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An Australian Government, AusAID initiative

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Response to the Biosecurity Australia Draft Import Risk Analysis Report for Fresh Ginger from Fiji

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Summary

The *Draft Import Risk Analysis Report for Fresh Ginger from Fiji* was issued for public comment by Australia's Department of Agriculture, Fisheries and Forestry (DAFF) – Biosecurity on 16 April 2012 and the Pacific Horticultural & Agricultural Market Access Program (PHAMA) provides the following comments for consideration prior to finalisation of this draft policy.

PHAMA thinks that the draft Ginger IRA has correctly assessed the risk posed by many of the pests and diseases within this draft document. However, comment is provided where estimates of risk are considered too high. One of the primary risk considerations for fresh ginger should be that rhizomes are imported into the capital cities (primarily Melbourne, Canberra and Sydney) for human consumption. Waste is not distributed to ginger production areas but rather disposed of in urban landfill or backyard composts of Melbourne, Canberra and Sydney where no ginger production exists. It appears that this very important fact has not been taken into consideration for some pests and diseases.

In particular, PHAMA considers that the risk posed by Fiji ginger weevil and yam scale is overestimated. In particular the likelihood scores allocated to these pests are significantly greater than previous assessments on other commodities such as the recently completed fresh taro corm review.

These comments are offered in the spirit of mutual cooperation to ensure that Australia's import policy for fresh ginger from Fiji is based on sound science and proposed measures congruous with the perceived risk. PHAMA seeks ongoing dialogue and cooperation with DAFF – Biosecurity to finalise this draft policy document and to implement commercially viable export/import operational policy for fresh ginger from Fiji.

Introduction

Fresh ginger is one of the few commodities for which Fiji has been able to achieve significant levels of exports over the past 50 years, although exports declined more recently due to competition with larger ginger export producers such as China, and Thailand. Fiji currently exports about 1500 tonnes of fresh ginger annually which is small scale in comparison to the leading ginger exporting countries of China, and Thailand, which exported 150,000 tonnes and about 45,000 tonnes in 2005, respectively (Camacho and Brescia 2009). Fiji's ginger export figures are steady and there has been little or no growth in these exports in recent years. However, Fiji produces high quality ginger and exports will increase over time with the establishment of new markets. Increased exports would result in substantial benefits for large numbers of low-income ginger producers and their families.

The *Draft Import Risk Analysis Report for Fresh Ginger from Fiji* was issued for public comment by DAFF – Biosecurity on 16 April 2012 and PHAMA submits the following comments for consideration prior to finalisation of this draft policy.

1.1 Estimate of volume of trade

PHAMA notes that DAFF – Biosecurity in the current draft report has not recognised the very small volumes of fresh ginger that would be exported from Fiji to Australia. In section *Time and volume of trade* (p. 10 of the draft Ginger IRA) DAFF – Biosecurity acknowledges that it assumes that a substantial volume of trade [of fresh ginger] will occur. As outlined in the same section, the risk of introduction of quarantinable organisms is proportional to volumes of trade (p. 9 of the draft Ginger IRA) annually and over time.

Fiji overall is one of the smallest exporters of fresh ginger worldwide. In the international arena, Fiji rates as a niche supplier of superior quality due to Fiji ginger's unique flavour profile and low fibre content. Ginger exports have remained steady over the past decade, averaging 1500 tonnes annually. This compares to 1/10 of the Australian and 1/100 of the Chinese ginger export volume annually (Camacho and Brescia 2009). Fiji already has established export markets, such as into New Zealand and the United States, and it is expected that Fiji will continue to supply these markets even with new market access opportunities becoming available.

Whilst ginger production in Fiji may increase over time, these increases are expected to be gradual, due to the modest mechanisation and smallholder structure of the industry (refer to p. 15 of the draft ginger IRA). Therefore, PHAMA requests that the small export volumes that can be expected to be exported to Australia, be considered as part of the risk assessment as well as for assumptions that estimate the likelihoods of Importation and Distribution of identified quarantine pests.

Further, due to the relative small volume of Fiji ginger to be imported into Australia, these import quantities will primarily be sold for human consumption into the main population centres of Melbourne, Canberra and Sydney in southern Australia. Waste is not distributed to ginger production areas but rather disposed of in urban landfill or backyard composts of Melbourne, Canberra and Sydney where no commercial ginger production exists. PHAMA thinks that these geographic regions pose negligible risk of entry and spread of any pests and diseases of quarantine concern.

1.2 Pest profile of the Australian ginger industry

PHAMA notes that the Australian ginger industry is only now in the process of putting together its Biosecurity Plan detailing, amongst others, the status of pests already present on ginger in Australia. PHAMA requests further consultation with DAFF – Biosecurity if and when the pest and disease status of Australian ginger has been clarified.

1.3 Use of unpublished reports and unauthenticated species references

PHAMA notes the extensive citing of unpublished reports (McKenzie et al 2004; Smith et al 2007) to substantiate presence and other biological data pertaining to organisms claimed to be associated with ginger in Fiji. Similarly, DAFF – Biosecurity uses Biosecurity New Zealand interception data for Fijian ginger imported into New Zealand over the past 11 years to demonstrate the presence and prevalence of organisms associated with ginger from Fiji.

These practices are misleading, due to the fact that these reports have not undergone peer review nor have the organism records in many instances been authenticated.

In regards to the use of Biosecurity New Zealand interception data to underpin the presence/prevalence of organisms on Fiji ginger, PHAMA is concerned about the misuse/misinterpretation of this data. For example, DAFF Biosecurity uses absolute interception figures without the provision of import volumes. Also, the status of authentication of intercepted organisms is not known and some of these could be misidentifications. For example, *Exaireta spinigera*, the garden soldier fly, does not occur in Fiji, but has been reported in NZ interception records for ginger from Fiji (p. 58 of the draft Ginger IRA).

In the event that DAFF Biosecurity continues to cite Biosecurity New Zealand's pest interception data, then PHAMA requests that this data is not only cited to underpin pathway association but is equally cited to underpin absence of organisms associated with the Fiji ginger pathway.

1.4 Next steps

In light of comments provided and the current development of a Biosecurity Plan by the Australian ginger industry PHAMA requests further consultation with DAFF Biosecurity once submissions received have been considered prior to finalisation of this very important policy document.

1.5 Pest categorisation

PHAMA provides the following pest categorisation comments;

1.5.1 Fiji ginger weevil (*Elytroteinus subtruncatus*)

Probability of importation

The overall assessment of Fiji ginger weevil being below the Appropriate Level of Protection (ALOP) is an accurate assessment. However, the estimated probability of importation of 'high' of the weevil being imported with fresh ginger rhizomes is a substantial overestimate.

Reasons being:

1. The probability of importation estimate of 'high' (up to 100% probability) is a vast diversion from the recent pest risk assessment for ginger weevil in the *Review of Import Conditions for Fresh Taro Corms* (Biosecurity Australia 2011) where the Import risk of the same weevil on taro was assessed as 'low' (5–30% probability). This is a huge discrepancy from the previous PRA undertaken for ginger weevil, considering that the PRA is for the same weevil species, the current commodity is from the same geographic region (i.e. Fiji), both, ginger rhizomes and taro corms are grown in soil, and the weevil is incurring the same damage to its hosts. Ginger weevil is a rather large weevil in all of its development stages (up to 1.2 cm in size) and incurs visible symptoms of frass and entry/exit holes of the damaged plant part, regardless if it is a ginger rhizome or a taro corm.

2. NZ interception data shows that over a period of 11 years of fresh ginger exports from Fiji to New Zealand (equating to more than 250 consignments) only a total of 6 ginger weevils were ever detected. These interceptions are based on a rigorous NZ on-arrival inspection regime and the very visible damage that ginger weevils cause to its host (i.e. frass and holes). This result indicates that the incidence of ginger weevil affecting Fiji grown ginger rhizomes is very low (up to 5% probability).
3. There also is no evidence that ginger weevil has bias towards ginger as a preferred host. As literature sources document, ginger weevil infests a number of different hosts in a number of Pacific countries. For example, the weevil's damage to kava in Tonga was described of serious proportion by Fakalata (1981; refer to draft Ginger IRA p.22). In contrast, there are no literature reports of the weevil causing similar damage on edible ginger, *Zingiber officinale*, anywhere throughout its distributional range. Detections of ginger weevil in Fiji are rare and its low prevalence within Fiji is congruent with the weevil not being recognised as a pest species of ginger in Fiji.

Based on the reasons given above, PHAMA requests that the likelihood of Importation for Fiji ginger weevil (*Elytroteinus subtruncatus*) be revised to **very low**, rather than the current score of 'high'.

Probability of distribution

Similarly, the likelihood of distribution of 'moderate' (30–70% probability) is also too high. Fiji ginger weevil is not a common pest in Fiji and the small volume of Fiji ginger would primarily be distributed for consumption to the high population centres of Melbourne, Canberra and Sydney. Waste is not likely to be distributed to ginger or taro production areas but rather disposed of in urban landfill or backyard composts of Melbourne, Canberra and Sydney where no commercial production of its hosts such as ginger or taro exists.

The probability of distribution includes also consideration of the likelihood of the pest's dispersal ability to move off the pathway to a host. In view of *Elytroteinus subtruncatus* legless larval stages and flightless adults (Padil 2012), the very low incidence of Fijian ginger being infested by ginger weevil (NZ interception data 2000-2011) and the distribution of fresh ginger imports for consumption to urban areas where ginger production does not occur, suggests that the probability for distribution is **very low**, rather than the current score of 'moderate'.

Probability of entry (importation × distribution)

Based on PHAMA comments the likelihood that *Elytroteinus subtruncatus* will enter Australia and be distributed in a viable state to a susceptible host, as a result of trade in fresh ginger rhizomes from any country where this pest is present, is **extremely low** rather than the current estimate of 'moderate'.

Probability of establishment

If a ginger rhizome should be infested with *Elytroteinus subtruncatus*, it is likely that only single eggs would be laid in the rhizome. A single egg, or a single adult of a species that reproduces sexually, does not constitute a viable population. Also, the distributional range of ginger weevil is restricted to tropical environments (i.e. Cook Islands, Fiji, Samoa, Tonga

Hawaii and French Polynesia (Nishida 2008)). There are no records of the weevil's establishment outside of tropical climates such as for instance in New Zealand (May 1993).

For these reasons the likelihood of establishment is much less than the estimated low (up to 30%) likelihood. PHAMA requests that the restricted distribution of ginger weevil to tropical environments be considered as part of estimating the likelihood of establishment and thinks that the score of **very low** better reflects the probability of establishment, rather than the current score of 'low'.

Probability of spread

An estimate of likelihood of spread of moderate (30–70%) contradicts the available biological distribution and spread data. *Elytroteinus subtruncatus* has not spread widely in Hawaii since it was first reported in 1918, despite the presence of hosts such as avocado and taro. Its distribution is restricted to parts of the island of Oahu (Follett et al 2007). Further, *Elytroteinus* spp. weevils are flightless (PaDIL 2012), so natural spread would be slow and longer distance spread would only occur via movement of infested produce. Based on these important facts PHAMA thinks that the likelihood of spread is **very low**, rather than the current score of 'moderate'.

Probability of entry, establishment and spread

Based on the above comments likelihood that *Elytroteinus subtruncatus* will be imported as a result of trade in fresh ginger from any country where this pest is present, be distributed in a viable state to a susceptible host, establish and spread within Australia is **extremely low** rather than the current estimate of 'low'.

Consequences

PHAMA supports the consequences estimate for *Elytroteinus subtruncatus* and notes that these are in line with the previous pest risk assessment for ginger weevil in DAFF – Biosecurity's finalised *Review of Import Conditions for Fresh taro corms (Nov 2011).*

Unrestricted risk estimate

PHAMA supports the unrestricted risk estimate (i.e. **negligible**) but suggests that the probabilities of entry, establishment and spread are overestimates and requests that these likelihoods are revised downwards.

1.5.2 Yam scale (*Aspidiella hartii*)

PHAMA notes that since the assessment of yam scale in *the Draft Review of Import Conditions for Fresh Taro Corms (Mar 2011)* its reported presence in Australia (Watson 2011; Soltic and Peacock 2006; Donaldson and Houston 2002) has now been reversed to being absent from Australia (noting only an unconfirmed record of this species in the Northern Territory (NTDPIF 2001) (Biosecurity Australia 2011).

PHAMA requests that specimens held by NTDPIF and J Donaldson be re-examined and the species of the scale authenticated. In the event that *Aspidiella hartii* is present and not under official control in Australia, then yam scale should be taken off the list of quarantinable pests for ginger and taro for Australia altogether.

Further, PHAMA notes that the assigned risk scores in the pest risk assessment for *Aspidiella hartii* (Diasipididae) varies significantly from other diaspidid scale species that were assessed

by DAFF - Biosecurity in previous import policy, where the risk posed by diaspidid scale species was assessed of being below the Appropriate Level of Protection (ALOP). This is mostly due to the vast discrepancy of the risk score given to distribution (i.e. high in the draft Ginger IRA and low in other IRAs such as Apples from China IRA (Biosecurity Australia 2010a); US stonefruit IRA (Biosecurity Australia 2010b); Unshu from Shizuoka Prefecture IRA (Biosecurity Australia 2009).

The overall assessment of *Aspidiella hartii* being above the Appropriate Level of Protection (ALOP) with an unrestricted risk estimate of 'low' is a substantial diversion from its previous pest risk assessment on fresh taro where its risk was assessed as 'negligible'.

PHAMA provides the following comments on the pest risk assessment for yam scale;

Probability of Importation

The estimated probability of Importation of 'high' for yam scale to be imported on fresh ginger rhizomes into Australia is an overestimate.

Reasons being:

> The *Importation* probability estimate of 'high' (up to 100% probability) is a vast diversion from the recent pest risk assessment for *Aspidiella hartii* in the *Review of Import Conditions for Fresh Taro Corms* (Biosecurity Australia, Nov 2011) where the Import risk of the same scale on taro was assessed as 'very low' (0.001–5% probability). This is a huge discrepancy considering that the PRA is for the same insect species, and the current commodity under assessment is from the same geographic region (i.e. Fiji).
>
> *Aspidiella hartii* is primarily a pest of yams (*Discorea* spp.) (Ben-Dov et al 2012) and whilst yam scale gets intercepted on ginger from Fiji, the majority of all export ginger consignments are free from *Aspidiella hartii*.

PHAMA therefore requests that the likelihood of Importation for yam scale (*Aspidiella hartii*) be revised to **moderate**.

Probability of Distribution

Similarly, the increase of the likelihood of distribution from 'moderate' (30–70% probability) in the Taro Review (Biosecurity Australia 2011) to 'high' (70–100% probability) in the draft Ginger IRA is not justifiable, given that the provided assumptions that are used to underpin the distribution likelihood of *Aspidiella hartii* on ginger are the same as for its distribution likelihood on taro (i.e. Australia-wide distribution of the assessed commodity, potential for some product being discarded or cultivated; limited tropical host range and limited self-propelled movement capacity).

Diaspidid scales are sedentary or at most crawl and none of its life stages can fly. In recent DAFF Import Risk Analyses, the likelihood for distribution of Diaspidid scales was assessed as 'low' (0.05–30% probability) refer to Unshu mandarin from Shizuoka Prefecture (2009); Apples from China IRA (2010a). US Stonefruit IRA (2010b). For reasons of consistency, PHAMA suggests that the probability of distribution be revised downwards to **moderate** in in line with the recent PRA for the same scale species in DAFF – Biosecurity's finalised *Review of Import Conditions for Fresh Taro Corms* (Nov 2011).

Probability of Entry (Importation × Distribution)

Based on PHAMA comments the likelihood that *Aspidiella hartii* will enter Australia and be distributed in a viable state to a susceptible host, as a result of trade in fresh ginger rhizomes from any country where this pest is present, is **low** rather than the current estimate of 'high'.

Probability of Establishment

PHAMA agrees with the assessment of the probability for establishment (i.e. 'moderate'), as long as the assessment remains congruent with recently finalised review policy for the same scale insect (refer to *DAFF – Biosecurity's finalised Review of Import Conditions for Fresh Taro Corms (Nov 2011)*).

Aspidiella hartii has a restricted distribution to tropical environments (Soltic and Peacock 2006) as described by Williams and Watson (1988) as a tropicosmopolitan species. Therefore, cold winter temperatures would limit its establishment in temperate environments such as the southern parts of Australia (refer to Figure 2 of the draft Ginger IRA). Narrow climatic tolerances moderate the potential of yam scale to establish in other Australian regions.

Probability of Spread

PHAMA agrees with the assessment of the probability for establishment, as long as the assessment remains congruent with recently finalised review policy for the same scale insect (refer to *DAFF – Biosecurity's finalised Review of Import Conditions for Fresh Taro Corms (Nov 2011).*

Probability of Entry, Establishment and Spread

Based on the above comments, the likelihood that *Aspidiella hartii* will be imported as a result of trade in fresh ginger rhizomes from Fiji, be distributed in a viable state to a susceptible host, establish and spread within Australia is **low** rather than the current estimate of 'moderate'.

Consequences

PHAMA supports the overall 'Consequences' estimate for yam scale of **low**. However, the increased risk scores for yam scale for the following criteria are unjustified:

- 'Other Aspects of the Environment' from 'A' in the Taro Review (Biosecurity Australia 2011) to now 'B' the draft Ginger IRA, and
- 'Domestic Trade' from 'B' in the Taro review to 'C' in the draft Ginger IRA.

The 'Consequences' assessment in the recently finalised *Review of Import Conditions for Fresh taro corms (Nov 2011)* already considered the impact of *Aspidiella hartii* on 'Other Aspects of the Environment' and on 'Domestic Trade' as evidenced by:

Other aspects of the environment	**Impact score**: A – indiscernible at the local level There are no known direct consequences of this scale on the natural or built environment.
Domestic trade	**Impact score**: B – minor significance at the local level Some yams and ginger may be destroyed in storage or may not be saleable if the infestation was severe.

(refer to page 39; finalised Taro Review).

This is in line with the International Standard for pest risk analysis (ISPM11, FAO 2004), which requires consequence analysis of an assessed pest species to consider all of its effects on each of its potential hosts in the PRA area; i.e. that the consequence assessment does not vary for the same species under assessment on a different host. The potential consequences of *Aspidiella hartii* on the Australian environment were assessed as recently as 6 months ago in the recently finalised *Review of Import Conditions for Fresh taro corms (Nov 2011)*.

For these reasons, PHAMA requests that the consequence scores in the draft Ginger IRA be amended in line with the recently issued *Review of Import Conditions for Fresh Taro Corms (Nov 2011).*

Unrestricted Risk Estimate

PHAMA thinks that the probability for entry is an overestimate and requests that this likelihood is revised downwards. PHAMA further requests that in congruence with International Standards for Pest Risk Analysis (ISPM 11; FAO 2004) the consequence analysis assessment for *Aspidiella hartii* be amended in line with its recent assessment in the *Review of Import Conditions for Fresh Taro Corms (Nov 2011)*, as the yam scale's potential consequences in Australia were assessed as recent as six months ago and considered the impact on all of its hosts. For these reasons the unrestricted risk estimate is **very low** rather than the current estimate of 'low'.

1.5.3 Nematode species

PHAMA agrees with DAFF-Biosecurity's assessment that the nematode species that were assessed in this draft Ginger IRA all fall below the ALOP. However, at the same time, PHAMA considers that the risk likelihoods in many of the pest risk assessments in the draft Ginger IRA are overestimates and provides the following comments on the nematode pest risk assessments for Biosecurity Australia's consideration.

1.5.3.1 Spiral nematode species

PHAMA agrees with the risk assessment for spiral nematodes (i.e. *Helicotylenchus egyptiensis; H. indicus; H. mucronatus*) in the draft ginger IRA to be congruent with DAFF's recent nematode import risk assessment for the same spiral nematode species (i.e. *Helicotylenchus mucronatus*) in the finalised *Review of Import Conditions for Fresh Taro Corms (Nov 2011).* However, the assigned likelihoods to the Probabilities of Importation, Distribution, Establishment and Spread are considered an overestimate of the risk posed by *Helicotylenchus* nematodes.

Probability of Importation

Helicotylenchus egyptiensis, *H. indicus* and *H. mucronatus* are ecto-parasitic root feeders that do not enter the plant tissues, such as the ginger rhizome. All roots of export ginger rhizomes are removed as part of the general processing procedures. Spiral nematodes have never been detected on Fiji export ginger to New Zealand, as demonstrated by the absence of their records from New Zealand interception data 2000-2011 (NZ interception data). The probability of importation for *Helicotylenchus muconatus* on taro which has a rather rough and hairy external surface in comparison to ginger was assessed as 'low'. Therefore the

likelihood of importation of *Helicotylenchus egyptiensis*, *H. indicus* and *H. mucronatus* on ginger from Fiji is **negligible** rather than the current score of 'low'.

Probability of Distribution

Helicotylenchus egyptiensis, H. indicus and *H. mucronatus* are tropical nematode species and only known to occur in countries with a tropical climate (refer to Appendix B, draft Ginger IRA). In Australia, similar tropical conditions occur in Far North Queensland and the Northern Territory (refer to Figure 2, draft Ginger IRA). Export ginger from Fiji after washing would be dried before being shipped and stored at 10°C. This temperature is not conducive to the survival of *Helicotylenchus egyptiensis, H. indicus* and *H. mucronatus* outside of their tropical and humid soil/rhizosphere environment. Neither do *Helicotylenchus* spp. form resistant structures (such as cysts) or live sheltered within host tissues that would prevent them from being killed by drying out, exposure to temperature extremes or exposure to ultraviolet light from sunlight (Krall 1990; van Dijk et al 2009). Further, the ability for nematodes to move off the pathway is limited due to their limited self-propelled movement.

Therefore, it is unlikely that *Helicotylenchus egyptiensis, H. indicus* and *H. mucronatus* will be able to survive distribution at low storage temperatures and find a host alive. The likelihood for distribution should be revised down to **extremely low** rather than the current score of 'moderate'.

Probability of Entry (Importation × Distribution)

Based on these comments PHAMA believes that the likelihood of *Helicotylenchus egyptiensis, H. indicus* and *H. mucronatus* to enter Australia and be distributed in a viable state to a susceptible host, as a result of trade in fresh ginger rhizomes from any country where this pest is present, is **negligible** rather than the current estimate of 'low'.

Probability of Establishment

Environmental conditions greatly influence the survival and dispersal of first-instar nymphs (Watson 2005). *Helicotylenchus egyptiensis, H. indicus* and H. *mucronatus* are nematode species that only occur in tropical environments with high relative humidity and high annual rainfall. In Australia, these environmental conditions only occur in the tropical belt of northern Australia (refer to Figure 2, draft Ginger IRA). It is unlikely that *Helicotylenchus egyptiensis, H. indicus* and *H. mucronatus* will survive under temperate/subtropical conditions (Krall 1990) such as the southern parts of Australia, where imports of Fiji ginger would be shipped and sold for consumption into the large population centres of Melbourne, Sydney and Canberra. The narrow suitability of climatic conditions conducive to the establishment of *Helicotylenchus egyptiensis, H. indicus* and H. *mucronatus* in Australia moderates their risk of establishment. Therefore, the likelihood for establishment should be revised down to **low** rather than the current score of 'high'.

Probability of Spread

Self-propelled movement is very limited for nematodes which can only spread over large distances by movement of infested plant material. Therefore, the likelihood for spread should be revised down to **low** rather than the current score of 'high'.

Probability of Entry, Establishment and Spread

Based on the above comments the likelihood that *Helicotylenchus egyptiensis, H. indicus and H. mucronatus* will be imported as a result of trade in fresh ginger rhizomes from Fiji, be distributed in a viable state to a susceptible host, establish and spread within Australia is **negligible** rather than the current estimate of 'low'.

Consequences

PHAMA supports the overall 'Consequences' estimate for nematode species of 'low'.

Unrestricted Risk Estimate

Considering the above information the unrestricted risk estimate for *Helicotylenchus egyptiensis, H. indicus and H. mucronatus* is **negligible** rather than the current estimate of 'very low'.

1.5.3.2 Ring nematode species

PHAMA agrees with the risk assessment for ring nematodes (*Discocriconemella discolabia, Mesocriconema denoudeni*) and their unrestricted risk being below the ALOP. However, the assigned likelihoods to the probabilities of importation, distribution, establishment and spread are considered an overestimate of the risk posed by *Discocriconemella discolabia* and *Mesocriconema denoudeni*.

Probability of Importation

The ring nematodes *Discocriconemella discolabia, Mesocriconema denoudeni* are ecto-parasitic root feeders that do not enter the plant tissues, such as the ginger rhizome. All roots of export ginger rhizomes are removed as part of the general processing procedures. Ring nematodes have never been detected on Fiji export ginger to New Zealand, as demonstrated by the absence of their records from New Zealand interception data 2000-2011 (NZ interception data). For these reasons the likelihood of *Discocriconemella discolabia* and *Mesocriconema denoudeni* importation on ginger from Fiji is **negligible** rather than the current score of 'low'.

Probability of Distribution

Discocriconemella discolabia and *Mesocriconema denoudeni* are tropical nematode species and only known to occur in countries with a tropical climate (refer to Appendix B, draft Ginger IRA). In Australia, similar tropical conditions occur in Far North Queensland and the Northern Territory (refer to Figure 2, draft Ginger IRA). Export ginger from Fiji after washing undergoes drying and then would be shipped and stored at 10°C. The shipping/storage temperature is not conducive to the survival of *Discocriconemella discolabia* and *Mesocriconema denoudeni* outside of their tropical and humid soil/rhizosphere environment. Neither do *Discocriconemella discolabia* and *Mesocriconema denoudeni* form resistant structures (such as cysts) or live sheltered within host tissues that would prevent them from being killed by drying out, exposure to temperature extremes or exposure to ultraviolet light from sunlight (Krall 1990; van Dijk et al 2009). Further, the ability for nematodes to move off the pathway is limited due to their limited self-propelled movement.

Therefore, it is unlikely that *Discocriconemella discolabia* and *Mesocriconema denoudeni* will be able to survive distribution at low storage temperatures and find a host alive. The

likelihood for distribution should be revised down to **extremely low** rather than the current score of 'low'.

Probability of Entry (Importation × Distribution)

Based on PHAMA comments the likelihood that *Discocriconemella discolabia* and *Mesocriconema denoudeni* will enter Australia and be distributed in a viable state to a susceptible host, as a result of trade in fresh ginger rhizomes from any country where this pest is present, is **negligible** rather than the current estimate of 'very low'.

Probability of Establishment

Environmental conditions greatly influence the survival and dispersal of first-instar nymphs (Watson 2005). *Discocriconemella discolabia* and *Mesocriconema denoudeni* are nematode species that only occur in tropical environments with high relative humidity and high annual rainfall. In Australia, these environmental conditions only occur in the tropical belt of northern Australia (refer to Figure 2, draft Ginger IRA). It is unlikely that *Discocriconemella discolabia* and *Mesocriconema denoudeni* will survive under temperate/subtropical conditions (Krall 1990) such as the southern parts of Australia, where imports of Fiji ginger would be shipped and sold for consumption into the large population centres of Melbourne, Sydney and Canberra.

Further, *Discocriconemella discolabia* reproduces sexually and the likelihood of males and females of this species being present on imported ginger and on a suitable host to establish a new population are remote. However, this has not been considered in the overall probability of establishment, considering that both, a species reproducing by sexual reproduction and a species reproducing parthenogenetically being assigned the same risk, i.e. of 'high'.

The narrow suitability of climatic conditions conducive to the establishment of *Discocriconemella discolabia* and *Mesocriconema denoudeni* in Australia, as well as *Discocriconemella discolabia* reproducing sexually, moderates their risk of establishment. Therefore, the likelihood for establishment should be revised down to **low** rather than the current score of 'high'.

Probability of Spread

Self-propelled movement is very limited for nematodes which can only spread over large distances by movement of infested plant material. Therefore, the likelihood for spread should be revised down to **low** rather than the current score of 'high'.

Probability of Entry, Establishment and Spread

Based on the above comments the likelihood that *Discocriconemella discolabia and Mesocriconema denoudeni* will be imported as a result of trade in fresh ginger rhizomes from Fiji, be distributed in a viable state to a susceptible host, establish and spread within Australia is **negligible** rather than the current estimate of 'very low'.

Consequences

PHAMA supports the overall 'Consequences' estimate for nematode species of 'Low'.

Unrestricted Risk Estimate

PHAMA supports the unrestricted risk estimate for *Discocriconemella discolabia and Mesocriconema denoudeni* of **negligible**.

1.5.3.3 Cystoid nematode species

PHAMA agrees with the risk assessment for an unidentified *Sphaeronema* nematode species to be below the ALOP.

Indeed, PHAMA queries why an unidentified cystoid nematode has undergone pest risk assessment noting that *Sphaeronema* sp. are also present in Australia (McLeod et al 1994). The *Sphaeronema* sp. occurring in Australia has a diverse host range (including bamboo, coconut, various ornamental trees and shrubs and a variety of commercial hosts such as pineapple and banana) (refer to Appendix B of the draft Ginger IRA). Therefore, DAFF Biosecurity's assumption that the *Sphaeronema* sp. in Queensland, Australia differs from the unidentified specimen detected on ginger in Fiji is unjustified.

PHAMA once more notes that an unpublished report (i.e. Smith et al 2007) has been cited as the source of information to report of an unidentified *Sphaeronema* sp. associated with ginger in Fiji. Smith et al (2007) claim that *Sphaeronema* sp. occur on ginger rhizomes without the provision of conclusive isolations of *Sphaeronema* sp. from ginger rhizomes prior to planting these into the experimental plots. The possibility of *Sphaeronema* sp. being present in experimental plots prior to the planting of ginger rhizomes can therefore not be excluded.

No *Sphaeronema* sp. has ever been intercepted during import inspections into New Zealand throughout the length of Fiji ginger exports to New Zealand (NZ interception data). Whilst *Sphaeronema* sp. is present in Fiji, they are not reported to be associated with ginger (Orton Williams 1980).

For these reasons, PHAMA requests that *Sphaeromema* sp. be deleted from the risk assessment until the quarantine status in Australia is clarified.

1.6 Comments on Appendix A – Pest Categorisation Table

Armillaria mellea Delete from pest categorisation table, as it is not on the ginger pathway.

Aspidiella sacchari [Diaspididae] does not occur on ginger in Fiji (Ben-Dov et al 2012). *A. sacchari* generally infests species within the Poaceae only [Ben-Dov et al 2012]. This species has never been intercepted on ginger from Fiji by NZ quarantine (NZ interception data 2000-2011). Delete this species from Appendix A.

Dickeya sp. [syn: *Erwinia chrysanthemi* (Burkh.); there is no record of this bacterial species being present in Fiji. Delete this species record from Appendix A.

Exaireta spinigera [Stratiomyidae] does not occur in Fiji. This is a misidentification by Biosecurity New Zealand. Biosecurity New Zealand does not authenticate their species identifications on a regular basis and an unauthenticated species record should not be used as a reference to support pathway association. Delete this species record from Appendix A.

Hoplolaimus seinhorsti Luc; although this species is present in Fiji, it is not associated with ginger (Orson Williams 1980; McKenzie et al 2004). Delete this species record from Appendix A.

Ralstonia solanacearum; the strain that affects ginger does not occur in Fiji.

Nematoda: PHAMA notes that except for *Radopholus similis*, the pathway association of all nematode species present in Fiji has not been made other than by

circumstantial evidence as indicated by the statement of "May be present on the surface of poorly cleaned rhizomes." (refer to Appendix A). Based on this, the following species should be excluded from pathway association with ginger from Fiji: *Helicotylenchus egyptiensis, Helicotylenchus indicus, Helicotylenchus mucronatus, Discocriconemella discolabia, Mesocriconema denoudeni*, and for that matter all other nematode species also for which a reference for pathway association has not been cited.

Sphaeromema sp. be deleted from the risk assessment.

1.7 Comments on Appendix B – Additional quarantine pest data

PHAMA requests also that Australia be added to the distribution list of *Sphaeronema* sp. at Appendix B (p. 74 of the draft Ginger IRA).

Pest Risk Assessment Conclusion

Detailed analysis of the draft document has identified some areas where estimates of likelihoods or consequences were overestimated. This submission provides evidence to support revised likelihoods and consequences to ensure that the PRAs are based on sound science and detailed knowledge of the pests and diseases. A summary table of risk assessment results with suggested changes in red is presented in Table 1, below.

Table 1 Summary of revised risk assessments

Pest name	Likelihood of						Consequences							URE
	Entry			Establishment	Spread	P[EES]								
	Importation	Distribution	Overall				Direct		Indirect				Overall	
							PLH	OE	EC	DT	IT	ENC		
Weevils [Coleoptera: Curculionidae]														
Elytroteinus subtruncatus	V L	V L	EL	V L	V L	EL	C	A	B	B	B	A	VL	N
Armoured scales [Hemiptera: Diaspididae]														
Aspidiella hartii	M	M	L	M	H	L	D	A	B	B	B	A	L	VL
Ring nematodes [Tylencida: Criconematidae]														
Discocriconemella discolabia; Mesocriconema denoudeni	N	EL	N	L	L	N	D	A	C	B	B	A	L	N
Spiral nematodes [Tylenchida: Hoplolaimidae]														
Helicotylenchus egyptiensis, H. indicus; H. mucronatus	N	EL	N	L	L	N	D	A	C	B	B	A	L	N

Pest risk management measures and phytosanitary procedures

The suggested revisions to risk assessments provided by PHAMA would not leave any quarantine pest above the ALOP for fresh ginger from Fiji. PHAMA does not think that the perceived risk for yam scale (*Aspidiella hartii*) is above the ALOP. Therefore, no specific risk management measures for ginger imports from Fiji are required.

Conclusion

PHAMA has provided these comments and suggestions in the belief that there is a genuine desire for DAFF Biosecurity to set the least trade restrictive requirements for imports of fresh ginger, whilst protecting the quarantine status of Australia. Finally, PHAMA hopes that the provision of comments will be the first chapter in the development of a commercially viable ginger export industry from Fiji to Australia. To ensure this, PHAMA will be seeking ongoing dialogue with DAFF Biosecurity prior to finalisation of this policy document.

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