Horticulture Innovation Australia

Final Report

Yellow Sigatoka Surveillance

Jim Pekin
Australian Banana Growers Council Inc

Project Number: BA09055

BA09055

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The purpose of this report is to describe the activities of the Yellow Sigatoka Liaison Officer, Mr Louis Lardi who monitored banana plantations in the northern pest quarantine zone for Yellow Sigatoka. Mr Lardi advised growers to take corrective actions when Yellow Sigatoka levels exceeded those specified in the Queensland Plant Protection Regulations. This project worked in closely with Biosecurity Queensland and has achieved a dramatic improvement in leaf disease control in the region.

This project has been funded by HAL using levies from the banana industry with matched funding from the Australian Government.

30th July 2012

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Yellow Sigatoka is a banana leaf disease which is present in all banana growing regions in Australia except Carnavon in Western Australia. Severe disease levels result in bunches which are smaller with fruit which ripen unevenly. Control of the disease is through de-leafing, whereby affected leaves are removed and laid on the ground to rot, and with fungicide applications. In Queensland there is legislation which requires Yellow Sigatoka to be kept to prescribed levels, however, enforcement of these levels has decreased as Biosecurity Queensland officers are being diverted to other areas.

In order to monitor leaf disease levels and encourage compliance with the legislation in banana plantations in far north Queensland, this project funded a Yellow Sigatoka Liaison Officer. The Yellow Sigatoka Liaison Officer visited all commercial plantations at least twice in each year and assisted growers to identify when de-leafing operations needed to be undertaken. Growers were given two opportunities to improve their farming practices before the Yellow Sigatoka Liaison Officer notified Biosecurity Queensland, the Sate body dealing with enforcement of plant health regulations.

Most growers complied voluntarily resulting in better leaf disease control for those growers. A minority of growers did not undertake de-leafing operations and Biosecurity Queensland were notified. Enforcement of these regulations by Biosecurity Queensland was crucial to the success of the project. After lobbying by Australian Banana Growers' Council and a visit by Hon. John McVeigh Agriculture Minister to far north Queensland in May 2012 there was a renewed level of enforcement by Biosecurity Queensland. All growers were made aware of this through media and education campaigns and there was an increase in the number of growers who were compliant with the regulations on the first visit by the Yellow Sigatoka Liaison Officer in subsequent visits.

The project has been so successful that another three year project has been developed to continue the role of the Yellow Sigatoka Liaison Officer. The project was well publicised with the Yellow Sigatoka Liaison Officer undertaking regular radio interviews and regular reports on the project appearing in 'Australian Bananas'.

Technical summary

Yellow Sigatoka is a banana leaf disease caused by the fungus *Mycosphaerella musicola* and is endemic in all banana growing regions in Australia except Carnavon in Western Australia. Severe disease levels result in bunches which are smaller with fruit which ripen unevenly. Control of the disease is through de-leafing, whereby affected leaves are removed and laid on the ground to rot, and with fungicide applications. In Queensland there is legislation which requires Yellow Sigatoka to be kept to prescribed levels, however, enforcement of these levels has decreased as Biosecurity Queensland officers are being diverted to other areas.

In order to monitor leaf disease levels and encourage compliance with the legislation in banana plantations in far north Queensland, this project funded a Yellow Sigatoka Liaison Officer. The Yellow Sigatoka Liaison Officer visited all commercial plantations at least twice in each year and advised growers to undertake de-leafing operations when leaf levels were above the prescribed level. The Yellow Sigatoka Liaison Officer followed a process whereby if the levels were above the prescribed level then a verbal instruction to undertake de-leafing operations was issued. Growers then had 7 days to comply, if they did not then the Yellow Sigatoka Liaison Officer would issue a written request to undertake de-leafing operations. If at the end of another 7 days the grower had not complied then Biosecurity Queensland were notified.

Most growers complied voluntarily with the regulations and for those growers disease control was superior to those who did not practice de-leafing. A minority of growers did not undertake de-leafing operations and Biosecurity Queensland were notified. Enforcement of these regulations by Biosecurity Queensland was crucial to the success of the project. After lobbying by Australian Banana Growers' Council and a visit by Hon. John McVeigh Agriculture Minister to far north Queensland in May 2012 there was a renewed level of enforcement by Biosecurity Queensland. All growers were made aware of this through media and education campaigns and there was an increase in the number of growers who were compliant with the regulations on the first visit by the Yellow Sigatoka Liaison Officer in subsequent rounds of visits.

The project has been so successful that another three year project has been developed to continue the role of the Yellow Sigatoka Liaison Officer. The project was well publicised with the Yellow Sigatoka Liaison Officer undertaking regular radio interviews and regular reports on the project appearing in 'Australian Bananas'.

Introduction

Yellow Sigatoka is an endemic pest of commercial bananas in all major production areas of Australia with the exception of Carnarvon Western Australia. The disease is a serious pest of bananas not only because of the increased cost of production that results from managing the disease but also because of the potential for high levels of the disease in commercial plantations to mask a potential outbreak of the exotic disease black Sigatoka. Whilst relevant plant health legislation in each state requires the disease to be kept to prescribed levels monitoring compliance with the legislation has become increasingly difficult as the various enforcement agencies have tended to focus their resources in other priority areas. This project aimed to provide a dedicated resource (the Yellow Sigatoka Liaison Officer) for the sole purpose of monitoring compliance with the relevant legislation with respect to the allowable level of Yellow Sigatoka in commercial plantations in north Queensland.

Yellow Sigatoka (or leaf spot) is caused by the fungus *Mycosphaerella musicola* and is an established, endemic disease in Queensland. When leaves are severely affected with the disease, the resulting bunches from affected plant are small with fruit which ripen early and unevenly (Grice *et al*. 2009). The field-ripe bunches harbour fruit fly and are unmarketable.

Yellow Sigatoka initially appears as light yellow or brown-green streaks which develop into brown to black elliptical spots up to 10mm long. The lesions on older leaves tend to be light grey with a dark brown or black border, often with a yellow halo (Grice *et al*. 2009). Spores of the fungus are produced in lesions and then are spread in wet windy weather. One of the types of spores produced by the fungus, ascospores, can be spread long distances by wind (Grice *et al.* 2009), this means that farms with high levels of disease provide high inoculum loads which can lead to disease outbreaks on nearby farms. Hence control of the disease is extremely important to areas where there are many banana plantations in close proximity as in far north Queensland. Control of the disease is through removal of inoculum by de-leafing and fungicide applications (Grice *et al.* 2009).

It is also crucial Yellow Sigatoka be kept under good control as the symptoms of the disease are very similar to the exotic disease Black Sigatoka, and uncontrolled Yellow Sigatoka outbreaks may mask an incursion of the devastating Black Sigatoka. Black Sigatoka is caused by the fungus *Mycosphaerella fijiensis*, the disease is far more destructive disease thank Yellow Sigatoka as it has a much more rapid disease cycle (Carlier *et al.* 2000).

The northern pest quarantine zone as prescribed by the Queensland Plant Protection Regulations 2002 is from Rollingstone in the south to Daintree and Tablelands in the north. The majority of bananas produced in Australia are from the region and production around the Innisfail and Tully areas is quite concentrated. Keeping Yellow Sigatoka and other leaf diseases under control is crucial to the ongoing viability of the Australian banana industry. The role of the Yellow Sigatoka Liaison Officer (YS Liaison Officer) was to regularly inspect plantations in the northern pest quarantine zone and inform grower when their leaf disease levels were above the prescribed levels, growers were given opportunity to become compliant with the regulations prior to the notification of Biosecurity Queensland.

Materials and Methods

Personnel and timeline

In February 2010 former banana grower Louis Lardi was appointed as the Yellow Sigatoka (YS) Liaison Officer. Mr Lardi has an excellent understanding of banana production and banana disease control, in particular leaf diseases. Mr Lardi is able to relate well to growers and has the diligent data collection skills required in the role.

On the 2nd February 2011 Cyclone Yasi made landfall near Mission Beach in North Queensland and devastated banana plantations in the Northern pest quarantine area. Activities on BA09055 were suspended and Mr Lardi was diverted to cyclone recovery activities. The Yellow Sigatoka Liaison Officer program was recommenced in February 2012.

Inspections and data collection

Each of the approximately 250 growers in the Northern pest quarantine area was to be visited at least twice in a year.

The Northern pest quarantine area was divided into:

- Kennedy Valley area including Ingham and Rollingstone
- Murray Upper area
- Mission Beach area
- Tully El Arish area
- Silkwood north to Innisfail area
- Innisfail north to Cairns area
- Tableland area
- Julatten to Daintree

The inspection process was as follows:

- The YS Liaison Officer phoned farms a few days ahead of when he knew he would be in the area to make an appointment
- On the appointed day the YS Liaison Officer would arrive at the farm gate, meet the grower, leave his vehicle at the farm gate and travel the plantation with the grower.
- The YS Liaison Officer and the grower would drive slowly through the plantation inspecting the plants for leaves which are showing more than 5% leaf area affected by Yellow Sigatoka or leaf speckle. An image of a leaf with 5% leaf area affected with Yellow Sigatoka is provided in Appendix 1.
- Where there was a leaf with more than 5% area affected by Yellow Sigatoka, the YS Liaison Officer verbally directed the grower to undertake de-leafing (removing the leaf from the banana plant and placing on the surface of the soil to rot) and a regular fungicide spray program. The grower had 7 days to comply with this direction before the YS Liaison Officer returned to inspect if de-leafing operations had been undertaken.
- If a grower did not comply with this direction then the YS Liaison Officer issued a letter shown in Appendix 2.
- If the grower did not comply then Biosecurity Queensland (BQ) were notified. BQ officers would visit the property, collect leaf samples and issue a written directive to the

grower. The grower had 7 days to comply with the directions of the BQ, if the grower did not comply then regulatory action would be taken and the grower would be liable for the cost of control (de-leafing).
- The YS Liaison Officer would be notified by BQ of the outcomes of the process.

Data collection:

In the first part of the project data were recorded onto a paper sheet (Appendix 3) and then manually entered into a database. In March 2012 a personal data assistant (PDA) was obtained and the YS Liaison Officer trained in its use. The use of the PDA enabled much quicker recording of data. Where a plantation was 'clean', the YS Liaison Officer was able to simply log his visit into the PDA at the farm gate at the completion of his visit, he was also able to log the number of hectares of banana grown by the grower. It was only if action was required that the YS Liaison Officer would have to record information manually onto paper forms. The use of the PDA has meant that data can be easily collected and downloaded and area maps easily generated.

When required the YS Liaison Officer provided growers with a copy of the Department of Agriculture, Fisheries and Forestry leaflet 'Banana Leaf Diseases' to assist growers with identifying and understanding leaf diseases. The leaflet also had images of symptoms of exotic pests and diseases and instructions for what to do if these are suspected to be present in a plantation.

Results

All known plantations were visited at least twice in the year some plantations were visited many more times depending on the levels of leaf disease and compliance.

Below is a summary of activities from the commencement of the project in February 2010 until project was halted due to the effects of cyclone Yasi in February 2011. The data were collected onto paper sheets and the data manually entered by BQ staff. This provided both ABGC and BQ with a database of banana growers in the northern pest quarantine zone. The map showing the areas visited in the first part of the project is provided in Appendix 4.

Between February 2010 and May 2010 the following was achieved:

- 274 properties visited by the YS Liaison Officer.
- Of these properties 69 properties required a revisit by the YS Liaison Officer.
- The YS Liaison Officer notified 7 property owners in writing regarding the seriousness of the disease on their property.
- Biosecurity Queensland issued a "Direction" on a banana farmer in support of the YS Liaison Officer's actions.
- Biosecurity Queensland issued a "Direction" on a banana farmer in the Daintree area in support of the plan due to the high level of disease.
- The YS Liaison Officer was authorised as an inspector with limited powers for the purposes of the "*Plant Protection Act 1989*".

Between June 2010 and August 2010 the following was achieved:

- 184 properties visited by the YS Liaison Officer from June to 12/8/10.
- Of the properties visited 43 required at least one re-revisit by the YS Liaison Officer.
- The majority of properties re-visited due to excess levels of leafspot were in the Innisfail district.
- Biosecurity Queensland issued two leafspot "Directions" to banana growers in the Ingham area, in support of the YS Liaison Officer's actions. These directions to control leafspot were completed by the growers.
- An interview was conducted with ABC radio to highlight disease issues in backyard bananas.
- Approximately 200 backyard banana plants were eradicated in the coastal production area.

Between August 2010 and November 2010 the following was achieved:

- 165 commercial banana plantations visited by the YS Liaison Officer from 13/8/10 to 26/11/10.
- Of the properties visited 70 required at least one re-revisit and 9 received written advice from the YS Liaison Officer.
- Biosecurity Queensland issued two leafspot "Directions" to commercial banana growers, in support of the YS Liaison Officer's actions. One direction was completed and the other plantation is going to be sprayed with herbicide to control volunteer plants.
- An interview was conducted with 4KZ radio to highlight disease issues in banana plantations.
- More than 200 backyard banana plants were eradicated in the coastal production area. Other backyard growers have been given information about controlling leafspot and will be subject to further inspections to ensure compliance.
- Despite the adverse wet weather conditions, the majority of banana growers seem to have leafspot levels under control. The YS Liaison officer has encouraged regular de-leafing and spraying. This message has been embraced by growers resulting in the low levels of leafspot.

Between November 2010 and January 2011 the following was achieved:

- 62 commercial banana plantations visited by the YS Liaison Officer from 27/11/10 to 19/01/12.
- Of the properties visited 27 required at least one re-revisit and 6 received written advice from the YS Liaison Officer. Biosecurity Queensland issued seven leafspot "Directions" to commercial banana growers, in support of the YS Liaison Officer's actions.

After the recommencement of the project in February 2012, the YS Liaison Officer used a PDA to collect data. The database for the collection of data was set-up based on the Digital cadastral database (DCDB) from the Queensland Department of Environment and Resource Management which provides the property boundaries and property descriptions for all parcels of land in Queensland.

Between February 2012 and 26th July 2012:

- 285 commercial banana plantations were visited by the YS Liaison Officer.
- Of those properties 61 required a revisit and 24 received written advice from the YS Liaison Officer.
- The map of the areas surveyed in this time is presented in Appendix 5.

There was some initial reluctance on the part of Biosecurity Queensland to follow though on written directives however through negotiations between Australian Banana Growers' Council and Biosecurity Queensland an agreement was reached whereby resources were secured to enable BQ to enforce the Yellow Sigatoka regulations. These negotiations were hastened by a visit to commercial banana operations at Innisfail, Silkwood and Tully on the 24th May 2012 by the Agriculture Minister John McVeigh and Natural Resources and Mines Minister Andrew Cripps. During that visit the YS Liaison Officer explained the impact of leaf diseases on banana production and the importance to the industry of controlling these diseases.

After the visit by the Ministers, and subsequent enforcement of orders by BQ, the number of revisits which have been needed to be undertaken have decreased. From March 2012 to May 2012, approximately 23% of growers required a revisit. In June 2012 it was 18% and in July 2012 16%.

On occasions leaf samples were collected and forwarded to Kathy Grice, Department of Agriculture, Fisheries and Forestry, Queensland (DAFFQ) examination and identification. No Black Sigatoka has been detected, some samples affected by an endemic rust were collected, a diagnosis made and a recommendation to the grower made.

Discussion

The success of this project is due in large part to having the right person in the role. Mr Lardi is an ex-banana grower and has an excellent understanding of banana production especially control of banana diseases. This meant that rather than simply verbally directing growers who were having trouble controlling the leaf diseases to undertake de-leafing operations, the YS Liaison Officer was able to demonstrate what levels of leaf disease were of concern and demonstrate how to best undertake de-leafing. The YS Liaison Officer was able to provide education to growers on what different stages of Yellow Sigatoka look like and encouraged understanding of the disease, for example, understanding the five different phases of the Yellow Sigatoka disease cycle. The YS Liaison Officer has also been able to explain to growers to correct rotation of fungicides used to control Yellow Sigatoka so the fungus causing Yellow Sigatoka does not become resistant to some of the 'at risk' fungicides. This interaction and all of the technology transfer activities have improved the general understanding of leaf diseases in the growing areas visited by Mr Lardi.

The inspections were undertaken by driving the banana plantation in the grower's own vehicle with the YS Liaison Officer accompanying the grower. This facilitated communication between the grower and the YS Liaison Officer and contributed to building a good relationship between

YS Liaison Officer and growers. This use of the growers' vehicles also served to prevent the possible transport of pathogens, weeds and pests by the YS Liaison Officer's vehicle.

After May 2012, the visible support of the project by the Queensland Government and BQ meant that more growers were compliant on their first visit by the YS Liaison Officer. This regulatory support has increased the effectiveness of the project as it sends a clear message to all growers and provides a means to deal with a few recalcitrant growers.

The data collected in the process of undertaking the inspections has provided an up-to-date database of banana farms in the northern pest quarantine zone. This data was used by ABGC and by the Queensland State government agencies in the response to Cyclone Yasi. The use of the personal data assistant (PDA) provided a very efficient data collection system, all data is entered into the PDA as the YS Liaison Officer leaves the farm he has just inspected negated the need for data to be manually entered at a later time.

Technology Transfer

A large part of the project was the provision of information to the banana industry. Regular radio interviews were undertaken with ABC and 4KZ as listed in project results. Articles were published in 'Australian Bananas' explaining the project, the significance of the project and better leaf disease control (Table 1).

Table 1. Articles in 'Australian Bananas' related to BA09055 and the date published.

Publication date	Publication	Article name
June 2010	Australian Bananas	Industry Steps up Biosecurity Support
June 2010	Australian Bananas	North Queensland biosecurity plans for yellow Sigatoka and leaf speckle
December 2010	Australian Bananas	Growers meet leaf spot challenge
April 2011	Australian Bananas	Banana spray oil improves fungicide activity
August 2011	Australian Bananas	Leaf Spot Management
July 2012	Australian Bananas	Win for growers with action on Yellow Sigatoka

The visit by the Ministers on the 24th May generated a great deal of awareness of the program. There were press releases from ABGC and the Queensland Government coverage in local media including on ABC Rural and ABC North Queensland.

Recommendations

Support for the YS Liaison Officer role should continue and a proposal for a project to support the role has been approved by HAL with the contract due to do be signed 1st August. In addition to surveillance, the YS Liaison Officer will begin to engage growers on best practice for biosecurity in an effort to lift awareness and adoption of good on farm practices.

Acknowledgements

Some sections of this report are taken from milestone reports written by Jenny Margetts (formerly P2P Business Solutions) and Jonathan Eccles (formerly CEO of ABGC). Russell Gilmore, Rebecca Sapuppo, Aaron Russell and Aurea King from Biosecurity Queensland provided assistance with collation and summaries of data for data from the first part of the project.

Kathy Grice is thanked for diagnostic support.

Barry Sullivan, Bunchy Top Inspector, ABGC is acknowledged for excellent assistance with data management and for building the maps. Rhyll Cronin, Communications Manager and Carly Civelle, Office Manager, ABGC are thanked for support with project activities.

We would also like to thank the banana growers of the northern pest quarantine zone, especially those who practice good leaf spot control measures.

References

Grice K, Henderson J, Pattison T, Vawdry L and Young A (2009) Banana *In* Cook T, Persley D and House S (*Eds)* Diseases of Fruit Crops in Australia. CSIRO Publishing, Collingwood.

Carlier J, Fouré E, Gauhl F, Jones DR, Lepoivre P, Mourichon X, Pasberg-Gauhl C and Romero RA (2000) Black Leaf Streak *In* Jones DR (*Ed*) Diseases of Banana, Abacá and Enset. CABI Publishing, Wallingford.

Appendix 1

Figure 1. Image of a leaf showing 5% leaf area affected by Yellow Sigatoka.

Appendix 2

Excessive leaf spot level letter given to growers who fail to comply with verbal direction

Date: _____

To: _____

Dear _____

EXCESSIVE BANANA LEAFSPOT LEVELS

Banana yellow Sigatoka and/or speckle disease above the 5% regulatory (*Plant Protection Regulation 2002, Section 34*) limit has been detected on your banana plantation located at

_____.

On _____ I conducted an inspection at your banana plantation and advised that the banana leafspot levels were above the 5% limit. I re-inspected your banana plantation on _____ and banana leafspot levels are still not controlled to below the 5% per leaf limit.

I wish to advise that if action is not taken to control the disease by _____ I am obliged to contact Biosecurity Queensland who will issue you with legally binding directions to control the banana leafspot.

Failure to comply with these directions without a reasonable excuse is an offence against the *Plant Protection Act 1989 Section 11 (7)*. A maximum penalty of $200,000 may be imposed. In addition contractors may be employed under *Section 16* at the owner's expense to control the disease in order to prevent spread to other properties.

A business currently accredited under an Interstate Certification Assurance (ICA) Arrangement for *Hard Green Condition of Bananas* [ICA06] cannot harvest bunches from block subject to a Leafspot Direction for certification under the arrangement.

Please contact Australian Banana Growers Council CEO on (07) 3278 4786 if you feel aggrieved by this process or Rosalie Anderson A/Principal Biosecurity Officer on (07) 4064 1197 if you would like to discuss the banana leafspot regulations.

If you require assistance to control the leafspot on your plantation, a list of contacts for banana contractors is supplied on the attached sheet.

Yours sincerely

Louis Lardi
Yellow Sigatoka Liaison Officer
Australian Banana Growers Council Inc

_____
Grower

CC: Rosalie Anderson, A/Principal Biosecurity Officer, Biosecurity Queensland, South Johnstone.

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Web: www.abgc.org.au

Appendix 3

Data sheet used by the Yellow Sigatoka Liaison Officer in the first part of the project

YELLOW SIGATOKA / SPECKLE MONITORING SITE VISIT FORM

LIAISON OFFICER	VISIT DATE / /	Visit -Code – Site Number
Lou Lardi		1213 - 10

TYPE Commercial ☐ Residential ☐ Feral ☐

ID Number | ABGC Number ☐ Plantation ID ☐ IP Number ☐

CONTACT PERSON | PHONE

Owner Notification required ☐

LOCATION
Address

PROPERTY COMMENTS

GPS at entry to site – Property Address

Latitude (Decimal degrees)	Longitude (Decimal Degrees)	WP No.
- .	.	

FIRST VISIT DATE / /

LEAF SPOT PRESENT ☐ VERBAL ADVICE GIVEN ☐

GPS at non conforming site Block/Paddock REGROWTH ADVICE GIVEN ☐

Latitude (Decimal degrees)	Longitude (Decimal Degrees)	WP No.
- .	.	

SECOND VISIT 7 days later DATE / /

LEAF SPOT PRESENT ☐ WRITTEN ADVICE GIVEN ☐ DATE / /

REGROWTH ☐ BQ NOTIFIED ☐ DATE / /

THIRD VISIT 7 days later DATE / /

LEAF SPOT PRESENT ☐ BQ ADVISED ☐ DATE / /

BIOSECURITY TO ACTION

BIOSECURITY INSPECTOR | Date notified by Liaison Officer / /

DRX ISSUED ☐ DATE / /

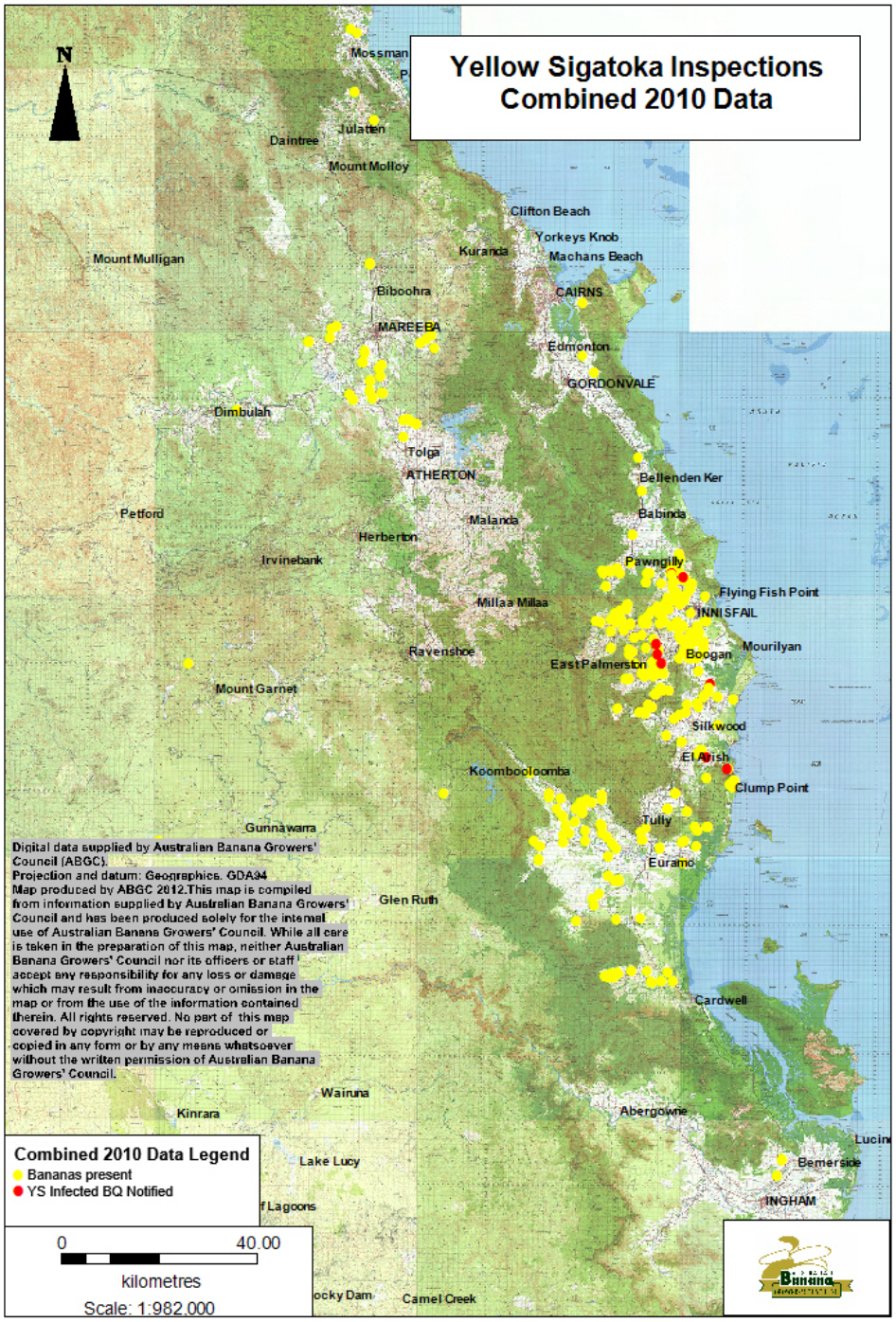
DRX LIFTED ☐ DATE / /

SECTION 16 CONTRACTORS USED ☐ DATE / /

LIAISON OFFICER ADVISED OUTCOME ☐ DATE / /

Appendix 4

Yellow Sigatoka Inspections from February 2010 until February 2011. Yellow dots indicate bananas inspected, red dots indicate regulatory actions by Biosecurity Queensland.



Appendix 5

Yellow Sigatoka Inspections from March 2012 until July 2012. Yellow dots indicate bananas inspected, red dots indicate leaf levels of Yellow Sigatoka above prescribed level.