Milestone Report

Project title:

Integrated Pest Management of Nematodes in Sweetpotatoes

Project code:

PW17001

Milestone number:

102

Project leader:

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Delivery partner:

DAF

Report author:

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Milestone due date:

28th of February, 2019

Submission date:

27th of February, 2019

Confidentiality:

Is this report confidential?

☒ No

☐ Yes (whole report)

☐ Yes (sections of report are confidential)

If sections of the report are confidential, list them here:

Milestone description:

Project plans in place. Program logic with linkage to Hort Innovation and industry objectives. PRG formed.

Milestone achievement criteria:

Program logic with linkage to Hort Innovation and industry objectives.
Monitoring and evaluation plan.
Project risk register and how risk will be managed.
Stakeholder engagement plan.
Project Reference Group formed in consultation with Hort Innovation and Terms of Reference developed.
First meeting held and minutes provided.

Funding statement:

Levy and co-investment funding – R&D projects

This project has been funded by Hort Innovation, using the Hort Innovation sweetpotato research and development levy, co-investment from the Department of Agriculture and Fisheries, Queensland and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

General project overview

Nematodes are an important pest of sweetpotatoes. This project aims to extend existing knowledge and develop new knowledge specific to sweetpotato farming systems on soil health and nematode management. Surveys will be conducted across production areas to identify nematode species present and a range of management options such as volunteer and host weed control, suitable summer and winter cover/rotation crops, low / minimum till, long term beds and nematicide efficacy will be investigated.

Summary

Nematodes are important pests of this crop. Current estimates suggest they cost the Australian industry $20 M per year (ASPG pers. com.). Root-knot nematodes (RKN) are widely distributed throughout the sweetpotato-growing areas of Queensland and northern NSW. They multiply readily in sandy soils and are suited to the volcanic soils around Bundaberg and Cudgen. The feeding activities of these nematodes causes stunting, general un-thriftiness and yield loss.

This project aims to both extend existing knowledge and develop new knowledge on soil health and nematode management. To date there has been minimal research on nematode species and their management in sweetpotato farming systems. This project will focus on a number of themes to gain a better understanding of the nematode issues associated with sweetpotato.

Initially masterclasses will be held to ensure growers have the most up to date information on soil health and nematode control options. At the projects conclusion further classes will be conducted incorporating new knowledge gained throughout the project. Field surveys to understand region specific nematode species occurrences and identify any potential biosecurity issues will be undertaken throughout the major cropping regions. Currently SARDI is developing a soil health PreDicta test for other crops. This project will ensure that sweetpotato specific pests and beneficial are included in test development.

Agronomic aspects such as cover crops suitable for sweetpotato farming systems, management of difficult to kill volunteers and weeds and organic amendments will also be studied. As nematicides are the current control method available to growers, new technologies will be evaluated against existing chemicals to ensure only improved efficiencies are promoted. Long-term farming system trials will run throughout the life of the project to assess a range of tillage options, soil amendments, cover crops and mulches to improve biological soil health and provide long-term sustainable nematode management.

Project results will be communicated to farmers and researchers through fact sheets, masterclasses, field days and magazine articles. By project end, it is expected that at least 80% of all sweetpotato growers will have increased knowledge in soil health management and a variety of nematode control options.

Achievements

Agreement between Horticulture Innovation and DAF signed.

Subcontract with Biological crop protection signed.

Please refer to (Attachment 1) for the following plans.

- Program logic with linkage to Hort Innovation and industry objectives.
- Monitoring and evaluation plan.
- Project risk register and how risk will be managed.
- Stakeholder engagement plan.

Project Reference Group

An initial project meeting was held on the 20-9-18 in Bundaberg to elect the project reference group (PRG). This meeting was attended by project team representatives and members of Australian Sweetpotato Growers Association, research and development committee. Terms of reference for the PRG are included (appendix 1). Minutes from this meeting are provided (Attachment 2).

Summary of actions and passed motions.

1) Reference Group has been nominated and motion passed:

   Reference Group members
   Eric Coleman (Chair)
   Matthew Prichard (quick response)
   Darren Zunker
   Rod Wolf
   Russ McCrystal (quick response)
   Steve Paddon

2) Motion passed to amend Terms of Reference document to include the requirement to meet face to face at least once per year.
3) Graham to standardise nematode lab techniques to ensure consistency
4) Potentially come up with a catchy project name and/or logo to unite all the groups to a common focus
5) Individual deliverables clarity -
   - Brenda (HIA) has requested clarity outlining who is doing what.
   - Subcontracts with the correct wording so that people know what they are doing and have to deliver.
   - Part of first milestone – Monitoring and evaluation requirement. Sandra and Brenda to have a conversation about Program Logic Framework.
6) 3 masterclasses to be held in Bundaberg rather than 2, based on ability to get enough attendees
7) 1st Masterclass date: 4th March 2019
8) Plant tomatoes and sweet potatoes to breed up nematodes in Oct/Nov and run for 2 to 3 months. Possibly just grow tomatoes to breed up the nematodes and then add sweet potato pieces at the end for volunteers
9) Rach to have more of a dig on site history

Outputs

- Contract signed
- Subcontract with Biological crop protection signed
- Program logic with linkage to Hort Innovation and industry objectives completed.
- Monitoring and evaluation plan initialised.
- Project risk register and risk management compiled.
- Stakeholder engagement plan in place.
- The PRG has been formed and the first meeting conducted.

Outcomes

The project has monitoring and evaluation plans in place to assist in tracking project progress. Risk register and Stakeholder engagement plans will guide the project team in managing risks and engaging with stakeholders. The project has a PRG in place to check project progress and provide technical advice.

Issues and risks

There are no apparent major issues or risks at this time. Management procedures for lesser risks are attached (Attachment 1).

Other information

Below is a brief summary of additional activities conducted to date additional to milestone 102 requirements. These will be reported in detail as part of future milestone reports when results have been collated.

Contracts

The contract with Hort Innovation has now been signed by the DAF minister, as has the subcontract with Biological crop protection. Subcontracts for CQU and USQ are with the respective universities for approval. Dr. Graham Stirling has decided to retire from the project at the end of March 2019. To fill this gap we will be receiving assistance from Dr. Tony Pattison (soil health expert) and Dr. Steve Harper (vegetable soil nutrition specialist) to provide project expert advice, assist with developing recommendations and work with the project team to develop/validate additional experimental approaches.

Surveys

Approximately seventy survey samples have been received at ESP since project commencement, as well as a smaller number of diagnostic samples. Plant-parasitic nematodes were extracted, identified and quantified from all samples and results standardised per 200 grams of dry weight equivalent soil. Initial results show that root-knot nematode (*primarily Meloidogyne incognita* and *M. javanica*) is widespread in the industry and reniform nematode appears to be extending its geographical range, with a detection in the Lockyer valley believed to be the most southerly recording of this species in Australia to date. SARDI have run the first 45 survey samples. A report by Grahame Stirling, Jenny Cobon and Wayne O'Neill has been sent to SARDI for editing. Collected samples have been tested for CO_2 respiration at GRF and sent to The Environmental Analysis Laboratory, Southern Cross University, Lismore for carbon analysis.

Pathogenicity

The pathogenicity of these species and other plant parasites detected in the survey will be determined on a range of cultivars later in the project. An initial glasshouse study indicated that Australian *M. javanica* is able to complete its lifecycle on sweetpotato, despite reports to the contrary for this species in the USA. This will be further investigated throughout the project.

Capacity building

A nematology capacity building exercise for project staff was held at ESP as well as a seminar day for visiting nematologists from Louisiana State University, Prof. Charles Overstreet and Prof. Ed McGawley, who both have extensive experience with reniform and root-knot nematode.

The sweetpotato team attended training workshops held at Biological crop protection and DAF Ecoscineces precinct (ESP) laboratories during September and October, 2018.

Host range experiments

Replicated bioassays have commenced to provide initial information on germination, growth habit and nematode host status of a range of Brassica (GRF) and legume (BRF) crops.

Long term farming systems trial

The long term farming systems trial has been established at Bundaberg research facility. 1018 tomato seedlings were propagated at Gatton Research facility (GRF) and inoculated with RKN species, *M.incognita* and *M. javanica* by the ESP nematology team. These were planted at the trial site in November 2018. PT Sweetpotato vine (Beauregard was also planted within the trial plot to build up nematode numbers. These were donated by Russell McCrystal of McCrystal Ag.

Nematode trapping fungi and microarthropods

Pure cultures of nematode trapping fungi (NTF) isolated from the Cudgen trial site are being maintained at GRF. Microarthropods have been extracted from soil samples using the Tullgren funnel method, with results being collated at Gatton.

Initial Masterclasses

The Sweetpotato soil health Masterclass workbook has been completed (attachment 3). Masterclasses will be held in Cudgen on the 4th of March, 2019, in Bundaberg on the 6th and 7th of March and in Atherton (Kairi) on the 14th of

Appendices

1. Terms of reference for the project reference group.

Terms of Reference for the Project Reference Group – PRG (Grower Advisory Group)

Project: ***PW17001*** *Integrated pest management of sweetpotatoes*

Background

ProjecPW17001, '*Integrated pest management of sweetpotatoes'* aims to both extend existing knowledge and develop new knowledge on soil health and nematode management specific to sweetpotatoes.

The project focuses on 6 main areas:

1. Extension of existing knowledge through masterclasses
2. Regional surveys and detection methods
3. Cover crops
4. Control of weeds and volunteers
5. Nematicide and fumigant trials
6. Integrated nematode management and soil health

The Project will seek advice from a Project Reference Group Reference Group (PRG) to ensure that the Project aligns with stakeholder capacity and need, and that the Project team work effectively and efficiently.

The PRG will provide:

- Tactical direction, oversight and support to ensure that the project meets its objectives.
- Advice to ensure that the interests and needs of key stakeholders associated with sweetpotato are addressed and that the project teams work effectively and efficiently.
- Insight into where the project can build on and add value to complementary activities on farming systems for healthy soils for nematode control.

The PRG will comprise the following

- Sweetpotato farmers
- Hort Innovation Representative (ex officio)

Meeting arrangements and logistics

- PRG meetings will be held three times per year, with a face to face meeting at least once per year. These will run in conjunction with field days and industry events where possible.
- Please note that funding (travel and accommodation) to participate in meetings is available upon request, but no sitting fee will be provided.
- Teleconferencing is an option for those unable to attend in person.
- The Chair will ensure that:
- an agenda is circulated to PRG members at least 7 days in advance
- minutes/action items are kept and promptly circulated to PRG members
- Conversations within the PRG are not considered confidential unless specified.
- The minutes and outputs will be circulated to Project members and submitted as part of the milestone reports to Hort Innovation. Minutes will be available to other interested parties upon request, except in exceptional circumstances.
- Representatives of the other organisations may be invited to attend meetings or parts thereof as deemed appropriate by members of the PRG.

Attachments

1. Program logic, M&E plan, risk assessment and stakeholder engagement plan (attachment 1).
2. Minutes of sweetpotato nematode IPM meeting and formation of the PRG, September 2018.
3. Sweetpotato soil health masterclass workbook.