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Department of
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27 JUN 2007

Ms Louise van Meurs
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Dear Ms van Meurs

Revised draft import risk analysis report for Cavendish bananas from the Philippines

I refer to Biosecurity Australia Policy Memorandum 2007/12, inviting stakeholders to comment by 29 June 2007 on the 'Revised draft import risk analysis report for Cavendish bananas from the Philippines', released in March 2007.

The Department of Primary Industries and Fisheries (DPI&F) acknowledges the considerable effort that has gone into preparation of the revised draft Import Risk Analysis (IRA) report and notes substantial revision to the previous revised draft released in 2004.

The DPI&F has reviewed the revised draft IRA report and has made a number of recommendations. Due to the significance of the banana industry to Queensland, the DPI&F is very interested in the issue of market access for Philippine bananas.

Attached is our submission, developed through consultation with DPI&F scientists who are familiar with banana pest issues. DPI&F would appreciate receiving a response on how the issues raised are addressed in the final IRA report.

DPI&F thanks Biosecurity Australia for the opportunity to provide input into the IRA process.

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If you require any further information regarding this matter, please do not hesitate to contact Dr Peter Whittle on telephone 07 3239 3953 or email peter.whittle@dpi.qld.gov.au.

Yours sincerely

Jim Varghese
Director-General

Att

Department of Primary Industries & Fisheries

Queensland Government
Department of Primary Industries and Fisheries

Response to Biosecurity Australia's Revised Draft Import Risk Analysis Report for the importation of Cavendish bananas from the Philippines

June 2007

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The *Revised Draft Import Risk Analysis Report for the Importation of Cavendish Bananas from the Philippines February 2007* (RDIRA) has been prepared by Biosecurity Australia in response to a request from the Philippines to export mature hard green bananas from the Philippines to Australia.

The IRA pest categorisation considered 110 pests of mature hard green bananas in the Philippines, and identified 27 species requiring pest risk assessment (RDIRA Part C, Appendices 3 and 4). Seven pests were subsequently assessed as having an unrestricted risk that exceeded Australia's appropriate level of protection (ALOP), and hence require risk mitigation. These are summarised below:

Pest	Mitigation
Moko	combination of ALPP*, inspection and corrective action, and post-harvest treatment (chlorine), dependant upon level of ALPP
Black Sigatoka	ALPP and trash minimisation and post-harvest treatment (fungicide) all required
Freckle	ALPP and pre-harvest bunch sprays
Armoured scales	pre-clearance inspection and corrective action *or* on-arrival visual inspection and corrective action, if requirements change
Mealybugs	pre-clearance inspection and corrective action *or* on-arrival visual inspection and corrective action, if requirements change
Spider mites	pre-clearance inspection and corrective action *or* on-arrival visual inspection and corrective action, if requirements change
Banana rust thrips	relevant to WA only

*ALPP = area of low pest prevalence

The unrestricted risks associated with *Banana bract mosaic virus*, *Banana bunchytop virus*, fruit flies and weevils were assessed as achieving Australia's ALOP and hence, no mitigation measures were recommended.

The Department of Primary Industries & Fisheries (DPI&F) has reviewed the risk assessments for each of the pests and has made specific comment on a number of these. However, DPI&F identified two pests, *Fusarium oxysporum* f. sp. *cubense* (Panama disease) and *ants* for which pest risk assessments were not performed and which should be considered further. These are discussed in detail in sections 3.6 and 3.13, respectively.

DPI&F has also made recommendations in relation to the risk management measures and procedures outlined in Chapter 20 to reduce the quarantine risks associated with the importation of Philippine bananas.

3 Comments on risk assessments

3.1 *Moko (*Ralstonia solanacearum *race 2)(Chapter 9)*

3.1.1 Introduction (Chapter 9.1)

The IRA risk assessment for Moko discusses the eradication of *Ralstonia solanacearum* race 2-infected *Heliconia* rhizomes in Cairns. *R. solanacearum* race 2 (Moko) is known to affect both *Musa* and *Heliconia* species. However, in Hawaii where Moko disease has been prevalent in *Heliconia* for many years, banana Moko does not occur. Recent research has demonstrated that the *R. solanacearum* strains affecting *Heliconia* in Hawaii are genetically distinct from the isolates causing Moko in the Philippines (Yu *et al.* 2003). While inoculation experiments have shown that the *Heliconia* isolates of *R. solanacearum* are virulent to diploid and triploid *Musa* plants (Diatloff *et al.* 1992), it would appear that there are physiological barriers preventing cross-infection in Hawaiian bananas in the field.

Recommendation 1: The successful eradication of *R. solanacearum* race 2 strains from *Heliconia* in north Queensland should not be used as an indication of likely success in the event of a Philippine banana Moko incursion because of distinct differences in the genetics and epidemiologies of the bacterial strains involved.

3.1.2 Species distribution and host plant association (Chapter 9.2.1)

Given the current absence of *R. solanacearum* race 2 from Australia, little is known about its potential host range in Australian plants. The number of hosts for all strains of *R. solanacearum* exceeds 300 worldwide (Bradbury 1986), and while it is perhaps unlikely that *R. solanacearum* race 2 can infect the entire number of *R. solanacearum* hosts, the potential range of hosts in Australia is not known. Therefore, there is potential that a Moko incursion could be sustained by previously unsuspected hosts.

Recommendation 2: As the number of alternate hosts for Moko is unknown, the possibility that an incursion will be sustained from previously unsuspected hosts should not be discounted.

3.1.3 Dispersal mechanisms (Chapter 9.2.2)

Although not yet established through empirical evidence, the potential for non-insect animal transmission of Moko exists. It is known for other plant vascular bacterial infections that animals that chew the stems can transmit the bacteria, for example, rats and ratoon stunting disease (*Leifsonia xyli* subsp. *xyli*) in sugarcane (Wehlberg 1956). Many animal pests in Australian banana plantations (e.g. pigs, cassowaries, whitetail rats and helmeted friarbirds) could conceivably transmit the infection in a manner analogous to other mechanical methods such as equipment and machetes. The potential for additional unforeseen vectors for Moko must increase the likelihood of spread within Australia of a Moko incursion.

As noted in Chapter 9.2.5 (RDIRA, Part B, Risk Scenarios, Scenario C, page 70), the high mechanisation of the Australian banana industry would facilitate relatively higher transmission rates of disease within Australia than in less-mechanised growing areas principally through damage to host plants from machinery. Further adding to the potential transmission rates in Australia is the regular inundation and drainage dynamics of Australian banana production systems. For example, around 90% of all Australian bananas are produced in Queensland, and most in far north Queensland (ABGC Inc. 2007) between Cardwell and Cooktown, where the consequences of a Moko incursion would be highest. In these areas the regular wet season results in excessive quantities of water around plantations, as well as excessive run-off, as many banana plantations are planted in vertical rows on hillsides. These factors increase the likelihood of disease dispersal should a Moko incursion occur.

Additionally, the prevalence of cyclones and associated rain in far north Queensland open greater potential for rapid, broad-scale dissemination of a Moko incursion into the environment. The spread of plant debris and soil, with the potential for it to damage potential hosts, is another mechanism for the spread of Moko. This form of infection was demonstrated following Tropical Cyclone Larry in 2006, when many avocado farmers suffered increased losses due to the establishment of various soil-borne soft-rots on attached fruit (A. Young, *pers. comm.*).

Recommendation 3: That consideration be given to other means of Moko transmission that may increase the spread of the disease beyond the extent considered in the report.

3.1.4 Survival (Chapter 9.2.4)

DPI&F questions the assumption made by the IRA team that Moko bacteria would survive in waste for no more than five days under field conditions. If *R solanacearum* can survive 'for a few days at high humidity in films dried to glass surfaces' (RDIRA Part C, Appendix 5, page 45) then it is highly likely that the bacteria from initial high densities would survive in excess of five days *in planta*.

Similarly, DPI&F also questions the figure of two years for survival in soil. While the gradual decrease of *R. solanacearum* strains in the soil is not contested, anecdotal evidence suggests that *R. solanacearum* race 1 strains can persist for up to seven years. This is based on the occasional emergence of bacterial wilt infections on properties in north Queensland, particularly where tobacco was formerly grown, where previous infections occurred years before (Akiew and Trevorrow 1994). Much depends on the initial population density for the bacterium, the soil type and prevailing climatic conditions. Under favourable conditions DPI&F suggest that Moko could survive in soil for far greater than two years, and in the event of an eradication program, a considerably greater period must be assumed.

DPI&F considers that the survival estimates of the Moko bacterium of five days in plant debris and two years in soil as cited in the RDIRA seriously underestimate the risk of establishment of this devastating pest. This is increased by the untested potential host-range of this bacterium in Australian plants. When consideration is given to the potential for the bacterium to enter a viable but not culturable (VBNC) state (Grey and Steck 2001), the very low effective dosage rate, and the optimal soil-survival conditions present in the majority of Australia's banana-growing environments, the potential for long-term survival of the Moko bacterium in the Australian environment is very high.

Recommendation 4: That survivability of *R. solanacearum* race 2 in discarded fruit waste, soil and water be reassessed.

3.1.5 Risk scenarios (Chapter 9.2.5)

The four risk scenarios presented in the RDIRA are agreed to be the most likely avenues for the establishment of Moko in Australian banana plantations, but as outlined above, cannot be considered an exclusive collection. It is sufficient here to reiterate the existence for the potential of alternative, non-considered transmission routes that threaten the establishment of Moko in Australia.

Recommendation 5: That all potential means of Moko transmission are considered in the report.

3.1.6 Incidence of Moko within an infected plantation (Chapter 9.3.2)

The data presented by BPI (2001) on reported cases of Moko symptoms do not provide sufficient detail of survey parameters, records and remedial action taken and should not be considered in estimates for *Imp2*.

Recommendation 6: That *Imp2* be reviewed.

3.1.7 Contamination by Moko during harvest and transport to packing station (Chapter 9.3.3)

A distinction needs to be made between 'infection' and 'contamination'. The heading refers to 'contamination' but the discussion of *Imp3a* refers to 'infection'. A surface can become *contaminated*, but this does not necessarily lead to *infection*.

The efficacy of mechanical transmission of Moko from contaminated knives in mobile packing stations is noted. However, *Imp3a* (RDIRA Part B, page 73) states that "infection in mobile packing stations is not likely to be any greater than at an equivalent point (*Imp5*) in permanent packing stations". However, this is contradicted in *Imp5* (RDIRA Part B, page 74) which states that "as compared with fixed packing stations the risk of infection of clean clusters is expected to be higher in mobile packing stations".

Recommendation 7: That *Imp3* be evaluated independently and a distinction made between infection and contamination.

3.1.8 Contamination during packing (Chapter 9.3.5)

DPI&F considers packing station operations that involve de-handing, cutting and trimming of clusters constitute 'wounding' of fruit. If "Moko infections only occur through wounded tissue" (RDIRA Part B, page 73), then it is likely that the contamination of a wounded surface could result in infection during packing. Considering the 1-10 colony-forming units required for infection (RDIRA Part C, Appendix 5, Inoculum dose, page 48), and the high bacterial titres in infected bananas, it seems likely that contamination during packing could be a significant source of risk.

The difference between contamination and infection is again unclear (see comments in section 3.1.7.

Recommendation 8: That the likelihood for *Imp5* be reviewed.

3.1.9 Contamination by Moko during distribution (Chapter 9.4.2)

Dist2 is assessed as 0. Fruit handling during the various distribution steps are obvious routes for the transmission of Moko from infected clusters. Any number of scenarios could account for such transmission, such as dropping crates, vehicular accidents and even further breaking up of hands at point of retail. These scenarios have not been taken into account in the RDIRA, which may have implications for *Dist2*.

Recommendation 9: That the likelihood for *Dist2* be reviewed.

3.1.10 Exposure - transfer by insects (Chapter 9.7, Scenario A)

The assumption that an insect will only fly 15 metres underestimates the likelihood of transfer of Moko by insects. Wardlaw (1972) reported that *R. solanacearum* race 2 had been transmitted 90 km by insects in Colombia and Venezuela, and over a period of three weeks, 5% of 700 bees and wasps collected in a Moko-infested area carried the disease and had transmitted it over five miles. It is also known that honey bees and various other bee species, which have been cited as potential vectors of Moko (RDIRA Part B, page 66), may forage many kilometres from their hive in search of pollen and nectar sources (Winston 1987; Williams 2001; Araujo *et al.* 2004; Artz and Waddington 2006). It is also known that even small insects can travel vast distances on prevailing winds, and the possible dispersal factors associated with cyclones appears not to have been considered. It is unclear why such conservative estimates were used in this risk scenario.

Additionally, estimations of an infective load of about 100 bacterial cells, and that the insect would be free of infecting bacteria after two stops, are not supported. It is known that Gram negative pathogenic bacteria can form persistent biofilms of thousands of bacteria on their insect vectors (Barbehenn and Purcell 1993; Jarrett *et al.* 2004; Muniz *et al.* 2007). Although there is no specific data available on the number of Moko bacteria adhering to insects, or their persistence, it seems highly unlikely that only 100 cells (about 1.25 μm^3) would be picked up, and that they would disappear in a matter of seconds. Furthermore, the claim that insects are not attracted to wounded plants must be discounted, particularly when no data are presented to the contrary.

Recommendation 10: That the likelihood of transfer of Moko by insects is reviewed.

3.1.11 Exposure - transfer by leaching (Chapter 9.8, Scenario B)

Factor 3 - Bacteria must wash from the waste

As previously outlined (section 3.1.3), the regular heavy inundation of banana crops in north Queensland provides additional risks not adequately considered in the RDIRA.

Recommendation 11: That transfer values for leaching of Moko through soil to *Musa* spp. and *Heliconia* spp. take into consideration weather events particular to north Queensland.

3.1.12 Direct impact (Chapter 9.14.1)

Environmental

Greater consideration should be given to the potential threat to Australia's biodiversity, given the impact that an incursion may have on rare Australian native *Musa* and other closely related species that have never been exposed to Moko.

In addition, agricultural industries in the Great Barrier Reef catchment are currently under heavy pressure in relation to chemical usage. Increased prophylactic copper and/or dithane sprays would result in further impacts on the environment, human populations and tourism. In the response to the black Sigatoka incursion in Tully from 2001, proposals for extraordinary chemical use for the response needed environmental regulatory approval. It is questionable whether this approval would be given again.

Recommendation 12: That the consequences of an incursion of Moko on the environment, human populations and tourism be reassessed.

3.1.13 Visual inspection and corrective action (Chapter 9.16.3)

In relation to Moko symptoms, it is still unclear whether it is the banana fruit or the peduncle that first shows signs of discolouration. If the fruit develops discolouration first, then examination of the peduncle may not reveal any discolouration despite being infected. Slicing of fruit, as is routinely performed in South American plantations to check for maturity, should be included as additional risk mitigation method for Moko.

Recommendation 13: That slicing of banana fruit to check for discolouration be incorporated as a risk mitigation measure for Moko.

3.1.14 Post-harvest treatment (Chapter 9.16.4)

BA has previously considered data on the inefficacy of chlorine as a post-harvest treatment for bananas (BA 2004, Lindsay S (2002b) *pers. comm*), however the quality of the report was questioned and was not taken into consideration on the basis that the work was an unreplicated trial. This same standard must also be applied to any demonstration by the Philippines to the efficacy of chlorine, i.e. the science must be robust and peer-reviewed for it to be considered. Unless efficacy of chlorine can be demonstrated and concentration of chlorine can be maintained in wash tanks, fruit passing through the wash and flotation tanks at the fixed and mobile packing stations may actually have a higher chance of being exposed to Moko infection than unwashed fruit.

Recommendation 14: That any data presented to demonstrate efficacy of chlorine and maintenance of chlorine concentration be independently verified.

3.1.15 Consideration of minority view

DPI&F believe that greater consideration should be given to the minority view published in the IRA report. It is our opinion that if Moko is present in a production area, harvest of internally infected yet symptomless fruit will be unavoidable, and hence importation of bananas from the Philippines may result in the repeated incursion and eventual establishment of Moko disease in Australia.

Recommendation 15: That greater consideration be given to the effectiveness of the risk mitigation measures proposed for Moko and the feasibility of attempting to mitigate against internal symptomless infection of fruit.

3.2 *Black Sigatoka (Mycosphaerella fijiensis)(Chapter 10)*

3.2.1 Risk scenarios (Chapter 10.2.4)

M. fijiensis is referred to as a leaf spot disease of bananas and plantains (RDIRA Part B, page 105). The risk scenarios presented in the report are contamination with infected plant material and surface contamination with spores.

The risk scenario not considered in the analysis is infection *within* the skin of the fruit. This has been demonstrated with *M. fijiensis* recently having been isolated from within the skin of symptomless 'Cavendish' type bananas grown in an environment where the disease is present (Fullerton 2006).

Recommendation 16: That infection within the skin of banana be considered as a dispersal scenario.

3.2.2 Appropriate level of protection (ALOP)

Australia set its ALOP for black Sigatoka during the eradication program in Tully in 2001. All states that produce bananas imposed restrictions on movement of bananas from within the Pest Quarantine Area until the disease was eradicated. This effectively reduces acceptable risk of entry of black Sigatoka in production areas to zero. The IRA report is proposing that our ALOP be lowered to accommodate a uniform assessment of appropriate risk when our domestic quarantine arrangements are significantly tighter than this.

Recommendation 17: That the ALOP for all pests are reviewed and assessed independently where relevant precedents and actions exist in Australia.

3.2.3 Dispersal (Chapter 10.2.3)

The RDIRA states that viability of fertile pseudothecia of *M. fijiensis* in leaf lesions is reduced from 21 weeks or more to 4 - 8 weeks with repeated wetting/drying cycles. However, trial work conducted in 1998 evaluated the survival of ascospores of *Mycosphaerella musicola* under varying conditions and showed that survival was greater than 20 weeks hanging in the canopy (wetting and drying). Leaf material kept on/close to the ground ejected ascospores for between 4 - 8 weeks (Peterson *et al.* 2000).

The RDIRA also claims that the dispersal range of conidia by water splash would be no more than 2 metres. No evidence is provided to substantiate this claim.

Recommendation 18: That assumptions about survivability and dispersal of *M. fijiensis* be reviewed.

3.2.4 Contamination level within an infected plantation (Chapter 10.3.2)

Leaf material

Factor 1 - The proportion of bunches contaminated with any leaf material at harvest

The level of leaf material (4.98%) found in cartons of fruit imported from the Philippines to NZ is extremely high given that the produce had already gone through a cleaning and inspection process.

Recommendation 19: That the Factor 1 rating should increase to at least 2.00E-01 to 5.00E-01.

Factor 2 – The proportion of clusters contaminated with any leaf material within contaminated bunches

The likelihood of only the top three hands of bunches being prone to contamination with leaf material from rodent nests is highly unlikely given that rodents chew leaf material in order to make their nests. This would allow small fragments of leaf material to fall through the bunch to the lower hands.

Recommendation 20: That the Factor 2 rating should be increased to at least 2.00E-01 to 5.00E-01.

Factor 3 – The proportion of leaf material pieces on contaminated clusters that are infected with black Sigatoka

The report states that "an average 10-12 of the youngest leaves remain free of black Sigatoka on unbunched plants". However, this would not be the case at harvest given that no new leaves are produced once a bunch is thrown. No data is provided that indicates disease levels on bunched plants.

Recommendation 21: That the Factor 3 rating be reviewed.

Factor 4 – The proportion of leaf pieces infected with black Sigatoka that contain fertile pseudothecia

Trial results on ascospore survival of *M. musicola* (refer Chapter 10.2.3) demonstrate alternate wetting and drying cycles do not reduce ascospore survival. Hence, 1 - 20 fertile pseudothecia per leaf piece is an underestimate of what would remain viable at this stage.

Recommendation 22: That the Factor 4 rating be reviewed.

3.2.5 Direct impact (Chapter 10.17.1)

Plant life or health

The impacts on plant life would be "highly significant" in the north Queensland area on both the banana and *Heliconia* industries given the weather conditions are conducive to disease development for five to seven months of the year.

Recommendation 23: That the rating for impact on plant life or health be increased from E to F.

3.2.6 Indirect impact (Chapter 10.17.2)

Domestic trade

The disruption to intrastate and national market arrangements in the event of a detection of black Sigatoka is likely to be years and not for a "short time". If the detection was to occur north of Tully then the infected areas would encompass the Innisfail area and would therefore affect 90% of the Australian banana industry. This would have a major impact on the markets, in particular Brisbane, Sydney and Perth. The rating should therefore increase to "highly significant".

Recommendation 24: That the rating for impact on domestic trade be reviewed.

Environment
Should black Sigatoka become established in Queensland the increase in fungicidal spray applications would probably double to 48 sprays per year compared to the 20 - 24 currently used. This has significant implications with the banana industry being in close proximity to the Great Barrier Reef and is inconsistent with the objectives of Reef Plan (Queensland Government 2007). It is likely that environmental regulatory approval would not be obtained for this increased pesticide use in the reef catchment, making the eradication or management of black Sigatoka near impossible.

Recommendation 25: That the impact on environment should be increased to highly significant across all levels – local, regional and national.

Communities
The banana industry on the wet tropical coast is a large employer of locals as well as backpackers holidaying in the region, who come to the region partly because of the work available in the banana industry. Hence tourism is a significant beneficiary from the industry. Associated businesses also rely on the industry eg. engineering, packaging, transport and fuel companies.

Recommendation 26: That the effect on communities be rated "highly significant".

3.2.7 Overall consequences for black Sigatoka (Chapter 10.17.3)

One or more of the criteria have been rated **F**, therefore the overall rating should be regarded as "high".

Recommendation 27: That the rating for overall consequences of black Sigatoka be reviewed in light of the reassessed ratings.

3.2.8 Areas of low pest prevalence (Chapter 10.19.2)

DPI&F have some doubt to the claim that "areas of low pest prevalence [for black Sigatoka] could be established and maintained "(RDIRA Part B, page 134). This seems unlikely given that:

i. nearby unsprayed blocks would provide constant disease inoculum pressure
ii. the high number of annual sprays (30 - 45) suggests that there may be some development of fungicide resistance, making a high standard of control impossible
iii. there is possible loss of aerial spraying in some regions due to perceived environmental and health issues, which would seriously limit the effectiveness of fungicide applications.

Recommendation 28: That the feasibility of the Philippines maintaining areas of low pest prevalence is reviewed.

The RDIRA states that the "IRA team agrees that visible symptoms of black Sigatoka at all weekly inspections shall not exceed 1% (of stage 1 or stage 2 lesions) of the leaf area per leaf". It would be extremely difficult to detect stage 1 or stage 2 lesions without physically looking at individual leaves at close range. This task would be impossible to do just walking through a block.

Recommendation 29: That the restricted likelihood for *Imp2* be reviewed.

3.3 *Freckle (*Guignardia musae*) (Chapter 11)*

3.3.1 Incidence of freckle within an infected plantation (Chapter 11.3.2)

It is concerning that freckle pcynidia were observed in two of four lots of bananas from the Philippines on sale in New Zealand supermarkets, considering these fruit would have already gone through an inspection process.

Recommendation 30: That the likelihood of *Imp2* be reviewed.

3.4 *Banana bract mosaic virus (Chapter 12)*

No comment.

3.5 *Banana bunchy top virus (Chapter 13)*

No comment.

3.6 *Panama disease* (Fusarium oxysporum *f. sp.* cubense*)*

DPI&F are concerned that *Fusarium oxysporum* f. sp. *cubense* (*Foc*) has been reassessed in the pest categorisation process of the 2007 revised draft IRA report as not requiring further consideration and warranting full pest risk analysis.

Foc fulfils the criteria for pest categorisation (RDIRA Part B, page 21-23):

- associated with banana fruit or banana plantations
- present but not widely distributed and being officially controlled
- potential for being on the pathway
- potential for establishment and spread
- potential for economic or other consequences

Biosecurity Australia identified three risk pathways for Panama disease in the 2004 RDIRA:

- symptomless infection of the vascular strands in the peduncle tissue
- the presence of small pieces of infected leaf trash trapped between the fingers of harvested fruit
- contamination of fruit and packaging surfaces with soil containing *Foc* spores

However, the 2007 revised draft report states that (RDIRA Part B, page 63):

> 'The IRA team also considered the quarantine status of Fusarium wilt or Panama disease (*Fusarium oxysporum* f. sp. *cubense*). It determined that the risk of entry, establishment and spread was minimal, taking into account the results of previous risk assessments (BA 2002d) and existing conditions for trade in bananas from areas where the disease is present. The minimal likelihood of occurrence of infected trash in banana shipments and the fact that Panama disease does not infect banana fruit are the key reasons for not conducting further assessment of this disease'.

DPI&F questions why the pathways for entry identified in the 2004 IRA are no longer considered valid for *Foc*, particularly when the first two pathways are considered in the PRAs for other pathogens (symptomless peduncle infection included in the PRA for Moko and presence of leaf trash included in the PRA for black Sigatoka).

Furthermore, page 17 of the RDIRA Part B also states that:

> *Prior to proceeding with a new PRA, a check should be made as to whether the*
> *pathway or pest has already been subjected to the PRA process, nationally or internationally. If the PRA exists, its validity should be checked as circumstances may*
> *have changed. The possibility of using a PRA from a similar pathway or pest, that may partly or entirely replace the need for this PRA, should also be investigated.*

In the case of *Foc*, circumstances have changed substantially because tropical race 4 (TR4) has recently been discovered in the Philippines (Bioversity International 2007). Previous PRAs (Biosecurity Australia 2002, 2004) did not include *Foc* TR4 in their assessments, and are no longer valid as they are based on inaccurate or dated information.

TR4 is an extremely aggressive strain of race 4 (attacks Cavendish and all varieties susceptible to race 1 and race 2). In the Northern Territory where TR4 has been detected, all infected plants are removed, the area is fenced off to restrict access, the movement of banana material and soil from infested areas is prohibited and no planting is allowed. Should TR4 become established and spread in north Queensland, where in excess of 80% of bananas in Australia are grown in tropical conditions, it has the potential to destroy the Queensland industry. In the Northern Territory, the effects of TR4 have been to reduce a developing industry to a small number of minor farms that can control the disease because they do not have significant traffic by workers. It is also not known how TR4 would react in subtropical conditions, but it is assumed that it would also attack the same varieties, but possibly more aggressively (and therefore, could potentially pose a threat to the entire Australian banana industry).

The following comments relate to the previous PRA for *Foc* in the 2004 revised draft (BA 2004), which should be considered when preparing a new PRA.

- Page 192, paragraph 4

'*only* VCG 0122 has been recorded in the Philippines, whereas VCG 0120-01215, 0124, 0129 and 01213-01216, but *not* VCG 0122, have been recorded in Australia (Ploetz and Pegg, 2000)'.

This information is outdated. VCG 01213/16 (Tropical race 4 has been recorded in Philippines (Bioversity International 2007).

- Page 192, paragraph 5

Discusses other hosts. There is a more recent reference which may be more informative (Hennessey *et al.* 2005). Other hosts are from widely unrelated species and show *Foc* TR4 cannot be eradicated from a significant area.

- Page 193, Probability of importation

This paragraph discounts contamination of fruit with soil as a pathway due to a claim that chlorine and alum will kill or remove spores as discussed in Method for Import Risk Analysis, page 59 which states that tanks will contain chlorine at a concentration of 20 ppm. Research by DPI&F has found that a rate of 1% v/v chlorine is required for killing spores, which is equivalent to 10 000 ppm (O'Neill 2007, *pers. comm.*) Therefore the rate of 20 ppm would not be effective at killing *Foc* spores and this pathway needs to be considered in the calculations.

- Page 193, *Imp 1*

Old data has been used. Tropical race 4 has been detected in the vicinity of Calinan, near the city of Davao, Mindanao (Daniells 2007, *pers. comm.*). It is likely that *Foc* tropical race 4 is also present in other banana growing plantations and, without a comprehensive survey, the actual extent of the spread of *Foc* tropical race 4 in Mindanao is unknown. Hence the likelihood of *Imp1* needs to be reassessed.

- Pg 194, Contamination with infected leaf trash

The likelihood that a particular bunch contains trash particles was assessed as very low. This needs to be reassessed given information contained in the 2007 draft that discusses the levels of leaf material/trash found in cartons of bananas exported to New Zealand (RDIRA Part B, page 107).

- Pg 194, *Imp 3 - the likelihood that a tonne of harvested fruit will be infected r infested during transport to the packing station*

A negligible likelihood was assigned to *Imp 3* partly due to the claim that spores would be killed by chlorine. This likelihood should be reassessed as chlorine at the level stated would not kill the spores (refer Probability of Importation above).

- Pg 195, Imp 4 – the likelihood that a tonne of harvested fruit will be infected or infested during routine procedures undertaken within the packing station

As discussed previously, chlorine concentration levels suggested are not biocidal to *Fusarium oxysporum* f. sp. *cubense*. Therefore this likelihood needs to be reassessed.

- Pg 196, Conclusion – probability of importation

This simulation needs to be repeated with the most recent data provided above.

- Pg 196 – Probability of distribution

This section discusses race 4 (VCG 0122). As tropical race 4 (VCG 01213/16) has been recently discovered in the Philippines, this should also be addressed in other parts of the documents (i.e. all mentions of race 4 (VCG 0122) should also include tropical race 4 (VCG 01213/16).

- Pg 196, Prop 2 – the proportion of imported bananas that is likely to be distributed to an area in which susceptible household banana plants, or other susceptible garden plants are found

Discusses other asymptomatic hosts of *Foc*. This information is in need of updating. Refer to Henessey *et al.* (2005).

- Page 197, Persistence

Mentions that no sexually produced spore stages are known for this species. This has recently been refuted. Work by a research group in South Africa have demonstrated (in the laboratory) the formation of asci containing viable ascospores (A. Viljoen, *pers. comm.*).

- Page 203, Impact on animal or plant life or health.

The consequences rating needs to be reassessed as it was initially based on race 4 (VCG 0122) and not tropical race 4 (VCG 01213/16). Tropical race 4 is extremely aggressive and to date there are no known control methods for this aggressive strain except the deployment of resistant cultivars. To date, there are no commercially accepted cultivars with resistance to tropical race 4 and hence as stated 'spread of this disease to other production areas would prevent commercial production of Cavendish'. (Biosecurity Australia 2004, Appendix 1 Pest data sheets, page 411)

As approximately 80% of Australian bananas are grown in Northern Queensland (i.e. under tropical conditions), and of this 80%, 90% of those grown are of the Cavendish variety, spread of tropical race 4 would threaten approximately 72% of Australia's banana industry.

- Page 204, The indirect impact of Panama disease.

This consequence rating was initially made based on detection of race 4 (VCG 0122) and should be reassessed using tropical race 4 (VCG 01213/16). As outlined in section 2.6 above, detection of TR4 results in destruction of affected plants and surrounding plants, and the land being fenced off indefinitely, and unavailable for agricultural or general use. Therefore the indirect effects would extend beyond costs for control and surveillance and need to include the loss due to access to land. In addition, the potential environmental impact of run-off from herbicide usage (to destroy infected plants) should be considered given that in excess of 80% of Australian banana's are grown in the vicinity of the Great Barrier Reef. Environmental damage to the Reef would have impact at a national level as it affects many facets – natural heritage, tourism, jobs.

- pg 205, Conclusion

DPI&F recommends the overall conclusion be reassessed in light of new data.

Recommendation 31: That *Foc* TR4 be reinstated as a pest requiring full pest risk analysis.

DPI&F wishes to make a clarifying note in regard to the risk from TR4 to Queensland and its response to the risk. In the past, Queensland has relied on the stringent quarantine measures in the Northern Territory and in addition has a prohibition on the introduction to Queensland of banana plants or soil (including that which might contaminate machinery) in which bananas have been grown. DPI&F has recently reviewed the risk from TR4 from the Northern Territory and concluded that this approach remains appropriate. The extent of decline in the Northern Territory banana industry is such that the amount of inoculum now is far below that which existed previously. The disease sites are effectively contained. There is little likelihood that machinery from one of these farms would be sold into Queensland when there is considerable local demand. There is no likelihood that banana plants would be moved from Northern Territory to Queensland. All fruit produced in the Northern Territory is readily sold close to the place of production.

3.7 *Insect pests*

3.7.1 General comment

The use of clusters of bananas for export, rather than single rows of fruit could compromise pre- and post- export inspection for hitch-hiker pests of bananas. Pests such as spider mites, armoured scales and mealybugs are particularly difficult to observe if fruit are left in clusters.

The IRA rates the consequences of the introduction of exotic scales, mealybugs and spider mites as *low*. There seems to be the perception that these are just pests that will add to but not increase the problems caused by similar pests that are already here. This is highly speculative, and fails to adequately consider the issues for particular hosts, virus transmission or the disruption to Integrated Pest Management Programs that might result (not specifically in bananas).

Visual inspection has been proposed as the only mitigating measures for armoured scales, mealybugs and spider mites and whilst this will initially involve pre-clearance inspections, the report states this could change to on-arrival inspections should requirements change in the future. Having uninspected produce awaiting inspection increases the risk of entry of pests. No detail about what might constitute corrective treatment has been provided.

Recommendation 32: That mitigation measures for armoured scales, mealybugs and spider mites be reviewed.

3.8 *Fruit flies (Chapter 14)*

Fruit flies probably pose a limited risk to hard green bananas, and the acceptance of fruit in this condition by Japan and New Zealand (countries which do not have fruit flies) adds weight to this perception. However, the *negligible* risk assessment for fruit flies is based entirely on the non-host status of mature hard green fruit. Should there be a failure in the system, and ripening fruit is despatched and identified at inspection, there needs to be remedial action recommended to mitigate the risk.

Recommendation 33: That corrective action measures be determined to safeguard against any failure in the inspection system.

Hosts

While the two species identified as important in the Philippines are acknowledged there are considerable gaps in our knowledge of these species, including their host range and activity in particular crops. Part C of the report indicates that *Bactrocera* *philippinensis* has 24 recorded hosts from 14 plant families. This is likely to be a very conservative list based on very limited data and lack of exposure to some hosts. *Bactrocera papayae*, a geographic variant of *B. philippinensis*, had 39 recorded hosts in 15 plant families during the Papaya fruit fly campaign alone (Hancock *et al.* 2000) and Allwood *et al.* (1999) indicate that it has 206 hosts in 50 families. *Bactrocera tryoni*, a similar polyphagous species, has 242 recorded hosts in 49 plant families (Hancock *et al.* 2000). Likely hosts missing from the IRA list are the stone and pip fruits (apples, pears, nashis, peaches, nectarines, apricots and plums), all the solanaceous species (particularly capsicum and tomato) except potato, many berry species (strawberries, mulberries, blueberries), grapes, coffee, a number of the Sapotaceae (abiu, yellow sapote, mammey sapote and star apple), most of the other citrus not listed, figs, jaboticaba, persimmon, black sapote and some cucurbits.

DPI&F is not aware of a quarantine trapping program for fruit flies in the Philippines, so the full extent of the fruit fly fauna is not known. There also appears to be limited data on post-harvest treatments for the fruit flies listed.

Recommendation 34: That the consequences for fruit flies be reassessed given that a comprehensive host plant survey has not been completed and the potential extent of the host range.

3.9 *Armoured scales (Chapter 15)*

Detections of armoured scale on bananas are relatively frequent as reported by both New Zealand and Japan. Many of these shipments are then required to be fumigated. The RDIRA does not provide information on what form of corrective action would be used should armoured scales be detected at pre-clearance inspections.

Recommendation 35: That corrective action measures be determined for on-arrival detection of armoured scales.

3.10 *Mealybugs (Chapter 16)*

Detections of mealybugs and other pests on bananas and other export fruit (e.g. durians, mangosteen) are relatively frequent (Anon 1995; Anon 2004; Levy 1997). Many of these shipments are then required to be fumigated. The RDIRA does not provide information on what form of corrective action would be used should pests be detected at pre-clearance inspections. This needs to be considered ahead of time, particularly given the volume of bananas that might be imported.

Whilst the ability of mealybugs to transmit viruses is acknowledged in the report (eg. banana streak virus and pineapple wilt virus (Kubiriba *et al.* 2001) which are endemic in Australia), there seems to be no weight given to mealybugs as a pathway for the introduction of exotic viruses into Australia. Although the direct effects of additional mealybug species to crops here may be small, the possibility of the introduction of significant (known or unknown) viruses should not be discounted.

Recommendation 36: That consequences of both Direct and Indirect impact of PEES for mealybugs is reviewed.

3.11 *Spider mites (Chapter 17)*

Inspection for spider mites would need to be performed under a microscope. This is not indicated in the document. Although the report does not mention what control measures are in regular use in Philippine banana plantations for spider mites, field control of mites is problematic because the resistance shown to miticides in high use environments is well known. Hence, spider mites are very likely to be found in bunches of bananas.

Recommendation 37: That pre-clearance and on-arrival inspections for mites be performed under a microscope.

3.12 *Weevils (Chapter 18)*

No comment.

3.13 *Contaminant Pests (Chapter 8.3)*

DPI&F is concerned that inadequate consideration has been given in the RDIRA to the matter of contaminant pests such as arthropods, amphibians and reptiles which may enter Australia as hitchhikers on imported banana consignments. Whilst not specific pests of bananas, entry and establishment of hitchhikers has the potential to cause considerable cost to both Federal and State governments in eradication campaigns and have negative impacts on trade.

The RDIRA states that commodities such as pineapples and mangoes which are currently imported from the Philippines would have similar contaminant pests concerns as importation of bananas. However, it is not reasonable to compare risks of contaminant pests associated with importation of bananas to existing trade in other commodities, given there is a much greater chance of hitchhikers being concealed in a banana cluster than on an individual pineapple or mango. In addition, given the proposed volume of banana imports compared with that of other commodities, there will be a much greater likelihood for entry of contaminant pests.

DPI&F has particular concerns about the risk of entry of ants in banana consignments. The association of ants with scales and mealybugs is well known. Ants, however, have not been included in the Pest Categorisation in Part C. Our governments take the threats to the environment, the economy and our lifestyle from incursions of exotic ants very seriously and this has been demonstrated in recent years by the enormous efforts to eradicate red imported fire ants, crazy ants and electric ants. Hitchhikers should not be discounted on the basis that they are not specific pests of bananas.

Recommendation 38: That contaminant pests of bananas and in particular ants, be subject to full pest risk analysis.

4 Risk management and draft operational framework

4.1.1 Registration of plantations/blocks and packing stations (Chapter 20.2.3)

Growers must ensure that bananas from registered plantations/blocks and destined for Australia are kept segregated from bananas from non-registered plantations/blocks at all times during the harvest, processing, packing and transport operations. (RDIRA Part B, page 265)

It is impractical to consider that certain blocks within a single farming operation would be farmed differently to the rest of the plantation. But unless this is done, it would be otherwise impossible to keep bananas destined for export to Australia segregated at all times from non-registered plantations/blocks. It would also be near impossible to audit compliance with this separating. It places a much higher requirement of surveillance and record-keeping on these plantations.

Recommendation 39 : That only whole plantations should be registered for export to Australia.

4.1.2 Audit (Chapter 20.2.4)

AQIS field audits will measure compliance with plantation registration, block identification, disease management/monitoring, records management and the administration of the areas of low pest prevalence and accreditation requirements. (RDIRA Part B, page 265*)*

It is unclear that compliance could be assessed effectively unless AQIS will also be in the plantations at harvest to count the number of mature green leaves on harvested plants for Black Sigatoka and to check for peduncle discolouration for Moko as bunches are cut.

Recommendation 40: That field audits to measure compliance are unannounced to ensure effectiveness.

4.1.3 Standard commercial practice (Chapter 20.3.1)

This risk analysis and the proposed risk management measures are based on bananas produced under the nominated standard commercial production practices. Information provided by BPI on plantation and packing station practices and procedures, levels of pest infestation/infection in plantations and on banana fruit is largely based on data derived from commercial banana production systems used in the Philippines.

BPI will ensure that all plantations registered for export to Australia are operating under standard commercial practices. Growers are responsible for maintaining adequate records relating to pest control and plantation monitoring, and spray diaries that confirm that the nominated standard commercial practices are used. These records are subject to AQIS audit. (RDIRA Part B, page 266)

There is no detail provided on what are standard commercial practices. These standards would need to be documented and have some basis for acceptability. It is not clear how compliance could be evaluated without specifications.

Recommendation 41: That standard commercial practices are documented and there is evidence of acceptance of these standards by the Philippine banana industry, such as a code of practice.

4.1.4 Areas of low pest prevalence (Chapter 20.3.2)

Plantations/blocks must be inspected each week for symptoms of Moko, black Sigatoka and freckle. Growers are responsible for maintaining adequate records relating to weekly disease control and plantation monitoring, and spray diaries that confirm that the nominated standards commercial practices were used. These records will be subject to AQIS audit. (RDIRA Part B, page 266)

If these inspections are performed by plantation staff, then for confidence to be held in the records, there would need to be independent verification of the inspections, not just the records.

Recommendation 42: That there be independent verification of the inspections, not just the records for weekly plantation inspections of disease.

Pseudostems from which bunches are harvested must have a minimum of eight sound green leaves on the day of harvest. (RDIRA Part B, page 266)

This would require in-field auditing, which would need to be unannounced. Inspections would need to verify the health of plants from which bunches has just been harvested.

Recommendation 43: That field auditing of inspections are unannounced.

In the event that the pest prevalence exceeds the accepted level of LPP, the affected plantation/block will be suspended immediately from export to Australia. (RDIRA Part B, page 267)

The whole plantation should be suspended, not just a block within a plantation, seeing as all blocks would be farmed as one unit.

Recommendation 44: That whole plantations are suspended from export should pest prevalence exceed the accepted level of LPP.

4.1.5 Moko

ALPP will not exceed 0.06 cases/ha/year (as part of a systems approach). (RDIRA Part B, page 267)

This does not taken into consideration the likelihood for 'hotspots' of disease to occur in large plantations, the size of which could result in disease incidence being diluted to meet ALPP.

Recommendation 45: That distribution of disease be take into consideration for determining ALPP.

4.1.6 Visual inspection and corrective action for Moko in the plantation (Chapter 20.3.3)

All freshly cut pseudostems and peduncles must be examined by trained operators for signs of vascular discoloration at the time of harvest.

The inspection will be done by inspectors who have the ability to detect visible symptoms of vascular discolouration with an effectiveness of 95% of all cases.

Records must be maintained of all inspections of the pseudostems and the peduncle, including details of the numbers of bunches per registered plantation/block removed from the export pathway due to discolouration. (RDIRA Part B, page 268)

As per Recommendation 42 this suggests that each bunch harvest will be accompanied by an inspector to look at cut pseudostems, record details of discolouration and then forward this information to another inspector who collates all the information for the plantation to calculate if the disease incidence of 0.06 cases/ha/year has been reached. This does not seem practicable in a system where harvesting is done by unskilled labour to deliver cost advantages.

Recommendation 46: That the practical issues of implementation be considered before being risk mitigation measures are proposed.

4.1.7 General requirements for packing stations (Chapter 20.4.1)

Packing stations registered for export of bananas must source fruit only from plantations/blocks with current registration to export to Australia" (RDIRA Part B, page 269)

It is not clear whether this means that the packing station can only process fruit destined for Australia (and if so, this contradicts the next point below, from page 270) or if it means that packing stations have to ensure that the only bunches processed are sourced from blocks registered for export to Australia.

Refer Recommendation 43 in relation to registration of whole plantations, not individual blocks on a plantation. Otherwise this would mean that a grower could be sending bunches that meet Australian standards to one packing station and bunches that do not meet Australian standards to another. If this was the case it would be extremely difficult to ensure bunches would not be mixed up.

It would also be inconsistent with protocols used during the black Sigatoka emergency in Tully in 2001, in which fruit had to remain segregated, else it became of the one compromised status that could not be sent to disease-sensitive markets.

Bananas for other markets may be packed in conjunction with bananas for Australia provided that all bananas have been sourced from plantations/blocks which satisfy AQIS requirements. Bananas for Australia must remain separated from bananas from non-registered plantations/blocks at all times. (RDIRA Part B, page 270)

It will be unlikely that import conditions from another country will be identical to that of Australia. Having bananas from more than one export market in the same packing house and expecting them to remain separated at all times is unlikely to be achievable.

Recommendation 47: That consideration be given to the practicality of implementing the proposed risk mitigation measures.

4.1.8 Trash minimisation for black Sigatoka (Chapter 20.4.3)

All bunches of bananas must be washed with high pressure hose to remove extraneous plant material as far as practical. (RDIRA Part B, page 270)

DPI&F has concerns about the ability of mobile packing stations to provide high pressure washing facilities, particularly with water that is clean, rather than taken from a nearby drainage channel which may itself be contaminated with pests.

Recommendation 48: That bananas destined for export to Australia not be processed in mobile packing stations.

4.1.9 Prevention of contamination (Chapter 20.4.5)

Packing stations must also ensure that all grading and packing equipment that comes in direct contact with bananas is cleaned and disinfected using an approved disinfectant immediately before each packing run for Australia. (RDIRA Part B, page 271)

Contradicts 20.4.1. *Packing stations registered for export of bananas must source fruit only from plantations/blocks with current registration to export to Australia* (page 269).

Recommendation 49: That proposals for risk mitigation in packing stations be reviewed for consistency and practicality.

4.1.10 BPI supervised inspection (Chapter 20.4.6)

All consignments of bananas for export to Australia will be inspected by BPI/agency prior to presentation to AQIS for pre-clearance.

Each consignment will be visually inspected at an inspection rate of 3,000 clusters. (RDIRA Part B, page 271)

Consignment is not defined in the List of Terms. It is not clear how the 3,000 unit inspection figure was derived.

Recommendation 50: That more information be provided on inspection procedure for fruit destined for export.

4.1.11 Verification of documents, and inspection on arrival without AQIS pre-clearance in the Philippines (Chapter 20.5.5)

Any trash detected will result in the consignment being rejected.

Any banana fruit that is found not to be in hard green condition at the time of on-arrival inspection will result in the consignment being rejected. (RDIRA Part B, page 275)

This will mean that one piece of leaf trash detected in a carton will result in rejection of a whole consignment, regardless of its size. There is no discussion of what will happen to a rejected consignment, for example treated, re-exported or destroyed, and the implications this would have for confidence in the program.

4.1.12 International obligations

Statements made in the RDIRA, such as the ones detailed below, suggest that information provided by BPI on surveys and reporting does not comply with International Standards for Phytosanitary Measures (ISPM) requirements for:

ISPM 6 Guidelines for surveillance,
ISPM 8 Determination of pest status in an area,
ISPM 17 Pest reporting,
ISPM 22 Requirements for the establishment of areas of low pest prevalence.

and hence should not be relied upon by BA to make assessments of risk.

- *Information provided by Philippine authorities indicates that a high degree of disease control is achieved throughout the year. General observations of IRA team members in Australia and the Philippines indicate that actual plantation management practices differ from recommended measures…* (RDIRA Part B, page 110)

- *Philippine authorities submit that BBrMV has been rarely encountered in commercial plantations since 1997. No recent survey data were provided to support this claim made by the Philippines.* (RDIRA Part B, page 170)

- *However, virus indexing technologies have not been widely adopted and there have been no recent surveys to establish disease incidence* (RDIRA Part B, page 170)

- *Survey data provided by BPI…no information has been provided on how these data were derived other than that they were from Cavendish banana plantations from which export fruit was harvested.* (RDIRA Part B, page 186)

- *… a large export Cavendish banana plantation near Davao City. This area bordered banana plantations that were heavily infested with BBTV.* (RDIRA Part B, page 186)

- *It has been reported that all Cavendish banana plantations in the Philippines are subject to weekly surveys for Moko disease (BPI)* (RDIRA Part C, page 49)

- *Additional spatial data on disease incidence has not been provided* (RDIRA Part C, page 49)

- *Details have not been provided of the plantations from which these data were derived* (RDIRA Part C, page 50)

- *The current incidence of BBrMV in commercial banana plantations is unclear. Philippine authorities have asserted that BBrMv has been encountered only rarely on commercial Cavendish plantations since 1997.* (RDIRA Part C, page 91)

Recommendation 51: That data provided by the Philippines to support their application to export bananas to Australia meet standards defined in the ISPMs.

4.1.13 Conclusion

The risk mitigation measures proposed in this IRA are reliant on implementation of procedures that are not practical. In addition, there is significant reliance on self-reporting of disease at the plantation level. This raises concerns that even if the implementation of the risk mitigation measures were practical they would not be met because of the lack of independence built into the processes.

It is also not clear whether BA is afforded the opportunity to verify the operational framework developed by AQIS to ensure that risks identified in the IRA are adequately mitigated. DPI&F would expect that the operational framework developed by AQIS would be evaluated by BA to ensure that the risk mitigation measures proposed are satisfied by the framework that has been developed.

As an alternative to the system outlined in the RDIRA, DPI&F proposes that this chapter should form the basis of a policy document for establishing an operational framework for the management of proposed risks or the means by which an 'Approved Supplier Program' (ASP) could be established and implemented between AQIS and BPI for the supply of bananas from the Philippines to Australia.

An ASP should:

- provide a defined policy and strategies including requirements from which an operational process could be effectively developed, document and implemented to manage the identified risks; and
- demonstrate adoption of a quality management philosophy and how this is applied to the policies, strategies and requirements (as described) to assure risk mitigation process are effective, practicable and achievable.

Under an APS framework the content of the Chapter would detail why risk management processes are required and the strategies or processes to be applied within the context of an ASP. For example why an operational framework is needed, the elements (including support elements such as management review, auditing, control of nonconforming product, corrective and preventative action and document management and control) of the framework, and a description of how they are to be applied. The elements of the ASP as described would reference operational documents such as procedures and work instructions. These documents would describe in detail the, who, what, when, where of specific activities used to manage the risks, including who is responsible.

As it stands, the Chapter is confusing, with a mix of policy and detailed operational requirements. When considering adoption of a quality management philosophy, a limited number of quality management principles and processes have been adopted (eg. process control, training, corrective action and auditing) however, these have not been consistently and adequately identified and applied across all parts of Chapter 20.

DPI&F suggests there are two quality management options that best fit in this situation (i.e. control and management of risks) and would facilitate the application of 'requirements' as defined in Chapter 20.

The first option would be for the supplier (BPI) and sub-suppliers (growers, packers, transporters, storage facilities and exporters) to develop their own management system based on a 'revised' framework provide in Chapter 20. This appears to be what is already suggested by the Section. This option presents some problems to the customer (AQIS) in that there is limited control over the processes used by the supplier to control and manage the risks. The customer would still need to audit the suppliers to verify that a system had been developed, meets requirements and had been implemented. However, the auditing of this type of system is time consuming and relies on the auditor to identify in the customers system where requirements are being met.

The second option is a prescriptive quality management system (as used by the Interstate Certification Assurance Scheme in use in Australian domestic trade) in which the customer prescribes to the supplier how the requirements as described in Chapter 20 are to be met. This option provides a higher level of assurance and greater level of control for the customer as it is known and agreed by both parties on what, who, how, when and where the processes associated with managing the risks is to be carried out. Auditing of this type of system is much simpler as the auditor is auditing against a known and consistent set of procedures.

The major disadvantage for this type of system is the demand on resources that the customer must provide to developing and documenting a set of procedures, work instruction and forms which the supplier must follow. In this particular case it may be possible for AQIS to work with BPI to develop the system thus sharing the demand on resources and fostering a culture of ownership with the supplier.

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