GOOD APIARY MANAGEMENT

Apiary management requires vigilance of the health of hives. Good biosecurity practices to ensure hive health include; regularly checking brood production and appearance, honey production and worker bee behaviour and appearance. Other practices that maintain hive hygiene include:

- quarantining and isolating new entrants to the apiary. For bee diseases this is typically 4-6 weeks
- clean all equipment between hives or loads of hives. If possible, have separate equipment between loads
- store equipment and consumables on the apiary in such a fashion that bees cannot access it
- hive components should only be interchangeable within a load
- honey supers should be separated at the extraction plant and not interchangeable between loads
- the extraction plant and hive equipment should be cleaned between loads to ensure all wax and honey debris is removed. Typically this is done using hot water or steam cleaning.

VEGETABLE FUND

PRINCIPLES OF CGMMV MANAGEMENT

Successful apiary management practices minimise the introduction and possible spread of CGMMV within a beekeeping enterprise. Management practices aim to prevent or control the introduction of CGMMV into hives and increase the likelihood of being able to trace detections back to the source. A variety of management practises are used, and may involve separation of single hives, separation of loads of hives or even the separation of entire apiaries into distinct units.

The principles of apiary management are the same, no matter what type of management system you adopt. Principles of apiary management are:

- physical separation to prevent and minimise possible CGMMV spread, changing frames and spinning off honey immediately after a known exposure to CGMMV positive plants
- use of biosecurity practices to minimise the introduction of CGMMV e.g. not working crops known to be CGMMV positive and resting hives at 3-5km away from known CGMMV positive sites
- keeping concise and accurate records, to enable trace back to determine the source of a disease.

Specific management practices are context specific and can be developed to suit commercial or individual needs.



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INFORMATION SHEET FOR APIARIES AND BEEKEEPERS Management practices to minimise Cucumber Green Mottle Mosaic Virus (CGMMV) in European honey bee hives

MANAGEMENT PRACTICES

Management practices for CGMMV require the continuous implementation of biosecurity measures.



ENSURE:

- clear permanent marking and identification of hives (individually or in loads) and their components
- accurate and concise keeping of records for all apiary activities
- you have a clear understanding on the how management systems operate
- you understand how bees and hives are exposed to CGMMV
- a 3-5 km separation of possible CGMMV infected hives and CGMMV free hives
- hives that contain CGMMV are attended to last in the workflow, and that you use separate hive tools and bee keeping gear for these hives
- restrict movement of people, vehicles and animals to hives that you suspect contain CGMMV
- you do not neglect hives, or equipment associated with hives suspected to contain CGMMV. They may act as a reservoir
- the apiary and pollination sites are kept free from weeds that may act as reservoir hosts for CGMMV.

VISIT OUR WEBSITE FOR FURTHER INFORMATION

https://nt.gov.au/industry/agriculture/food-crops-plants-and-quarantine/cucumber-green-mottlemosaic-virus

https://dpir.nt.gov.au/primary-industry/primary-industry-strategies-projects-and-research/plantindustries-research

If you have any questions, please contact the Exotic Plant Pest Hotline on 1800 084 881.



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