AUSTRALIAN SWEETPOTATO GROWERS INC.

THE VINE

SPRING 2023 | EDITION 3

Presidents Word

Marketing levy vote

Troy Prichard
ASPG PRESIDENT

As you would be aware ASPG determined at the 2022 AGM to review payment of the 1% sweetpotato marketing levy and hold a vote on its future. The vote provided an opportunity for all growers to have their say and vote to either retain the levy or wind the levy back to 0%. In August, a ballot paper was emailed to all growers and those recently retired from the industry.

The ballot closed on 15 September and of the 46 potential votes, 15 growers voted, with 13 in favour of reducing the levy to 0% and one against. The formal result will need to be documented and sent to the Commonwealth Department of Agriculture and Forestry for the regulation to be amended which will most likely to be in early 2024. There will be carry over marketing levy funds and ASPG will work with the Hort Innovation marketing team to determine how these are best invested.

Challenges of current sweetpotato prices

We are fully aware of the difficult times facing growers in the industry today. Poor prices for our sweetpotatoes over the past three to four years have led to a reduction in grower numbers, with one major and several smaller growers exiting the industry. Bringing some good news, through 2023 most growers have experienced higher yields due to the favourable planting and growing conditions of last summer.

However, this has obviously put more sweetpotatoes into the market putting further pressure on prices. With the drier winter and autumn, I suspect that yields will decline. In contrast, red and whites have been receiving reasonable prices in the markets.

In the past 18 months we have seen a rapid increase in farm input costs of labour, fuel, chemicals, and fertilizers. At the same time, we are dealing with a dominant supermarket duopoly of Woollies and Coles holding approximately 70% of the fresh food sales in Australia. Recently there is evidence they are putting downward price pressures on all fruit and veggie categories. And while our farm input costs have increased, equally the cost-of-living pressures on families have reduced spending amongst the lowest income households.

I refer you to the supermarket data report in this newsletter which shows a drop in the average spend by consumers on sweetpotatoes over the years 2019 to 2022.

Please be assured we are working in small ways to address falling consumer demand through a major investment of levy funds in the Quality Project with the project team and several growers meeting with supermarkets and agents to hopefully lift the quality standard of sweetpotatoes on supermarket shelves (refer page 6, Quality Improvement Roadmap Project Update).

Hort Innovation SWEETPOTATO FUND

This project has been funded by Hort Innovation using the sweetpotato research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

Presidents Word

Hort Innovation workshop in Melbourne

Left to right - George Russell, Bundaberg based Industry Manager, Troy Prichard ASPG President, Brett Fifield, CEO, Andrew Francey, General Manager, Andrew Philpotts, Finance Manager

In July, Peter Long and I participated in a Hort Innovation (HI) Peak Industry Body workshop in Melbourne. Topics covered included the partnering changes made by HI in the past 18 months, cross industry collaboration opportunities, a presentation by the Department of Agriculture, Fisheries, and Forestry and an opportunity to provide industry feedback on HI performance.

Feedback from near all industries was dominated by the slowness of HI taking up industry priorities and the length of time for research and development projects to be tendered and commence. Further, there was widespread frustration with the lack of impact from the marketing levy investment.

While it was comforting to hear other industries have similar experiences, it was even more positive there is a real effort to improve HI's performance and ASPG looks forward to working more closely with them. As part of HI's effort to better engage and understand industry needs, the CEO, Brett Fifield, and a senior manager, Andrew Francey, visited two sweetpotato farms at Bundaberg on 10 October 2023. They had the opportunity to see planting, harvesting and packing operations and better understand production and industry issues.

Current industry challenges featured in the discussions as well as the value of past research and development projects and the importance of focusing on industry priorities for future funded research.

AUSTRALIAN SWEETPOTATO GROWERS INC.

ASPG Annual General Meeting

ASPG's upcoming AGM is on the 23 November 2023 in Bundaberg. I would encourage you to attend either in person or online. Equally, I would encourage members to consider nominating for the positions of president, vice-president, treasurer or management committee, with five committee positions available. The management committee meets online monthly for one hour.

ASPG Management Committee

President:	Troy Prichard
Vice-President	Matthew Pritchard
Treasurer	Eric Coleman
Executive Officer	Peter Long

Damien Botha
Rodney Wolfenden
Emily Zunker
Russell Mortimer
Russell McCrystal

From the Executive Officer

Sweetpotato Emerging Leaders Program

Peter Long
ASPG Executive Officer/Secretary

The highlight for me in the past six months has been the very successful emerging leaders' professional development held in Hervey Bay. Ten industry personnel participated in the two-day workshop delivered by Jill Rigney from The Right Mind. The evaluation and feedback were very positive, and I refer to the emerging program update and photos in this newsletter (page 4).

New Research and Development project update

In the past six months Hort Innovation staff have worked to develop, call tenders and appoint the successful organisation to deliver our prioritised projects. Several growers have been involved in developing the tender calls and assessing the tender proposals and once established, they will be part of the reference panel. Hort Innovation R&D Managers are currently finalising the following projects:

- PW22000 - Pest management for the Australian sweet potato industry with a focus on Guava root knot nematode (Status: awaiting sign off).
- PW23000 - Access to New Sweetpotato Varieties (Status: awaiting clarifications).

Once the projects have been signed off and budget allocated there may be an opportunity to consider funding for another project that was prioritised. This would be subject to available funds. The next project is an industry development and communication project.

Sweetpotato industry research and development process

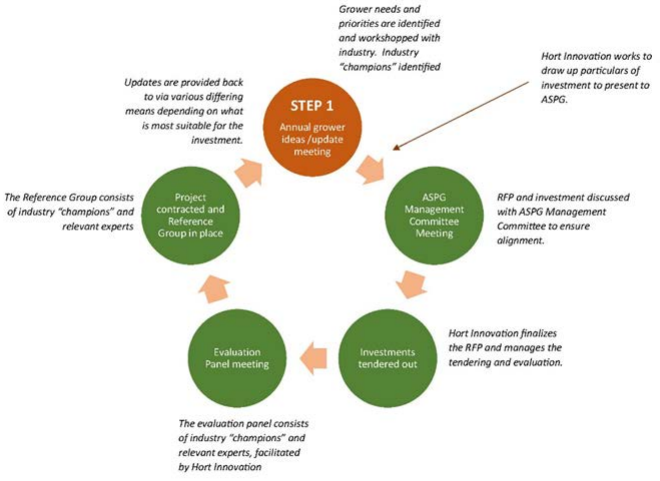
To help you better understand the process of turning your R&D levy into research projects, I worked with Jason Hingston from Hort Innovation to produce the following diagram. In summary, the 0.5% R&D levy that is collected on the sale of all fresh sweetpotatoes is matched by the Commonwealth Government and funds industry research and development. The process is managed by Hort Innovation.

ASPG web site refresh

We have undertaken a refresh of our Web site https://www.aspg.com.au/. Up until recently all the reports and technical information were accessible to members only via a login password. I know we all forget our login passwords and can't find them when we need and to solve the problem all sections of the Web page are now accessible without a password. The research and technical reports are available on the site under Growers and Members Info https://www.aspg.com.au/membersinfo/. I would encourage you to revisit the site and just have a look at the reports as there is plenty of great information there. The website refresh was completed by Mel from Manea Creative who does a great job on designing our newsletters.

Department of Agriculture and Fisheries

Again, a huge thanks to Sandra Dennien, Department of Agriculture and Fisheries Researcher based at Gatton for the extensive DAF report. It provides a detailed summary of their latest research results. Also, congratulations to Sandra on the completion of her master's studies through the University of Queensland. Sandra's research investigated the accuracy of the new molecular virus detection technology to detect Sweetpotato Feathery Mottle virus (SPFMV). It is high quality research and will be very valuable in screening sweetpotato plants (refer pages 13-16).



Emerging leaders program Update 2022-2023

The focus in Year Two of the Sweetpotato Emerging Leaders Program was to support participants to explore the complexity of leadership roles and styles including: leading self and others, leading strategy and implementation and leading engagement.

Equally, it focused on developing participants' leadership styles to improve the health and effectiveness of their organisation / industry. Activities completed in Year Two were delivered by Jill Rigney from The Right Mind (TRM) and they included:

- Two webinars targeting the Sweetpotato Emerging Leaders;
- One-on-one coaching sessions for the participants; and
- A two-day effective communication and personal development workshop.

TRM delivered two webinars, with the first on 29 November 2022 and a second on 20 April 2023. One-on-one coaching sessions were offered to all program participants, with Jill conducting 12 sessions. Across the year, TRM set up a portal and uploaded tools and resources for the participants. A two-day intensive training workshop was delivered to 10 emerging leaders and the ASPG executive officer (17 and 18 August 2023) in Hervey Bay.

Year Two Workshop participants

Kate Eden
Mike Eden
Alex Hellmuth
Dayne Mortimer
Emily Zunker
Jill Rigney (The Right Mind)
Peter Long (Exec Officer)
Rach Langenbaker
Lachlan Sprott
Matthew Williams
Brodie Wolfenden
Eathan Zunker

Support and mentoring were provided by the ASPG Executive officer throughout the year to all participants.

Following commencing of the program, for various reasons, several emerging leaders exited the program. As such, there is availability for any interested members

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to participate in this valuable personal and professional development opportunity.

Following the year two workshop, an evaluation survey was completed by participants. Participant feedback was sought on the year one study tour, webinars, coaching sessions, and year two workshop. Survey results were very positive for all aspects of the program.

For the study tour, participants rated it 4.57 out of 5 for increasing their knowledge of the sweetpotato supply chain. For the usefulness of the webinars, they rated it 3.57 out of 5 and for the one-on-one coaching sessions, 71% of respondents said the coaching sessions were useful.

For the year two workshop there was a score of 4.43 out of 5 for the content being understandable, relevant to their professional life and adding skills, tools and knowledge to their role as an adaptable manager and future leader. Some of the feedback from participants included:

- Implement the new skills I learnt to better conduct tough conversations with workers and what language should not be used.
- How to undertake disciplinary conversations easier with order.
- Listening without judging.

The three-year Sweetpotato Emerging Leaders Program will conclude in June 2024 with a one-day workshop in Bundaberg. The participants will make a short presentation on their workplace project completed during the year, showcasing the application of their new knowledge, tools and skills.

Sweetpotato Quailty Improvement Roadmap Project Update

(Hort Innovation Project PW20000)

Tristan Kitchener (Kitchener Partners), Andreas Klieber (Quality Associates)

This project aims to improve the overall quality of sweet potatoes by fostering collaboration between stakeholders throughout the entire value chain. This network encompasses growers, wholesalers, processor, and retailers, all of whom play pivotal roles in ensuring high-quality sweetpotatoes reach consumers. Over the past two years, the project has monitored in-store quality and identified quality-related actions that have affected on-shelf quality.

Drawing upon the insights gathered during this project, key activities that can enhance the quality of sweetpotatoes have been compiled into a Quality Improvement Plan. This plan outlines the actionable changes that can be implemented across the broader supply chain. These changes aim to elevate quality standards, enhance consumer satisfaction, and, ultimately, drive an increase in the consumption and demand for sweetpotatoes.

Key recommendations from the Quality Improvement Plan are:

A. Production

- Minimisation of excessive in-ground holding of gold-skinned varieties during winter (due to bronzing).
- Sufficient pre-harvest topping period to allow skin hardening.
- Ground preparation and selection to minimise nematode pressure.
- Equipment design and handling practices to minimise skin damage during harvest.
- Wash process design to minimise skin damage.
- Wash-water sanitiser and post-wash drying to control bacteria and other pathogens.
- Packing according to specification in relation to size, shape and defects such as nematode damage.

B. Transport

- Loading stock at the correct temperature (13-20 degrees).
- Pre-cooling trucks to the correct temperature (13-20 degrees).
- Transport with compatible co-loads (temperature, cross-contamination).

C. Cross-docking and Wholesaling

- Maintaining appropriate temperatures throughout and eliminating temperature fluctuations.
- Elimination of delays and storage at excessively low temperatures (chilling injury).

D. Retailer Distribution Centres & Stores

- Consistently use and enforce the product specifications.
- Review delays through minimising carry-over stock and opportunities for holding temperature optimisation.
- Reviewing purchasing practices that impact stock-turn, suitable range and quality.

The roadmap has been shared with the industry and retailers in face-to-face meetings and has been widely accepted as presenting a real opportunity for improving on-shelf quality.

In response to the discussions, the project team is also developing retailer Quality Guides for stores and distribution centres, making recommendations regarding retailer specifications and a guide to the industry on tackling the most significant issues.

Whilst the project is still seeing quality issues in stores linked to a wide range of factors that were identified in the Quality Improvement Plan, by working as a collective supply chain, there is an opportunity to lift the bar for quality to improve consumer satisfaction.

The project will further monitor the sweetpotato quality of the product over the next 9 months in-store to determine progress considering the Quality Improvement Plan.

For more information and a copy of the Quality Improvement Roadmap contact Peter Long on M: 0490 324 671 or E: aspg.sec@gmail.com.

Researcher news

Congratulations are in order to our long serving sweetpotato researcher, Sandra Dennien who completed a master's degree through the University of Queensland earlier this year. Sandra's research investigated the accuracy of the new molecular virus detection technology Loop-Mediated Isothermal Amplification (LAMP) to detect Sweetpotato Feathery Mottle virus (SPFMV).

Sandra showing Crow Prichard some of DAF's results

Similar to PCR, LAMP detects viral DNA, however LAMP is much faster, taking only 30 minutes to run and around an hour for sample preparation. LAMP technology was initially developed for bed side care to detect Malaria. LAMPs are compact, transportable, rechargeable and is half the cost of PCR instruments.

The foundation of the Australian sweetpotato pathogen or virus testing (PT) program is the use of very sensitive indicator plants highly susceptible to sweetpotato viruses. Sweetpotato plants are grafted onto indicator plants to promote rapid an increase in virus particles. Indicator plant sap does not interfere with follow on serological or molecular testing like sweetpotato sap does. This greatly enhances diagnostic accuracy. To reduce testing timeframes, Sandra assessed this new technology using traditional 'gold standard' protocols as a base line.

Results indicated that LAMP was just as effective as traditional techniques in detecting SPFMV from all positive inoculated indicator plants, both as a single and dual infection (SPFMV plus Sweetpotato leaf curl virus (SPLCV)) at two weeks after grafting, in some cases before obvious symptoms had developed on indicator plants.

The integration of LAMP to the current PT program potentially halves the virus testing time with infected plants detected at 2 weeks after grafting, enabling faster result reporting and rapid assessment of plants undergoing virus removal. LAMP provides increased rigour to the pathogen test (PT) program and adds another weapon to the arsenal for the detection of sweetpotato viruses and monitoring for biosecurity threats.

A second study evaluated the effectiveness of LAMP to detect SPFMV directly from sweetpotato leaf tissue without the use of indicator plants. Accuracy was much lower with LAMP detecting only one third of known positive samples with single infections and two thirds of positive samples from plants infected with both viruses. The majority of positive detections were from symptomatic leaf tissue. Leaf tissue without symptoms taken from infected plants was mostly negative. This indicates that sweetpotato plant sap also interferes with the newer technologies of LAMP and PCR, resulting in reduced accuracy to detect the presence of viruses.

When SPLCV testing was carried out on leaf samples from an additional Beauregard plant with a single SPLCV infection, 87% were detected by LAMP. However, two thirds of positive samples from plants infected with both viruses were detected. There was no difference in positive detections from leaf tissue of infected plants with or without symptoms. The differing positive detection rates between plants infected with one or both viruses suggests that synergistic reactions are occurring within sweetpotato plants between SPFMV and SPLCV.

With many laboratories and quarantine programs moving towards molecular only testing, this study raises potential concerns around accurate SPFMV detection in asymptomatic sweetpotato plants without the use of indicator plants or Electron microscopy.

The take home message of this work is if someone promises to test plants from your farm for virus there is a low chance of an accurate diagnosis if they are using samples taken directly from sweetpotato plants.

Sandra is committed to continuous improvement of the Sweetpotato PT program to improve diagnostic outcomes and evaluate new technology as it becomes available, ground truthed with traditional proven methods.

Sandra was able to complete this study as part of the previous ACIAR project (Hort 2014/097) externally, whilst working full time. Sandra would like to thank Emma Crust and Jean Bobby for their invaluable assistance with the large experiments and is glad to have her nights and weekends back.

Workplace health and safety support

Queensland Government and WorkCover Qld have worked closely together to design a WHS support program for Queensland businesses. The program is titled Injury Prevention and Management (IPaM). IPaM is a joint initiative delivered by Workplace Health and Safety Queensland (WHSQ) and WorkCover Queensland. There is no charge for the service.

WHSQ work with organisations of all sizes and in all industries, anywhere in Queensland. Their advisors tailor the program to suit the unique requirements of each business. The program can be as short as a one-off visit, or up to two years of ongoing support, or anything in between. Employers can self-refer to the program or can be referred by WorkCover Queensland, work health and safety inspectors or industry associations.

IPaM's goal is to assist every employer establish and maintain the most effective WHS and Return to Work systems for your business. Whatever WHS and RTW challenges your organisation faces, their advisors can assist.

Why should my business participate?

If you've ever had a worker injured, you know the physical, psychological and financial pain and suffering it can cause. Not just for the injured worker themselves, but their family, their co-workers and their employer.

In 2017–18 there were 99,720 workers' compensation claims lodged in Queensland. These claims resulted in payments of just over $1 billion dollars. Sadly, 59 of these claims were for work-related fatalities. And don't forget—there are large penalties for organisations that breach WHS laws.

The IPaM advisors understand the current WHS and RTW issues impacting Queensland employers and can give you the most up-to-date advice on legislative requirements. Advisors can share practical industry solutions from other employers they have worked with. IPaM advisors are a fresh set of eyes to identify where gaps may have emerged in your WHS and RTW systems or help you get started creating a system if you don't have one.

Over the past few years, the popularity of the IPaM Program has skyrocketed with over 2,000 businesses using the program, and for good reason: their safety management insights are taking the guess work out of safety and saving businesses money.

By being involved you get:

- Access to free advice from a health, safety and return to work professional
- Site and industry specific information on what every Queensland employer should know about injury prevention and management— and how to apply it in your workplace
- Support to implement long lasting and sustainable safety processes
- Assistance including on-site consultations, specialist training for managers and staff, and access to tools and templates.
- Option to take up a fully funded program that's proven to help businesses improve health, safety and injury management performance.

Contact Sean Roberts, 0437 683 018
sean.roberts@oir.qld.gov.au
https://www.worksafe.qld.gov.au/services/injury-prevention-and-management-program

Consumer and supermarket data for sweetpotatoes for the year 2020 to 2022

Harvest to Home Nielsen IQ

This work is funded by Hort Innovation from sweetpotato R&D levies and matching funds of the Commonwealth Government.

How the data is collected

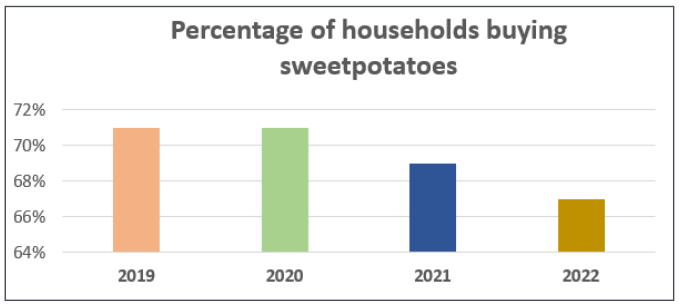
Nielsen Homescan® is a continuous panel of 10,000 households who record all take-home packed and fresh grocery from all retail outlets. The sample is demographically and geographically representative of the Australian household population.

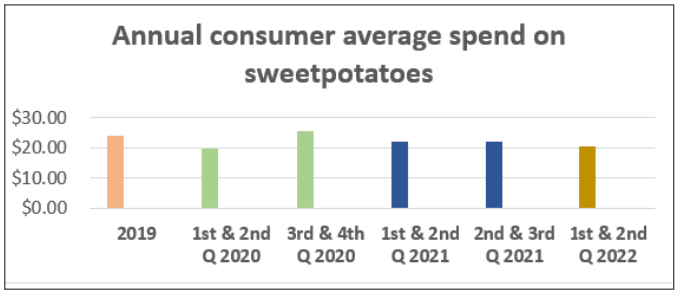
Each household is equipped with either a small handheld terminal or an app on their mobile phone through which details of all purchasing are entered - product, quantity, price and outlet. This information, along with the date of purchase, is linked with demographic details of the household and the household purchasing history. Data is projected to represent take-home purchases of the Australian household population.

Data recorded

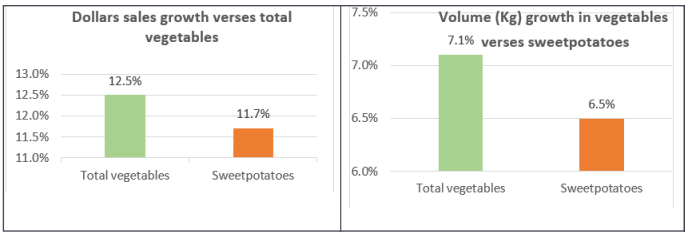
The primary data collected is what consumers are spending on a weekly basis across their food spend. This snapshot focuses on the annual purchases of sweetpotatoes covering the dollars spent, the kilograms purchased, how the spend compared with other vegetables, percentage of householders purchasing sweetpotatoes and where they shopped.

SUMMARY OF RESULTS

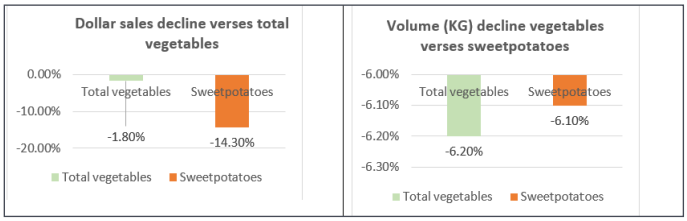




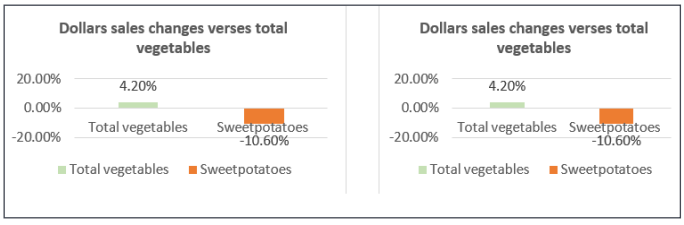
2020 Supermarket sale movements for all vegetables and sweetpotatoes



2021 Supermarket sale movements for all vegetables and sweetpotatoes



2022 Supermarket sales movements for all vegetables and sweetpotatoes



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Reid Tucker Case Study

Business	Reid Tucker
Owners and Managers	R. L. & J. K Tucker
Location	Moore Park Beach, 25 kms north of Bundaberg
Area in production	Farm area is 70 acers with 35 acers of Sweetpotatoes grown each year. A low-lying area of the farm is planted to sugar cane. It is too wet for Sweetpotatoes.
Varieties grown	Northern Star (red variety)
Main markets	Brisbane, Sydney, and Adelaide market agents. Consignments usually 3/times a week depending on demand and harvest volumes.
Soil	Sand with very limited organic matter and nutrients with poor water holding capacity. The farm is 1.5kms from the beach.
Water	Channel and piped from Fred Haig Dam
Cover cropping	Half of the farm is cover cropped while the other half is under sweetpotatoes. Prefers to use forage sorghum and if there is the need for a winter cover crop oats are grown. Depending on the sorghum growth they may get one cut for hay and then mulch the ratoon crop.
Growing calendar	First seed beds are established in September with planting through to Easter. Harvesting is 12 months/year. Reid is very happy with the seed Sweetpotatoes which are supplied by Aust Sweetpotato at Rockhampton.
Farm key goals	To be consistent in yield and the quality produced. Experience has shown Northern Star is suited to the sandy soil and by growing Reds Reid is not competing against volume gold producers. Matching the skills and availability of his employees is critical to operating the farm and their lifestyle. Reid has developed a farming operation which is sustainable which he believes he can maintain for another 10 years.

Regional location benefits	The climate of the Bundaberg district suits production of Sweetpotatoes for 12 months of the year as evidenced by growing approximately 80% of Australia's Sweetpotatoes. Contributing to the region's advantage is the consistency and availability of irrigation water. As a major horticultural producer Bundaberg is well serviced by transport companies to all major capital cities. Reid has small consignments, and they are aggregated in Bundaberg and freighted south with no problems.
Major challenges	In the heat of summer, it can be difficult to establish plants in the hot soil and at time they are exposed in 25 to 35kms winds which can sand blast young plants. Before Covid Reid employed mainly Back Packers and as they became unavailable, he switched to a local crew. Reid now employs locals on a part time. It does mean that he has up to 15 employees for payroll and the associated paperwork, but it is working. The significant increases in all input costs in the past four years has added to their operational costs significantly. Rises in fuel, electricity and fertilizers need to be budgeted for.
Key climatic risks	Summer temperatures have been rising and when planting in sandy soils with low water holding capacity irrigation need to be very regular. Reid does not use trickle tape and uses 73mm (3 inch) overhead sets which are hand shifted and he has found it has aided their establishment. There is also a significant saving in avoiding tape costs and reducing plastic waste. Surprisingly the area can frost which can impact on yields.
Recent changes in business operation	Reid purchased a new locally manufactured harvester recently and with some minor modifications he is very happy with it. It was his largest sweetpotato machinery purchase. Harvesting is either a three or four-person operation. Whilst all the other equipment is older but very well maintained.
Most valuable innovations/change	Reid shifted from sugar cane production 20 years ago and tried a range of crops including Sweetpotatoes. He initially planted gold varieties which were not successful in the sandy soil and eventually he tried Northern Star which gave consistent size, shape and yield.
Farm employees	Prior to Covid backpackers were the primary source of workers. When their availability reduced, Reid shifted to local workers. In the packing shed there are three local women who work between school drop off and pick up times and they work three or four days a week. As his packing crew works regularly, he can deliver a more consistent grade ensuring the Sweetpotato size and quality are within specifications. For planting, harvesting and irrigation Reid employees high school students and matches major farm operations to their availability (Friday afternoons, weekends, and school holidays). He recently signed up a school-based trainee for one day a week and he is very motivated and working well. Reid employs a skilled worker to maintain his farm machinery which is a priority.

Hort Innovation Sweetpotato Fund 2022/23

Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australia's horticulture sector. We work closely with industry to invest the sweetpotato R&D and marketing levies, together with Australian Government contributions, into key initiatives for growers, through the Sweetpotato Fund.

Visit www.horticulture.com.au/sweetpotato at any time to access information on new, ongoing and completed projects, and to download resources produced by your levy investments.

From the Sweetpotato Fund page, access your industry's *Annual Investment Plan 2023/24* which includes details on current and proposed investments, as well as key financial information including a five-year forecast.

A snapshot of 2022/23

$539,896
invested in R&D

$143,264
invested in marketing

$1,364,668
in levies collected by the Government and passed on to Hort Innovation for investment

Here are some highlights from what was delivered during the year:

An industry communications program to keep sweetpotato growers up to date on R&D and marketing activities, as well as other industry news – see hortinn.com/pw21000.

An emerging leaders' program to build capability within the sweetpotato industry and grow participants' knowledge and skills – see hortinn.com/pw21001.

Development of a comprehensive manual is underway on pre- and post-harvest best practices for reducing skin loss in sweetpotatoes – read more at hortinn.com/pw21002.

Continued work to improve the quality of sweetpotato across the supply chain through investigating pre- and post-harvest quality issues – see hortinn.com/pw20000.

Access to consumer insights through multi-industry investments to understand consumer behaviours, attitudes and purchase intentions – see www.horticulture.com.au/sweetpotato.

The sweetpotato Harvest to Home dashboard providing regular household purchase data and insight reporting at www.harvesttohome.net.au.

DEPARTMENT OF AGRICULTURE AND FISHERIES UPDATE

Integrated pest management of nematodes in sweetpotatoes

(Hort Innovation Project PW17001)

Funded by Hort Innovation from sweetpotato levies matched by Federal funding.

Project aim: To extend existing knowledge and develop new knowledge on soil health and nematode management, specific to sweetpotato farming systems.

Comprehensive surveys were conducted across production areas to identify the nematode species present in sweetpotato growing soils. The project investigated a range of management options: control of volunteers and host plants, resistant rotation crops, long term beds (low/minimum till), efficacy of registered nematicides and the application of organic amendments to promote nematode suppression and enhance soil health.

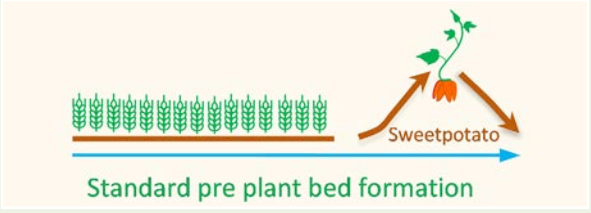
Aerial view of the Extensive and Intensive trial at Bundaberg Research facility.

1. Long term farming systems trials

At the start of the project in 2018, two long term farming system field trials were established at the Department of Agriculture and Fisheries (DAF) Bundaberg Research Facility (BRF). Rotation crops were chosen due to their high root-knot nematode (RKN) resistance ratings. A forage sorghum variety, Jumbo, was used in spring and summer and White french millet (used in autumn and winter) as well as additional grass, brassica and legume rotations in the extensive trial. Amendments were chosen due to their availability and accessibility to growers in Bundaberg (poultry manure, sugarcane trash, sawdust and compost).

Several parameters were monitored throughout the life of the trial including populations of plant parasitic nematodes and soil health indicators (free-living nematodes, microarthropods and nematode trapping fungi), as well as soil physical and chemical properties. Crop assessment parameters included yield and root defects. The project team are currently planning for the second harvest of the nematicide trial in late October and compiling the final report due on 30 November 2023.

Intensive trial

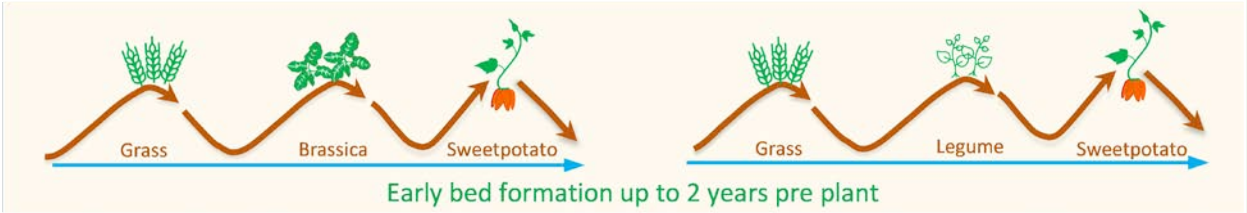


Aim: to assess nematode suppression and soil health benefits provided by relatively high rates of organic amendments.

- Designed to be similar to conventional best practice currently used by most sweetpotato growers.
  - Two rotation crops –
    a. Forage sorghum - Jumbo (spring and summer)
    b. White french millet (autumn and winter).
  - Organic matter/compost amendments incorporated at bed formation or in a V furrow prior to planting.
- 5 treatments: Organic Matter, Compost, V-Furrow, nematicide (Nimitz - fluensulfone) and Nil, with 5 replicates.
- 4th commercial crop harvested in May 2023.

Extensive trial

Aim: To assess nematode suppression and soil health benefits provided by farming systems that incorporate minimum tillage (pre-formed beds), controlled traffic, organic amendments and cover cropping with either a grass legume rotation or a grass brassica rotation.



- More experimental in design than the intensive trial with the use of pre-formed beds.
  - Organic matter/compost amendments incorporated at bed formation (incorporated and double amendment treatments).
  - Rotation crops grown on formed beds, above-ground biomass mulched or sprayed off.
  - Organic matter or compost incorporated prior to planting, or V-furrows formed and filled with the amendment prior to planting.
  - Sweetpotato (cv. Beauregard) planted with minimum tillage and controlled traffic.
  - Harvest and re-form beds using controlled traffic and repeat.

- A total of 5 treatments and two rotation types = 10 treatments, with 5 replicates.
  - Treatments: V furrow amendment, Incorporated amendment, Double amendment (V furrow + Incorporated amendment, Nematicide (Vydate – oxamyl) and Nil.
  - Rotation types, a grass species (White french millet, Swan oats, Signal grass) followed by either:
    a. A brassica mix ("Nemsol", (Raphanus sativus (Terranova radish)/ Eruca sativa (Nemat))
    b. A legume species (Soybean A6785, Sunn Hemp)
- 3rd commercial crop harvested in April 2023.

Results from both trials (DAF Nematologist, Wayne O'Neill)

Rach Langenbaker has managed the trials over the five-year trial period, installing and maintaining the BRF trials to a high standard using best practice. The intensive trial demonstrated successful control of RKN through a farming system of a resistant rotation crop and organic amendments. Statistically significant control was achieved with the organic amendment treatment (a band of sawdust + chicken manure) for harvests 2, 3 and 4. The compost treatment also gave significant RKN control at harvests 3 and 4. At the final harvest, root-knot number were low across the whole trial, but the organic matter and compost treatments still had significantly less root-knot than the other treatments.

In contrast, the nematicide treatment (Nimitz) showed no better than the nil control treatment at any of the four harvests. Other nematicide trials have demonstrated that plant parasite numbers can rebound to high levels after initial chemical suppression in sweetpotato crops. Suppression of root-knot nematode by the organic amendment treatment corresponded to a significantly higher mean count of free-living nematodes at almost all sampling dates from January 2021 onwards.

RKN control was achieved with the susceptible variety Beauregard, used in both trials to better show differences between treatments. In a true integrated nematode management system, it would be preferable to use a more resistant variety, which would result in better control of RKN numbers through the crop cycle, when combined with the other elements of the system.

The extensive trial was not as successful in suppressing RKN, despite the use of similar organic amendments. The sweetpotato system poses many challenges for implementing soil health practices, related to the marketable product being underground (e.g., major disturbance required for harvest, storage roots subject to direct effects of amendments/ pests). The early bed formation utilised in the extensive trial was an attempt to introduce minimal tillage practice into the system, but unfortunately this also meant that the banded organic amendments were added a long time prior to planting, with an apparent reduction in efficacy.

All rotation crops utilised in both trials were successful in reducing RKN populations between sweetpotato crops. The legume/sunn hemp performed especially well, reducing RKN to extremely low numbers during its three-month rotation. Sunn hemp appears to be an excellent rotation option, quickly producing a large amount of biomass, fixing nitrogen, shading weeds and is a very poor host for RKN.

In both trials, there was no significant treatment effect at any assessment, for reniform nematode (Rotylenchulus

Harvesting the Intensive trial in Bundaberg. Right, washing harvested roots plot by plot for assesment on a rainy winters day in Gatton.

reniformis). This nematode came to be the dominant plant parasite in both trials, even in treatments where RKN was suppressed. This demonstrates that management strategies that may work for one nematode pest won't necessarily control another. Compared with RKN, reniform nematode is more difficult to control as it becomes metabolically inactive in dry conditions (enabling it to survive in soil for long periods of time) and it also can move very deep in the soil profile, avoiding the effects of nematicides and biological suppression near the soil surface.

It can then reinvade a susceptible crop from the deeper soil layers. Competitive interactions between reniform and RKN have been reported in the literature and reniform can be favored in situations where RKN survival between crops is reduced by fallowing or resistant rotations.

We would especially like to thank McCrystal Ag, Prichard Farms, Windhum Farms and Mortimers Farms for their assistance with the field trials in Bundaberg.

2. Long term Pot trials

Aim: To investigate the incidence and type of skin damage on storage roots of Bellevue and susceptible control variety Beauregard, exposed to reniform nematode (Rotylenchulus reniformis) and RKN Meloidogyne javanica.

Two pot experiments were established at BRF in September 2022 with six replicates, incorporating two treatments: inoculated and non-inoculated (control). Plants were inoculated with juvenile R. reniformis (Reniform experiment) and eggs of M. javanica (RKN experiment) at 16 days after planting. The remaining plants designated as controls were not inoculated.

The pot trial was grown to commercial harvest according to best practice and both experiments were harvested on the 6 February 2023 at 132 DAP. A representative soil sample was collected from each pot to determine the nematode populations. Roots were graded and individually inspected for damage according to DAF sweetpotato nematode assessment protocols.

Results - Reniform experiment

Plants inoculated with reniform nematodes produced significantly less roots compared to the non-inoculated (control) plants. Results suggest that reniform nematodes damaged forming roots, resulting in inhibited root development. The findings of Clark and Wright (1983) suggested that R. reniformis doesn't develop on storage roots once they enlarge past approximately 5 – 10mm in diameter.

The overall mean root weight in inoculated plants was significantly higher than the root weight of the uninoculated plants. This was evident in both cultivars. Less competition for nutrients and space (due to the lower number of developing roots) in the inoculated plants likely led to the increase in individual root size but reduced overall yield. Uninoculated plants, which didn't suffer damage to developing roots, produced more roots, but competition for space and nutrients resulted in a lower mean root weight. Uninoculated control plants of both cultivars produced roots with a lower mean proportion of 'dirty eye' or darkened lateral feeder root scars (DLRS) than the inoculated plants, so this condition may be exacerbated by the presence of R. reniformis.

Results - RKN (M. javanica) experiment

When compared to the uninoculated control plants, infection with M. javanica reduced the number of both storage and fibrous roots, the percentage of first grade roots, the overall weight of roots and was associated with a significantly higher proportion of non-marketable roots, ultimately negatively impacting crop value.

Nematode extractions from post-harvest pot soil identified three times as many M. javanica in inoculated Beauregard plants compared with the inoculated Bellevue plants. This indicates that M. javanica replication was greater in Beauregard plants and confirms previous project finding that Beauregard is highly susceptible to M. javanica and Bellevue only moderately susceptible. M. javanica enhanced some skin defects that occur naturally (raised pimple, DLRS, elongated lenticels, and sunken lenticels) and appeared to be responsible for causing defects such as black pimple or barnacles which only occurred in the presence of RKN.

Reniform experiment. Left: Beauregard, top = control, bottom = inoculated showing DLSRs. Right: Bellevue, top = control, bottom = inoculated showing some DLSRs.

RKN (M. javanica) experiment. Left: Beauregard, top = control, bottom = inoculated. Right: Bellevue, top = control, bottom = inoculated.

3. Nematicide trial – red soil

***Aim:** To evaluate the efficacy of currently registered nematicides for RKN control over the long winter growing period. Efficacy will be assessed by monitoring nematode populations and crop yield and quality assessments at commercial harvest.*

The 0.1Ha red soil block at Bundaberg Research Facility was planted with sweetpotato (cultivar Beauregard) on March 6, 2023. The trial is a randomised blocked design consisting of 48 rows, six replicates and eight treatments: Nimitz (spray), Vydate, Metham Sodium, Salibro, a Nimitz alternative application method, a Salibro alternative application method and Nil (control). Nematicide applications were completed by July 2022. This trial will be harvested and assessed in late October 2023.

Preliminary results 120 DAP harvest

A preliminary harvest of five plants per plot was conducted in July 2023 at 120 DAP. Some preliminary findings are listed below. However, it is important to note that this is preliminary data from one harvest only. The final harvest is scheduled for November.

- Metham and Vydate treatments produced:
    - a significantly higher weight of total roots than all other treatments.
    - a significantly higher number of total roots than all other treatments.
- Vydate treated roots displayed a significantly lower occurrence of barnacles (severe skin lesions due to nematode damage) than all other treatments.
- A significantly higher occurrence of wire worm damage was recorded on roots treated with Metham than all other treatments except Salibro.
- Vydate treated roots had a significantly lower occurrence of soil pox (Streptomyces ipomoeae) than all other treatments.

Rach Langenbaker, casual Ella Wightman (UQ) and Mary Firrell compare skin damage and root shape across the different treatments in the nematicide trial 120 DAP assessment.

Causes and management strategies for skin loss in sweetpotato

(Hort Innovation Project PW21002)

Funded by Hort Innovation from sweetpotato levies matched by Federal funding.

Thanks to the persistence of Department of Agriculture and Fisheries (DAF) science leaders, contractual negotiations have been successful, and this project has now been fully contracted.

Aim: To identify mechanisms responsible for skin retention/strength and key factors related to skin loss through sweetpotato production and handling practices, pre farm gate.

This project builds on previous collaborative pilot greenhouse studies conducted by Australian and USA sweetpotato researchers to investigate the role of nutrients in relation to skin hardening. Follow-up studies will investigate the role of nutrients and confounding environmental variables in relation to skin durability under field conditions.

Left to right: Skin damage and shrinkage on Beauregard, surface skin damage on Northern star and WSPF.

The project has three main objectives:

1. Identify mechanisms responsible for strength/retention of skin.
2. Identify factors that cause skin loss through production and handling pre farm gate.
3. Develop and validate location specific advisory systems, fact sheets and an industry wide best practice manual validated for Australian commercial production systems to reduce skin loss.

Most growers would have already taken part in a survey of field and pack shed practices during the last 12 months. Other activities in the first year include a literature review, in field monitoring of environmental variables, selection of field sites to evaluate various preharvest curing methods and detailed glasshouse experiments in Louisiana. Project collaborator, Professor Arthur Villordon (Louisiana University) plans to visit Australia in November 2023.

Above: plants awaiting virus testing after exposure to viliferous insects. Right: exposing aphids to virus infected plants.

Improving root crop resilence and biosecurity in Pacific Island Countries and Australia

(Hort Innovation Project HORT2018/195)

Funded by the Australian Centre for International Agricultural Research (ACIAR) from Federal funds.

Aim: *To improve knowledge of sweetpotato viruses in neighbouring Pacific Island countries to inform potential biosecurity threats to Australia and improve diagnostic capacity through agreed international standards to support increased preparedness for sweetpotato biosecurity surveillance and response. This project will continue to build on the existing collaborative relationships between Australian sweetpotato researchers and those from the Centre for Pacific Crops and Trees in Fiji.*

DAF staff Michael Hughes and Julie O'Halloran visited Pacific Island project partners in August 2023. This visit was the first for the project and focused on meeting staff who will be delivering project activities and commencing two key project activities, a survey of sweetpotato farmers and variety collections for viral diagnostics and pathogen testing development.

Australian work is underway to:

- Investigate possible insect vectors involved in the transmission of Sweetpotato chlorotic fleck virus and Sweetpotato collusive virus.
- Conduct replicated glasshouse trials to determine optimal virus sampling parameters for accurate detection of Sweetpotato feathery mottle virus and Sweetpotato leaf curl virus using sweetpotato tissue.

Pest management for Australian sweetpotato industry

(Hort Innovation Project PW22000)

Funded by Hort Innovation from sweetpotato levies matched by Federal Funding

Aim: *This project will build on a long-term body of work and take a holistic approach to address the two key pests in sweetpotato production, nematodes and viruses. The project will continue screening for nematode resistant rotation crops, investigate nematode species diversity in Australian sweetpotato growing soils to facilitate effective control strategies and provide improved virus diagnostic capacity for the Australian sweetpotato industry. This project is currently awaiting signing by the DAF director general.*

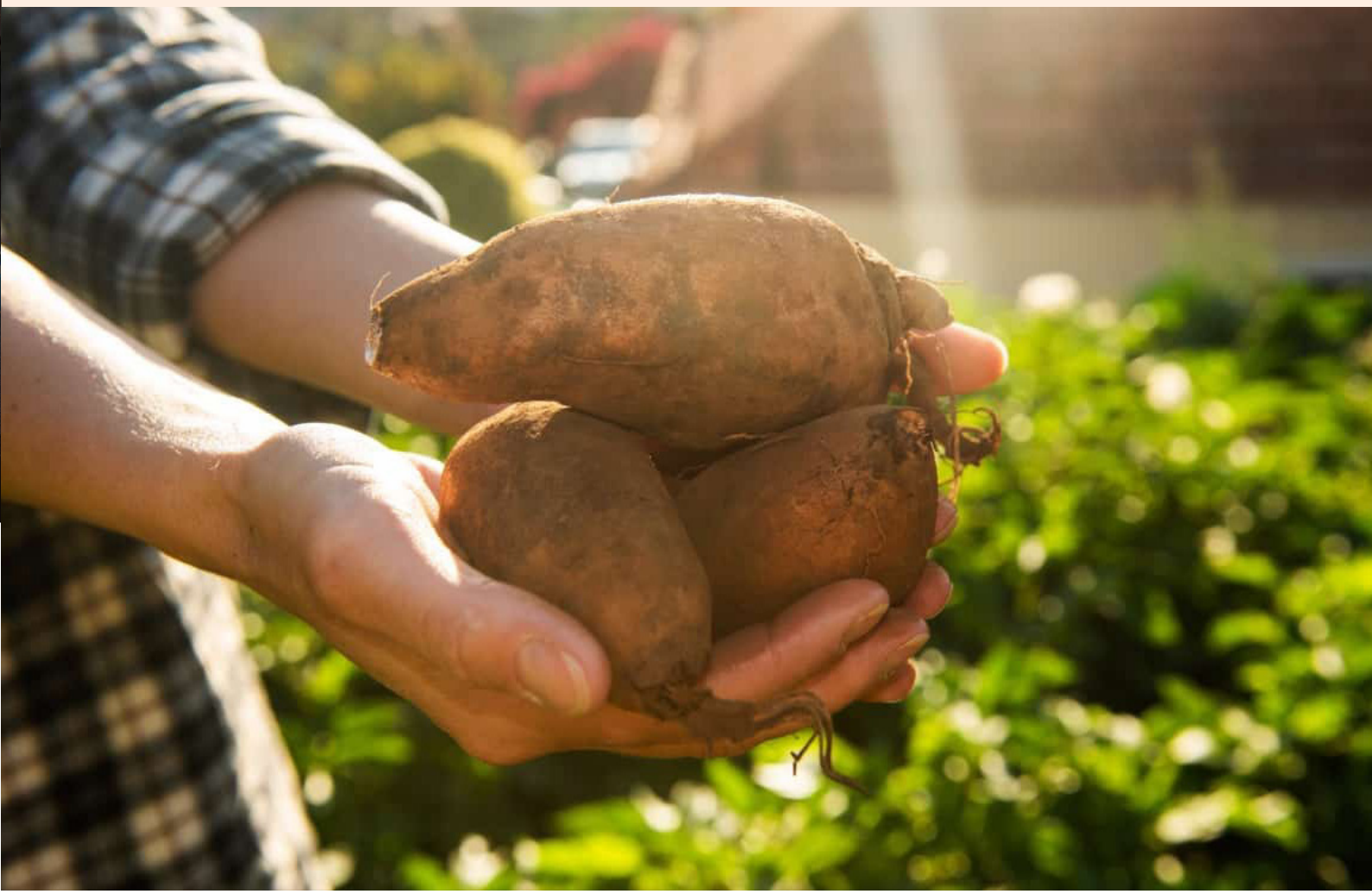
GRKN - Reminder

Although Meloidogyne enterolobii or Guava Root-knot nematode (GRKN) has not been detected in commercial sweetpotato production areas to date, on-farm biosecurity measures are your front line of defence to keep GRKN (and many other pests) out of your property. Like other root-knot nematodes, M. enterolobii can be easily spread through infested soil and infected plant material. It is critical that growers are mindful of risk pathways and strive to avoid introduction to their property.

Signage, restricted access (particularly to cropping areas), machinery wash-down and use of clean planting material are all measures which can help to reduce the risk. Simple, low-cost measures can make a big difference in keeping your farm safe.

Good information about farm biosecurity is available through the Farm Biosecurity Website, including the Farm Biosecurity Action Planner. The Australian banana industry has also produced a lot of resources (e.g. Better Bananas On-farm Biosecurity) to help growers protect themselves from Panama disease, and many of the same biosecurity principles can be used to prevent M. enterolobii spread and protect sweetpotato farms.

If you see any unusual or particularly severe nematode damage to crops, contact Biosecurity Queensland on 13 25 23 or via the Report a Pest or Disease website portal.



The Sweetpotato crew embracing the new technology.

Smart technology sweetens sweetpotato R & D

The sweetpotato research team have embraced technology to increase efficiencies when conducting trial assessments. The team were able to access specialist software and the assistance of DAF Bioinformatic experts through the Gatton Smart Farm initiative to develop a digital data capture process specific to sweetpotato assessments.

With over 20,000 sweetpotatoes to grade and assess this year, hand-held barcode and QR code readers, coupled with electronically connected scales were used to streamline the data capture and recording process. Previous assessments were based on manual data recording for each sweetpotato assessed, generating piles of data sheets and subsequent manual transcribing of data to a computer.

The new instant data capture system allows individual sweetpotato parameters to be automatically electronically recorded. The use of the technology also reduces the potential for human error and has resulted in significant time savings. This pilot use of technology has also identified opportunities to increase efficiencies in other areas of our research.

Left: 1. DAF Senior Experimentalist, Mary Firrell using the scanner to record sweetpotato characteristics.

2. Previous data sheets with manual data entry of root quality parameters, each line represents an individual sweetpotato. Centre, assessment parameters converted to barcodes and QR codes.

Hort Innovation SWEETPOTATO FUND

This project has been funded by Hort Innovation using the sweetpotato research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

Four of the current GRF casuals, Left to right, UQ Gatton undergraduate students Daniel Franettovich, Jorgen Themsen, Dayne Mortimer and UQ Gatton alumni Luke Jackson (BAgribus, 2000s).

Help flows from across the highway

Strengthening the long association between Gatton Research Facility (GRF) and the UQ Gatton campus, research projects at GRF have a long history of employing UQ students on a casual basis. Sweetpotato projects, in particular, have gained a much-needed boost in manpower during peak season with up to eight students working in any given year over the last two and a half decades.

Research projects benefit from enhanced research capacity within busy project teams. Work undertaken provides students with opportunities to develop real world research skills and gain practical experience in a range of horticultural science disciplines. Two students have been able to secure permanent employment within DAF (in 2008 and 2018).

Many GRF staff undertake advisory roles for UQ undergraduate and post graduate students. The sweetpotato group have supervised nine students to date, (PhD, MPhil and honours). Many GRF staff are also UQ Gatton alumni.

Rotation Crop Resistance Ratings

To support growers, included is a complete list of rotation crops screened for resistance to root knot nematode. Follow this link to view the comprehensive list.

https://www.aspg.com.au/wp-content/uploads/2022/11/UPDATED-RKN-Resistant-or-highly-resistant-Rotation-crops-top-logo-July-2022.pdf

Rotation Crops with Highly Resistant or Resistant Rating to root knot nematode. This list only includes the cover crops that are Highly Resistant or Resistant to RKN. Follow this link to view the list.

https://www.aspg.com.au/wp-content/uploads/2022/11/UPDATED-RKN-Resistant-or-highly-resistant-Rotation-crops-top-logo-July-2022.pdf

Rotation Crops Resistance to Reniform. Cover crops and their resistance ratings to reniform nematode. Follow this link to learn more.

https://www.aspg.com.au/wp-content/uploads/2022/11/UPDATED-SUMMARY-OF-RESISTANCE-Reniform-Rotation-crops-top-logo-July-2022.pdf

Currently funded sweetpotato research and development projects with forecast budgets

Project Code	Project Title	Delivery Partner	2023/24 Forecast	Future Years 24/25 Forecast	Future Years 25/26 Forecast	Future Years 26/27 Forecast
MT20005	Management strategy for serpentine leafminer, Liriomyza huidobrensis	Qld Department of Agriculture and Fisheries	1,956			
MT20007	Regulatory Support & response Coordination	AKC Consulting	1,165	1,747		
MT21004	Consumer Behavioural Retail Data	Nielsen Connect Australia Pty Ltd	16,804	16,804	16,804	20,241
MT21005	SARP Updates	AGK Services	1,555			
MT21006	Horticulture Statistics Handbook 2021/22 to 2023/24	Retailworks	4,166	7,583		
MT21015	Horticulture impact assessment program 2020/21 to 2022/23	JW Powell Holdings Pty Ltd	1,555	1,865		
MT21202	Consumer Usage & Attitude Tracking - FY22/23	FiftyFive 5 Pty Ltd	5,690			
MT22000	Hort Innovation Fund Annual Reports 2021/22	Gasoline Communications Pty Ltd	624			
MT22005	Horticultural Trade Data 2022-2025	IHS Global Pte Ltd	825	854		
MT22012	Industry Preparedness for exotic root knot nematode (Meloidogyne enterolobii)	CSIRO	15,000	15,000		
MT22200	Comms Evaluation Modules - FY23	FiftyFive 5 Pty Ltd	2,400			
MT23002	2022/23 Fund Annual Reports	Gasoline Communications Pty Ltd	489			
PW17001	Integrated farm management (IFM) to control nematodes in Sweetpotatoes	DAFQ	447,738			
PW18002	Minor Use Permits	Hort Innovation	2,900	2,900		
PW20000	Quality improvements in the Sweetpotato industry	Kitchener Partners	98,894	94,185		
PW21000	Communications Program	Australian Sweetpotato Growers Inc	24,000	38,000		
PW21001	Sweetpotato emerging Leaders program	Sweetpotatoes Australia	25,575	35,000		
PW21002	Causes and management strategies for skin loss in sweetpotatoes	Qld Department of Agriculture and Fisheries	62,744	125,488	188,231	
ST18003	Plant Biosecurity Research Initiative - PBRI Program	PBRI	800	800	800	
ST22001	Generation of Data - Crop Protection 2022	Eurofins Agroscience Services Pty Ltd	3,445	3,445	3,445	
TOTAL			**718,325**	**343,671**	**209,280**	**20,241**