

Final Report

Banana Industry R&D Coordination

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Australian Banana Growers' Council

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Banana Industry R&D Coordination BA17002

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Summary

The objective of the BA17002 'Banana Industry R&D Coordination' project was to lead and coordinate R&D delivery for the Australian banana industry in collaboration with Hort Innovation and others. The need for the project was driven firstly by the depressed banana prices for the three financial years prior to BA17002's inception and secondly, the significant threat posed by Panama Tropical Race 4 (TR4) to the industry. Both drivers have an impact on the profitability, productivity and sustainability of the industry. Given the severity of TR4, (that it cannot be eradicated and is easily spread), effective RD&E is vital in ensuring long-term viability of the industry.

The banana industry also faces challenges in other areas of biosecurity, fruit quality and diversification. It is therefore important that industry has both technical expertise and R&D adoption expertise to provide input to the banana industry R&D program and work closely with Hort Innovation.

The target audience for this project was primarily the banana-growing region of North Queensland (NQ) where TR4 has been confirmed on five properties. The project did however target the entire Australian banana industry in biosecurity preparedness and through the provision of technical and R&D adoption expertise.

The overarching goal of BA17002 was to act as a central point of contact for industry R&D and the major deliverables of the project included:

- providing technical input to the development and conduct of R&D projects.
- facilitating beneficial collaborations.
- working with industry extension and communication projects to ensure that the latest R&D developments are being made available to industry in an accurate and timely manner.
- representing the industry and its R&D at relevant forums, and meetings of relevant government departments and agencies.

This project produced a range of valuable outputs for the banana industry that are detailed in this report. The Banana Industry R&D Manager played a significant role in facilitating the establishment, coordination and development of the industry's major R&D investments such as the 'Banana Bunchy Top Project (Phase 4)', 'Improved Plant Protection Program', the 'Banana Development and Extension Program', Management of banana pests and diseases in NQ as well as other smaller projects. The role was also instrumental in the successful establishment of QBAN (the banana industry's clean planting material scheme), under a third-party accreditation, in partnership with Greenlife Industry Australia (GIA) and driving the banana industry's participation in several plastic recycling initiatives. All the suppliers of banana propagative material to commercial banana growers have become accredited under the new QBAN scheme.

The Banana Industry R&D Manager made a major contribution to the extension and communication of R&D projects as well as technical and biosecurity matters to the growers and other industry stakeholders. One of the most significant outputs was the conceptualization and delivery of the R&D scientific program at the 2019 and 2021 Banana Industry Congresses. This included a session of 'Science Speed Talks' featuring emerging researchers, international scientific experts on TR4, panel discussions on TR4, and poster sessions of latest R&D discoveries.

The 2019 Congress attracted 350 participants (99 of which were growers, who represented an estimated 80% of the Australian production area). The 2021 Congress attracted 470 delegates, 140 of which were growers. A post-congress survey of the 2019 Congress showed that 66% of those surveyed, felt they had gained a lot of R&D knowledge from the program with a further 28% feeling they had gained a moderate amount of R&D knowledge. 61% rated the Science Speed Talk session as highly satisfactory or excellent, and a further 25% found it satisfactory. The remaining respondents did not attend this session.

The R&D Manager brokered knowledge to the entire banana R&D program through membership of project reference groups, as a member of the Banana R&D Strategic Investment Advisory Panel (SIAP) and through representation at a wide range of stakeholder meetings. The R&D Manager obtained an overview of all banana research in Australia and played a key contribution to the development of the new Banana Industry Strategic Investment Plan 2021-2026, which represents the interests of the entire industry and is the blueprint for decision-making in levy investments.

Considerable technical advice was provided to the banana industry on important pest and disease issues e.g. TR4, clean planting material, Banana Bunchy Top Virus, leaf spot, plus chemical usage, reviews and permits and the withholding period of horticultural oils. Substantial advice was also provided to BQ who deliver the Panama TR4

Program in partnership with ABGC. This has helped the implementation of policy and legislative matters including surveillance, sampling and compliance issues.

Key outcomes of the project included:

- Improved coordination of the banana industry R&D Program
- Increased awareness and collaboration amongst banana R&D projects
- Enhanced extension and communication of R&D developments, with and amongst all sectors of the banana industry.

These outcomes contributed to delivery of the Australian Banana Strategic Investment Plan 2017-2021 priorities to 1) support industry efficiency and sustainability and 2) Improve productivity of the supply chain and ensure tangible outcomes were delivered to banana growers.

Keywords

Banana

Fusarium oxysporum f.sp cubense

Panama disease

Tropical Race 4

TR4

R&D

RD&E

Pests and diseases

Biosecurity

Introduction

Bananas are Australia's number-one selling supermarket product (in volume), with over five million eaten daily, and all of which are grown in Australia. The Australian banana industry is one of the largest in the horticultural sector with an estimated farm gate value of around \$600 million annually and contributing \$1.3 billion to the national economy (including indirect benefits). Ninety-four percent of Australia's 13,000 ha of banana production occurs in NQ, around Tully, Innisfail, Kennedy, Atherton Tablelands and Lakeland. Production occurs to a lesser extent in New South Wales, Western Australia, Southeast Queensland, and the Northern Territory.

The need to have a skilled resource to accelerate the coordination, development and implementation of key R&D projects aligned to industry priorities has been identified since 2012 and resulted first in the HAL project BA11027 Banana Industry Extension and Research & Development (R&D) Management. This need became even more pressing in March 2015, when the destructive fungal disease Panama TR4 was confirmed on a farm in the Tully Valley. Hort Innovation then funded BA14012 Coordination of Banana Industry R&D (Panama TR4) which was focused primarily on coordinating and building knowledge and capacity within the industry to manage and contain TR4. Both BA11027 and BA14012 delivered excellent results in project coordination, project development, technical advice, and support. At BA14012's conclusion, the Strategic Advisory Panel (SIAP) supported a continuation of investment in this type of project to build on the valuable work of these previous projects in a new project BA17002.

The need for BA17002 was driven firstly by the depressed banana prices for the three financial years prior to BA17002's inception and secondly, the continuing significant threat posed TR4 to the industry. Both drivers have an impact on profitability, productivity and sustainability of the industry. Given the severity of TR4, (that it cannot be eradicated and is easily spread), effective RD&E is vital in ensuring long-term viability of the industry.

The banana industry also faces ongoing challenges in other areas of biosecurity, fruit quality and diversification. Technical and R&D adoption expertise is therefore key for industry to provide input to the banana R&D program and work closely with Hort Innovation. Furthermore, the industry wished to ensure that

- all R&D was well-coordinated so tangible, adoptable outcomes could be delivered for growers
- it was kept informed on technical matters of other important issues for example other pests and disease issues, chemicals, or new innovations.

The SIAP agreed that BA17002, implemented by an appropriately skilled scientist and focused on priority areas was essential for the banana industry in providing that coordination and technical/scientific advice.

The outcomes of BA17002 contributed to delivery of the Australian Banana Strategic Investment Plan 2017-2021 priorities to 1) support industry efficiency and sustainability and 2) Improve productivity of the supply chain and ensure tangible outcomes were delivered to banana growers.

Methodology

The objective of BA17002 'Banana Industry R&D Coordination' was to lead and coordinate R&D delivery for the Australian banana industry and Dr Rosie Godwin was re-employed by ABGC to deliver BA17002.

The R&D Manager acted as a central point of contact for industry R&D and primary deliverables of the role were to:

- i. provide technical input to the development and conduct of R&D projects.
- ii. facilitate beneficial collaborations.
- iii. work with industry extension and communication projects to ensure that the latest R&D developments are being made available to industry in an accurate and timely manner.
- iv. represent the industry and its R&D at relevant forums, and meetings of relevant government departments and agencies.

A wide range of activities were undertaken to deliver the required services which were prioritised annually through workplans. Activities undertaken during the project are detailed below.

1. Provide technical input into the development and conduct of R&D projects

The R&D Manager provided technical advice to the banana industry and Hort Innovation on a range of matters to assist in the development and conduct of the R&D Program. This was a key function of the role. Services provided included:

- Building and retaining an understanding of banana R&D projects.
- Keeping abreast of Australian and international banana research through studying scientific literature, industry publications and attending relevant conferences and meetings.
- Regularly interacting with leadership and assisting in the coordination of the industry's major R&D projects such as Improved Plant Protection for the Banana Industry, TR4 research program, National Banana Bunchy Top Virus Program, The National development and extension project, and Management of pests and diseases in NQ.
- Serving on and providing technical and industry advice to the project reference groups (PRGs) of most banana R&D projects.
- Acting as the central point of contact and leading industry discussion and information flow on R&D matters by maintaining good communication channels between all parties as well as facilitating and participating in industry meetings, field days, R&D workshops, project reference groups and being available for consultation.
- Analysing, reviewing, and providing technical input into ABGC, Biosecurity Queensland (BQ) and the federal government's banana biosecurity plans.
- Developing R&D concepts for submission into the Hort Innovation that are relevant to the industry strategic investment plan's priority areas.
- Provide technical and industry advice to Hort Innovation group Leads and R&D Portfolio Managers to facilitate the development of R&D projects for the banana industry.
- Providing to industry specific technical advice on TR4, banana production and supply chain issues, intellectual property issues, minor use chemical permits, market access issues and any other matters involved in banana research.
- Driving and providing advice on the transition and establishment of the Quality Approved Banana Nursery (QBAN) clean planting material scheme) in collaboration with Greenlife Industry Australia.
- Reviewing and reporting on significant work on Panama TR4 Program and any other emergency plant pests for the banana industry as they occur.
- Providing technical and industry support to R&D service providers as needed.

2. Facilitate beneficial collaborations

Effective collaborations allow R&D effort to be better coordinated, result in more efficient use of funding and ensure more tangible outcomes to industry. Services provided included:

- Developing and maintaining informal networks with banana researchers to identify opportunities for collaboration, resource sharing and greater efficiencies.

- Developing and maintaining productive collaborations with relevant government bodies e.g. BQ and Agri Science Queensland (ASQ), Plant Health Australia (PHA).
- Collaborating with extension and industry development projects to confirm service providers are working together to ensure R&D outcomes are understood and disseminated through appropriate channels.
- Regular liaison, assistance and collaboration with Hort Innovation Banana Strategic Industry Partner and R&D Portfolio Managers and assistance to solve any issues that may arise in the banana R&D program.
- Facilitating the interaction between growers and research providers to allow productive exchange of information and so that growers can work with researchers on field-based projects.
- Networking and developing effective collaborations with international researchers that may benefit Australian banana R&D.

3. Work with industry extension and communication projects to ensure that the latest R&D developments are being made available to industry in an accurate and timely manner.

Effective extension and communication of R&D outcomes facilitate practice change and adoption of new ideas. This maintains the resilience and sustainability of the banana industry.

The following activities were conducted to assist in achieving these outcomes:

- A stakeholder Engagement/Communications plan was developed for R&D project information.
- R&D project updates and activities were communicated to a range of stakeholders and their views considered. Stakeholders included Hort Innovation, all growers, all banana service providers, banana agribusiness managers, nursery operators.
- Assistance was given to the National Banana Development and Extension Program to ensure they were effective conduits for R&D information in an accurate and timely manner.
- Collaboration with other banana projects nationally wherever R&D could be extended.
- Working with R&D service providers wherever assistance can be provided e.g. field days, road shows, workshops, scientific exchanges and meetings with international experts.
- Providing leadership to and at the 2019 and 2021 Banana Congress in developing and delivery of the scientific program.
- Providing advice at regional growers' meetings on R&D outcomes and issues.
- Keeping levy payers informed on this project and the value of their investment through regular communications and updates from the R&D Manager in industry newsletters, banana e-bulletins, Australian bananas magazine, the ABGC web site and at the industry's biennial national congress.

4. Represent the industry R&D at relevant forums, and meetings of relevant government departments and agencies.

The R&D Manager represented the banana industry and its R&D at a range of relevant forums and to government departments and other agencies. Examples included:

- Agri Science Queensland- e.g. Horticultural stakeholder events, Scientific exchanges, R&D planning workshops and any other events which require R&D or industry representation.
- Banana R&D Project Reviews.
- BQ –with the Panama TR4 Program to assist in the development and implementation of surveillance, containment and management protocols and which help contain the spread of TR4 and assist in the adoption of biosecurity best management practice by growers. Also work with BQ to support the new project BA17005 Management of Pest and Diseases in NQ.
- Interstate biosecurity agencies e.g. NSW, WA and NT to discuss pest and disease issues, market access issues (e.g. coffee bean weevil fruit or, fruit from TR4 infested farms), other disease incursions and surveillance.
- Plant Health Australia- at plant industry forums and meetings.
- Consultative Committee for Emergency Plant Pests – represent and provide technical advice on any incursions where the banana industry is considered as an affected party.

5. General services

To ensure deliverables, ABGC undertook all the general services specified by Hort Innovation including:

- Being accountable to the Hort Innovation for the provision of the services and deliverables in accordance

with the services plan and agreement for services.

- Ensuring the methodology processes, procedures and documentation used are robust, transparent and capable of withstanding independent scrutiny.
- Providing a single point of contact responsible for delivering the services.
- Bringing issues that require consideration and/or decision by Hort Innovation to the Hort Innovation contract manager's attention as they arise, including options for their resolution which include the impact on the project and its program, and recommend a course of action.
- Taking all necessary action for and assist in effective and timely resolution of issues.
- Developing and implementing project monitoring and evaluation activities (following a M&E plan).
- Providing feedback and other information to Hort Innovation on issues and opportunities facing industry
- Supporting Hort Innovation in achieving its objectives and strategies as required.
- Supporting Hort Innovation in achieving the industry's R&D and Marketing objectives and strategies.
- Supporting Hort Innovation membership processes.
- Applying Hort Innovation acknowledgement and branding on project outputs as per the Hort Innovation Publications Guide.
- Providing information necessary for Hort Innovation's project management system.
- Preparing six monthly (or as agreed) milestone reports and a final report.
- Communicating all events funded by project activities i.e. workshops, conferences etc. to the Hort Innovation Communications/Events team or through the Process Owner prior to the event.

Governance and Monitoring and Evaluation

Mr Jim Pekin the CEO provided leadership and support for the R&D Coordinator role of BA17002. The R&D Coordinator role was also supported by and collaborated with other ABGC staff.

At the start of BA17002, ABGC developed a program logic framework, monitoring and evaluation (M&E) plan, (Appendix 1) to guide and ensure regular and ongoing evaluation measures were built into the project. These included a combination of KPIs measuring outputs and outcomes that informed the M&E.

Though a project reference group (PRG) was initially established to provide guidance on project direction at the start of the project, Hort Innovation granted a variation after 12 months to enable project guidance and feedback to be sought on *an ad hoc* basis depending on needs, rather than through a formal PRG.

An independent mid-term review was commissioned by ABGC two years after commencement of BA17002 in which progress was assessed in terms of delivery of outputs and achievement of intended outcomes. ABGC engaged consultant Dr Tracy Henderson to conduct the Review, the Terms of Reference of which can be found in Appendix 3. Project M&E data was considered in the mid-term review and the resulting recommendations informed (i) the delivery of services and outcomes in the 6 months of the project and (ii) the development of a new project to follow on from BA17002.

The project encompassed by BA17002 did not engage in activities that were not considered as R&D by Hort Innovation and did not engage in marketing and promotion, Agri political and advocacy, and industry association business.

Outputs

The four major deliverables of BA17002 were to act as a central point of contact for industry R&D and:

- i. Provide technical input to the development and conduct of R&D projects.
- ii. Facilitate beneficial collaborations.
- iii. Work with industry extension and communication projects to ensure the latest R&D development are made available to industry in an accurate and timely manner.
- iv. Represent the industry at relevant forums and meetings of relevant government departments and agencies on banana R&D matters.

A snapshot of outputs against key deliverables is shown in Figure 1. A detailed description of project outputs can be found in Appendix 2.

Impact of Covid

During 2020, Covid had a negative impact on face-to-face activities in which the R&D Manager would normally have been involved. Many were cancelled due to the travel restrictions and social distancing and others converted to virtual interactions. Examples include assisting with the development of, and participation in the Roadshows, Scientific Symposium, Banana Grower association meetings, farm visits, PHA meetings in Melbourne in November. Fortunately, many R&D coordination activities have easily been conducted remotely thereby limiting the impact of the Pandemic on this project.

In 2021 there has generally been an easing of restrictions allowing more travel especially within the state. This enabled several major events such as the Banana Scientific Symposium to go ahead in Brisbane in April and the Banana Industry Congress to be run as normal in May in Cairns 2021.

Figure 1: A 3-year snapshot of outputs against key deliverables

1. Technical input to the development & conduct of R&D projects	2. Facilitate beneficial collaborations	3. Ensure the extension & communication of latest R&D developments	4. Represent the industry & its R&D at relevant forums and meetings	5. Project Governance
• Member of 7 Project Reference Groups. • Oversight and management of 4 projects. • Secured banana industry Involvement in 7 new R&D initiatives. • QBAN - A new industry clean planting material Scheme implemented. • Widened scope of Mort Johnston Scholarship and now offered through two universities. • 3 minor use chemical permits • 3 chemical submissions to APVMA. • With holding period changed on 3 horticultural oils.	• Relationships with at least 72 collaborators/ month developed and or maintained. • >30% time per month spent collaborating. • Fostered relationships and brokered knowledge between more than 8 different types of stakeholder groups.	• 20 Australian Bananas Magazine articles. • > 30 e-bulletin articles. • 8 oral presentations at conferences, symposia or workshops. • Scientific program delivery at 2 Banana Congresses. • Input at 2 Road Show series • Input at 2 Scientific symposia. • Organising committee of two workshops. • Facilitation of WA Innovation grants. • Development of 12 types of resources for banana growers and businesses. • Provision of a wide range technical advice into ABGC's communication and other projects.	• Attended and had input at more than 54 stakeholder meetings and forums.	• 3 Annual Work Plans. • 1 Program Logic and Monitoring and Evaluation (M&E) plan. • 1 Project Risk Register and Risk Management Plan. • 1 Stakeholder Engagement Plan. • 5 Milestone Reports • 1 Independent Mid-term Review. • 1 Final Report

Outcomes

The intended key outcomes of Project BA17002 included:

1. Improved coordination of the banana industry R&D Program
2. Increased awareness and collaboration amongst banana R&D projects
3. Enhanced extension and communication of R&D developments, with and amongst all sectors of the banana industry.

It was expected that these outcomes would contribute to the delivery of the Australian Banana Strategic Investment Plan 2017-2021 priorities to (i) support industry efficiency and sustainability, and (ii) improve productivity of the supply chain.

Project success meant that tangible outcomes would be delivered to banana growers which in turn would lead to improvements in sustainability and resilience in the banana industry.

The mid-term review report details the outcomes delivered by this project over the first two years (See Appendix 3). Outcomes being delivered by the specific outputs are shown below.

1. Improved coordination of the banana industry R&D Program

The success of BA17002, in terms of improved coordination of the banana industry R&D Program, is evidenced by the initiation and progress of a series of well-coordinated banana R&D projects as detailed above and in Appendix 2. These projects are delivering useful strategies for growers mainly in the area's effective management of TR4 as well as biosecurity and management of other significant pest and diseases. Specific examples include the major investments in Improved Plant Protection for the banana Industry and Strengthening the Banana Industry Diagnostic Capacity, Banana Bunchy Top Virus (Phase 4) Education and Awareness, Management of Banana Pests and Diseases in NQ and the National Banana Development and Extension project.

The R&D Manager (in collaboration with GIA) has also been instrumental in the development and establishment of QBAN as an industry-led and 3rd party accredited scheme for the provision of high health nursery stock for the banana industry. This is critical for preventing the spread of diseased material (e.g. TR4 and BBTV) in planting stock. The importance of this work has been stressed by both industry and biosecurity authorities nationally over the last 10 years and, without the continuity of a dedicated resource such as the R&D Manager the transition of the QBAN Scheme would not have succeeded.

Through BA17002, the R&D Manager creates awareness and generates interest in the banana industry and its challenges and opportunities amongst the private sector such as chemical companies, Startups, Not-for-profits, and technology companies. The R&D manager role provides a mechanism to coordinate and develop new projects and pursue R&D funding sources outside the Banana Fund which are targeted to solving priority issues or embracing opportunities. This contributes to enhancing the efficiency and sustainability of banana farming. For example, by securing involvement in the plastics recycling projects, the Australian banana industry has an opportunity to address the environmental problem of farm plastic waste, create income opportunities for banana farmers, waste recovery and recycling businesses and create regional jobs.

2. Increased awareness and collaboration amongst banana R&D projects

Input from the Banana Industry R&D Manager at both formal (e.g. horticulture or biosecurity meetings) and informal activities (e.g. phone calls, meetings and emails) helps different R&D service providers, Hort Innovation and other stakeholders become better informed about the range of R&D outputs for the banana industry, reduces duplication and facilitates beneficial collaborations. Examples include linking the work being undertaken at the University of Queensland on the identification of TR4 resistance genes to the evaluation work being undertaken by QDAF in the varieties program. Another example is linking service providers to private companies to develop joint submissions for new project initiatives such as plastics recycling or automation.

International collaborations have been fostered through webinars and liaison with ACIAR with the aim to develop new projects between banana producing nations and international researchers. This helps reduce duplication of effort internationally, facilitates progress of Australian research and is especially important around biosecurity of TR4 and other high priority pests and disease.

The involvement of the R&D Manager in international Webinar series and workshops contributed to the exchange of information with international collaborators and helped raise the awareness of the Australian Banana Industry internationally.

Diseases that threaten the sustainability and profitability of the banana industry continue to be effectively contained and managed. TR4 is contained to just five farms in the Tully Valley and Banana Bunchy top disease is being effectively contained suppressed within the bunchy top biosecurity zones. These management programs would not have been possible without effective collaborative effort between growers, biosecurity agencies, state and federal government and industry. Significant work is undertaken through this project and the banana industry R&D Manager to foster awareness and these collaborations.

3. Enhanced extension and communication of R&D developments, with and amongst all sectors of the banana industry.

The R&D Manager is essentially a knowledge broker between all stakeholders associated with the banana industry on technical and R&D matters. Having a resource to interpret and translate information between stakeholders improves understanding and the efficiency of information-flow. Different groups achieve a shared understanding of the banana industry, its needs and how to meet those needs. The types of interactions which are promoted by the R&D Manager are shown in Figure 2.



Figure 2 The range of stakeholder groups between which the R&D Manager acts as an intermediary.

Growers were better informed and had greater understanding about a range of R&D developments by the informal and formal activities conducted during this project e.g. Chemical access and reviews, on-farm biosecurity management plans, banana varieties, Code of Practice for Planting Material, QBAN and pest and disease issues (e.g. TR4, Bunchy top, leaf spot, bunch pests and bat damage) and plastics recycling. Through the scientific program delivered at two banana Congresses and the communication materials developed through BA17002, growers received up to date information on R&D outcomes that may have a positive impact on the sustainability and profitability of their farming enterprises.

The industry and its R&D were well represented at a range of forums as outlined above and in Appendix 2. Many of these forums concerned biosecurity, pest and disease management, and AgVet chemical access and use. These are significant threats to a range of horticultural industries. The exchange of information and sharing of experience between industries and other stakeholders whether they be private sector, government or international is helpful to other horticultural industries as well as the banana industry in gaining awareness of issues and how to address them.

Monitoring and evaluation

BA17002 has delivered a wide range of outputs and outcomes to industry and stakeholders. The M&E plan (Appendix 1) prepared for this project included a series of key evaluation questions to determine this project's relevance, effectiveness, process appropriateness and efficiency to assess whether industry funds have delivered benefits to growers. These questions were used to interview stakeholders in the independent mid-term review which assessed the first two years of the project (Appendix 3).

Relevance

Feedback from R&D providers, growers, government, and other industry stakeholders demonstrates that this project has been very relevant to their needs and has had a significant impact on the banana industry. This was highlighted in the mid-term review (Appendix 3) where all interviewees readily identified topics, activities, outputs and outcomes of relevance from Project BA17002. These included areas such as TR4, Bunchy top disease and other banana pests, chemicals, varieties, clean planting material particularly QBAN and the Code of Practice for Sourcing and Planting Banana Material. It was felt that the Banana Industry R&D Manager was a competent and effective coordinator, a broker of information who improved connectivity between all project partners involved in Banana R&D. This resulted in a more efficient suite of projects from disparate research providers.

The fact that the R&D Manager has an overview of all banana research domestically and internationally, allows the role to take a holistic view about managing challenges faced by industry and influencing research and biosecurity stakeholders accordingly.

Effectiveness

The development and progress of R&D projects has been accelerated by the presence of the R&D Manager who catalyses action and partnerships, bridges information between growers and researchers, between research within different organization and between researchers, policy makers and industries.

There has been a significant increase in awareness and adoption of a wide range of R&D outputs as detailed previously in this report and in Appendix 2. Examples include the new QBAN scheme, more compliant use of horticultural oils by the change in WHP, greater knowledge and adoption of on-farm biosecurity, better management of diseases such as leaf spot, bunchy top and TR4. The Banana Industry R&D Manager is important translator of information taking highly technical concepts and communicating them back to industry in a clear understandable way and *vice versa*. This enables the industry and Hort Innovation make more knowledgeable and informed decisions about resource allocation into banana industry R&D.

The Banana Industry R&D Manager works closely with the National Development and Extension Project and the Banana Industry Communications Project to disseminate knowledge to industry and has been responsible for the development of a series of resources to benefit growers. The role is ideally placed in ABGC to capitalize on their agile communication system and ensure information relating to R&D matters is disseminated in a rapid and timely manner to the whole industry.

Having an independent and dedicated industry person such as the R&D Manager to drive these processes and coordinate stakeholders was seen as a benefit by all stakeholders consulted in the mid-term review and would leave a significant gap if BA17002 did not exist.

A range of “without project BA17002” scenarios were identified by interviewees in the mid-term review including:

- no central point of contact for banana R&D
- slower response to grower R&D questions from researchers
- no strong foundations for future research and policy activity
- no clean planting scheme/QBAN
- less awareness, knowledge, understanding and collaboration between researchers and industry; and between researchers
- less cohesion between research activities
- less new emerging R&D projects
- less funding streams for banana R&D
- less effective communication and extension of banana R&D; and
- less achievement.

As well as the coordination work performed by R&D Manager, industry and R&D stakeholders view the R&D Manager as the ‘first point of call’ for technical advice and information about the banana industry and R&D matters generally. The current R&D Manager is a competent and experienced scientist in her own right providing advice on a wide range of subjects including pest and disease issues (especially TR4), aspects of molecular biology, tissue culture, research principles and experimental design, diagnostic testing, chemical review and registration, genetics and plant breeding.

As a neutral third party, BA17002 has fostered agreements between parties, and improved the understanding and appreciation of different groups. This ensures that time and money invested to meet industry challenges are not hindered by disagreements between different parties.

Process appropriateness

The appropriateness of the project approach and strategies for BA17002 is evidenced by the many outcomes delivered by the project and detailed in this report, and by the comments made by stakeholders interviewed in the mid-term review. The methodology was successfully implemented, and activities suitably pitched to the different stakeholders and organisations. The engagement and communication processes that were recognised by interviewees in the mid-term review as appropriate and valued included:

- approachable, partnership approach
- conduit of research information to and from growers
- provision of input to magazine articles, e-bulletins
- organisation of Science Speed talks and poster session at Congress
- organisation of guest speakers for ABGC Board meetings
- communication with extension work
- suggested materials for hosting on external websites (e.g. Better Bananas).

Interviewees also commented in the mid-term review that the R&D Manager works in true partnership with them, is easy to deal with, and makes genuine use of feedback when issues are brought to her attention. The R&D Manager then drives the initiation and conduct of new projects to solve these issues.

Efficiency

The project has been efficient at implementing the agreed activities according to agreed schedules and budgets. Information gathered for six monthly milestone reports and PRG meetings was comprehensive.

BA17002 has been highly efficient at delivering value for money. This is demonstrated by the large number of useful outcomes delivered within budget to industry as detailed in this report and earlier milestone reports. The efficiency of the project is further supported by the findings of the independent mid-term review which provided a comprehensive and independent assessment of the first two years of this three-year project. Overall, the review found that BA17002 represented value for money, and that the project represented an efficient use of funds. (For further detail see Appendix 3).

Recommendations

The mid-term review made three recommendations for the remaining 6 months of the project and any future project:

- **Recommendation 1:** The banana R&D coordination work conducted within Project BA17002 is valued by stakeholders, has delivered results and outcomes, and should continue in the medium-term (3-5 year) future.

Interviews of industry, research and policy stakeholders highlighted numerous examples of valuable positive outcomes from Project BA17002. Coordination between researchers and growers (both individual growers and the ABGC Board) on a wide range of topics was highlighted as critical by interviewees including Panama TR4, Code of Practice, banana oils, chemical registration and use, variety development. Several research interviewees highlighted the importance of Project BA17002 in connecting their research to other relevant research, both domestically and internationally. Numerous interviewees across all groups (industry, research, policy) highlighted the importance of ensuring banana R&D coordination work is continued in the future.

- **Recommendation 2:** Project BA17002 and/or future banana R&D coordination work should articulate and communicate the current and future portfolio of banana R&D work to a broader audience of stakeholders to:
 - (a) improve awareness and understanding of the scope of past/current banana R&D work among industry, research and policy audiences; and
 - (b) provide industry, research and policy personnel with the opportunity for further connection, collaboration and coordination on areas of mutual interest and benefit.

Several growers, researchers, consultants, government policy personnel, and research managers indicated they did not fully understand the entire portfolio of banana R&D work and/or have a complete picture of the scope of work conducted by Project BA17002. Several interviewees noted they had line of sight to particular topics and/or R&D projects and would benefit from improved understanding and appreciation of the complete portfolio of banana R&D activity.

- **Recommendation 3:** Project BA17002 and future banana R&D coordination work should continue to grow the scope and scale of the banana R&D portfolio by:
 - (a) brokering new R&D funding streams
 - (b) facilitating new collaborations; and
 - (c) initiating new R&D projects with new, innovative partners.

The opportunity to source R&D funds from non-traditional sources and involve new and innovative partners in banana R&D was highlighted by interviewees as a necessary next step to accelerating progress toward the Banana Industry Goals.

ABGC fully supports the recommendations of the mid-term review as listed above as well as their implementation in the delivery of any future R&D Coordinator Project.

Additionally, ABGC recommends the revised Path-to-Impact developed by the Mid Term Review is adopted for a future R&D Coordinator Project.

Refereed scientific publications

Not applicable

Intellectual property, commercialisation and confidentiality

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

Acknowledgements

ABGC would like to acknowledge the valuable input that the many growers, research providers, and Hort innovation have had in this project particularly Mr Stephen Spear, Mr Stewart Lindsay, Ms Tegan Kukulies, Prof Andre Drenth, Dr Bianca Cairns and Dr Olive Hood.

The R&D Manager would also like to thank the team at ABGC for their ongoing support in making this project a success and Dr Tracy Henderson for conducting an informative mid-term review of BA17002.

Appendices

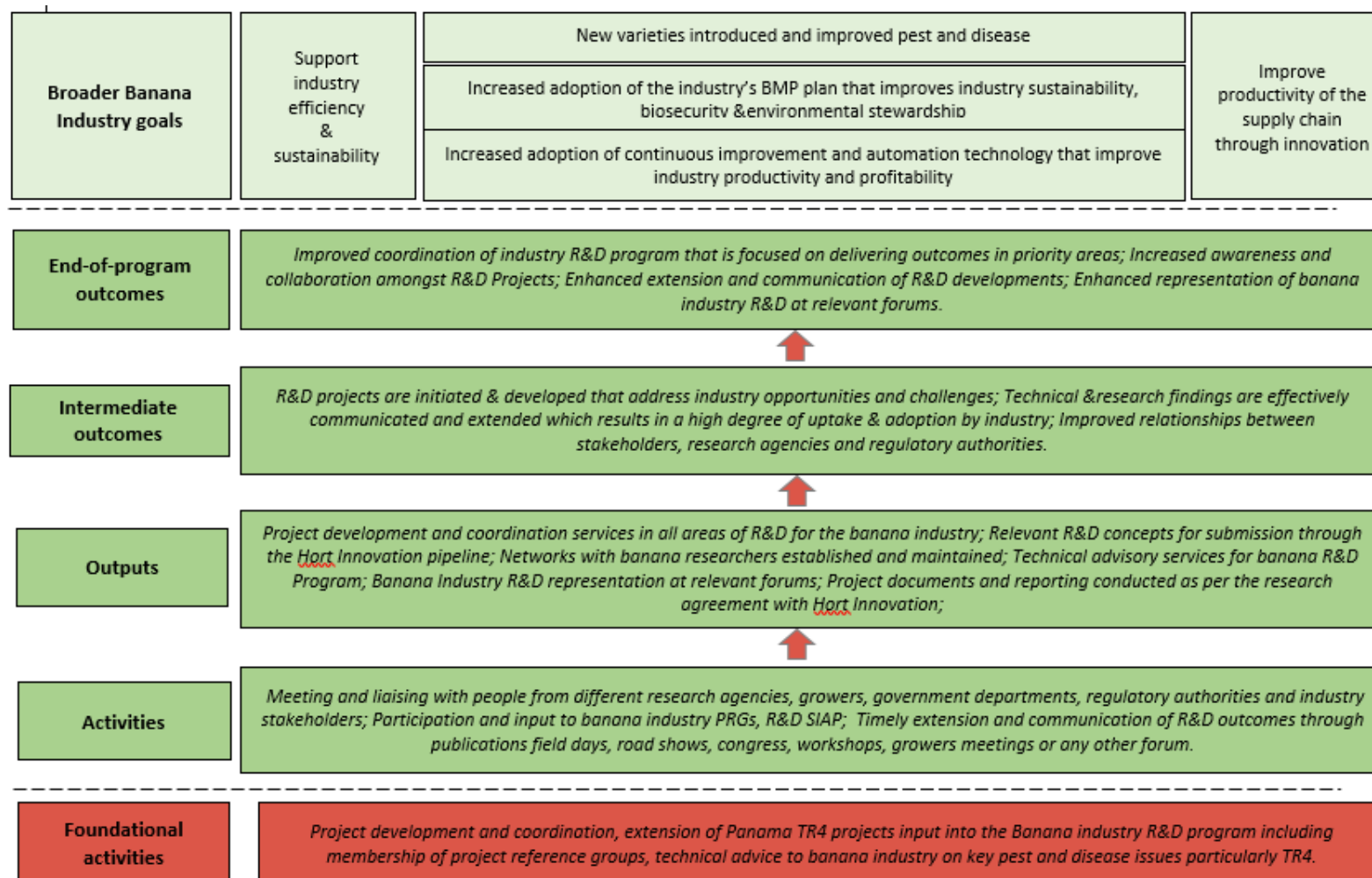
Appendix 1 BA17002 Coordination of Banana Industry R&D Project M&E plan.

Appendix 2 Detailed outputs against key deliverables.

Appendix 3 Independent Mid-term Review.

Appendix 1 BA17002 Coordination of banana industry R&D project M&E Plan

1. Program Logic



2. Project M&E: Aug 2018 - Aug 2021

2.1 Audience:

The audience for project R&D development and coordination services will be research providers, government departments and regulatory authorities, Hort Innovation and the project reference group.

Extension and communication services will be delivered to stakeholders including government, Hort Innovation, all growers, all banana services providers, banana agribusiness managers and nursery operators.

Collaboration and communication with other related projects, national and international experts will also occur which is outlined in the stakeholder engagement plan.

2.2 Key Evaluation Questions:

Domain	Key Evaluation Questions
Effectiveness To what extent has the project achieved its expected outcomes?	To what extent has • coordination of the banana industry R&D Program been improved? • collaboration and awareness amongst banana R&D Projects been enhanced? • extension and communication of R&D developments been enhanced with and among all sectors of the banana industry?
Relevance How relevant was the project to the needs of intended beneficiaries?	To what extent has the project met the needs of research providers, growers, government departments, and other industry stakeholders for • Improving coordination of the banana industry R&D Program • Increasing collaboration and awareness amongst banana R&D projects • facilitating extension and communication of R&D developments among all sectors of the banana industry?
Process Appropriateness How well have the intended beneficiaries been engaged in the project? To what extent were communication and engagement processes appropriate to the target audience.	• To what extent were target levels of engagement of levy payers achieved? • Was the range of communication and engagement processes used to the target audience appropriate? • Was content regularly provided through the communications project? • To what extent did this project collaborate with the national extension project in order to engage the target audience.
Efficiency What efforts did the project make to improve efficiency	To what degree has this project • implemented agreed activities according to agreed schedules and budgets outlined in the research agreement? • Made effort to achieve value for money?

2.3 M&E Budget: The budget for the M&E plan will be part of the overall project budget.

3. Performance expectations data collection and analysis

- Project documents, including M&E plan, program logic, risk register, stakeholder engagement plan.
- 6 monthly milestone status reports, mid-term project review and final report completed on time, project reference group meetings twice per year.
- Annual work plans.
- Project development and R&D coordination services for the banana industry.
- Active participation in project reference groups for all major banana projects and the Banana R&D Strategic Investment Advisory Panel.
- R&D Concepts submitted through Hort Innovation pipeline.
- Networks with banana researchers maintained and enhanced- for example via input through activities such as Scientific Symposium, Road Shows, Congress 2019. There will be 2 major activities per year.
- Collaborations between groups fostered.
- Technical advisory services delivered to the banana industry R&D Program in areas such as biosecurity, pest and diseases, plant improvement, agrichemicals.
- Banana Industry representation at relevant forums and meetings with government departments, DAF (BQ and ASQ), PHA, other industries, service providers.
- Publications in the Australian Bananas Magazines, e-bulletins, fact sheets as required.

3.1 Data collection and analysis

Performance in project coordination will be measured during the life of the project using indicators such as:

- Relevance of R&D projects to the banana industry strategic investment plan 2017-2021.
- Linkages between projects.
- Dialogue and collaborations between Australian R&D service providers.
- Development of new projects as per industry requirements.
- Improved collaborations with international scientists.
- Feedback from Hort Innovation and service providers on participation in project reference groups.

Improvements in industry knowledge and adoption of R&D outcomes will be evidenced by:

- Survey data.
- Details of extension activities that have received input from BA17002.
- Detailing the levels of engagement with stakeholders.

- Feedback indicating and increase in knowledge and intention to adopt new practices.

Representation of the industry and its R&D by the R&D Manager at relevant forums will be evidenced by feedback from research providers, Hort Innovation, government departments growers and industry stakeholders on:

- The accessibility and quality of relevant banana information.
- The effectiveness of relationships developed with the banana industry.
- How receptive the banana industry is to information from their departments and agencies.

Program logic level	What to Monitor	Performance expectations KPIs	How to Monitor	Data collection and Source	When	Responsibility
Activities	1. Liaising with people from different research agencies, growers, government departments, regulatory authorities and industry stakeholders. 2. Participation and input to banana industry PRGs, R&D SIAP. 3. Timely extension and communication of R&D outcomes. 4. Professional development through attendance at relevant meetings and conferences.	Meetings, teleconferences, extension & communication activities such as publications & reports, field days, road shows, congress, workshops, growers' meetings or any other forum.	Record keeping	Research providers, Hort Innovation, government depts, growers, industry stakeholders	Ongoing	R&D Manager, PRG, milestone reports, final reports.
Outputs	1. Provision of technical input to the development and conduct of R&D projects. 2. Facilitation of beneficial collaborations. 3. Work with industry extension and Comms projects to ensure latest R&D developments are being made available to industry in an accurate and timely manner. 4. Representation of the industry and its R&D at relevant forums.	• Number of PRG meetings. • Number of concepts submitted. • Number Extension participation. • Number of technical inputs into chemical permits/industry use. • Number of stakeholder meetings, forums etc. attended	Record keeping	Research providers, Hort Innovation, government depts, growers, industry stakeholders	ongoing	R&D Manager, PRG, milestone reports, final reports, Industry reports, publications.

Immediate outcomes	1. R&D projects are initiated & developed that address industry opportunities and challenges. 2. Technical & research findings are effectively communicated and extended which results in a high degree of uptake & adoption by industry. 3. Improved relationships between stakeholders, research agencies and regulatory authorities	• Number of linkages between projects. • Number of new projects. • Increased technical knowledge of banana R&D, • Enhanced relationships between stakeholder groups	Record keeping questionnaires, surveys, interviews, observations.	Research providers, Hort Innovation, government depts, growers, industry stakeholders.	Intermittent, Milestones due 6 monthly. Mid-term review at the end of year 2.	R&D Manager, PRG, milestone reports, final reports, independent reviewer, industry reports, publications.
End-of-project outcomes	1. Improved coordination of industry R&D program focused on delivering outcomes in priority areas. 2. Increased awareness & collaboration amongst R&D Projects. 3. R&D projects that are better developed and conducted because of accurate technical and industry advice. 4. Enhanced extension and communication of R&D developments. 5. Enhanced representation of banana industry R&D at relevant forums.	• Number of projects, degree of development and level of collaboration. • Increased knowledge of R&D • Contribution of R&D Manager to improving awareness and collaborations	Record keeping, questionnaires, surveys, interviews, observations.	Research providers, Hort Innovation, government depts, growers, industry stakeholders.	Intermittent Final report due at the end of year 3.	R&D Manager, PRG, milestone reports final reports, evaluation report, publications.

4. Evaluation

There are no further data requirements other than what has already been listed above.

The project will be evaluated through a mid-term review at the end of year two (due 2 Aug 2020)

Final evaluation will occur as part of the final report (2 Aug 2021).

5. Project Reporting and continuous improvement

Reporting

Report type	To whom	Timing
Milestone Reports	Hort Innovation	6 monthly
Final report	Hort Innovation	At the end of the project
Articles	Australian Bananas and e-bulletins	At least annually
Written and verbal updates	Project Reference group	At least six monthly
Financial Reporting	Hort Innovation	At the end of the project

Project Continuous Improvement activities.

Continuous Improvement Process	Details	Timing
Project Reference group meetings	Meetings between the project team, Hort Innovation and industry reps to gain feedback on project activities and refine methodology	6 monthly
Project team meetings	To discuss project progress and methodology	As required (quarterly)

6. Stakeholder Engagement Plan – BA17002 – Banana Industry R&D Coordination

Engagement Objectives To achieve efficient and effective project coordination, development, and extension of Banana industry R&D. Enhance technical and R&D adoption in the banana industry and input into the Banana Industry R&D program.		
Who	Stakeholders	Research providers and their individual research scientists; State and Federal departments; Regulatory authorities; Hort Innovation; Individual growers; Growers Associations; Other Horticultural industries and their representatives; banana supply chain businesses; members of the public, ABGC colleagues.
Why	Why engage with this group?	Research provider and research scientists: To improve the knowledge and understanding of the banana industry opportunities and challenges, increase awareness and understanding between individuals and groups to reduce duplication, increase collaboration and ensure the delivery of tangible outcomes to growers. State and federal departments: Improve knowledge of R&D for the banana industry and provide relevant technical information. Regulatory authorities: Improve knowledge of R&D for the banana industry and provide relevant technical information. Individual growers: Provide information on R&D outcomes, how they can be adopted and increase awareness and understanding of the banana R&D Program. Growers' associations: Provide information on R&D outcomes, how they can be adopted and increase awareness and understanding of the banana R&D Program; provide technical advice Other Horticultural industries and their representatives: Provide information and improve understanding of banana industry's challenges and opportunities, increase awareness of the banana R&D program and provide technical advice. Banana supply chain businesses: Improve knowledge of R&D for the banana industry and any relevant outcomes and provide relevant technical information. Hort Innovation: Improve knowledge of R&D for the banana industry, provide relevant technical information to the R&D Program. Members of the public: To improve the knowledge and understanding of the banana industry R&D Program and provide technical advice. ABGC colleagues: To improve the knowledge and understanding of the banana industry opportunities and challenges, the R&D Program and provide technical information.

How	What is the level of engagement?	Research providers and their individual research scientists – Inform, consult, involve, collaborate and empower State and Federal departments- Inform, consult, involve, collaborate Regulatory authorities- Inform, consult, involve, collaborate. Hort Innovation - Inform, consult, involve, collaborate. Individual growers- Inform, consult, involve, collaborate, empower Growers Associations- Inform, consult, involve, collaborate, empower Other Horticultural industries and their representatives - Inform, consult, involve, collaborate Banana supply chain businesses - Inform, consult, involve, collaborate, empower members of the public – inform and consult ABGC colleagues - Inform, consult, involve, collaborate, empower.
	Proposed method of engagement	Research provider and research scientists: Individual & group activities including meetings, attendance and input at ideas exchanges, conferences, workshops, written publications, websites, bulletins, circulars. Membership of project reference groups,
		State and federal departments and Regulatory authorities: Face to face meetings, membership of project reference groups, steering committees, focus groups, public comment, forums.
		Individual growers: Individual and group meetings, Fact sheets, web sites, bulletins, circulars, surveys, public meetings, workshops
		Growers' associations: Group meetings, seminars, Fact sheets, web sites, bulletins, circulars, surveys, public meetings, workshops
		Other Horticultural industries (including nurseries) and their representatives: Individual and group meetings, Fact sheets, web sites,, bulletins, circulars, surveys, public meetings, forums.
		Banana supply chain businesses: Web sites, bulletins, meetings, forums.
		Hort Innovation: Meetings, project reporting, workshops, project steering committees
		ABGC colleagues: meetings, individual and group activities, collaboration.
		Members of the public: Fact sheets, web sites, newsletters, bulletins, circulars, surveys, public meetings, forums

	Timing	Research provider and research scientists Regular meetings with major banana research groups to maintain informal networks of banana researchers. Attend and have input into ideas exchanges in the form of group meetings, seminars, field days and workshops when available. Attendance and input to project reference group meetings of relevant projects – twice yearly Participation and input to Banana Road Shows and Congress R&D Segments of the Program Ongoing is the dissemination of information through the web site, e-bulletins and magazine etc.
		State and federal departments and regulators Weekly Industry updates with BQ – ongoing. Email consultation by APVMA on chemical issues as required. Individual and group meetings with NGIA and BQ about QBAN. ASQ regarding diagnostics as required.
		Individual growers Individual or group activities with growers at least 4 times per year. The R&D manager will have input into fact sheets, web sites, newsletters, bulletins, circulars, surveys, public meetings, workshops – ongoing. These will be targeted to growers.
		Growers’ associations Attend a meeting of a grower’s association at least once per year, provide advice either written or verbal as requested. Have input into fact sheets, web sites, newsletters, bulletins, circulars, surveys, public meetings, workshops – ongoing.
		Other Horticultural industries and their representatives Liaise with other horticultural industries through meetings, networking events, meetings, forum, and workshops – as required -on going.
		ABGC colleagues Meetings and collaboration on different projects and towards goals relevant for industry. This will be ongoing, occurring frequently each week. Joint input into publications and representation for industry.

		Members of the public: Provide written or verbal advice as required and have input into any media released to the public e.g. web site and any other publications. This will be ongoing as required.
	Resources required	The project is well resourced to meet the stakeholder engagement plan. Funds and time have been appropriately allocated.
	Responsibilities	The major responsibility for implementation of the Stakeholder engagement plan will be via the ABGC R&D manager and PRG. The R&D manager will be the conduit for information flowing between all interested parties and stakeholders and to provide input into the banana R&D program. Research project leaders and service providers are responsible for reporting their R&D outcomes and technical advice. The R&D manager will liaise with researchers, extension groups, national and international collaborators. Hort Innovation-funded Extension project teams will be responsible for adoption strategies. The R&D manager will work closely with the ABGC Communications manager for the dissemination of information to industry and the general public. The R&D manager will work collaboratively with other ABGC R&D projects and ABGC management team in stakeholder engagement activities. It will be the R&D manager's responsibility to submit milestone, mid-term, and final reports to Hort Innovation.
	Key messages to communicate	Research priorities identified by industry will be communicated to research providers and Hort Innovation Cooperation and coordination of research priorities to interested parties R&D investments and outcomes will be communicated to all growers and any other relevant industry bodies to maximize adoption.
Special considerations	Risk management, issues, engagement barriers, audience characteristics.	See Attached risk management plan

7. Risk Management Plan: for the delivery of BA17002 – Banana Industry R&D Coordination

The risk	Potential causes/sources	Potential impacts	Controls	In terms of the delivery of this project BA17002		Treated risk assessment	Risk evaluation	Responsible person
				Likelihood with controls in place	Consequence with controls in place			
Loss of key project personnel such as the R&D Manager	Resignation or illness	Loss of key knowledge and experience	Project leader and PRG well-informed of project progress. Regular project team meetings to share information on progress. Central storage of project data/information	Remote	Minor	Low	Yes	R&D Manager, Project Leader and PRG
Industry is confronted by unexpected challenges	Rapid spread of TR4 or new pest incursions,	Change in project scope and focus. Disruptions to work time.	Ensure current RD&E has some focus on new scenarios such as, when TR4 is widespread, or new threats e.g. exotic pests. Build relationships with all stakeholders so there can be rapid reappraisal of R&D strategy. The R&D Manager and this project are in the prime position to facilitate this rapidly.	Possible	Minor	Medium	Yes	R&D Manager, Project Leader and PRG
Duplication of research efforts either nationally or internationally	Different research providers are conducting similar research projects on similar topics, caused by lack of awareness or scientific competitiveness.	Re-evaluate the mechanisms for staying abreast or current research	Good communication and engagement with different research providers should increase awareness and understanding of each project's research directions, capability and findings. Attendance at conferences and continuous appraisal of scientific literature should keep the project up to date internationally.	Remote	Minor	Low	Yes	R&D Manager, Project Leader and PRG
R&D Manager does not manage relationships	Personality clashes. Inappropriate communication	Re-evaluate communication and engagement strategies for each stakeholder group.	The R&D Manager was recruited using a selection panel and is experienced in the key skills and experience required for the job. The R&D Manager will be working in conjunction with a PRG.	Remote	Moderate	Low	Yes	R&D Manager, Project Leader and PRG

with stakeholders	and engagement strategies	Professional development in dealing with difficult people						
Low grower engagement in adoption activities	Growers unable or unwilling to attend; Adoption activity content not relevant; Inappropriate extension strategies for the target audience	Low uptake of new practices; Underachievement of intended project outcomes.	Development of stakeholder engagement plan; early establishment of industry networks; close liaison with industry development officers and extension personnel.	Possible	Insignificant	Low	Yes	R&D Manager, Project Leader and PRG

Appendix 2 Detailed outputs against key deliverables

The four major deliverables of BA17002 were to act as a central point of contact for industry R&D and:

- i. Provide technical input to the development and conduct of R&D projects.
- ii. Facilitate beneficial collaborations.
- iii. Work with industry extension and communication projects to ensure the latest R&D development are made available to industry in an accurate and timely manner.
- iv. Represent the industry at relevant forums and meetings of relevant government departments and agencies on banana R&D matters.

Deliverable #1 Provide technical input to the development and conduct of R&D projects.

1. Projects

Established QBAN as a third-party accredited industry led Scheme for clean planting material.

The R&D Manager coordinated and drove the Quality Banana Approved Nursery (QBAN) Scheme development with Greenlife Industry Australia (GIA) and the Department of Agriculture and Fisheries (DAF), provided technical advice on aspects of the scheme, its practical implementation, ensured appropriate consultation was conducted.

Key meetings involved, organising and coordinating the project steering committee (including growers), consultation with technical experts, QBAN businesses, and biosecurity authorities. A meeting was organized with QBAN businesses at the Banana Congress in May 19, to discuss the new scheme and implementation timetable. Six QBAN businesses attended along with GIA, and ABGC. Meetings were also held with state biosecurity authorities to ensure joint understanding government senior management on how they will support the transition phase in 2020 and the future scheme.

Drafting of new guidelines were completed by the end of Aug 2019, which was followed by a transition year from Jan- Dec 2020. The new Scheme was fully implemented and operational from January 2021.

The R&D manager also coordinated the development of a new QBAN trademark, promotional material and QBAN branding style guide. The new QBAN will ensure businesses are meeting and maintaining high standards in the propagation and supply of banana planting material. This project (BA17002) and its successor BA20002, has ongoing responsibility for overseeing and coordinating the QBAN scheme in partnership with GIA and the steering committee

Coordinated of Management of yellow sigatoka and other diseases in NQ (BA15003). BA15003 was finalized at the end of December 2018 and the incumbent Liaison Officer Mr Louis Lardi retired. The Banana Industry R&D Manager played a major role in coordinating the finalization BA15003 and, during the last 6 months of the project, the development and establishment of its replacement project, **BA17005 Management of banana pests and diseases in NQ**, which has a wider emphasis on general biosecurity extension in addition to leaf spot management. The two projects (BA15003 and BA17005) overlapped by three months ensuring a smooth transition of information and capability between Mr Lardi and incoming Plant Health Officer, Mr Carl Rickson. The R&D Manager had oversight of both projects including the mentoring and support of Mr Rickson. The R&D Manager has weekly phone meetings with Mr Rickson who continues to develop his skills in extension, data management and report writing on top of his usual inspection and liaison tasks. Project deliverables are being met, and reports submitted on time.

Coordinated National Banana Bunchy Top Virus (BBTV) Project. The Banana Industry R&D Manager had input as a member of the Project Reference Group (PRG) of Phase 3 projects BA15006 and BA15007. She assisted in the organisation and delivery of the BBTV Workshop Aug 2018 in collaboration with Hort Innovation. Results from BA17001 'Banana Bunchy top virus control data' were presented and considered by workshop participants. The Banana Industry R&D Manager also provided advice about the prioritisation and development of concepts for a follow-on project and, as a member of the R&D Strategic Investment Advisory Panel (SIAP), provided advice on the recommendations and evaluation of the concepts. This work culminated in new project, BA18000 Banana Bunchy Top Virus Program (Phase 4) National surveillance and Education' which was released for open tender by Hort Innovation in February 2019. On behalf of ABGC, the R&D Manager played a key role in successfully tendering for

BA18000, its establishment and ongoing management for ABGC (start date 1 Jul 2019). This included:

- the recruitment of staff.
- being an active as a member of the PRG, coordinating meetings twice a year and providing technical input.
- developed, released, and evaluated the social research project tender document and organised contracting.
- Organizing the subcontracting and briefing of the consultants,
 - Biosecurity Solutions Australia, who developed the Industry Code of Practice for planting material.
 - Proof Research who conducted the social research project.
- liaison with Biosecurity NSW and BQ representatives to ensure regulatory support for the project, the Code of Practice and the sharing of information of new plantations and incidence of Bunchy Top Virus and weedy plantations.
- Providing feedback on extension and communication material, advice to the team on WHS, budget, timesheets and chemical usage. Weekly meetings with project managers.
- Organising a workshop in NQ to train extension and field staff from BQ, NAQS, ASQ, ABGC extension staff and private consultants in bunchy top detection and reporting.

Development of a new five-year Banana Industry Strategic Plan (SP).

ABGC is developing an overarching Strategic Plan for the national banana industry to provide direction in industry development priorities and decision-making over the next 5-10 years and assist Hort Innovation develop the new five-year Banana Strategic Investment Plans (SIP) for the banana industry. The Strategic Plan encompasses all areas of importance to industry and has a clear vision for the future, thereby facilitating the development of the Strategic Investment Plan easier and ensuring its relevance to industry needs.

Since August 2020, the R&D Manager played a major role in determining

- the process of development for the new Strategic Plan,
- the formation and coordination of an ABGC working group and associated workshops.
- the coordination of industry consultation with growers through
 - regional workshops
 - surveys (online and by phone interviews),
 - liaison with the National Extension Project individual grower interview
- the collation of data for the prioritization process.
- Liaison with Hort Innovation's Strategic Industry Partner Ms Georgia Shiel and the Regional Extension Manager Dr Olive Hood to facilitate the development of the new Banana Strategic Investment Plan.

The new Banana Industry Strategic Plan will be published on the ABGC web site from mid-2021.

BA14014 Panama TR4 Research Program The banana industry R&D Manager was involved in BA14014 in three main ways:

- Coordinating the QBAN transition project as detailed above.
- as an active member of the Project Reference Group providing technical advice and input into the strategic direction of the project and how aspects of the work (e.g. varietal evaluation) could be continued in BA16001.
- the R&D Manager assisted in the coordination and payments for the development of the online Biosecurity BMP which was also funded through BA14014.

BA14014 finished in that finished in 2020.

BA16001 Improved Plant Protection for the banana industry. The banana industry R&D Manager has been and continues to be an active member of the Project Reference Group and Varieties sub-committees providing input into the strategic direction of the project. She has regular meetings with Project Leader and was involved in the end-of-project review as an interviewee. As an active participant in Theme 5, the R&D Manager assisted DAF to organise and convene both two-day Banana Scientific Symposiums in Cairns November 2018 and Brisbane in April 2021. Input was given to the development of the program and its goals, participants, venue and execution.

BA16005 Strengthening Banana Industry Diagnostic Capacity Regular discussion are undertaken between the R&D manager and service provider University of Queensland on high priority pests, threat levels, diagnostics and industry preparedness.

BA16007 & BA19004 National Banana Development and Extension Projects The banana industry R&D Manager is

a member of the project reference group providing input into the strategic direction of both of these projects and the various activities undertaken as part of them. This included participation and a presentation at the 2018 Banana Road Shows in 2018, participation in Science Speed dating event 3rd Oct 2019 and visit to NT variety trials as part of the NextGen group and participation in the 2020 Mini Road Shows.

The R&D manager also had input to prioritization planning and re-contracting of the National Development and Extension project when BA16007 finished and the new project BA19004 was initiated. An additional role the R&D manager plays in BA19004 is assisting in the coordination and payment of grants for the WA Innovation trials.

BA16012 Revision of the Owner Reimbursement Costs (ORC) Framework for the Australian Banana Industry.

Integral technical and industry advice was provided by the Banana industry R&D Manager to the service provider, Agdynamics and PHA throughout this project until its completion. This involved coordinating the interactions with industry contracts e.g. growers, PHA, and Pinnacle Agribusiness (the service provider of the BA16009 Benchmarking project) to ensure the most recent data was included in the new evidence framework. In 2019 this has involved the facilitating the finalization of the new Evidence Framework through the approvals process. The Banana industry Owner Reimbursement Cost Evidence Framework V2.0 received its final endorsement by the board of PHA in Jul 2019 and has now been published on the PHA website. (planthealthaustralia.com.au/biosecurity/incursion-management/owner-reimbursement-costs/).

Rural R&D for profit program The Banana Industry R&D Manager secured involvement of the banana industry in Multi-scale Monitoring Tools for Managing Australian Tree Crops: Phase 2 funded through Round 4 Rural R&D for profit program. This large project involves a range of service providers and horticultural industries but the major aim for the banana industry, to assist project partners in mapping the national banana industry and to assist with industry partners in the use of RFID tags for yield monitoring and forecasting in the banana industry.

Smart Farms Partnerships Round 2: ‘Digital remote monitoring to improve horticulture’s environmental performance’. The R&D Manager secured the banana industry’s inclusion in Hort Innovation’s successful bid for a cross- industry project funded through the Federal government Smart Farming Partnerships Round 2 Grants. The has been managed by the Banana Industry Strategy Manager since its start since it dovetails with work on water quality for the Great Barrier Reef. Four pilot demonstration smart farms in the Great Barrier Reef catchment (one for bananas). Each farm was established using a digital dashboard to integrate sensor and other data to remotely monitor environmental performance and drive adoption of BMP codes nationally.

A Banana Bunch Plastic Recovery Project and recycling initiates for on farm plastics.

Plastics (bunch covers, twine and fertilizer bags) generated by banana farms are an increasing problem for the banana industry and there has been growing interest from growers and industry stakeholders plus mounting public pressure to solve the issue of plastic disposal and improve the industry’s environmental sustainability.

The R&D Manager therefore worked with a range of different stakeholders over the last 18 months within the plastic waste recycling industry, to try and establish a project that will address the plastics issue. This included growers, bunch covers suppliers, resellers, two technology companies, waste collection providers (MAMS group and Cleanaway), and Greencollar Australia (one of Australia’s largest environmental markets investors and project developers).

In April 2020, the R&D Manager facilitated a partnership between ABGC, Greencollar and the MAMS group to develop a pilot project proposal to recover and recycle agricultural plastic waste from NQ banana farms. The project team will work with existing local organisations, including NQ banana growers, to incentivize efforts to recycle plastic waste. Greencollar (as the lead agency) submitted the joint project concept to the 3R Initiative, a plastics scheme that is being developed by Verra and their partner BV Rio. It is a market mechanism designed to incentivise and scale up Recovery of environmental plastics, Recycling, and Reuse. The concept was successful, and a full project proposal was submitted in June 2020. The project is still in development, but it is anticipated it should be contracted, in late 2021 or early 2022. The R&D Manager’s role in this proposal was to identify and build relationships with participants in the waste recycling sphere, provide relevant technical and industry advice, estimate, and provide statistics on bunch bag usage in the NQ industry, liaise, organize, and host meetings with partners.

The R&D Manager has also been facilitating another initiative to assist a small startup company Rtech to be able to build a pilot commercial-scale prototype recycling plant at Silkwood in NQ. This has involved pursuing funding options, investigating grants, organising meetings with stakeholders and fostering collaborations.

Automation and mechanization

One of the most recent initiatives currently being driven by the R&D Manager has been investigating the feasibility and application of technology and automation to solve labour force and manual handling challenges in the banana farming system. Banana farming is intrinsically labour intensive, costly, has many associated WHS issues, and relies heavily on an international workforce. The Covid 19 pandemic has had a severe impact on the sourcing of labour for the banana industry which has led to increasing interest in automation and mechanisation within the industry. The R&D Manager has initiated relationships with QUTs Centre for Robotics and the ARM Hub that latter of which provides access to a tightly woven network of research institutions, facilities and commercial companies in Queensland. Together the R&D Manager and the Arm Hub and has been scoping project possibilities and have prepared a concept for a time in motion study and feasibility study which is planned for the second half of 2021 if funding can be secured.

International Projects

The R&D Manager secured the banana industry's involvement in two ACIAR projects on Fusarium TR4.

- **HORT/2018/192** An Integrated Management Response to the spread of Fusarium wilt of Banana in south-east Asia led by DAF 2020-2024. This project has two aims (i) to examine the relationship between management practices and the microbiome (ii) develop practices banana growers can implement to manipulate the banana microbiome and reduce the inoculum of Fusarium in the soil. ABGC is a project partner in Hort/2018/192 which is led by QDAF. The R&D Manager represents ABGC as a member of the project steering committee and, as such, has provided input at virtual meetings on project planning, proposed activities, reviewed and provided feedback on milestone reports, conducted budget acquittals, and participated in webinars. The R&D Manager also attended the 'Fundamentals in Soil Biology' online course run by the project.
- **HORT/2019/163** The aim of this project was to run two workshops in China in 2020 however they were cancelled because of Covid 19. These workshops were to be jointly coordinated by ACIAR, ABGC and international partners. Instead, the project partners developed a webinar series entitled 'Safeguarding the banana industry from Fusarium wilt: Research updates and opportunities in the Asia Pacific' with the objectives to:
 - Share information on current research and technologies in mitigating the impact and spread of banana wilt caused by *Fusarium oxysporum* f.sp. *cubense* (FOC).
 - Enhance awareness of the dangers of the disease to all participating countries to encourage regional cooperation in combating the disease.
 - Strengthen quarantine procedures among participating countries to prevent disease spread.
 - Prepare a summary and analysis of recommendations to partners and countries.
 - The four three-hour webinars were held virtually in 2020 on:
 - o 20 Oct Research updates and opportunities in the Asia Pacific.
 - o 27 Oct Biodiversity, Evolution & Host/Pathogen Interactions.
 - o 03 Nov Breeding initiatives for resistance against FOC TR4
 - o 10 Nov Integrated control measures and sustainable field management practices.

Each webinar was attended by over 50 - 65 participants worldwide and had a good participation rates from Australian banana researchers. Speakers from Australia included Mr Stewart Lindsay, Prof Elizabeth Aitken, Prof James Dale and Dr Tony Pattison. The webinars illustrated the wide range of research being conducted across the Asia Pacific in TR4 management, breeding and biosecurity and host pathogen relationships and stimulated networking and discussion between Australian and international researchers. This is important during the restrictions imposed by Covid 19.

The R&D Manager was a member of the organizing committee of the webinar series providing suggestions on the program and timing, the names of Australian researchers to canvass interest in participating and speaking at the webinar series. The R&D Manager also attended three out of the four of these three-hour webinars.

Mort Johnston Scholarship – The R&D Manager coordinated the broadening of the scope of the scholarship to offer the scholarship through an additional University (JCU) and be open to students from additional disciplines as well as plant sciences e.g. engineering, ecology and agribusiness. This involved the development of a new agreement with JCU and the renewal the UQ agreement. In the past, ABGC offered the scholarship each year only through the UQ School of Agriculture and Food Sciences. It has been open to students in their final undergraduate or postgraduate years to encourage students to take up a career in the banana industry. In recent years There has been a low uptake of scholarships which has been a general trend across the University exacerbated by Covid 19. From 2021, these strategies should allow a greater number of high-quality students access to the scholarship.

2. Chemicals

Permits and chemical registration

- In collaboration with Hort Innovation, the Banana Industry R&D Manager played a major role in successfully coordinated the drafting and submission of
 - a new permit application for Success Neo.
 - and with BQ facilitated the amendment to PER86485 for changes to TR4 sanitising protocols and a new minor use permit for the use of Bifenthrin in TR4 destruction zones. The latter was approved by APVMA 19th November 2020.

These permits assist growers manage pests and disease and in particular, assist owners of TR4 infested properties to legally manage banana weevil borer as required by legislation in destruction zones.

- Provided industry contacts for Eurofins and Staphyt to conduct residue trials for new actives for the banana industry (for leaf spot and banana aphids)
- Provided banana industry specific advice to Hort Innovation subcontractor Kevin Brodnaruk on critical uses for the Chlorpyrifos Review June 2020.

Submissions for chemical reviews

The R&D Manager prepared submissions to the APVMA and provided data to Hort Innovation on behalf of the banana industry for chemical reviews being undertaken by APVMA. This included the Chlorpyrifos review (2019), Neonicotinoid review (2020), general chemical usage and Dithiocarbamates (2020).

Banana Strategic Agrochemical Review Process (SARP)

Information was provided by the R&D Manager to Hort Innovation contractors for the new Banana Strategic Agrochemical Review Process (SARP). The R&D Manager had several meetings with the consultants herself and organized the promotion of the SARP and its survey through ABGC comms channels to canvass information from banana growers (February 2020). Out of all the horticultural industries undergoing the SARP, the banana industry had the best response (>30 growers took the survey) and overall provided the most information to the process. The R&D Manager also provided feedback on the draft SARP to the consultants.

Technical Advice to growers

Technical information was provided to growers on chemical issues for example leaf spot controls and resistance management, with-holding periods, new products registered for leaf spot, banana weevil borer, and thrips as well as bird and bat damage. Updates were also provided to growers ABGC board and BQ about chemical reviews, possible new actives and status of minor use permits and any other technical issues.

With Holding Period (WHP) of horticultural oils

The R&D Manager was successful in obtaining the cooperation of three chemical companies to change the withholding period (WHP) of their horticultural oils to be more practical and usable for the banana industry.

A significant issue for the banana industry is that many growers were being given corrective action notices during their HARPS audits because they had been breaching the 1-day WHP when spraying for leaf spot with mineral oils as well as some of the triazole fungicides. It is complicated and expensive for chemical companies to change their labels and for the triazoles, may require residue testing. It was therefore decided to pursue a change to the 1-day WHP for spray oils as the easier first step. These oil products have no maximum residue limits (MRL), are non-toxic and residue testing would not be required.

There are three major horticultural oils used by the banana industry in leaf spot control Sacoa Biopest oil (estimated to be used by 80% of the industry), Banole Oil (10-15% of industry), Trump Oil (5-10% of industry).

The R&D Manager liaised with Hort Innovation R&D Manager Jodie Pedrana, sought pre-application advice from APVMA on what was needed to change the WHP of mineral spray oil products from 1 day to nil, then through meetings and letters with Sacoa, Total fluids and VICCHEM requested the change to the WHP. This resulted in the positive outcome that all three companies pursued applications with APVMA to amend the WHP on their labels. These applications were ultimately successful, and the labels were changed.

Deliverable #2 Facilitate beneficial collaborations

1. Service Providers

The R&D Manager had frequent informal and formal exchanges by email or meetings to improve awareness of the progress of current R&D and the potential for future R&D. The R&D Manager was also active in initiating meetings between research providers to strategically plan future work to allow continued development of the most valuable RD&E being generated from current projects. This is particularly relevant to varietal development components of large projects such as BA14014 (finished in Jun 2020) and BA16001 (due to finish Dec 21) as well as development of the latest BA19004 Banana Industry National development and extension Program.

The R & D Manager also conducted extensive liaison with many companies and stakeholders over the plastics recycling projects (e.g. Green collar, MAMS, Rtech, Arm Hub etc.), management of subcontractors involved in BA18000 Bunchy Top Virus Project (e.g. Proof Research, biosecurity solutions Australia), updates on varietal development components of BA16001 (Plant Protection Program), and input into project development of the two new ACIAR projects. Considerable effort was made in this project to facilitate introductions and meetings and build networks between stakeholders and service providers. This helps accelerate the building of beneficial collaborations.

2. Hort Innovation

The R&D Manager fostered productive collaborations with Hort Innovation staff including R&D Portfolio Managers for each banana project and the Banana Strategic Industry Partner and the Regional Extension Manager to improve the transfer of information and coordination of the R&D program. This involved assisting the planning and delivery of SIAP meetings, new concepts and projects, project reviews, and the renewal of the Banana Fund Strategic Investment Plan.

In conjunction with Hort Innovation's General Manager of Extension & Adoption, the Banana Industry R&D Manager organised an extension and adoption forum for banana industry communication and extension professionals in Oct 2019. This included Hort Innovation representatives and was aimed at improving understanding of strategies currently being employed in the banana industry as well as identifying areas of opportunity. The R&D Manager also fostered the transfer of information between Hort Innovation staff and service providers and also between Hort Innovation and growers.

3. Biosecurity Agencies

Biosecurity Queensland and Biosecurity NSW - The R&D Manager had weekly meetings with TR4 Panama Program leader (these ceased as from Nov 2020) and other relevant staff as required. She aided BQ staff to scope, commission and manage a social research project, the outcomes of which were used to develop engagement strategies to improve adoption of on-farm Biosecurity BMP. The R&D Manager was a member of the technical working group involved in reviewing surveillance strategy annually and other issues such as destruction zones and provided advice to the Transition working group on legislative tools that could be used to manage the TR4 Program when industry takes over its delivery.

In terms of Bunchy top disease management and the initiatives included in BA18000, the R&D Manager facilitated beneficial collaborations to develop the Banana Industry Code of Practice for Planting Material, review of the NSW Bunchy Top Control Order, compliance associated with weedy plantations and information sharing.

The R&D Manager attended PHA/BQ Biosecurity workshop 10-11th Oct 18 Brisbane; various CCEPP and NMG meetings on EPPs such as Freckle, Fruit flies and other possible emergency plant pest; PHA; private consultants such as Agdynamics, Labrom Agriculture/ AgKonec, Biosecurity Solutions Australia, Kevin Clayton Green (Coffs Harbour Bypass Biosecurity Risk Management plan). She recently joined the National Plant Industries Biosecurity Committee to represent the banana industry.

4. Growers

Information exchanges were facilitated by the R&D Manager between growers and researchers during Roadshows in Tully, Innisfail and Carnarvon in Aug 18, by presenting information and participating in meet-the-scientists speed-dating sessions. Also, during Next Gen visit to the NT variety trial in Sep 19 and during the Science Speed dating evening in Innisfail Oct 19. The R&D Manager provided advice to groups of growers on chemical assess and usage at both events and informally fostered interchanges between growers and researchers on relevant scientific matters such as new varieties. The outputs from various R&D project were specifically targeted to growers at the Banana Congresses R&D Speed Talks session and poster session in 2019 and 2020 as detailed below.

Advice was provided to banana growers associations as required on issues for the industry e.g. impact of birds and bats, chemical permits and new actives, submissions and chemical reviews and withdrawals.

5. Chemicals companies

Relationships were established with representatives of three of the five major chemical companies. The R&D Manager met with major representatives of Corteva, Bayer and Nufarm and discussed the banana industry's priority pests, gaps, impact of chemical reviews, new actives, WHPs, and residue testing on bagged and unbagged fruit. Contact still needs to be made with BASF and UPL. The R&D Manager also liaises with chemical resellers for information about chemical use in the industry and the status of permits and reviews.

As mentioned previously, the R&D manager also fostered productive collaborations with the chemical companies Saccoa, Total Fluids and VicChem and to change the withholding period on their horticultural oils.

6. Professional development

The R&D Manager undertook professional development to enhance skills in negotiation and communication. This included attending an online course run by PD Training on Dealing with Difficult People (Apr 20), and webinars on 'Improving online presentations'. The R&D Manager also became a member of APEN in September 2020 and has participated in several on-line events to improve extension techniques.

Deliverable #3 Work with industry extension and communication projects to ensure the latest R&D development are made available to industry in an accurate and timely manner.

1. National extension project

The R&D Manager was an active member of the PRG and had regular meetings one-on-one meetings with project leader and NSW Industry Development Officer. Through these discussions, input was given to the major activities being delivered under the project, extension priorities were considered options for future project work were explored. The R&D Manager assisted Hort Innovation and QDAF with the recontacting process of BA19004. As mentioned previously, the R&D Manager often attended or delivered presentations at the Banana Roadshows, the Science Speed Dating Sessions, NextGen trip to the NT 2019 and Banana Agribusiness Manager's meeting. Titles of oral presentations are shown below.

The R&D manager assisted in the planning and delivery of the Scientific Symposia in Cairns in 2018 and Brisbane 2021.

Further detail may be found under Section 1 Projects of this Appendix.

2. Communications projects

- The R&D Manager also liaised closely with the Communications Project providing technical input into information being disseminated through the range of communications channels whenever needed. Specific input was provided in the range of articles – see below.
- Involvement in the Australian Banana Industry Congresses (ABIC) **Gold Coast 2019 and Cairns 2021** planning and delivery.

The R&D Manager provides leadership on development and delivery of the scientific program at each Congress serving as a member of the Congress Program Committee. The committee met regularly during the 12 months prior to the Congress being held. The R&D Manager's major achievement at these Congresses was her key role in planning, coordination and delivery of the one-hour Science Speed Talks Session and Science Poster Session. The R&D manager took responsibility for preparing briefing material for presenters, forming and coordinating a selection panel to review submitted abstracts, selecting and briefing speakers, providing advice to presenters, and chairing the Speed Talk session at each Congress. A post-congress survey of the 2019 Congress showed that 66% of those surveyed, felt they had gained a lot of R&D knowledge from the program with a further 28% feeling they had gained a moderate amount of R&D knowledge. 61% rated the Science Speed Talk session as highly satisfactory or excellent, and a further 25% found it satisfactory. The remaining respondents did not attend this session.

The 2019 Congress attracted 350 participants (99 of which were growers, who represented an estimated 80% of the Australian production area). The 2021 Congress attracted 470 delegates, 140 of which were growers.

3. Communication and extension publications and presentations

Australian Bananas Magazine articles

A list of the current QBAN facilities is published in every issue of the magazine which the R&D Manager keeps up to date. The R&D Manager had input or wrote the following media for dissemination to growers and other stakeholders.

Dec 2018 Issue:

Banana Scientific Symposium.
Coffee Bean Weevil Update.
Get the facts on Chlorpyrifos Dust.
Spotlight on tissue culture nurseries.
Coordination of banana industry R&D.

Aug 2018:

Aussie TR4 experience shared in USA.
Freckle Freedom on Track.
Leaf Spot on the rise in NQ.

Apr 2019:

Make the call on clean planting material.
Biosecurity for under \$1000.
Hitting the right spot with leaf disease management.

Aug 2019:

Casting off complacency - TR4 is spreading slowly but surely.

Dec 2019:

Crunch time for leaf spot.

Apr 2020:

Why planting material matters.
Weedy plantations risk to fight against Bunchy Top virus.

Aug 2020:

Biosecurity Code of Practice to protect banana industry.
TR4 continues to spread.

Dec 2020:

Putting professionalism into your planting material.

Apr 2021:

Bananas without borders - tapping into global research.
QBAN next chapter begins.

E-bulletins information

Nov 18 Tissue Culture spotlight.
23 Nov 18 Chlorpyrifos information.
26 Oct 18 WA update on Coffee Bean Weevil.
26 Oct 18 Organophosphate insecticides.
12 Oct 18 Folimat deadline fast approaching.
14 Sep 18 Update on Folimat cancellation.
3 Aug 18 Permit for TR4 decontamination chemicals.
20 Mar 2019 Time is running out: Share your Science Snapshot!
20 Feb 2019 Make the call about moving plant material.
Spinetoram (Success Neo) now legal to bell inject.
1 Feb 2019 Don't take a risk with bits and suckers.
16 Sep 19 Chemicals up for review.
10 Oct 19 New option for treating leaf spot.
24 Oct 19 It's time for leaf spot control.
14 Jul 20 Update on the spread of TR4.
14 Jul 20 Chemical update.
2 Jul 20 Grower feedback sought on Banana Industry Code of Practice.
24 Feb 20 Support requested from SEQ and northern NSW growers for Bunchy top research
5 Feb 20 Help identify pest and disease priorities for strategic agrochemical review.
2 Oct 20 Permit for Chlorpyrifos extended

14 Sep 20 'You're invited: industry strategic planning meetings'
31 August 20 New Banana Biosecurity Code of Practice.
21 Jan 21 Bunchy top National project.
21 Jan 21 Comment on chemical regulation reforms.
23 Feb 21 Congress Call for Abstracts.
9 Apr 21 Field sites needed for data on new leaf spot active.
9 Apr 21 Agchemical update.
2 Jun 21 Bunnings selling banana plants in Innisfail.
2 Jun 21 Industry strategic plan.
3 Jun 21 Bunnings bananas – further information for growers.
18 June Minor use permit extended – Mancozeb.
5 July 21 Update on chemicals.

Oral presentations:

- TR4: The Australian Banana Industry's Experience Boston USA Jul 2018
- Banana surveillance: epiphanies & revelations Apr 2019
- Banana Ag Chemical Update (BAGMAN meeting) Jul 2019
- QBAN Update Jul 2018
- Review of the ORC Evidence Framework Aug 2020
- Deploying new technologies to secure the banana industry TropAg Conference Nov 2019
- TR4 Lessons learned by the Australian banana Industry Online workshop Nov 2020
- Bunchy top workshop An Industry Code of Practice SJRS May 2021

Revision and development of grower resources:

Bunch pests - Factsheets

- 'Update on Bunch Pest Control'
- 'Controlling Bunch Pests with Chlorpyrifos Dust'

QBAN

- QBAN information for web site
- QBAN application form

TR4

- Amendments and development of resources for TR4 infested farms including Factsheets templates and training.
- On-farm Biosecurity Farm Management plan template.

Banana Bunchy top Virus

- How to identify Bunchy Top.
- 'National banana bunchy top project.
- 'How to control bunchy top' and brochure.
- Join the fight against Bunchy Top.
- Spot verify destroy brochure.
- Banana industry code of practice for the sourcing and planting of banana material.
- Two professionally shot videos for the bunchy top project.

Technical advice was also provided to the ABGC Comms team on many subjects e.g. biosecurity zones, the new bunchy top resources, banana quality, sale of banana plants and planting material, pest and disease issues, chemicals.

Deliverable #4 Represent the industry and its R&D at relevant forums and meeting of relevant government departments and agencies.

Outlined below are some of the meetings at which the R&D manager provided representation for the banana industry

- 6 R&D SIAP meetings Sep 18, Dec 18 and May 19, Dec 19. Dec 20, Mar 21

- 12 ABGC board meetings—Reporting of R&D project progress, R&D outcomes and providing updates on the problems and challenges facing the industry quarterly
- Freshcare stakeholder meetings.
- Panama TR4 Program - numerous
- Weekly meetings with BQs leader and other Program staff as required.
- Panama TR4 tracing and surveillance strategy review working group Innisfail Aug 19, Nov 19, Mar 2020; 2021
- TR4 Industry Technical working group and Industry Transition Working group.

Congress

- Program Planning Committee meetings 2019 and 2021: This required suggesting R&D program speakers, topics, sessions and advising of space and time requirements. Monthly meetings for at least 6 months prior to each Congress
- Science Speed Talks and poster session at 2 congresses.

Plant Propagation

- NGIA BioSecure HACCP Launch Gatton Sep 18: members of government and industries involved with the HACCP system were present. QBAN is currently being transitioned across to NIASA accreditation/ Biosecure HACCP certification.
- QBAN ABGC/GIA meeting (Mar 20 and July 20)
- Nursery Stock Project - Review of import conditions by Federal government (Apr 20)

Research Development and Extension

- 2019 Plant Biosecurity Research Symposium. Brisbane 15th-16th Aug 19.
- Tropical Horticulture meeting (Hort Innovation offices) Aug 19.
- Horticulture and Forestry Science RD&E showcase on Wednesday Brisbane, Dec 19.
- Rural R&D for Profit – ‘Multiscale tools for monitoring in tree crops meeting’ Brisbane Sep 18. Meeting of interested horticultural industry reps, service providers and collaborators. Nov 19. One meeting of horticultural industry reps, service providers and collaborators to assist with program logic and M&E plan. Rural R&D for Profit – M&E evaluation of ‘Multiscale tools for monitoring in tree crops meeting’ (Jun20)
- Independent Review of QAAFI by Ag Insights (May 20)
- Interview with Dr Vandana Subroy UWA Black Soldier Fly Fertilizer project (Oct 20)
- Interview with Grace Yang California on the response to TR4 in Australia (Nov 20)
- Plastics Recycling Innovation with Greencollar, MAMS, Rtech Michael and William Ritchie (Numerous)
- Regional Education Plastic Recycling Strategy Workshop (Mar 21)
- Virtual workshop series on safeguarding the banana industry from Fusarium Wilt: research updates and opportunities in the Asia Pacific - 20 and 27th Oct; 3rd Nov 2020
- Virtual ‘Masterclass on Fusarium wilt of banana’ 26th Nov 20.
- Virtual Mini symposium ‘Towards the Integrated Management of Fusarium Wilt of Banana’ 16th Dec 20.
- Banana Industry Strategic planning workshops in Mareeba, Innisfail. Sep 20
- Quarterly video conferences for BA16001 numerous
- 2 Banana Industry Road shows 2018 and 2020
- 2 Banana Scientific Symposiums Dec 2019 Apr 2021
- Next gen trip to Darwin Aug 2019.
- BWAP biosecurity meeting Greg Chandler Hort Innovation and other technical experts
- Banana Bunchy top workshop August 2018, and NQ May 2021- Extension, BQ, NAQs and private consultants
- Extension development Forum Workshop at Hort Connections (Jun 21).

Biosecurity

- Biosecurity Partners Forum and Biosecurity Roundtable, Brisbane, two-day meeting Oct 18. Included were state and federal government representatives, PHA, plant and animal industry reps.
- Banana Biosecurity Reference Panel meetings at least annually - Included technical experts, government and industry reps and PHA representatives.

- Biosecurity Pathways and Surveillance Strategy 2-day Workshop- hosted by PHA for industry and government stakeholders. Delivered an oral presentation on ‘Pest and disease surveillance in the banana industry’ (Feb 19).
- National Fruit Fly Council meet and greet (Feb 20)
- Industry Liaison workshop on Biosecurity emergencies (Feb 20)
- Industry Biosecurity Capability Assessment Pest categorization (Feb 20)
- Biosecurity Import Risk Analysis meeting with BQ (Mar 20)
- Biosecurity Plan Prioritisation with PHA (May 20)
- PHA’s Owner Reimbursement Cost (ORC) workshops 20 Aug and 8 Sep 20
- Plant Industries Biosecurity Committee June 2021.
- Coffs Harbour Bypass Biosecurity Plan: Met with consultants BD Infrastructure to provide technical advice and recommendations on the Panama Disease Control Management Plan for construction of the Coffs Harbour Bypass. ABGC office Dec 19 and Jun 20.
- PHAs Biosecurity EPPRD Parties meeting, Members Forum and General Meetings. These two-day meetings include state and federal government representatives, PHA, plant industry reps. At least annually.
- Consultative Committee for Emergency Plant Pests (CCEPP) and National management group.
- Technical advice provided on the National Freckle Eradication Program, Torres Strait Fruit Fly Response plus other EPP issues.

Chemicals

- Banana Agribusiness Manager’s meeting – delivered an oral presentation ‘Update on Ag Chemical Review and Access in the banana industry’ (Jul 19).
- Review of Agvet chemical regulatory framework - NFF, DAWE & Panel (two workshops in Apr 20 and May 20).
- Review of Agvet chemical regulatory framework QLD Industry. Consultation group #2 Jun 20
- Metagen Agricultural Biotechnology Company industry meeting Gatton Aug 20
- DAWE|FSC|HORT COUNCIL briefing on the Independent Review of the Agvet Chemicals Regulatory System draft report (Jan 21)
- Chemical water quality Monitoring results for Johnstone, Tully and Normanby catchments (RP204 banana pesticide monitoring workshop) Mar 21

Deliverable #5 Project Governance

- 3 Annual work plans
- A Program Logic and Monitoring and Evaluation (M&E) plan with linkage to Hort Innovation and banana fund objective (including stakeholder engagement plan, project risk register, risk management plan)
- 5 milestone Reports
- Mid-term Review
- Final Report

Appendix 3 Independent mid-term review

Mid-Term Review

BA17002 Banana Industry R&D Coordination

Final Report

to

**Australian Banana Growers' Council &
Hort Innovation**

by

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4 December 2020

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Disclaimer

This report has been produced independently by Tracy Henderson on the request of Australian Banana Growers' Council of Australia (ABGC). The information, data and statements contained in this report have been prepared by Tracy Henderson from information provided by ABGC and interviews of stakeholders. Tracy Henderson does not express an opinion as to the accuracy or completeness of the information provided, the assumptions made by the parties that provided the information or any conclusions reached by those parties. Tracy Henderson has based this report on information received or obtained, on the basis that such information is accurate. Tracy Henderson does not assume liability of any kind whatsoever resulting from any person's use and reliance upon the content of this report.

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- Jane Wightman, Hort Innovation
- Olive Hood, Hort Innovation

Executive Summary

Background

This report presents the findings of a Mid-Term Review of Project BA17002 *Banana Industry Research and Development (R&D) Coordination*. The duration of Project BA17002 is three years, with the project commencing 2 August 2018 and due for completion 31 July 2021. The Mid-term Review of Project BA17002 was conducted over the period September to November 2020. The purpose of the Mid-Term Review was (1) to determine the value delivered by banana industry R&D coordination, and (2) to identify opportunities to improve future R&D coordination effort.

The overarching goal of Project BA17002 is to act as a central point of contact for industry R&D. The four primary deliverables of Project BA17002 are to:

1. provide technical input to the development and conduct of R&D projects.
2. facilitate beneficial collaborations.
3. work with industry extension and communication projects to ensure the latest R&D developments are made available to industry in an accurate and timely manner; and
4. represent the industry at relevant forums and meetings of relevant government departments and agencies on banana R&D matters.

Approach

The progress of Project BA17002 was evaluated in terms of relevance, effectiveness, process appropriateness and efficiency as per the four domain areas specified in the Project BA17002 Monitoring and Evaluation (M&E) Plan. A mixed-method approach was implemented in order to meet the Terms of Reference for the Mid-Term Review of Project BA17002.

The evaluation approach included:

- a review of documentation including the project BA17002 project plan and milestone reports, other background material provided by ABGC, and other publicly available materials.
- an initial workshop involving key representatives of ABGC, Hort Innovation and the consultant was held on 2 September 2020 to clarify the project context, confirm the project intent, confirm the Key Evaluation Questions, confirm the evaluation approach and align expectations.
- a series of 15 semi-structured telephone interviews of key stakeholders from industry, research, government and other sectors to gather primary data and information.
- a second workshop with key representatives of ABGC and Hort Innovation was held 13 October 2020 to consider the mid-term review interview responses to date, determine the implications of findings, and co-develop future improvements; and
- synthesis and report writing.

Findings

The key finding of the Mid-Term Review is that all 15 industry, research and policy interviewees consulted deemed Project BA17002 to be relevant, effective, appropriate and efficient. The findings of the interviews, together with information and data supplied in Project BA17002 Milestone Reports, provide evidence this project has delivered against the project objectives over the past two years since project commencement.

Project BA17002 has achieved against the four major deliverables of the project. The project has:

- provided technical input to the development and conduct of R&D projects.
- facilitated beneficial collaborations.
- worked with industry extension and communication projects to ensure the latest R&D developments are made available to industry in an accurate and timely manner; and
- represented the industry at relevant forums and meetings of relevant government department and agencies on banana R&D matters.

Recommendations

Three recommendations are provided to inform the design of the final year of Project BA17002 and/or future banana R&D coordination work:

Recommendation 1: The banana R&D coordination work conducted within Project BA17002 is valued by stakeholders, has delivered results and outcomes, and should continue in the medium-term (3-5 year) future.

Recommendation 2: Project BA17002 and/or future banana R&D coordination work should articulate and communicate the current and future portfolio of banana R&D work to a broader audience of stakeholders to:

- (a) improve awareness and understanding of the scope of past/current banana R&D work among industry, research and policy audiences; and
- (b) provide industry, research and policy personnel with the opportunity for further connection, collaboration and coordination on areas of mutual interest and benefit.

Recommendation 3: Project BA17002 and future banana R&D coordination work should continue to grow the scope and scale of the banana R&D portfolio by:

- (a) brokering new R&D funding streams.
- (b) facilitating new collaborations; and
- (c) initiating new R&D projects with new, innovative partners.

1. Introduction

1.1 Background

The Australian Banana Growers' Council is delivering the Hort Innovation funded Project BA17002 'Banana Industry R&D Coordination'. The project involves leading and coordinating R&D delivery for the Australian banana industry in collaboration with Hort Innovation and others.

Project BA17002 was imperative due to two drivers in the Australian banana industry:

- 1) depressed banana prices; and
- 2) Panama Tropical Race 4 (TR4) posing a major threat to the industry.

Both these drivers impact on profitability, productivity and sustainability of the industry and make effective RD&E vital to ensuring long-term containment and management of TR4 and overall sustainability of the industry

Project BA17002 commenced 2 August 2018 and will conclude 31 July 2021. Dr Rosie Godwin commenced in the role of *Banana Industry R&D Manager* in October 2015 under the previous Project BA14012 *Coordination of Banana Industry R&D (Panama TR4)*.

1.2 Terms of Reference

Purpose

In accordance with the research agreement between Hort Innovation and ABGC, a mid-term review will be conducted to determine whether industry funds are achieving their R&D objectives and delivering benefits to growers.

Deliverables

The four major deliverables of the project are to act as a central point of contact for industry R&D and are:

1. Provide technical input to the development and conduct of R&D projects.
2. Facilitate beneficial collaborations.
3. Work with industry extension and communication projects to ensure the latest R&D development are made available to industry in an accurate and timely manner; and
4. Represent the industry at relevant forums and meetings of relevant government departments and agencies on banana R&D matters.

The Mid-Term Review will evaluate project progress in terms against these deliverables in terms of impact, effectiveness, appropriateness, and efficiency and will provide recommendations for optimal implementation of the second part of the project and the development of any follow-on project.

Scope and time frame

The mid-term project review will be undertaken by an independent consultant with input from the Hort Innovation and ABGC. The review will occur between August and October 2020 and a report on the review will be completed November 2020.

Methodology

The Monitoring and Evaluation (M&E) plan developed for Milestone 103 was used to develop a series of questions to enable the review of the project and its methodology (Table 1). This information will form the basis for the mid-term project review and allow recommendations to be made for the remainder of the project. Data collated during the review will be summarized into a report and will be used to make recommendations about past and future work.

It is expected that the mid-term review will take the form of individual interviews with stakeholders and a survey. These will be developed by the independent consultant based on the project description, consultation with ABGC and Hort Innovation and the key evaluation questions.

The audience for this review is Hort Innovation, ABGC, and any interested stakeholders.

1.3 Evaluation Questions

The four evaluation domains and key evaluation questions are outlined below in Table 1.

Table 1. Evaluation Domains and Key Evaluation Questions

Domain	Key Evaluation Questions
1. Relevance How relevant was the project to the needs of intended beneficiaries?	To what extent has the project met the needs of research providers, growers, government departments, and other industry stakeholders for: • improving coordination of the banana industry R&D Program? • increasing collaboration and awareness amongst banana R&D projects? • facilitating extension and communication of R&D developments among all sectors of the banana industry?
2. Effectiveness To what extent has the project achieved its expected outcomes?	To what extent has: • coordination of the banana industry R&D Program been improved? • collaboration and awareness amongst banana R&D projects been enhanced? • extension and communication of R&D developments been enhanced with and among all sectors of the banana industry?
3. Process Appropriateness How well have the intended beneficiaries been engaged in the project? To what extent were communication and engagement processes appropriate to the target audience?	• To what extent were target levels of engagement with research providers, growers, government departments, and other industry stakeholders met? • Was the range and quality of communication and engagement processes used to the target audience appropriate? • Was content regularly provided through the communications project? • To what extent did this project collaborate with the national extension project to engage the target audience?
4. Efficiency What efforts did the project make to improve efficiency?	To what degree has this project: • implemented agreed activities according to agreed schedules and budgets outlined in the research agreement? • made effort to achieve value for money?

1.4 Intended Outcomes

The intended outcomes of Project BA17002 project include:

- improved coordination of the banana industry R&D Program;
- increased awareness and collaboration amongst banana R&D projects;
- enhanced extension and communication of R&D developments, with and amongst all sectors of the banana industry.

(Source: *Project Plan for BA17002 Banana Industry R&D Coordination.*)

The intended outcomes of Project BA17002 are expected to contribute to the delivery of the Australian Banana Strategic Investment Plan 2017-2021 priorities to:

1. support industry efficiency and sustainability, and
2. improve productivity of the supply chain.

Project success will ensure tangible outcomes are delivered to banana growers and will lead to improvements in sustainability and resilience in the banana industry. (Source: *Project Plan for BA17002 Banana Industry R&D Coordination.*)

2. Approach

The Mid-Term Review of Project BA17002 evaluated project relevance, effectiveness, process appropriateness and efficiency as per the four Domain areas specified in the *Project BA17002 Monitoring and Evaluation (M&E) Plan*. A mixed-method approach was implemented to meet the Terms of Reference for the Mid-Term Review and address the Key Evaluation Questions specified. The evaluation approach included five key tasks as detailed below.

2.1 Initial Workshop

An initial workshop was held 2 September 2020 involving representatives of ABGC, Hort Innovation and the consultant. Workshop participants clarified the background context to the Mid-Term Review, confirmed the intent of the review, confirmed the Key Evaluation Questions, confirmed the evaluation approach and aligned expectations. Relevant background materials and documents were made available to the consultant, and potential interviewees for the semi-structured telephone interviews were discussed.

2.2 Review Documentation

Project BA17002 milestone reports, the BA17002 M&E Plan and other background material provided by ABGC, and other publicly available materials were reviewed by the consultant for background contextual understanding.

2.3 Semi-structured Interviews

Semi-structured interviews of key stakeholders gathered qualitative data, information and insights from individuals with a stake in Project BA17002. An introductory email was sent by AGBC to 27 potential interviewees to introduce the Mid-term Evaluation process and prepare them for a subsequent interview. Potential interviewees include representatives of the following groups: banana growers, RD&E partners, government departments, Australian Banana Growers' Council, Horticulture Innovation Australia, and others as appropriate.

Telephone interviews were conducted by the consultant during October 2020. All 27 potential interviewees were telephoned to arrange an interview and a total of 15 interviews were able to be completed. Interview questions were crafted to gather attitudinal data towards the efficiency, effectiveness, appropriateness and relevance of banana industry R&D coordination services and are provided within Appendix A.

2.4 Second Workshop

A second workshop involving representatives of ABGC, Hort Innovation and the consultant was held 13 October 2020 to consider the interview responses and analysis to date, determine the implications of these findings, and co-design practical and feasible recommendations and future pathways for Project BA17002.

2.5 Analysis and Report

Following the completion of all 15 interviews, thematic analysis to synthesise and make sense of the qualitative data was undertaken. A written report detailing the evaluation purpose, objectives, approach, methodology, findings, insights and recommendations was prepared for ABGC and Hort Innovation.

3. Findings

Findings of the Project BA17002 Mid-Term Review are reported against each of the four evaluation domain areas defined in the Terms of Reference:

1. relevance (Section 3.1)
2. effectiveness (Section 3.2)
3. process appropriateness (Section 3.3)
4. efficiency (Section 3.4)

Interviewee suggestions to improve the value delivered by Project BA17002 and/or any subsequent banana R&D coordination activity are reported within Section 3.5.

A total of 15 telephone interviews were completed. The average duration of the telephone interviews was 30 minutes, with interviews ranging in duration from 15 to 60 minutes. Findings are reported for following three groups of interviewees: industry, research and policy. These three groups of interviewees are defined below, together with the number of interviewees per group:

1. Industry
The industry group comprised 5 interviewees:
-4 growers
-1 ABGC representative
2. Research
The research group comprised 7 interviewees
-6 researchers/research consultants/extension personnel
-1 research manager
3. Policy
The policy group included 3 interviewees from the government and non-government sectors.

3.1 Evaluation Domain 1: Relevance

All 15 interviewees stated the banana industry R&D coordination work conducted within Project BA17002 was relevant to them/their organisation/their sector's needs.

In response to the question “how relevant is Project BA17002 to your needs?” industry interviewees stated Project BA17002 was “absolutely relevant” and “very relevant”; research personnel commented “very relevant”; and policy personnel stated the project was “absolutely relevant” and “Rosie does a fantastic job”.

All 15 interviewees readily identified topics, activities, outputs and outcomes from Project BA17002 of relevance.

Research coordination work was identified as a topic of high relevance to many interviewees, in areas such as:

- TR4
- sourcing and planting propagative material,
- chemicals,
- varieties,
- banana oils,

- QBAN,
- Bunchy Top,
- Codes of Practice.

In particular, growers, researchers, consultants and government policy interviewees nominated the work of Project BA17002 to drive QBAN as highly relevant.

Numerous researchers highlighted improved connectivity between researchers and industry, and among researchers were delivered by Project BA17002. Several researchers stated Project BA17002 has better connected their research work to (a) other researchers within Australia and overseas and (b) the banana industry – both to individual growers and the ABGC Board. Researchers also valued the input this project provided to a number of research Project Reference Groups.

Further detail of the interviewee responses relevant to Evaluation Domain 1: Relevance is provided in Appendix B under Question 2a, 2b and 5a headers.

3.2 Evaluation Domain 2: Effectiveness

All 15 interviewees were unanimous in their agreement that project BA17002 has been effective in delivering against the project objectives of:

- coordination of banana industry R&D.
- enhanced collaboration and awareness among banana R&D projects; and
- enhanced extension and communication of R&D developments with and among all sectors of the banana industry.

Priority areas of effectiveness identified by interviewees included bridging information and knowledge between growers and researchers; between researchers within different organisations; between researchers, policymakers and industry.

Views were expressed by several interviewees that significantly greater levels of R&D coordination within the banana R&D system are needed in the future to further build on the effectiveness of Project BA17002 given the breadth of R&D issues and the opportunity to capitalise on additional future potential funding sources. This point was re-iterated by several interviewees when asked about areas for future improvement (as detailed in Section 3.5).

To clarify further the effectiveness and value of Project BA17002, interviewees were asked to define what would be different if Project BA17002 did not exist. A range of scenarios were identified by interviewees:

- no central point of contact for banana R&D.
- slower response to grower R&D questions from researchers.
- no strong foundations for future research and policy activity.
- no clean planting scheme/QBAN.
- less awareness, knowledge, understanding and collaboration between researchers and industry; and between researchers.
- less cohesion between research activities.
- less new emerging R&D projects.
- less funding streams for banana R&D.

- less effective communication and extension of banana R&D; and
- less achievement.

These possible “without-project BA17002” scenarios identified by interviewees highlight the extent to which the project has effectively achieved against the project objectives and expected outcomes.

Further detail of the interviewee responses relevant to Evaluation Domain 2: Effectiveness is provided in Appendix B under Question 3a and 3b headers.

3.3 Evaluation Domain 3: Process Appropriateness

Industry, researcher and policy interviewees unanimously characterised Project BA17002 engagement and communication processes as appropriate to themselves, their organisation and/or their industry.

Industry, research and policy interviewees provided numerous positive examples of appropriate engagement and communication work conducted within Project BA17002. Several grower and researcher interviewees noted the negative impact of COVID-19 restrictions upon Project BA17002 engagement and communication processes in 2020. The following Project BA17002 engagement and communication process were recognised by interviewees as appropriate and valued:

- approachable, partnership approach.
- conduit of research information to and from growers.
- provision of input to magazine articles, e-bulletins.
- organisation of Science Speed talks.
- organisation of guest speakers for ABGC Board meetings.
- communication with extension work.
- suggested materials for hosting on external websites (e.g. Better Bananas).

Interviewees were asked to identify any gaps in engagement, or any areas for future engagement/communication improvement, and a small number of gaps were identified:

- engage with new partners and new potential sources of R&D funding to grow the R&D portfolio; and
- further engagement with international researchers in Europe, South America etc. on topics such as Fusarium wilt (Panama disease); and
- further educate industry on the nature, timeframes and likely beneficial impacts of R&D to generate greater industry interest and confidence in their research.

Further detail of the interviewee responses relevant to Evaluation Domain 3: Process Appropriateness is provided in Appendix B under Question 4a and 4b headers.

3.4 Evaluation Domain 4: Efficiency

The majority of interviewees across all groups indicated that the investment in Project BA17002 represented value for money, and that the project represented an efficient use of funds. One interviewee was uncertain regarding the efficiency of the overall project and noted they did not have a comprehensive understanding of the scope of work completed, nor understand the total investment in Project BA17002.

Further detail of the interviewee responses relevant to Evaluation Domain 4: Efficiency is provided in Appendix B under Question 5b header.

3.5 Future Improvement

To identify potential areas for future improvement of Project BA17002 and/or any subsequent banana R&D coordination projects, interviewees were asked to identify one priority area Project BA17002 could do to address their needs and/or make their job easier. A second question sought to elicit from interviewees suggestions for improvement, future pathways and/or opportunities. All respondents provided at least one suggestion for future improvement. Many respondents noted the importance of building on existing Project BA17002 work and continuing to invest in priority areas of R&D coordination. A long list of suggestions for improvement was provided, and these are summarised in Table 2 below for by interviewee group. Many respondents highlighted these were potential opportunities, rather than firm recommendations for the future, recognising the resource constraints associated with the implementation of some ideas and suggestions.

**Table 2. Summary of Responses by Interviewee Group for
*Future Improvement***

Interviewee group	Suggestions for Future Improvement
Industry	• continue work on TR4, varieties, chemicals, softer chemicals, etc. • increase work on environmental issues e.g. fertigation, leaching, Reef water quality, etc. • proactive development of solutions for growers to help address reef regulations • attract more funding for banana R&D as there's more R&D to do and not enough funds to do much • cut red tape associated with importing plant breeding material from overseas e.g. Israel • connect banana R&D to other R&D e.g. citrus, apples, etc. • continue to connect with researchers around the world e.g. China, Philippines • more supply chain work to ensure quality is delivered to supermarkets • more work on automation to reduce issues associated with unreliable labour supply in the paddock and packing shed
Research	• continue to educate industry on priority R&D topics, and help industry understand the value of investing in long-term research • more R&D coordination and/or further improve R&D coordination e.g. annual meeting of researchers and extension personnel to learn what others are working on; bring in a couple of international speakers to get a new perspective; two R&D Coordinators.

	• more active role in generating new R&D • provide funding to enable a more proactive approach to generating new R&D e.g. seed funding, learn from other industries on topics such as automation, etc. • influence R&D to enable the Australian banana industry to become more internationally competitive • more innovative research, not just plant protection research, e.g. reduce plastics, social licence to farm, recycling, reusing, good environmental practices etc. • improve the accessibility of banana research findings • increase the duration of any future R&D Coordination project from 3 years to 5 years to provide more certainty and continuity • share the value of the banana R&D coordination work with other industries e.g. avocado, macadamia, almond so others can learn from this approach • consider cultivating Rosie's leadership capability via Hort Innovation Women in Leadership in Australia Scholarship • include a broader range of stakeholders in planning e.g. government policy personnel
Policy	• continue to share information, collaborative approach • continue to work with others to meet Biosecurity Queensland requirements • influence R&D to focus on the delivery of outcomes, not just the production of static research report outputs • attract funding from R&D funders other than Hort Innovation • improve linkages between R&D projects • educate and share knowledge with government policy personnel via a webinar series to help me/my team understand issues and connect more knowledgeably with growers • opportunity to improve the current R&D system e.g. tendering process, encourage input from a broader range of service providers, incentivise research to deliver a benefit for industry • all research should have grower input • give smaller growers more of a voice • invest in research to improve the viability of tissue culture to help more growers use nursery stock rather than other less desirable sources • influence Hort Innovation to improve their processes and culture and focus on delivering greater outcomes from banana R&D

Further detail of the interviewee responses relevant to future improvements is provided in Appendix B under Questions 6 and 7 headers.

3.6 Overview

The key finding is that all 15 industry, research and policy interviewees consulted deemed Project BA17002 to be relevant, effective, appropriate and efficient. The findings of the interviews, together with information and data supplied in Project BA17002 Milestone Reports, provide evidence this project has delivered against the project objectives over the past two years since project commencement.

As detailed in Sub-Sections 3.1 to 3.5 evidence and examples were provided by interviewees to clearly demonstrated Project BA17002 has achieved the four major deliverables of the project. This Mid-Term Review concludes Project BA17002 has:

- provided technical input to the development and conduct of R&D projects.
- facilitated beneficial collaborations.
- worked with industry extension and communication projects to ensure the latest R&D developments are made available to industry in an accurate and timely manner; and
- represented the industry at relevant forums and meetings of relevant government department and agencies on banana R&D matters.

A long list of suggestions for future improvement were put forward by interviewees for consideration in shaping both the final year of Project BA17002 and any subsequent banana R&D coordination work. Many interviewees noted the importance of building on existing Project BA17002 work and continuing to invest in priority areas of R&D coordination.

4. Recommendations

This Mid-Term Review process has concluded Project BA17002 is delivering against its stated objectives and deliverables. Three recommendations are provided for consideration within the final year of Project BA17002, or within the design of any future banana R&D coordination activity, as detailed below.

Recommendation 1: The banana R&D coordination work conducted within Project BA17002 is valued by stakeholders, has delivered results and outcomes, and should continue in the medium-term (3-5 year) future.

Interviews of industry, research and policy stakeholders highlighted numerous examples of valuable positive outcomes from Project BA17002. Coordination between researchers and growers (both individual growers and the ABGC Board) on a wide range of topics was highlighted as critical by interviewees including: Panama TR4, Code of Practice, banana oils, chemical registration and use, variety development. Several research interviewees highlighted the importance of Project BA17002 in connecting their research to other relevant research, both domestically and internationally. Numerous interviewees across all groups (industry, research, policy) highlighted the importance of ensuring banana R&D coordination work is continued in the future.

Recommendation 2: Project BA17002 and/or future banana R&D coordination work should articulate and communicate the current and future portfolio of banana R&D work to a broader audience of stakeholders to:

- (a) improve awareness and understanding of the scope of past/current banana R&D work among industry, research and policy audiences; and**
- (b) provide industry, research and policy personnel with the opportunity for further connection, collaboration and coordination on areas of mutual interest and benefit.**

Several growers, researchers, consultants, government policy personnel, and research managers indicated they did not fully understand the entire portfolio of banana R&D work and/or have a complete picture of the scope of work conducted by Project BA17002. Several interviewees noted they had line of sight to particular topics and/or R&D projects and would benefit from improved understanding and appreciation of the complete portfolio of banana R&D activity.

Recommendation 3: Project BA17002 and future banana R&D coordination work should continue to grow the scope and scale of the banana R&D portfolio by:

- (a) brokering new R&D funding streams.**
- (b) facilitating new collaborations; and**
- (c) initiating new R&D projects with new, innovative partners.**

The opportunity to source R&D funds from non-traditional sources and involve new and innovative partners in banana R&D was highlighted by interviewees as a necessary next step to accelerating progress toward the Banana Industry Goals.

Appendix A: Interview Questions

1. Tell me about your role (& organisation) and your involvement with the Rosie's work project/work
2.a. How RELEVANT do you believe the Banana Industry R&D Coordination work has been to you/your organisation/your sector's needs? b. What has been a highlight or key benefit for you/your organisation/the industry? Or what has been the most important work in your view?
3. How EFFECTIVE has Rosie's Banana Industry R&D Coordination work been? a. Has coordination of banana industry R&D improved as a result of her work? (How? To what extent? Can you provide an example?) b. Has collaboration and awareness among banana R&D projects improved? (How? To what extent? Can you provide an example?) c. Has extension and communication of R&D developments been enhanced with and among all sectors of the banana industry? (How? To what extent? Can you provide an example?) d. What would be different if this role did not exist ? (Without scenario?)
4. How APPROPRIATE have the processes been? a. Was communication and engagement processes appropriate to you/your organisation/industry? (range and quality of processes; regularity of communications; extent of collaboration with the national extension project, etc.) b. Any "gaps" in engagement or recommendations for improvement ?
5. What VALUE has been delivered from this work? a. Has this work contributed to the Broader Banana Industry Goals, i.e. economic/environmental/social benefits such as: - Increased production and profitability of Australia's banana industry. - A valued and quality product is consistently delivered to consumers - The sustainability of the banana industry - Bananas maintaining their lead position in the produce category ? If yes, can you identify more specifically what value this work has delivered from your perspective? b. Does this investment represent value for money in your view? (EFFICIENT?)
6. What is one thing Rosie's work could do to make your job easier? Why? (needs/pain points)
7. What OPPORTUNITIES for improvement, future pathways, and/or opportunities can you suggest, if any?
8. Is there anything further comments or feedback you'd like to provide?

Appendix B: Interview Responses

The responses provided by the 15 individual interviewees are summarised below.

Q2. RELEVANCE

2A. How relevant do you believe the Banana Industry R&D Coordination work has been to you/your organisation/your sector's needs?

- No problems with relevance, all working. (grower)
- Absolutely relevant. (grower)
- Where I have a problem is with the R&D SIAP, there hasn't been a meeting for months and months. (grower)
- I don't get that much exposure to it. All that stuff happens in the background, I don't quite understand all of it. (grower)
- Rosie has a fair bit to do with ABGC Board Directors on research issues, strategic planning. (grower)
- Very. Rosie has worked really hard over the past 12 months on the chemical work, and work with oils – we have a new chemical out now for Banana weevil borer. If she weren't around, that wouldn't happen. So much better to have someone. (grower)
- The work has been focused and directed. (consultant)
- Rosie is good at value adding, engaging other industries, and providing advice. Rosie does a fantastic job. (consultant)
- Work has been relevant. (researchers/extension)
- Very. There are discussions between Rosie, myself, growers, scientists, she binds things together, pulls people together to look at issues. (researcher)
- Very. Rosie has suggest ways of getting more funding, approaching industry, encouraged me to visit farms in the North – to help growers understand what we researchers do. (researcher)
- Rosie is good at making the interactions work. Nice for someone in her position to actually understand the science. (researcher)
- Relevant. Really unique role, no other industry has this position. (researcher)
- Very. Rosie keeps across things that our time doesn't allow us to do e.g. chemical work. (extension)
- I don't understand the R&D Coordination project very well, there should be greater awareness. I may be in my own bubble. (policy)
- Absolutely relevant. Drone surveillance work was a massive benefit, very worthwhile. Paid off in spades re: early detection. (policy)

2B. What has been a highlight or key benefit for you/your organisation/the industry? Or what has been the most important work in your view?

- TR4 work. Still an ongoing priority and will be in the future. It's huge. (grower)
- TR4 program, breaking that science down and communicating it to us. (grower)
- Chemicals. A comprehensive chemical review, what's going off the market, what that means for bananas, Australian agriculture. (grower)
- Varieties. Good to have Rosie talking about different varieties in different countries about varieties. (grower)
- Plant breeding. Breed a commercially accepted variety. No use breeding a variety that tastes like crap. (grower)

- Banana oils were a big one for us. Obviously it is big for the rest of the industry. (grower)
- Rosie talks with growers and that's how she gets information. Growers know there is someone they could talk to directly if they have an issue. She has always made it clear anyone can ring her at anytime, and growers ring her direct. (grower)
- The project/Rosie helps the ABGC Board make informed decisions about what R&D to invest in. We wanted to do work in Bunchy Top, TR4 with UNE and aerial mapping – we were keen. Rosie did background research and we couldn't see any benefit to us. (grower)
- Within my scope of knowledge the work done on establishing a Code of Practice and QBAN provided an important foundational output. The Code of Practice is continually improving, there's provision for feedback, and these are living documents. (consultant)
- Driving QBAN into the nursery specifications means the banana industry will be truly better protected. (consultant)
- Coordination work, bringing in industry people and consultants, Rosie was the bridge. When we hit snags, generally generated by government, Rosie was the bridge, helping people working together to get the job done, on time, on budget. (consultant)
- Within an ACIAR project, Rosie's role has helped give us extra capacity to give it relevance to the Australian industry. There are some sensitivities to doing research overseas (e.g. Philippines) with some thinking "why are we helping a competitor?" Rosie has been able to get grower champions along to combat the idea we are giving away trade secrets. Really needs someone outside our scientific organisations to do that. (researcher)
- The role has meant our research project is communicated back to the ABGC Board – e.g. information out of our research, the situation is in other countries, what advances we are making in our research project. (researcher)
- The clean planting scheme was a big one. There were a couple of attempts in the past 15 years, but until we got Rosie's role and Greenlife Australia, it just kept falling over. It wouldn't have happened with the role or project or Rosie. (researcher)
- Rosie's contribution on our project reference group, and on about a dozen other project reference groups, is important to keep the industry informed, and to gain a bigger picture of what's going on. (researcher)
- Plant protection. QBAN was a nightmare for many years. (researcher)
- Code of Practice re: Banana Bunchy Top. Rosie was instrumental in getting a standard way of operating. It was all over the place before. (researcher)
- Rosie has made it clear to industry what we researchers are working on – we were working on diagnostic foundational work in the past – we are now working on developing resistance to Fusarium Wilt. (researcher)
- Reduced duplication. Pursuit of opportunities for collaboration. All the R&D that sprung up in response to TR4 needed to be coordinated. In the past 70% of the project's focus was TR4, and this was a key benefit of the project. (researcher)
- The whole process of R&D Coordination is important: understanding all the different projects, identify potential gaps, understanding industry, accompanying Next Gen group to Darwin in 2019 for example. (extension)
- Fantastic industry lead taken on QBAN. Hugely beneficial as industry seen as leading quality planting material. (policy)

The R&D Coordinator role – has been the only consistent, this has been of benefit to me (policy)

- Driving QBAN into the nursery specification, we are improving outcomes for growers, the banana industry will truly be better protected as a result. (policy)

Q3. EFFECTIVE

3A. *How effective has coordination/collaboration and awareness/extension and communication work been?*

- Very effective. Rosie is like a bridge between growers and researchers. (grower)
- Yes. Rosie does a lot of work in the background. Rosie's communications have been really good. She does get on with growers well. (grower)
- I think she's pretty effective. Gives enough information back to understand where things are at, what's happening. I see her mainly around Congress Time and AGMs. (grower)
- Very effective. Rosie got the Bunchy Top project back on track. The previous project was run abominably. Rosie worked hard with the researcher, it's now more effective than in the past. (grower)
- Extension and communication of R&D has improved. There's more to be done and grower involvement in R&D is needed. Rosie has worked hard to attract grower interest. But more extension is really important. (grower)
- Good communication at grass roots level, gets good information. (consultant)
- Good team building and capacity building across industry, government, across the stakeholder spectrum. Engages the right people that can promote and support beneficial change. Meets critical needs. (consultant)
- Key challenge is dealing with the generational lag. Many are 3rd or 4th generation banana growers and Rosie handles this very well. (consultant)
- Very effective. We don't know about relevant research that's outside the Hort Innovation framework – and there is a lot including CRC Northern Australia, CRC Plant Biosecurity, and Reef Work. (researcher)
- Very. Rosie is very proactive. This project is even more important than existing extension work where DAF extension people extend DAF projects but don't come up with issues. (researcher)
- Very. She is always very diplomatic with people. She can speak at different levels. (researcher)
- Very effective. She works for the majority. She is a high achiever. I hear anecdotally about the banana road show, congress, and involvement in quite a few research reference groups. (researcher)
- Very. She is involved in lots of things. How to integrate R&D into our Congress for example. (extension)
- Beneficial having Rosie in Brisbane to liaise with the more science elements (UQ, ESP etc.). All banana projects are so integrated, and this can be attributed to Rosie. They work as one team, not "That's an ABGC project, that's a DAF project", everyone is working toward a common goal. (extension)
- The independence of this role is important. It is not viewed as a Queensland Government project; it's an industry project. That's one factor making it successful. Obviously Rosie is very good in her role, very organised and effective. (extension)
- Given the human hours available, the coordination occurs. But it would appear to be a drop in the ocean compared with what needs to occur. It's a problem between

depth of knowledge and breadth of the scope of work - it is impossible to be across that as one person. (policy)

- The role is right amongst QBAN, biosecurity, and consultancy – a helicopter above it all keeping those pieces glued. I don't know of that same approach in other areas. QBAN is a great project to have achieved. (policy)
- In any situation, when you don't have a point of contact, it's problematic. Bringing people together has been effective to understand where things are. (policy)
- I don't think the investment in banana R&D would have been as effective without this role. (policy)
- Rosie played a big role in educating/informing the ABGC research work was worth doing, she is strategic in helping to move the industry to where it needed to be, she got me to present to the Board (policy)
- Very effective in managing the politics, working with us in true partnership, and her ability to advise us re: issues. (policy)

3B. What would be different if this role did not exist?

- We need a scientist, we need to put a name or face to all the science. We need Rosie. (grower)
- Without this project, where would I go as a grower to throw these questions around and get a timely response? There are some DAF people around and they have a heavy workload. It's good to have an in-house R&D person that can look at something specific for the banana industry (grower)
- I'd have to ring Jim all the time! There's a need for an R&D coordinator.
- Without Rosie, no strong foundation. Can't build a strong building without a strong foundation. These projects - Code of Practice and QBAN - provide a foundation for future research work. (consultant)
- Working with Rosie achieved something I doubted we would otherwise achieve re: QBAN etc. (consultant)
- The clean planting scheme wouldn't have happened. (researcher)
- Researchers do so many little projects, and people don't go beyond their milestones, it's "not my job", this is the downside of what we do. Rosie's role goes across the various organisations. This is very important. (researcher)
- I don't know who my point of contact with industry would be. In other industries I rely on my DAF colleagues and it's a bit of a convoluted route. This R&D Coordination role provides more direct access. Without this role there would be a missing link between DAF and UQ and others. (researcher)
- I just don't think the awareness of individual projects would be there. (researcher)
- The links to ABGC wouldn't be as strong. ABGC would have less knowledge re: how R&D spent. (researcher)
- Communication projects would suffer. I know this role works closely with the ABGC communication person (researcher).
- There would be less cohesion between different R&D projects. As well as less new emerging R&D projects coming out. Less funding streams. (extension)
- In any situation when you don't have a point of contact it is problematic. (policy)
- Less achievement. The project/Rosie's role was instrumental in achieving the QBAN scheme. (policy)

Q4. APPROPRIATE

4A. *How appropriate have the engagement and communication process been to you/your organisation/industry?*

- COVID has caused issues. At meetings we miss out on the smoko discussions and we've suffered as a result. It's no-one's fault, it's just the way it is. (grower)
- Rosie brings all the communications together. Magazine articles, e-bulletins through Communication Officer, Science Speed talks at different events, speakers for the Board. (grower)
- Internal Reference Groups held on schedule. Feedback taken into account. (consultant)
- I couldn't imagine anyone making the point they didn't feel their concern was heard. Genuine use of feedback and input to the best use, to draw on the broad strength of experience across the group. (consultant)
- I find Rosie easy to deal with. Others not as easy to deal with. (consultant)
- COVID has crippled us all. Particularly ACIAR projects and doing international work. Missed out on some grower engagement and feedback. (researcher)
- In general, Rosie is my first point of call. Rosie has a lot of contact with growers and is a really great conduit with the growers. If they have an issue with post-harvest problems or something, they call AGBC, they Rosie contacts the researchers. This position makes it happen. (researcher)
- Very appropriate. I myself would like more interaction with the growers, it is a problem trying to communicate what we do. I don't believe in overselling things (the benefits of research). (researcher)
- Really good. (researcher)
- Communication with our extension project has been very good, very appropriate. Information is fed into e-bulletins and banana magazines, just one part of the toolbox. She also advises what material could be hosted on our Better Bananas website. (extension)
- There needs to be more investment in the whole coordination and communication. Growers are not feeling as if they are getting bang for their buck. ABGC and researchers do long hours, committed to the job, lack of appreciation by industry – growers think \$1m should deliver something bright and shiny. (policy)
- Engagement has always been there, what I do like is that I always hear from Rosie. (policy)
- Amazing to deal with and she really does try hard. (policy)
- Very appropriate. Rosie has worked with us in true partnership. (policy)

4B. *Any gaps in engagement or recommendations for improvement?*

- Growers are sick of these zoom meetings. If you miss something you tend to just let it go, don't follow up. (grower)
- I think the banana industry has a very good communication system. I don't know how we can reach growers at a better level without doing more physical engagement. It's probably as good as it gets. (grower)
- I'm all for the R&D Coordination role being promoted as a National Banana R&D Coordinator, not just an ABGC R&D Coordinator. (grower)
- No. (consultant)
- Think of other programs such as "Healthy Waterways" to attract greater funding, not necessarily using grower funds, and seek endorsements from the R&D peak body for

that research to be undertaken. Not just environmental research. Because banana industry is sizeable, it can have an impact. (researcher)

- Rosie does a great job within the role. I realise her time is stretched (researcher)
- There is a lot happening in the international space, regarding Panama disease, Fusarium wilt, Europe and South America are key players. Important to be a part of international conversations so we can get things out of them (researcher)
- We never have enough funding! (researcher)
- I'm sure there are some gaps. I don't know of any. Maybe with smaller projects? (researcher)
- No. Keep on continually improving. (extension)
- Keen to know more about the progress of varieties. We know that is a very slow process. How do you continue to generate industry interest and confidence in this work when it is so slow? (policy)
- No. (policy)

Q5. VALUE

5A. Has this work contributed to the Broader Banana Industry Goals? If so, can you identify more specifically what value this work has delivered from your perspective?

- Yes. Planting materials. Dealing with TR4. (grower)
- Yes. Variety, TR4, Bunchy top, chemical work has been very useful. Possibilities for the banana product itself. Profitability is based on so many other factors. (grower)
- Yes. Rosie is like a catalyst or an enzyme that makes this work $1 + 1 = 3$ (grower)
- Yes. Industry is very diverse. Never going to please everyone. As long as you are in the forefront of what the industry needs, keeping it relevant, that sort of stuff. I think other industries look to ABGC as an example of what a good body looks like. Doesn't mean we will always agree. (grower)
- Yes. Rosie did this when I was tackling the banana spray oil one myself, then I handed info to Rosie, I thought that was really good. Took a while, dealing with APVMA, maybe Rosie's more apt to talk to them, seemed like it wasn't going anywhere, then she rang up and said it was done! (grower)
- Environmental is the main area of value – with regard to chemical use, soft chemical use and all that. (grower)
- There is no way I want this project to end. As an industry we can't cut it off now. It is really important to continue with Rosie or someone else. The project is important. It must continue. (grower)
- Yes. I could talk to you about this all day. (consultant)
- Biosecurity and pest and disease risk. (consultant)
- Yes. (researchers)
- I think so, speaking outside my area, the message seems to get across. You'd be better asking industry that question. (researcher)
- Yes, industry realise now, particularly the bigger growers, they appreciate research. Larger growers are more proactive, and come from or have more of a science background. (researcher)
- There is more of an indirect link between this project (BA17002) and the outcomes. (researcher)
- This project has helped researchers be more coordinated in how they've handled TR4. This project contributes to farm profitability, maybe there is less TR4 than

would've been the case without this project. Further economic benefits as a result of less duplication of research effort, more efficient. (researcher)

- To have someone across all the R&D investments, this project definitely contributes toward the broader banana industry goals. (researcher)
- Yes, is definitely the answer. Projects like this deliver indirectly to the goals. From a grower's point of view, when you don't see something tangible, it's difficult. The success of this project might go unnoticed. We are all quiet achievers. Behind the scenes we don't jump up and down and say, "we've achieved" – this project (BA17002) chips away and does achieve. (extension)
- I don't understand the monster of the job, so can't answer this. (policy)
- This project has delivered benefits to government and taxpayers. (policy)
- It has contributed in some way, shape or form. Definitely a contributor to the broader banana industry goals. (policy)

5B. Does this investment represent value for money in your view (efficiency)?

- Yes. Absolutely. (growers)
- Yes, this project has been managed well economically. Governance of the project is really well done. (grower)
- Yes. (consultant)
- Yes (researcher)
- I don't know the value of the project. The project maximises opportunities where it can. (extension)
- Yes, and from where I sit, these roles are not valued enough – research coordinator, industry development role, innovation roles. Sometimes communication is valued more. (researcher)
- Yes, \$510,000 for three years August 2018 to August 2021. \$130,000 per year. Yes, this is cost-efficient. (research)
- Yes, there is a robust system in place now that the industry can trust: the banana nursery stock specification meets the needs of nursery growers and banana growers. With this well-established partnership, emerging issues are going to be so much easier. Government and taxpayers get the benefit because this is not a clunky ineffective process thanks to Rosie (policy)
- I think it does. From a return-on-investment perspective this delivers value to the growers. They have someone they can call. (policy)

Q6. NEEDS/PAIN POINTS

What is one thing Rosie's work could do to make your job easier? Why?

- Get rid of TR4. Containment is the biggest thing. (grower)
- Varieties, TR4 and chemicals. (grower)
- Consumers need another banana product, too dependent on Cavendish. (grower)
- If we could get softer chemicals, less stronger chemicals. I'm using Confidor at the moment, it's a great controller of beetles in bananas, inject it in the plant. It would be good to get a chemical that's softer and doesn't kill bees. All industries are going this way. (grower)
- The environmental side of things is an area that needs a bit of work. We do a lot of fertigation, and lots of fertiliser goes on in a liquid. We could reduce leaching and washing. The reef is important and will be more important in 10 years' time. (grower)

- Continue to share information. Some people hoard information, Rosie is really good at sharing information and this is really valued. (consultant)
- Improve the collaborative capacity of some people. Some people are not thinking about the industry and moving the industry forward; are not open to any constructive feedback. (consultant)
- Help manage the expectations of ABGC from suppliers, get everyone on the same page. (consultant)
- Continue to work together to meet Biosecurity Queensland requirements. (consultant)
- Rosie is really good value, she does a really good job, she wants to get the job done. They need to keep her in horticulture (consultant)
- The main thing is getting industry support for the R&D projects. Sometimes R&D benefits aren't always obvious straight away, they may take 5-10 years to deliver results. Having industry support for work like this, and how the research can benefit growers is important. (researcher)
- I think what is needed is more R&D coordination. Get an annual meeting of the researchers to find out what other researchers are doing. Some of these things were done within projects. Within maybe extension projects. This coordination really needs an independent person like Rosie. Bring in one or two international speakers to get new perspective. (researcher)
- Fill in all the forms that I need to do! (researcher)
- She did a great job of reporting. Tying back into Hort Innovation. Active role in generating R&D would make my job easier. (researcher)
- Two Rosies would be great! (extension)
- What we need to do is change my naivety. A regular check in with this space. Webinar series. We can dip in and out. This would help me speak more knowledgeably with growers. It would help me connect networks. Policy people have a lot of on the ground face to face contact with growers and growers need to have confidence these people are knowledgeable – the policy people can't answer "this is not my area". (policy)
- Ramp up the R&D Coordination work. (policy)
- Continue to draw on technical expertise. Rosie does this well. (policy)

Q7. OPPORTUNITIES

- More money for R&D. You've got to be able to do things. There's more R&D to do, and not enough funds to do much. It's no one's fault it's just the way it is. Because funds are tight there's talk of blending with other commodities e.g. avocados. Not sure if this is the way to go. (grower)
- Plant breeding and bringing in new material from overseas. We have got to cut red tape. Israeli plants coming into the country are held up. We need to get these plants in the ground and do the R&D and get results. We really need to cut red tape. (grower)
- I don't know. (grower)
- I'd be worried if Rosie left us. (grower)
- Maybe it would be really useful to have Rosie speak with some people in similar roles in citrus/apples etc. There's probably a lot going on (grower)
- We need research into supply chain stuff, we need quality delivered to supermarkets. (grower)

- Automation of the industry, so labour dependent in the paddock and in the packing shed. It's becoming a point of tension due to lack of workers. (grower)
- All that Reef Regulation stuff isn't going to go away. As a business we've been trying engage with some of the people doing some of the testing to try and be part of the solution. Industry needs to keep our finger on the pulse. Growers/industry shouldn't stick their heads in the sand. Most times it is not about fighting it. Need to be in the passenger seat, need to steer. (grower)
- Panama, variety research, other opportunities. I don't know how you prioritise. (grower)
- I'm pretty impressed with the work she's done. I hope she stays for a long time. She has worked with researchers, and has great contacts with researchers around the world e.g. China, Philippines, this is important work to continue (grower).
- Identify where a completed project would feed into other projects. Address the problem of static documents being the key outputs of research. You only know how good a project is based on outcomes. (consultant)
- Opportunity to improve the current R&D systems. Tendering for contracts and all that stuff. The current system needs to encourage input from a broader range of service providers – consistent with modern business. The current system could be less piecemeal and more strategic, not just doing projects with urgent and immediate need. People get stuck in a rut in the current Hort Innovation model. No impetus for researchers to deliver a benefit. (consultant)
- All research should have grower input. (consultant)
- When growers do provide input, ensure they go back to growers and provide feedback "Thank you for your time, thanks for your input, this is what happened with your input". This could happen I don't know. (consultant)
- Smaller growers don't feel they have a voice. (consultant)
- Hort Innovation gave me 12 days to write a proposal for 5-year funding, it just highlights there is no care for the quality of outcome. (consultant)
- Attract funding from R&D funders other than Hort Innovation. (researcher)
- Bring information from international research to the Australian banana industry and researchers. (researcher)
- We are not doing enough to be internationally competitive. States within Australia don't know what people in South America and China are doing. International aspects should be explored a lot more. Maybe some grower tours, but not just growers, get a few people there that focus them to put it down on paper. Not just to think it is interesting, but to really analyse and drill into issues and critically think about things. In macadamias we did a lot of grower tours with researchers to understand the economic consequences of doing things. This sort of thing could be added to the next phase. It could improve connectedness between researchers, growers, ABGC, regulatory bodies, biosecurity Qld people. It could really open grower eyes. (researcher)
- Reducing plastics is a good opportunity. Rosie is working on a project re: "right to farm" good environmental practices. There are many more things, not just plant protection. Recycling, reusing, etc. (research)
- Quite a specific person is needed to do this job well. Do they have enough resources to travel and do their job? Do they have enough money to follow up? Can they look at other industries and look at for example automation? They identify an issue, and

need seed money to get new coordination work started. Not sure if they have funding. (researcher)

- Who is the custodian of information? Macadamia industry has a great database, when you're a member you get a password to a database. Who is doing this in bananas? This information is useful 1-5 years down the track. Hort Innovation is not a custodian, I get a lot of questions from them re: have you got a paper? I sent it to them 3 years ago. This is very important in the current climate of rapid change. (researcher).
- This R&D Coordination project has been running as a 3-year project for 4 rounds. Should be running for a 5-year project. Make it longer. It gives people more certainty and more continuity. (researcher)
- It's pretty tricky dealing with biosecurity, DAF, ABGC, universities, ACIAR – it would be good to know if there's repetition. Rosie does a good job of knowing what's going on, but probably not aware of everything, she's not just focussed on Hort Innovation work. (researcher)
- Other industries are looking at this R&D Coordinator role and wondering if they should explore this. There's the opportunity to demonstrate the value added by this project by speaking at other industry conferences. E.g. avocado, macadamia, almond. (researcher)
- Perhaps cultivate leadership capability? Rosie could be an ideal candidate for the Hort Innovation Women in Leadership in Australia Scholarship. (researcher)
- We were doing a fantastic job with extension but we can look beyond that and do better, keep working as a team. Continuing to improve is important. It always comes down to the people, Rosie is doing a really good job, and her and my project is sailing along. (extension)
- There's the opportunity to ramp the R&D coordination work up a little bit. Maybe more assertiveness, to influence things. There's a complex set of personalities to deal with researchers. In saying that, I think she's great, these R&D coordination projects are needed. (policy)
- The way things are structured internally in Hort Innovation they can allocate money without consulting with peak bodies. They disregard peak bodies. That's why we shut down HRDC and went to HAL in 2015. We've just gone backwards. They don't care about people. It's a process, not an outcome focus. It's all about them and their process. A lot of really good R&D Managers, and a lot of really bad Relationship Managers. Systematic failure for Hort Innovation. Arrogance levels of some HI people off the scale. (policy)
- A lot of work to do in field establishment to address the viability of tissue culture re: nursery stock. Opportunity to look at investing in field establishment of tissue culture plantlets. At the moment the industry source 45-47% of all new plantings from tissue culture. Therefore ~55% are all bits and suckers being traded over the fence, with the risk of pathogens etc. Opportunity to look at the reasons for poor plant establishment from tissue culture, and look at different growing areas NQ to NSW. (policy)
- It would be awesome to see your report, and discuss the findings of this report. I don't know what I don't know. (policy)

Appendix C: Banana R&D Coordination Deliverables (2015-2025)

Phase	Deliverable	Timeframe (Project code)		
		2015-2018 (BA14012)	2018-2021 (BA17002)	2021-2025 (unknown)
Future	Articulate and communicate the portfolio of Banana R&D to industry, research, policy		✓	✓ ✓
	Broker new and innovative collaborations, new R&D projects, new funding streams		✓	✓ ✓
Current	Technical input to banana R&D projects	✓	✓ ✓	✓ ✓
	Facilitate beneficial collaborations	✓	✓ ✓	✓ ✓
	Support extension and communication of banana R&D	✓	✓ ✓	✓ ✓
	Represent industry on banana R&D matters	✓	✓ ✓	✓ ✓
Initial	Coordinate and build knowledge and capacity to manage and contain Panama TR4	✓ ✓	✓ ✓	✓ ✓

Key:

- ✓ **Emerging deliverable:** this deliverable was of emerging priority over the nominated period
- ✓ ✓ **Foundational deliverable:** this deliverable was a foundational priority over the nominated period

Appendix D: Path-to-Impact for Future Banana R&D Coordination

The Project BA17002 program logic was used as a basis to develop a Revised Path-to-Impact for future banana R&D coordination efforts. The outputs and outcomes outlined below incorporate the findings and recommendations of this Mid-term Review.

Outputs	Outcomes	Impacts
New, innovative banana R&D projects and activities brokered and coordinated	Improved scope and scale of banana R&D	Greater and faster realisation of Outcomes (defined in the relevant Banana Strategic Investment Plan)
Balanced and coordinated portfolio of high-quality banana R&D projects	Reduced duplication and improved collaboration between researchers, research projects and other relevant partners	
Improved two-way flow of information and trust between industry, research, policy, funders and other relevant stakeholders	Connected and resilient banana research, industry, policy system Faster and greater industry uptake of beneficial R&D	