vegenotes 40

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IN THIS ISSUE:

- **Farm-wide fruit fly management systems for the east coast of Australia.**

HAL R&D project number: MT12050

Project MT12050 is testing a farm-wide system of bait application technology to control and manage fruit flies on the east coast of Australia.

- **Environmental effects of vegetable production on sensitive waterways.**

HAL R&D project number: VG09041

Project VG09041 is evaluating nutrient management practices in the vegetable industry and developing strategies to improve productivity while reducing environmental risk.

Farm-wide fruit fly management systems for the east coast of Australia.

Traps in cucurbit crop at Bundaberg.

Facilitators:

Milestone 102 of project MT12050 has recently been completed by project leader Stefano De Faveri from the Department of Agriculture, Fisheries and Forestry Queensland (DAFFQ), with the assistance of Lara Senior (DAFFQ) and Pat O'Farrell (DAFFQ).

Introduction

Fruit fly management in the field has conventionally relied on cheap and effective insecticide sprays. Following restrictions in the use of the chemicals dimethoate and fenthion, however, growers are experiencing problems with managing cucumber fly in cucurbits and some other vegetable crops. In response to the long-term threat to accessing such chemicals, growers are moving towards systems that guarantee residue-free fruit.

Further challenges facing growers include the ineffectiveness of cover sprays and their potential to disrupt biological control of other pests, such as whiteflies and aphids, and the absence of a commercially available lure for the cucumber fly to allow pest monitoring.

More recently, a lure developed overseas for a different species, the melon fly, has become available for research in Australia. Preliminary work has shown it to have potential for use with cucumber fly.

Fruit fly trap at field border.

About the project

This project (MT12050) will test a system incorporating the monitoring of male lures in traps, a male annihilation technique (MAT) to control male fruit flies, a protein bait spray program to control immature female fruit flies and a field hygiene program.

Project team member Lara Senior, from the Department of Agriculture, Fisheries and Forestry Queensland (DAFFQ), is handling the vegetable/cucumber component of this study.

"One common method for fruit fly is to use protein baiting for tree crops," Dr Senior said.

"Bait spraying involves combining an autolysed yeast protein with insecticide and applying it to the trunks and foliage of trees. It's used to control Queensland fruit fly (Q fly) but unfortunately, has not proven effective in vegetable crops."

"In the perimeter baiting system (developed for control of melon fly in Hawaii), sorghum or other vegetation is planted around the perimeter of the crop and a bait spray is applied to the sorghum. Fruit flies roosting in the sorghum overnight feed on the protein bait and receive a lethal dose of insecticide."

Dr Senior said she aimed to evaluate whether a similar technique could be suitable for control of cucumber fly in vegetable crops in Australia.

"It's not possible to carry out field evaluations of the system within one year, so the project will only evaluate components of the system," she said.

A number of potential plants were evaluated for their attractiveness to cucumber fly and follow-on trials evaluated the optimum height to place protein baits.

Other research components include behavioural observations (scheduled for early January 2014), field trapping (currently underway in commercial cucurbit crops in the Bundaberg and Lockyer Valley regions), laboratory trials evaluating commercially available fruit fly protein baits for attractiveness to cucumber fly (January 2014) and trap efficacy trials.

Preliminary findings and conclusions

Based on the vegetable farm-wide management research completed to date, plants suitable for use in a perimeter baiting system for cucumber fly have been identified as forage sorghum and sweet corn. These plants are quick-growing and according to Ms Senior, could easily be grown as a border around a cucurbit crop.

"Forage sorghum was also an attractive roosting site for Q fly, although sugar cane and cassava were preferred by this species," Ms Senior said.

"Plants such as forage sorghum, which are attractive to both species, could be grown around tomato blocks, which are susceptible to both the cucumber fly and Q fly."

Ms Senior recommended that in order for Australian growers to target cucumber fly, bait spray should be applied no higher than 1.5m above-ground. In the case of Q fly, bait sprays should be applied at 2m and above.

"By the end of the project we should have information on the most effective protein bait for use in a perimeter baiting system, as well as some preliminary results on the behaviour of cucumber flies in relation to the border vegetation and the host crop," she said.

Findings on the seasonal activity of cucumber flies and the efficacy of a new lure for trapping cucumber fly, enabling effective monitoring, are also being sought.

"Further trial work would be required to take this to the next step, utilising the information gained during this project to develop a perimeter baiting system for cucumber fly," Ms Senior said.

THE BOTTOM LINE: MT12050

- Following restrictions in the use of dimethoate and fenthion, vegetable growers are experiencing problems with managing cucumber fly in cucurbits and other crops.
- Perimeter baiting has been developed for control of melon fly in Hawaii, with positive results.
- Based on a literature search, forage sorghum and sweet corn are suitable for use in a perimeter baiting system for cucumber fly but further trial work is required to fully develop this system.

Acknowledgements

Project MT12050 is co-funded by Horticulture Australia Limited and the Queensland Government.

Environmental effects of vegetable production on sensitive waterways.

Facilitators:

Milestone 107 of project VG09041 has been completed by project leader Stephen Harper from the Department of Agriculture, Fisheries and Forestry Queensland (DAFFQ).

Introduction

While a majority of vegetable growers adjacent to sensitive waterways are environmentally aware and undertake best practice fertiliser management, it is important that all growers are able to demonstrate their contribution to the maintenance of good water quality.

In 2009, the Vegetable Industry Advisory Committee (IAC) identified sensitive waterway management as a key priority for industry research and development (R&D). A workshop was held in November 2009 with three separate research groups to establish a consortium approach to the investigation.

The group determined that the new project would focus on making vegetable growers more aware about sensitive waterway management, and encourage them to work with other stakeholders, such as regional natural resource management (NRM) bodies and water agencies, to improve sensitive waterway management.

About the project

The project has completed a series of case studies in the Lockyer Valley evaluating nitrogen management, including replicated research station trials that have developed knowledge supporting better nitrogen management.

In Bowen, the project has evaluated soil, water and nutrient dynamics with the use of FullStop™ Wetting Front Detector and nutrient and irrigation monitoring equipment. This has resulted in involved growers implementing improved irrigation and nutrient use efficiency.

Finally, field work in the area of Watsons Creek, Victoria, has been conducted to determine the impact of local vegetable growing on nitrogen (N), phosphorus (P) and potassium (K) concentrations in sensitive waterways. Watsons Creek flows into an environmentally sensitive area that is home to a number of endangered migratory birds.

Preliminary findings and conclusions

The second season of field trials at both Gatton and Bowen Research Stations has recently been completed. Throughout 2012, trials at Gatton evaluated brassica yields under higher N rates, the efficacy of different fertiliser formulations on crop growth in lettuce and broccoli, the effect of multiple split rate treatments on fertiliser use efficiency in lettuce and broccoli, and the effect of N rate of application on crop growth rate and time to maturity in cauliflower and cabbage.

Trials at grower properties in the Lockyer Valley have evaluated nutrient dynamics in cauliflower, lettuce, cabbage and pumpkin.

The case studies have demonstrated that vegetable farmers in the Lockyer Valley region essentially operate neutral budgets for nitrogen, whereby nutrient application matches removal and nitrogen losses through leaching are minimal.

In addressing under-application of nitrogen to brassica crops,

replicated trials have shown the potential to increase broccoli plant density combined with higher nitrogen application to increase crop yields.

In addition, nitrous oxide (N_2O) emissions from various vegetable crop residues, including cabbage, were sampled by a PhD student at the Gatton Research Station. Data has demonstrated that the emissions factor for vegetables is relatively low, with overall N_2O emissions lower than 15g of nitrogen per hectare per day.

The field work in Watsons Creek has been completed and a Good Agricultural Practices (GAP) guide for growing in sensitive waterways has been produced, titled *Clean streams, sustainable vegetable farms*. This was presented to both industry members in Bowen and Victorian vegetable growers. A draft publication titled *Living with Sensitive Waterways - A guide to working with the Community* has also been produced. A further two recommendation fact sheets, *Fertiliser use efficiency - Matching fertiliser inputs to vegetable crop removal* and *Optimising nitrogen fertiliser use efficiency in vegetables* have been produced. Workshops with leafy vegetable growers in East Gippsland have been held to review and discuss the results of the investigation in Watsons Creek.

The project team has spent much of 2013 processing soil and plant samples, and collating and analysing collected data for inclusion with the project's final report. The final report for VG12041 is due in January 2014.

THE BOTTOM LINE: VG12041

- Vegetable farmers in the Lockyer Valley region operate effectively neutral budgets for nitrogen.
- Trials have shown the potential to increase broccoli plant density combined with higher nitrogen application to increase crop yields.
- Research has demonstrated the need for a GAP guide for growing in sensitive waterways, which has been produced for vegetable growers.

Acknowledgements

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Photo credits:
MT12050: Stefano De Faveri, Lara Senior (DAFFQ).

Please contact Jamie Racicos at AUSVEG on (03) 9882 0277 or email jamie.racicos@ausveg.com.au to submit topics for potential inclusion in future editions of **vege**notes*.*

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