Milestone Report

Project title:

Integrated Pest Management of Nematodes in Sweetpotatoes

Project code:

PW17001

Milestone number:

104

Project leader:

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Milestone due date:

27th of February, 2020

Submission date:

27th of February. 2020

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:

Trials commenced
Nematicide trials planned
Herbicide evaluation planned

Milestone achievement criteria:

Long term farming systems trial established
Grower trials established
Cover crop pot trials commenced
Herbicide review commenced
Nematicide trial plans in place
Pathogenicity trial plans in place
Project reference group 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.

Abbreviations

ASPG	Australian Sweetpotato Growers Inc.
RKN	Root-knot Nematode
RL	Root lesion nematode
PRG	Project Reference Group
DAF	Department of Agriculture and Fisheries
USQ	University of Southern Queensland
CQU	Central Queensland University
ESP	Ecosciences Precinct
GRF	Gatton Research Facility
BRF	Bundaberg Research Facility
WRF	Walkamin Research Facility
PT	Pathogen Tested
NTF	Nematode Trapping Fungi
DES	Queensland Department of Environment and Science
SARDI	South Australian Research and Development Institute

General project overview

Nematodes are important pests of sweetpotatoes, with current estimates suggesting they cost the Australian industry $20 M per year (ASPG pers. com.). 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

This project has to date been consistently tracking in line with milestone requirements. The long term farming systems trial is now well established in Bundaberg. Many activities multiple pathogenicity and host range trials are tracking ahead of required timeframes. During the milestone 104 period some activities such as intensive sampling and on farm trials had to be delayed due to drought conditions and lack of available water. These activities can now commence after recent rainfall was received in most growing regions. Some activities such as herbicide fact sheets, microarthropod monitoring, and intensive soil assessments through the Department of environment and science are additional activities to milestone requirements.

Sampling in the long term farming systems trial showed the 16 plots that had received organic amendments prior to early bed formation had greatly reduced numbers of root-knot nematode. These plots also had greatly increased free-living nematode numbers, compared with the 24 plots which had no amendment added at that stage.

The second round of amendments were added to the long term farming systems trial in early January and comprised a range of banded treatments such as compost, organic matter (poultry manure + sawdust 40/60 blend), compost in a v-furrow and organic matter in a v-furrow. Rates for amendments were based on those used in previous field trials successful in suppressing plant-parasitic nematodes, but also based on cost and local availability. It is hypothesised that newly developed roots will potentially be protected from nematode attack due to increased suppressive activity in this zone enriched with organic matter. Nematicides were applied at label rates to the appropriate plots in the intensive (Nimitz) and extensive (Vydate) trials. Biological soil monitoring showed that the *Brassica* cover crop both amended and non-amended produced the highest numbers of microarthropods and plots planted to legumes produced the lowest number. The first commercial crop has now been planted. It is envisaged that this will be harvested in June.

Host range experiments on thirteen *Brassica* spp. inoculated with 2 species of root-knot nematodes (*Meloidogyne incognita* and *Meloidogyne javanica*) confirmed that Black Jack is highly resistant to *M. incognita* and Terranova is resistant, while all other cultivars tested were susceptible to both RKN species. Seven *Sorghum* spp. were also inoculated with two species of root-knot nematodes (*M. incognita* and *M. javanica*). Results showed that Jumbo sorghum is highly resistant and sweet jumbo sorghum LPA is resistant to both RKN species. BMR Rocket and Scavenger are resistant to *M. javanica* only. All other cultivars tested were susceptible to both RKN species. Counting of nematodes for a mixed species experiment was inoculated with two species of root-knot nematodes (*M. incognita* and *M. javanica*) is underway.

Gold and red varieties of sweetpotato were also inoculated with two species of RKN (*M. incognita* and *M. javanica*) to determine the host status. This experiment is due to be harvested in mid-March 2020. A future experiment will incorporate purple fleshed and new varieties.

Based on grower feedback, a herbicide trial will be conducted in March 2020 to investigate the efficacy

of chemicals registered for control of Ipomoea species and plant back effects of herbicides routinely used in sweetpotato production for weed control and those used to spray off cover crops. A draft herbicide factsheet has been developed, with another herbicide factsheet considering environmental effects on herbicides, is planned.

Soil analysis on initial survey samples did not show any correlation between low numbers of nematodes and high clay content in the set of samples analysed to date. Particle size analysis indicates that there is a wide range of soil properties that support sweetpotato production. Correlation between grower practice and levels of total organic carbon (TOC) and other soil properties will be statistically analysed when the analyses are complete.

Intensive surveys can recommence after recent rainfall events in Queensland and Northern New South Wales. Plans are underway for on farm nematicide and cover crop trials pending discussions with PRG, availability of new chemicals and pot trial results. A project reference group (PRG) meeting was held on the 21st of August 2019. It is envisaged that the next meeting will take place in autumn 2020.

Achievements

Long term farming systems trial established
Grower trials established
Cover crop pot trials commenced
Herbicide review commenced
Nematicide trial plans in place
Pathogenicity trial plans in place
Project reference group meeting held and minutes provided.

Long term farming systems trial

A long-term farming systems trial was established in November 2018 at the Bundaberg Research Facility. The aim of the trial is to investigate if it is possible to grow sweetpotatoes in a manner that uses integrated management to minimise losses to plant-parasitic nematodes and improve biological soil health. Practices that will be included during the course of the trial include rotation crops, reduced tillage, traffic control and organic amendments. Various combinations of these practices will be trialed with regular monitoring of nematode populations, other soil/biological characteristics as well as yield data.

The trial block is subdivided into two trials:

1. **Extensive Trial**
    - Three Sweetpotato crops in 5 years with longer rotation breaks
    - 40 plots (10 treatments X 4 reps)
    - Combinations of organic amendments vs Vydate vs no amendment
    - Early bed formation (soon after harvest)
    - Amendments incorporated at early bed formation (in a band), in a furrow prior to planting, or both
    - Rotations sprayed out or cut/mulched

2. **Intensive Trial**
    - Four Sweetpotato crops in 5 years with shorter rotation breaks
    - 25 plots (5 treatments X 5 reps)
    - Combinations of organic amendments vs Nimitz vs no amendment
    - Organic matter/compost incorporated at bed formation or in a furrow prior to planting
    - Rotations also incorporated at bed formation

Following on from milestone 103, soil samples for nematode analysis were taken in August 2019, while the white French millet rotation was still standing. Results from the extensive trial (Table 1) showed that the 16 plots that had received organic amendments prior to early bed formation had greatly reduced numbers of root-knot nematode and greatly increased free-living nematode numbers, compared with the 24 plots which had no amendment added at that stage.

Table 1 Root-knot nematode numbers

Plots	Root-knot nematode	Total free-living nematodes
Amended (n=16)	6	10490
Unamended (n=24)	104	2250

Mean numbers of root-knot and free-living nematodes per 200g of soil in amended and unamended plots of extensive trial August 2019.

Following the millet rotation, plots were sown to Jumbo sorghum (intensive trial), A6785 soybean (half of the Extensive trial plots trial plots) or Nemsol (the other half of the extensive trial).

After the rotations were sprayed out, soil was sampled from both field trials on January 14th 2020 for nematode, chemical, molecular and soil health analyses. Organic amendments were applied to the intensive trial on the 14th and to the extensive trial on the 15th. Details of the amendments applied are as follows:

Intensive trial

- Compost in a band prior to incorporation (@56 kg/row), placed into 5 rows.
- Organic matter in a band prior to incorporation (poultry manure + sawdust 40/60 blend @ 56 kg/row), placed into 5 rows.
- Compost in a v-furrow (@76 L/row = 42.5 kg/row), 5 rows

Extensive trial

- Organic matter in a v-furrow (poultry manure + sawdust 40/60 blend @76 L/row = 28.65 kg/row), was placed into 16 rows.

Rates for banded amendments were based on those used in previous field trials that were successful in suppressing plant-parasitic nematodes; 56 kg/row on top of the bed is equivalent to 50 t/ha.

Amendments were added to v-furrows in the centre of each bed at a rate of 76 litres/row (approx. 5.5 L/m). It is hypothesised that newly developed roots will potentially be protected from nematode attack due to increased suppressive activity in this zone enriched with organic matter. Plots that were not hilled up from prior amendments application in May 2019, were then hilled up. Thanks to Windhum farms for supplying both machinery and an operator to create the remaining hills.

Nematicides were applied at label rates to the appropriate plots in the intensive (Nimitz) and extensive (Vydate) trials. Nematode counts from the latest sampling are being completed at the time of writing.

Fig 1: Left to right, cover crop sprayed off and construction of a V-furrow, extensive trial. V-furrow compost treatment, intensive trial.

Fig 2: Left to right, apply amendments to plots in extensive and intensive trials.

Fig 3: Left to right, irrigation installed in both trial blocks, cultivar Beauregard, 8 weeks after planting.

Both the intensive and extensive trial blocks were planted with standardised hi spec vine tip cuttings of cultivar Beauregard on the 20th of November. Thanks to McCrystal Agricultural Services for supplying the planting material. A soil test taken on the 7th of January prior to the second round of amendment application was sent for analysis. Based on the results, a maintenance schedule was developed for the trial blocks in conjunction with the PRG. Discussions resulted in the decision to not apply any soil insect chemicals as per current grower practice, so as not to interfere with biological soil populations at this stage.

A spray schedule was developed to deliver calculated amounts of fertilizer, pest control (foliar sprays only) and grass control. Plots will be hand weeded until canopy is a full coverage. DAF designed weevil traps containing pheromone for sweetpotato weevil (*Cylas formicarius*) were installed at each corner of the block. Thanks to Prichard farms for performing scuffling operations.

Biological soil monitoring - developing methodologies

One method to monitor the influence that soil amendments and farming practices have on the overall status of soil health, is to monitor microarthropod populations. Microarthropods can be extracted from soil using the Tullgren funnel method.

A Tullgren funnel apparatus was constructed at Gatton Research Facility in late 2019. As this was a new procedure for the project team, an initial test run was performed to establish methodologies for subsequent sampling and processing.

Soil samples were collected from the long term trial site in Bundaberg on 14th January 2020, (both intensive and extensive blocks) prior to the second round of treatments. The treatments from the extensive trial were grouped firstly by cover crop type – brassica or legume. These were further categorised by amendment status; amended (organic matter added) or non-amended (no organic matter added). The intensive samples were pooled, as all plots were unamended at the time of soil collection. Samples (100g of soil) were processed through the new Tullgren funnel and microarthropods were successfully extracted.

Results (Table 2) show that the *Brassica* cover crop both amended and non-amended produced the highest numbers of microarthropods and plots planted to legumes produced the lowest number. This test run has allowed researchers to gain an understanding of the Tullgren Funnel method and will allow for more thorough subsequent sampling from future project activities.

Table 2 Microarthropod numbers – Tullgren funnel extraction method

Trial	Cover crop	Treatment	Average number of Microarthropods
Extensive	*Brassica*	Amended	133
Extensive	*Brassica*	Unamended	69
Extensive	Legume	Amended	18
Extensive	Legume	Unamended	29
Extensive	Sorghum	Unamended	36

Soil samples have been collected at each critical step of the long term faming systems trial. These are being held at -20 degrees awaiting metagenomic analysis.

Grower trials

Grower cover crop trials were delayed due to drought conditions and as the number of nematode resistant available cover crops is quite low, trials were dependent on pending results from host range pot trials. Demonstration sites are planned for winter and spring 2020.

Cover crop pot trials

Host range experiments – root-knot nematode

Resistance to plant-parasitic nematodes is determined by the capacity of the nematode to multiply on a plant, with high multiplication rates indicating susceptibility and low multiplication rates indicating

resistance (Table 3). Levels of resistance or susceptibility were determined by inoculating plants with a known number of nematode eggs (initial population density Pi), measuring final population density (Pf) and then making the following calculation: Reproduction Factor (RF) = Pf/Pi.

Since not all eggs in inoculum are capable of hatching and invading roots, a conservative figure of 1/10 of the Pf was used as Pi, i.e. 1,000 for both *M. incognita* and *M. javanica.*

Table 3 Resistance categories

	Resistance Rating
> 100	Highly Susceptible (HS)
10 - 100	Moderately Susceptible (MS)
1 - < 10	Slightly Susceptible (SS)
0.1 - < 1	Resistant (R)
< 0.1	Highly Resistant (HR)

Cultivars of *Brassica* spp. (Biofum, Black Jack, BQ mulch, Caliente, Cappucchino, FungiSol, Mustclean, Nemasol, Nemat, Nemclear, Nemcon, Terranova and Tillage Radish) were inoculated with 2 species of root-knot nematodes (*Meloidogyne incognita* and *M. javanica*) to determine the host status of these cultivars. This second experiment with Brassica that included more cultivars confirmed that Black Jack is highly resistant (HR) to *M. incognita* and Terranova is resistant (R) to *M. incognita* while all other cultivars tested were susceptible to both *M. incognita* and *M. javanica.*

Cultivars of *Sorghum* spp. (BMR Octane, BMR Rocket, Jumbo, Scavenger, Sprint, Sugargraze, and Sweet Jumbo LPA) were inoculated with two species of root-knot nematodes (*Meloidogyne incognita* and *M. javanica*). Jumbo sorghum is highly resistant (HR) to both *M. incognita* and *M. javanica* and sweet jumbo sorghum LPA is resistant (R) to both *M. incognita* and *M. javanica*. BMR Rocket and Scavenger are resistant (R) to *M. javanica* only. All other cultivars tested were susceptible to both *M. incognita* and *M. javanica.*

A mixed species experiment (sabi grass, signal grass, annual ryegrass, buckwheat, Culgoa11 oats, ryecorn, triticale, and sunnhemp) was inoculated with two species of root-knot nematodes (*Meloidogyne incognita* and *M. javanica*) and has just been harvested with counting of nematodes underway.

Pathogenicity trials

The project experienced two failed attempts to establish host-range experiments at Gatton Research Facility due to extreme temperatures late in 2019 and equipment failure (sub-standard glasshouse facilities). Therefore, varieties of sweetpotato (Beauregard, Bellevue, Orleans, Northern Star, Southern Star and Murasaki) bulked in the Gatton tunnel house were later established at ESP glasshouses in Brisbane. The experiment was inoculated with two species of root-knot nematodes (*Meloidogyne incognita* and *M. javanica*) to determine the host status of these cultivars. This experiment is due to be harvested in mid-March 2020.

Herbicide review

A working herbicide review was attached to milestone 103. Based on grower feedback, trials to investigate the efficacy of chemicals registered for control of Ipomoea species are planned to commence in March 2020 when planting material will be available. Plant back effects of herbicides routinely used in sweetpotato production for weed control and those used to spray off cover crops will also be investigated. This trial will be conducted at Walkamin Research Facility and will incorporate chemicals from 3 herbicide groups including post-emergent and pre-emergent herbicides.

A draft herbicide factsheet has been developed, titled ‘Herbicides – what are they?’ describing herbicide formulations and how they are categorised. This will be distributed to growers at the next

industry event. Another herbicide factsheet considering environmental effects on herbicides, is planned for later in 2020.

Nematicide trial plans

The project team has developed initial nematicide trial design discussions. Initial surveys have identified blocks with high nematode numbers suitable for trials. Negotiations are in place to incorporate new nematicides. Results from efficacy trials in the USA will be presented in Bundaberg and Cudgen in late March, followed by more detailed plan discussions during the next PRG meeting.

Project reference group meeting held and minutes provided.

A project reference group meeting was held on the 21st of August 2019 via phone link. Minutes were emailed previously. The next meeting will take place in autumn 2020.

Outputs

- Subcontract with ASPG signed
- PRG meeting held
- Draft fact sheet 'Herbicides – what are they?' to be distributed at next grower event.
- Report on host range experiment (RKN ratings for 13 Brassica cultivars and seven sorghum).
- Pathogenicity trials underway

Outcomes

- First commercial crop planted in long term farming systems trial
- Increased knowledge on RKN host status of 13 Brassica species and seven sorghum cultivars
- Individual growers have been informed which nematode species are present on their farms (83 sites)
- New knowledge on differences in nematode diagnostic testing.
- New knowledge on pathogenicity status of main commercial sweetpotato cultivars.
- New capacity at Gatton research Facility to extract soil microarthropods.
- Researchers have a new appreciation of the vast range of soil types used for sweetpotato production.

Issues and risks

There are no apparent major issues or risks at this time. Previous risks during this reporting period included drought conditions and lack of available water. Trials planned for the late 2019 planting window will now take place in autumn and spring of 2020.

Other information

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

Survey data

The DAF nematology team has processed eighty-three survey samples 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. Free-living nematodes were also identified to give an overall indication of the soil's biological status. Eighty soil samples were sent to SARDI for molecular identification of root-knot nematode.

Final survey results – DAF morphological identification from 83 survey sites

- Root-knot nematode is by far the most important nematode pest of sweetpotato – with 50 of 83 sites across all regions identified with root-knot nematode numbers ranging from 1 – 3,413/200 gram dry soil. In the Bundaberg region, 28 of 45 sites were identified with root-knot nematode while in the Cudgen region 15 of 17 sites were identified with RKN.
- *Rotylenchulus reniformis* was recorded in four sites in Central Queensland, three in Bundaberg and one in South East Queensland and poses a serious threat to the industry. This new detection South East Queensland is a long way from its known geographic distribution. This nematode has not been found in Cudgen or the Atherton Tablelands to date
- *Pratylenchus zeae* was the most common lesion nematodes detected. It was detected in 24 sites in the Bundaberg region, five sites in Cudgen, six sites in Central Queensland, four sites in South East Queensland and two sites on the Tablelands. The effects of *P. zeae* on sweetpotato varieties needs to be assessed.
- Spiral nematodes were relatively common, but are not a cause for concern as they have little impact on root growth
- *Rotylenchulus parvus* is in relatively low numbers suggesting sweetpotato is not a good host. Not detected in Central Queensland to date, but is a common nematode in other regions
- Stubby, stunt, ring and dagger nematodes were recorded in low populations also suggesting sweetpotato is not a good host of these nematodes.

SARDI molecular identification of *Meloidogyne* spp. from 80 sites

- DNA of *Meloidogyne javanica/incognita/arenaria* was identified in 54 of 80 sites using their non-specific assay.
- In 21 of these 54 samples, SARDI were not able to further identify the RKN to species level.
- SARDI identified eight sites with their *Meloidogyne javanica/incognita/arenaria* non-specific assay from which DAF were unable to extract and identify RKN, however,
- DAF identified seven other sites with root-knot nematode where SARDI were unable to identify DNA of *Meloidogyne javanica/incognita/arenaria* using their non-specific assay
- In the Bundaberg region, *M. javanica* was the most dominant species identified from 16 of 43 sites tested, with *M. incognita* identified from five of 43 sites and *M. arenaria* identified from two of 43 sites
- In the Cudgen region, *M. javanica* was identified from three of 15 sites tested, with *M. incognita* identified from four of 15 sites and *M. hapla* identified from six of 15 sites
- In the Central Queensland region, *M. javanica* was identified from two of 12 sites tested
- In the South East Queensland region, *M. hapla* was identified from one of six sites tested
- In the Tableland region, *M. javanica* was identified from one of four sites tested, with *M. incognita* identified from one of four sites.

Intensive surveys

Plans for intensive surveys were developed to sample a representative group of fields, both pre-plant and post-harvest. Drought conditions especially during the latter half of 2019 prevented further surveys as dry soil does not give a true representation of nematode numbers. Recent rainfall events in Queensland and Northern New South Wales mean that surveys can now re commence in March 2020.

Future pathogenicity trials

Sweetpotato cultivars including, WSPF, Eclipse and Bonita are being bulked up at the Gatton research facility tunnel house to produce planting material for the third pathogenicity experiment. Production of planting material for the fourth trial will commence in March 2020.

Soil testing

Samples collected from grower properties in Cudgen , South East Queensland, Bundaberg, Central Queensland and the Atherton Tableland regions as part of the initial survey, were sent to DES for soil chemical

and physical analysis.
The following analyses were undertaken with some results still pending:

- 1:5 water extractions: pH, electrical conductivity (EC), chloride (Cl) and nitrate (NO_3)
- Total organic carbon (TOC)
- Permanganate oxidisable carbon (Perm OC)
- Total nitrogen (TN)
- Colwell + phosphorus buffer index (S_PBI_COL)
- Particle size analysis (PSA) and air dried moisture content (ADMC)

The anticipated correlation between low numbers of nematodes and high clay content of soils hasn't been encountered in the set of samples analysed to date. Evidence of this correlation has mostly been anecdotal and further investigation will being undertaken over the life of the project.

Soils analysed for Particle size analysis (PSA) to date indicate that there is a wide range of soil properties that support sweetpotato production (Fig 4). Clay content ranges from a low of 1.2% at one Bundaberg farm to highs of 72, 68 and 63% in Bundaberg, Cudgen and the Atherton Tablelands respectively. Fine sand content ranges from 6% to 57% across all sites.

Total Organic Carbon (TOC) in the 36 Bundaberg samples analysed to date ranged from 0.21% to 2.35% for land cropped to sweetpotato. Two soil samples collected from an undisturbed pasture site had TOC levels of 4.13% and 2.18%. The Cudgen samples overall had higher and more consistent levels of TOC. The 15 samples analysed so far ranged from 2.00% to 3.72%. The six samples collected from the Lockyer Valley ranged from 0.28 to 1.78% and the two samples from the Atherton Tablelands were 1.65 and 2.27%.

Correlation between grower practice and levels of TOC and other soil properties will be statistically analysed when the analyses are complete later in 2020.

Fig 4: Left and Right wide range of sweetpotato growing soils

Weed hosts
A list of weed species encountered in sweetpotato growing fields is being put together for later collation of host range information from various sources.

Extension events
Two presentations for sweetpotato growers are planned for late March and early April in Bundaberg and Cudgen. Visiting USA sweetpotato researchers will discuss, efficacy data on new chemicals as part of nematicide trials, Guava root-knot nematode, new cultivars, and sweetpotato physiology.

Subcontracts

The subcontract with USQ is still under negotiation around their costings.

Table 2 Performance expectations and achievements, accumulative to date as per table 4 in M & E plan (M/S 102).

Project monitoring plan	How the project is tracking	Grower uptake
Sweetpotato nematode and soil health masterclass	4 Initial Masterclasses completed	51 attendees, all of which rated the masterclass as being of high quality 84% of growers said the masterclasses were highly relevant
Collation of previous data	Historical data collated with new survey data 2019.	New surveys identified reniform nematode in the same four sites as historical surveys. Growers informed that this nematode had not moved to any new sites proving that grower biosecurity measures had been effective at halting the spread of this difficult to control nematode.
Provision of extension materials, factsheets, field days	11 nematode Factsheets completed. I herbicide factsheet drafted to be distributed prior to M/S 105 Masterclass handbook handed out at masterclasses. Field days and project updates held 25th July 2019, Bundaberg, 7th August 2019 Cudgen, 14th August Bundaberg.	Factsheets distributed to all growers. Growers more informed on nematode ecology and management. Growers provided with project updates and informed on how project is tracking.
Pathogenicity trials	Trials completed for 3 gold, 3 red skin sweetpotato cultivars in relation to 2 Root-knot nematode (RKN) species. Trials completed for gold cultivars for three root lesion nematode (RL) species	Growers have a better understanding of the pathogenicity of individual gold and red cultivars to 2 RKN species and gold cultivars to 3 RL species.
Nematode species identification	83 samples processed from grower properties	Individual growers are now more informed on nematode species identified on their farms enabling them to make informed management decisions.
Identification of suitable cover crops	List of potential cover crops with historical resistance ratings complied	List of potential cover crops has been distributed to growers. Accurate resistance/susceptibility levels to be determined in pot trials.
Host range testing	4 Brassica spp pot trials completed, 1 sorghum variety trial completed, one mixed species trial under analysis.	Very few nematode resistant cover crops available at project commencement. New information gained form pot trials presented at field days on resistant /susceptibility status for a range of potential cover crops.
Long term faming systems trial	Trial under way, 2 rounds of amendments applied, first commercial crop planted, due to be harvested June 2020.	2 field walks to date, regular field walks planned, Growers are very interested to see the pre hilled beds in action.
On farm cover crop demonstration trials	Negotiations underway plans postponed in 2019 due to drought. Trails to commence 2020.	TBA
On farm herbicide demonstration trials	Trials planned to commence autumn 2020.	TBA
Nematicide trials	Negotiations underway plans postponed in 2019 due to drought. Trails to commence 2020.	TBA
Capacity building - sweetpotato researchers trained in basic nematology	3 training workshops completed in September and October 2018.	Researchers more informed on basic nematology, ecology and diagnostic processes, leading to more accurate and efficient on farm sampling. Researchers better equipped to address grower queries relating to nematodes.
Initialise Predicta SP development	SARDI results and manual counts for 84 samples complied. Biometric analysis to be completed prior to M/S 105.	Individual growers informed of SARDI results and manual counts for their farm. Grower group informed on species detected in each region.