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National Banana Development & Extension Program

Project code:

BA19004

Project leader:

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Delivery partner:

Department of Agriculture & Fisheries

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Disclaimer:

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Public summary

The National Banana Development and Extension Program provides a multi-faceted extension service for the Australian banana industry. The project aims to equip growers with the latest research and development (R&D) to inform decisions about farm management practices. Over the past six months, the program has continued delivering extension services for the industry while engaging in a co-design process to inform a future investment in extension and development.

Continuation of extension services for the industry - The program supported the Australian Banana Industry Congress and Scientific Symposium (6–8 August 2025) through a variety of contributions. Program team members were part of the organising committee, collaborated with the R&D Manager (Banana R&D Coordination Program (BA20002)) to organise and co-facilitate the Scientific Symposium, delivered a presentation at the symposium, prepared two posters and delivered accompanying 1-minute pitches, and hosted a booth in the exhibition area. The program also supported two WA growers to attend the congress, addressing cost barriers and sharing their experiences in an upcoming Australian Bananas magazine article. The FNQ team has completed two proof-of concept style trials investigating a post-harvest option to remove sooty blotch flyspeck (SBFS). They have also facilitated a meeting with the Banana Agribusiness Managers (BAGMan) network providing information for them to support their grower clients and businesses. There have been six new pages added to the Better Bananas website (www.betterbananas.com.au) plus 3 updates to the home page. The program team in FNQ and NSW has continued to provide one-on-one extension support to growers through farm visits, phone calls and e-mails.

Co-design process – The co-design process for the future program included a workshop and one-on-one grower consultation. The day long workshop was independently facilitated and involved project leaders from various banana industry initiatives and industry stakeholder representatives. Following the workshop, the program team conducted grower consultation to gather feedback on the themes and activities proposed during the workshop. The co-design process, combining the workshop outcomes, grower feedback, together with feedback from monitoring and evaluation activities throughout the program, informed the development of the project proposal. This proposal, designed to align with industry needs and priorities, was submitted on 30 October 2025.

Table 1. Achievements

Achievement criteria	Delivery partner assessment: • Achieved • Partially achieved • Not achieved	Justification
Summary of on-going extension activities (between 30/04/2025 – 31/10/2025) listed in outputs table.	Achieved	The program facilitated a **BAGMan** (Banana Agribusiness Managers) meeting on Thursday 23 October 2025. There were 13 people who attended the meeting (excluding presenters). The meeting agenda was as follows: • Update from the Integrated Pest and Disease Management Program - *David East, Richard Piper & Daniel Farrell, Department of Primary Industries* • Update and summary of results from the Nutrient Rate Trial Project - *Alex Lindsay, Department of Primary Industries* • Reef protection regulations: clarification and Q&A opportunity - *Amelia Foster, Australian Banana Growers Council* • Insights on Birds and Bats - *Stewart Lindsay, Department of Primary Industries* • New National Banana Development & Extension Program: your input - *Ingrid Jenkins & Tegan Cavallaro, Department of Primary Industries* The FNQ program team have completed 2 proof-of-concept style i**nnovation trials** exploring the use of sodium hypochlorite as a post-harvest treatment for sooty blotch flyspeck (SBFS). Sooty blotch flyspeck is a fungal disease that causes superficial damage to the banana peel which can result in fruit not meeting market specifications. Growers have expressed concern that the recent shift to bunch spraying due to the deregistration of chlorpyrifos will exacerbate fruit fungal diseases including SBFS. The proof-of-concept trials showed that 1% sodium hypochlorite solution applied to both dry and wet fruit for a range of contact times (1-60 minutes) was effective in removing sooty blotch symptoms on the surfaces the solution contacted. Further work needs to be undertaken to progress this. A full summary of the two trials and a list of recommendations and considerations for future work is included in Appendix 1. The program team liaised with the Regulatory Affairs & Crop Protection Manager, Hort Innovation, and the R&D Manager, ABGC about this trial work to determine the next steps. Appendix 1 will also be shared with these stakeholders. There have been 6 new pages added to the **Better Bananas** website (www.betterbananas.com.au) plus 3 updates to the home page promoting the new or timely information. The 6 updates are as follows: • Keeping vigilant on banana freckle • Problem solver/spots on leaves/Banana freckle • Problem solver/spots on fruit/Banana freckle • Timing of bunch cover application and its effect on bunch pests • Volume and timing trial for bunch protection

		• Bunch spray technology trial Updates to the home pages are included in Appendix 2. **One-on-one extension** and other grower extension support: The FNQ program team has undertaken: • 13 farm visits + 2 one-on-one farm visits undertaken off farm (e.g. growers met the team at the South Johnstone DPI office). • 35 significant phone calls to growers. • Presented at the Cassowary Coast Banana Growers Association (14/08/2025) which 15 growers from 12 banana growing businesses attended. • 16 phone calls, in-person meetings and e-mails with industry stakeholders (e.g. agronomists, consultants, resellers and other service providers). The NSW IDO has undertaken: • 11 farm visits • 34 significant phone calls and e-mails to growers, industry stakeholders and researchers. • Presented at the Nambucca Banana and Coffs Harbour Grower Association meetings (4/11/2025 and 5/11/2025) which combined were attended by 14 banana growing businesses. • Study tour to QUT Bioeconomy Lab (Brisbane), 4 selected growers were invited and attended the event with NSW IDO and Leader for Northern Horticulture (NSW DPIRD). The **Australian Banana Industry Congress** was held from Wednesday 6 to Friday 8 August 2025 at the Royal Pines Resort, Gold Coast. The first day was the Science Symposium and the following two days that followed consisted of the main congress agenda. A full summary of the program's contributions to the event is included in Appendix 3. • Program team members Tegan Cavallaro and Steven Norman were part of the organising committee and participated in on-line Teams meetings leading up to the event to help shape the program, especially the R&D elements. • All members (Tegan Cavallaro, Ingrid Jenkins, Stewart Lindsay & Steven Norman) attended the Science Symposium and the two following days of the event. • The project leader (Tegan Cavallaro) worked collaboratively with project leader of the Banana R&D Co-ordination Program (BA20002) Dr Rosie Godwin to organise and facilitate the Scientific Symposium. • The Scientific Symposium was very well attended with 182 researchers, banana growers and industry stakeholders registering for the event. The event featured 18, 10-minute presentations from researchers on a range of banana research and development topics. One of these was from program team member Ingrid Jenkins who gave a 10-minute presentation - *Facing challenges to achieve a quality future.* • 100% of attendees said their knowledge of banana R&D benefited from attending the symposium. 86% said they gained new contacts from attending and 98% said they would attend the event again. **Evaluation undertaken by 97 attendees* • The congress again featured the popular 1-minute science poster pitches which was then followed by the dedicated poster viewing time over a break. Tegan Cavallaro supported Dr Rosie Godwin in organising the 1-minute science poster pitch session.

		• The program submitted two posters authored by Tegan Cavallaro and Ingrid Jenkins and they delivered 1-minute summaries to promote their posters. • The program planned and hosted a booth in the exhibition area. The program team has facilitated 6 **Banana Extension Network** meetings during this 6-month period on 13 May, 10 June, 8 July, 19 August, 9 September, 14 October. These meetings continue to be hosted as hybrid in-person on-line format and are attended by representatives of 10 different projects/programs. To maintain the efficiency of these 1-hour meetings the program team altered the agenda with the first half hour consisting of 3-minute updates from each of the projects/programs and the second half an hour for open discussion on the updates provided. The program provided an opportunity to share R&D information with WA growers. It was established that cost was one of the barriers to Carnarvon growers attending the event. The program in collaboration with ABGC put out an EOI announcement for WA growers to express interest in being part-funded to attend the event. The result was that two growers expressed interest and both growers were partially supported to attend the 3-day event (including the Scientific Symposium). The program team has since drafted an article sharing their experience, what they took away and insights from attending the event with Carnarvon growers and the whole industry. The article which will be publish in the December edition of the Australian Bananas magazine is included in Appendix 4.
Independent facilitator and TOR for co-design agreed with Hort Innovation.	Achieved	The TOR in the form of a co-design brief (Appendix 5) was developed in consultation with Hort Innovation (Matt Reynolds). This was used to help determine the independent facilitator to help guide the co-design process. Cath (Catherine) Botta (PCB Consulting) was selected as the independent facilitator and was subcontracted by the program to facilitate an in-person co-design workshop.
Future extension and development needs for Australian banana industry determined through consultation with industry.	Achieved	The co-design for the future program consisted of a co-design workshop followed by one-on-one input from growers. The co-design workshop with independent facilitator Cath Botta was held on 22 July 2025 with 17 participants including project leaders of the various projects and programs supporting the banana industry and representatives of industry stakeholders. All project team members participated in the workshop. The program team prepared pre-reading for the workshop participants and also a presentation which was given during the workshop. Cath Botta in consultation with the program team and Hort Innovation (Matt Reynolds) formulated the agenda, facilitated the workshop and summarised the outcomes (Appendix 6). Following the co-design workshop the program team wanted to seek feedback from growers on some of the outcomes and suggestions that emerged from the co-design workshop to help ensure that a future program will be designed to deliver activities/services that are of value and meet their needs. The program team sought input on the suggested themes of a future program and some specific project activities. 13 growers were interviewed in FNQ from different regions, farm sizes, cultural backgrounds who had varying degrees of engagement with the

		current program activities. Feedback was sought by the NSW IDO from 11 growers from the Tweed, Coffs Harbour and Nambucca Regions. This feedback from growers is summarised in Appendix 7. The co-design process consisting of the workshop and grower consultation together with previous M&E activities throughout the program helped shape the project proposal which was submitted on 30 October 2025.

Outputs

Table 2. Output summary

Output	Listed in M&E Plan: • Yes • No	Description	Evidence and data
Magazine articles	Yes	The August edition (Issue 74) of the Australian Bananas magazine was published in this period of reporting. The project team contributed to 3 articles/reminders in this edition: - Time ticking on chlorpyrifos (page 8). - Drop your spot, it's the only chance you've got! (Page 9) - Kick-start your biosecurity for under $1000 (Page 31)* *This was a collaborative effort between the program and the communication program and will be included in the refreshed Grower's Kit compiled by the Grower Support – Biosecurity Program.	The August 2025 edition of the Australian Bananas magazine can be downloaded via the Australian Banana Growers Council website: Issue-74-AUGUST-2025-WEB-1.pdf
Better Bananas website updates	Yes	There have been 6 new pages added to the **Better Bananas** website (www.betterbananas.com.au) plus 3 updates to the home page promoting new or timely information in this reporting period.	Links to pages on the Better Bananas website: • Keeping vigilant on banana freckle • Problem solver/spots on leaves/Banana freckle • Problem solver/spots on fruit/Banana freckle • Timing of bunch cover application and its effect on bunch pests • Volume and timing trial for bunch protection • Bunch spray technology trial Updates to the home pages are included in Appendix 2
2023 Australian Banana Industry Congress - Banana Scientific Symposium	Yes	- Co-facilitation of the Scientific Symposium. - 1 x presentation at the Scientific Symposium - 2 x posters in poster display - 2 x 1 minute poster pitches - 1 x exhibition booth.	The program's contribution to the Banana Congress and Scientific symposium is detailed in Appendix 3. The title of the presentation given by Ingrid Jenkins at the Scientific Symposium was *Facing challenges to achieve a quality future* The titles of the posters and associated 1-minute pitches delivered were: - Exploring options to lighten the sooty blotch problem (delivered by Ingrid Jenkins) - Piecing together bunch pest and disease

			management practices (delivered by Tegan Cavallaro). Copies of the posters are included in Appendix 3
Banana Extension Network	Yes	The program team has facilitated 6 Banana Extension Network meetings during this 6-month period on 13 May, 10 June, 8 July, 19 August, 9 September, 14 October.	These monthly meetings were run as hybrid online and in-person meetings. Having this regular communication between the DAF/ABGC extension teams continues to work as a mechanism to keep up to date on different project activities and industry issues.

Outcomes

Table 3. Outcome summary

Outcome as listed in M&E Plan	Progress to achieving outcome	Evidence and data	Progress: • On track • Off track
Growers and industry have access to the latest R&D results. Positive change in KASA for target audiences and project team. Positive feedback at extension events.	Over the past six months, growers and industry stakeholders have had ongoing access to the latest R&D through events such as the Australian Banana Industry Congress and Scientific Symposium, local banana grower association meetings, and one-on-one engagement. Additionally, written resources have been made available via the Better Bananas website and articles published in the Australian Bananas magazine.	Overall feedback from the Banana Scientific Symposium was positive: - 100% of attendees said that their knowledge of banana R&D benefited from attending the symposium. - On a scale of 1-5 (1 - not at all through to 5 - significantly) when asked how much their knowledge of banana R&D activities benefited from attending the symposium 94% of respondents rated a 3 or higher and 70% rated a 4 or 5. - 39% of respondents rated the event 5/5 and 47% rated it a 4/5. - "Well constructed symposium with varied and interesting tropics presented. Well done" – *Banana grower* *97 attendees participated in the evaluation. Appendix 3 contains more evaluation data.	On track
Stronger relationships and networks for shared learning: growers, project team, researchers, industry, and supply chains	The Australian Banana Industry Congress and Scientific Symposium offered the opportunity for networking between growers, researchers, and members of the supply chain. Based on feedback from the 2023 event, the agenda for the Scientific Symposium was adjusted to include longer breaks, allowing more time for networking between attendees, which was well received. Over the past six months, Carnarvon growers involved in the program, through their attendance at the congress and subsequent follow-up discussions with the program team, agreed that a key highlight of attending was the opportunity to connect and network with growers and those who support the industry.	Feedback from the Scientific Symposium: - 86% of respondents said that they gained new contacts from attending the event. - "Well-structured program. Good amount of networking time. Good that speakers ran to time." – *Researcher or support staff* member - "Good day, good time in breaks for discussions" – *Researcher or support staff member* *97 attendees participated in the evaluation. Appendix 3 contains more evaluation data. Feedback from the Carnarvon growers when asked if they if they	On track

		made any valuable connections or network with individuals? - "The growers I spoke with, no matter where they're from, were like-minded and great to talk to. While many things are different for us growing bananas in Carnarvon, most challenges are the same—we all face similar issues." – *Chris Collins* - "It was also valuable to reaffirm connections with the DPI and ABGC staff that support the industry." – *Les Ball*	
In-depth understanding of grower issues and priorities to better target R,D&E efforts. Better understanding of barriers and drivers for best practice adoption	The program's activities and associated monitoring and evaluation initiatives have provided the team with valuable insights into growers' issues and priorities, enabling more targeted research, development, and extension (RD&E) efforts. Over the past six months, the co-design process, which included follow-up one-on-one engagement with growers, has further contributed to shaping the project proposal for the next iteration of the program, ensuring it is tailored to meet the needs of growers.	The co-design workshop provided insights into the key themes a future program could focus on and considerations for future program activities (Appendix 6). The grower consultation, which sought input on the themes proposed during the co-design workshop and specific program activities, was very valuable in shaping the new project proposal (Appendix 7).	On track

Intellectual property

No project IP or commercialisation to report

Issues and risks

Other information

No additional information to report

Appendices

Appendix 1: Innovation trial activity report

Appendix 2: Better Bananas website updates

Appendix 3: Summary of project contributions to the Australian Banana Congress and Science Symposium

Appendix 4: Australian Bananas magazine article - Carnarvon growers reflect on the congress

Appendix 5: Co-design brief

Appendix 6: Co-design workshop: Summary of workshop outcomes

Appendix 7: Summary of grower consultation as part of co-design process

Appendix 1 – Innovation trial activity report

Proof-of-concept research report

DPI Extension Team (October 2025)

The use of sodium hypochlorite as a post-harvest bunch application for treatment of Sooty blotch flyspeck

Background

Sooty blotch flyspeck is a fungal disease that causes superficial damage to the banana peel. It does not affect the eating quality but negatively impacts the aesthetics of the fruit, reducing its market acceptability. Typical symptoms are charcoal-like smudges that are dark and irregular in shape (Image 1). However, flyspeck symptoms are conspicuous, consisting of small dark pinhead spots that coalesce, resulting in specked patches on fruit (Image 2).[1] Marks cannot be removed by normal water bunch washing systems in packing sheds.

Historically in Australia, sooty blotch has always been regarded as a minor issue,[2] mainly affecting Lady Finger and Ducasse bananas (≤3% of production).[3] However, in more recent years anecdotal advice from growers suggests sooty blotch is an emerging situation in Cavendish production.

At certain times of the year, when weather conditions are conducive to the disease, growers in Far North Queensland (FNQ) have reported losses in the tens of thousands of dollars.

Coinciding with its increasing prevalence, is a significant practice change for a large proportion of industry, with growers converting from bunch dusting to bunch spraying, a consequence of the deregistration of chlorpyrifos. Although not scientifically proven, many growers converting, have expressed concern that bunch spraying will exacerbate fruit fungal diseases.

Image 1 Sooty blotch symptoms on Cavendish fruit. The disease presents as charcoal-like smudges that are dark and irregular in shape. Symptoms are also visible on ripened fruit (right).

Image 2 Flyspeck symptoms on Lady Finger fruit.

Current research

Currently there is no registered control options for sooty blotch. Research is currently underway as part of the Banana Integrated Pest and Disease Management Program (BA21004). For Australia, this is the first significant research into the pathology of the disease in bananas. Overseas research associated the disease with a single fungal organism, *Chaetothyrina musarum*.[2] However, work conducted by the IPDM team here in FNQ has isolated an additional six fungal organisms (Table 1) that can produce disease symptoms, suggesting the disease is caused by a complex of fungi.

Table 1 Habits of fungi associated with SBFS symptoms[1]

Fungal organism	Frequently observed	Cultured	Pathogenicity	SBFS overseas
Chaetothyrina musarum	✘	✘	Not tested	✓
Diatractium sp.	✘	✓	Not tested	✘
Meutocladosporiella musae	✓	✓	✓	✘
Paramycosphaerella sp.*	✓	✓	✓	✘
Queenslandosphaerella musae	✓	✓	✓	✘
Ramichloridium sp.	✓	✓	✓	✓
Schizothryium sp.	✓	✓	✓	✓

* Observed on Lady Finger

Laboratory studies are assessing mancozeb and sulphur (products permitted for use on fruit), together with non-pathogenic bacteria recovered from the banana microbiome which may have antagonistic properties. Different laboratory methods are being assessed to determine if species of *Curtobacterium*, *Bacillus* or *Pseudomonas* could manage SBFS infection. To date, two species of *Bacillus* have shown promising results by reducing fungal growth of *Ramichloridium* sp.[1]

While this foundational research is being undertaken and until an in-field treatment is found, the DPI extension team as part of the National Banana Development and Extension Program (BA19004), in collaboration with the IPDM team, has explored the use of sodium hypochlorite as a post-harvest treatment for SBFS management. This proof-of-concept work is detailed in this trial summary report.

Method

Mature hard green Cavendish fruit with symptoms of Sooty blotch blemishes on the peel were collected from the South Johnstone Research Facility in March and April 2025. The fruit was clustered on-farm and efforts were made to reduce sap staining on the fruit at the point of clustering. However, fruit was impacted by some sap staining as shown in the images in this report.

March sample

Dry fruit clusters were treated with a 1% sodium hypochlorite solution sprayed with a small hand-sprayer. Clusters were held upright, and fruit was sprayed to cover the exposed surface area. The treatments applied were different contact times of the 1% solution before it was rinsed off with water using a handheld hose. The contact times were 1-minute, 2-minutes and 3-minutes. A water control was also included, as well as one cluster that was sprayed with the 1% solution and rinsed after 1 hour (to simulate a lunch break) and one cluster that was sprayed with 1% solution but not rinsed.

A minimum of 3 clusters per treatment (treatments 1 to 4) were photo documented and included in Appendix A of this report.

Table 2 Treatments used for March sample

1 – Dry cluster	1% solution @ 1-minute contact time
2 – Dry cluster	1% solution @ 2-minute contact time
3 – Dry cluster	1% solution @ 3-minute contact time
4 – Dry cluster	Water
5 – Dry cluster (x1)	1% solution rinsed after 1 hour
6 – Dry cluster (x1)	1% solution not rinsed

Sodium hypochlorite product and dilution

Coogee sodium hypochlorite (10% solution) was used to make a 1% solution (10 000 ppm).

$C_1V_1 = C_2V_2$

$10\%V_1 = 1\%x\ 1000ml$

$V_1 = \frac{1\%x\ 1000ml}{10\%}$

V_1 = 100 ml sodium hypochlorite solution in 900ml water

Fungal identification

An untreated sample with sooty blotch symptoms was given to Plant Pathologist, David East who confirmed the fruit was affected by *Ramichloridium* sp. (likely *musae)* (Image 3). This is a common organism being isolated from fruit with sooty blotch symptoms in Far North Queensland.

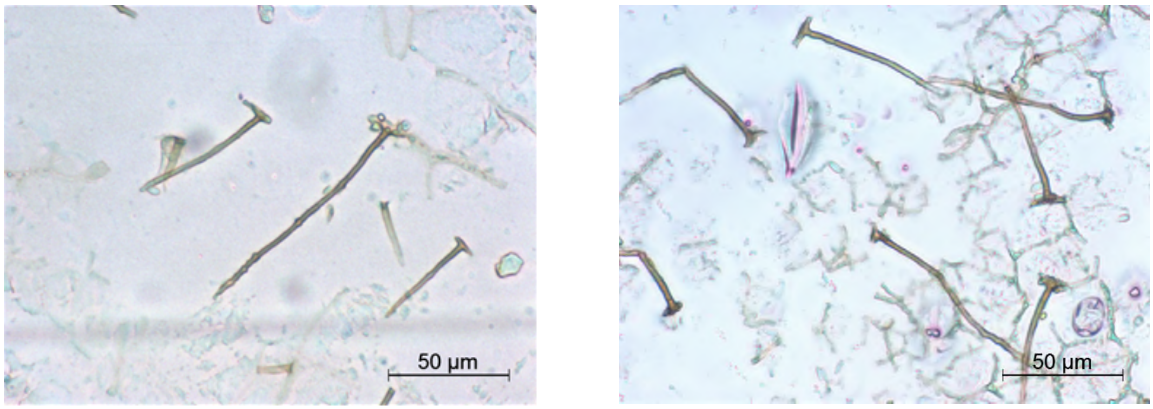


Image 3 Microscopic images of fungal hyphae of causal organism *Ramichloridium* sp.

Assessment method

The method used to assess the treatment effects were visual observations documenting the presence or absence of blotch post-treatment. The treatment effects observed were recorded as images pre-and-post treatment and post ripening. See Image 4 below as example.

Pre-treatment Post-treatment Post-treatment (ripened)

Image 4 Cluster treated with 1% sodium hypochlorite solution with 2-minute contact time before being rinsed with water. Marks remaining on the left finger of the middle and last photo are sap stains, not sooty blotch marks.

April sample

The April sample was undertaken to confirm that the same treatment effect could be observed if spraying onto wet fruit. If successful, this would provide growers with additional options when looking at retrofitting the spray application into their shed setup.

Wet fruit clusters were treated with a 1% sodium hypochlorite solution sprayed with a small hand-sprayer. Clusters were held upright, and fruit was sprayed to cover the exposed surface area. The treatments applied were different contact times of the 1% solution before fruit was submerged in a tub full of water, this was to simulate water rinsing fruit in a trough system. The contact times were 1-minute, 5-minutes, 10-minutes and 20-minutes. A water control was also included.

A minimum of 3 clusters per treatment (treatments 1 to 5) were photo documented and included in Appendix B of this report.

Table 2 Treatments used for April sample

1 – Wet cluster	1% solution @ 1-minute contact time
2 – Wet cluster	1% solution @ 5-minute contact time
3 – Wet cluster	1% solution @ 10-minute contact time
4 – Wet cluster	1% solution @ 20-minute contact time
5 – Dry cluster	Water

Results

The 1% sodium hypochlorite solution applied to both dry and wet fruit at all the contact times (1 to 60 minutes) was effective in removing sooty blotch symptoms on the surfaces the solution contacted. The cluster that wasn't rinsed with water after the solution had been applied, showed signs of phytotoxicity post-ripened. As expected, water did not remove blotch symptoms on the untreated control clusters.

The fungal organism *Ramichloridium* sp. was isolated from the fruit samples and is known to cause blotch symptoms on banana fruit.

Recommendations

- Due to there being no current control options for Sooty blotch, **investigating the APVMA requirements to allow the use of sodium hypochlorite as a post-harvest treatment for Sooty blotch should be explored**. It's recommended that this is undertaken as a stepwise process, to limit the financial risk, with progression based on the feasibility and findings at different stages (listed 1-4 below) of the investigation.

  A suggested staged process is:

  1) Seek APVMA Pre-Application Assistance (PAA), tier 3.
  2) Undertake minimum concentration/contact time trials, including spraying whole bunches on bunch line.
  3) Undertake WH&S and environmental risk assessments based on minimum concentration and application as a spray system.
  4) Undertake supply chain studies.

- The effectiveness of sodium hypochlorite is a direct function of both concentration and the contact time. Therefore, **further trial work is needed to determine the minimum concentration and contact time** to achieve the desired effect. Previous proof of concept work has shown concentrations up to 0.1% is not effective at removing blotch marks, however this should be verified by the proposed minimum concentration trial. Contact times will need to consider how a spray system would be retrofitted to suit layout and bunch hang times within most sheds.

- Previous work conducted by the DPI has showed that adding chlorine to banana troughs was not feasible due to the volume of organic matter, particularly banana sap in the troughs, oxidising the chlorine and reducing the concentration, requiring the continual addition of concentrate. **Therefore, a spray system is deemed more appropriate**, if WH&S and environmental risks can be managed at the determined minimum effective concentration rate.

- This proof-of-concept work used clusters of bananas. **Any future trials should include spraying harvested whole bunches** on a bunch line to ensure the recommended spray system can achieve adequate coverage.

- Once a minimum concentration rate is determined, an **assessment of WH&S and environmental risks should be undertaken**.

- If it is deemed that the identified risks can be appropriately managed, **further supply chain studies would need to be undertaken** to assess if the chlorine treatment has any negative impact on quality including the green life and shelf life of bananas.

References

1. Grice, K, East D, Pathania N (2025, August 6-8). A deep dive into the SBFS complex [Poster presentation]. Australian Banana Growers' Congress, Gold Coast, Australia.
2. Jones DR, editor. Handbook of diseases of banana, abacá and enset. Oxfordshire: CAB International; 2019.
3. Australian Banana Growers' Council. Our industry [Internet]. Brisbane (AU): ABGC; 2025. Available from: https://abgc.org.au/our-industry/#growing-regions

Appendix A

Treatment 1 – 1% solution @ 1-minute contact time and then washed with water

Cluster 3 (Pre)

Cluster 3 (Post – green unripe)

Cluster 3 (Post – yellow ripened)

Cluster 7 (Pre)

Cluster 7 (Post – green unripe)

Cluster 7 (Post – yellow ripened)

Cluster 11 (Pre)

Cluster 11 (Post – green unripe)

Cluster 11 (Post – yellow ripened)

Cluster 15 (Pre)

Cluster 15 (Post – green unripe)

Cluster 15 (Post – yellow ripened)

Cluster 19 (Pre)

Cluster 19 (Post - green unripe)

Cluster 19 (Post - yellow ripened)

Comments: Blotch marks no longer evident post treatment (1 minute) Sap stains remaining

Treatment 2 – 1% solution @ 2-minute contact time and then washed with water

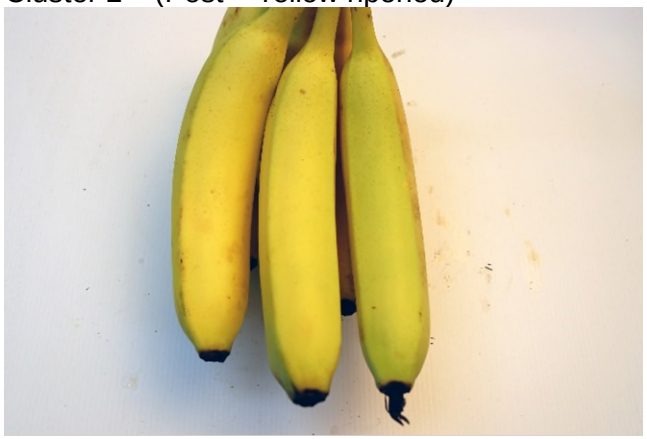
Cluster 2 – (Pre)

Cluster 2 – (Post – Green unripe)

Cluster 2 – (Post – Yellow ripened)

Cluster 10 – (Pre)

Cluster 10 – (Post – Green unripe)



Cluster 10 – (Post – Yellow ripened)

Cluster 18 – (Pre)

Cluster 18 – (Post – Green unripe)

Cluster 18 – (Post – Yellow ripened)

Comments: Blotch marks no longer evident post treatment (2 minutes) Sap stains remaining

Treatment 3 – 1% solution @ 3-minute contact time and then washed with water

Cluster 1 (Pre)

Cluster 1 (Post – Green unripe)

Cluster 1 (Post – Yellow ripened)

Cluster 9 (Pre)

Cluster 9 (Post - Green unripe)

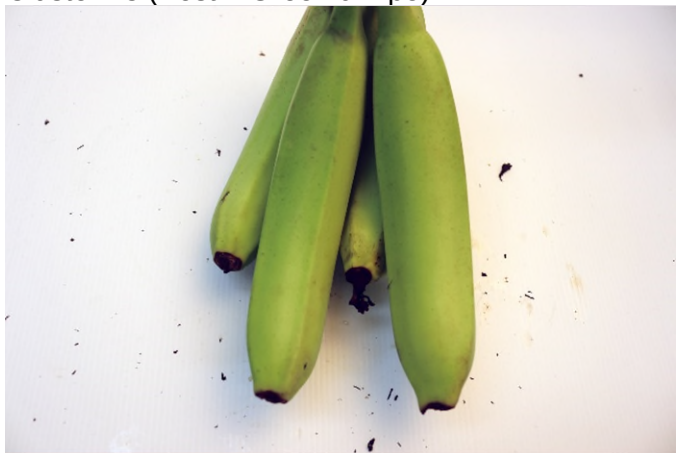
Cluster 9 (Post – Yellow ripened)

Cluster 13 (Pre)

Cluster 13 (Post – Green unripe)

Cluster 13 (Post – Yellow ripened)

Cluster 17 (Pre)



Cluster 17 (Post – Green unripe)

Cluster 17 (Post – Yellow ripened)

Comments: Blotch marks no longer evident post treatment (3 minutes)

Treatment 4 – Water control

Cluster 8 (Pre)

Cluster 8 (Post – green unripe)

Cluster 8 (Post – yellow ripened)

Cluster 12 (Pre)

Cluster 12 (Post – green unripe)

Cluster 12 (Post – yellow ripened)

Cluster 16 (Pre)

Cluster 16 (Post – green unripe)

Cluster 16 (Post – yellow ripened)

Comments: Washing with water does not remove sooty blotch marks

Treatment 5 – 1% solution @ 60 minute contact time and then washed with water

Cluster E1 (Pre)

Cluster E1 (Post – green unripe)

Cluster E1 (Post – yellow ripened)

Comments: Sooty blotch marks removed. 1 hour contact has not changed colour of peel.

Treatment 6 - 1% solution and not washed with water

Cluster E0 – (Pre)

Cluster E0 – (Post – green unripe)

Cluster E0 – (Post – yellow ripened)

Comments: 1% solution removed sooty blotch marks

Appendix B

Treatment 1 – Washed with water to wet fruit, 1% solution applied @ 1 minute contact time and then dipped in water to rinse (Pre-treatment photos)

Cluster 1 (**Pre** treatment)

Cluster 5 (**Pre** treatment)

Cluster 12 (**Pre** treatment)

Treatment 1 – Washed with water to wet fruit, 1% solution applied @ 1 minute contact time and then dipped in water to rinse (Post-treatment photos)

Cluster 1 (**Post** treatment)

Cluster 5 (**Post** treatment)

Cluster 12 (**Post** treatment)

Treatment 2 – Washed with water to wet fruit, 1% solution applied @ 5-minute contact time and then dipped in water to rinse (Pre-treatment photos)

Cluster 7 (**Pre** treatment)

Cluster 8 (**Pre** treatment)

Treatment 2 – Washed with water to wet fruit, 1% solution applied @ 5-minute contact time and then dipped in water to rinse (post-treatment photos)

Cluster 7 (**Post** treatment)

Cluster 8 (**Post** treatment)

Treatment 2 – Washed with water to wet fruit, 1% solution applied @ 5-minute contact time and then dipped in water to rinse (pre-treatment photos)

Cluster 9 (**Pre** treatment)

Cluster 9 (**Pre** treatment)

Treatment 2 – Washed with water to wet fruit, 1% solution applied @ 5-minute contact time and then dipped in water to rinse (post-treatment photos)

Cluster 9 (**Post** treatment)

Cluster 9 (**Post** treatment)

Treatment 3 – Washed with water to wet fruit, 1% solution applied @ 10-minute contact time and then dipped in water to rinse (pre-treatment photos)

Cluster 4 (**Pre** treatment)

Cluster 4 (**Pre** treatment)

Treatment 3 – Washed with water to wet fruit, 1% solution applied @ 10-minute contact time and then dipped in water to rinse (post-treatment photos)

Cluster 4 (**Post** treatment)

Cluster 4 (**Post** treatment)

Treatment 3 – Washed with water to wet fruit, 1% solution applied @ 10-minute contact time and then dipped in water to rinse (pre-treatment photos)

Cluster 6 (**Pre** treatment)

Cluster 10 (**Pre** treatment)

Treatment 3 – Washed with water to wet fruit, 1% solution applied @ 10-minute contact time and then dipped in water to rinse (post-treatment photos)

Cluster 6 (**Post** treatment)

Cluster 10 (**Post** treatment)

Treatment 4 – Washed with water to wet fruit, 1% solution applied @ 20-minute contact time and then dipped in water to rinse (pre-treatment photos)

Cluster 2 (**Pre** treatment)

Cluster 2 (**Pre** treatment)

Treatment 4 – Washed with water to wet fruit, 1% solution applied @ 20-minute contact time and then dipped in water to rinse (post-treatment photos)

Cluster 2 (**Post** treatment)

Cluster 2 (**Post** treatment)

Treatment 4 – Washed with water to wet fruit, 1% solution applied @ 20-minute contact time and then dipped in water to rinse (pre-treatment photos)

Cluster 3 (**Pre** treatment)

Cluster 11 (**Pre** treatment)

Treatment 4 – Washed with water to wet fruit, 1% solution applied @ 20-minute contact time and then dipped in water to rinse (post-treatment photos)

Cluster 3 (**Post** treatment)

Cluster 11 (**Post** treatment)

Treatment 5 – Control washed with water only

Cluster 16 – (**Pre**- treatment - Control – water wash only)

Cluster 16 – (**Post**- treatment – Control – water wash only)

Appendix 2 - Better Bananas website updates

(1 May 2025 – 31 October 2025) – www.betterbananas.com.au

Webpage	Date published
Keeping vigilant on banana freckle	01/10/2025
Problem solver/spots on leaves/Banana freckle	01/10/2025
Problem solver/spots on fruit/Banana freckle	01/10/2025
Timing of bunch cover application and its effect on bunch pests	14/05/2025
Volume and timing trial for bunch protection	04/07/2025
Bunch spray technology trial	03/07/2025
Home page updates **1. Banana freckle** Having a conversation with your staff about the importance of reporting anything unusual in your banana plants is just as important as it's ever been. The risk of exotic pests and diseases is ever present, and early detection is critical to limit the impact. Banana freckle poses a significant threat to Australia's banana industry. The fungus *Phyllosticta cavendishii* causes banana freckle disease in Cavendish and non-Cavendish varieties and is found in the Northern Territory. Click here for more information to help guide a conversation on banana freckle, including what you and your staff need to look out for. **2. Deleafing reminder** **Drop your spot, it's the only chance you've got!** Have you scheduled regular deleafing into your work program? The warm weather is ramping up and this is your chance to remove the spot from your canopy before the wet season kicks in. This year has certainly been challenging for growers on Queensland's wet tropical coast, with the first half of 2025 recording 3451 mm of rain at Innisfail aerodrome. DPI's Banana Extension Team and plant pathologist, David East have worked together to produce yellow Sigatoka information resources that includes a summary of best management practices. Dave's top tips include: • Regularly deleaf your canopy. This is critical, as you can't spray your way out of a problem. • Use fungicides appropriately and always follow label directions. • Deleaf before you apply systemic fungicides, otherwise you are wasting your money and promoting resistance.	 30/09/2025 26/08/2025

• Use the winter-spring period to clean up your canopy prior to going into the wet season. David also shares information on block hygiene and management that can also assist with reducing disease pressure. If you are a commercial banana grower and would like to have a chat about your yellow Sigatoka management, feel free to contact DPI's Banana Extension Team on 13 25 23 or email betterbananas@dpi.qld.gov.au. **3. Chlorpyrifos reminder** **Have you changed your bunch protection practices recently?** New information on bunch pest and disease management trials using alternative (to chlorpyrifos) registered chemicals and cultural practices is now available. If you are a commercial banana grower and would like further assistance on bunch pest and disease management, contact DPI's Banana Extension Team on 13 25 23 or email betterbananas@dpi.qld.gov.au.	26/08/2025

Appendix 3 – Summary of project contributions to the Australian Banana Congress and Science Symposium

The Australian Banana Industry Congress was held from Wednesday 6 to Friday 8 August 2025 at the Royal Pines Resort, Gold Coast. The first day was the Science Symposium and the following two days that followed consisted of the main congress agenda. All project members (Tegan Cavallaro, Ingrid Jenkins, Stewart Lindsay & Steven Norman) attended the Science Symposium and the two following days of the event. Below is a summary of the project contributions to the Banana Science Symposium and the Banana Congress.

Banana Science Symposium 2025 (6 August 2025)

The Banana Science Symposium like the 2023 event was held in conjunction with the 2025 Australian Banana Industry Congress as a one-day event. There were 182 researchers, banana growers and industry stakeholders who registered to attend the event. The event featured 18, 10-minute presentations from researchers on a range of banana research and development topics (agenda included in Appendix 1). One of these was from program team member Ingrid Jenkins who gave a 10-minute presentation - *Facing challenges to achieve a quality future*.

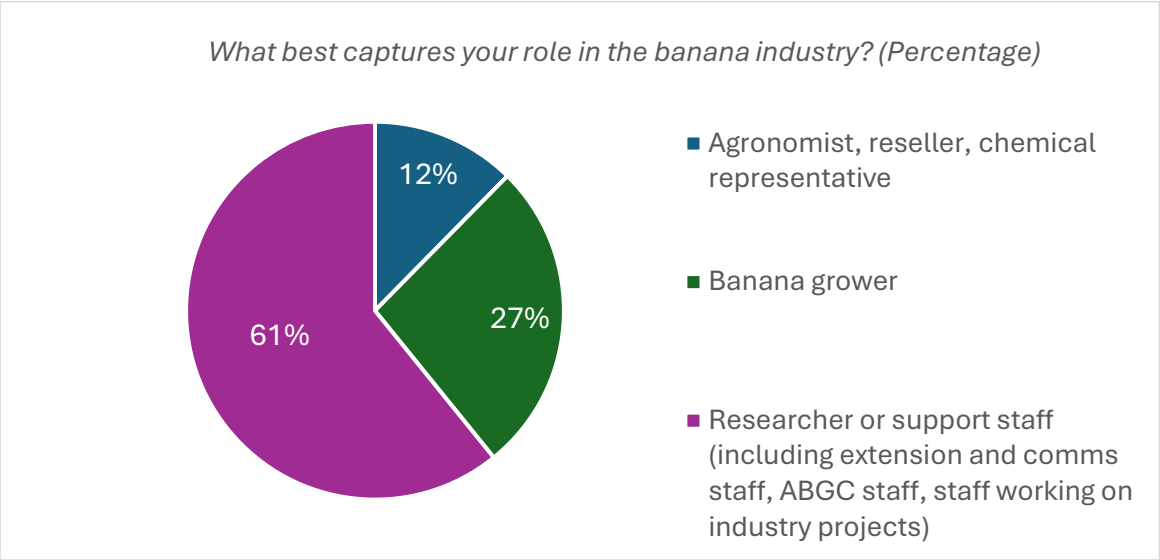
The agenda also included a guest presentation from international speaker Professor Altus Viljoen from Stellenbosch University. Presenters formed panels at the end of sessions (2-4 presentations) for Q&A time to answer questions from the audience. In response to feedback from the 2023 event, additional time was built into breaks to allow more time for networking and discussion amongst attendees.

The event was funded by the Banana R&D Co-ordination Project (Funded by Hort Innovation), sponsored by Woolworths Group and the guest speaker was sponsored by the Australian Centre of International Agricultural Research. The event was organised and co-facilitated by Rosie Godwin (project leader of the Banana R&D Co-ordination Program (BA20002), ABGC) and Tegan Cavallaro (project leader National Banana Development & Extension Program (BA19004), Department of Primary Industries). The Banana Industry Communication Program (BA22000) (Led by Amy Spear ABGC) with funding from Hort Innovation co-ordinated the 2025 Australian Banana Industry Congress and provided logistical support to the science symposium event.

Participants at the 2025 Banana Science Symposium

Evaluation

At the end of the symposium, participants were asked to evaluate the event and provide feedback via an online survey. A total of 97 people completed the evaluation (12 agronomists, resellers, chemical representatives, 26 banana growers and 59 research and support staff).



The evaluation questions asked were as follows:

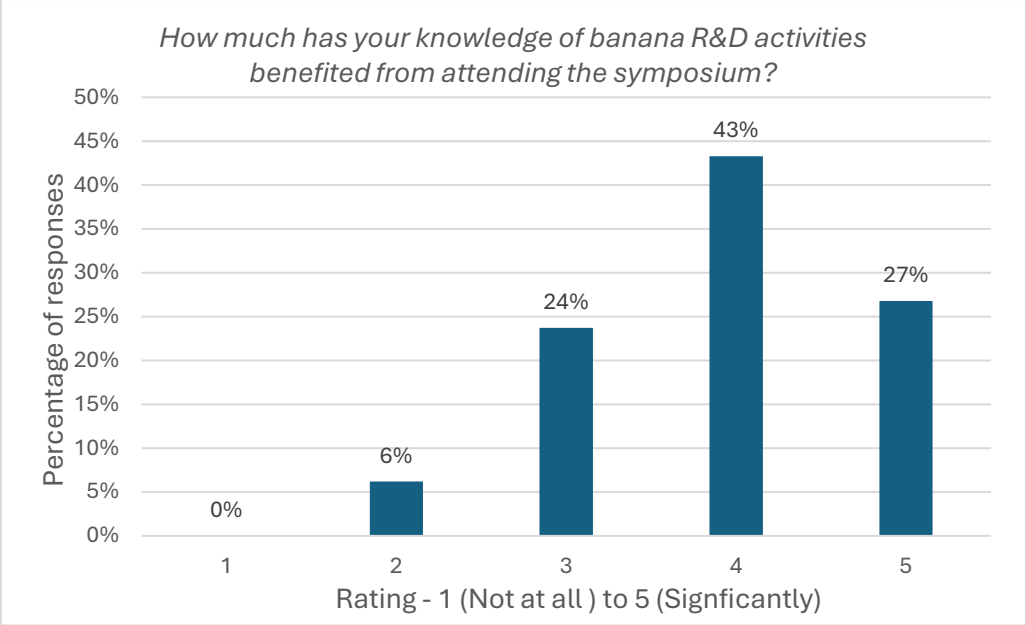
- Has your knowledge of banana R&D activities benefited from attending the symposium? (Yes/No)
- How much has your knowledge of banana R&D activities benefited from attending the symposium (Rating 1-5 (Not at all→ Significantly)).
- Have you gained new contacts from attending this symposium (Yes/No)
- Would you attend this event again? (Yes/No)
- How would you rate this event overall? (Rating 1-5 (Lowest →Highest))
- Which presentation did you find most interesting? (Free text)
- Any other feedback, comments, or suggestions.

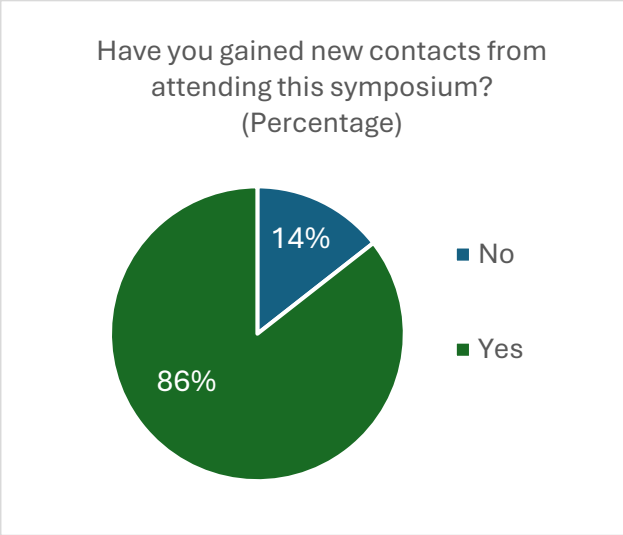
Below is a summary of the responses to these evaluation questions.

100% of attendees said that their knowledge of banana R&D benefited from attending the symposium.

How much has your knowledge of banana R&D activities benefited from attending the symposium? (Number of responses)

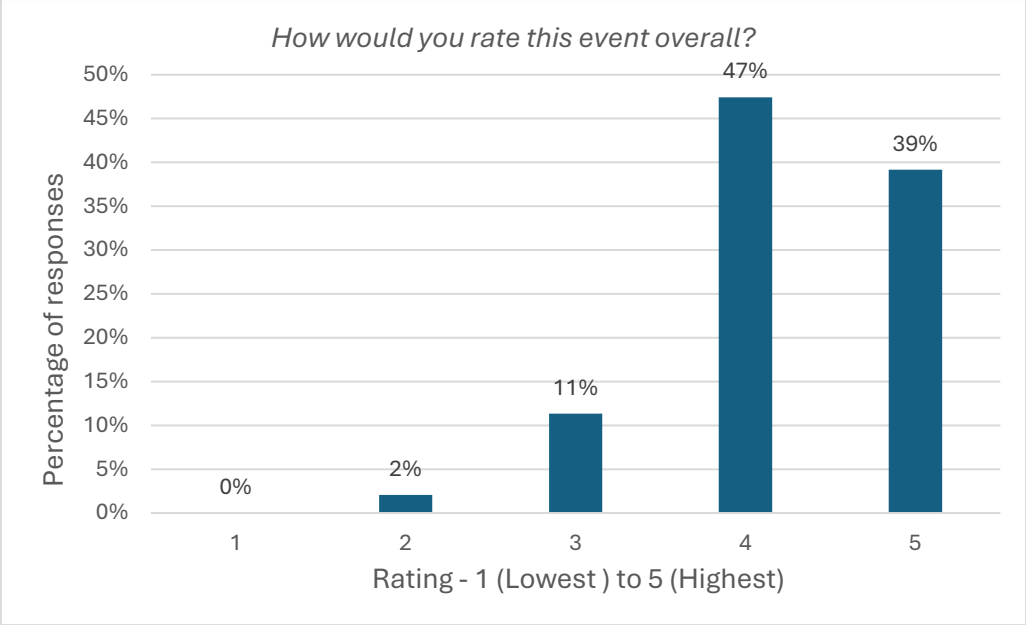
	Rating				
	1	2	3	4	5
	Not at all→ Significantly				
Agronomist, reseller, chemical representative	0	1	5	5	1
Banana grower	0	4	10	10	2
Researcher or support staff (including extension and comms staff, ABGC staff, staff working on industry projects)	0	1	8	27	23
Total	0	6	23	42	26





Have you gained new contacts from attending this symposium? (Number of responses)		
	Yes	No
Agronomist, reseller, chemical representative	2	10
Banana grower	3	23
Researcher or support staff (including extension and comms staff, ABGC staff, staff working on industry projects)	9	50
TOTAL	14	83

98% of attendees said they would attend this event again. Those (2) that indicated that they would not attend again were researchers or support staff.



Insights from the question - Which presentation did you find the most interesting?

The presentations mentioned by attendees as the most interesting were:

- Survival of the mite predator, *Stethrous Fenestralis* after exposure to banana fungicides – *Daniel Farrell, Department of Primary Industries*
- Have you got your soil health covered? The role of ground cover in banana farm soils – *Hazel Gaza, Department of Primary Industries*

Session	Most interesting presentation categorised by session.
Guest Speaker	8
Gene Scene and Variety Show	19
Protect and Detect	14
Mites, flights and things that keep you up at night	31
Ground truths	19

Some people mentioned sessions rather than presentations as their most interesting. Some people nominated two presentations or sessions or all presentations (8 people). In these instances, both or all presentations/sessions are added into the above counts.

How would you rate this event overall?

	Rating				
	1	2	3	4	5
	Lowest → Highest				
Agronomist, reseller, chemical representative	0	0	2	9	1
Banana grower	0	2	6	16	2
Researcher or support staff (including extension and comms staff, ABGC staff, staff working on industry projects)	0	0	3	21	35
Total	0	2	11	46	38

Responses to the question – Any other feedback, comments or suggestions.	
Positive feedback	**Improvement feedback**
Feedback from **agronomists, resellers, chemical representatives.**	
• Good sessions • Good time keeping	• Work on rust thrip • Send all the presentations in emails after the so can be referred for details • To make the presentations before lunch a little easier to digest.
Feedback from **banana growers**	
• Well organised and run. • Well done Tegan & Rosie. Fantastic event! • Great job Rosie and Tegan • Well constructed symposium with varied and interesting topics presented. Well done.	• The genetics talks were quite technical • It's too cold • Less scientific information and more practical farming related information • The science side was a little heavy would be good if you had some more grower friendly presentations that we could take back to use on farm. The cairns one had a lot more variety for growers. • Well run. Be nice to have had some startling new research but maybe there isn't any.
Feedback from **researchers and support staff (including extension and comms staff, ABGC staff, staff working on industry projects)**	
• Good day, good time in breaks for discussions • Food was awesome • Great work!!! • Thank you for the decent breaks and good time keeping! • Great conference, thank you! • The format of panel discussions/QT were good. A very pleasant day. • Great day • Have a diverse group of topics • Well prepared & delivered • Great event. Everyone in the audience looked engaged. Sessions were a good length and good pitch. • Well-structured program. Good amount of networking time. Good that speakers ran to time. • Excellently designed and executed. Well done. • Great day. Some of the presentations were over my head (genetics) but great information and have made new contacts. • All good. Great program, great speakers, great location.	• No banana lollies! Haha. Someone should research tastier banana lollie flavours! • Lunch too long • less unintelligible gene jockey stuff • Talks need to be pitched to the audience • Maybe more focused presentation representing growers • Breaks, on longer side - 1hour for lunch is enough. Some variety of talks other than Tr4/wilt • Encourage presenters to describe their graphs and diagrams; and only display those that they can describe for the scientifically less literate. Also encourage presenters to draw out relevance of their research to growers today • More diversity in presentations which deliver across disciplines and not just TR4 (despite its importance) • Attendance of retailers around the future chemicals and controls of fruit quality • You could another category as regulator or biosecurity? • I'd suggest having the scientific symposium separate from the banana congress and last two days, so that the science can be presented and discussed in more profound ways. • Some more food and drinks would be good.

Reflections and recommendations

Two weeks after the event Rosie Godwin (ABGC), Tegan Cavallaro (DPI) and Amy Spear (ABGC) had a debrief of the event via Teams to reflect on the event, discuss feedback and suggest recommendations for consideration for a future science symposium event. From the evaluation and feedback received from conversations with participants following the event, the consensus was that the event was a success. It provided the opportunity for researchers to share information about the latest R&D with each other as well as interested growers and industry stakeholders. The following points were raised from feedback and discussion:

- There was positive feedback about the agenda and comments about the well structure and designed program. The main theme that emerged from the feedback was regarding the technical and scientific nature of some of the content. It is a challenge to communicate science to a mixed target audience. There were more growers and stakeholders (e.g. agronomists, resellers) than the previous event held alongside the congress in 2023 which is likely to have led to more feedback on the content. From the debriefing meeting a suggestion to help cater for the mixed audience would be to potentially formulate a set question which relates to growers and/or industry which all presenters would need to include and answer as part of their presentation. This technique may help to draw out the relevance of some of the more complex scientific topics/presentations.
- Having guest speaker Prof Altus Viljoen was great to offer an international perspective on Fusarium wilt tropical race 4. Future events could again consider a guest speaker either from overseas, or from a different industry or someone outside the banana R&D community.
- The techniques used to keep the event running to time (including presenter timing cues, in-build buffer time, method of keeping the Q&A timing visual to the audience) worked very well and should be utilised similarly for a future event.
- Outsourcing the AV support for the entire day was valuable to ensure the day ran smoothly and professionally. Future events should have sufficient budget for similar AV support.
- Based on feedback from the 2023 event more time was allocated to the breaks to allow more time for networking amongst participants. This was well received by participants. The same amount of time should be allocated for networking amongst participants at a future event. The brief 'icebreaker' style activities were also strategically included into the program worked well to encourage brief discussion amongst participants at tables and created energy in the room. Similar short activities should be incorporating into a future event.
- The collaboration between Rosie Godwin (Banana R&D Co-ordination Project), Tegan Cavallaro (National Banana Development & Extension Program) and Amy Spear (Banana Industry Communication Program) again worked very well and the collaborative effort between projects would be important for a future event if undertaken alongside the Banana Congress.

Australian Banana Industry Congress (7-8 August 2025)

The program supported the Banana Congress in a range of ways. Program team members Tegan Cavallaro and Steven Norman were part of the organising committee. They participated in on-line Teams meetings leading up to the event to help shape the program especially the R&D elements. The congress again featured the popular 1-minute science poster pitches which was then followed by the dedicated poster viewing time over a break. The project leader Tegan Cavallaro supported Rosie in organising the1-minute science poster pitch session. The program submitted two posters authored by Tegan Cavallaro and Ingrid Jenkins and delivered 1-minute summaries to promote their posters. Below are the two posters which featured in the session.

Exploring options to lighten the sooty blotch problem

Department of Primary Industries
Ingrid Jenkins[1], Tegan Cavallaro[1], Stewart Lindsay[1], David East[1] and Kathy Grice[2]
[1] South Johnstone Research Facility
[2] Mareeba Research Facility

Sooty blotch – an emerging situation

Sooty blotch is a fungal disease that causes superficial damage to the banana peel. It does not affect the eating quality but negatively impacts the aesthetics of the fruit, reducing its market acceptability. Typical symptoms are charcoal-like smudges that are dark and irregular in shape (Image 1). Marks cannot be removed by normal water bunch washing systems in packing sheds.

Historically in Australia, sooty blotch has always been regarded as a minor issue,[1] mainly affecting Lady Finger and Ducasse bananas (≤3% of production)[2]. However, in more recent years anecdotal advice from growers suggests sooty blotch is an emerging situation in Cavendish production.

At certain times of the year, when weather conditions are conducive to the disease, growers in Far North Queensland (FNQ) have reported losses in the tens of thousands of dollars.

Coinciding with its increasing prevalence, is a significant practice change for a large proportion of industry, with growers converting from bunch dusting to bunch spraying, a consequence of the deregistration of chlorpyrifos. Although not scientifically proven, many growers converting, have expressed concern that bunch spraying will exacerbate fruit fungal diseases.

Image 1 Sooty blotch symptoms on Cavendish fruit. The disease presents as charcoal-like smudges that are dark and irregular in shape. Symptoms are also visible on ripened fruit (right).

The role of research

Currently there is no registered control options for sooty blotch. Research is currently underway as part of the Banana Integrated Pest and Disease Management Program (BA21004). For Australia, this is the first significant research into the pathology of the disease in bananas. Overseas research associated the disease with a single fungal organism, *Chaetothyrina musarum*.[1] However, work conducted by the IPDM team here in FNQ has isolated an additional six fungal organisms that can produce disease symptoms, suggesting the disease is caused by a complex of fungi.

While this foundational research is being undertaken, the DPI extension team as part of the National Banana Development and Extension Program (BA19004) in collaboration with the IPDM team is exploring a post-harvest treatment option.

Promising post-harvest solution

- Bunches sprayed with a sodium hypochlorite solution at a specific concentration for a minimum contact time of 1 minute was effective at removing most sooty blotch marks. Images 2a-c is an example of a fruit cluster treated with a 2-minute contact time.
- This treatment was successful when applied to both dry and wet fruit.
- Fruit sprayed with sodium hypochlorite should be rinsed with water after specified contact time to ensure there is no phytotoxicity damage (Image 3).

Pre-treatment

Image 2a Fruit cluster pre-treatment showing sooty blotch symptoms.

Post-treatment

Image 2b Fruit cluster treated with sodium hypochlorite solution with a contact time of 2 minutes and rinsed with water.

Post-treatment (ripened)

Image 2c Treated fruit cluster ripened.

Not rinsed

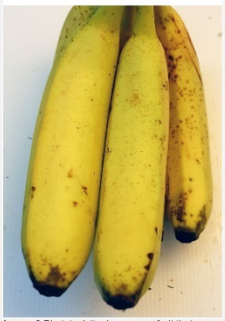


Image 3 Phytotoxicity damage on fruit that was not rinsed with water after the application of sodium hypochlorite solution.

What's next?

- More work is needed to ensure the treatment has no negative impact on green life or shelf life.
- Determine APVMA regulation requirements for its use at effective concentration, which may include the need for efficacy data and human health and environmental risk assessments.

Sources
1. Jones DR, editor. Handbook of diseases of banana, abacá and enset. Oxfordshire: CAB International; 2019.
2. Australian Banana Growers' Council. Our industry [Internet]. Brisbane (AU): ABGC; 2025. Available from: https://abgc.org.au/our-industry/#growing-regions

This research has been undertaken as part of the National Banana Development and Extension Program (BA19004), which is funded by Hort Innovation, using the banana industry research and development levies and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture. The Queensland Government has also co-funded the project through the Department of Primary Industries.

Hort Innovation BANANA FUND

Queensland Government

Piecing together bunch pest and disease management practices

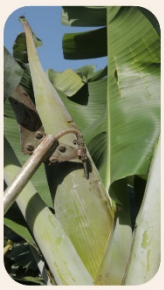
Tegan Cavallaro, Ingrid Jenkins, Stewart Lindsay, Sarah Williams

Queensland Department of Primary Industries, South Johnstone

Banana bunch pests, consisting of vertebrates (e.g. birds and bats), insects (e.g. banana rust thrips, banana flower thrips, banana scab moth) and fruit fungal diseases, all impact fruit quality and can considerably increase on-farm waste. It is no surprise, that growers reported bunch pests as one of the main factors affecting yield and quality when prioritising issues with the National Banana Development & Extension Program team 5 years ago. Managing these pests is compounded by the loss of chlorpyrifos and the permitted 'dusting' application. With this in mind the team proactively undertook a series of field trials to provide knowledge around managing bunch pests in the absence of chlorpyrifos. Trial results, and grower experiences have been shared at industry events such as the Bunch Spray Forum, roadshows, field days etc, and via written material (e.g. Australian Bananas magazine). Below is a summary of some of the key learnings.

Bell injection

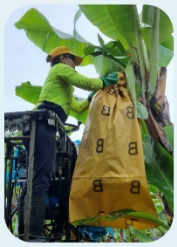
- Timing of injection and bell position (upright) is critical, especially for scab moth control.
- Volume of bell injection is important for flower thrips control.
- Bell injection with 40mL volume of acephate solution @ label rate did not provide a commercially acceptable level of control of flower thrips.
- Both 60mL of acephate @ label rate or 60mL spinetoram (PER8798) solutions provided good control of flower thrips.
- When compared, spinetoram recorded less flower thrips damage and may be considered if flower thrips pressure is high.



Remember *- The permitted mixing rate for bell injection with spinetoram is 40mL/10L (PER8798)*

Bagging and fruit fungal issues

- For growers with bird and bat pressure, bagging early (bells) significantly reduces scratching.
- Bagging early (bells) also reduces rust thrips damage.
- Leaving a hole or 'flue' in the top of the bunch cover is thought to increase air flow through the bag and reduce fruit speckling. Trial work indicates that this reduces fruit speckling, however the practice is not a treatment on its own.
  - Tying bags with a 'flue' did not increase rust thrips damage.
  - Fungal diseases such as sooty blotch and fruit speckle impact fruit quality.
- Paper bunch covers may reduce fungal issues and trial results are promising but not conclusive. Growers could consider trialling them if they have high fungal disease pressure.



Bunch spraying

- Bunch spraying with 60mL of spinetoram @ label rate provided good control of rust thrips.
- Coverage is important!
- Both air assisted, and hydraulic spray equipment provided good control.
- Staff training is critical to ensure good coverage and correct volume is consistently achieved.
- Growers and commercial providers continue to innovate their spray systems to achieve good coverage in a timely and effective way.

Remember *– Check labels as different formulations can have different mixing rates. The rate for bunch spraying with spinetoram is different to that permitted for bell injection.*

Ground and stem application

- In addition to bunch protection, chemical control for rust thrips can be directed at the soil dwelling pupal stage and adults and larvae on the plant via stem injection.
- Consider the timing of applications ahead of peak insect pressure. Ground sprays may take 6-7 weeks compared to stem treatments (2-3 weeks) before full effects are observed on rust thrips populations.

Remember *– Group 4A chemicals (e.g. imidacloprid) can lead to mite flares. Limit the use of these chemicals at times of the year when environmental conditions are favourable to mite flares (e.g. hot, dry periods).*

Resistance management

- There are limited chemical actives available to control bunch pests, so chemical stewardship is IMPORTANT! Repeated use of chemicals with the same mode of action, and/or application of sub-lethal doses can increase the risk of resistance developing.

There isn't a one size fits all approach to managing bunch pests.
Research is continuing to investigate the knowledge gaps. Trialling practices on your own farm is important.

Get in touch with the program team to arrange a farm visit - 07 4220 4152 or betterbananas@dpi.qld.gov.au

Visit **betterbananas.com.au for more information and to** keep up to date with our banana R&D

The National Banana Development and Extension Program (BA19004) is funded by Hort Innovation, using the banana industry research and development levies and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture. The Queensland Government has also co-funded the project through the Department of Primary Industries.

Hort Innovation BANANA FUND

Queensland Government

The program organised and facilitated a booth in the exhibition area. The booth was designed to spark discussion about banana R&D occurring in the industry. There were some beneficial insects and fungi growing in petri dishes which are being trialled as part of the Integrated Pest and Disease Management projects on display alongside a raft of factsheets and case studies which have been created by the program. One of the walls of the booth was also dedicated to promoting the Better Bananas website as digital resource for Banana RD&E information.

Researchers from the Department of Primary Industries in front of the R&D exhibition booth. Left – Right: Daniel Farrell, Massimo Bianco, Hazel Gaza, Tegan Cavallaro, Ingrid Jenkins, Sharan Muthukumar.

Appendix 1 - Science Symposium agenda

SCIENCE SYMPOSIUM Wednesday 6th August 2025				
Talk #	**Start**	**Finish**	**Speaker**	**Title**
	8:00	8:45		Arrival
	8:45	9:00	Rosie & Tegan	Welcome and introduction
1	**9:00**	9:15	**Prof Altus Viljoen** - Professor in Plant Pathology Stellenbosch University, South Africa.	Banana Fusarium wilt research at Stellenbosch University: 'An overview'
	9:15	9:20		Q&A
			THEME: The Gene Scene	
2	**9:20**	9:30	**Prof Robert Henry**, Professor of Innovation In Agriculture, Univ of Qld and & **Dr Emily Rames** - Research Scientist at the Qld Dept of Primary Industries	Development of resources to accelerate the genetic improvement of banana and support long-term industry resilience
3	**9:30**	9:40	**Prof Elizabeth Aitken**- Professor in Plant Pathology at the School of Agriculture and Food Sustainability at the University of Queensland	Identifying Resistance Genes in Wild Banana
4	**9:40**	9:50	**Dr Anthony James** - Senior Research Fellow, Banana Biotechnology Program , Queensland University of Technology	QCAV-4: A Cavendish banana with Fusarium wilt tropical race 4 resistance – now approved for commercial cultivation in Australia
5	**9:50**	10:00	**Dr Jacinta Watkins-** Research Fellow in the Banana Biotechnology Program at Qld University of Technology	Towards a consumer-acceptable Goldfinger banana via gene editing
	10:00	10:15		Q&A
	10:15	10:45		**Morning Tea**
			THEME:VARIETY SHOW	
6	**10:45**	10:55	**Jeff Daniells** - Senior Principal Horticulturist, Qld Department of Primary Industries	New varieties for Australian banana growers
7	**10:55**	11:05	**DR Steven Janssens-** Senior scientist at Meise Botanic Gardens Belgium and Professor in Evolutionary Botany at KU Leuven	Uncovering the hidden genetic diversity of *Musa acuminata* ssp. banksii in Northern Queensland, Australia
	11:05	11:15		Q&A
			THEME: Protect and detect	
8	**11:15**	11:25	**Prof Andre Drenth**- Professor in Plant Pathology at Queensland Alliance for Agriculture and Food Innovation at the Unversity of Qld	The enduring benefits of excluding plant diseases
9	**11:25**	11:35	**Dr Lilia Carvalhais** Senior Research Fellow at the Queensland Alliance for Agriculture and Food Innovation at the Unversity of Qld	Strengthening Australian banana biosecurity through validated diagnostics for exotic fungal and bacterial diseases

10	**11:35**	11:45	**Dr Edward Gilding**- Senior Molecular Biologist - Genomics at Biosecurity Queensland	Improvement of Panama disease diagnostics with high-throughput sequencing
	11:45	12:00		Q&A
11	**12:00**	12:10	**Dr Kathy Crew** - Principal Plant Pathologist (Virology), Qld Dept Primary Industries	Small RNA sequencing as a high throughput screening tool for banana viruses
12	**12:10**	12:20	**Mignon De Jager** PhD student at Queensland Alliance for Agriculture and Food Innovation, the University of Queensland	Diversity of banana wilt associated phytoplasmas and their diagnostics
	12:20	12:30		Q&A
	12:30	12:35		Wrap-up of morning and instructions about lunch
	12:35	2:00		**Lunch & Networking**
			THEME: Mites, flights and challenges that keep you up at night	
13	**2:00**	2:10	**Ingrid Jenkins**- Senior Horticulturist, Department of Primary Industries	Facing challenges to achieve a quality future
14	**2:10**	2:20	**Stewart Lindsay** - Team Leader of Banana Production Systems, QLD Department of Primary Industries	A review of the interactions between birds and bats and bananas and the implications for the Australian banana industry
15	**2:20**	2:30	**Daniel Farrell** - Entomologist, QLD Department of Primary Industries	Friends or Foes? Survival of the Mite Predator *Stethorus fenestralis* After Exposure to Banana Fungicides
16	**2:30**	2:40	**Kathy Grice** - Principal Experimentalist, Department of Primary Industries	A deep dive into the SBFS complex
	2:40	2:55		Q&A
	2:55	3:25		**Afternoon Tea**
THEME: Ground truths				
17	**3:25**	3:35	**Janet Roberts** - PhD Student, Queensland Alliance for Agriculture and Food Innovation University of Qld	Revealing the Risks of Fusarium Wilt Subtropical Race 4
18	**3:35**	3:45	**Hazel Gaza** - Senior Soil Ecologist, Department Of Primary Industries	Have You Got Soil Health Covered? The Role of Ground Cover in Banana Farm Soils
19	**3:45**	3:55	**Alex Lindsay** - Senior Research Agronomist, Department of Primary Industries	Phosphorus in banana plant tissue under different levels of soil P
	3:55	4:10		Q&A
Rosie & Tegan	**4:10**	4:20		Buffer time for the day
Rosie & Tegan	**4:20**	4:30	Tegan	Post event evaluation
			Rosie	Wrap up and close

Appendix 4: Australian Bananas magazine article

Carnarvon growers reflect on the Congress

By Tegan Cavallaro, Department of Primary Industries

It has been a few months since growers and industry stakeholders gathered on the Gold Coast for the 2025 Australian Banana Industry Congress. Recently, we caught up with two Western Australian growers, Chris Collins and Les Ball, who attended the event, to reflect their key takeaways and insights gained from stepping away from their farms to participate in the three-day event.

It didn't take long for these growers to express how valuable they found attending the event. Les, who has been growing bananas in Carnarvon for three years, shared, "I'm relatively new to the industry, so it was fantastic to listen to all the presentations—I thought it was all really insightful." Chris added, "One of the main takeaways for me was being reminded that many of the challenges we face are the same across different growing regions. TR4, for instance—it was helpful to learn how it's being managed and to be reminded about the threat it poses."

When asked which sessions, speakers, or presentations stood out, Les shared, "I really enjoyed it all. The Science Symposium was great. For me—I found the soil health and phosphorus presentations interesting. It was also valuable to be reminded about TR4 and gain an international perspective on it. It certainly reinforces the importance of on-farm biosecurity for us in WA." He also added "Jana Pittman was a great guest speaker, very inspiring."

Chris said, "I really enjoyed the soil health panel session with the growers. It was fantastic to hear a practical perspective on what growers are doing in this space. The variety session was also great, and the presentation by Naomi About from NQ Banana Research was excellent. I now have a much better understanding of the importance and challenges of maintaining other plant characteristics, like yield and eating quality, while developing a plant with resistance to TR4." Chris also mentioned "The snake guy, Billy Collett - what a character! He was a great opening guest speaker"

Both Chris and Les also noted that, while they don't face the same challenge of managing leaf diseases in WA, the event reignited their interest in exploring the use of drones for applying foliar nutrients.

Both growers agreed that a key highlight of attending was the opportunity to connect and network with other growers and those who support the industry. Chris shared, "The growers I spoke with, no matter where they're from, were like-minded and great to talk to. While many things are different for us growing bananas in Carnarvon, most challenges are the same—we all face similar issues." Les added, "It was also valuable to reaffirm connections with the DPI and ABGC staff that support the industry."

When asked what they would recommend to others, particularly WA growers considering attending a future congress, Les said, "It's definitely worth going. You always pick up one or two things that can make a difference. Things are always evolving and changing and attending is a good way to learn about new things"

Chris added, "If you get the chance to go, go! It really opens your eyes to a lot of things we aren't exposed to in WA. It's a fantastic week—very social and a good opportunity to see what's going on in the world of bananas."

Both growers were partly supported to attend the congress by the National Banana Development & Extension Program with support from ABGC. They are happy to continue sharing their experiences and knowledge gained from attending the congress with fellow Carnarvon growers and encourage them to participate in future congress events.

From Left: Tegan Cavallaro (DPI), Chris Collins, Les Ball, Rosie Godwin (ABGC)

The National Banana Development and Extension Program (BA19004). This project has been funded by Hort Innovation, using the banana research and development levy, co-investment from the Department of Primary Industries and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Hort Innovation BANANA FUND Australian Banana Growers Queensland Government

Appendix 5 - Co-design brief

Background:

The Australian banana industry is supported to develop towards more sustainable and prosperous futures by several industry development projects (e.g. BA19004, BA23000, BA20002) yet is facing escalating and cumulative challenges to continued prosperity and sustainability. In no order these challenges include:

1. Maximum household penetration in the domestic market and barriers to export
2. Production and marketing challenges associated with the majority of production being a single variety.
3. Increasing cost of production diminishing margins.
4. Over the past 10 years R&D levy investment has focused on the management of the Panama tropical race 4 and other disease threats.
5. Loss of chemistry resulting from reviews undertaken by the APVMA and limited new chemicals being registered.
6. Increased regulation due to over 90% of industry adjacent to Great barrier reef.
7. Some growers who participate in consultation activities have expressed that they find themselves overwhelmed with requests. Engaging with smaller geographically diverse production areas (e.g. NSW, WA & NT) with limited resources is challenging.
8. Grower's reporting difficulty in screening and navigating the increasing volume of information and services offered to them.

In response to these challenges the industry through an ideation session, Banana Strategic Reference Group meetings and Banana R&D Strategic Investment Advisory Panel (SIAP) have identified the need to involve a range of key service providers in co-designing the future extension and development program.

For the purpose of this brief, co-design is defined as the inclusion of users (i.e. relevant industry development service providers, other important information providers such as agronomists, resellers etc.) in the design and testing phase of new technologies, practices or approaches to ensure it is grounded in user needs and conditions and so is useful and adoptable. Co-design will explore the issues and opportunities to develop outputs needed to specifically and in a targeted way address those identified issues and opportunities. Engaging growers in this process is important and should be done in a time efficient manner (e.g. one-on-one discussions had prior and/or following discussions with those that engage with growers to seek input on priorities and needs and/or consensus on proposed outputs).

Objectives:

Purposefully assess where the industry is at, where it would like to be (scenarios) and what support is required to transition to preferred futures through the mechanism of a grower-focused industry development and extension program:

1. Assess current state of industry (informed by desktop review)
2. Develop and share a preferred future state for the industry (desktop review could help give context to this)
3. Agree on how to arrange support infrastructure to achieve the preferred future state (see page 7 feedback from ideation).
4. Identify the specific role and services the industry development investment will contribute to this.

The co-design will examine opportunities within the broader banana R&D portfolio and other industry development services (e.g. major R&D investments, banana BMP), through the developed project, to:

1. Align objectives
2. Avoid duplication in service delivery
3. Create efficiency in levy spend

Possible co-design activities could include:

1. Visioning exercise – checking shared understanding of industry aspirations
2. Joint mission statement – based on industry aspirations
3. Inventory of support infrastructure against a framework such as the structural/functional analysis or the functions that must be performed to achieve innovation or a synergy matrix of who is doing what and where to identify key roles of players, gaps and ways of working together in the performance of roles
4. Identifying and developing critical roles of any further industry development investments

Audience:

All research, development and innovation delivery partners levy and non-levy funded who have material knowledge of the industry and its aspirations. Representatives of those that also play a key role in the information supply chain to growers including sales agronomists, resellers, private agronomist etc.

Whist growers may not be involved in the more intensive group engagement. It is important they are consulted, and their input is provided into this process. Therefore, the nature of the engagement with growers should be fit for purpose. For example, one-on-one contact either in phone or in person. This could be undertaken by the program team with guidance on the process and targeted questions.

Time frame:

Mid-June – August 2025

Procurement timeline for next Banana Industry Development & Extension project

Date	What	Who	Notes
June – Mid-July	Co-design	QDPI, ABGC teams, key stakeholders, Consultant and Hort Innovation	Implement co-design plan
Mid-July	Investment recommendation and project advice	Hort Innovation and SIAP	Use findings of co-design to generate the investment recommendation
By August 31	Procure new project	Hort Innovation	Hort Innovation send out request for proposal, evaluation and clarifications etc.
By September 30	Contract of next industry development project executed	Hort Innovation and preferred delivery partner	

Appendix 6 – Co-design workshop: Summary of workshop outcomes

Banana Development and Extension Program – Co-design Workshop

Summary of Workshop Outcomes

PCB Consulting Pty Ltd
July 2025

Table of Contents

Introduction

The *National Banana Development and Extension Program* (BA19004) has provided a coordinated extension initiative for the Australian Banana Industry. The program has provided banana growers and industry stakeholders with an increased understanding of banana research and development (R&D), facilitated adoption of best practice, addressed key challenges faced by the industry, as well as provided opportunities for growers and industry stakeholders to collaborate on R&D initiatives. The current program will conclude later in 2025.

The project team invited key industry stakeholders to a Co- Design workshop on Tuesday 22nd of July, 2025. The objectives for the workshop included:

- Develop a shared understanding of the current state of the Industry: Gather insights on key challenges and opportunities for the Banana Industry (current and future) and identify the critical priorities for focus in the future Banana Development and Extension Program.
- Develop a shared understanding of the broader Research, Development and Extension program context for the Banana Industry: Gather insights from across the R,D and E spectrum to ensure the development of the future extension program is designed to align with and compliment other relevant planned Banana projects/programs.
- Strengthen Industry Engagement in the program: Foster deeper engagement, involvement and shared ownership in shaping the extension programs future direction.
- Enhance Program Effectiveness: integrate lessons learned from the past program to maximize the program's effectiveness, efficiency and impact.

The forum was facilitated by PCB Consulting, and this report provides a summary of the key outcomes from the workshop discussions. The raw notes from the discussions can be found in the appendix to the report.

Industry vision

Participants started by sharing their vision for the Banana Industry. The key themes that emerged were for a Profitable and Sustainable Industry, as well as a potential vision for the Extension program:

Providing support for business development, innovation and capturing opportunities for industry growth.

Critical priorities for focus

Participants discussed the many current and emerging challenges and opportunities for the Banana industry. The critical priorities for focus suggested for the future extension program were:

- Business development capacity building – what resources and activities can help to improve grower skills?
- Production system focus – helping growers understand the implications of change (eg new varieties) for the production system and the supply chain? Including more of an Integrated Pest and Disease Management approach in the production system.
- Developing resource materials
- Innovative engagement/extension approaches for time poor growers
- Flexibility to enable the program to respond to emerging issues eg changes in available chemistry

Shaping the future program

Participants provided advice and suggestions for the project team to consider in shaping the future Banana Development and Extension program for the industry. In summary, participants suggested that most of the current program's elements should be continued with some suggestions for improvements.

Key themes that emerged from the workshop discussions could be considered as the Strategic high-level objectives of the future program including:

- Building the capability of the extension network that services the Banana Industry
- Develop and test a business skills program to build grower business capability and financial literacy
- Build knowledge and understanding of Technology and Science Information for the banana industry to address agronomic and other practical on – farm issues/challenges

The structure and approach of the program should be flexible with some suggestions for consideration including:

- Include grower and stakeholder consultation (potentially an annual "check in" process to identify key issues for focus)
- Refresh the BAGman element to include some professional development to build regional extension capability, access to research information, and enable a collaborative regional extension approach.
- Review the Roadshow element particularly the purpose and format
- Build in resourcing for the Innovation Trials to allow high priority grower issues to be addressed providing practical knowledge and shared learning
- Innovative strategies and tools to engage with growers including online content, videos and training resources. This could also include reviewing and updating existing content, with consideration of including other language groups.
- Develop and test a business capacity element to build grower business skills and finance literacy.
- Review the need for a specific Next Gen component

The monitoring and evaluation approach for the program needs to focus on key metrics that measure impact. Practice change is influenced by variables outside the program and practice

change may not be achieve within the timeline of a future program. An M&E approach should allow for this. The approach could be further developed with Hort Innovation.

Alignment with other relevant R, D, E activities

Participants identified a number of other relevant activities that the future program could align with, link with and collaborate with.

- Strategic Government policy – need to ensure alignment as non-alignment can impact government willingness to co-invest.
- International research and development work – eg what can we learn on panama disease that has already been studied?
- Working with other industries on regionally relevant activities eg what are other industries doing to work with culturally and linguistically diverse communities?
- Innovative extension methodology – looking out for other mechanisms for information exchange.
- The ABGC led Grower support – Biosecurity program
- The ABGC Supply chain engagement project

Appendix – raw workshop data

Current and emerging Industry Challenges and Opportunities

- Taking a systems approach – "agro-ecology" – not looking at issues in isolation
- TR4
- Increasing Cost of compliance, production, marketing and implementing biosecurity
- Varieties – planting material supply (Small numbers of niche varieties)
- Chemistry – loss of chemistry, off-label use, MRL load rejections, resistance, slow to replace with new chemistry, application technology and costs
- Clear improvement pathway – innovation tech
- Labour – on farm training, skills, care, social; farm support with experience and knowledge
- Supply chain technology
- Regulation and compliance awareness – fresh care, food safety, environmental
- Potential future shocks – pest and disease, imports, climate
- Business management skills
- Mis-information
- Cultural awareness within industry – language and cultural differences
- Succession planning – growers and for broader industry roles
- Work Health and safety
- Engagement of growers/industry
- Pollution
- Experience and technical knowledge – new growers, older growers and industry support
- Cultural diversity within growers
- Growers are time poor with competing priorities for engagement in extension opportunities
- Fundamental knowledge is not always present
- Profitability – increasing costs, stable or decreasing returns
- Labour – quality, cost, efficiency, availability, reliability, auditing, technical support availability
- Compliance
- Chemicals – availability, access, lack of alternatives, stewardship
- Awareness and information on emerging issues
- Building and retaining skilled labour
- Tech based solutions – problem driven
- Growers finding time to work on their business because they are too busy
- Understanding different grower situations
- Chemicals eg bunch pest chemicals – fit for purpose, availability, risk of MRL
- Demographic shift – old guard going out and new growers are coming in; cultural change
- TR4, varieties – NSW context
- Weather
- Market, costs, prices – supply chain transparency
- Labour – management of PALM workers
- Emerging industry leaders
- Compliance
- Tissue culture product needs work
- Crop Protection – keep doing trials and demos
- Uptake of information – yellow sigatoka, chemicals
- Panama TR4 – biosecurity; new varieties (more implications); improve Tissue Culture process to decrease off-types
- Extension materials in multiple languages and different formats

- Training materials – bunch spraying, bell injection; farm induction and compliance auditors (one standard) – retailers
- New growers entering the industry – Best management practices on all subjects
- AI – technology – to improve efficiencies – labour, mapping and monitoring systems
- Business development capacity building – what resources can help to improve grower skills; study tours to other industries and overseas industry
- Train the trainer – DPI building the capacity of Agri-business
- Compliance – auditors

Considerations for Shaping the Future Program

What should we **stop or drop** in the future program?

Theme	**Ideas, Comments, suggestions**
Biosecurity	Link into the ABGC Biosecurity program rather than have it as a key focus in the future program
Supply Chain Engagement	Link into the ABGC Supply chain strategy
Roadshows	Try something new or a refresh of the approach
Banana Congress	
Next Gen	Review, refresh, reset. Clarify the objectives and the target audience

What should we **keep/continue** from the current program?

Theme	**Ideas, comments, suggestions**
BAGMang	Perhaps needs a better name?
Better Bananas	Would be good to put some nutrient related content onto the website
Field days	And workshops
Innovation trials	On – farm grower trials
One on one extension	Flexibility to address emerging priority issues Have a multi-faceted approach to extension Strategic Extension approach DPI and ABGC collaboration (where appropriate) Grower case- studies
Road shows	
Congress	

Create – new ideas, activities, and elements for the future program

Theme	**Ideas, comments, suggestions**
Business capacity building program component	Decision support tools Markets and Consumer focus – understanding market opportunities Webinars Business management support for growers Build business skills and financial literacy Building staff capability and capacity – getting the most out of your labour spend.
Building regional extension capacity	Helping to build regional extension capacity improved training opportunities – train the trainer

Banana 101 content	Online resources, videos, training resources
Compliance	Auditors need to be more aware of current limitations on the labels Identify the top 10 issues picked up by the auditors and feed this information into BAGman. Banana grower Q and A session open to all
Applied research and development program component	Demonstrate new banana systems – future IPDM systems Create a IPDM group for bananas
Farmer efficiency program component	Publish a Drone user guide Explore how to make more use of new technologies eg AI Publish a booklet "what the good growers do" More leaf disease work More Bell injecting and bunch protection work
Innovation in engagement and accessibility	New strategies to engage growers Strategies to engage all demographics of growers Rotate the research activity focus Improve focus on education of banana workers/growers, especially non – English speakers Need for information to be accessible in multiple languages
Increase Grower awareness of grants available	Grants for biosecurity
	What is the role of this project in the new emerging issues or the new research? What is the value add from this program?

Build on/Strengthen

Theme	**Ideas, comments, suggestions**
Project content	Next Gen – need to make it what the next gen want/need it to be TR4 – focus on future varieties Knowledge work for varieties Steep slope management advice
Strengthen PRG Governance	NSW needs to have an independent PRG
Build on the extension tools and resources in current program	Better Bananas website – increase the content Build on the available resources - Revise and update existing information – needs a refresh. Video content Digital and online resources Ensuring activities/outputs are clearly documented for growers succession
Grower responsive demonstration plots/trials	Resourcing of innovation trials to allow high priority issues to be adequately addressed On-farm trials – chemistry; novel approaches Targeted innovation trials – practical knowledge and shared learning DPI needs more scope to do what growers need
Interactive Extension delivery	Emerging leaders group – international trip; quarterly dinners Field walks NSW road show – to expand stakeholder engagement
Build a more collaborative	Bagman meetings currently tend to be one-way conversation – could it be more interactive?

extension approach	Bagman could focus more on professional development and access to information. Continue to build a collaborative extension approach Not just tech transfer – put learning and understanding at the centre of planning the new program Include supply chain insights into Bagman

Tweaks and improvements

Theme	Ideas, comments, suggestion
Review the Road show component	Could be better targeted for capacity building – focus on the reseller/agronomist for professional development If the focus is for growers, then needs to increase grower engagement with greater relevance for growers.
Extension network	Could expand the network to include a broader group Include more networking opportunities More of a participation and engagement focus
Support for smaller production areas	Resourcing support for smaller production areas Re-evaluate how to engage smaller areas in program activities eg NSW, WA & NT
Review Monitoring and evaluation of the program	Standardise M and E for impact assessment Clearer demonstration of program impact on farm practice
Collaborative Trial activities	Use external partners to conduct trials DPI agribusiness information flow More actual trial work
Growers at Congress	Grower participation at Congress (Note the congress is not organised as part of this project. The project supports and contributes to the event)

What have we missed?

- Mechanisms that capture Supply chain feedback on issues and feed back to industry
- Mechanisms for new research project information to be fed into the program
- Selecting Priorities for emphasis in the future program should be about industry impact

Closing Reflections

- Suggest formulating the objectives of the program at a higher strategic level. For example from the workshop discussion the emerging themes were:
    - Building the capability of the professional extension network servicing the Banana Industry
    - Building the capability of growers in business skills, problem solving and self-directed learning
    - Technology and Science Information Transfer to address agronomic and other practical on – farm issues/challenges
- Adopt a flexible structure and approach
- Design in grower and stakeholder consultation
- monitoring and evaluation approach needs to measure impact where possible