Australian Government

Biosecurity Australia

Revised Draft Import Risk Analysis Report for the Importation of Cavendish Bananas from the Philippines

Part A

February 2007

Cite this report as:

Biosecurity Australia (2007) Revised Draft Import Risk Analysis Report for the Importation of Cavendish Bananas from the Philippines, Part A. Biosecurity Australia, Canberra.

Postal address:
Biosecurity Australia
GPO Box 858
CANBERRA ACT 2601

Internet: www.biosecurityaustralia.gov.au

Cover image: Emerging banana bunch showing bracts, flowers and fingers (Photo: D Peasley)

Please note this is a draft document for comment only.

It has been issued to give all interested parties an opportunity to comment and draw attention to any scientific, technical, or other gaps in the data, misinterpretations and errors. Any comments should be submitted to Biosecurity Australia within the comment period allowed (usually 60 days). The draft will then be revised to take account of the comments received. The Eminent Scientists Group will review a draft final document to ensure comments have been addressed properly and a final report will be released at a later date.

Comments on the revised draft IRA report should be submitted to:

Branch Support
Plant Biosecurity
Biosecurity Australia
GPO Box 858
CANBERRA ACT 2601

Telephone: (02) 6272 5094
Facsimile: (02) 6272 3307
Email: plantbiosec@daff.gov.au

Biosecurity Australia will post on its website (www.biosecurityaustralia.gov.au) a corrigendum of corrections that may be required that come to its attention during the consultation period.

Foreword

This draft import risk analysis report is in three parts:

- Part A contains a summary of the import risk analysis (IRA).
- Part B contains background material, an explanation of the method used in the IRA, hazard identification, detailed risk assessments and proposed risk management measures.
- Part C contains technical details on the full range of pests[1] considered.

This document is Part A

It contains a brief background on risk analysis, a summary of the method used and the results and conclusions of the analysis. Part A is intended to assist stakeholders' understanding, but it does not contain the full details of the analysis and should not be relied on as such.

[1] The term 'pest' used throughout this report is the collective term used for insect pests, plant diseases, viruses, bacteria and fungi that could harm plants. The formal definition used is the one provided in the International Plant Protection Convention (IPPC): 'any species, strain, or biotype of plant, animal or pathogenic agent injurious to plants or plant products' (FAO 2006).

Contents

1 Overview

Biosecurity Australia and a specialist import risk analysis team have prepared a revised draft import risk analysis report assessing an application to import Cavendish bananas from the Philippines to Australia.

This revised draft import risk analysis (IRA) report assesses the quarantine risks to Australia and proposes risk management options to reduce the risks to a very low level, consistent with Australia's appropriate level of protection (ALOP).

This revised draft import risk analysis report proposes permitting the importation of mature hard green bananas to Australia from the Philippines subject to stringent risk management measures.

Seven pests have been identified that pose a quarantine risk that exceeds Australia's ALOP and therefore require risk management measures. The seven pests are Moko, black Sigatoka, freckle, armoured scales, mealybugs, spider mites and banana rust thrips.

Mandatory pre-clearance arrangements will be required, with Australian Quarantine and Inspection Service (AQIS) officers involved in all risk management measures in the Philippines, and auditing of the systems and processes used by the Philippines to certify exports.

Specific risk management is required for Moko, black Sigatoka and freckle based on a systems approach comprising a combination of measures for each disease. The operational effectiveness of specific measures will need to be verified by commercial trials before exports begin.

Any plantations/blocks that do not achieve mandatory levels of low pest prevalence for each disease or fail to implement other approved measures to the required standard will be immediately suspended from export to Australia.

The mandatory measures for each plantation/block and for stages of the export pathway are discussed in Sections 20.2 and 20.3 of Part B and include:

- registration of all plantations/blocks and packing stations
- approved documentation systems in packing stations
- AQIS audits of entire production cycle
- AQIS field audits
- application of standard commercial practices, including:
  - maintenance of disease control programs for quarantine pests (for example, fungicidal spray programs and the maintenance of spray diaries)
  - freedom from trash
  - labelling of lots
  - prevention of contamination
  - inspection
  - disinfestation.

Additional approved measures for specific pests include:

Moko

- Weekly plantation/block inspections to verify areas of low pest prevalence, not to exceed 0.06 cases per hectare per year.
- Inspection of pseudostems and peduncles for vascular discolouration at harvest, and further inspection of peduncles at the packing station. All bunches showing vascular discolouration must be removed from further processing.
- Post-harvest disinfection treatment (chlorine) at the packing station to prevent contamination of clusters in flotation tanks.

Black Sigatoka

- Weekly plantation/block inspections to verify areas of low pest prevalence with visible symptoms not to exceed one per cent of leaf area with either stage 1 or stage 2 lesions.
- Trash minimisation procedures in plantations.
- Disinfection treatment (for example, approved fungicide) at packing stations to prevent contamination of clusters in flotation tanks.

Freckle

- Weekly plantation/block inspections to verify areas of low pest prevalence.
- Spray bunches with fungicide according to an approved schedule.

Arthropod pests – armoured scales, mealybugs, spider mites and banana rust thrips

- Specific risk management for all arthropod pests (armoured scales, mealybugs, spider mites and banana rust thrips) is required, comprising inspection, followed by corrective action (treatment or withdrawal of the lot) if any pests are detected.

Part B of the revised draft IRA report contains full details of the analysis and the conclusions.

2 The import risk analysis process

2.1 The process

The objective of Australia's biosecurity policies is to protect the nation from the risks of exotic pests entering, establishing and spreading, thereby threatening Australia's unique flora and fauna, and agricultural industries that are free from many serious pests.

The import risk analysis (IRA) process is an important part of Australia's biosecurity policies. It enables the Australian Government to consider formally the risks that could be associated with proposals to import new products. If the risks are found to exceed Australia's appropriate level of protection (ALOP), risk management measures are proposed to reduce the risks to an acceptable level. However, if it is not possible to reduce the risks to an acceptable level, trade will not be allowed.

Successive Australian Governments have maintained a conservative, but not a zero-risk, approach to the management of biosecurity risks. This approach is expressed in terms of Australia's ALOP. It reflects community expectations through government policy and is described as providing a high level of protection aimed at reducing risk to a very low level, but not to zero. This definition of ALOP, and its illustration by way of a risk estimation matrix, is shown in Table 4.1. The State and Territory governments agreed in 2002 that Australia's needs are met by this definition of the ALOP.

Biosecurity Australia undertakes Australia's import risk analyses, using teams of technical and scientific experts in relevant fields, and consulting stakeholders at various stages of the process. Biosecurity Australia's recommendations are provided to the Director of Animal and Plant Quarantine, who is the Secretary of the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) and responsible for making the formal decision on whether trade will occur, and under what conditions. The Australian Quarantine and Inspection Service (AQIS) is responsible for implementing the import protocol, including any risk management measures.

Full details of the processes used by BA are given in Part B of this report and the *Import Risk Analysis Handbook* (BA 2003), available at its website www.biosecurityaustralia.gov.au.

2.2 The IRA team

An import risk analysis team (IRA team), formerly referred to as a risk analysis panel, was established to assist Biosecurity Australia in preparing this revised draft IRA report. The IRA team included members with expertise in different areas, including quarantine risk analysis, plant pests and diseases, and the banana industry.

Under the terms of reference, the IRA team was required to consider scientific and other relevant information to identify quarantine pests that could be on the pathway associated with the importation of mature, hard green banana fruit from the Philippines. In particular, it was to assess the potential for these pests to enter, establish and spread in Australia and have direct and indirect consequences. The IRA team was also required to consider and recommend risk management measures for the identified quarantine risks that it considered necessary to meet Australia's appropriate level of protection and to report to the Chief Executive of Biosecurity Australia.

During the analysis, many complex issues were considered where empirical data were not available and the IRA team was required to exercise expert judgement. To help with this process, the IRA team worked on various occasions with external experts. On other occasions, particular parameters in the analysis were allocated a range of values that took account of the members' differing views.

3 Scope

This revised draft import risk analysis report focuses on the importation from the Philippines of mature hard green banana fruit of four Cavendish varieties, Extra Dwarf, Giant Cavendish, Grand Nain and Williams (referred to as mature hard green bananas in this revised draft report) produced in specified areas of the Philippines. The specified areas are Davao (Davao del Sur, Davao del Norte and Davao Oriental), Cotabato (South Cotabato, North Cotabato and Sarangani) and Bukidnon, on the island of Mindanao.

This revised draft report has been prepared for stakeholder comment as part of the IRA process set out in the *Import Risk Analysis Handbook* (2003). The report contains details of the quarantine pests associated with Philippine bananas. It also includes recommendations on risk management measures to manage any pests for which the risk has been assessed as being higher than is acceptable for Australia. In preparing the draft report, all stakeholder comments on the previous drafts issued in June 2002 and February 2004, and the Addendum in June 2004 were taken into account. Recommendations in the reports of the Senate Committee on Rural and Regional Affairs and Transport (Commonwealth of Australia 2005) were also considered.

4 Import risk analysis — an overview

An IRA for plants or plant products has three key stages:

- **pest categorisation** (identifying pests that may be associated with the commodity in question)
- **risk assessment** (assessing the likelihood that the identified pests will enter, establish and spread, as well as the types and likely magnitude of consequences)
- **risk management** (assessing the measures that can be used to mitigate the assessed risks, if possible).

What is risk?

There are many concepts and definitions of risk and what constitutes risk. However, in an IRA, risk is considered to have two major components:

- the likelihood of a pest entering, establishing and spreading in Australia from imports
- the consequences or impact this may have.

The two components are combined to give an overall estimate of the risk.

4.1 Pest categorisation

Pest categorisation is the initial stage in the IRA process, and identifies pests that require a risk assessment. In this draft report, it identifies pests that:

- are known to be associated with Cavendish bananas in the Philippines
- are absent from Australia, or whose presence in Australia is uncertain, or which are present but are limited in distribution and under official control
- have the potential for being on the pathway (see 4.2.1)
- have the potential for entry, establishment and spread
- have the potential for unfavourable consequences.

4.2 Risk assessment

Risk assessment, the second stage, evaluates the risks associated with the plant or plant product. This process assesses the likelihood that the importation of bananas from the Philippines for an average year will result in the entry, establishment and spread of each pest. The reference to ‘average’ indicates that the likelihood estimate is based on an average or representative single year of trade. However, it does not mean the quarantine protection applies only to one year. The methodology is based on Australia’s policy for on-going quarantine protection. It combines this likelihood with an assessment of the magnitude of the potential consequences to provide an assessment of risk.

In this analysis, the risk of pathogens was assessed with the assistance of a risk simulation model. The risk of arthropod pests was assessed qualitatively, in line with existing policy.

4.2.1 Entry, establishment and spread

Pathways for pests

The entry, establishment and spread of a new pest in Australia resulting from trade in bananas require an unbroken chain of events from the exporting country to suitable host plants in Australia. Typically, this requires that:

- the pest is present in the plantation
- it remains on, or in, the banana fruit at harvest
- it survives packing, storage and transport to Australia
- it is not detected when subjected to on-arrival border procedures
- it survives distribution within Australia on, or in, the fruit and the waste that is subsequently generated
- the waste is disposed of close to suitable host plants, resulting in their exposure to the pest
- infestation or infection of a host plant by the pest occurs
- the pest population becomes self-perpetuating.

Importation steps

The initial part of the analysis mainly considers the steps on the pathway in the exporting country. The first step is in the plantation where the bananas are growing. In some cases, pests may be completely absent from some plantations and bananas from these plantations will initially, and may continue to, be free of the pests.

The next step considers the likelihood that the pest will be present on, or in, the bananas when they are harvested for export. It is important to note that the pest categorisation stage of the risk analysis eliminates pests that have such a small likelihood of being present on or in mature hard green bananas that they do not constitute a threat to Australia. Conversely, a number of the pests of concern for Philippine banana plantations are not primarily pests of bananas, but they may require further consideration because they are associated with banana fruit. This is further considered in Section 8.3 of Part B of this report dealing with contaminant pests.

During the harvesting and transport of bananas in bunches to packing stations, bananas that are not carrying pests may come into contact with contaminated objects, such as plant material, implements, clothing and equipment that could readily transfer pests. Frequent handling by workers also provides opportunities for further cross-contamination. The analysis allows for these possibilities.

At packing stations, bananas are subject to several operations, including high pressure and high volume washing, separation of bunches into hands and clusters, immersion in wash tanks and, in some instances, sponging, brushing, sorting and grading, before being packed in plastic-lined cartons. These operations may reduce the number of pests present or the number of bananas carrying a particular pest, but their effect will depend on the pest. A specific step in the analysis assesses the likelihood of this happening. The processes at packing stations may also increase the number of bananas carrying pests or the numbers of pests on individual bananas. For example, a wash tank where the water is contaminated with bacteria or fungal spores, may result in the contamination of clean bananas. The analysis allows for a possible increased rate of infection of pest-free bananas during processing at packing stations.

At the end of the packing line, bananas will be subjected to various operations related to their export and transport to Australia. This could include quality inspection, palletisation, containerisation and stages of transportation to the final port of destination in Australia. Bananas may also be stored for some time at this stage. Depending on the pest, some operations may reduce the number of bananas carrying pests or the number of pests present on individual bananas, and the analysis allows for this. Conversely, some operations could increase the number of bananas carrying pests, and the analysis considers this.

On-arrival procedures are the last step in the import process that may affect the number of bananas carrying pests. For example, if live insects are noticed when a container is opened to check that the contents comply with the documentation, action may be taken (such as treatment) that results in a reduction in the number of infested bananas. The analysis allows for this possibility.

Distribution of fruit and banana waste within Australia

The other steps in the pathway occur in Australia. The analysis takes the estimate for the likelihood of pest entry from the exporting country and continues by estimating where pests may end up after entering Australia, as well as the likelihood of a pest establishing and spreading at these locations.

The important elements for the on-shore analysis are the distribution pattern for bananas, the availability of suitable hosts for pests and the probability that a pest being carried on, or in, a banana will start a pest population.

The pathway continues by looking at the distribution pattern for bananas (packaged as clusters in cartons) after quarantine authorities have released them at the border. The analysis follows the steps in the supply chain of imported clusters. It considers storage periods, ripening requirements, their distribution through wholesalers and retailers, and finally the production and disposal of waste. Allowance is made for the various end uses of banana fruit, and how and where waste will be generated and disposed of.

While domestic consumers are the main end user, the analysis recognises the importance of wholesalers, retailers, food processors and food services as significant end users generating and disposing of banana waste. The analysis also distinguishes between various types of waste, recognising that some waste disposal will be done through municipal garbage collection to municipal tips, some through home composting, and the rest will be discarded into the broader environment. Importantly, the analysis considers the various distribution pathways in commercial banana-growing areas, as distinct from other areas that may be climatically less suitable for plant species to support introduced pests.

Exposure, establishment and spread within Australia

The pathway then considers the likelihood that banana waste is discarded sufficiently close to a suitable host plant and whether, if the waste is either infected or infested with pests, pests then transfer to the plant.

It is recognised that different pests have different host ranges, so this part of the analysis is specific for each pest or group of pests with similar biology. Black Sigatoka, for example, has a narrow host range and is restricted to species of *Musa* and *Heliconia*, while many arthropod pests are polyphagous and can feed (and therefore establish) on a wide range of plant species. Pests not only have different host ranges, they also have different mechanisms for spread. This means waste supporting pests that have low mobility will need to be discarded relatively close to a suitable host plant compared with waste infected with pests that can disperse over substantial distances, such as black Sigatoka, which produces wind-dispersed spores.

The detail in this part of the analysis extends to considering the many factors that could affect a pest's ability to transfer from the waste material. They include the time the pest remains viable in, or on, the discarded waste, whether the waste is buried, the density of the host plants in close proximity to the waste, whether biological (vectors or intermediate hosts), physical or mechanical means of transfer exist and any known behaviour of the pest in actively seeking host plants.

The final important element in the analysis considers the likelihood that a pest will establish and spread once it successfully transfers to a suitable host. Again, there are many factors that need to be considered. For example, with an insect pest being carried as a larva in a fruit, the larva must emerge, mature into an adult, find a mate and lay eggs. In turn, the eggs must hatch successfully and establish a pest population. The whole pathway must be continuous to result in pest establishment. However, there is much potential for breaks in the chain. Pest establishment may be possible only during relatively short periods, depending on climate and host plant development. There also may be only a short time for a mature insect to find a mate. Pests that emerge on different days may have little chance of finding a mate. In addition, many insects have a dispersal phase when they are searching for and selecting host plants before mating. If only a

few insects emerge at one time, there is a strong chance they will disperse in different directions and not find a mate.

By contrast, other pests, such as Moko, that have no means of self-dispersal, rely on other mechanisms to establish and spread. The analysis evaluates various risk scenarios for Moko, including transfer by insects, leaching in free water, movement of machinery, vehicles and implements, and cutting, mowing and slashing. For each scenario, a sequence of events is considered unique to each pathway.

At this point, it is worth noting the record of plant pest incursions in Australia. Although it is always difficult to draw firm conclusions about the pathway of entry, most incursions appear to be associated with the movement (often illegal) of planting material (e.g. cuttings and plants) or natural movement, particularly into northern Australia. There is little evidence that the regulated importation of agricultural commodities for human consumption (e.g. citrus, table grapes, kiwi fruit and cherries) is a significant pathway for the entry of pests.

Probability of entry, establishment and spread

Combining the likelihoods of each of the component steps in the pathway provides an overall estimate of the probability of entry, establishment and spread for each pest.

4.2.2 Consequences

The other part of the risk assessment involves estimating the potential consequences or impact of a pest establishing in Australia. To determine an overall estimate, the consequences are considered under four headings – local, district, regional and national. The approach used allows for consideration of direct pest effects, such as potential production losses, control costs and quality loss. Indirect consequences, such as eradication costs, effects on domestic and international trade, and impacts on the environment and communities, are also assessed.

Scores for these impacts range from ‘unlikely to be discernible’ to ‘highly significant’, and are applied to direct and indirect criteria. The scores are then combined using a series of rules to provide an overall assessment of the consequences for each pest, ranging from ‘negligible’ to ‘extreme’.

4.2.3 Risk

The estimate of the annual likelihood of entry, establishment and spread is combined with the estimate of the consequences according to the matrix shown in Table 4.1 to provide an estimate of the risk for each pest. As mentioned earlier, the reference to ‘annual’ indicates that the likelihood estimate is based on an average or representative year of trade. However, it does not mean the quarantine protection applies only to one year. Clearly, the consequences of pest entry, establishment and spread can extend beyond a year, and the assessment of consequences is not restricted to a particular period. In addition, it is always possible to modify the quarantine measures in response to changes in pest status, scientific knowledge and new treatments.

Risk estimates of ‘low’, ‘moderate’, ‘high’ or ‘extreme’ are considered to exceed the level of risk Australia will accept. Estimates of ‘very low’ or ‘negligible’ are considered acceptable. If the risk estimate for a pest exceeds ‘very low’, risk management measures are required.

4.2.4 Unrestricted risk

The initial risk analysis for each pest assumes there are no risk management measures in place. This is called the ‘unrestricted risk’. If the unrestricted risk estimate for a pest exceeds ‘very low’, risk management measures are required.

Table 4.1 Risk estimation matrix

*Likelihood of entry, establishment and spread							
	High	Negligible risk	**Very low risk**	Low risk	Moderate risk	High risk	Extreme risk
	Moderate	Negligible risk	**Very low risk**	Low risk	Moderate risk	High risk	Extreme risk
	Low	Negligible risk	Negligible risk	**Very low risk**	Low risk	Moderate risk	High risk
	Very low	Negligible risk	Negligible risk	Negligible risk	**Very low risk**	Low risk	Moderate risk
	Extremely low	Negligible risk	Negligible risk	Negligible risk	Negligible risk	**Very low risk**	Low risk
	Negligible	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Negligible risk	**Very low risk**
		Negligible	Very low	Low	Moderate	High	Extreme
		Consequences of entry, establishment and spread					

*When this likelihood is assessed quantitatively, the qualitative descriptors on the vertical axis are replaced by numerical likelihood ranges as follows: *High* by 0.7–1; *Moderate* by 0.3–0.7; *Low* by 0.05–0.3; *Very low* by 0.001–0.05; *Extremely low* by 1.0E–06 to 0.001; and *Negligible* by 0 to 1.0E–06.

4.3 Risk management

Risk management is the third stage of the IRA process. Where the unrestricted risk estimate for an individual pest is unacceptable (that is, it exceeds ‘very low’), appropriate risk management measures will be needed to reduce the risk estimate to an acceptable level. The effectiveness of the proposed measures is evaluated by repeating the analysis after the effects of a proposed risk management measure have been included to give a ‘restricted risk’. This is repeated for each proposed measure and/or proposed combination of measures. This value is checked against the matrix to determine whether the proposed measure reduces the risk to a ‘very low’ or ‘negligible’ level.

Various risk management measures may be available, depending on the biology of individual pests. Some examples of risk management measures that can be applied up to the point of import include sourcing the fruit from areas free of a pest or areas where the pest is at a low level, and applying a treatment followed by inspection and rejection if pests are detected.

Risk management measures that can be applied at, or after, importation of the fruit are limited. However, some possibilities that could be considered include inspection and rejection if pests are found, and treatments such as fumigation. Several pests of bananas in eastern Australia are absent from Western Australia. Western Australia already has controls on the movement of bananas from eastern Australia, and these may be relevant to risk management for bananas from the Philippines moving into Western Australia.

The analysis for some pests may indicate there is no single risk management measure that will reduce the risk to ‘very low’ or ‘negligible’. In these cases, it may be possible to combine individual risk management measures to achieve a sufficient level of risk reduction. This is referred to as a ‘systems’ approach to risk management.

In developing final recommendations on risk management measures, consideration is given to the potential impact of the measures on potential trade. Where there are alternative and equivalent risk management measures that achieve the required degree of risk reduction, the final recommendations need to take into account Australia’s international obligations and propose the least trade-restrictive risk management measures available.

5 Results

5.1 Pest categorisation

The IRA process categorised 110 potential pests of mature hard green bananas according to their presence or absence in Australia, including regulatory status where applicable, their potential for being on the pathway (association with banana fruit), their potential for establishment and spread in Australia, and the potential consequences of establishment and spread. Table 5.1 summarises the findings. Part C contains details of the categorisation.

Table 5.1 Outcome of the pest categorisation process

Groups	Associated with bananas in the Philippines	Not in Australia, uncertain or of regional concern	Potential for being on pathway (Likely)	Potential for establishment or spread (Feasible)	Potential for consequences (Significant)	No. of species to be considered further
Arthropods						
Insects	67	37	21	21	18	18
Mites	6	3	3	3	3	3
Pathogens						
Bacteria	2	1	1	1	1	1
Fungi	23	3	2	2	2	2
Viruses	6	3	3	3	3	3
Nematodes	6	0	0	0	0	0
Total	**110**	**47**	**30**	**30**	**27**	**27**

After all the pests were considered, 27 quarantine pest species were identified as requiring further consideration in detailed risk assessments, because of their likely potential for being on the pathway of entry, because of the potential to establish or spread, and because the potential consequences for Australia were judged to be significant. One bacterium, two fungi, three viruses, 13 insect pests and three species of mites were considered for the whole of Australia (Table 5.2). Five additional insect pests were considered for Western Australia only (Table 5.3).

Table 5.2 Pests of mature hard green bananas considered further for the whole of Australia

Pathogens	Scientific name
Bacteria	
Moko	*Ralstonia solanacearum* race 2 (Enterobacteriales: Enterobacteriaceae)
Fungi	
Black Sigatoka	*Mycosphaerella fijiensis* (Ascomycota: Mycosphaerellaceae)
Freckle	*Guignardia musae* (Cavendish strain) (Ascomycota: Mycosphaerellaceae)
Viruses	
Bract mosaic	*Banana bract mosaic virus* (Potyviridae)
Bunchy top	*Banana bunchy top virus* (Nanoviridae) Abaca bunchy top virus (Unassigned: Nanoviridae)
Arthropods	
Fruit flies	*Bactrocera occipitalis* (Diptera: Tephritidae) *B. philippinensis* (Diptera: Tephritidae)
Armoured scales	*Aspidiotus coryphae* (Hemiptera: Diaspididae) *Aspidiotus excisus* (Hemiptera: Diaspididae) *Pinnaspis musae* (Hemiptera: Diaspididae)
Mealybugs	*Dysmicoccus neobrevipes* (Hemiptera: Pseudococcidae) *Nipaecoccus nipae* (Hemiptera: Pseudococcidae) *Pseudococcus jackbeardsleyi* (Hemiptera: Pseudococcidae)
Spider mites	*Oligonychus orthius* (Prostigmata: Tetranychidae) *O. velascoi (*Prostigmata: Tetranychidae) *Tetranychus piercei* (Prostigmata: Tetranychidae)
Weevils	*Philicoptus demissus* (Coleoptera: Curculionidae) *P. iliganus* (Coleoptera: Curculionidae) *P. strigifrons* (Coleoptera: Curculionidae) *P.* sp.1 (Coleoptera: Curculionidae) *P.* sp.2 (Coleoptera: Curculionidae)

Table 5.3 Pests of mature hard green bananas considered further for Western Australia only

Common name	Arthropods
Armoured scales	*Abgrallaspis cyanophylli* (Hemiptera: Diaspididae) *Hemiberlesia palmae* (Hemiptera: Diaspididae) *Pseudaulacaspis cockerelli* (Hemiptera: Diaspididae)
Mealybugs	*Planococcus minor* (Hemiptera: Pseudococcidae)
Thrips	*Chaetanaphothrips signipennis* (Thysanoptera: Thripidae)

5.2 Risk assessment

Detailed risk assessments were conducted on the 27 quarantine pests identified as requiring further assessment in the pest categorisation stage. Where the biology of pests was considered sufficiently similar, they were assessed as a group. The results are summarised in Table 5.4. The unrestricted risks posed by Moko, black Sigatoka, freckle, armoured scales (six species), mealybugs (four species), spider mites (three species) and one species of thrips exceed Australia's appropriate level of protection. Therefore, specific risk management measures for these pests are required to reduce the risks to a level consistent with Australia's ALOP. The unrestricted risk of each of the other pests assessed was within Australia's ALOP and risk management measures are not required.

Results of the risk assessments in this revised draft report are substantially different from those in earlier drafts (BA 2002d, 2004) and, in many respects, are not directly comparable.

Significantly, the IRA team made more detailed analyses of the pathways for the distribution of fruit and the production and disposal of waste in Australia, and also considered in more detail how host plants could be exposed to introduced pests and how the pests could establish and spread in Australia.

The IRA team used a banana cluster as the unit of analysis in all risk assessments rather than a tonne, as was used previously. This recognises that a cluster is the basic unit derived from bunches in packing stations and essentially maintains its integrity throughout the marketing chain until it reaches the consumer. It was also considered likely that individual clusters could provide a pathway for the entry and establishment of pests without considering larger quantities of fruit.

The current analyses of estimates of unrestricted risk also exclude practices considered common in the Philippines but not mandatory, such as the chlorination of flotation tanks, that were considered in previous drafts. Where appropriate, some of these practices are considered as phytosanitary measures in sections dealing with risk management.

Table 5.4 Summary of the assessment of unrestricted risk of quarantine pests

Common name of pest	Probability of entry, establishment and spread (PEES)	Consequences	Unrestricted risk	Assessed for management measures:
Pests of concern to the whole of Australia				
Moko	1.06E–01	High	Exceeds ALOP	Yes
Black Sigatoka	1.00E–00	Moderate	Exceeds ALOP	Yes
Freckle	1.00E–00	Low	Exceeds ALOP	Yes
Bract mosaic	4.29E–03	Low	Achieves ALOP	No
Bunchy top	3.81E–08	Moderate	Achieves ALOP	No
Fruit flies	Negligible	High	Achieves ALOP	No
Armoured scales	Moderate	Low	Exceeds ALOP	Yes
Mealybugs	High	Low	Exceeds ALOP	Yes
Spider mites	High	Low	Exceeds ALOP	Yes
Weevils	Negligible	Low	Achieves ALOP	No
Pests of concern to Western Australia*				
Armoured scales	Moderate	Low	Exceeds ALOP	Yes
Mealybugs	High	Low	Exceeds ALOP	Yes
Thrips	High	Low	Exceeds ALOP	Yes

*Western Australia has a pest and disease status that is different, in some respects, from other areas of Australia. This regional freedom from pests or diseases that may already be present in other locations in Australia is recognised in the risk assessment.

5.3 Risk management

The proposed risk management measures for the pests that had an unrestricted risk exceeding Australia's ALOP are summarised below.

The effectiveness of specific measures will need to be verified by commercial trials before exports can begin.

5.3.1 Pests – Australia

Moko

The major entry, establishment and spread pathway identified for Moko was the potential for Moko bacteria to be present in the vascular tissue of banana fruit harvested in the Philippines and transported to Australia. Transfer of Moko to host plants in Australia could occur as a result of bacteria leaching from banana waste and colonising the roots of host plants in the general vicinity, or as a result of mechanical transfer by implements coming into contact with infected waste and subsequently making contact with susceptible hosts.

The proposed risk management measures (systems approach) for Moko are:

- Inspection of all mats in each registered plantation/block at weekly intervals to record the incidence of banana plants showing symptoms of Moko disease. Plantations/blocks will be required to have a Moko prevalence not exceeding 0.06 cases per hectare per year for a period of one year before they become eligible for registration or re-registration to export banana fruit to Australia. A case is defined as the detection of a mat with Moko symptoms on any of its parts within a registered plantation/block from which a bunch could be harvested. The detection of symptoms of Moko exceeding 0.06 cases per hectare per year will result in the immediate suspension of any registered plantation/block. This measure is intended to significantly reduce the risk of banana fruit being infected with Moko. and
- Inspection of freshly cut cross-sections of pseudostems and peduncles at harvest, and further inspection of fresh cuts to the peduncles at packing stations will be required to detect any vascular discolouration that could be symptomatic of Moko infection. All bunches showing vascular discolouration must be removed from further processing. This measure is intended to further reduce the risk of harvesting infected fruit from infected banana plants not yet showing visible symptoms of Moko. and
- A post-harvest disinfection treatment, such as chlorine, will be required at packing stations to prevent contamination of clean banana fruit by Moko in flotation tanks.

Alternatively, if it can be demonstrated that the incidence of Moko is less than 0.005 cases per hectare for a period of one year, this measure alone will be sufficient to meet Australia's ALOP.

Black Sigatoka

The major entry, establishment and spread pathway identified for black Sigatoka is the potential for fungal fruiting bodies to be on pieces of leaf and floral plant tissue (referred to as trash) adhering to banana fruit, and for spores to be released from fruiting bodies and contaminate fruit being processed at packing stations. Subsequent spore dispersal could lead to infection of host plants in Australia.

The proposed risk management measures for black Sigatoka are:

- Inspection of at least 3000 mats in each registered plantation/block at weekly intervals to record symptoms of black Sigatoka, with an upper limit of the case rate below 0.1 per cent. A case for recording black Sigatoka is defined as any mat with a leaf with visible symptoms of black Sigatoka (stage 1 or stage 2 lesions) exceeding one per cent of the total leaf area, or a leaf with more advanced disease symptoms (necrosis) or one or more leaves showing both sets of symptoms. and
- Procedures to minimise trash are required in each registered plantation/block and packing station to eliminate primary sources of leaf and floral tissue fragments associated with bunches of fruit during maturation and before harvest. Fruit presented for export must be free of trash. and
- Disinfection treatment with an approved fungicide to prevent contamination of fruit with spores liberated during processing and suspended in water flotation tanks at packing stations.

Freckle

The major entry, establishment and spread pathway identified for freckle was the potential for fruiting bodies to develop on fruit infected either immediately before harvest or during processing at packing stations. Subsequent spore dispersal could lead to infection of host plants in Australia.

The proposed risk management measures for freckle are:

- Inspection of at least 3000 mats in each registered plantation/block at weekly intervals to record symptoms of freckle, with an upper limit of the case rate below 0.1 per cent. A case for recording freckle is defined as a mat with any visible symptoms of freckle on any leaf. and
- Spraying of bunches with fungicide in plantations/blocks when bunches are covered and at regular intervals thereafter, consistent with the efficacy of any approved fungicide. This measure is intended to prevent late infections of fruit that could support the development of fungal fruiting bodies after passing quarantine inspection.

Arthropod pests – armoured scales, mealybugs, spider mites and banana rust thrips

The major entry, establishment and spread pathway identified for armoured scales, mealybugs and spider mites is the presence of various life stages of the insects, including adults, nymphs and eggs, that are protected in spaces between the fingers of harvested banana fruit.

The proposed risk management measure for all arthropod pests is:

- Inspection of 600 clusters of fruit drawn randomly from each lot or consignment of fruit presented for export. If any quarantine arthropod pests are found, the lot or consignment will be immediately withdrawn from export or treated to kill the pests.

5.3.2 Pests – regional

The pests of regional concern include arthropod pests (three species of armoured scales, one mealybug species and one thrips species) that are absent from Western Australia. On-arrival inspections and corrective action will be performed by AQIS for regional quarantine pests only if consignments are first landed at an international port in that state.

Arthropod pests – armoured scales, mealybugs and thrips

The major entry, establishment and spread pathway identified for armoured scales, mealybugs and thrips is the presence of various life stages of the insects, including adults, nymphs and eggs, that are protected in spaces between the fingers of harvested banana fruit.

The proposed risk management measure for all arthropod pests is:

- Inspection of 600 clusters of fruit drawn randomly from each lot or consignment of fruit presented for export. If any of the quarantine arthropod pests are found, the lot or consignment will be immediately withdrawn from export. If the rejected lot is treated to kill the pests, a re-inspection will be required.

5.3.3 Pre-clearance

It is proposed at least for the initial trade, that the quarantine measures will be undertaken through a standard pre-clearance arrangement directly involving AQIS officers. The need for pre-clearance will be reassessed after experience has been gained following significant trade.

AQIS officers will be involved in these arrangements in the plantation inspections for Moko, black Sigatoka and freckle, and direct verification of procedures at packing stations and during fruit inspection. The involvement of AQIS officers in pre-clearance will also facilitate a rigorous audit of other arrangements, including registration procedures, standard commercial practice, traceability and arrangements for the secure handling of export fruit.

Under the pre-clearance arrangement, on-arrival procedures will involve verifying that the consignment received is the pre-cleared consignment and the consignment's integrity has been maintained.

5.3.4 Operational arrangements

A range of operational arrangements for Philippine bananas entering Australia will supplement the specific risk management measures outlined above. The operational arrangements will ensure the risk management measures effectively mitigate the risks identified in the risk assessment. Part B of the report contains details of the operational arrangements.

A detailed operating manual and work plan will need to be developed to take account of the following issues:

- recognition of the competent authority
- registration of export plantations/blocks
- standard commercial agronomic practice
- inspection for Moko, black Sigatoka and freckle
- operational requirements for disease monitoring
- registration of packing stations
- disinfection treatment at packing stations and prevention of contamination after disinfection
- adequate labelling of lots
- freedom from trash
- prevention of contamination in storage, transport and handling
- phytosanitary inspection and certification
- notification of non-compliance
- import permits and notification of quarantine entry
- verification of documents on arrival in Australia
- audit arrangements
- review of import conditions.

Fruit will be inspected in the Philippines by the Philippines Bureau of Plant Industry (BPI) before presentation to AQIS officers for pre-clearance inspection. BPI will be required to inspect a 3000 unit sample to ensure freedom from trash and other quarantine pests. Only lots found free of trash and other quarantine pests (through sampling) will be presented to AQIS officers for pre-clearance inspection. However, the detection of any quarantinable pests at on-arrival inspection will require the consignment to be treated, destroyed or re-exported under AQIS supervision.

6 Consideration of minority view

As indicated at Section 2.2 of Part A of this revised draft IRA report, Biosecurity Australia established an import risk analysis team to assist Biosecurity Australia to undertake the risk analysis.

The IRA team reached agreement on most of the conclusions and recommendations included in this revised draft report. The majority view acknowledged that, while some of the proposed risk management measures could be difficult to achieve, it was feasible that they could be implemented and should therefore be included in the draft report made available to stakeholders for comment. The majority of the IRA team noted that if the proposed measures are ultimately adopted as quarantine conditions, the exporting country would be required to comply with them in a manner and to a standard that fully achieved Australia's appropriate level of protection (ALOP).

A member of the IRA team had a differing view in relation to the risk management measures proposed for Moko in the Philippines that are summarised in Chapter 20 of Part B of this draft report (*Risk management and draft operational framework*). In summary, the minority view is that these measures should not be included in the revised draft IRA report because:

- based on information currently available, Areas of Low Pest Prevalence (ALPP) cannot be defined, implemented, maintained and verified in the Philippines, where Moko is widespread. The assumptions underlying the proposed measure do not take sufficient account of the presence of undetectable, symptomless Moko-infected plants or the practical difficulties associated with preventing the incursion of flying insects that are known vectors of the disease. In these circumstances, the proportion of infected plants in a population or the efficacy of the proposed measure cannot be determined;
- there is insufficient evidence to conclude that any measurable effect would result from visual inspection and corrective action. This is because symptomless infected fruit is not detectable and vascular discolouration can be caused by factors other than Moko. Visual inspection and corrective action to remove all bananas showing discolouration that is interpreted as symptomatic of Moko is likely to result in infected fruit being admitted to the export pathway while excessive quantities of non-infected fruit will also be removed;
- field trials undertaken to date do not show that post harvest chlorine treatment is effective in reducing pathogen loads in banana flotation tanks. There is also no evidence available to indicate whether other treatments are available that are potentially more effective than chlorine; and
- consequently, given that there was a lack of information or evidence to support the individual risk management measures proposed for Moko, a systems approach to managing the risk is also not considered sustainable.

The majority disagreed with the conclusions of the minority view. The IRA team and Biosecurity Australia have considered and evaluated the minority view in a very careful and detailed way. Reflecting this, the draft report discusses the issues relevant to Moko at Chapter 9 of Part B of this report.

Importantly, the revised draft IRA report concludes that the risk of Moko exceeds Australia's ALOP and that risk management measures are required. The report notes that the establishment and maintenance of pest free areas, pest free places of production and pest free production sites are unlikely to represent a technically feasible risk management option *(Chapter 9.16.1).* The report also concludes that none of the measures that are proposed would be sufficient on their own to achieve Australia's ALOP and that an integrated systems approach (i.e. a combination of risk management measures) would be required *(Chapter 9.16.5).* Finally, the report is very clear that, prior to the implementation of any risk management measures, the Philippines Bureau of Plant Industry (BPI) will be required to provide data for evaluation by Australia on the efficacy of the various components of the risk management measures, including chlorine or other treatments.

Biosecurity Australia encourages stakeholder discussion and would welcome comments and information relating to any matter included in this revised draft IRA report.

7 Further steps in the IRA process

The administrative process adopted requires the following steps to be undertaken:

- comments on this draft IRA report to be received within a specified period (usually 60 days)
- consideration of stakeholder comments on the revised draft IRA report and preparation of a draft final report
- consideration of the draft final report by an independent Eminent Scientists Group to ensure all stakeholder comments have been taken properly into account
- completion of the final IRA report
- release of the final IRA report for an appeal period (usually 30 days)
- consideration of appeals, if any
- if there are no appeals or the appeals are rejected, the Director of Animal and Plant Quarantine to make a policy determination
- notification of the proponent/applicant, registered stakeholders and the World Trade Organization of the policy determination.

Stakeholders will be advised if there is any significant variation to the process.

Biosecurity Australia is committed to a thorough risk analysis of the proposed importation of mature hard green Cavendish bananas from the Philippines. The analysis requires it to gather technical information from a wide range of sources. If you have information relevant to this IRA, you should provide it as quickly as possible if you wish it to be taken into account as part of the quarantine decision-making process.

8 Acknowledgements

Biosecurity Australia wishes to acknowledge the extensive work of the IRA team on this revised draft IRA report.

Others who deserve special acknowledgement are the many scientists, government personnel and banana industry people from Australia and overseas who have contributed in various ways, including the collection and provision of technical information.