New South Wales

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DEPARTMENT OF PRIMARY INDUSTRIES

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23 MAY 2007

Ms Louise Van Meurs
General Manager
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Dear Ms van Meurs

I refer to the release by Biosecurity Australia (BA) in March 2007 of the *Revised Draft Import Risk Analysis (IRA) Report for the Importation of Cavendish Bananas from the Philippines, Parts A, B and C,* for which stakeholder comment was requested.

Technical review undertaken by experts in NSW Department of Primary Industries (NSW DPI) indicates that BA has underestimated the likelihood and consequences of risk that NSW would incur were bananas to be imported into Australia from the Philippines. Exotic pest and disease introductions may still occur despite mitigation measures being imposed.

In responding to the revised IRA, five areas of the report are addressed in the Attachment to this letter: general issues, statistics and modelling, diseases, arthropod pests and the operational framework.

The NSW DPI technical working group agreed that Moko, in particular, remains a serious threat to the NSW banana industry and the risk of entry and establishment of this bacterial disease was not sufficiently addressed in the IRA. That a member of the IRA team dissented from the recommendations presented in the IRA because of unaddressed concerns regarding Moko disease indicates that further research is required to substantiate the level of risk associated with importation of bananas from a country known to be infested with the Moko bacterium.

Neither was the risk of entry, establishment and spread of the banana leaf spider mite *Tetranychus piercei* adequately assessed. The difficulties of visual detection of small cryptic pests in banana clusters coupled with their wide host ranges, wide temperature ranges for survival and reproduction and the necessity for continuous application of chemical controls during production indicate that the risks posed by mites, mealybugs and scale insects should not be underestimated.

Greater specification of mandated conditions to mitigate risks to acceptable levels is also required. While it may lie beyond the scope of Biosecurity Australia to develop details of

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the phytosanitary protocols required for the implementation of risk managed importation of bananas from the Philippines, this presents a suite of unanswered concerns for which there seems to be no consultation mechanism that harnesses the expertise of stakeholders. It is not an unreasonable expectation that protocols for undertaking such procedures would be documented as part of a quality system, including reference to the specific standards that will be used and the competency levels required of inspectors and that this information should be referred to in the IRA for scrutiny by stakeholders

I would appreciate your department providing an itemised synopsis of the points raised by NSW DPI and your response to each as you progress assessment of this request by the Philippines to access Australian markets.

Yours sincerely

B D BUFFIER
DIRECTOR-GENERAL

Encl

Attachment

NSW Department of Primary Industries

Comments on the *Revised Draft Import Risk Analysis (IRA) Report for the Importation of Cavendish Bananas from the Philippines, Parts A, B and C*

Points are presented in each of the following areas:

1. General issues
2. Statistics and modelling
3. Diseases
4. Arthropod pests
5. Operational framework

1. General issues

- The NSW banana industry is distinct from that operating in north Queensland. In sub-tropical northern NSW, plantations are sited on steep slopes. Topography impacts on plantation management practices, potential pest and disease dispersal patterns and approaches to surveillance, containment and treatment. The risks of establishment and spread of pests and diseases could be greater if calculated separately for NSW within the IRA.
- Current NSW legislation establishing the NSW Banana Protected Area has not been mentioned. The discussion of NSW legislation is an historical record only and does not report regulations in force in NSW which are designed to protect the NSW banana production areas from diseases such as Black sigatoka and Banana bunchy top virus. The lack of currency of this information in the IRA raises the question of currency for other information in the report.
- The consequences for control and eradication of Moko are underestimated by being ranked as significant only at the district level, rather than at regional or national levels. Moko is a Category 2 pest under the Government and Plant Industry Cost-sharing Deed (funding ratio Government 80 : Industry 20) and if an incursion occurred and eradication was agreed, the costs would be high and would be borne nationally.
- Contaminant pests which are not pests of bananas but which may enter Australia in shipments of bananas have been excluded from the risk analysis process. The reason given is that if detected, action would be taken under existing quarantine policy. The uncertainties in this scenario are whether such contaminant pests would be detected at the border and if not, and entry and establishment occurs, what would be the subsequent impacts on other industries, the environment or public amenity. Tramp ants illustrate the risks and costs that might occur due to contaminant pests.
- Despite BA adopting a position that the feasibility of implementing mitigation measures is beyond its scope, acceptance of the recommendation to allow importation of Cavendish bananas from the Philippines implies that market access will occur and that the Philippines will be able to meet the requirements. In future, pressure may be brought to bear on Australia to accept less stringent measures which would correspondingly increase the level of risk to the Australian banana industry and possibly other Australian industries and the environment.

2. Statistics and modelling

- In the quest for thoroughness, it appears that the IRA process could almost be considered over-modelled with the consequence that the model becomes very sensitive to specific parameter values. Under such situations, slightly tweaking a few parameters could achieve a pre-determined outcome unless, in the process of model parametisation, the assignment of values and distributions to the parameters is performed independently of running the model to determine the probability of entry, establishment and spread.

- The spreadsheet model was obtained from BA with a view to testing how slight modifications to some of the parameters altered the conclusions. In practice, using the spreadsheet to do this was cumbersome and time consuming since many of the parameters had to be manually entered. Consequently, the transparency that was anticipated through obtaining access to the model did not eventuate.

- The IRA is a pest risk analysis in which each potential pest on the pathway is assessed individually, irrespective of the number of potential pests. Although each pest and disease is assessed against whether Australia's ALOP is met for that organism there is no consideration of the cumulative or interactive impacts of pests and diseases. This underestimates the chance of an adverse event occurring and may not fully reflect the product risk of importing that commodity. Furthermore, there was no consideration of a possible cumulative impact on pests and diseases already present in Australia. An example cited by the IRA is that the strains of Banana bunchy top virus which occur in the Philippines have "*significant genetic differences*" from the strains isolated in Australia. If introduced, these strains could compound management issues for these pathogens.

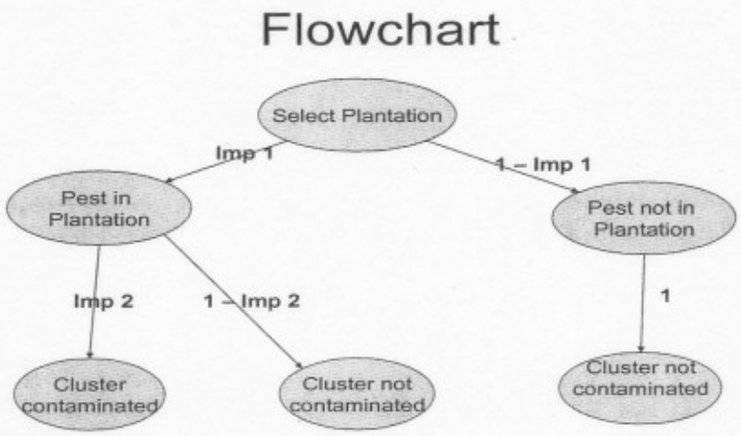
  In order to assess the overall risk associated with the commodity the importation risk for *at least one* of the pests should be considered. For example, if the consequence for each of two pests is '*High'* and the likelihood of entry, establishment and spread for each is '*Extremely low'*, then the risk estimation value for each is '*Very low risk*'. If these were the only two pests associated with the commodity then importation could be permitted. This though is not to say that the risk estimation value for *at least one* of the two diseases spreading in Australia would be *Very low risk*: it will be at least as high as *Very low risk.* More specifically, if there is a 1% chance that there will be adverse event for each of ten independent events, then there will be approximately a 9.6% chance of at least one adverse event amongst these ten.

- The IRA presents the likelihood of risk of entry, establishment and spread of each pest and disease in terms of an '*average year*' of trade. While this concept may serve as a baseline for comparison purposes, real risk is underestimated by lowering the perception of risk. If, for example, eleven pests are evaluated, the probability of at least one adverse event for any particular pest in a randomly chosen year is p so then the probability of at least one adverse event for that particular pest over Y years equals $1 - (1-p)^{Y}$. Further if the eleven pests independently infest / infect clusters, and the probability of at least one adverse event for each pest in a randomly chosen year is p, then the probability of at least one adverse event for at least one pest over Y years equals$1 - (1-p)^{11Y}$. To quantify the example, if the probability of at least one adverse event for each pest equals 0.001, then the probability of at least one adverse event for at least one pest within *10* years equals 0.1 (i.e. a 10% chance of at least one adverse event within 10 years). This level of risk is likely to exceed Australia's ALOP.

- Presentation of statistical components of the model lack transparency. This applies not only to how some realisations are simulated but to flow charts, parameterisations and the number of significant figures used even though assigned values are estimates.

  The flow chart represented at Figure 5.1 in the IRA deviates from usual practice. Normally the outcome of an action comes at the end of the specific probability arrow but in this example that pattern is not adopted and consequently the chart is difficult to read and can

even be misleading. For example, the first two steps in the process '*Select a source plantation'* and '*Select a cluster'* would normally be represented as follows:



In contrast Figure 5.1 of the IRA is more complex and inherently misleading. Take for example the node *'Cluster is infected/infested by the pest at harvest'* from which emanates two arrows labelled '*Imp2* and *1- Imp2'* respectively. The second path '*1 – Imp2*' implies that if one follows the nodes on this path then: the pest was in the source plantation; the selected cluster was contaminated; the cluster then became a non-contaminated cluster which then became contaminated during harvest / transport. No explanation is given in Figure 5.1 about how this cluster changed its contamination status.

Table 5.3 seems to only define the number of imported clusters for the utilities in '*Commercial banana growing areas*' and should be so labelled. Mention could then be made that the numbers for *'Other areas'* have been similarly calculated. In sub-section 5.3.8 it is not clear how the total number of infested / infected clusters going to waste in the category '*Grower (Other Area)*' was determined and whether it was sampled as a hyper-geometric random variable or set as a multiple of the infested / infected clusters imported.

- Some of the assumptions in the IRA may not fully address future risks. For example, it seems as if no account is taken in the model for local bananas to become infected / infested by imported bananas during distribution in Australia, '*P infected waste = P imported × Dist1 × (1 + Dist2)'*. It would appear from this definition that '*Dist2'* only includes the contamination of imported bananas, in which case '$Dist2 \leq (P\ imported \times Dist1)^{-1} - 1$'. Otherwise there is no guarantee that '*P infected waste'* so defined will not exceed one.

  The distribution of imported bananas is assumed to follow the current Australian supply chain. Regulation of movements of foreign bananas into NSW production areas will need to be reviewed if the recommendation to allow importation of Philippine bananas was approved. Current practices mean there is a real possibility that cartons used for transporting bananas into Australia may end up in commercial plantations in NSW and that bananas from the Philippines distributed through centralised warehouses or supermarket chains could also enter NSW production areas.

3. Diseases

- The dissenting member of the IRA team raised significant concerns regarding Moko disease, flagging the need for further technical and scientific validation of the levels of risk concerning verification and maintenance of Areas of Low Pest Prevalence, symptomless infection and efficacy of post-harvest treatments.

- Moko is a systemic bacterium which infects the whole plant including fruit. Asymptomatic infection in mature ready-to-harvest hard green fruit is a possibility and a likely pathway of entry to Australia because BA has relied heavily on a single unpublished scientific report used to establish an incubation period of greater than 13 weeks for Moko and that the presence of Moko is indicated by vascular discolouration. Peer-reviewed time course research is essential to demonstrate that at no stage of disease development Moko bacteria can be isolated from fruit which does not show vascular discolouration. Furthermore, the IRA notes that the expression of symptoms is lowest in mature plants so the likelihood of not detecting symptoms is greatest in plants close to harvest and the risk of symptomless infection in imported fruit is increased. The consequent risk of entry and spread from symptomless infected imported fruit is further increased because '*the most numerous vascular bundles in the fruit occur in the fibrous tissue of the peel*' which is discarded.
- Moko can survive asymptomatically in common weed hosts such as field mustard, thorn apple and blackberry nightshade and can remain viable in the rhizosphere for up to two years. Plantations are required to remain symptomless for a period of one year prior to entry into the export scheme yet it could be possible for a plantation to carry a significant population of Moko bacteria and for the disease not to be expressed at the time of inspection. The IRA admits that information is lacking on the identity and importance of weed hosts in the epidemiology of Moko.
- Under-reporting of Moko could occur in plantations. Field symptoms of wilt might be recorded as unthriftyness rather than Moko and the Moko status of the plantation could be masked as no diagnostic testing of culled moderately wilted plants is required.
- Efficiently detecting Black sigatoka in export plantations is one component of the integrated risk management system proposed in the IRA but detections and consequently the risks may be underestimated. Recent history demonstrates that if introduced, Black sigatoka would establish in Australia. High quality peer-reviewed research is needed to substantiate the fundamental assumptions made in the IRA regarding detection. The difficulty of packing trash-free also increases the risk of entry of Black sigatoka, especially if symptoms in the export plantation were masked through cover sprays.

  Steep terrain used for banana plantations and less mechanisation in the NSW banana industry compared with Queensland could decrease the likelihood of early detection of Black sigatoka and increase the difficulties of treatment so that the potential risks to NSW caused by Black sigatoka are greater.
- The IRA recognises that "*there are significant genetic differences between isolates of Banana bunchy top virus in Australia*" and the Philippines and that "there is no information about the relative pathogenicity of strains, or if they were to coexist, how this would affect their virulence". Despite acknowledging concern due to "*the possibility of introducing additional genetic variability into Australian strains of Banana bunchy top virus*" the unrestricted risk assessment for Banana bunchy top virus was deemed by the IRA to be negligible and to achieve Australia's ALOP without requiring mitigation measures. This decision should be reviewed.

4. Arthropod pests

- Mealybugs are acknowledged as *"one of the most destructive insect pests in the world"*. Although the IRA cites Williams (2004), that mealybug instars are often not detected because they "*are very small and hide in crevices and protected spaces in the fruit*", the mitigation measure to reduce the level of risk below Australia's ALOP is, in contradiction, to be "*inspection*". This concern applies equally to spider mites and scale insects.
- Long-range dispersal of mealybugs is attributed to human transport of infested material from one area to another. Transport assisted dispersal of exotic pests during transit to supply retailers within Australia is acknowledged in the IRA. *"Small mobile arthropods,*

especially mites and first instars of mealybugs and hard scales" are specifically mentioned. That these pests are assumed to be present raises questions about the efficacy of inspection as a mitigation measure to minimise the risks of entry and spread of these inconspicuous exotic pests.

- The seriousness of the potential impacts if introduced into Australia of the banana leaf spider mite *Tetranychus piercei* has been underestimated. *T. piercei* has a wide host range, is capable of surviving and reproducing across a wide range of temperatures and the application of control measures has proven difficult. Zhang FangPing & Fu YueGuan (2004) 'The occurrence of banana leaf mite and its control.' *South China Fruits* **6**: 44-47 was cited in the IRA in reference to mite biology but not pest impact and difficulties of control. The paper indicates that in recent years 100% of banana plantations in Hainan province, China, have been attacked by *T. piercei*. The banana leaf spider mite has 26-29 generations per year and is rampant during drier conditions and drought. Damage symptoms include yellow and withered leaves, delays in fruit maturity and decreases in production quality and quantity. An earlier paper by Fu et al (2002) considers that *T. piercei* is a major pest of bananas in China. Farmers see no option other than to apply major chemical control measures which exacerbate resistance and loss of natural predators. Plant Health Australia Fact sheet 'Exotic threats of banana: Spider Mite *Tetranychus piercei*' states that "*T. piercei is not normally seen with the naked eye. Magnifying glasses or microscopes are needed due to its very small size."*

5. Operational framework

- Details of operational procedures to ensure Australia's ALOP is achieved are not presented in the IRA and neither is there a process in place to allow stakeholder consultation in the development of such details. For example, the IRA mentions "*visual examination*" for spider mites, mealybugs and scale insects but gives no indication about how this will be done.

  The exact procedures for undertaking such assessments should be documented as part of a quality system, including reference to the specific standards that will be used and the competency levels required of inspectors and this information should be referred to in the IRA for scrutiny by stakeholders.

- The 1-year time frame for disease free status of a plantation prior to being registered as an export plantation should be doubled because the Moko bacterium can be present within symptomless plantations as soil-borne populations for up to two years and within asymptomatic weed hosts.

  The international benchmark for pest-free status is two years surveillance with nil detections. If Moko were to enter and establish in Australia and an eradication program was undertaken, this two year requirement would be applied.

- Visual inspection is presented as a principal mitigation measure but might be compromised by physiological factors and practical implementation.

  Inspection of peduncles and pseudostems at harvest for vascular discolouration is suggested to detect Moko but presence of the disease could be discounted due to normal oxidation of the cut surface.

  Routine spraying is likely to suppress symptom expression of Black sigatoka, making visual detection in the plantation difficult.

  Inspection of fruit is suggested to detect mealybugs, spider mites and scale insects but these organisms are very difficult to detect without thorough examination. These organisms have the ability to hide in crevices and small spaces within the banana clusters and are unlikely to be visible between banana fingers without damaging fruit quality.

- Chlorine dipping may be effective against surface pathogens such as Freckle but asymptomatic infection by pathogens such as Moko within the conducting tissue of fruit would be unaffected.

  Procedures to ensure chlorine levels are maintained in dip treatments have not been presented but maintenance of prescribed effective concentrations in these dips should be closely monitored because dip effectiveness is likely to be rapidly reduced due to banana fruit exuding large amounts of resin when harvested.

  Air is trapped as bubbles around fruit ends and between tight fingers when fruit is dipped. Pests, especially spider mites, mealybugs and scale insects and pathogens that are there could escape treatment.

  As fruit is packed wet for export an entry pathway is established.

- Freedom from trash has been presented as the standard requirement for bananas imported into Australia but contradictory statements in the IRA imply that trash will be present. The discussion headed "*Production of Philippine bananas and distribution in Australia*" assumes that trash will be present in imported bananas and become part of the waste stream in Australia even though steps to achieve trash minimisation in both the production and packing stages have been suggested to reduce the risk of Black sigatoka.

  The presence of trash could also introduce Freckle disease. The IRA notes a research data gap by stating that *"there is no information of the survival of freckle in leaf or fruit litter"* but for *"similar fungi … a strong overwintering capacity on infected leaf and stem tissue"* has been documented.

- Knowledge presented as high quality peer reviewed data is needed to substantiate each of the components comprising the proposed integrated system, especially in detecting pests, the efficiency of routine inspection, packing free of trash and efficacy during use of chlorine dips.