BIOSECURITY NEW ZEALAND

Import Risk Analysis: Litchi (*Litchi chinensis*) fresh fruit from Australia

Review of Submissions

September 2008

Ministry of Agriculture and Forestry
Te Manatū Ahuwhenua, Ngāherehere

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MAF Biosecurity New Zealand
Wellington
New Zealand

September 2008

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MAF Biosecurity New Zealand

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September 2008

Approved for general release

Christine Reed
Manager, Risk Analysis Group
MAF Biosecurity New Zealand

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1. Executive summary

The risk analysis examined the nature and possible effect on people, the New Zealand environment, and the New Zealand economy of any organisms that may be associated with fresh irradiated litchi fruit imported from Australia.

Litchi chinensis is a member of the Sapindaceae family and is native to Southern China, Northern Vietnam and Malaysia. It is a growing fruit industry in Australia, with most fruit being distributed on the domestic market. Fruit is assumed to be sourced from some of the 250 commercial growers along the east coast of Australia from Cairns to northern New South Wales (Diczbalis & Campbell 2004). Variations in cultivars means the season continues for about 5 months from November-December until February-March.

In this risk analysis pests and pathogens are grouped according to their biology and members of the same genus are considered within one pest risk assessment. A total of 70 pests and pathogens associated with litchi were considered. Of these, 13 were considered potential hazards and subjected to risk assessment. Twelve were considered to be hazards and management options to mitigate the risk from these species are discussed and reviewed. These include irradiation, washing fruit and visual inspection.

The draft risk analysis was released for public consultation on 30April 2008. MAF received 2 submissions from Horticultural Access Solutions and Biosecurity Australia. While both submissions from Horticultural Access Solutions and Biosecurity Australia accepted the proposed treatment doses for irradiation and washing there were some questions around the assessment of entry exposure and establishment, and clarification was sought on technicalities of the irradiation treatment.

Copies of all submissions are included in Appendix 1 of this document

2. Introduction

Risk analyses are carried out by MAF Biosecurity New Zealand under section 22 of the Biosecurity Act 1993, which lays out the requirements in regard to issuing Import Health Standards (IHSs) to effectively manage the risks associated with the importation of risk goods.

Draft risk analyses are written by the Risk Analysis Group and submitted to internal, interdepartmental, and external technical review before the draft risk analysis document is released for public consultation. The Risk Analysis Group of MAF Biosecurity New Zealand then reviews the submissions made by interested parties and produces a review of submissions document. The review of submissions identifies any matters in the draft risk analysis that need amending in the final risk analysis although the decision to implement these changes lies with an internal committee of MAF Biosecurity New Zealand. The final risk analysis and the review of submissions together inform the development of any resulting IHS by the Border Standards Group of MAF Biosecurity New Zealand for issuing under section 22 of the Biosecurity Act by the Director General of MAF on the recommendation of the relevant Chief Technical Officer (CTO).

Section 22(5) of the Biosecurity Act 1993 requires CTOs to have regard to the likelihood that organisms might be in the goods and the effects that these organisms are likely to have in New Zealand. Another requirement under section 22 is New Zealand's international obligations and of particular significance in this regard is the Agreement on Sanitary & Phytosanitary Measures (the “SPS Agreement”) of the World Trade Organisation.

A key obligation under the SPS agreement is that sanitary and phytosanitary measures must be based on scientific principles and maintained only while there is sufficient scientific evidence for their application. In practice, this means that unless MAF is using internationally agreed standards, all sanitary measures should be justified by a scientific analysis of the risks posed by the imported commodity. Therefore, risk analyses are by nature scientific documents, and they conform to an internationally recognised process that has been developed to ensure scientific objectivity and consistency

MAF Biosecurity New Zealand released the document *Draft Import Risk Analysis: Fresh litchi fruit from Australia* for public consultation on 30 April 2008. Every step was taken on the transparency of the risk analysis to ensure that it provided a reasoned and logical discussion, supported by references to scientific literature. The closing date for public submissions on the risk analysis was 30 May 2008.

Two submissions were received. Table 1 lists the submitters and the organisations represented.

This document is MAF Biosecurity New Zealand’s review of the submissions that were made by interested parties following the release of the draft risk analysis for public consultation. Public consultation on risk analyses is primarily on matters of scientific fact that affect the assessment of risk or the likely efficacy of the recommended measures. For this reason, the review of submissions will answer issues of science surrounding likelihood[1], not possibility[2],

1 Likelihood**:** The quality or fact of being likely or probable; probability; an instance of this.
2 Possible: Logically conceivable; that which, whether or not it actually exists, is not excluded from existence by being logically contradictory or against reason.

of events occurring. Speculative comments and economic factors other than the effects directly related to a potential hazard are beyond the scope of the risk analysis and these will not be addressed in this review of submissions.

Table 1. Submitters and organisations represented

Date	Submitter	Organisation Represented/Location
30/05/2008	Louise van Meurs	Australian Government: Biosecurity Australia (BA)
30/05/2008	Michael Daysh	Horticulture access solutions P/L

3. Review of Submissions

3.1. HORTICULTURAL ACCESS SOLUTIONS COMMENTS

The submission from Horticultural access solutions is included in Appendix 1. The discussion below summarises the main points raised and gives MAF's responses to them.

3.1.1. The submitter notes that the commentary and analysis seems excessive and at times goes into material that is of little relevance to biosecurity, e.g. "In the Snowy Mountains…"at p9

MAFBNZ response: Submission noted

3.1.2. The analysis makes little use of existing import Health Standards for Australian mango and papaya which use irradiation as the treatment and uses no new science or data.

MAFBNZ response: There was an assessment of risk done for mango and papaya, but this is the first detailed documentation around these risks particularly for irradiation treatment. The litchi risk analysis includes a review of irradiation technology and its application to the hazard organisms associated with the produce.

3.1.3. Does NZMAFF intend to continue to "reinvent the wheel" with the remaining Australian tropical fruit access applications on the work program; longans, mangosteens, rambutan, custard apple and breadfruit? This approach is a cost to NZ taxpayers through the use of scare biosecurity resources in duplication and repetition and a cost to NZ consumers through delayed access to improved supply and competition in tropical fruits.

MAFBNZ response: We will be re-using information when looking at how the remaining fruit products could be assessed. The irradiation review in the litchi RA will be used as a basis for future risk analyses using irradiation as a treatment measure. Where pests and treatments are similar previous work will be utilised. Where new species and information exist these data will be collected and reviewed.

3.1.4. There is an industry expectation that the risk analysis process for Australian tropical fruits, which have common production areas, share many common pests and will share a common insect treatment measure, would become more rather than less efficient over time.

MAFBNZ response: This risk analysis for litchi will provide some baseline data on pests and treatments for other tropical fruits.

3.1.5. Rather than building on ISPM 18, some discussion in the analysis such as sterilisation tests and the suggested use of irradiation indicators is counter to the standard

MAFBNZ response: While recommending options for management we consider international standards, country specific legislation and other relevant biosecurity issues. There is some available technology in the area of sterilisation testing, for individual organisms. The testing takes time however and is not practical at the border. The discussion around this is intended to illustrate what could be available in the future if technology advances.

In their current form sterilisation testing and irradiation indicators do not provide fast and effective monitoring techniques. In the future if this technology becomes available it would provide an effective performance measure on irradiation treatment that does not counter international standards such as ISPM 18.

3.1.6. Section 3.7, Para 2. The value of AU$16/kg is not referenced and is almost certainly too high.

MAFBNZ response: This figure is based on current retail price of litchi fruit in New Zealand from 2004-2008 (this fluctuates between A$14-$16). As litchi's become more widely available in supermarkets it is assumed these prices will fall.

3.1.7. Section 3.10, Transport The discussion in para 3 & 4 is loose ("average", "'considerably shorter", "much lower") and is of no relevance to biosecurity as the risk analysis does not suggest that the pathway will be part of the treatment.

MAFBNZ response: Section 3.10, is provided as background information. See paragraph 1 under 3. Commodity and Pathway Description p17

3.1.8. Section 3.10, Transport. What is the biosecurity relevance of "on a plane which transports passengers as well"?

MAFBNZ response: Section 3.10, is provided as background information for the pathway. Produce can come to New Zealand on both passenger and cargo aircraft. See paragraph 1 under 3. Commodity and Pathway Description p17

3.1.9. Section 3.10, Transport. What is the purpose of "temperatures in the hold of the plane are likely to be average to cold", "the length of time in transit is considerably shorter" and "humidity is also likely to be much lower"?

MAFBNZ response: Section 3.10, is provided for context. See paragraph 1 under 3. Commodity and Pathway Description p17

3.1.10. In practice, Australian lychee exporters use measures such as insulated wraps and plastic bags to maintain approximately +5C and 95% RH 9p12) by both air and sea to maintain premium quality.

MAFBNZ response: Submission noted.

3.1.11. Section 4.1 p18 Lychee from other sources. What is the scientific or biosecurity purpose of this section? These interceptions come from different production systems and different treatments.

MAFBNZ response: In each country where litchi is grown there are a few species shared with other countries and many more that are not shared but have similar ecological characteristics, eg. Nut borers, surface feeders, pathogens etc. The broad groups of organisms that attack litchi may be similar ecologically from different sources. It can be useful to look at the types of risk on existing pathways to get a general idea of the possible types of risk that could occur on a new pathway. It is not intended as a direct comparison see paragraph 3 Section 4.2.

3.1.12. Section 4.2 p19. Interceptions on other irradiated produce. The opening sentence is misleading as there is currently no IHS for irradiated lychee.

MAFBNZ response: Submission noted. The sentence will be clarified.

3.1.13. According to Statistics New Zealand, 3488 kgs of papaya was imported in 2006 and 8498kgs of Australian papaya was imported in 2007

MAFBNZ response: Submission noted

3.1.14. The discussion on 4.2 is based on the incorrect premise that the interceptions on Australian mangoes and papaya were live (live meaning capable of normal development). The interceptions took place because of inconsistencies between two pieces of legislation. Without those inconsistencies, the interceptions would not have taken place and the analysis would have been quite different.

MAFBNZ response: Irradiation is different to other types of treatment because the viability of irradiated organisms cannot be instantly ascertained as it can with say methyl bromide, cold or heat treated organisms. While interceptions of organisms that are non viable should not affect biosecurity clearance, they still provide valuable information on the association between commodities and pests. Understanding baseline levels of infestation in the field prior to treatment is an important part of determining the appropriate treatment measures.

The use of interception data in this risk analysis has highlighted the issue of live but non viable organisms, and the intent is to clarify some of the understanding around this concept. This Risk Analysis is also the first to review and document irradiation as a treatment for a particular fresh product in New Zealand and will be used as a baseline for other risk analyses where irradiation is used.

3.1.15. Section 4.3.6 Uncertainty. It would be useful to present the uncertainty with a balanced equation such as: Low probability of insect surviving the desired response (sterility, non emergence, mortality) due to the standard required in the research X Low probability of commercial fruit being infested X Low probability of the target insect surviving the desired response X Impact of higher than minimum required absorbed dose through effect of min: max ration = High level of confidence in the treatment

MAFBNZ response: Thank you for your suggestion. We think this could be more appropriate in the measures section. The uncertainty section discusses exactly where there are gaps in information and for the efficacy data available provides an estimate of the level of uncertainty that the treatment will be successful. The risk associated with a particular organism is assessed according to its likelihood of entry, exposure and establishment in New Zealand and the potential unwanted consequences it could cause were it to establish. Where there is a lack of information about a certain aspect of its biology or the pathway on which it occurs assumptions are made about these likelihoods.

3.1.16. Section 5.4 Irradiation. This is a wide ranging introductory level discussion on food irradiation, much of which is not relevant to biosecurity and the provision of a phytosanitary treatment for fresh horticulture. The purpose is unclear, particularly as there is no new science.

Para 2. The comment ‘its use in trade...” is not referenced and an opinion. The reasons for the rate of adoption of irradiation as a phytosanitary treatment are more complex than suggested and probably more to do with community attitudes and acceptance (concern over cobalt 60 and radioactivity) and the availability of convenient and established alternative treatments such as thermal, chemical and fumigants. Electricity based irradiation is now available and chemical and fumigant treatments are facing restrictions.

MAFBNZ response: Submission noted.

Para 3. This paragraph has grammatically muddled the food safety and biosecurity requirements, which are entirely separate. The Food Standards Australia New Zealand (FSANZ) standard for nominated tropical fruits mandates for food safety a minimum dose of 150 Gy and a maximum dose 1000Gy where the purpose is a phytosanitary treatment. A plant quarantine treatment for consumption within New Zealand (or Australian), typically a nominated minimum absorbed dose, must be within the FSANZ minimum/maximum.

MAFBNZ response: Submission noted. This sentence will be clarified.

Para 4. This paragraph should refer to the FSANZ standard 1.5.3, referred to in the previous paragraph for consistency and as 1.5.3. is the operative legal standard in New Zealand. FSANZ 1.5.3 differs from Codex 106-1983 in that cesium-137 is not a permitted source in 1.5.3.

MAFBNZ response: Submission noted. The addition of the reference to FSANZ standard 1.5.3 to this paragraph will be made.

Para 5. If it is necessary to have a introductory discussion on cobalt 60 dose uniformity, then it is appropriate to have a similar discussion on dose uniformity for electrons and x-rays. Miller covers the topic in detail. It is also appropriate that for the source for electrons and x-rays, electricity, is stated

MAFBNZ response: Submission noted.Agreed. The recognition that electricity is the source which produces electrons and x-rays will be included in Paragraph 5.

Para 7. There is no evidence that irradiation at disinfestation doses is any more deleterious to fresh fruit and vegetables than thermal, chemical or fumigation treatments.

MAFBNZ response: Submission noted

3.1.17. Section 5.4 – fungi p27/28. Is such a lengthy discussion about irradiation andfungi necessary when the literature and data does not support a treatment and there was no request in the Australian access application?

MAFBNZ response: Submission noted. The assessment concluded that two fungal pathogens are hazards on litchi from Australia. And that risk management measures are justified for these organisms. See p118

3.1.18. 5.4 – p29, Line 7. "Sources" of and "'types" of ionising radiation have been muddled. The two permitted sources in New Zealand are cobalt 60, which produces gamma rays and electricity which produces electrons and x rays. The sentence should be "…source activity (cobalt-60 or electricity), control and recording…"

MAFBNZ response: Submission noted. Wording changed as outlined.

3.1.19. Section 5.4 – p29, Line 9. "Calibrated delivery of dose"- what does this mean? Should it mean… "back to a minimum absorbed dose"?

MAFBNZ response: Submission noted. Wording will be changed from calibrated to verified for clarity.

3.1.20. Section 5.6 Para 4. Using an irradiation "risk management option" there will be no "alive" insects. Irradiation indicators cannot and do not confirm that the treatment has been carried out where 'treatment' is defined as achieving a nominated minimum absorbed dose. This is discussed briefly at p29. Irradiation indicators can merely indicate that the indicator (box) has been exposed to radiation. In a worst case, that could have been sunlight! Irradiation indicators will present misleading and potentially false information to border inspectors while adding costs. For border inspectors, documentation supported by irradiation process controls as outlined in ISPM 18 is the only proper measure. USDA discussed the use of irradiation indicators and decided not to adopt them and irradiation indicators do not form part of the USDA irradiation work plans. Appropriate irradiation process controls are the only suitable method to verify treatment.

MAFBNZ response: This emerging technology of irradiation indicators has current limitations, please note the following sentence in paragraph 28 of section 5.4 "It is essential to note that such methods are not quantitative or suitable for dose verification (P. Roberts Pers. Comm. 2007)." It is discussed within the context of a review which covers all aspects of irradiation as a technology, including irradiation indicator techniques.

3.2. BIOSECURITY AUSTRALIA (BA)

The Biosecurity Australia submission is included in Appendix 2. MAF appreciates the efforts taken by Biosecurity Australia to review this risk analysis and wishes to take this opportunity to thank them for their generous time and expertise. The discussion below summarises the main points raised and gives MAF's responses to them.

Biosecurity Australia's comments on draft import risk analysis for Fresh litchi fruit 30 May 2008 are based on the risk analysis processes as set out in the International Standards for Phytosanitary Measures (ISPMs), particularly ISPM No. 2 – Guidelines for Pest Risk Analysis and ISPM No. 11 – Pest Risk Analysis for Quarantine Pests including Analysis of Environmental Risk Analysis Pests and Living Modified Organisms.

3.2.1. It is suggested that the risk rating for Bactrocera tryoni, B. neohumeralis and B. jarvisi has been overstated. Particularly there are few host records on litchi fruit from these species, there is no evidence that litchis would prove suitable hosts for hybrids of the fruitflies, and climate data does not conclusively show that B. jarvisi or B. neohumeralis could establish in New Zealand.

MAFBNZ response: This group of species is widely referred to in the literature as the Batrocera tryoni species complex, making it important to consider all related Bactrocera's and their hybrids (including B. aquilonis which was ruled out as a risk because of its geographical distribution and lack of association with the host). There is some uncertainty about the frequency of hybridisation in the field. Uncertainty around levels of hybridisation does not imply there are negligible risks of hybrids occurring and infesting litchi fruit.

It is agreed that the likelihood of any of the three species entering the country in litchi is low but non-negligible i.e. worth considering, as litchi is not a major host (this will be ammended for B. tryoni and B. neohumeralis).

Smith et al. (1988) predicted that B. jarvisi had the potential to increase in economic importance, as it had increased its host range from nine (four cultivated) species in 1979 up to 21 (12 cultivated) species in 1988. Hancock et al (2000) lists 83 species as hosts for B. jarvisi in 2000. All three specie have a wide host range and if any were to enter (despite the likelihood being low) there are small areas in New Zealand that could support populations of the flies with suitable hosts and climate. The use of CLIMEX B. cucumis data as a proxy for B. neohumeralis (for which no climate modelling has been undertaken) is based on the widely overlapping geographic distribution of the two species in Australia. Because both species are found in the same areas, it is a reasonable assumption that they probably share similar environmental tolerances. It appears B. neohumeralis occurs further inland than B. cucumis where mean annual temperatures are slightly lower, so probably has a higher cold tolerance than its congener.

In experiments comparing B. neohumeralis and B. tryoni, Meats (2006) found no difference in the cold torpor thresholds of either species. There is also no direct evidence in the literature that the lesser distribution of B. neohumeralis compared to B. tryoni is restricted by cold intolerance (see Meats 2006). It is suggested that the only physiological restraint to B. neohumeralis may be that it is less fecund (Meats 2006).

Also see pg 274 (Fay & Meats 1983) for reference to flies with mean cold torpor thresholds of 6.8 and 3.2ºC.

There is some uncertainty about aspects of the biology of B. neohumeralis and B. jarvisi particularly around cold tolerance. As this data does not exist assumptions have been made in the analysis. These assumptions and slightly different ways of looking at the data do not change the management recommendations of this RA overall.

3.2.2. Litchi has been identified as a host for Ischnaspis longirostris in Florida and Hawaii, and although present in Australia has not been recorded associated with litchi there, so it should not be considered in this risk assessment. Also the likelihood of it entering being exposed to the environment and establishing has been overstated.

MAFBNZ response: If there is evidence for a pest using the commodity as a host in another country it will be considered as a potential hazard if it occurs in the country exporting the commodity. The significant factors are evidence of the association and occurrence of the pest in Australia for example. Comment on likelihood of entry and exposure noted. This will be amended Ischnaspis longirostris has also been intercepted on fruit coming from overseas in the past (Interception records – Quancargo Database 2008). Because economic consequences of the establishment of this pest would be highly significant the risk is considered non negligible.

3.2.3. A restricted population of Isotenes miserana was detected in Auckland, New Zealand. To date, BNZ has not yet clarified whether this incursion is under official control. Biosecurity Australia would appreciate BNZ providing confirmation of the status of this pest, as this impacts on the assessment of this species as a quarantine pest for New Zealand.

MAFBNZ response: The unwanted status of Isotenes misera has been removed, and it will not be considered a hazard organism in this risk assessment. That section of the document will be taken out and replaced as a smaller note in the appendices.

3.2.4. Although Nysius vinitor has been recorded from most Australian states and territories, there is little evidence supporting the association of this pest with harvested litchi fruit. There is a low likelihood of eggs being deposited on fruit or of hitch hiking adults being present with washing or brushing likely to remove eggs, or they would be detected and culled during sorting and grading operations.

MAFBNZ response: N. vinitor is widely accepted as a pest of litchi in commercial environments and has been assessed as such. Nysius vinitor has arrived in New Zealand from Australia at various life stages (Interception records – Quancargo Database 2008) on basil, honeydew melon, lettuce, orange and strawberry. While there is a low likelihood of eggs or immature stages being associated with the mature litchi fruit this likelihood is still non-negligible.

3.2.5. It is considered unlikely that Pestalotiopsis sp. would be associated with the exported commodity and should be removed from the finalised risk analysis. It is characterised as a weak pathogen requiring older host material and older damaged fruit are likely to be inspected and removed in the grading process. High infection rates seen in other countries are not expected to occur in Australia. Measures including washing, brushing and application of a broad spectrum fungicidal dip would most likely cull any infected fruit.

MAFBNZ response: There is some difficulty around the taxonomy of the Pestalotiopsis species which attacks litchi in Australia as it has not been identified to species level. Some reasonable assumptions have been made about its biology and life cycle based on the characteristics of a closely related congener Pestalotiopsis mangiferae. P. mangiferae is capable of infecting healthy fruits if in direct contact with diseased tissue (Mordue 1980). Mycelia of the fungi colonize inflorescence tissue as it matures and in certain conditions, including specific water regimes, defoliation and pruning practices, reach the stem end of fruit. Infections then remain latent until after harvest or until the unharvested fruit senesce (Johnson et al. 1991). This clearly implies that on some occasions infection will not be picked up until after harvest. No data exist on exact length of time before infection becomes noticeable.

As this pathogen is recorded attacking Vitis vinifera and Eucalyptus spp. the consequences of its establishment were it to enter the country would also warrant its inclusion as a hazard organism.

There is no literature around infection rates of this Pestalotiopsis sp. (it is not known whether it is a described species or undescribed) in Australia compared to overseas studies. Until that information becomes available the assumption remains.

Thank you for suggesting washing, brushing and application of a broad spectrum fungicidal dip as an additional management option. Any efficacy data around the success of these fungicidal treatments in Australia would be helpful. We will take this into account further in the Import Health Standard stage.

3.2.6. As noted by BNZ in its assessment, B. hawaiiensis is considered to be senectopathic and therefore only capable of causing infection to ageing host tissue. The potential for the fungus to infect fresh litchi fruit is therefore likely to be minimal (Brecht et al. 2007).

MAFBNZ response: We acknowledge and agree that the likelihood of entry and establishment into New Zealand are low for this species.

Some authors propose that B. hawaiiensis is senectopathic (Brecht et al. 2007) while others (Xiang & Zhong 1999) observe it as a pathogen. Uncertainty exists around its being pathogenic on litchi (it was isolated from fruit after 3 weeks of storage in one example Hancocks, B. Biosecurity Australia pers. comm. 2007). It is possible it could enter the country on fruit at a stage where it is not detectable by visual inspection.

B. hawaiiensis is considered allergenic and causes severe cases of mycotic keratitis, phaeohyphomycosis and chronic fungal sinusitis in humans (Sharkey et al. 1991; Sharkey et al. 1990; Washburn et al. 1988). As there are potentially high consequences of B. hawaiiensis it will remain as it has been assessed in the risk analysis. When more information becomes available indicating its pathogenicity on litchi this analysis can be re-assessed.

3.2.7. Management options for quarantine pests:

Management of insect pests: While BNZ has concluded that litchi may be host to various fruit flies, litchi are considered non-hosts for fruit fly in Australia (Leach 2004). The poor host status of litchi for other tephritid species has also been demonstrated by research in Hawaii by Armstrong (1994) and in Florida by Gould (1999).Biosecurity Australia, in consultation with the Australian litchi industry, accepts the proposed irradiation dose of 250 Gy to mitigate the importation risks for all identified insect pests.Australian mangoes and papayas have commenced trade into New Zealand under a treatment schedule of 150 Gy for fruit flies and 250 Gy for other arthropods, since 2004. Biosecurity Australia requests that the successful operational arrangements already in place for irradiated tropical fruit exports be applied to Australian litchi.

MAFBNZ response: Submissions noted.

Management of pathogens: Biosecurity New Zealand has identified both Bipolaris hawaiiensis and Pestalotiopsis sp. to be hazards on the commodity requiring mitigation measures. However, as has been discussed, BA considers that there is a lack of evidence supporting the association of these two pathogens with Australian commercial litchis. Additionally, the obvious symptoms of infection would ensure that affected fruit would likely be culled. While we assert that no measures are required, if BNZ contends specific measures still need to be imposed, BA considers that Phytosanitary certification declaring the commodity to be free of signs of Bipolaris hawaiiensis and Pestalotiopsis sp., would more than adequately address the importation risks of these two fungi.

MAFBNZ response: The risk management options in the risk analysis are based on the detectability of pathogens. Some pathogens are not always visually detectable. The measures recommended for pathogens which may or may not be visually detectable are stated in risk management options section for the fungal pathogens and are covered in more detail in the chapter on management (See section 5.5). Considerations in the issuance of Phytosanitary Certificates are dealt with at the Import Health Standard stage of the process.

Appendix 1 Submissions Received

1.1 Horticultural Access Solutions

1.2 Biosecurity Australia

Horticulture Access Solutions Pty Ltd
to markets through science

30 May 2008

Ministry of Agriculture and Forestry
Wellington
New Zealand

Attention: Charlotte Hardy

By email: charlotte.hardy@maf.govt.nz

Re: **Comments on the draft Australian lychee risk analysis – April 2008**

Horticulture Access Solutions P/L (HAS) thanks the Ministry of Agriculture and Forestry for the opportunity to comment on the draft Australian lychee risk analysis. HAS, created with New Zealand capital, is establishing an x-ray horticulture disinfestation facility in Australia.

HAS supports the proposed measure of 250 Gy for insects of concern. This measure is consistent with the data for *Cryptophlebia ombrodelta*, however there are other insects identified in the analysis that are not associated with the Australian pathway.

HAS makes the following general comments on the analysis;

- The commentary and analysis seems excessive and at times goes into material that is of little relevance to biosecurity, e.g.; "In the Snowy Mountains…" at p9.

- The analysis makes little use of the existing New Zealand Import Health Standards for Australian mango and papaya which use irradiation as the treatment and uses no new science or data.

- Does NZMAFF intend to continue to 'reinvent the wheel' with the remaining Australian tropical fruit access applications on the work program; longans, mangosteen, rambutan, custard apple and breadfruit? This approach is a cost to NZ taxpayers through the use of scare biosecurity resources in duplication and repetition and a cost to NZ consumers through delayed access to improved supply and competition in tropical fruits.

- There is an industry expectation that the risk analysis process for Australian tropical fruits, which have common production areas, share many common pests and will share a common insect treatment measure, would become more rather than less efficient over time.

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- Rather than building on ISPM 18, some of the discussion in the analysis such as sterilization tests and the suggested use of irradiation indicators is counter to that standard.

HAS makes the following specific comments on the risk analysis;

Section 3.7, Para 2.

The value of AU$16/kg is not referenced and is almost certainly too high. Horticulture Australia[1] indicated a gross value $6.55/kg in 2001/02 and current values may be lower.

Section 3.10, Transport.

The discussion in para 3 & 4 is loose ('average', 'considerably shorter', 'much lower') and is of no relevance to biosecurity as the risk analysis does not suggest that the pathway will be part of the treatment.

What is the biosecurity relevance of "on a plane which transports passengers as well"?

Is it necessary to nominate a particular airline (misspelled), particularly as that airline currently operates narrow body aircraft with limited / nil freight capacity on Brisbane to NZ routes?

What is the purpose of "temperatures in the hold of the plane are likely to be average to cold", "the length of time in transit is considerably shorter" and "humidity is also likely to be much lower"?

In practice, Australian lychee exporters use measures such as insulated wraps and plastic bags to maintain approximately +5C and 95% RH (p12) by both air and sea to maintain premium quality.

Section 4.1 p18 Lychee from other sources.

What is the scientific or biosecurity purpose of this section? These interceptions come from different production systems and different treatments.

Section 4.2 p19. Interceptions on other irradiated produce

The opening sentence is misleading as there is currently no IHS for irradiated lychee.

According to Statistics New Zealand, 3488 kgs of papaya was imported in 2006 and 8498 kgs of Australian papaya was imported in 2007.

The discussion in 4.2 is based on the incorrect premise that the inceptions on Australian mangoes and papaya were 'live'[2]. There was no suggestion from NZMAFF

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[1] *The Australian Horticulture Statistic Handbook 2004,* Horticulture Australia

[2] 'Live' – capable of normal development.

2

that the interceptions were 'live' and that the treatment had failed. The inceptions took place because of inconsistencies between two pieces of New Zealand legislation and without those inconsistencies, the interceptions would not have taken place and the analysis would have been quite different.

Section 4.3.6 Uncertainty

It would be useful if this section was more balanced with an illustration such as;

Low probability of insect surviving the desired response[3] due to the standard required in the research

X

Low probability of commercial fruit being infested

X

Low probability of the target insect surviving the desired response

X

Impact of higher than minimum required absorbed dose through effect of min : max ratio

=

High level of confidence in the treatment

Section 5.4 Irradiation.

This is a wide ranging introductory level discussion on food irradiation, much of which is not relevant to biosecurity and the provision of a phytosanitary treatment for fresh horticulture. The purpose is unclear, particularly as there is no new science.

Para 2. The comment "its use in trade…" is not referenced and an opinion. The reasons for the rate of adoption of irradiation as a phytosanitary treatment are more complex than suggested and probably more to do with community attitudes and acceptance (concern over cobalt 60 and radioactivity) and the availability of convenient and established alternative treatments such as thermal, chemical and fumigants. Electricity based irradiation is now available and chemical and fumigant treatments are facing restrictions.

Para 3. This paragraph has grammatically muddled the food safety and biosecurity requirements, which are entirely separate. The Food Standards Australia New Zealand

[3] Sterility, non emergence, mortality

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(FSANZ) standard for nominated tropical fruits mandates for food safety a minimum dose of 150 Gy and a maximum dose 1000Gy where the purpose is a phytosanitary treatment. A plant quarantine treatment for consumption within New Zealand (or Australian), typically a nominated minimum absorbed dose, must be within the FSANZ minimum / maximum.

Para 4. This paragraph should refer to the FSANZ standard 1.5.3, referred to in the previous paragraph for consistency and as 1.5.3 is the operative legal standard in New Zealand. FSANZ 1.5.3 differs from Codex 106-1983 in that cesium-137 is not a permitted source in 1.5.3.

Para 5 If it is necessary to have a introductory discussion on cobalt 60 dose uniformity, then it is appropriate to have a similar discussion on dose uniformity for electrons and x-rays. Miller[4] covers the topic in detail. It is also appropriate that the source for electrons and x-rays, electricity, is stated.

Para 7. There is no evidence that irradiation at disinfestation doses is any more deleterious to fresh fruit and vegetables than thermal[5], chemical or fumigation treatments.

Section 5.4 – fungi, p27/28. Is such a lengthy discussion about irradiation and fungi necessary when the literature and data does not support a treatment and there was no request in the Australian access application?

Section 5.4 – p29, line 7. 'Sources' of and 'types' of ionizing radiation have been muddled. The two permitted sources in New Zealand are cobalt 60, which produces gamma rays and electricity which produces electrons and x-rays. The sentence should be "....source activity (cobalt-60 or electricity), control and recording…".

Section 5.4 – p29, line 9. "Calibrated delivery of dose" – what does this mean? Should it mean …"back to a minimum absorbed dose"?

Section 5.6 Para 4.

Using an irradiation 'risk management option' there will be no 'alive' insects.

Irradiation indicators cannot and do not confirm that the treatment has been carried out where 'treatment' is defined as achieving a nominated minimum absorbed dose. This is discussed briefly at p29. Irradiation indicators can merely indicate that the indicator (box) has been exposed to radiation. In a worst case, that could have been sunlight!

Irradiation indicators will present misleading and potentially false information to border inspectors while adding to costs. For border inspectors, documentation supported by irradiation process controls as outlined in ISPM 18 is the only proper measure.

[4] Miller, R.B., *Electronic Irradiation of Foods*, Springer, 2005
[5] FSANZ, Final Assessment Report, Application A443, 2002, p60

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USDA discussed the use of irradiation indicators and decided not to adopt them[6] and irradiation indicators do not form part of the USDA irradiation workplans[7]. Appropriate irradiation process controls are the only suitable method to verify treatment.

Thank you for the opportunity to comment of the draft Australian lychee risk analysis.

Yours sincerely

Michael Daysh
CEO
Horticulture Access Solutions P/L

[6] Federal Register No 67, No 205, October 23, 2002, 7 CFR Parts 305 & 319.
[7] Irradiation Operational Workplan between Australia and United States of America, draft, 2008

Australian Government

Biosecurity Australia

Biosecurity Australia's Response to Biosecurity New Zealands's "Risk Analysis for the Importation of Fresh Litchi Fruit (*Litchi chinensis*) from Australia"

May 2008

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1 SUMMARY

Biosecurity Australia accepts the proposed irradiation treatment schedule of 250 gray to be efficacious in mitigating the insect pests identified by Biosecurity New Zealand (BNZ) as being associated with the trade of Australian litchi into New Zealand.

Biosecurity Australia (BA) requests that a number of pests identified by BNZ be removed from the assessments, as the information used to justify their inclusion in the list of pests does not accurately reflect the scientific information available. These pests are either not associated with litchi production in Australia, or not likely to be associated with mature harvested fruit. As a result, Biosecurity Australia requests that the quarantine measures proposed by BNZ for the two fungal pathogens identified as hazards on the commodity pathway, be removed from the finalised risk analysis for Australian litchi. We also request that the risk ratings assigned to the three fruit flies identified by BNZ as hazards on the commodity be downgraded to more accurately reflect the risks of importation. While these changes do not alter the proposed irradiation measures to be imposed on Australian litchi exports, their adoption would ensure that the risk assessment is based on the most recent, sound science available.

Currently, the use of irradiation as a quarantine measure is an accepted treatment for mango and papaya entering New Zealand, and trade has commenced under these conditions. The finalisation of this risk analysis, subject to review of the scientific content, will therefore allow for the immediate commencement of trade.

2 INTRODUCTION

Australian litchi producers and exporters are seeking market access for produce into New Zealand. To facilitate this access, BA forwarded a *Technical Market Access Submission for Australian Litchi (Litchi chinensis)* to the New Zealand Ministry of Agriculture and Forestry (NZMAF) in March, 2002. This submission includes a list of pests and diseases known to be associated with litchi production in Australia and an overview of the in-field and post-harvest practices. The purpose of the submission was to provide NZMAF with the information required to assess the risks posed by the importation of Australian litchi and to determine the pests and diseases that may require quarantine measures.

Biosecurity New Zealand, a division of NZMAF, provided a risk assessment, the *"Risk Analysis for the Importation of Fresh Litchi Fruit (Litchi chinensis) from Australia"* to Biosecurity Australia for comment in April 2006, and invited comments on the risk analysis. The risk analysis identified 10 pests and two pathogens as quarantine pests likely to follow the pathway. The pest risk potential (consequences of introduction and likelihood of introduction) of these organisms was assessed in the risk analysis. For these pests, BNZ has suggested specific mitigation measures will be required.

This response to the BNZ risk analysis includes input from the Australian litchi and export industry, and suggests finalised import conditions to permit the entry of Australian litchi into New Zealand.

3 COMMENTS ON THE QUARANTINE PESTS FOR AUSTRALIAN LITCHI

Biosecurity Australia has examined the evidence presented by BNZ for associating specific pests with litchi production in Australia. It is considered that for a number of these pests, there is insufficient evidence to support their potential association with litchis produced in Australia.

In line with the risk analysis processes as set out in the International Standards for Phytosanitary Measures (ISPMs), particularly ISPM No. 11 - *Pest Risk Analysis for Quarantine Pests including Analysis of Environmental Risk Analysis Pests and Living Modified Organisms* (FAO 2004), a list of pests "likely to be associated with the pathway" is to be generated during the initiation of the pest risk analysis. Where a specific pest is not associated with the pathway of fresh litchi for commercial sale, no risk is posed to the importing country and consideration of that pest should cease. The general criteria for determining this pathway association are demonstrating the association of the pest with the crop in the exporting country and demonstrating the likelihood of the pest being present on the exported commodity.

3.1 Pests Identified by BNZ

The table below lists the pests identified by BNZ as requiring quarantine measures.

Table 1: Quarantine pests identified in the BNZ draft risk analysis

Pest	Order/Family	Common name
Bactrocera jarvisi	Diptera : Tephritidae	Jarvis's fruit fly
Bactrocera neohumeralis	Diptera : Tephritidae	Lesser Queensland fruit fly
Bactrocera tryoni	Diptera : Tephritidae	Queensland fruit fly
Amblypelta lutescens lutescens	Hemiptera : Coreidae	Banana-spotting bug
Amblypelta nitida	Hemiptera : Coreidae	Fruitspotting bug
Ceroplastes rubens	Hemiptera : Coccidae	Pink wax scale, red wax scale
Ischnaspis longirostris	Hemiptera : Diaspididae	Black threaded scale
Nysius vinitor	Hemiptera : Lygaeidae	Rutherglen bug
Cryptophlebia ombrodelta	Lepidoptera : Tortricidae	Macadamia nutborer
Isotenes miserana	Lepidoptera : Tortricidae	Orange fruitborer
Bipolaris hawaiiensis	Pleosporales : Pleosporaceae	Leaf spot
Pestalotiopsis sp.	Xylariales : Amphisphaeriaceae	Leaf blight, fruit rot

3.2 Host Status

3.2.1 Insect Pests

Fruit Flies (*Bactrocera tryoni, B. neohumeralis, B. jarvisi*)

Biosecurity New Zealand identified three fruit flies, *Bactrocera tryoni*, *B. neohumeralis*, and *B. jarvisi*, as hazards on the commodity requiring mitigation measures. Both *B. neohumeralis* and *B. jarvisi* were not documented in the pest list provided with Biosecurity Australia's market access submission for Australian litchis. Although the recommended mitigation measures proposed for other pests identified by BNZ in its risk analysis will be efficacious against the three fruit flies assessed here, BA considers the risk ratings assigned to these pests to be overestimated. Biosecurity Australia requests that these ratings be downgraded to better reflect the risk of importation. A justification for this request is provided below, and will address all three fruit flies together.

In Australia, litchis have conditional non-host status, where they are not considered a host, provided the skin remains unbroken (QDPI 1997). Domestic quarantine regulations restrict the importation of any litchi fruit with broken skin into South Australia and Victoria (QDPI 1997). However, if the skin is unbroken, no controls for fruit fly are required due to the non-host status. All fruit are therefore inspected during sorting and grading operations to remove any damaged or infested fruit. In thirteen years of domestic litchi trade, no fruit flies have been detected (pers. comm. Ian Groves 2008).

The poor host status of litchi is also supported by the limited reports recorded for these pests on litchi in Australia. Host records have been maintained since 1960 and commercial production of litchis has taken place for over 30 years. During this period, there have been no records of *B. neohumeralis*, only one for *B. jarvisi*, and only two for *B. tryoni* (Hancock et al 2000). Additionally, fruit fly larvae rarely survive in litchi fruit as the larvae drown shortly after the eggs hatch (Waite and Hwang 2002). Furthermore, host status investigations by Leach (2004) demonstrated *Kwai may pink* litchis to be non-hosts of *B. tryoni*.

Biosecurity New Zealand suggested in its risk analysis that hybrids of the fruit flies may find litchis a suitable host. However, there is no evidence to suggest that litchis would provide suitable host material for any hypothetical hybrids of the three fruit fly species considered in this assessment. Also, there has been no significant hybridisation practically observed as interspecific fruit fly crosses are considered to be rare, particularly in the field (Pike and Meats 2002). Although there is potential for hybridisation in the field, it would be inevitable that hybrids will be outnumbered by normal flies and would backcross with one of their parent species (Pike and Meats 2002).

In its risk analysis, BNZ states that severe infestations occur in some seasons and relies heavily upon fruit fly host records reported by Hancock et al (2000), personal communication with Waite (2007), and chapters from Waite and Hwang (2002) and Waite (2005). However, Hancock et al (2000)

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acknowledged that many of these records were from damaged or overripe fruit and observed secondary infestations from other pests and diseases. Some of these records may also be attributed to misidentification of species, contamination of samples, and transcription errors. Additionally, Waite and Hwang (2002) and Waite (2005) report only occasional attack and not severe infestation as cited. Biosecurity Australia therefore considers that the reference to severe infestations is an overestimation, and does not accurately reflect the conditional non-host status for Australian litchi.

In its analysis, BNZ contends that the three fruit fly species assessed are capable of establishing founding populations in New Zealand. However, BA considers that the information presented by BNZ does not provide sufficient evidence to support these claims. Biosecurity New Zealand referred to research by Fay and Meats (1983), however, this research focused on the mating frequency of *B. tryoni* males. The paper does not address cold torpor thresholds, or support any inferences concerning the overwintering ability and capacity to survive in the New Zealand climate. We were therefore unable to verify any published data reporting cold torpors of 6.8°C and 3.2°C for this species and can only assume that BNZ is referring to other work by Meats on cold torpor thresholds for *B. tryoni*. Importantly, the ability to enter a low state of metabolic activity is not suggestive of this pest's ability to survive and establish in New Zealand as short term torpor and long term survival in a specific environment are separate issues.

Biosecurity Australia is also concerned about the extrapolation of data for *B. tryoni* to assert that *B. neohumeralis* would survive in New Zealand. The assessment claims that the distribution range for *B. neohumeralis* is the same as for *B. tryoni* and also includes high altitude regions of Queensland. However, these assertions are not supported by references. In the experience of Australian researchers, the distribution of *B. neohumeralis* is significantly less than that of *B. tryoni*, being fully contained within the range of *B. tryoni*. While *B. neohumeralis* may be found in some regions with a comparatively high altitude, BNZ did not provide any reference or evidence to suggest that *B. neohumeralis* would be particularly cold tolerant.

The BNZ risk analysis cites climate modelling data conducted by Kriticos *et al.* (2007) which investigates the potential for *B. cucumis* to survive and establish in New Zealand to support their assessment that *B. neohumeralis* could also establish. Biosecurity New Zealand also disputed the investigations by Sutherst and Maywald (1990) that concluded *B. neohumeralis* and *B. jarvisi* were unlikely to survive anywhere in New Zealand on the basis that it is outdated and doesn't factor changing weather patterns. We contest any attempt to draw a link between modelling data for *B. cucumis* to *B. neohumeralis*, and contend that such modelling is not as relevant as research specifically addressing *B. neohumeralis* and *B. jarvisi*. Furthermore, Kriticos *et al.* (2007) highlights that the biological data for the development and survival of adult flies at cool temperatures is incomplete, and that this is a key weakness with regard to accurately assessing the invasion potential of *B. cucumis*. Kriticos *et al.* (2007) acknowledges that additional research would be required to assess the sensitivity of the development rate functions to

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hosts that are found in New Zealand. Biosecurity Australia strongly believes that there are a number of limitations associated with the methodology used to derive modelling assumptions of data, which limits the precision and robustness of the climate enveloping techniques used to quantify species distribution. While conservative assessment may make note of any potential scenarios, BA considers that weighting the assessment on scientific unknowns and hypothetical situations has resulted in significantly exaggerated risks.

Biosecurity Australia considers that the ratings assigned to entry, exposure and establishment are significantly over-stated. Given the conditional non-host status of litchis and few historic records, no fruit flies could be expected to be on the pathway. Of particular note, no undamaged commercially packed fruit, have ever been shown to harbour fruit fly infestations, a fact accepted for domestic trade within Australia (QDPI 1997). In the unlikely event that infested fruit entered New Zealand, and should any larvae survive in fruit, they would need to exit the fruit in New Zealand, find a suitable pupation site, emerge as adults, and find a suitable protein source to survive for up to two weeks before sexual maturity is reached (Meats 1998; Perez-Staples and Taylor 2007). Flies would then need to find a suitable mate, the chances of which would be extremely low when considering the dispersal of the insect and the extremely low numbers of insects likely to enter New Zealand, even in the worst case scenario.

Biosecurity Australia considers that the evidence provided in the risk analysis does not sufficiently support BNZ's assessment that there is a frequent or strong association between fruit flies and litchis in Australia, or that flies could survive, find a mate, and establish a founding population in New Zealand.

Black threaded scale (*Ischnaspis longirostris*)

Ischnaspis longirostris was identified by BNZ as a hazard on the commodity requiring mitigation measures. However, it was not documented in the pest list provided with Biosecurity Australia's market access submission for Australian litchi. Although records for this pest are reported from Australia, we consider *I. longirostris* to not be associated with the exported commodity, and should therefore be removed from further consideration in the finalised risk analysis. A justification for this assessment is provided below.

Litchi chinensis was identified by BNZ as a host for this pest, specifically citing North American records for Florida and Hawaii. Although this pest has been recorded from some Australian states, there are no Australian records for *I. longirostris* on litchi. Therefore, there is no evidence provided to suggest *I. longirostris* is associated with Australian commercial litchi, and on the importation pathway. Additionally, as noted in BNZ's assessment of this pest, the spread of scales is principally achieved through the movement of infested plant material such as potted plants, cut flowers, and cut foliage (Lenbrink and Hara 1992). The probability of the spread of scales through non-propagative plant materials such as fruits, would be minimal as establishment requires

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infested material to be placed in close proximity to suitable growing hosts (Beardsley and Gonzalez 1975). The spread of other scale species in citrus orchards has been reported to be of little or no importance (Beardsley and Gonzalez 1975). Mature harvested litchi fruit is not identified as a principal pathway for transmission of this pest, and it is unlikely to be present on exported litchi fruit.

Armoured scales affect their hosts by removing sap, as well as by injecting toxic saliva during feeding (McClure 1990, Kosztarab 1990). Feeding results in depressions, discolorations, cell death, deformation of plant parts, the formation of galls and pits, as well as increased susceptibility to other destructive agents such as frost, disease, and other pests (McClure 1990; Kosztarab 1990; Beardsley and Gonzalez 1975). Heavy infestations may cause bark splitting, defoliation, dieback of twig terminals and sometimes death of trees (Beardsley and Gonzalez 1975). The visible symptoms caused by armoured scale feeding would cause affected fruit to be rejected during harvesting, sorting and grading operations.

Crawlers are the primary dispersal life stage of scales and are the only stage that could contaminate clean fruit. Any crawlers associated with the commodity would easily be dislodged during washing and brushing processes. Dispersal distances for crawlers are generally no more than one meter from the parent female before settling to feed and there is a high rate of mortality for crawlers during dispersal due to abiotic factors such as unsuitable environments and temperatures (Ker and Walker 1990; Watson 2006). After the dispersal stage, crawlers draw their legs beneath their body and flatten themselves against the host, where they become immobile and insert their mouthparts into the host tissue to commence feeding (Carver et al 1991; Koteja 1990; Beardsley and Gonzalez 1975).

The limited dispersal range of crawlers, combined with the fact that other life stages of this pest are sessile, suggests a limited ability to spread to commercial litchi production regions in Australia, or to be present on the importation pathway. In particular, long range dispersal of the sessile female can only occur through facilitated transport with infested plant material. While sessile stages would remain attached to any infested fruit during washing and brushing processes, sorting and grading operations would likely remove contaminated fruit, as these pests are relatively easy to visually detect.

Orange fruitborer (*Isotenes miserana*)

In April 2007, a restricted population of *Isotenes miserana* was detected in Auckland, New Zealand. To date, BNZ has not yet clarified whether this incursion is under official control. Biosecurity Australia would appreciate BNZ providing confirmation of the status of this pest, as this impacts on the assessment of this species as a quarantine pest for New Zealand.

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Rutherglen bug (*Nysius vinitor*)

Nysius vinitor was documented in the pest list provided with BA's market access submission for Australian litchi, but not identified as a key pest likely to require specific measures. However, BNZ has identified this pest as a hazard on the commodity requiring mitigation measures. Although records exist for this pest on other hosts in Australia, Biosecurity Australia considers that this pest is not associated with exported commercial litchis, and should be removed from further consideration in the finalised risk analysis. A justification for this assessment is provided below.

Although *N. vinitor* has been recorded from most Australian states and territories, there is little evidence supporting the association of this pest with harvested litchi fruit. The draft risk analysis provided highlighted that while this pest has been reported from litchi hosts during flowering and early fruit-set, they are not known to be associated with the commodity once the fruit size exceeds 3 mm (GK Waite, Pers. Comm. 2007, cited in BNZ 2008). It was on a similar basis that *N. vinitor* was included as a fruit pest in BA's original submission, a point not originally made clear. Therefore, *N. vinitor* is not observed on developing or mature fruit. Also noted in BNZ's risk analysis was the low likelihood of oviposition directly on the fruit surface, with eggs preferentially deposited on foliage and stems. This is common to most hemipterans, and contamination of harvested fruit by eggs is likely to be minimal. Any eggs or hitchhikers present on the commodity would likely be easily dislodged during washing and brushing processes, or detected and culled during sorting and grading operations.

3.2.2 Fungi

Leaf blight; fruit rot (*Pestalotiopsis* sp.)

Pestalotiopsis sp. was documented in the pest list provided with BA's market access submission for Australian litchi, but not identified as a key pathogen likely to require specific measures. However, BNZ has identified this fungus as a hazard on the commodity requiring mitigation measures. Although previously recorded on *Litchi chinensis* in Queensland, we consider this pathogen is unlikely to be associated with the exported commodity and should be removed from further consideration in the finalised risk analysis. A justification for this assessment is provided below.

As noted in BNZ's assessment *Pestalotiopsis mangiferae* has been characterised as a weak pathogen which typically requires older host material, direct contact with infected plant material, or wounding in order to cause infection to its hosts (Tandon et al 1955). Domestic quarantine regulations restrict the importation of any litchi fruit with broken skin into South Australia and Victoria (QDPI 1997). It is therefore unlikely that the fresh harvested commodity, which has been inspected to remove any damaged or potentially susceptible fruit, would harbour this weak pathogen. Additionally, any fruit

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showing signs of infection would be culled during sorting and grading operations.

Pestalotiopsis sp. are found in tropical and subtropical regions with an optimum temperature range for proliferation from 20-30°C (Sawant and Raut 1992). Additionally, high infection rates of more than 85% on litchi have been observed in other regions (Sawant and Raut 1992; Kang and Singh 1991). Given the climate of litchi production regions in Australia, the high infection rates reported for other countries, and the various records for this species for other hosts in Australia, we would expect far more reports of this pest recorded on litchi in Australia. Therefore, the few historical records for *Litchi chinensis* in Australia, suggests *Pestalotiopsis* sp. is unlikely to be associated with Australian commercial litchi production.

Symptoms of fruit infection by *Pestalotiopsis* sp. appear as small light brown spots on the fruit which enlarge and coalesce to form black brown patches, with surrounding discoloration of the fruit (Tandon et al 1955; Chauhan and Gupta 1984). As the infection advances, the disease spreads up to the stony endocarp and the fruit takes on a burnt appearance (Chauhan and Gupta 1984). Due to the visible symptoms caused by infection, affected fruit would likely be culled during harvesting, sorting and grading operations.

Post-harvest measures currently applied to Australian commercial litchi production include washing, brushing, the application of a broad-spectrum fungicidal dip, and sorting and grading operations. These measures would likely cull any infected fruit and remediate any concerns of *Pestalotiopsis* sp. being present on the importation pathway, especially given the weak pathogenic nature and few historic records on Australian litchi.

Leaf spot (*Bipolaris hawaiiensis*)

Bipolaris hawaiiensis was documented in the pest list provided with BA's market access submission for Australian litchi, but not identified as a key pathogen likely to require specific measures. However, BNZ has identified this fungus as a hazard on the commodity requiring mitigation measures. Biosecurity Australia considers that this pathogen is not associated with the exported commodity, and should be removed from further consideration in the finalised risk analysis. A justification for this assessment is provided below.

As noted by BNZ in its assessment, *B. hawaiiensis* is considered to be senectopathic, and therefore only capable of causing infection to ageing host tissue. The potential for the fungus to infect fresh litchi fruit is therefore likely to be minimal (Brecht et al. 2007).

Although *B. hawaiiensis* has been recorded for some hosts in Australia, it is generally associated with grasses and soils. There is little substantial evidence supporting the association of this fungus with litchis or mature harvested litchi fruit, which would warrant its classification as a non-negligible pest requiring specific quarantine measures. While there may be some potential for conidia to disperse to litchi production regions, such contaminating conidia would be washed from the surface of the fruit during post harvest operations, or affected fruit culled during sorting and grading operations (Sivanesan and Halliday 1982). The lack of records for *B. hawaiiensis* on litchis in Australia strongly supports this claim, and we consider that the assigned risk rating of non negligible is overstated, based on the scientific information available.

4 MANAGEMENT OPTIONS FOR QUARANTINE PESTS

Biosecurity New Zealand has identified a number of pests that require quarantine measures to address the risks posed to New Zealand by the importation of Australian litchi. Broadly, these can be divided into insect pests and pathogens.

4.1 Management of insect pests

While BNZ has concluded that litchi may be host to various fruit flies, litchi are considered conditional non-hosts for fruit fly in Australia (Leach 2004). The poor host status of litchi for other tephritid species has also been demonstrated by research in Hawaii by Armstrong (1994) and in Florida by Gould (1999).

Biosecurity Australia, in consultation with the Australian litchi industry, accepts the proposed irradiation dose of 250 Gy to mitigate the importation risks for all identified insect pests.

Australian mangoes and papayas have commenced trade into New Zealand under a treatment schedule of 150 Gy for fruit flies and 250 Gy for other arthropods, since 2004. Biosecurity Australia requests that the successful operational arrangements already in place for irradiated tropical fruit exports be applied to Australian litchi.

4.2 Management of pathogens

Biosecurity New Zealand has identified both *Bipolaris hawaiiensis* and *Pestalotiopsis* sp. to be hazards on the commodity requiring mitigation measures. However, as has been discussed, BA considers that there is a lack of evidence supporting the association of these two pathogens with Australian commercial litchis. Additionally, the obvious symptoms of infection would ensure that affected fruit would likely be culled. While we assert that no measures are required, if BNZ contends specific measures still need to be imposed, BA considers that Phytosanitary certification declaringho

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commodity to be free of signs of *Bipolaris hawaiiensis* and *Pestalotiopsis* sp., would more than adequately address the importation risks for these two fungi.

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