

Vegetable leafminer under the microscope in far north Queensland

In May 2019, Cesar and AUSVEG travelled to Torres Strait and Cape York Peninsula to undertake research and extension activities focusing on control, eradication and preparedness for the vegetable leafminer. AUSVEG Biosecurity Officer Madeleine Quirk provides an overview of the surveillance activities undertaken so far, and emphasises the role that the Northern Australia Quarantine Strategy plays in the project and in biosecurity.

Research, Development and Extension program for control, eradication and preparedness for vegetable leafminer (2017-2020) (MT16004) is a strategic levy investment under the Hort Innovation Vegetable, Nursery and Melon Funds. It brings together Cesar, Plant Health Australia, the Department of Agriculture's Northern Australia Quarantine Strategy (NAQS), the University of Melbourne and AUSVEG to undertake activities to prepare for vegetable leafminer (*Liriomyza sativae*; VLM).

Since 2008, the VLM has been moving down the Torres Strait islands and in 2015, the pest was detected on Cape York Peninsula in northern Queensland. The project was developed in recognition of the impact that VLM could have on the vegetable, nursery and melon industries were it to move into production regions.

NAQS plays a key role within the VLM project by providing extensive knowledge, technical and practical advice and data resources to Cesar, the University of Melbourne and AUSVEG, as well as logistics assistance during our visits to Torres Strait and Cape York Peninsula.

NAQS combatting biosecurity threats in Australia's north

In support of the Department of Agriculture's broader objectives, NAQS conducts monitoring and surveillance for exotic plant and animal diseases across the north of Australia from Cairns to Broome, including Torres Strait.

The biosecurity strategy's key responsibility is to provide early detection of target exotic plant pests, diseases and weeds that may affect Australia's national plant and animal health status and trade in agricultural products and environmental amenity. In doing this work, NAQS delivers a range of services and operations, including:

- Onshore scientific surveys.
- Offshore scientific surveys under direction from the department's Plant Division.

- Community awareness activities on how to report evidence of exotic target species and comply with applicable biosecurity regulations.
- Engagement activities with Indigenous Ranger groups under contract to assist surveys, collect data, and perform trapping services under direction from NAQS scientists and Community Liaison Officers.
- Contribution of expertise to national policies, industry measures and research relating to plant health surveillance.

In addition to this work, specific activities in Torres Strait include performing biosecurity functions to manage risks in accordance with applicable biosecurity regulations and deliver surveillance and response measures under the Exotic Fruit Fly in Torres Strait Response Plan.

NAQS collaborates with horticulture industries in other parts of Australia by periodically having industry representatives participate in NAQS surveys, for example citrus canker; providing data to industry groups to assist their biosecurity preparedness and planning; and contributing expertise to research projects upon request and where they align with NAQS surveillance objectives.

Research up north supporting horticulture industries further south

Through MT16004, NAQS has been instrumental in working with Cesar and the University of Melbourne to develop survey guidelines and rapid genetic diagnostics for VLM, which will assist industry in preparation for this horticultural pest.

It is important to quickly detect VLM if it spreads to a new area. Our research team is measuring survey efforts for VLM in Torres Strait so that we can provide advice to growers about management strategies.

At the Frog Gully Community Garden on Thursday Island in 2018, NAQS staff were tasked with searching for real leafminer damage on garden plants, while Cesar

recorded how long before surveillance officers detected VLM damage, and what percent of damage they spotted.

Harold Matthew, one of NAQS' local biosecurity officers, was involved in the experiments in 2018 and 2019.

"The research team and I learned a lot from this project that occurred on Thursday Island," Mr Matthew said.

"It is a reminder to NAQS biosecurity officers of how to identify that particular leafminer, and how important our job is to be mindful when we carry out our daily operations."

The 2018 NAQS survey on Thursday Island validated the approach taken by Cesar last year in the Victorian vegetable production regions of Werribee and Tyabb, where growers surveyed for 'fake' VLM damage painted onto crops. Together, these trials allowed the research team to calculate the amount of time that must be spent per area to ensure a high chance of spotting low abundance leafminer damage in agricultural systems, forming part of the VLM survey guidelines that are being developed.

This year, Cesar returned to Thursday Island to test whether the guidelines developed from the 2018 trials would improve detection success. During an annual training activity, biosecurity staff from NAQS and rangers from the Torres Strait Regional Authority were divided in two groups, half surveying without instruction and half surveying according to the guideline, at the pace of approximately two metres per minute. While the data still requires analysis, preliminary results suggest survey success improved when participants followed our guidelines.

"The leafminer training received this year will assist in supporting the work we carry out in Torres Strait in our role in the frontline of biosecurity surveillance," Mr Matthew said.

"I encourage all NAQS staff to be able to identify and manage the process of doing these activities and contact the correct authorities if they find any leafminer activity."

In addition to this surveillance work, NAQS has been providing valuable support to Cesar in developing rapid diagnostic tests that will be able to determine whether suspicious damage was caused by VLM or by one of Australia's many native leafminers. Specifically, Cesar is developing a molecular test that will be capable of determining if VLM DNA is present in a seemingly empty leafmine.

Cesar ran an experiment in the Frog Gully Community Garden on Thursday Island in 2018, which looked at the persistence of DNA in 'empty' leafmines – or those mines from which a fly has already emerged, but has left behind traces of itself. The experiment required freshly vacated leafmines to be tagged and then left to age before collection. With Harold Matthew leading these leafmine collections after Cesar staff returned home, Cesar was able to determine that VLM DNA can be detected, even in empty leafmines that were one month old, with a success rate of approximately 75 per cent. This is exciting news for surveillance, as this test will make it possible to identify whether VLM is causing damage to a crop or if it is one of Australia's native leafminers.

Benefits for industry

The research undertaken in Torres Strait will significantly assist vegetable, nursery and melon growers in preparation for VLM as it will give them guidelines for surveillance and new options for diagnostics. The surveillance and DNA diagnostics work is forming the core of surveillance toolkits supporting industry, government, and gardeners, which are currently under development. They will bring together statistically-based recommendations for survey technique, guidelines for sample collection and minimum standards for data recording. These toolkits will be available to industry at the conclusion of the project in 2020, but you can view a draft of our VLM survey guide for growers at the AUSVEG webpage (ausveg.com.au/biosecurity-agricultural/biosecurity/mt16004/). We are very keen to hear your thoughts and feedback.

This project was made possible with support from the Australian Department of Agriculture, Torres Strait Regional Authority, Kaurareg Native Title Aboriginal Corporation, Torres Shire Council, myPathways, Apudthama Land Trust, Seisia Enterprises and NPA Regional Council.



Vegetable leafminer damage to siratro leaf on Thursday Island, QLD.

Find out more R&D

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This project has been funded by Hort Innovation using the vegetable, nursery and melon research and development levies and contributions from the Australian Government.

Project Number: MT16004

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