Developing a Best Management Practices Guideline for the Australian Banana Industry

Naomi King
The Department of Agriculture, Fisheries and Forestry, Qld

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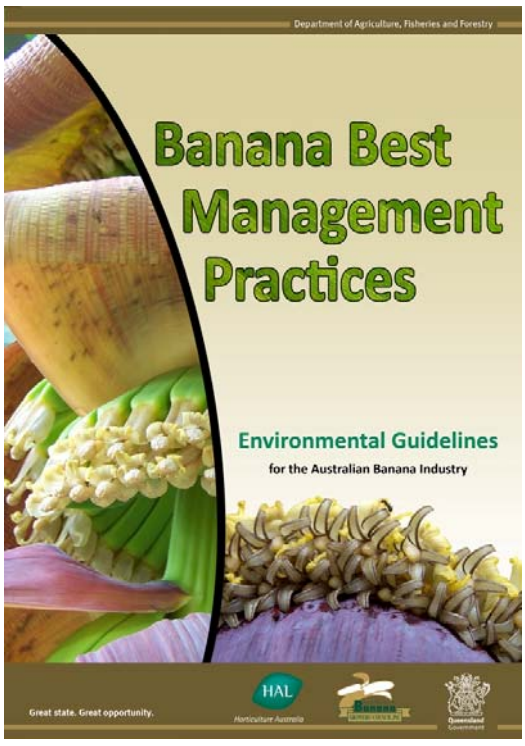

BA11006

Naomi King
(07) 4064 1152
Centre for Wet Tropics Agriculture
South Johnstone QLD 4859

Stewart Lindsay
(07) 4064 1120
Centre for Wet Tropics Agriculture
South Johnstone QLD 4859

This report contains information relating to the development of the Banana Best Management Practices Environmental Guideline, which commenced in 2011 and was released to industry in September 2013.

This project has been funded by HAL using the banana industry levy and matched funds from the Australian Government. This project was lead by the Department of Agriculture, Fisheries and Forestry (Queensland). The project was funded as part of *Reef*ocus Extension, a Queensland Government Reef Plan initiative, working with growers to increase farm productivity and profitability and improve water quality in the Great Barrier Reef.

27 September 2013

Acknowledgements
Many people helped with the development of the Banana Best Management Practices Environmental Guidelines and their contribution is gratefully acknowledged and appreciated by the project team. A full list of acknowledgements is included in the Appendix.

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Media Summary

Bananas are produced in some of the most ecologically sensitive and important areas of Australia. Many production areas are surrounded by world renowned natural wonders and World Heritage listed attractions. While sustainable production is important for these eco systems, the issue extends beyond impacts on surrounding environments and must also consider future farming generations and the productivity of the land they inherit.

The Australian banana industry's Banana Best Management Practices (BMP) Environmental Guideline was released in September 2013. The development of the Banana (BMP) was a priority project by the Australian banana industry. The primary function of the Banana BMP is to provide a system for banana growers to benchmark their farming activities against an industry standard and provide practical information to assist growers in adopting best practice. It demonstrates to the broader community the commitment of banana producers to responsibly manage the natural resources and environment within which they farm.

The content for the Banana BMP was developed in participation with banana growers representing the major production regions, contributing their knowledge and experience. This participatory approach ensured only tried, tested and practical information was included. Technical specialists were then consulted to validate the practices and ensure rigorous research underpinned the information.

The Banana BMP has been designed to be a valuable resource for all banana farming businesses, whether they are businesses with existing environmental management systems or businesses assessing their environmental performance for the first time.

The layout of the document reflects the Freshcare Environmental Code, however businesses audited under other standards will also find value in the resource. Essentially Freshcare's Environmental Code provides the framework and evidence based system for auditing purposes, while the Banana BMP will provide the practical information and method to assess actual farming practices.

Version 1 of the Banana BMP was released in September 2013 and is available to all banana producers in either a hardcopy or online format. To date, 20% of the banana industry, on a hectare basis, has commenced using the Banana BMP online system.

Technical Summary

The banana industry has a proud track record of growers voluntarily improving production practices to achieve improved sustainability and environmental outcomes. At an industry level, environmental stewardship has always been a priority for the banana industry and as such, was recognized in the 2009-14 Banana Industry Strategic Plan. The availability of resources through the *Reef*ocus project, tasked with education and extension activities in select regions of the banana industry, combined with the industry's desire to demonstrate their environmental commitment, lead to the development of the Banana BMP.

Prior to the commencement of this project, a desktop audit was conducted to assess what environmental information and systems existed and were currently available to banana producers. This audit also included a summary of what other horticultural industries were doing in terms of environmental management. The information was presented to the ABGC board at their board meeting in December 2010, and subsequently it was decided that the banana industry would develop their own Best Management Practices (BMP) Environmental Guideline.

The terms of reference for the Banana BMP included;

- it was to be a voluntary guideline that provided producers with a system to assess their farming practices and provide banana specific practice information,
- developed in conjunction with a grower reference group that had representation from all major production regions which included tropics, sub tropics east coast and sub tropics west coast,
- practices that have been proven through commercial practice or research are to be included; conceptual or theoretical practices are to be avoided
- align with Freshcare's Environmental Code, however ensure the guideline is suitable for users of a range of third party audited Environmental Management Systems including ISO 14001.

Initially a literature review of information relating to banana production and natural resource management was conducted. A BMP reference group consisting of 13 growers was established and they were responsible for developing the majority of the content. The BMP reference group meetings were facilitated by DAFFQ employees to allow informal but structured conversation. Discussion would focus on each stage of the production system and assess whether there was potential impact associated with the particular module being addressed. Where potential impacts were identified the group would suggest practices that would overcome the problem or minimise the risk. Information gained from the literature review would be retained or discarded based on the consensus of the group. This information would then be presented to the representatives from the sub tropic growing regions to include regionally specific information. To ensure practices captured by the reference group were valid and supported by research, technical specialists would then review the content. This participative approach was considered critical to ensuring the Banana BMP was developed using grower experience and terminology, which would ultimately improve the adoption rates.

The Banana BMP was initially to be released as a hardcopy document. However during the development of the product the project team felt it would lend itself to

being placed online. The online system had a number of advantages over hardcopy which primarily related to the automation of activities, the ability to provide the user with a scorecard benchmarking their practices against the industry average and greater version control.

Extensive industry consultation occurred throughout the development of the Banana BMP which included the project leader visiting producers in both the sub tropical east coast and sub tropical west coast production regions in early 2012. The progress of the Banana BMP development was also regularly communicated to the banana industry through industry publications.

The draft document was released to the banana industry in June 2013. This trial phase allowed select growers to access the resource for testing purposes. Based on these trials, minor edits were made and version 1 was released in September 2013. To date, without a formal extension program in place, businesses representing over 20% of the banana industry on a hectare basis have already signed up to the Banana BMP.

This project was tasked with the development of the Banana BMP. Future activities beyond this project will be tasked with extension activities associated with increasing industry adoption of the Banana BMP. At this stage it is anticipated that the Banana BMP will be introduced to growers through a series of workshops held in all of the major production regions. This training will be supported by the development of hard copy and online training instructions.

Introduction

The Australian banana industry is valued at approximately $450 million dollars annually and produces bananas on approximately 14,000ha[1]. Many banana growing regions are located in ecologically significant areas which include world renowned natural wonders. Over 90% of national production occurs in north Queensland[2] which is surrounded by World Heritage listed rainforest and catchments that flow into the Great Barrier Reef Marine Park. The other major production regions are Carnarvon in Western Australia and northern New South Wales that includes the Coffs Harbour and Tweed/Lismore regions.

The banana industry has always had a proud track record of growers voluntarily improving production practices to achieve improved sustainability. This is demonstrated through practices such as grassed inter-rows, the introduction of integrated pest and disease management, targeted chemical application, reduction in fertilizer inputs, improvements in fertilizer application methods, improved irrigation efficiency and filtering run-off water through systems such as sediment traps and constructed wetlands.

The Australian banana industry highlighted in their Strategic Plan 2009-2014, the need to safeguard the environment and society through improving the environmental integrity of the Australian banana industry. Based on this priority, *BA09063 Establishing a strategy for improving the environmental integrity of the Australian banana industry*; was commissioned to provide an environmental stocktake of the Australian banana industry. The industry acknowledged that a great deal of work had already been carried out by individuals, however it was necessary for an industry as mature as the banana industry to have a national environmental guideline. The purpose of such an environmental guideline is to reinforce the positive work already occurring in the industry, identify areas for further improvement and provide banana specific information to assist in practice change.

The Reef Water Quality Protection Plan is a 10 year joint initiative of the Australian and Queensland Governments. It was initially launched in 2003 and aims to improve the quality of agricultural run-off water entering waterways and the Great Barrier Reef lagoon by reducing sediment, nutrient and pesticide losses. With the updated version released in 2009, came the introduction of regulation in the form of Environmental Risk Management Plans (ERMP) for sugar cane producers in the Cassowary Coast Regional Council area and graziers in the Burdekin council area.

While the banana industry is exempt from these regulations, they are seen as a major industry in the Wet Tropics of far north Queensland. Subsequently the banana industry was included in the pilot Reefocus Extension program, lead by the Department of Agriculture, Fisheries and Forestry Queensland (DAFFQ), focusing banana extension activities in the Tully and Johnstone River catchment areas. In late 2010, DAFFQ staff met with the Chairman of ABGC to discuss how this funding could be best utilized by DAFFQ and the banana industry to achieve meaningful outcomes for both parties.

[1 & 2] ABGC (2013). *Banana industry key facts*, Australian Banana Growers Council webpage, (abgc.org.au).

At the request of ABGC, a desktop audit was completed by DAFFQ and presented to the board of ABGC in December 2010. This audit involved a review of available environmental standards, environmental strategies and resources from other industries, environmental pressures facing the banana industry and culminated in a suggested strategy to develop a Best Management Practices (BMP) Environmental Guideline for the Australian banana industry. ABGC provided verbal support of this concept in January 2011 and subsequently a project application was submitted to HAL.

The Banana BMP provides a benchmark that the banana industry expects their growers to achieve or exceed. Industry wide adoption of the BMP has the potential to reduce sediment, nutrient and pesticide losses, thereby helping to meet the targets of the Reef Water Quality Protection Plan. Advice from representatives of the Department of Natural Resources and Mines (DNRM) suggested the banana industry could reduce consideration of future government regulation if they developed their own standard and achieved sufficient adoption amongst growers.

The structure of the Banana BMP reflects Freshcare's Environmental Code in the module and sub module structure. Freshcare is the most commonly used quality assurance system in the banana industry[3], therefore it was expected that most growers who adopt an environmental standard would use Freshcare's Environmental Code. This would avoid system duplication, streamline paperwork and increase the adoption rate of the Banana BMP by reducing barriers to adoption.

In recent months Coles have stated that banana suppliers will be required to be compliant with an Environmental Standard by early 2014 in order to continue supplying Coles. Freshcare's Environmental Code is one of three standards that Coles will accept and the likely choice for banana businesses.

The purpose of the Banana BMP is to provide a system for businesses to assess their farming practices and provide examples of best practice in banana production. Essentially the Banana BMP provides the practical content and banana specific information, while Freshcare's Environmental Code provides the structure and evidence based system for auditing purposes.

Initially the Banana BMP was to be produced in a hard copy format, consisting of a self-assessment checklist and resource material. The self-assessment checklist would help to identify the business's strengths and weaknesses and benchmark practices, while the resource material would provide examples of best practice. However, after consideration about how to encourage adoption of the Banana BMP, project members decided to include other features to enhance the functionality of the Banana BMP. The system then leant itself to being placed online which provided many advantages in terms of capturing quantitative data at an industry level, providing active hyperlinks and automation to streamline the process. A project variation was approved by HAL to allow for these improvements. Additional features were also added to the system including a management plan to prioritize action items and the online system also has a scorecard to compare the farm average with a moving industry average.

[3] Russell A (2010). *BA09063 Establishing a strategy for improving the environmental integrity of the Australian banana industry*, HAL final report.

Materials & Methods

With the permission of Freshcare, the framework for the Banana BMP was provided by Freshcare's Environmental Code. Freshcare is the most commonly used quality assurance program in the banana industry and it is anticipated Freshcare will also be the environmental standard most banana growers use. This would allow growers to maximise use of existing recording systems and avoid duplicating paperwork for different standards. Coles' recent announcement that banana suppliers will be required to be compliant with an Environmental Standard by early 2014 in order to continue supplying Coles, will further increase the number of growers using Frechcare's Environmental Code as it is one of three standards accepted by Coles. Therefore aligning the Banana BMP to Freshcare is expected to increase industry adoption of the Banana BMP.

The Banana BMP follows the same module and sub module structure, with two minor changes. The second module was renamed 'pesticides' in the Banana BMP rather than 'chemicals' as per Freshcare's code and an additional module 'integrated pest and disease management' (IPDM), was added rather than having this information within the pesticides module. The 10 modules in the Banana BMP are listed below:

1. Land & Soil
2. Pesticides
3. Integrated Pest & Disease Management (IPDM)
4. Fertilisers & Soil Additives
5. Water
6. Biodiversity
7. Waste
8. Air
9. Energy
10. Fuel

Literature review

A literature review of existing publications was undertaken by the project leader in late 2011. The Better Banana Businesses Group project from 2003 provided a very valuable resource for the literature review. This project was tasked with a similar responsibility to the Banana BMP, however it was regionally specific to the north Queensland banana industry. The project was managed by DAFFQ employees Stewart Lindsay and John Bagshaw and involved a number of Innisfail banana growers. Therefore much of the content was still relevant for the Banana BMP.

Reviewed publications included industry, general horticulture and natural resource management documents. This information was then populated into the respective modules of the Banana BMP. Extensive consultation with industry stakeholders and natural resource specialists was carried out to refine the list of consulted material. A full list of reference material can be found in the appendix.

BMP reference and consultative groups

In the approach of 'do with' rather than 'do to' it was crucial to the success of the project and future adoption by industry, that banana growers themselves develop much of the content within this Banana BMP resource. To ensure industry participation, contribution and ownership a BMP reference group was established.

Due to the national scale of banana production and the subsequent geographical diversification, environmental issues and priorities vary from farm to farm and between production regions. It was necessary that all major production regions were represented on the BMP reference group. In the HAL project proposal, the BMP consultative group would develop and validate practices considered 'best practice'. Within this group, select growers would provide guidance for project direction and overarching issues and this would be the BMP reference group. This functionality changed throughout the project with the larger consultative group effectively taking on both roles and being collectively referred to as the BMP reference group.

Members of this group were selected based on their geographical location and commitment to environmental management. The group consisted of 13 growers; 10 from Queensland, 2 from New South Wales and 1 from Carnarvon. These growers represented the major banana production areas of Australia. The proportion of growers from north Queensland reflects both the size of the industry in this region and also the key focus area for the funding provided by the Queensland Government through *Reef*ocus. The names of the reference group members and their farming locations are listed below. The contributions of these growers are greatly appreciated by the project team.

- Paul Johnston, Tully, Queensland
- Adrian Crema, Tully, Queensland
- Caleb Mathews, Tully, Queensland
- Gavin Devaney, Innisfail, Queensland
- Dean Sinton, Innisfail, Queensland
- Steven Lizzio, Innisfail, Queensland
- Marc Darveniza, Innisfail, Queensland
- Brett Gaia, Innisfail, Queensland
- Gavin Eilers, Innisfail, Queensland
- Fabian Della Bosca, Walkamin, Queensland
- Peter Molenaar, Murwillumbah, New South Wales
- Stephen Spears, Via Macksville, New South Wales
- Michael Nixon, Carnarvon, Western Australia

BMP reference group meeting structure

DAFFQ employees Stewart Lindsay and Naomi King facilitated meetings with the 9 Innisfail and Tully growers. These meetings occurred at a number of venues which included the DAFFQ Centre for Wet Tropics Agriculture research at South Johnstone, farms and a public venue which was central to all producers. These meetings would generally run for 2 hours and there was no set timeframe between the meetings, with 8 occurring over a period of August 2011 through to June 2012.

These meetings were facilitated to allow an informal but structured discussion, which followed a Hazard Analysis Critical Control Point (HACCP) approach. The banana production system was essentially broken down into a series of process steps like a flowchart, Figure 1. Discussion would focus on each process step of the production system, from fallow management through to storage and dispatch, and assess whether there was potential for environmental impact associated with the particular process step being addressed.

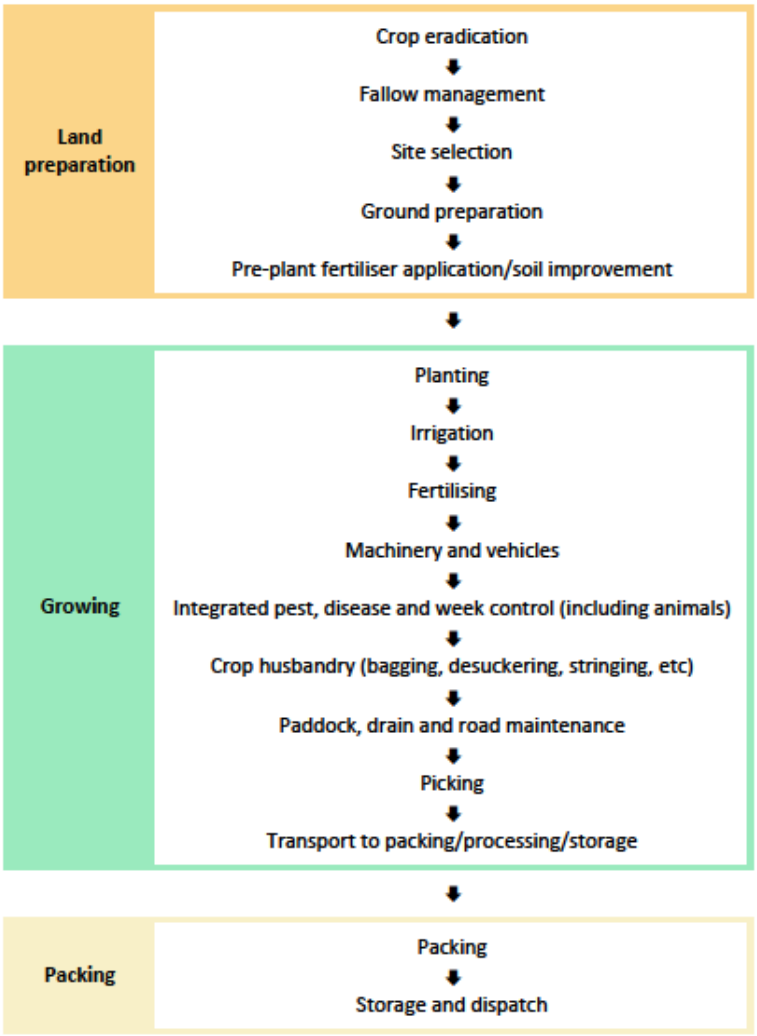

Figure 1. Banana Production System Flow Chart, as illustrated on page 136 as an appendix of the Banana Best Management Practices Environmental Guidelines

This HACCP approach was carried out for a single module at a time and repeated for each of the 10 modules. If there was a potential impact, discussion would concentrate on how growers managed these risks and what was best practice. Information gathered from the literature review would be considered and either retained or discarded, depending on the opinion of the group. This structured approach was adopted based on the success of the previously mentioned DAFFQ banana project, Better Banana Businesses, managed by project member Stewart Lindsay.

In addition to the previously mentioned reference group meetings, the group also met in February 2013 to develop the self-assessment checklist and again in July 2013 to test the online system during the trial phase.

Figure 2. BMP reference group members Adrian Crema and Paul Johnston trialling the online version in July 2013

The information generated from these group meetings would then be presented to the remaining members of the reference group. The project leader would travel to Walkamin to meet with the Tableland's grower representative at their farm. The NSW and WA growers where consulted via email, phone or face-to-face where travel allowed. The face-to-face meetings were generally when these growers were visiting north Queensland for other industry responsibilities, however the project leader also travelled to Carnarvon in March 2012 and New South Wales in May 2012 to meet with these reference group members. This approach allowed the majority of the content to be developed by growers using their own experience and terminology.

Grower consultation

A wider selection of banana growers beyond the reference group was engaged throughout this process. The project leader visited Carnarvon in March 2012 and New South Wales in May 2012. These visits provided the opportunity to consult more broadly with other growers in these regions and discuss their production systems. These meetings were held on-farm providing the opportunity to inspect examples of best practice. Discussions with growers in north Queensland and visits to farms in this region were ongoing throughout the life of the project due to their close proximity.

These farm meetings followed a semi-structured process where a list of key points for discussion was developed by the project leader prior to these visits, helping to focus conversation rather than being used to dictate conversation.

Banana BMP review

Technical specialists, including consultants, advisers, researchers and service providers, reviewed the information generated by the BMP reference group. These specialists were selected based on their knowledge and field of expertise. The purpose of the review was to ensure the practices suggested by the growers were validated and supported by scientific research. It also provided the opportunity to include technical content and have a person independent of the BMP reference group review the material.

Technical specialists were consulted a number of times throughout the process. Firstly as a list of practices was developed for each module and again when these modules were drafted into a readable format. Depending on where the technical specialist was located, the project leader would provide hardcopy documents during a meeting or email the content and follow this up with a phone conversation. In addition to these technical specialists, a wider group of industry and natural resource stakeholders were given the opportunity to provide comment on the entire draft document.

The BMP reference group members also reviewed each of the draft modules. The 9 growers from the Innisfail and Tully regions were divided into 3 groups and each group given either 3 or 4 modules to review. These draft modules were emailed to the growers initially and the project leader then met with each group to include their suggested edits. To ensure a representative of each production region had reviewed the content, the other BMP reference group members were required to review every module. As this was an onerous task these modules were emailed out progressively and feedback sought before the next modules sent. A full list of document reviewers is included in the appendix.

Figure 3. BMP reference group members Steve Lizzio, Brett Gaia and Dean Sinton provide suggested edits to draft modules in October 2012

Editing, formatting and printing

The editing and formatting of the Banana BMP was undertaken internally by DAFFQ employees Susan House and Melissa Frazer respectively. Both staff members have extensive experience and skills in their relevant area. The project leader travelled to Mareeba initially to discuss the format of the document and all other communication relating to editing and formatting was performed via phone and email.

System to support the Banana BMP

This project was tasked with developing the BMP resource, which was to consist of a self assessment checklist and resource material. During one of the BMP reference group meetings, group members discussed the issue of industry adoption. A great deal of time and effort had gone into producing the resource; however it was significant in size and potentially appeared onerous to growers.

Therefore it was necessary to streamline the process and maximise the system benefits to users. It could not be expected that growers would read the BMP from start to end and identify practices for improvement. When growers are first introduced to a BMP type resource it can be hard to know where to start. Therefore a system to support the Banana BMP was developed. This allows users to:

- assess and benchmark their production practices against an industry standard (self-assessment checklist)
- compare their practices against the industry average (scorecard)
- identify and prioritise their actions for improvement (management plan)
- direct users to relevant sections of the resource material for information on best practice and provide links to relevant websites (resource material)

Online development

The project leader consulted with members of DAFFQ, ABGC and HAL to revise the delivery method of the Banana BMP to include an online system as well as hardcopy document. A project variation was provided to HAL and approval gained to develop an online system.

The benefits of an online system over hardcopy alone included:

- version control, with growers always having access to the latest version
- industry avoids excessive printing costs as future versions are released online
- single access point for farm practice information
- immediate delivery of new resources and information
- ability to benchmark farm practices against a moving industry average
- action items automatically added to the management plan
- hyperlinks from the management plan to the relevant sections of the resource material
- resource material has active links to websites providing additional information
- ability for industry to collect quantitative data about production practices helping prioritise future R&D investment and providing the ability to promote/defend industry's position

Select members of the reference group were consulted about the online system requirements. A web design brief was developed by the project leader and reviewed by ABGC's communication manager and a DAFFQ staff member experienced in

information technology. These 3 people were also responsible for reviewing submissions and choosing the successful applicant. A copy of the web design brief is included in the appendix.

Alyte Creative was the successful applicant due to their experience with the Word Press Content Management System (CMS) and their project budget.

The project leader and ABGC's Communication Manager were responsible for liaising with the web designer. The project leader was responsible for the content, design and features of the BMP, while the Communications Manager was responsible for integration with the ABGC website. The project team met twice in Brisbane and the rest of the consultation occurred via phone, email and with the aid of Sifter, a web based task creation program.

The online component of the Banana BMP is located on the ABGC website. The initial development work cost $15,000 and was funded by DAFFQ from funding sources separate to BA11006. A Collaborative Agreement was developed between DAFFQ and ABGC and funds transferred to ABGC, who then commissioned the web designer. It was later identified that additional work was required outside of the scope of the original tender process. A Collaborative-Subcontract Agreement for the additional $6820 was developed between DAFFQ and ABGC and forwarded to all project partners, including HAL, prior to approval.

The online Banana BMP system requires each grower to have individual logon usernames and passwords, which are consistent with grower access details for the broader ABGC website. This allows growers to save their information online and maintain confidentiality. Access to the Banana BMP is not restricted with all banana growers encouraged to use this resource.

Trial phase

The Banana BMP was launched at the Banana Congress on 31 May 2013. This was delivered in a joint presentation by the project leader Naomi King and ABGC Director and BMP reference group member Marc Darveniza. The banana industry was advised that the document was in a trial phase and growers wanting to participate could register their interest through ABGC's website.

The purpose of the trial phase was to allow a limited number of growers access to the online system for testing. A registration button was activated on ABGC's website for growers to register their interest.

Approximately 10 growers used the system during the trial phase. The project leader met with the growers and walked them through the BMP system. These growers provided feedback relating to functionality and terminology and the BMP was edited accordingly.

Figure 4. Banana grower Cameron Mackay tests the Banana BMP during the trial phase in July 2013

Results

Version 1 of the Banana BMP was completed in August 2013 and released in September 2013. It is now a fully functional BMP which provides banana specific information relating to best farming practice and a system to support its use and delivery to growers. The information contained in the document captures national issues as well as regionally specific information.

Users are able to access best practice information on issues relating to the 10 modules of land and soil, pesticides, integrated pest and disease management, fertiliser and soil additives, water, biodiversity, waste, air, energy and fuel.

Often it is difficult to know where to start. Therefore the Banana BMP system provides a step-by-step process for the user. The system to support the Banana BMP consists of a self-assessment checklist, scorecard and management plan.

The benefit of the self-assessment checklist is it provides a framework for growers to systematically review their production practices. The checklist eliminates the possibility that some practices are omitted from an internal review and ensures that all aspects of the business' banana production system are assessed. Growers are able to rate their farming practices against an industry standard which provides three levels; best, okay and improve. This process identifies where the business' strengths and weaknesses lay.

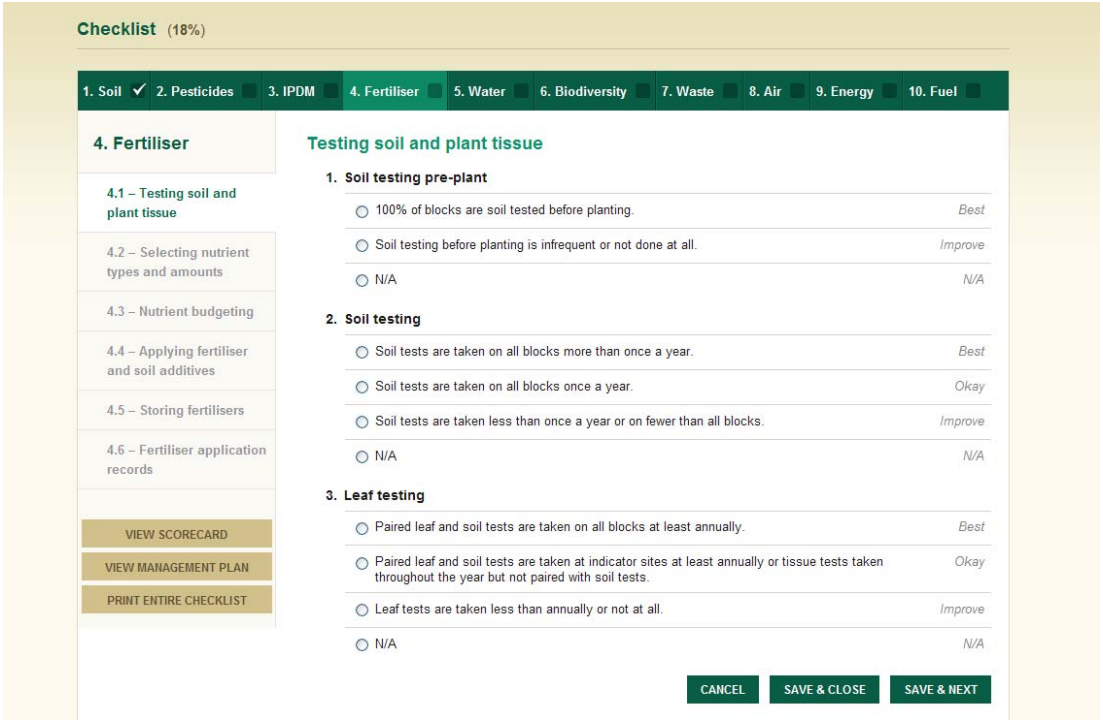

Figure 5. A screen shot of the self-assessment checklist from the online version of the Banana BMP. This checklist allows growers to assess their farming practices against an industry standard.

The online version has a scorecard which provides a summary of practice ratings from each sub module represented as a pie chart. This provides the user with a quick visual representation of how they are performing, compared to other growers.

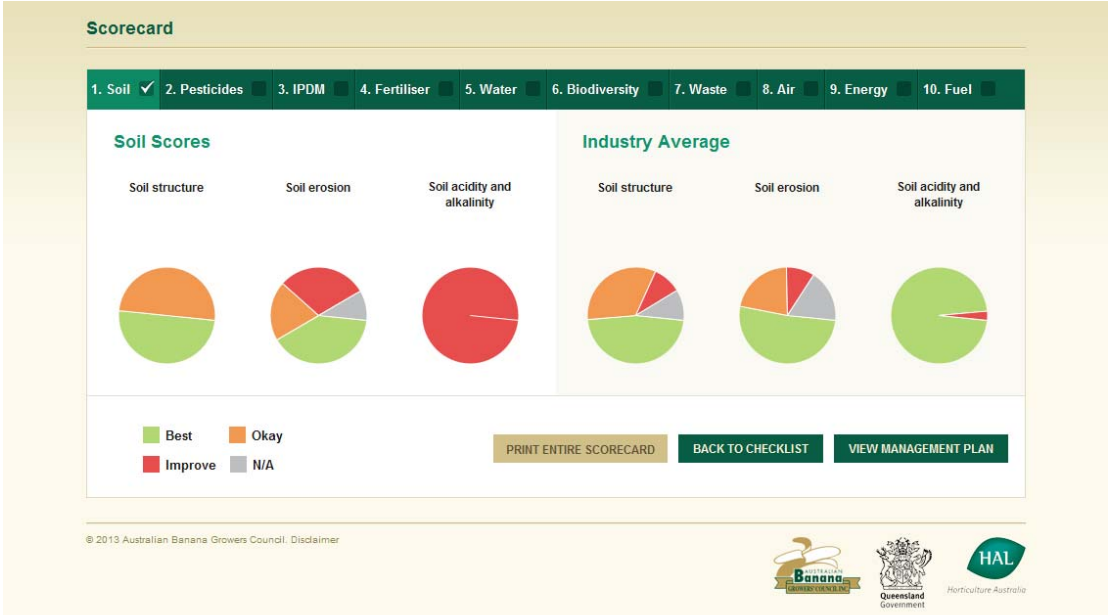

Figure 6. A screen shot of the scorecard from the online version of the Banana BMP. Growers can compare their farm practice ratings against an industry average.

The management plan provides an opportunity for businesses to capture their farm practices for improvement in a consolidated list. This checklist allows the user to prioritise action items and allocate their resources accordingly. The management plan records the item for improvement, a priority rating, action required, person responsible, due date, budget, project progress and completion date. All practices from the self-assessment checklist falling into the 'improve' category should be added to the management plan and this is an automated process with the online version. Users also have the ability to manually add additional items to the online-management plan. For example, practices that are currently acceptable but the business would like to improve further or items that are not related to environmental management can easily be added. Hyperlinks contained in the online-management plan direct users to the applicable sections of the resource material.

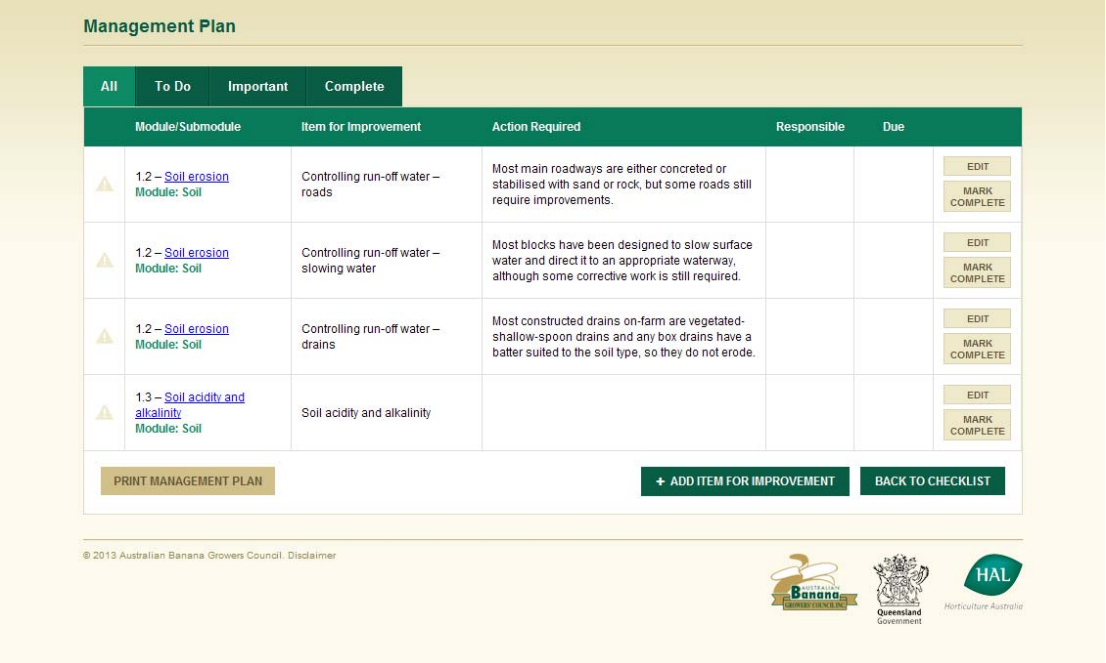

Figure 7. A screen shot of the management plan from the online version of the Banana BMP. The management plan allows growers to capture all of the practices for improvement in a consolidated list and prioritise activities.

The content of the resource material was largely developed by growers and then validated by technical specialists, ensuring the farming practices have been proven through commercial practice. The purpose of the resource material is to provide a single point where growers can access information. It was a balancing act to ensure enough information was included to make it useful and informative, while not so much that it became cumbersome. Where more information was available, links to the relevant websites have been included. The online version has active links that provide direct access to additional web-based information in a new browser window. Both the online and hardcopy versions have a full list of additional resources under the section 'More Information' and this list contains the actual link, as well as the file pathway in the event that websites change and links become inactive. A full list of links is provided in the appendix.

Users will be sent an email reminder 12 months from when they first register for the Banana BMP online system, reminding them to reassess their practices and review their management plan. Should the business decide to be audited under an Environmental Standard, they can use the Banana BMP to demonstrate they are complying with industry recognised best practice.

Consultation between project members and Freshcare representatives has resulted in a close association between the two systems. Banana growers attending Freshcare's environmental training will be supplied with logon details for the Banana BMP, allowing them to complete the Banana BMP before they attend the Freshcare training. The Banana BMP will also be referenced throughout the training presentation to demonstrate how the two systems align and where the Banana BMP will provide value. Essentially Freshcare's Environmental Code will provide the framework and evidence based system for auditing purposes, while the Banana BMP will provide the practical banana specific information and method to assess farming practices.

The Banana BMP reporting function is capable of providing the banana industry with quantitative data about the practices used in the banana industry. This information can be represented on a hectare and regional basis, in addition to number of growers. The reporting capabilities provide the opportunity to measure BMP adoption/uptake within the industry, monitor practice change over time, prioritise industry R&D investments, promote the positive work within the industry and defend the industry against criticism if the need arises.

To date, 20% of the banana industry, on a hectare basis, has commenced using the Banana BMP online system. This has occurred despite the absence of an 'official' extension effort. At this early stage only limited 'on-ground' practice change could be expected, however it does indicate that banana growers and the industry in general are responding positively.

Discussion

The methodology for developing the Banana BMP has been successful and provides a structure that could be replicated again for new initiatives in the banana industry, or similarly in other primary production industries. A number of horticultural industries have already inquired about the product, however access has been restricted to banana growers at present. Once a suitable test user account is created non-grower access will be possible. All project partners have indicated they are happy to share the system with other industries, as ultimately it will help to improve the image of farming in general.

Industry ownership was essential to increase the uptake by growers. Growers respond more positively when they are engaged in the process and in the case of the Banana BMP, it ensured the farming practices recommended were commercially valid. A grower reference group, extensive industry consultation and regular communication activities, kept the banana industry informed of project activities and provided the opportunity for growers to participate in the development of the Banana BMP.

The decision to make the Banana BMP available online as well as hardcopy has made the Banana BMP much more dynamic. The system that supports the Banana BMP streamlines the process for users by providing a sequenced process, automation and active links and hyperlinks. It also provides an avenue for the banana industry to collect data about farming practices avoiding unpopular grower surveys.

There is currently a project submission with HAL for a National Banana Development and Extension project, which will be responsible for training and extension activities associated with the Banana BMP. It is envisaged that the Banana BMP will be extended to banana growers through a series of workshops. At these workshops growers will be able to complete the online self-assessment checklist and management plan with the aid of iPads and they will also be provided with a hardcopy version of the Banana BMP. Hardcopy and online training instructions will also be developed to support the workshops.

The development of the Banana BMP has been timely. In recent months Coles has stated their banana suppliers will be required to have an Environmental Standard by early 2014 in order to continue supplying Coles. There are three standards that Coles will accept; Freshcare's Environment Code, the vegetable industry's EnviroVeg and GLOBALG.A.P. Coles have stated they will not accept ISO 14001. Therefore Freshcare's Environmental Code is the obvious choice for banana growers and this is expected to further increase the adoption of the Banana BMP.

The other relevant development in the banana industry since the commencement of this project is the Great Barrier Reef Marine Park Authority's (GBRMPA) Reef Guardian Farms pilot project. The concept behind the Reef Guardian farms initiative is the promotion of positive farming activities in the Great Barrier Reef catchment areas. This is achieved by acknowledging businesses with good environmental performances and promoting these businesses and their activities to the wider community. The Banana BMP will provide the framework to assess banana businesses in becoming Reef Guardian Farmers.

Technology Transfer

Project activities have been extensively communicated to the banana industry. In total 8 articles were published in banana industry publications, 2 presentations and 1 briefing document were prepared for the board members of ABGC, 6 presentations were given to the wider banana industry including at the Banana Congress in May 2013 and 3 articles were published in other rural media. A full list is provided below.

1. Cronin R (2013). BMP gets a test drive in NQ. *Australian Banana News*, September, p 7.

2. Cronin R (2013). BMP gives green light to better farming. *Australian Bananas*, Vol 39, p 9.

3. Cronin R (2012). Grower talks shape BMP. *Australian Bananas*, Vol 36, p 27.

4. Cronin R & King N (2012). Growers get project update. *Tropical Banana News*, Vol 8, p 3.

5. Cronin R & King N (2013). Growers test drive new online BMP. *Banana e-bulletin*, August.

6. Francis A (2013). Better practices to lift banana industry. *Good Fruit and Vegetables*, Vol 24, No 12, p 4.

7. King N (2012). *Banana Best Management Practices (BMP) Guidelines*. Presentation prepared for Cassowary Coast Banana Association meeting, April 12, El Arish.

8. King N (2013). *Banana BMP*. Presentation prepared for Environmental Code training, 29 August, South Johnstone.

9. King N (2013). *Banana BMP*. Presentation prepared for Environmental Code training, 30 August, Mareeba.

10. King N (2013). *Banana BMP*. Presentation prepared for Environmental Code training, 2 September, Tully.

11. King N (2013). Banana BMP Environmental Guidelines. *Freshcare News*. Vol 25, p 3.

12. King N (2012). Best practice makes perfect for banana growers. *Tropical Banana News*, Volume 6, p 3.

13. King N (2011). *Developing a best management practices guideline for the Australian banana industry*. Presentation prepared for ABGC board meeting presentation, August 26.

14. King N (2013). *Demonstrating Banana BMP*. Presentation prepared for Cassowary Coast Banana Association meeting, August 8, South Johnstone.

15. King N (2012). *Developing a best management practices guideline for the Australian banana industry*, briefing document prepared for ABGC board meeting, April.

16. King N (2010). *EMS stock take for the Australian banana industry*. Presentation prepared for ABGC board meeting, December.

17. King N & Cronin R (2013). Growers put best foot forward. *Australian Bananas*, Vol 38, p 19.

18. King N & Cronin R (2013). Growers sign up for new online guide. *Australian Banana News*, July, p 3.

19. King N & Darveniza M (2013). *Banana Best Management Practices Environmental Guidelines*. Presentation prepared for Australian Banana Congress, May 29, Coolum.

20. King N & Wegscheidl C (2012). *Reef*ocus Extension Update – Banana. *Reef Matters Newsletter*, Vol 2, p 3.

21. King N & Wegscheidl C (2013) *Intro to the Banana BMP*, Citrix online webinar, 24 September.

In addition the project leader attended most monthly Cassowary Coast Banana Association meetings and provided project updates as part of general business at these meetings. There is currently a project submission with HAL for the National Banana Development and Extension project, which will be responsible for extension activities associated with the Banana BMP.

Recommendations

There are a number of recommendations to improve the uptake of this product by the banana industry. The National Banana Development and Extension Project (BA13004), to be lead by DAFFQ, will be responsible for these recommendations.

- **Funding to facilitate adoption of the package**. The Banana BMP will be rolled out to industry through a series of workshops in each of the major production regions and supported by hardcopy and online training instructions.
- **An evaluation of the BMP after 12 months.** This evaluation will provide the opportunity to update content and improve the system based on grower feedback
- **Continued links with Freshcare.** Continue to promote and provide access to the Banana BMP during Freshcare's Environmental training. Include evidence based recording systems within the Banana BMP system to satisfy external auditing requirements.
- **Expansion to a whole farm management system.** Both the hardcopy and online formats have been designed to allow additional guidelines, such as biosecurity and occupational health and safety, to be added to the BMP series.
- **A mechanism for ongoing support and continuous improvement of the package.** To ensure it remains a 'grower' resource, the future direction of the Banana BMP beyond the life of the National Development and Extension Project will be the responsibility of ABGC. There may be the opportunity for ABGC to employ an Environmental Officer to continue to encourage uptake and further develop the Banana BMP.

Appendix

Acknowledgments

Many people helped with the development of the Banana Best Management Practices Environmental Guidelines and their contribution is gratefully acknowledged and appreciated by the project team.

A Banana Reference Group was established to develop the Banana BMP, consisting of 13 banana growers who generously gave their time, knowledge and advice as part of the project:

- Paul Johnston, Tully, Queensland
- Adrian Crema, Tully, Queensland
- Caleb Mathews, Tully, Queensland
- Gavin Devaney, Innisfail, Queensland
- Dean Sinton, Innisfail, Queensland
- Steven Lizzio, Innisfail, Queensland
- Marc Darveniza, Innisfail, Queensland
- Brett Gaia, Innisfail, Queensland
- Gavin Eilers, Innisfail, Queensland
- Fabian Della Bosca, Walkamin, Queensland
- Peter Molenaar, Murwillumbah, New South Wales
- Stephen Spears, Via Macksville, New South Wales
- Michael Nixon, Carnarvon, Western Australia

Several more banana growers also contributed in various ways to the project:

- Matthew Abbott, Innisfail, Queensland
- Doug Phillips, Innisfail, Queensland
- Cameron Mackay, Tully, Queensland
- Jeff Zanette, Tullera, New South Wales
- Jeff Larsson, Tullera, New South Wales
- Ian and Warren Simpson, Uralba, New South Wales
- Mick Spears, via Macksville, New South Wales
- Nicky Singh, Coffs Harbour, New South Wales
- Ted, Liz and Stephen Knoblock, Coffs Harbour, New South Wales
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- Vicki McCudden, Nambucca, New South Wales
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- Sweeter Banana Co-operative Packing Shed, Carnarvon, Western Australia
- Darryl and Cherelle Hardman, Carnarvon, Western Australia
- Rob Scott, Carnarvon, Western Australia
- Tom Day, Carnarvon, Western Australia
- Bruce and Darrell Munro, Carnarvon, Western Australia

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- John Bagshaw, formerly DAFF (Qld), Bundaberg, Queensland
- Tony Pattison, DAFF (Qld), South Johnstone, Queensland
- Tegan Kukulies, DAFF (Qld), South Johnstone, Queensland
- Lynton Vawdrey, DAFF (Qld), South Johnstone, Queensland

- John Armour, DNRM, Mareeba, Queensland
- David Peasley, Peasley Horticultural Services, Murwillumbah, New South Wales
- Callum Rowe, WaterWright Solutions, Cairns, Queensland
- David Astridge, DAFF (Qld), South Johnstone, Queensland
- Darryl Evans, Soil Conservation Consultant, Innisfail, Queensland
- Richard Piper, Scientific Advisory Services, Tully, Queensland
- Kerry McDonald, Tableland Air Services & Secretary of AAAA, Atherton, Queensland
- Norman Liddle, Liddle's Aerial Spraying Pty Ltd, Tully, Queensland
- Mark Hickey, NSW DPI, Wollongbar, New South Wales
- Jeremy Bright, NSW DPI, Wollongbar, New South Wales
- Peter Newley, NSW DPI, Coffs Harbour, New South Wales
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- Rhyll Cronin, ABGC, Brisbane, Queensland
- Jay Anderson, ABGC, Brisbane, Queensland
- Neil Sing, Terrain NRM, Atherton, Queensland
- Melissa Brady, Carnarvon Growers Association Inc, Carnarvon, Western Australia
- Neville Sloss, Banana Communications Officer, Green PR, Teven, New South Wales
- Adam West, DAFF (Qld), Townville, Queensland
- Graham Cripps, former Growcom Water for Profit officer, Tully, Queensland
- Angela Steain, Freshcare, Sydney, New South Wales
- Belinda Hazel, Optimum Standard, Mornington, Tasmania

Photos
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- David Astridge, DAFF (Qld), South Johnstone, Queensland
- Lynton Vawdrey, DAFF (Qld), South Johnstone, Queensland
- Carla Wegscheidl, DAFF (Qld), South Johnstone, Queensland
- Darryl Evans, Soil Conservation Consultant, Innisfail, Queensland
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Document Reviewers

Document	Person	Date	Comment
Resource_soil_120110	Darryl Evans, private Soil Conservation Officer	16/02/12	Hard copy provided during meeting at South Johnstone
Resource_soil_120110	John Armour, Soil Chemist DNRM	29/02/12	Emailed, phone discussion 13/03/12 after receiving email edits
Resource_fertiliser_120210	John Armour, Soil Chemist DNRM	29/02/12	Emailed, phone discussion 13/03/12 after receiving email edits
Resource_chemical_120112	Tony Pattison, Technical Officer DAFFQ	29/02/12	Emailed, met 05/03/12
Resource_chemical_120112	Tegan Kukulies, Technical Officer DAFFQ	29/02/12	Emailed, met 05/03/12
Resource_chemical_120112	Lynton Vawdrey, Plant Pathologist DAFFQ	13/03/12	Emailed, met 16/03/12
Resource_chemical_120112	David Astridge, Entomologist DAFFQ	13/03/12	Emailed, Stewart reviewed edits and returned
Resource_Fertiliser_120427	Callum Rowe, private irrigation consultant	27/04/12	Hard copy provided during meeting at South Johnstone
Module_Energy	Callum Rowe, private irrigation consultant	27/04/12	Hard copy provided during meeting at South Johnstone
Resource_Water_120418	Callum Rowe, private irrigation consultant	27/04/12	Hard copy provided during meeting at South Johnstone
DRAFT_WASTE 120523	John Bagshaw, former DAFFQ extension officer	19/06/12	Emailed, returned with track changes
DRAFT_ENERGY120625	John Bagshaw, former DAFFQ extension officer	2/07/12	Emailed, returned with track changes
DRAFT_FUEL120625	John Bagshaw, former DAFFQ extension officer	2/07/12	Emailed, returned no changes, suggests adding bunding after what volume
DRAFT_WATER120619	Callum Rowe, private irrigation consultant	4/07/12	Emailed, returned 16/08/12 with edits
DRAFT_LAND&SOIL 120806	Darryl Evans, private soil conservation officer	08/08/12	Emailed, returned 14/08/12 with edits, met later in afternoon to discuss
DRAFT_CHEMICAL 120806	Stewart Lindsay, DAFFQ Developmental Horticulturalist	06/08/12	Placed on U drive, returned with edits 14/08/12
DRAFT_CHEMICAL 120814	Tony Pattison, Nemtologist/Soil Health DAFFQ	15/08/12	Emailed,
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DRAFT_CHEMICAL 120814	Tegan Kukulies, Technical Officer DAFFQ	15/08/12	Emailed, comments provided 16/08/12
DRAFT_LAND& SOIL 120814	John Bagshaw, former DAFFQ extension officer	15/08/12	Emailed, comments provided 21/08/12
DRAFT_FERTILISER 120821	Stewart Lindsay, Developmental Horticulturalist DAFFQ	21/08/12	Emailed, returned 29/08/12
DRAFT_WATER 120816	Stewart Lindsay, Developmental Horticulturalist DAFFQ	21/08/12	Emailed, returned 03/09/12
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DRAFT_WASTE_120523 JB comments	Steve Lizzio, Dean Sinton & Brett Gaia – BMP reference group	25/09/12	Emailed, met at farm 25 October 2012
DRAFT_ENERGY_120710	Steve Lizzio, Dean Sinton & Brett Gaia – BMP reference group	25/09/12	Emailed, met at farm 25 October 2012
DRAFT_LAND & SOIL 120912	Steve Lizzio, Dean Sinton & Brett Gaia – BMP reference group	25/09/12	Emailed, met at farm 25 October 2012
DRAFT_AIR_120824	Paul Johnston, Adrian Crema, Caleb Mathews – BMP reference group	25/09/12	Emailed, met at Tully leagues club 2 November 2012
DRAFT_BIODIVERSITY_120917	Paul Johnston, Adrian Crema, Caleb Mathews – BMP reference group	25/09/12	Emailed, met at Tully leagues club 2 November 2012
DRAFT_CHEMICALS_120822	Paul Johnston, Adrian Crema, Caleb Mathews – BMP reference group	25/09/12	Emailed, met at Tully leagues club 2 November 2012
DRAFT_FERTILISER_120829	Gavin Eilers, Gavin Devaney, Marc Darveniza – BMP reference group	25/09/12	Emailed, met at farm 24 October 2012
DRAFT_FUEL_120625	Gavin Eilers, Gavin Devaney, Marc Darveniza – BMP reference group	25/09/12	Emailed, met at farm 24 October 2012
DRAFT_WATER_120912	Gavin Eilers, Gavin Devaney, Marc Darveniza – BMP reference group	25/09/12	Emailed, met at farm 24 October 2012
DRAFT_WATER_120912	Jeremy Bright, Mark Hickey, and Peter Newley, NSW DPI David Peasley – private Horticultural consultant	25/09/12	Emailed
DRAFT_FERTILISER_120829	Jeremy Bright, Mark Hickey, and Peter Newley, NSW DPI David Peasley – private Horticultural consultant	25/09/12	Emailed

DRAFT_CHEMICALS_120822	Jeremy Bright, Mark Hickey, and Peter Newley, NSW DPI David Peasley – private Horticultural consultant	25/09/12	Emailed, Jeremy returned 25/09/12, Peter returned 15/10/12
DRAFT_LAND & SOIL 120912	Jeremy Bright, Mark Hickey, and Peter Newley, NSW DPI David Peasley – private Horticultural consultant	25/09/12	Emailed
DRAFT_WATER_120912	Peter Molenaar, Michael Nixon and Stephen Spear – BMP referernce group	25/09/12	Emailed, Mal Nixon emailed general response for modules 02/09/12, Stephen spear 10/10/12, Peter Molenaar 11/10/12
DRAFT_FERTILISER_120829	Peter Molenaar, Michael Nixon and Stephen Spear – BMP referernce group	25/09/12	Emailed, Mal Nixon emailed general response for modules 02/09/12, Stephen spear 10/10/12, Peter Molenaar 11/10/12
DRAFT_CHEMICALS_120822	Peter Molenaar, Michael Nixon and Stephen Spear – BMP referernce group	25/09/12	Emailed, Mal Nixon emailed general response for modules 02/09/12, Stephen spear 10/10/12, Peter Molenaar 11/10/12
DRAFT_LAND & SOIL 120912	Peter Molenaar, Michael Nixon and Stephen Spear – BMP referernce group	25/09/12	Emailed, Mal Nixon emailed general response for modules 02/09/12, Stephen spear 10/10/12, Peter Molenaar 11/10/12
DRAFT_CHEMICALS_120822	Richard Piper – private Entomologist consultant	25/09/12	Emailed
DRAFT_CHEMICALS_120822 portion relating to spray drift and buffers	Kerry McDonald -Tableland Air Services	25/09/12	Emailed, emailed responses by 12/10/12 & 23/10/12
DRAFT_CHEMICALS_120822	Liam Riedy – agronomist Total Grower Services	3/10/12	Emailed
DRAFT_FERTILISER_120829	Liam Riedy – agronomist Total Grower Services	03/10/12	Emailed
DRAFT_CHEMICALS_120822	John Bletsis – agronomist Soils First	04/10/12	Emailed
DRAFT_FERTILISER_120829	John Bletsis – agronomist Soils First	04/10/12	Emailed
DRAFT_AIR_120824	Peter Molenaar, Michael Nixon and Stephen Spear – BMP referernce group	24/10/12	Emailed, Michael responded by email 25/10/12
DRAFT_BIODIVERSITY_120917	Peter Molenaar, Michael Nixon and Stephen Spear – BMP referernce group	24/10/12	Emailed, Michael responded by email 25/10/12
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DRAFT_FUEL_120625	Peter Molenaar, Michael Nixon and Stephen Spear – BMP referernce group	24/10/12	Emailed, Michael responded by email 25/10/12
DRAFT_WASTE_120523	Peter Molenaar, Michael Nixon and Stephen Spear – BMP referernce group	24/10/12	Emailed, Michael responded by email 25/10/12
DRAFT_CHEMICAL_121022	Tony Pattison – Nematologist/Soil Health DAFFQ	29/10/12	Emailed
DRAFT_LAND & SOIL_121022	Tony Pattison – Nematologist/Soil Health DAFFQ	29/10/12	Emailed
Aerial section from chemicals	All aerial operators Peak Aviation, Liddles, Blanches, ShadAv, Helispray	6/11/12	Emailed, only Liddles responded
Full BMP document	Jay Anderson – R&D Manager ABGC David Peasley – private Horticultural consultant John Bagshaw, former DAFFQ extension officer Mark Hickey – NSW DPI Jeremy Bright – NSW DPI Peter Newley – NSW DPI Angela Steain – Freshcare Neil Sing – Terrain NRM Carla Wegscheidl – DAFFQ *Reef*ocus extension program co-ordinator Liam Riedy – private agronomist Total Grower Services John Bletsis – private agronomist Soils First	4/12/12	Emailed, and follow up reminder email in early February 2013. Responses from Richard Piper, Jeff Daniels, David Astridge, David Peasley, Carla Wedscheidl, Lynton Vawdrey

	Richard Piper – private entomologist Scientific Advisory Services Dave Doolan – GF Rural agronomist DAFFQ employees: Tony Pattison, David Astridge, Jeff Daniells, Lynton Vawdrey, Tegan Kukulies, Neil Wiltshire, Sebastian Recabarren, Stewart Lindsay, Allan Blair Dave Doolan		
Self assessment checklist	Marc Darveniza, Gavin Eilers, Gavin Devany & Brett Gaia – BMP reference group	22/2/13	Met at Darveniza's farm
Self assessment checklist	Stephen Spears, Peter Molenaar, Michael Nixon – BMP reference group	27/02/13	Met at South Johnstone

Web Design Brief

Banana
BMP Guideline

Banana BMP Guidelines - Web Design Requirements

The Australian banana industry requires the development of an online resource tool. The resource will be used to deliver the Banana Best Management Practices (BMP) guideline to banana producers across Australia. The BMP resource will be housed on the Australian Banana Growers Council (ABGC) website that is currently being upgraded and will operate within a Word Press system www.abgc.org.au .

Growers will access the BMP by clicking on a large "icon" that appears on the home page as well as having the option to select it from a drop down list. Once in the Banana BMP there will be 4 main sections: Introduction, Checklist & Report Card, Management Plan and Resource Section. The Introduction page will provide an overview of the suggested way to use the BMP tool, explaining that it is essentially a 3 step process, however all areas should be available in any order.

Introduction page
• Static information – text and images • Facility for embedded video • Project and Industry logos • Access to the 3 main areas: checklist/scorecard, management plan, resource material • Links to grower case studies and other grower videos, housed on the ABGC main web page, from this page • A "print all" function with a prompt asking "*are you sure you want to print all?"* • Disclaimer
Checklist & report card
• User required to select production region to determine which checklist they complete – tropics, sub tropics east coast, sub tropics west coast • User required to enter production size to assist with reporting • Requires banana growers to assess their practices against a pre set list of questions • One answer per question

- A segmented bar displayed at the top of the page to indicate progress through the questionnaire
- Require a 'not applicable' option when the question is not relevant to the grower
- Answers to fall into one of three categories either A, B, C or Above Acceptable, Acceptable, Below Acceptable. Category names yet to be determined
- Require ability to validate responses before moving on ie, all questions answered
- Ability to commence answering questions and retrieve data should the user be called away, or should they want to review and update responses
- Information separated into modules and sub modules for ease of use, user to choose which modules to complete and in what order
- Ability to identify which checklist modules and sub modules have been completed
- Automatic prompt to grower every 12 months to complete modules again
- Print and save to PDF functions required for checklist
- Project and Industry logos

- REPORT CARD
    - summary of all questions answered so far, to be accessible at any stage of the checklist process so growers can monitor performance during not just upon completion
    - graphical representation of 3 main answer categories, possibly pie or bar chart
    - "not applicable" answers not included
    - report card needs to be divided into module and sub module
    - ability to identify which question the score relates to
- User average and industry average to be represented for each module
- Print and save to PDF functions required for scorecard
- Project and Industry logos

Management Plan

- Form template to include headings such as module/sub module, priority rating, item for improvement, action required, person responsible, target completion date, completed
- Consist of automatically generated data input and manual data input
- Answers falling into the "C" or "Below Acceptable" categories automatically populate the "items for improvement" part of the management plan and their association module and sub module classification also populated
- Manual data input function also required in "items for improvement" and all other columns
- Completed items have the option of removing from management plan and adding to a completed items list. Data not to be lost however simply moved to a new area, eg, bottom of the management plan list in greyed out box, allowing user to monitor project progress over time
- The "module" column in the management plan is a direct link to the relevant information in the resource section, accessible by simply clicking

- Print and save to PDF functions required for management plan
- Project and Industry logos

Resource section

- Static information, photos and links to web content
- Information divided into modules and sub modules, this index structure to be placed at start so user can click on area of interest and be directed to it
- Need to be print friendly for users who would rather hard copy over online. Print layout and web content to be consistent across project – layout, colours, fonts
- Some information will be relevant to a particular production region, this will appear in colour coded boxes below generic information
- Project and Industry logos

General

- **WordPress –** The content management system that the new ABGC website will use is WordPress

- **Supporting links -** Potentially not all links in the resource section will be available online. Therefore need an area housing scanned copies so the user can still access them if they click on the link

- **Download speed –** Internet connection speed may be slower in regional areas depending on individual circumstances. This needs to be considered throughout the design phase of this BMP tool

- **Reporting requirements -** Ability for administrator to print reports. ABGC to determine final reporting requirements however examples include:
  - Downloadable as a PDF to save and print, or an excel file to create a spreadsheet
  - Ability to present information as data or graphs (pie, bar, column & line)
  - ability to search a number of time points for comparison of trends/shifts in practices over time
  - ability to refine search down to single modules
  - ability to refine search to a single question
  - information to be presented as number of growers, percentage of growers and production area
  - information listed above available as a whole and region
  - potential future requirement to share report responses with users

- **References –** The Banana BMP will follow the module and sub module structure of Freshcare's Environmental Code. More information about the Freshcare Environmental Code is available at www.freshcare.com.au

- **Timeline** – It is anticipated that the web content development will begin by August and be completed by October 2012

- **Quotation requirements –** Please include break down of timeline against

activities, systems to support required functions, project costs and progress payments. If illustrations assist please also include.
- Please email to naomi.king@deedi.qld.gov.au

- **Closing Date – Please submit all quotations by Friday 25 May 2012**

- **Contact –** For more information or to submit a quotation, please contact:

Naomi King
Development Horticulturalist
Department of Agriculture, Fisheries and Forestry (QLD)
Email: naomi.king@deedi.qld.gov.au
Phone: (07) 4064 1152
Mobile: 0459 846 053

More Information

Agrilink: Topical banana information kit and Subtropical banana information kit
(Department of Agriculture Fisheries and Forestry, Queensland)
Pathway – www.daff.qld.gov.au > plants > fruit and vegetables > fruit and nuts > bananas > eResearch Archive > new search > and search 'banana agrilink'

Land and Soil

Banana related soil resources
www.dpi.nsw.gov.au/agriculture/horticulture/tropical
(New South Wales Department of Primary Industries)
Pathway – www.dpi.nsw.gov > agriculture NSW > horticulture > tropical fruit

Banana root and soil health user's manual
www.daff.qld.gov.au/4789_18453.htm
(Department of Agriculture Fisheries and Forestry, Queensland)
Pathway – www.daff.qld.gov.au > plants > fruit and vegetables > fruit and nuts > bananas

Case study: Bananas - Nurturing the soil and neighbouring wetlands on a banana farm in the wet tropics
wetlandinfo.derm.qld.gov.au/resources/static/pdf/farming_case_studies/2011-11-09_case-study-bananas_final.pdf
(Queensland Government)
Pathway – wetlandinfo.derm.qld.gov.au and search 'case study banana'

Factsheets and general information relating to land degradation and management options
www.nrm.qld.gov.au/land/management/land_degradation.html
(Department of Natural Resources and Mines)
Pathway – www.nrm.qld.gov.au > land management > land degradation

Permit for glyphosate use in the banana industry
permits.apvma.gov.au/PER11733.PDF
(Australian Pesticides and Veterinary Medicines Authority)
Pathway – www.apvma.gov.au > permit search > permit number 11733

Soil and water best management practices for NSW banana growers
www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/242359/soil-and-water-best-management-practices-for-nsw-banana-growers.pdf
(New South Wales Department of Primary Industries)
Pathway – www.dpi.nsw.gov.au > agriculture NSW > horticulture > tropical fruit

Stream bank planting guidelines
www.nrm.qld.gov.au/factsheets/pdf/river/r31.pdf
(Department of Natural Resources and Mines)
Pathway –www.nrm.qld.gov.au > resource centre > factsheets > river fact sheet series

Tillage implements, their benefits and potential impacts
www.dpi.nsw.gov.au/agriculture/resources/soils/structure/cultivation

(New South Wales Department of Primary Industries)
Pathway – www.dpi.nsw.gov.au > agriculture > natural resource management > soil health and fertility > soil types > structure and condition > how cultivation affects soil

Wetland management handbook: Farm management systems (FMS) guidelines for managing wetlands in intensive agriculture
wetlandinfo.derm.qld.gov.au/resources/static/pdf/fms/fms_025_handbook_web.pdf
(Queensland Government)
Pathway – wetlandinfo.derm.qld.gov.au > science and research > programme reports

Pesticides
Aerial spraying
www.aerialag.com.au
(Aerial Agricultural Association of Australia Limited)

Chemical use training and accreditation
www.chemcert.org.au
(Chemcert®)

Chemical use training and accreditation
www.smarttrain-publications.com
(SMARTtrain)

Collection of unwanted chemical or out-of-date chemical
www.chemclear.com.au
(ChemClear®)

Collection of empty chemical containers
www.drummuster.com.au
(DrumMUSTER®)

Design and plant selection for buffer zones to reduce spray drift
www.dpi.vic.gov.au/agriculture/farming-management/chemical-use/agricultural-chemical-use/spraying-spray-drift-and-off-target-damage/ag0860-using-buffer-zones-and-vegetative-barriers-to-reduce-spray-drift
(Department of Primary Industries, Victoria)
Pathway – www.dpi.vic.gov.au > agriculture > farming and management > chemical use > agricultural chemical use > spraying, spray drift and off target damage > using buffer zones and vegetative barriers to reduce spray drift

Integrated Pest and Disease Management
Agricultural chemical users' manual: Guidelines and principles for responsible agricultural chemical use
www.daff.qld.gov.au/documents/Biosecurity_AgVetChemicalsAndResidues/AgChem-UsersManual.pdf
(Department of Agriculture Fisheries and Forestry, Queensland)
Pathway – www.daff.gov.au > biosecurity > agvet chemicals and residues

Banana disease risk assessment tool
abgc.org.au

(Australian Banana Growers Council)
Pathway – abgc.org.au > projects and resources > industry information

Banana Industry Biosecurity Plan and the Banana Farm Biosecurity Manual
www.planthealthaustralia.com.au/go/phau/biosecurity/banana
(Plant Health Australia)
Pathway - www.planthealthaustralia.com.au > biosecurity > banana

Banana pest and disease resources
www.dpi.nsw.gov.au/agriculture/horticulture/tropical
(New South Wales Department of Primary Industries)
Pathway – www.dpi.nsw.gov > agriculture NSW > horticulture > tropical fruit

Burrowing nematode management booklet (provides information on how to calculate a RDI)
abgc.org.au
(Australian Banana Growers Council)
Pathway – abgc.org.au > projects and resources > industry information

Chemical activity tables (groups) for fungicides, insecticides and herbicides to help develop chemical rotation programs
www.croplifeaustralia.org.au/default.asp?V_DOC_ID=1952
(Crop Life Australia)
Pathway – www.croplifeaustralia.org.au > resistance management

Design and plant selection for buffer zones to reduce spray drift
www.dpi.vic.gov.au/agriculture/farming-management/chemical-use/agricultural-chemical-use/spraying-spray-drift-and-off-target-damage/ag0860-using-buffer-zones-and-vegetative-barriers-to-reduce-spray-drift
(New South Wales Department of Primary Industries)
Pathway – www.dpi.vic.gov.au > agriculture > farming and management > chemical use > agricultural chemical use > spraying, spray drift and off target damage > using buffer zones and vegetative barriers to reduce spray drift

Factsheets about pests and diseases and production aspects of bananas
www.daff.qld.gov.au/26_16322.htm
(Department of Agriculture Fisheries and Forestry, Queensland)
Pathway – www.daff.qld.gov.au > plants > fruit and vegetables > fruit and nuts > bananas

Legislation about pesticide use,
Queensland – www.legislation.qld.gov.au
New South Wales – www.legislation.nsw.gov.au
Western Australia – www.legislation.wa.gov.au
Northern Territory – www.legislation.nt.gov.au
Search the databases under 'A' for Agriculture and Veterinary Chemicals

Material safety data sheets (MSDS)
www.apvam.gov.au
(Australian Pesticides and Veterinary Medicines Authority)

Permit for glyphosate use in the banana industry permits.apvma.gov.au/PER11733.PDF
(Australian Pesticides and Veterinary Medicines Authority)
Pathway – www.apvma.gov.au > permit search > permit number 11733

Pheromone baits for banana weevil borers
www.chemtica.com/site/?p=2764
(ChemTica)

Predatory insects commercially available in Australia, suppliers and toxicity of certain chemicals to predatory insects
www.goodbugs.org.au
(Association of Beneficial Arthropod Producers Incorporated)

Search engines for products registered and permitted in the banana industry
www.apvma.gov.au
(Australian Pesticides and Veterinary Medicines Authority)

Subtropical banana growers best practice guides:
Factsheet 1 – Pests and disease: Banana bunchy top virus
Factsheet 3 – Panama disease
Factsheet 8 – Banana weevil borer
Factsheet 9 – Soldier fly in subtropical bananas
Factsheet 10 – The banana aphid – The only carrier of banana bunchy top virus
Factsheet 11 – Nematodes in subtropical bananas
abgc.org.au/projects-resources/industry-info/subtropical-fact-sheets/
(Australian Banana Growers Council)
Pathway – abgc.org.au > projects and resources > industry information > subtropical fact sheets

Fertiliser & Soil Additives
Subtropical banana grower's best practice guides:
Factsheet 2 - Banana Nutrition - Part 1, The nutrient cycle
Factsheet 4 - Banana Nutrition - Part 2, Leaf analysis as a guide
abgc.org.au/projects-resources/industry-info/subtropical-fact-sheets/
(Australian Banana Growers Council)
Pathway – abgc.org.au > projects and resources > industry information > subtropical fact sheets

Water
Irrigation and water quality factsheets produced as part of the Water for Profit initiative
www.growcom.com.au/home/inner.asp?pageID=57
(Growcom)
Pathway – www.growcom.com.au > projects and case studies > water for profit > resources

Soil and water best management practices for NSW banana growers
www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/242359/soil-and-water-best-management-practices-for-nsw-banana-growers.pdf
(New South Wales Department of Primary Industries)

Pathway – www.dpi.nsw.gov.au > agriculture NSW > horticulture > tropical fruit

Subtropical banana growers best practice guides:
Factsheet 7 – Irrigating bananas in the subtropics, Part 1
abgc.org.au/projects-resources/industry-info/subtropical-fact-sheets/
(Australian Banana Growers Council)
Pathway – abgc.org.au > projects and resources > industry information > subtropical fact sheets

Biodiversity
Acts, policies and codes of practice relevant to each state
www.daff.gov.au/natural-resources/soils/ems/biodiversity
(Department of Agriculture Fisheries and Forestry)
Pathway – www.daff.gov.au > search 'ems biodiversity'

Banana disease risk assessment tool
abgc.org.au
(Australian Banana Growers Council)
Pathway – abgc.org.au > projects and resources > industry information

Banana Industry Biosecurity Plan and the Banana Farm Biosecurity Manual
www.planthealthaustralia.com.au/go/phau/biosecurity/banana
(Plant Health Australia)
Pathway - www.planthealthaustralia.com.au > biosecurity > banana

Case study: Bananas - Nurturing the soil and neighbouring wetlands on a banana farm in the wet tropics
wetlandinfo.derm.qld.gov.au/resources/static/pdf/farming_case_studies/2011-11-09_case-study-bananas_final.pdf
(Queensland Government)
Pathway – wetlandinfo.derm.qld.gov.au and search 'case study banana'

Conserving Australia's biodiversity
www.environment.gov.au/biodiversity//index.html
(Department of Sustainability, Environment, Water, Population and Communities)
Pathway – www.environment.gov.au > biodiversity

Flying foxes and control permits:
Queensland – www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes
New South Wales – www.environment.nsw.gov.au/animals/flyingfoxes.htm
Northern Territory – www.parksandwildlife.nt.gov.au
Western Australia – www.environment.wa.gov.au/management-and-protection/animals/living-with-wildlife
(State based environment and heritage departments)

Identification of regional priorities
www.environment.gov.au/cgi-bin/sprat/public/conservationadvice.pl
(Department of Sustainability, Environment, Water, Population and Communities)
Pathway – www.environment.gov.au > biodiversity > threatened species and ecological communities > conservation advices by NRM region

Identify regional priorities and potential on-farm projects

- Queensland – list of Queensland NRM groups www.regionalnrm.qld.gov.au
- wet tropics coast , Terrain www.terrain.org.au
- west of Mareeba, North Gulf Region www.northerngulf.com.au
- Lakeland and Cooktown areas, Cape York Natural Resource Management www.capeyorknrm.com.au
- Bundaberg, Burnett Mary Regional Group –www.bmrg.org.au
- Sunshine Coast and Caboolture, SEQ catchments –www.seqcatchments.com.au
- New South Wales
- Northern rivers catchment management authority www.northern.cma.nsw.gov.au
- Northern Territory
- NRM Board (Northern Territory) Inc – www.territorynrm.org.au
- Western Australia
- Rangelands NRM (northern and eastern WA) – www.rangelandswa.com.au

Native vegetation selections and projects
www.greeningaustralia.org.au
(Greening Australia)

Native vegetation selections and projects
www.landcareonline.com.au
(Landcare)

Subtropical banana growers best practice guides:
Factsheet 5 - Managing flying foxes in bananas
abgc.org.au/projects-resources/industry-info/subtropical-fact-sheets/
(Australian Banana Growers Council)
Pathway – abgc.org.au > projects and resources > industry information > subtropical fact sheets

Weeds and noxious weeds
www.weeds.org.au/noxious.htm
(Weeds Australia)

Weeds of national significance (WoNS)
www.weeds.org.au/WoNS
(Weeds Australia)

Waste

Collection of empty chemical containers
www.drummuster.com.au
(DrumMUSTER®)

Collection of unwanted chemical or out-of-date chemical
www.chemclear.com.au
(ChemClear®)

Energy

Carbon calculator for horticultural businesses
agbiz.daff.qld.gov.au/tools/business-farm-operations/HortCarbonInfo.XLS
(Queensland Government)
Pathway – agbiz.daff.qld.gov.au > business and finance > farm operation tools > carbon footprint tools

Carbon farming initiative
www.climatechange.gov.au/en/government/initiatives/carbon-farming-initiative.aspx
(Department of Climate Change and Energy Efficiency)
Pathway – www.climatechange.gov.au > carbon farming initiative

Carbon farming initiative
www.cleanenergyregulator.gov.au/Carbon-Farming-Initiative/Pages/default.aspx
(Clean Energy Regulator)
Pathway – www.cleanenergyregulator.au > carbon farming initiative

Save energy and alternative sources of energy
www.greenpower.gov.au
(Green Power)

Fuel
Australian Standard AS 1940 – 2004
www.saiglobal.com.au/store
(SAI Global)
Pathway – www.saiglobal.com.au > products and services > standards, legislation, codes and business information > standards and technical information services > search publications

National Code of Practice for the Storage and Handling of Dangerous Goods (NOHSC:2017 (2001))
www.safeworkaustralia.gov.au/sites/SWA/AboutSafeWorkAustralia/WhatWeDo/Publications/Pages/CP2001StorageAndHanding.aspx
(Safe Work Australia)
Pathway – www.safeworkaustralia.gov.au > about Safe Work Australia > publications and resources > use the search function

National Standard for Storage and Handling of Workplace Dangerous Goods (NOHSC:1015(2001))
www.safeworkaustralia.gov.au/AboutSafeWorkAustralia/WhatWeDo/Publications/Pages/NS200103StorageAndHandling.aspx
(Safe Work Australia)
Pathway – www.safeworkaustralia.gov.au > about Safe Work Australia > publications and resources > use the search function