

Final Report

VegNET NT

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NT Farmers Association Inc (NTFA)

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VG19017

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VegNET NT (VG19017)

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Summary

VegNET NT Phase 2, VG19017, focused heavily on developing an innovation system extension strategy for the NT vegetable industry that built on previous project work delivered. The extension strategy was developed into a 5-year Regional Extension Plan (2020-2025) aimed at ensuring the resilience and development of the NT vegetable industry. A Regional Extension Advisory Group (REAG) of 9 members, including the RDO, were pivotal in the development and endorsement of the 2020-2025 Regional Extension Plan which identifies the 5 key focus areas: IPM, Soil Health, Water Efficiencies, Biosecurity and Protected Cropping. These identified focus areas are critical to providing resilience, sustainability and further development of the NT vegetable industry. Underpinning this extension plan, in essence, is the key to attaining best practice change in the NT vegetable industry.

Project hosts, NT Farmers Association (NTFA), continued to build on industry relationships through engagement-focused extension interactions with vegetable growers assisted by stakeholder involvement. The REAG, officially formed in September 2020, and the development of the Regional Extension Plan (REP) were significant key outcomes of this 18-month long project. The REAG's role was to endorse any supporting documentation towards the implementation of the plan as well as being responsible for assisting the RDO with identifying gaps in industry and for recommending pathways towards filling these gaps. A Regional Extension Plan was developed to guide the completion of the project and to drive the extension effort in vegetables until 2026. This plan was extended into a Regional Extension Work Plan 2020-2021 for the remainder of the VegNET Phase 2 program.

The aim in development was to consolidate NT grower business and agronomic models through addressing best-practice gaps and capacity requirements identified in relevant research conducted through implementation, adapted to suit industry needs. Industry priorities identified include improving pest and disease management in tropical vegetable crops, improving current and existing water measuring efficiencies with the ongoing development of irrigation practices, a greater understanding and awareness around soil health and its implications for tropical vegetable production, further development in the importance of adequate biosecurity practices and a move to more intensive production in hydroponics and protected cropping which needs significant support and industry assistance. Extensive collaboration with stakeholders and engagement with wider industry was and is crucial to the success and future roll out of the 2020-2021 REWP.

The commencement of the implementation of the REP through the 2020-2021 annual operational workplan in December 2020 only witnessed small shifts in engagement, KASA and overall practice change. NT's vegetable growing season is during the dry season period with many growers not planting until late February (wet season providing)/March. Prior to the growing season the growers tend to use this time to relax and spend 'downtime' with their families. They are often not eager to participate in extension activities associated with growing and many of our growers go 'off-grid'. In 2021, during the growing season, 65% of growers that attended any events held learnt about these events occurring through the RDO and their interactions with growers or through NT Farmers communications platforms of emails, Facebook, and Twitter. Of the 2021 attended events which saw a combined attendance of over 400 participants the vegetable levy payers in attendance were not recorded highlighting a need to gather this information in VegNET 3 to clearly monitor and evaluate any KASA and practice change amongst our vegetable levy payers. The water efficiency workshops held identified 45% of growers in the Darwin rural areas do not use any water efficiency tools while only 28% in the Katherine area. This clearly demonstrates the efforts that need to be address in the Darwin rural area is significant to ensure improvements in water use efficiencies and to ultimately enhance production systems. 80% of growers across both Darwin and Katherine surveyed in a pre and post season check in still rate water as a high priority and are eager to learn and develop skills in understanding their current practice model and how they can improve on this. 100% of vegetable growers surveyed know that soil health is vital with 72% wanting to engage in extension opportunities and develop their KASA. Limitations surrounding proposed extension opportunities in 2021 were dampened by the ongoing challenges faced with covid restrictions meaning that events planned were either postponed or cancelled. Attendance and engagement were challenged due to growers having external pressures of facing limited seasonal workers to assist with harvesting produce. Many land managers were forced to harvest their own vegetables that they often employ seasonal workers to do.

KASA and practice change will be evident as the REP continues under VegNET 3 and the proposed 5-year extension plans developed in VegNET 2 will enable solid practice change capacity to be clearly monitored and evaluated by the end of 2026. VG19017 has allowed for the continuation of capacity building of the Northern Territory's vegetable industry and maintained industry relationships, engagement and delivery of extension from previous projects and extending the learnings of previous VegNET projects.

Keywords

Regional Extension Plan (REP); Regional Extension Advisory Group (REAG); RDO; IPM; soil health; water efficiencies; biosecurity; diversification; protected cropping; grower engagement; practice change; KASA; water use efficiencies (WUE)

Introduction

Project hosts NT Farmers Association (NTFA) continue to build on industry relationships through engagement-focused extension interactions with vegetable growers assisted by stakeholder involvement. The establishment of a Regional Extension Advisory Group (REAG) a Regional Extension Plan (REP) was developed to guide the completion of the project and to provide vision which will ultimately drive the extension effort in vegetables until 2026. The project outcomes and deliverables involved the wider national VegNET activities and professional development as required. VG19017 was committed to working closely with other vegetable R, D & E projects delivered by collaborative partners Hort Innovation and AUSVEG, key focus areas that impact on vegetable growers across Australia.

The development of the REP prioritised the 5 key focus areas of IPM, Soil Health, Modern Water Efficiencies, Biosecurity principles and Protected cropping as an emerging industry all of which unpin the continuation of sustainable development of the NT vegetable industry. The extension activities for these focus areas were planned and initiated in the 2020-2021 regional extension workplan and stakeholder engagement plan.

The Program Logic and M & E plan developed identified adequate and relevant extension tools used to engage and facilitate the increase in capacity of our vegetable growers and to bring further positive practice change in industry. These tools included regular meetings with key stakeholders, the inclusion of dedicated demonstration sites through local departmental research stations as well as on-farm stakeholder demonstration sites, the continuation and regular engagement with departmental technical staff on field days, site walks, farm visits, seminars, conferences and workshops as well as through social media, e-news and newsletter platforms.

NT vegetable growers are a diverse group with 85% being of Vietnamese and Cambodian nationalities. A growing and emerging number of regional NT growers, both corporate and family farms, can also be found in the Douglas Daly, Katherine, Tennant Creek and Central Australia regions. NTFA also has a strong and well-established association and collaboration with the Kununurra Region in Western WA which does support vegetable producers in this remote region as required and is a valuable networking opportunity for industry. Although recent times have limited face to face engagement with our near neighbours in the top parts of WA.

Methodology

Planning implementation documents

The RDO undertook a series of modules on a systems extension approach to identify gaps in industry and to bring together a program logic that was then worked into a 5-year Regional Extension Plan. This plan identified 5 key areas that ultimately growers felt were essential drivers to support industry development, awareness, understanding, capacity building and to promote practice change. Each area was then developed into a specific 5-year project plan. The REAG's role within this documentation development stage was to assist the RDO to ensure that all aspects of each project adequately meet growers' needs. Across the 18 months the REAG have been engaged with as a 'check in' on the process of VegNET 2 enabling the project to remain current to the needs of the growers and industry. The REAG has endorsed all documents required for previous milestones and have connected with the RDO as required on an individual basis or through email correspondence. Given the constraints since the inception of this project and the geographical distances between REAG members this was agreed on by the REAG as the most appropriate forms of communication.

The RDO met monthly with Hort Innovation and the other 10 national RDO's to discuss progress and to engage in professional development opportunities that assisted in the individual regional scope of the project while gaining insight at a national level.

Professional Development opportunities

The RDO had opportunities for professional development throughout VG19017. This enabled the progression and staging of both the REP, its associated documents and the implementation of the 2020-2021 workplan to be achieved successfully.

- Developing Regional Extension Strategies – Rural Consulting Group
- Developing Regional Strategies Modules – Rural Consulting Group
- Enablers of Change Webinar Series
- MLA Capability Building Workshop
- NT Farmers Webinar Series – coordinated and delivered 'Biosecurity: Our Farm Our Future' with a focus on Fall Army Worm
- National Soil Strategy Workshop & Discussion
- Vegetable Nutrition Masterclass RMCG/SWICP 2020
- Soil Biology Masterclass SWICP 2021
- NT Vietnamese Grower Association meetings
- Area Wide Surveillance project 2020 & 2021
- APEN Extension Chat sessions
- DrumMUSTER Regional Consultant – attendance/presentation at the annual Local Government Association of the Northern Territory (LGANT)
- PSNAP Workshop 2020 – Presenter for NT
- Hort Connections Conference June 2021

Grower Engagement

VegNET Phase 2 highlighted and supported the maintaining of grower engagement from the extension tools used and developed in previous projects to facilitate the increase in capacity to enhance engagement and build relationships with the vegetable growers of the NT. Growers were approached individually as either members of the NT Farmers Association or individual growers who are levy payers.

Other industry stakeholders support provided an avenue to contact growers and assess with issues and impacts on the NT vegetable industry. These stakeholders had an economic interest in improving grower profitability and

sustainability, best practices and improved communication and logistics for the NT vegetable producers. Partnering with many representatives in these supporting industries has assisted the project to deliver extension services, conduct demonstrations, on-farm trials and supply chain monitoring and improvement.

Face to face engagement with growers at a farm level has been key to the ongoing success of this project. Offering value, either via information or services on farm visits enhanced perceptions of growers benefit which lead to acceptance and being welcomed into the community. This establishment of trust has been critical in working with Asian growers that have often been more withdrawn from government agencies.

Adopting Best Practice

Leading by example and providing opportunities for support and assistance to encourage practice change significantly improved, shifted and strengthened relationships between growers and industry.

Territory experts such as the Department of Industry Trade and Tourism (DITT) staff, particularly within the Plant Industries Department have been a part of the project from its inception and have continued working with the RDO and key growers to establish solid relationships through their commitment to all stakeholder engagement processes. Interstate expert and industry support was also positive. All the 7 extension events/workshops held included outside NT industry experts. These representatives were welcomed by our growers and valuable experiences were had at these events.



The Irrigation Field Day Trade show, event hosted at Arnhem Mangoes in March 2021

The social capital/license is critical to the project's continuation into VegNET 3. Our Asian growers past experiences with government interaction in their own country, generally being a negative one. The VG19017 project has further cemented and strengthen grower relationships by helping to alleviate social concerns growers have had, opening lines of communication and trust to benefit the industry. Therefore, it is vitally important as the project moves forward and evolves, that we keep working to provide outcomes for grower's individual needs which enhance their ability to produce quality product. We can do this by addressing best practice issues affecting on farm production to increase the grower's knowledge of better farm management practices to benefit the supply chain which in turn stimulates economic growth.

Communications

VegNET NT used a range of communication strategies to connect with the growers and stakeholders. The project used the NT Farmers social media platforms of Facebook and Twitter and the more traditional newsletter and weekly e-news. The RDO supplied regular articles for NT Farmers GrowNT magazine. This provides an extensive network of over 2500 stakeholders that are receiving the targeted information.

The RDO provided VegNET updates for the AUSVEG Vegetable Australia magazine, including an NT Farmers Around the States industry briefing. These articles covered:

- Irrigation Efficiencies Masterclass and Field Day events
- Biosecurity Champions
- Soil Wealth Unearthing
- Protected Cropping Forum
- Grower Profile – Organic Ag
- RDO regional grower engagements



Organic Ag, Bluey and Mike

NT Farmers Association and the RDO have developed a good rapport with the vegetable growing community by providing them with no-fee for service assistance thanks to the levy's growers pay to the industry levy fund, this helps to build a strong foundation for the project and sound and trusted relationships between VegNet and the growers.

Working with other projects

The project has worked in conjunction with and is utilising the products from many other levy-funded projects including but not limited to:

- VG16067 Impact of pesticides on beneficial arthropods of importance in Australian vegetable production
- VG18003 Regional capacity building to grow vegetable business – Northern Territory
- VG18004 vegetable Industry Agrichemical review Process
- VG16086 Area wide management of vegetable diseases: viruses and bacteria
- VG15027 Vegetable Communications
- VG15028 VegPro Vegetable Education and Training Initiative
- VG16011 Irrigation Management in Sweet Corn
- VG14048 Review of Current Vegetable Irrigation Technologies summary
- VG13114 NTDPF Vegetable Pest, Disorders and Beneficials Field Guide
- VG14048 Review of current vegetable irrigation technologies
- VG13076 and VG13078 Soil Wealth Project and integrated Crop Protection
- VG VG13076 Soil Condition Management – Extension and Capacity Building
- VG15070 A strategic approach to weed management in the Australian vegetable industry
- AS19005 Australian Protected Cropping RD&E Strategy 2030
- VG16083-Protected-cropping-review-Final-Report
- VG16009 Adoption of precision systems technology in vegetable production

Outputs

Regional Extension Advisory Group

Liaise with grower group to discuss, implement and revise the 5-year Regional Extension Plan (REP) and all associated supporting documents to this plan. This group endorsed the 5 key focus area projects to be delivered, commencing with VegNET 2 and extending into the VegNET 3 roll out. These focus areas are:

1. IPM
2. Water Efficiencies
3. Soil Health
4. Biosecurity
5. Protected Cropping

Grower Interactions

The project officers visited over 27 vegetable farms over the term of VG19107 comprising of vegetables and mixed farms that have been recorded in the NT Vegetable Growers data base (Appendix 1). Contacts listed in database do not reflect true interactions made as daily connections and activities were logged officially in computer form however handwritten notes and email correspondence was considered in compiling the data for this milestone report. Within this cohort not all those listed are levy paying vegetable growers

These face-to-face discussions with NT Vegetable growers shows that the RDO had visits to vegetable growers in the Darwin and Katherine region as well as vegetable farmers in central Australia.

Regular attendance by the Industry Development Manager, Greg Owens, to the Palmerston markets made it possible to check in with Vietnamese vegetable growers who sell produce to Darwin residents. Some growers choose to drop into the NT Farmers office as they travel to and from town on a weekly basis for assistance with on farm issues such as labour shortage challenges, water licensing or land clearing applications. Other places for face to face conversations were the departmental field days, local agricultural shows, reseller events and other industry provider events.

Grower and Industry activities and opportunities

Growers, stakeholders and relevant industry bodies participated in a variety of events over the 10-month period from 1st December 2020 through to 30th September 2021.

- **NT VegNET Workshops and field events**
 - Grower meeting – Murrumbidgee February 2021 (17 participants)
 - Irrigation Efficiencies Workshop Darwin and Katherine March 2021 (87 participants)
 - Water Forum Katherine April 2021 (125 participants)
 - Biosecurity Risk Assessment Meeting Okra May 2021 (18 participants)
 - Food Futures Conference May 2021 (>450 participants)
- **Joint NT VegNET workshops and field events with other key associated industry bodies**
 - Plant Biosecurity Industry Workshop – Plant Health Australia May 2021 (25 participants)
 - TNRM – VegNet NT Soil Network Symposium Darwin, Katherine & Alice Springs September 2021 (110 participants) including Bluey Stoldt as guest speaker (vegetable grower)
 - Soil Composting workshop – postponed twice due to Covid travel restrictions (>40 registrations)
 - TNRM – VegNET NT Erosion control 2-day course July 2021 (20 participants)
 - Rural Business Support Services Financial Fitness Workshop – Asian Grower group (22 participants)
- **Communication Materials**

NT Farmers contact list includes 2767 members, growers and industry stakeholders

 - Bimonthly GrowNT newsletter articles

- NT Farmers weekly Enews
- NT Farmers has an active social media presence with numbers of followers increasing weekly – Facebook 3352, Instagram 335, Twitter 1577
- Vegetables Australia Magazine
 - Around the States column
 - Regional Development Officer article (600 minimum word count) quarterly editions
- **Industry coordination and engagement**
 - NT Biosecurity Reference Group 2020-2021; regular monthly meetings
 - NTFA Northern Australian Food Futures Conference and Roadshow series 2020-2021
 - NTFA NT Plant Industry Strategic Investment Development Plan 2020-2021
 - Northern Australian Quarantine Survey (NAQS) Program 2020-2021
 - Hort Innovation Food Futures Conference 2021 – Olive Hood
 - AUSVEG Biosecurity visit – Callum Fletcher
 - Department Industry Trade and Tourism Area Wide Surveillance monitoring 2020-2021
 - Northern Australia Preparedness Response Training (Plant Health Australia) 2021
 - Water Reference Group (WRG) formed late 2020; meetings 2-4 times/year with its terms of reference to include a project committee for the NTF Water Productivity, Efficiency and Sustainability Project, as well for broader water discussions such as NT policy development that the reference group can contribute to
- **VegNet and AUSVEG Meetings**
 - monthly via zoom/teams

Integrated Pest Management Wheeling on

The objective of this project is to see over 50% of growers in the NT engaging in on farm IPM practice by 2026. The 3 components of in crop monitoring and surveillance, the releasing and management of beneficial predatory population thresholds and the use of the in field wheel charts of critical value to the indicator of achieving the project objectives and shifting the practice gaps identified.



IPM snake bean wheel chart

Two wheel charts have been completed for snake bean and okra with the intention of two more charts to be developed to complete the suite of materials for use by vegetable growers. This wheel chart compliments and collaborates with the Northern Territory Governments Field Guide for Pests and Disease. Through this extension greater acceptance using IPM techniques, improved chemical efficacy on traditional farming practices and a reduction in reliance on harsh synthetic chemicals will be achieved for over 50% of NT vegetable growers.

Modern Water Efficiencies

Over the 5-year project improving grower uptake of water efficiency practices and adoption on new technologies is targeted at 50%. This will be measured through the replacement of old technologies, engagement in workshopping to improve current methodologies used and educating growers on the values and importance of correct and adequate water usage.

Improved irrigation scheduling and crop water use information is key to the success of the life of this project. Identifying the key influential growers within the community will create momentum and longer-term adoption practice changes. 20% of influential growers adopt improved water efficiency measures this will reach another 20-30% of growers in the community. The longer-term cost benefits reaching 50% of industry.

The Northern Australia Food Futures Water Roadshow held in April in the Katherine saw over 55 delegates attended the day forum allowing excellent opportunities for extension and networking with the evening public session seeing over 70 local community attendees. A series of presentations and panel discussions were delivered by a range of industry bodies and key stakeholders.

Two Darwin region champion vegetable growers commenced water efficiency trials in August 2021 with the support of NT Farmers using both MAIT Industries and GoAnna Ag soil moisture probes being installed to monitor soil temperatures, moisture levels and EC. The monitors were on okra and snake bean crops and be used as demonstration sites for other local growers. Probes were installed at varying depths of up to 80cm with data collected, monitored and recorded. The data collected to date will be collated and combined with forward season data to create benchmark tools for growing NT vegetables. Snake bean and okra considered as key focus crops initially with the intention to use the probes on a variety of crops, such as cucurbits, Asian vegetables and corn over the life of the REP. (Appendix 3)



Soil moisture probe on site

Water allocations and monitoring is a relatively new policy regulation for the Darwin rural areas where 80% of the NT vegetable growers are positioned. This has meant that many of our established vegetable growers are learning what this means for compliancy. With over 85% of our growers being from non-English speaking backgrounds our Asian growers are still working to understand the complexities of what is required by them. They are required to have water meters installed and then provide monthly water usage meter readings to the department. NT Farmers has been an advocate for supporting this engagement with growers to ensure that our non-English speaking growers understand these requirements, are compliant and can use this information to help adopt best practice management with their crops they grow. (Appendix 4 and 5)

Unearthing NT Soil Wealth

90% producers in the NT acknowledge that they have a lack of understanding on soils and the influences that good soil management practices could have on productivity. There has been a significant amount of R & D & E completed on soils in the southern areas of Australia with no focus in the Northern Territory. There is a need for development of understanding on general soil health and its importance as a limiting factor in production. A greater understanding on soil and its plant interactions represents a huge opportunity to produce immediate gains with on-farm productivity and profitability. As the Northern Territory vegetable industry continues to expand there is an ongoing need to support new and existing growers, to help the industry grow and be sustainable into the future. This can be achieved through demonstrating and modelling current best practice models. The adage *'it's just the way NT soils are'* and *'more on'* approach has long-term failings to support industry development and sustainability. The emphasis for the 2020-2026 REP is to establish Regional Soil Health Focus Groups across the varying Regions of the Territory with the key driver to promote healthy soil practice change.



A series of soil events including workshops and a composting trial were delivered which culminated in a final NT Soil Symposium event held in Darwin, Katherine and Alice Springs. (Appendix 5)

The aim of the composting trial was to demonstrate the benefits of composting to soil health and fertility, through the utilisation of regionally available resources and ingredients, appropriate methods and inputs required for effective composting. It aimed to demonstrate to producers the benefits of considering their soil to be one of their most important farm assets, how efforts to improve soil can be made simply by adding compost and how the addition of compost to our fragile tropical soils can assist with production. Practical demonstrations of this type are so important for encouraging the industry to take up positive soil management techniques and to implement practice change. The composting workshop day had been scheduled to run twice but was unfortunately postponed on both attempts due to the ongoing

Soil composting trial 2021

uncertainties of Covid and the travel restrictions imposed across the country. Capped at 40 registrations, due to demand, it demonstrates the desire for our northern territorialian producers to know more about their precious asset and resource, SOIL. This workshop is now proposed to run in 2022. 72% of growers continue to want to learn more about their soils and see this as an important value add to their enterprises.

The NT Soil Symposium sessions (Appendix 6) covered a range of topics including the importance of an unknown and underappreciated organism vital to soil health. Local and interstate industry experts covered a range of topics to enhance soil health, understand regenerative techniques and products. Local producers, Bluey Stoldt and Jeremy Trembath introduce the audience to a range of practices being used by them on their farms. With over 100 participants, these sessions provided an important opportunity to foster relationships, share knowledge, research and experiences from the agricultural industries from around Australia to our local NT communities with participants ranging from home gardeners to pastoralists and agriculturalists (including vegetable growers), educators, Indigenous land managers, government representatives and industry stakeholders.



On farm soil workshop, Batchelor

Bio securing NT farming futures



Fall Army Worm monitoring with DITT



NAQS Survey for ASLM

The RDO coordinated a NAQS survey following detections across Darwin and vegetable crops in Katherine of American Serpentine Leafminer (ASLM). NAQS working with NT Farmers and assisted by Callum Fletcher from AUSVEG visited 2 vegetable farms one in Berry Springs and the other at Middle Point. ASLM damage was noted at both farms. Further to this indication of damage on sinqua crops in Lambells Lagoon area also flagged. Samples were taken by NAQS and sent away for genetic testing will be done to verify the presence of ASLM. All damage appears to be minor and on older leaves. At this stage this is not impacting production suggesting that local

parasites are being effective at keeping under control. Continued surveillance, monitoring and trial work will be planned for 2022.

Earlier in the season the RDO worked closely with DITT and regional growers to monitor the movement and impact of the Fall Army Worm and the transmission of Poty viruses in cucurbits. In its third season of surveillance now growers are opting for regular surveillance visits and interest in the value add this can have is being supported. This outcome will continue to build with VegNET 3.

NT Farmers has played a significant role in assisting with the development of the Tropical Plant Industries Biosecurity Surveillance Strategy (TPIBSS) driven by PHA across all plant industries northern Australia. This strategy forms the cornerstone of effective biosecurity and is essential for the managing of plant pest threats in Australia. All of which could have a significant impact on our vegetable producers. The TPIBSS will contribute to the development of a plant pest surveillance system in northern Australia that supports collaboration between industry, government and the community. Surveillance ultimately plays an important role in both preparedness and response for the following reasons:

- Early detection of pest incursions – recent detection and impact of FAW and more recently the ASLM
- Delimiting the distribution of a pest – what methods of adoption, importantly IPM can be used to best manage detections such as FAW and ASLM
- Supporting market access – ensure minimal impacts of detections and incursions impacting our vegetable producers

Emerging and Diversifying Industry a Protected Cropping approach

This project was developed to examine various protected cropping systems, technology and practices while working with targeted growers to scope and develop how they can implement the right system for them. Then to highlight successful low cost protected cropping options that have been successful, what this means and how can be this influence productivity – showcasing these stories will encourage conversations and give enthusiasm to growers who are looking to diversify (10-15% growers). To ultimately build capacity and awareness of options for diversification and to demonstrate an emerging industry to improve the sustainability of the NT industry. In attendance at these events 30% will be growers.

Protected Cropping Case Studies identifying 3 regional growers have been identified and will be showcased in 2022. One grower, who was to be case study in this project recently sold their property and is moving to a different site. There continues to be interest in this emerging industry and the fit it can have in the NT. 80% of growers surveyed in September 2021 are interested in protected cropping systems as a means of potentially diversifying their enterprises.



PC hydroponic cucumber trials, Marrakai grower

Outcomes

The outcomes from VG19017 have been built the very strong outcomes from VG18003, VG 15044, VG13011, VG and continue to build towards lasting and sustainable practice change in these areas. VG19017 outcomes cannot be judged solely on only the outcomes from this project but rather looking at the bigger suite of projects from previous VegNET projects. These will all build on the final project outcomes at the completion of the REP in 2025.

The key deliverables in VegNET phase 2 was to deliver:

- a Regional Extension plan for July 2020 through to end of June 2025
- a stakeholder engagement plan for forming the Regional Extension Reference Group (REAG) and engaging the wider vegetable growing community
- a project logic and M & E plan that links to the Vegetable Industry Fund Objectives
- performance data that clearly shows the project outcomes, and impact
- a project risk register that explains risk management strategies (Appendix)
- demonstrate the implementation of the 2020-2021 work plan

The 2020-2021 REWP noted a pre-season self-assessment survey to be completed. The data from this survey indicated the focus areas of soil and water had the strongest interest by growers. 50% have limited knowledge on soils and 100% were keen to know more about their soils. 83% do not know the exact volumes of water they place on their crops and 75% were keen for seasonal crop benchmarks to be developed as a resource. As identified in the 2020-2021 REWP a follow up survey was completed before the end of VegNET Phase 2 to revisit the value placed on the key focus areas and to determine if there had been any shift in value on these areas and the deliverables identified as extension opportunities. The results from this survey identified:

- 70% consider IPM an integral component of their operation and are eager to learn more
- 80% believe that monitoring and understanding water efficiencies is vital for production
- 100% know that soil health is vital with 72% wanting to engage in extension opportunities
- 80% are confident in their current understanding of biosecurity principles
- 80% are interested in protected cropping systems as a means of potentially diversifying their enterprises

VG19017 has enabled the following outcomes to be achieved through the pathway of the 5 key focus areas:

- Creating new knowledge - soils
- Increasing adoption of best practice - water
- Building grower capacity using existing knowledge - biosecurity
- Increased level of engagement – grower group meetings
- Pathway to industry wide practice change – identifying and acknowledging leading and championing growers. These early adopters are leading the way in their given communities showcasing their achievements of water management, integrated pest management, soil management practices, on-farm biosecurity and higher productivity.
- Growers now have networks to continue to increase capacity in knowledge and skills implementation of best practices will become more prevalent as industry champions demonstrate and advocate for change to more sustainable and profitable practices.

Integrated Pest Management Wheeling on

Feedback from growers shows that that increased implementation of IPM programs is occurring. The key to enabling adoption of these practices for these growers was the instilled confidence that growers have access to the RDO and could ask questions, receive support as needed and when it was required and that the information given was concise, clear and specific to their crops. Unfortunately to the ongoing challenges Covid is presenting the capacity to deliver further key deliverables in IPM was not achieved. The RDO has prioritised IPM extension events for growers in VegNET 3.

A grower survey results indicated:

- 60% used IPM techniques on farm 2020-2021
- 80% gaining advice from outside industry experts like NT Farmers and local Agronomists
- 80% looking to use IPM next season

Due to ongoing Covid challenges and travel restrictions faced throughout the roll out of VG19017 intended workshops and field days with an IPM focus for growers was postponed and will be delivered in VegNET 3. The recent identification of the American Serpentine Leafminer in the top end has cemented the importance of the need to understand how IPM techniques implemented into practice are essential. In a recent survey 70% consider IPM an integral component of their operation and are eager to learn more. IPM trials, field days and workshops for growers will occur in 2022. The trials will be centered around the development of wheel charts for Cucurbits and Solanaceae. This will bring back on track the 5-year project plan as developed in VG19017.

Modern Water Efficiencies

Engaging our champion vegetable growers at 2 key sights (Marrakai and Berry Springs) with on-farm demo sites to promote the benefits of soil moisture water monitoring probes. Both growers have agreed to open these sites up to other interested growers for extension and promotional events – the value add to this extension model is How many growers change irrigation practices due to this on farm trial site in future?

Initial data collection and preparatory notes collected from demo sites August/September 2021 (Appendix 3)

These probe installation on farm generated a lot of interest within the community regarding water efficiency technologies in the short time since installation.

In February 2021 the formation of the NT Water Reference Group comprising of key influential stakeholder and relevant industry bodies as members (Appendix 4)

The development and trialling of a 'My Meter App' (assisted text format) growers can use who have an allocated water extraction license in the Darwin rural areas – at the time of writing this report this App is being trialled on 4 key growers non-English speaking growers. The aim is for full compliance with water regulations instead of the Department sending notices of default to license holders. The app will be translated into Vietnamese

A small market gardener of tropical fruit and vegetables reached out to NT Farmers recently to ask for assistance with how to read their meter, collect the data and use this data to determine their water consumption on crops.

Unearthing NT Soil Wealth

The RDO supported and collaboration with TNRM on the agenda of industry presenters and local farmers who have a depth of soil expertise and are exemplars in their field and holding of the TNRM Soil Symposium where over 100 participants attended across the 3 days. Acknowledgement of practice change industry champions – Bluey Stoldt (Darwin) / Jeremy Trembath (Katherine) who both presented at the series of days across Darwin, Katherine and Alice Springs. Both producers gave their stories on the both the highlights and challenges faced by adopting soil health practices on their farms. They spoke of the personal stories that had led them to this point and the value add they have made to their enterprises because of their changes.

A demo site proposed at a Katherine farm in collaboration with SWICP to commence in February 2022 looking at benefits of multi species cover crops on vegetable production (corn) and soil health. This work will target the 72% of growers surveyed that are keen to know more about their soils.

Aligned closely with all 5 key projects specifically to date the data collection from soil moisture probes installed at 2 demo sites have been included in the Appendix. This raw data, although not used at the time of writing this report will be collated against future growing seasons and initially used to prepare for the 2022 growing season. Grower groups meetings in early 2022 will see this data explained by the RDO.

A grower survey results indicated:

- 100% feel they could improve their soil management practices through cover cropping and rotation of blocks
- 60% had their soils tested and found the information this provided regarding soil health as a valuable tool for assisting them with further nutritional inputs

Bio securing NT farming futures

Seasonal NAQS and AWS continuing value of the integrated surveillance program resulting in timely detection and response of incursions. This outcome is strongly interrelational with bio securing NT farming futures project. This season 9 farms were involved in the program of regular and follow-up surveillance support monitoring

30% of growers who are still not adequately engaged in biosecurity principles or feel they are across it. The targeting of champions in industry has assisted with key messaging and promoting mindset change

2-day Biosecurity preparedness workshop in conjunction with Plant Health Australia saw 6 growers and 3 resellers/agronomists in attendance. Valuable conversations and learning had amongst growers and key industry bodies through presentations, role playing and peer to peer mentoring activities

Active participation and involvement on the Northern Australian Plant Biosecurity reference group with regular monthly or bimonthly meetings

Development of the TPIBSS

Targeting influential growers in communities and regional areas. 2 influential growers in a community can influence up to 80% of growers in their network. This is particularly successful in the Asian growing communities as their cultural hierarchy is such that a valued member is seen as 'how to grow' for others in that community. The interest in grower involvement of the AWS farm visits is indication of the practice change growers have adopted in understanding and seeing merit in checking crops regularly.

Emerging and Diversifying Industry a Protected Cropping approach

Chantha Chhorn, a local Marrakai grower, had two 20m x 50m white shade cloth shed constructed for this season and currently has trials happening in these sheds growing cucurbits. One shed has been set up as a traditional in ground row trial under plastic with the other set up as a hydroponic system using coir bags on trellises. Oedema issues arose with the traditional system as well as the collapsing of soil beds under the plastic. These plantings were removed and replanted using the coir bag system which reinforced the value of using a hydroponic system to the grower. It also highlighted the fragile nature of our tropical soils.

Chantha built 2 low-cost shade structures planting cucurbits using both hydroponic and traditional under plastic methods as a comparative.

Hydroponic System



Conventional System



Traditional plantings removed due to oedema issues and soil beds collapsing due to issues with irrigation (timing and volumes delivered) – soil limitations and irrigation methods highlighted as a gap in understanding and require further extension models. Second house replaced with staggered coir plantings.

Challenges experienced -

Early Production: 2 pieces fruit/plant/day with production dropping off to less than 1 fruit/plant/day when peak volumes of production expected.

Limiting factors: Demand increase for water, adequate drainage of coir bags and over fertilizing plant causing imbalances in EC were detrimental to production. Adjustments were made to the system and improvements in plant production was noted back to 1.5 fruit/plant/day.

These trials have given insight into further learnings and extension models for the remainder of the 2020-2025 REP with grower survey results indicating 80% interested in protected cropping systems.

Monitoring and evaluation

The achievements of VegNET Phase 2 against the details and targets set in the Monitoring and Evaluation Plan for each of the identified key focus areas of IPM, Water, Soil Health, Biosecurity and Diversification – Protected Cropping are covered in the table. Due to limitations posed by the ongoing Covid 19 challenges not all extension activities proposed for VegNET 2 2020-2021 regional extension workplan were able to be completed or delivered. These will now rollover into the 2021-2022 workplan.

There were 122 vegetable producers (combined totals) at VegNET initiated events inclusive of associated industry networking activities since the annual operational workplan commenced in December 2020. Numbers attending the Northern Australia Food Futures Conference have not been included for reporting purpose however this event attracted over 450 delegates across the 3 days of industry presentations and workshopping. This was a significant achievement for the Northern Australia industry, in particular NT Farmers who organised the event and should be mentioned.

The 2020-2021 REWP events covered specifically Water Efficiencies, Soil Health and Biosecurity awareness. Other proposed extension activities for IPM and Protected Cropping were unable to be effectively delivered within the constraints of this project due to the ongoing challenges and travel restrictions around Covid 19. For example, the proposed soil composting workshop and field day was postponed twice as a result and will be a high priority in the 2022 season and is now to align with VegNET 3. Recent end of season surveys to ‘check-in’ on growers’ interests and concerns illustrated the continuation of all 5 key focus areas as valuable for industry.

Highlighted in the survey responses all growers continue to express a high interest in understanding the principles behind protected cropping systems and how these could be a value add to their existing enterprises. This showed that growers were engaged and learnt new knowledge and could apply new skills in their production systems. Participation of growers and industry stakeholder in the extension review process demonstrated ownership of extension process in the NT. Evidence gathered in VegNET 2 suggests that the project has positively impacted the NT Vegetable industry achieving improvements in knowledge, attitude to uptake, skills and the capacity to drive widespread practice change in the NT vegetable industry. Growers are eager to continue to provide valuable feedback to industry on areas of concern and highlights with 75% surveys completed.

VegNET M & E reporting document in Appendix 7

Recommendations

Key recommendations at the completion of VegNET 2 to consider as high priority within VegNET 3:

- The continuation of the VegNET project nationally with a full time RDO position for the benefit of all 10 regions nationally
- The third phase minimum is crucial to provide on-going support for industry and to adequately deliver the 2020-2025 REP
- To ensure that the RDO's are professionally developed to provide adequate record keeping templates are developed in order to record appropriate and valuable data that can then be used to demonstrate KASA and practice change across the 5 focus areas
- Extension modelling and mentoring for VegNET officers through, regular extension method sharing, attending APEN and Hort Connections conferences yearly for the duration of Phase 3 and utilising APEN, AUSVEG and other key industry bodies mentoring programs as a requirement in Phase 3 for up-skilling extension delivery
- Communicating project success and lessons learnt through various industry channels to create awareness and allow the opportunity for knowledge up take
- Continued streamlined reporting to allow VegNET staff more hands-on time, on farm and in the field with producers, to present and enable best practice change at the farm level
- Focus on supporting adoption of the 5 key project area outputs for example the IPM wheel charts and Insect Monitoring Calendar in conjunction with the Pest and Beneficials Field produced by VegNET and DITT extension partners

Refereed scientific publications

No refereed scientific articles were produced by this project

References

No refereed scientific articles were produced by this project

Intellectual property, commercialisation and confidentiality

No project IP, project outputs, commercialisation or confidentiality issues to report

Acknowledgements

The NT Regional Development Officer thanks all those who helped to see the development of VegNET 2 (VG19017) come to fruition, in particular they are very appreciative for the access to farms and the crucial role in engagement interactions with other growers to encourage adoption of key learnings within their communities as well as to the large collaborations with other relevant industry bodies.

The members of the Regional Extension Advisory Group (REAG) are to be commended for their commitment and dedication to assisting with the development and endorsement of the 2020-2025 Regional Extension Plan and associated plans. Without their valuable insights and continual support, the NT vegetable industry would not continue to thrive.

To the Hort Innovation staff, AUSVEG team and VegNet officers across the 11 regions your support has been greatly appreciated.

Acknowledgments to the support given by industry stakeholders and staff at NT Farmers Association who providing an environment focused on outcomes for the NT vegetable growers thank you.

Appendices

Appendix 1. Grower Database, identified risk strategies/mitigation methods and end of season survey results

Appendix 2. End of Season Survey questions

Appendix 3. Soil Moisture monitoring notes – August/September 2021 – probe installation

Appendix 4. Water Reference Group members

Appendix 5. Water Efficiency survey data – Darwin/Katherine

Appendix 6. NT Soil Symposium Agenda

Appendix 7. VegNET M & E reporting table