



Australian Government  
Department of Agriculture,  
Fisheries and Forestry

# Guava fruit from Taiwan: biosecurity import requirements draft report

July 2025



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Department of Agriculture, Fisheries and Forestry

GPO Box 858 Canberra ACT 2601

Telephone: 1800 900 090

Web: [agriculture.gov.au](https://www.agriculture.gov.au)

Email: [plantstakeholders@aff.gov.au](mailto:plantstakeholders@aff.gov.au)

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### Acknowledgement of Country

We acknowledge the continuous connection of First Nations Traditional Owners and Custodians to the lands, seas and waters of Australia. We recognise their care for and cultivation of Country. We pay respect to Elders past and present, and recognise their knowledge and contribution to the productivity, innovation and sustainability of Australia's agriculture, fisheries and forestry industries.

### Stakeholder submissions on draft reports

This draft report has been issued to give all interested parties an opportunity to comment on relevant technical biosecurity issues, with supporting rationale. A final report will then be produced taking into consideration any comments received.

Submissions should be sent to the Department of Agriculture, Fisheries and Forestry following the conditions specified within the related Biosecurity Advice, which is available at: [agriculture.gov.au/biosecurity-trade/policy/risk-analysis/memos](https://www.agriculture.gov.au/biosecurity-trade/policy/risk-analysis/memos).

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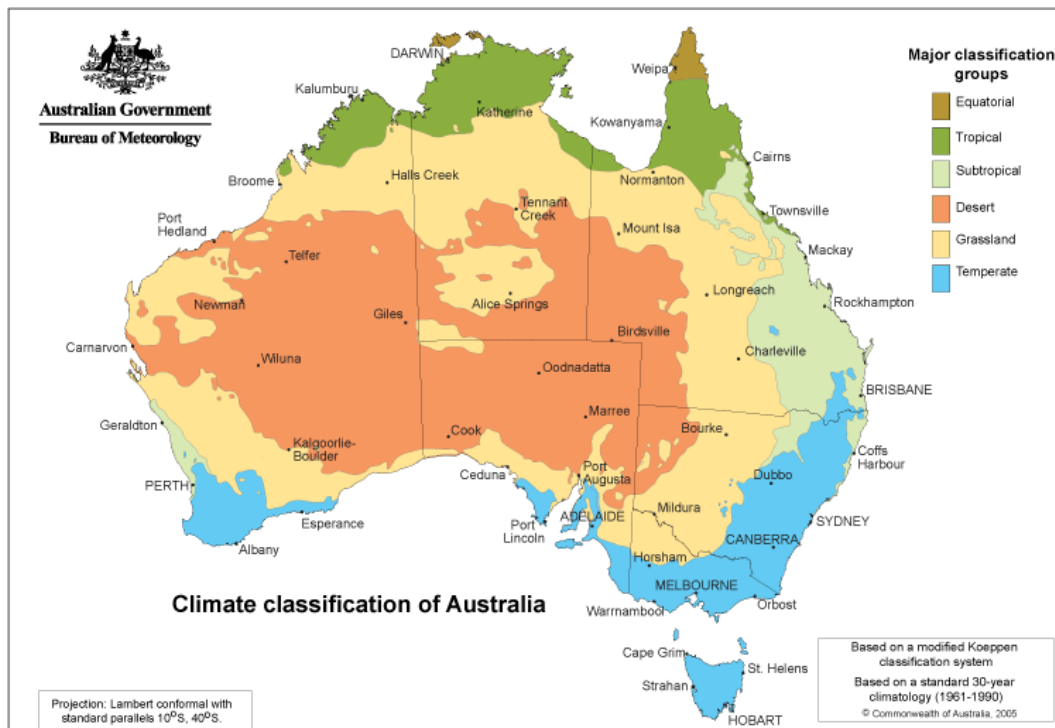
Guava fruit from Taiwan: biosecurity import requirements draft report

Maps of Australia

Map 1 Map of Australia



Map 2 A guide to Australia's bio-climatic zones



## Summary

The Australian Government Department of Agriculture, Fisheries and Forestry (the department) has prepared this draft report to assess the proposal by Taiwan for market access to Australia for guava fruit for human consumption.

Australia does not currently permit the importation of guava fruit from any country, for human consumption.

This draft report determines that the importation of commercially produced guava fruit to Australia from all commercial production areas of Taiwan can be permitted, subject to a range of biosecurity requirements.

This draft report contains details of plant pests that are of biosecurity concern to Australia and are potentially associated with the importation of guava fruit from Taiwan. The term ‘pests’ includes both arthropod pests and pathogens. This report also contains risk assessments for the identified quarantine pests, and, where required, proposed risk management measures to reduce the biosecurity risk to an acceptable level, that is, to achieve the appropriate level of protection (ALOP) for Australia.

Seven quarantine pests have been identified in this risk analysis as requiring risk management measures to reduce the biosecurity risk to an acceptable level. These pests are:

- fruit flies: Oriental fruit fly (*Bactrocera dorsalis*), fruit fly (*Bactrocera occipitalis*), melon fly (*Zeugodacus cucurbitae*) and pumpkin fruit fly (*Zeugodacus tau*)
- mealybugs: coffee mealybug (*Planococcus lilacinus*), Pacific mealybug (*Planococcus minor*) and Jack Beardsley mealybug (*Pseudococcus jackbeardsleyi*)

The identified pests are the same, or of the same pest groups, as those associated with other horticultural commodities that have been analysed previously by the department.

The proposed risk management measures take account of regional differences in pest distribution within Australia. One pest requiring risk management measures, *Planococcus minor*, has been identified as a regional quarantine pest for Western Australia. Interstate quarantine regulations and enforcement are in place to prevent the introduction and distribution of this pest into Western Australia.

In this draft report the department proposes a range of risk management measures, combined with operational systems, to reduce the risks posed by the 7 identified species to achieve the ALOP for Australia. The proposed measures are:

- for fruit flies
  - pest free areas, pest free places of production or pest free production sites; or
  - fruit treatment considered to be effective against all life stages of fruit flies, such as cold disinfestation treatment
- for mealybugs
  - pre-export visual inspection and, if found, remedial action

This draft report has been published on the department's website to allow interested parties to provide comments and submissions within the specified consultation period.



# 1 Introduction

## 1.1 Australia's biosecurity policy framework

Australia's biosecurity policies aim to protect Australia against the risks that may arise from exotic pests entering, establishing and spreading in Australia, thereby threatening Australia's unique flora and fauna, as well as Australia's agricultural industries that are relatively free from serious pests.

The risk analysis process is an important part of Australia's biosecurity policy development. It enables the Australian Government to formally consider the level of biosecurity risk that may be associated with proposals to import goods into Australia. If the biosecurity risks do not achieve the appropriate level of protection (ALOP) for Australia, risk management measures are proposed to reduce the risks to an acceptable level. If the risks cannot be reduced to an acceptable level, the goods will not be imported into Australia until suitable measures are identified or developed.

Successive Australian governments have maintained a stringent, but not a zero risk, approach to the management of biosecurity risks. This approach is expressed in terms of the ALOP for Australia, which is defined in the *Biosecurity Act 2015* as providing a high level of protection aimed at reducing risk to a very low level, but not to zero.

Australia's risk analyses are undertaken by the department using technical and scientific experts in relevant fields and involve consultation with stakeholders at various stages during the process.

Risk analyses may take the form of a biosecurity import risk analysis (BIRA) or a review of biosecurity import requirements (such as scientific review of existing policy and import conditions, pest-specific assessments, weed risk assessments, biological control agent assessments or scientific advice).

Further information about Australia's biosecurity framework is provided in the *Biosecurity Import Risk Analysis Guidelines 2016* located on the department's website at [agriculture.gov.au/biosecurity-trade/policy/risk-analysis/guidelines](https://agriculture.gov.au/biosecurity-trade/policy/risk-analysis/guidelines).

## 1.2 This risk analysis

### 1.2.1 Background

Taiwan's Animal and Plant Health Inspection Agency (APHIA) formally requested market access to Australia for guava fruit for human consumption in a submission received in January 2010. This submission provided information on the pests associated with guava fruit in Taiwan, including the plant parts affected. Information was also provided on the standard commercial production practices for guava fruit in Taiwan.

On 25 October 2023, the department notified stakeholders of the decision to progress a request for market access for guava fruit from Taiwan as a review of biosecurity import requirements. This analysis is conducted in accordance with the *Biosecurity Act 2015*.

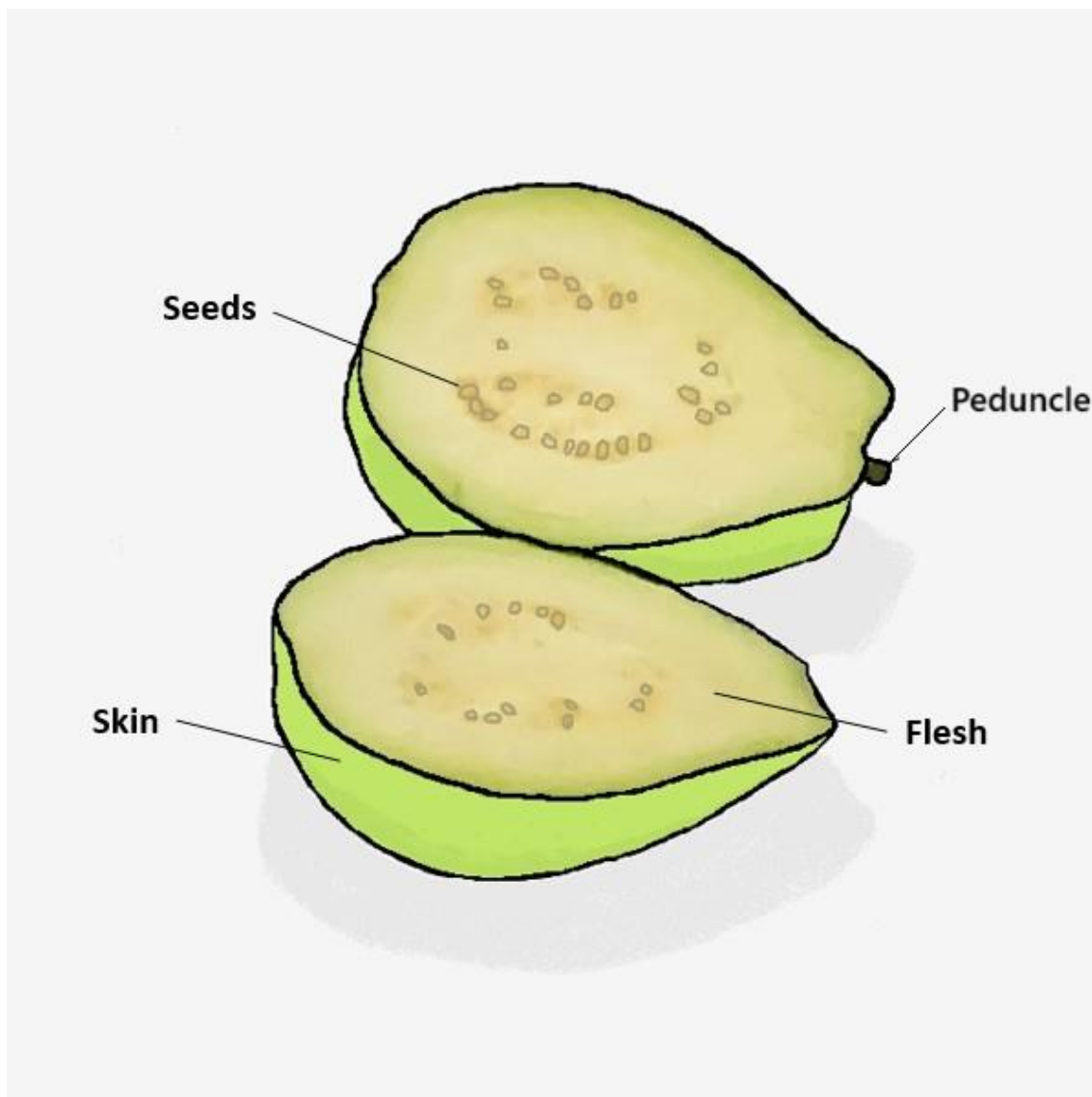
In November 2023, officers from the department visited guava fruit production areas and packing house facilities in Taiwan. The objective of this visit was to observe commercial production, pest management and other export practices.

### 1.2.2 Scope

The scope of this risk analysis is to consider the biosecurity risk that may be associated with the pathway of imported guava fruit (*Psidium guajava*) from Taiwan, produced using standard commercial production practices as described in Chapter 2, for human consumption in Australia.

In this risk analysis, guava fruit are defined as the entire fruit comprising skin, flesh, seeds and potentially a small portion of peduncle (fruit stalk), but no other plant part such as leaves or stem (Figure 1.1). This risk analysis covers all cultivars of commercially produced guava fruit from all production regions in Taiwan.

Figure 1.1 Diagram of a guava fruit morphology



Source: DAFF image

### 1.2.3 Existing policy

#### International policy

Australia does not currently permit the importation of fresh guava fruit for human consumption from any country. This commodity has not been previously assessed for import into Australia.

However, import policy exists for other fresh fruits from Taiwan including lychees (DAFF 2013), mangoes (Biosecurity Australia 2006) and de-crowned pineapples (Department of Agriculture 2019). The biosecurity import conditions for these commodity pathways can be found at the Biosecurity Import Conditions (BICON) system on the department website at [bicon.agriculture.gov.au/BiconWeb4.0](https://bicon.agriculture.gov.au/BiconWeb4.0).

The department has reviewed all the pests and pest groups previously identified in the existing policies and, where relevant, the information in those assessments has been considered in this risk analysis. The department has also reviewed the latest scientific literature and other information and, where relevant, the department has included new information in this risk analysis.

The biosecurity risk posed by thrips and the orthotospoviruses they transmit was previously assessed for all countries in the *Final group pest risk analysis for thrips and orthotospoviruses on fresh fruit, vegetable, cut-flower and foliage imports* (thrips Group PRA) (DAWR 2017a).

The biosecurity risk posed by mealybugs and the viruses they transmit was previously assessed for all countries in the *Final group pest risk analysis for mealybugs and the viruses they transmit on fresh fruit, vegetable, cut-flower and foliage imports* (mealybugs Group PRA) (DAWR 2019a).

The biosecurity risk posed by soft and hard scale insects was previously assessed for all countries in the *Final group pest risk analysis for soft and hard scale insects on fresh fruit, vegetable, cut-flower and foliage imports* (scales Group PRA).

The biosecurity risk posed by the spider mites has been re-assessed by the department in the *Final report for a review of pest risk assessments for spider mites (Acari: Trombidiformes: Tetranychidae)* (spider mites Group PRA) (DAFF 2024a).

The Group Policies (GP) for thrips, mealybugs, scales and spider mites are applicable for the guava fruit from Taiwan pathway. The department has determined that the information in these GPs can be adopted for the species under consideration in this risk analysis. These GPs and their adoption are further explained in Chapter 3 (Section 3.3).

### **Domestic arrangements**

The Australian Government is responsible for regulating the movement of goods such as plants and plant products into and out of Australia. The state and territory governments are responsible for plant health controls within their individual jurisdiction. Legislation relating to resource management or plant health may be used by state and territory government agencies to control interstate movement of plants and plant products. After imported plants and plant products have been cleared by Australian Government biosecurity officers, they may be subject to interstate movement regulations/arrangements. It is the importer's responsibility to identify and ensure compliance with all requirements.

#### **1.2.4 Contaminating pests**

In addition to the pests of guava fruit from Taiwan that are assessed in this risk analysis, other organisms may arrive with the imported commodity. These organisms may include pests considered not to be associated with the fruit pathway, pests of other crops, or predators and parasitoids of arthropods. The department considers these organisms to be contaminating pests ('contaminants')

that could pose sanitary (to human or animal life or health) or phytosanitary (to plant life or health) risks. These risks are identified and addressed using existing operational procedures that require an inspection of all consignments during processing and preparation for export. Consignments will also undergo a verification process on arrival in Australia. The department will investigate whether any pest identified through import verification processes may be of biosecurity concern to Australia and may thus require remedial action.

### **1.2.5 Consultation**

On 25 October 2023, the department notified stakeholders, in Biosecurity Advice 2023-P09, of the commencement of a review of biosecurity import requirements to assess a proposal by Taiwan for market access to Australia for guava fruit for human consumption.

Prior to, and following the announcement of this decision, the department engaged with the small number of guava growers in Australia through the relevant state and territory government agencies, and generalist industry bodies. This approach was necessary as the Australian guava industry does not have an official industry representative or peak industry body.

The department has consulted with Taiwan's APHIA and Australian state and territory governments during the preparation of this report.

### **1.2.6 Overview of this pest risk analysis**

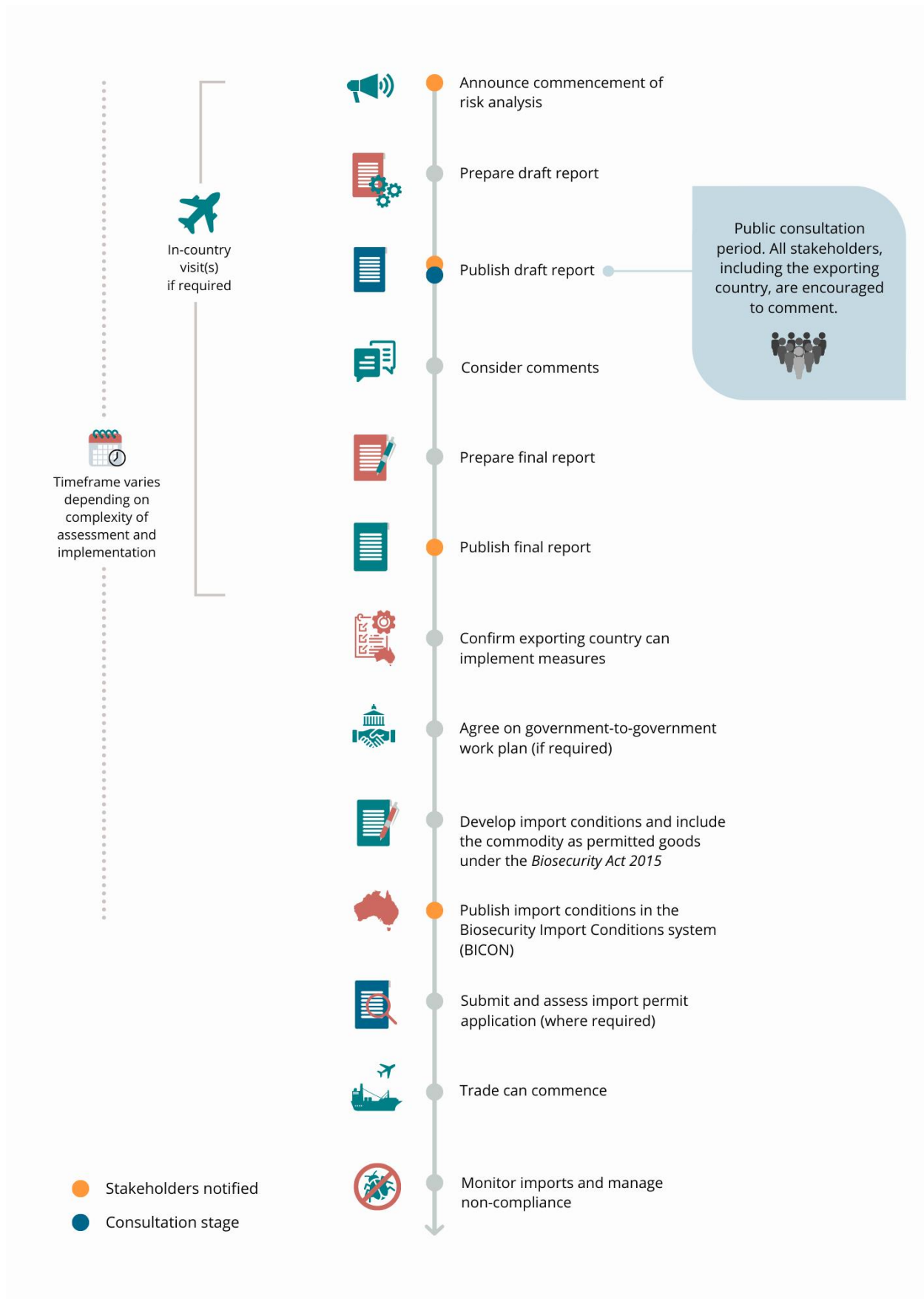
A pest risk analysis (PRA) is 'the process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken against it'. A pest is 'any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products' (FAO 2024b). This definition is also applied in the *Biosecurity Act 2015*.

The department conducted this PRA in accordance with Australia's method for pest risk analysis (Appendix A), which is consistent with the International Standards for Phytosanitary Measures (ISPMs), including ISPM 2: *Framework for pest risk analysis* (FAO 2019a) and ISPM 11: *Pest risk analysis for quarantine pests* (FAO 2019b), and the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement) (WTO 1995).

A summary of the process used by the department to conduct a risk analysis and implement trade is provided in Figure 1.2.

## Introduction

Figure 1.2 Process flow diagram for conducting a risk analysis and implementing trade



The PRA was conducted in the following 3 consecutive stages:

- 1) Initiation—identification of:
  - the pathway being assessed in the risk analysis
  - the pest(s) that have potential to be associated with the pathway and are of biosecurity concern and should be considered for analysis in relation to the identified PRA area.
- 2) Pest risk assessment—this was conducted in 2 sequential steps:
  - 2a. Pest categorisation: examination of each pest identified in stage 1 to determine whether it is a quarantine pest and requires further pest risk assessment.
  - 2b. Further pest risk assessment: evaluation of the likelihoods of the introduction (entry and establishment) and spread, and the magnitude of the potential consequences of the quarantine pest(s). The combination of the likelihoods and consequences gives an overall estimate of the biosecurity risk of the pest, known as the unrestricted risk estimate (URE).
- 3) Pest risk management—the process of identifying and proposing/recommending required phytosanitary measures to reduce the biosecurity risk to achieve the ALOP for Australia where the URE is determined as not achieving the ALOP for Australia. Restricted risk is estimated with these phytosanitary measure(s) applied.

A phytosanitary measure is ‘any legislation, regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests’ (FAO 2024b).

For further information on the:

- method for PRA see: Appendix A
- terms used in this risk analysis see: Glossary, acronyms and abbreviations at the end of this report
- pathway being assessed in this risk analysis see: section 1.2.2
- initiation and pest categorisation see: Appendix B
- commercial production practices of guava fruit in Taiwan and its export capacity see: Chapter 2
- pest risk assessments for pests/pest groups identified in Appendix B as requiring further pest risk assessment see: Chapter 3
- risk management measures for pests/pest groups assessed in Chapter 3 as not achieving the ALOP for Australia see: Chapter 4.

### **1.2.7 Next steps**

The department has notified the proposer, the registered stakeholders and the WTO Secretariat about the release of this draft report.

This draft report gives stakeholders an opportunity to comment on the department’s review and proposed measures, and to draw attention to any scientific, technical or other gaps in the data, or misinterpretations or errors.

The department will consider submissions received on the draft report and may consult further with stakeholders. The department will revise the report as appropriate and then prepare a final report, taking into account stakeholder comments.

Introduction

The final report will be published on the department's website along with a notice advising stakeholders of the release. The department will also notify the proposer, the registered stakeholders and the WTO Secretariat about the release of the final report. Publication of the final report represents the end of the risk analysis process.

Should the final report recommend importation be permitted, Taiwan must be able to demonstrate to the department that processes and procedures are in place to implement the agreed risk management measures prior to publication of import conditions on BICON. This will ensure safe trade in guava fruit from Taiwan.

The biosecurity requirements recommended in the final report will form the basis of the conditions published on BICON, and for any import permits subsequently issued.

## **2 Commercial production practices for guava in Taiwan**

This chapter provides information on the pre-harvest, harvest and post-harvest practices considered to be standard practices in Taiwan for the production of guava fruit for export. It also outlines the export capacity of Taiwan.

### **2.1 Considerations used in estimating unrestricted risk**

Taiwan provided a technical market access submission to Australia that included information on commercial production practices of guava fruit in Taiwan.

In November 2023, the department visited guava production areas and fruit packing houses in the Changhua and Tainan counties in Taiwan. The department's observations during the visit and additional information provided during and after the visit confirmed the production, harvest, processing and packing procedures described in this chapter as standard commercial production practices for guava fruit for export.

The information provided by Taiwan and gathered by the department during the visit has been supplemented with data from published literature and other sources. This information has been taken into consideration when estimating the unrestricted risks of pests that may be associated with import of fresh guava fruit from Taiwan.

In estimating the likelihood of pest introduction, it was considered that the pre-harvest, harvest and post-harvest production practices for guava fruit in Taiwan, as described in this chapter, are implemented by all growers and packing houses for all varieties of guava fruit produced for export.

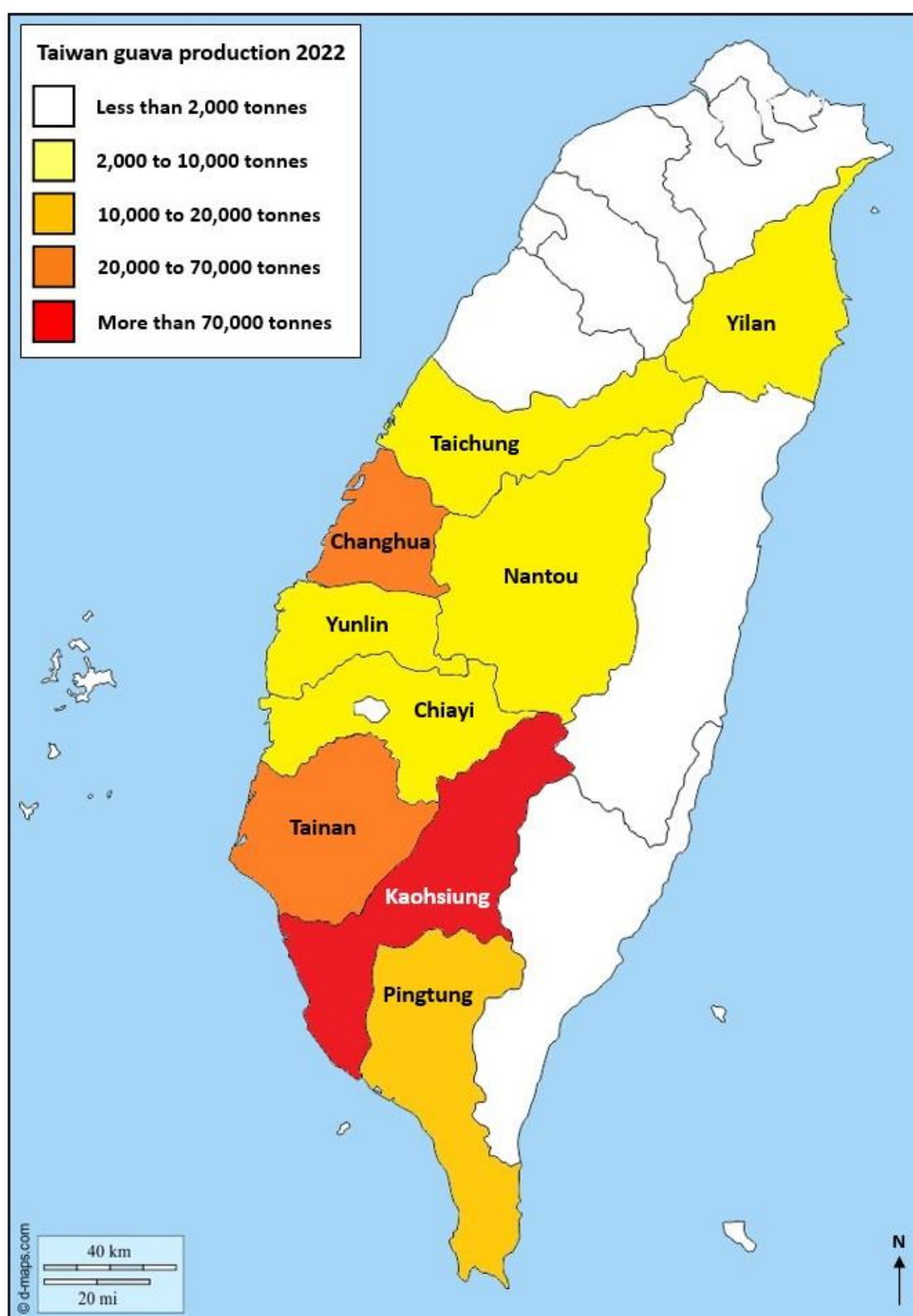
### **2.2 Production areas of guava fruit**

Guava are grown throughout Taiwan, although commercial guava production is predominantly undertaken in the central and southern regions of Taiwan. Taiwan's commercial guava industry is large and well-established. The total area under production has been steadily increasing and continues to grow with domestic demand and access to new international markets. In 2007, 131,704 tonnes of guava fruit was produced across 7,019 hectares, but production increased to 197,397 tonnes of guava fruit across 8,078 hectares in 2022.

The main production areas are in Changhua, Kaohsiung, Pingtung and Tainan, with each area producing in excess of 10,000 tonnes of fruit per year. Smaller volumes of guava fruit are also produced in Chaiyi, Taichung, Yilan and Yunlin. The location of these counties is displayed in Map 3.



Map 3 Main production areas of guava fruit in Taiwan



Source: modified from <https://d-maps.com>, based on production data from APHIA

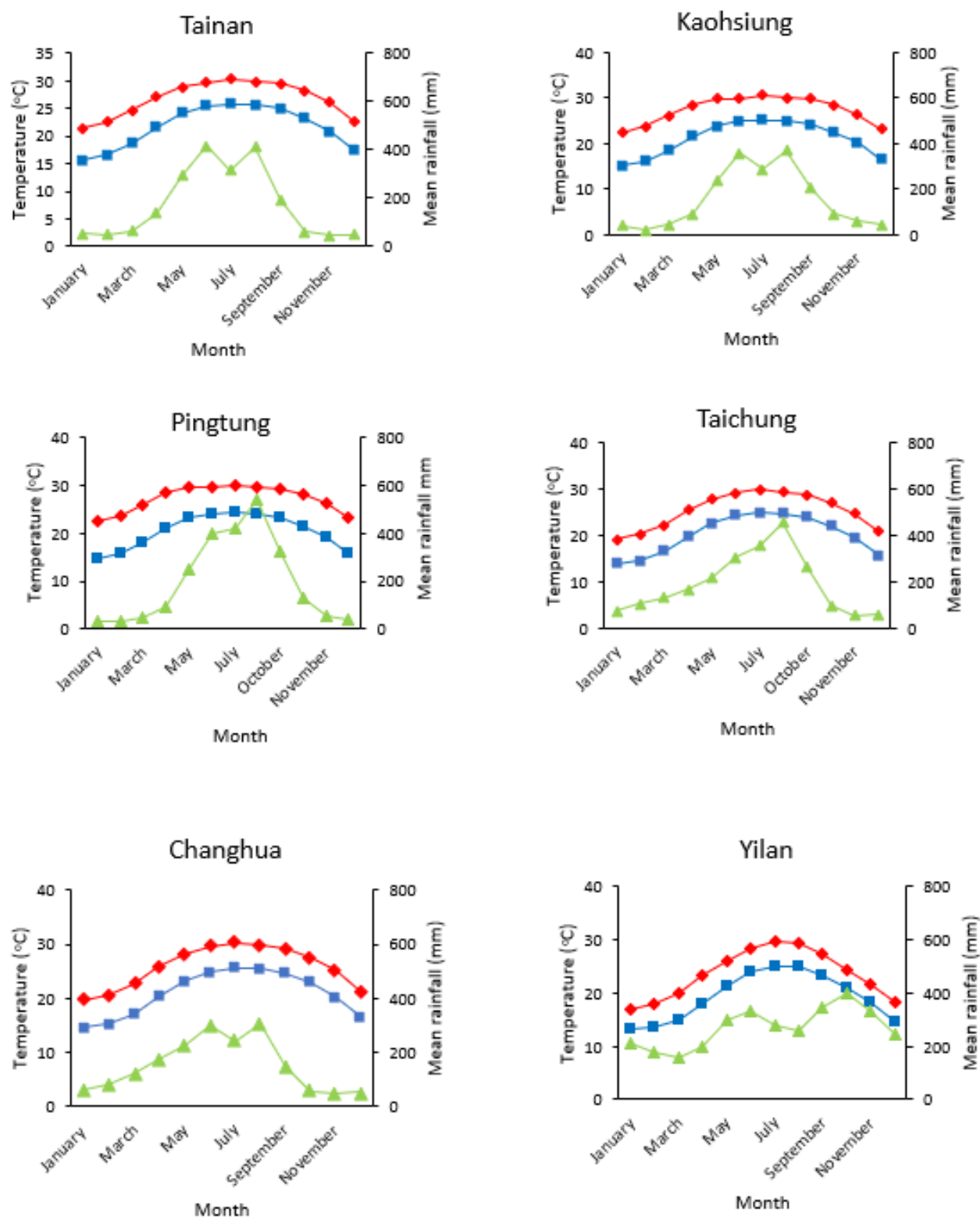
## 2.3 Climate in production areas

Taiwan's climate is primarily subtropical, but the northern areas have a temperate climate with 4 seasons, while the south experiences tropical conditions with wet and dry seasons, including frequent typhoons. Elevational gradients crossing the island from east to west go from sea level to 3,952 m at the highest point and steeply back to sea level (Doorenweerd et al. 2019).

The main guava production areas extend through central Taiwan down to the western lowlands and southern Taiwan. This region has warm summers; in the west (for example, Taichung) there is a discernible dry period over the winter months, while in the east (for example, Yilan) the seasonal variation in rainfall is relatively minor.

The western lowlands and most of southern Taiwan experience a tropical savanna or monsoon climate with hot summers from April to October and mild winters, although seasonal temperature fluctuations are relatively minor. In these regions, daily temperatures range from minimums around 25°C to maximums around 30°C in the summer months and between 15°C and 20°C in the winter months. The average monthly rainfall in summer can exceed 400 mm, but winter is typically very dry. The mean maximum and minimum temperatures and rainfall by month in six of the major guava-producing regions of Taiwan are shown in Figure 2.1.

Figure 2.1 Mean monthly minimum and maximum temperatures and mean monthly rainfall in the main production areas of guava fruit in Taiwan



Source: World Weather Online Monthly mean maximum (—◆—) and minimum (—■—) temperatures (°C) and mean monthly rainfall (millimetres) (—▲—) from climatic data collected between 2000 and 2012.

## 2.4 Registration of exporting orchards and packing houses

Orchards and packing houses intending to export guava fruit are required to be registered with Taiwan's Food and Drug Administration (FDA) and this registration information is then used by APHIA for their auditing, export facilitation and farm assistance activities including biosecurity activities.

Orchards and packing facilities for guava in Taiwan are recommended by APHIA to adhere to GLOBALG.A.P. standards.

APHIA requires that individual orchards producing guava for export are registered prior to each annual production cycle. Packing houses also need to be registered with APHIA. Exporting companies register their contracted supplying orchards with APHIA.

If a packing house intends to undertake phytosanitary cold treatment at their premises, the facility must be registered with APHIA as a cold treatment export facility. Facilities must meet the necessary requirements for registration, including design specifications for receipt and dispatch areas, sealing of the facility to prevent entry of insect pests, and provision of discrete areas for phytosanitary inspection.

## 2.5 Pre-harvest

### 2.5.1 Cultivars

Guava is a fruit tree in the myrtle family (Myrtaceae). It is native to Central and South America and has been widely adopted as a crop in other parts of the world, including Asia and Australia. Commercial guava production began in Taiwan more than 200 years ago following the introduction of the fruit from Japan.

Both climacteric (which continue ripening after harvest) and non-climacteric (which do not ripen further after harvest) guava fruit varieties are grown in Taiwan, however non-climacteric varieties are preferred for larger commercial production. The most popular and commonly grown variety in Taiwan, and the variety most commonly produced for export, is Pearl. This variety produces large oval-shaped fruit with pale green skin and white flesh (Figure 2.2). The fruit are delicate and can bruise easily. However, this variety is favoured for export because of its crisp flesh and long shelf life. Fruit grown for export are typically between 250 g and 600 g in weight.

Other non-climacteric varieties of guava fruit that are commercially grown in Taiwan include Twentieth Century and Crystal. The Twentieth Century variety produces large elongate to oval fruit with white to slightly yellowish flesh. The skin is slightly rugose and yellow to greenish yellow in colour. Its thick crispy flesh is tart in flavour. This variety is known for heavy vegetative growth in the field, requiring increased pruning and trimming. The Crystal variety was selected from the Thai variety as it has fewer seeds. Its productivity is lower than other varieties, producing flat round medium to large fruit. The flesh is thick, and white to pale yellowish in colour and there are few to no seeds. The texture is very crisp and the flavour is sweet to slightly acidic. This variety is notably more susceptible to fruit rots and requires more care during growth.

Figure 2.2 Guava fruit of the Pearl variety



### 2.5.2 Cultivation practices

Production manuals are produced by APHIA and distributed to all registered commercial guava orchards in Taiwan. These manuals provide advice to guava growers on the best production practices and pest management methods available.

#### Propagation and planting

Guava trees are usually sourced from accredited nurseries, where trees are checked to ensure they are of good health and showing no pest and disease symptoms. The most common method of propagation for guava in Taiwan is ground grafting. This involves grafting stem material onto nursery grown rootstocks. The grafting of cuttings of desirable varieties onto clean established rootstocks produces fast-growing plants that have a high survival rate.

The guava trees typically produce commercial quality fruits 2 to 3 years after planting. The trees remain productive for approximately 20 years.

#### Orchard design

Guava orchards in Taiwan are small and typically less than one hectare in size.

Guava planting material that has well-established and healthy root systems are planted in open fields, in raised rows that are approximately 3.5 to 4 m apart (Figure 2.3). The young trees are planted along the raised rows, spaced approximately 1.5 m apart (Lin et al. 2005).



**Figure 2.3 Rows of guava trees in the orchard**



### **Irrigation and fertiliser application**

Guava trees have shallow root systems and prefer high draining soils. Frequent watering of guava trees is necessary for adequate growth and fruit production. Irrigation requirements are dictated by the rainfall experienced in a season. Flood irrigation is the typical method used for irrigation. Irrigation ditches, around 50 cm deep, are dug between rows. Underground piping may also be installed to assist in the drainage of soils to prevent inundation of the root systems.

Fertilisers are applied when needed, which is usually dependent on the stage of growth and development of the guava trees. As a guide, organic fertilisers are usually applied when establishing new trees, after tree pruning and after harvest, and trees are supplemented with small quantities of inorganic fertilisers when required.

### **Pruning and tree management**

Mature trees are maintained at a relatively low height of around 1.5 to 2 m high. As the tree grows, timber poles are placed in the ground to support the branches, preventing tree damage and assisting in maintaining the tree structure and shape.

Trees are pruned twice a year, following harvest. This involves removing branches that show disease symptoms or are weak in appearance, and branches that are overhanging or close to the ground. Pruning can also be used to manage the timing of orchard flowering to avoid typhoon seasons and ensure fruiting coincides with specific production periods (Lin et al. 2005). The pruned branches are removed from the property.

Mulching (for example, rice straw or leaves) around the base of the trees helps to retain moisture and suppress weeds. Weed management is done mechanically (slashing/mowing) or with chemical sprays.

Guava trees are self-pollinating with a high proportion of flowers reliably setting fruit. Once the fruit have grown to around 2 to 3 cm in diameter they are thinned by hand, leaving only one fruit per branchlet. This thinning is done to improve the consistency and quality of the fruit produced.

### **Fruit bagging**

Each individual fruitlet is bagged when it is around 2 to 3 cm in diameter (Figure 2.4), to prevent damage to the fruit from fruit flies, birds, snails and other pests. The fruit are bagged with two layers, an inner layer of low-density polyethylene foam mesh sleeve, and the outer layer of a transparent non-perforated plastic bag (Figure 2.5). The fruit are bagged carefully to ensure no leaves are present within the bags. The outer layer plastic fruit bag is tied to the branch rather than the fruit stem, as this technique is more secure during high winds, reducing the potential for damage to the fruit.

Fungicide and insecticide spraying is recommended prior to bagging of fruit to reduce the potential for pests to be enclosed with the fruit. The bags remain on the fruit when harvested and are not removed until the fruit are processed at the packing house.

**Figure 2.4 Bagging of young fruit**



**Figure 2.5 Mature bagged guava fruit**



### **2.5.3 Pest management**

Orchard hygiene, involving removal of weeds and fallen plant material including fruit and branches, is maintained to prevent spread of diseases and arthropod pests. Preventative fungicidal and insecticidal chemicals are regularly applied, including a recommended spray shortly before fruit bagging. These applications follow the spraying schedules approved by the Taiwan Food Safety organisation and are conducted in adherence with the Plant Protection Manuals published by APHIA. Pest populations are monitored regularly, which allows strategic and targeted use of chemical insecticides when an increase in population is observed.



Fruit fly management in Taiwan is managed nationally by the Taiwan Agricultural Research Institute (TARI), which operates a national trapping network to monitor the abundance of *Bactrocera dorsalis* and *Zeugodacus cucurbitae*. This network informs TARI when there is a shift in the abundance of fruit flies in the area and triggers growers to implement targeted management of these pests, which includes chemical control and the use of bait traps. Growers must follow the good agricultural practice standard (GLOBALG.A.P.) guidelines for the use of chemicals if using pesticide sprays to control fruit flies in the orchard.

Methyl eugenol traps (Figure 2.6) may be placed in orchards to trap and kill male *B. dorsalis* flies, which reduces the potential for female flies to reproduce, thereby reducing the fruit fly population in the orchard. The use of fruit fly traps is not a standard requirement for all guava orchards registered for export, but they may be selectively deployed as part of the TARI fruit fly monitoring and trapping program during periods of elevated pest prevalence.

Figure 2.6 Fruit fly trap in a guava orchard



## 2.6 Harvesting and handling practices

Guava fruit is ready for harvest when the skin is light green in colour, which is about 60 to 80 days after bagging the fruit. Harvester experience is necessary to gauge the readiness of the fruit for harvest. The fruit are harvested by hand using pruning shears, cutting above the site where the plastic bag is tied. This can include a small section of stem and leaves at this stage, as further trimming to remove this material is conducted later at the packing house. Care is taken to avoid physical damage during harvesting and handling. The fruit, still wrapped in the plastic bag, are placed in hessian bags or plastic tubs for transport via truck to the sorting house (Figure 2.7) or to the packing house if initial sorting and grading occurs at a primary collection point in the orchard.



Guava grows in Taiwan all year round, although there are 2 peak fruiting periods annually. These are the summer fruit (March to July) and winter fruit (October to December) seasons. The fruit are usually harvested over a one-month period each fruiting season, as fruit on the tree does not all ripen at the same time.

## **2.7 Post-harvest**

### **2.7.1 Sorting and packing house practices**

#### **Sorting and grading**

The initial sorting and grading process can occur either at a primary collection point in the orchard or at a sorting house, prior to the fruit being transported to the packing house.

The fruit are inspected for blemishes, pests or discolouration (Figure 2.8). The fruit bags and inner mesh sleeves are not removed at this stage but disease symptoms, pest infestation or damage is typically visible through the bags. The mesh sleeve is flexible and can be moved around to enable observation of the obscured parts of the fruit surface. Any fruit not meeting the quality standard are excluded and placed in colour coded tubs for domestic sale at the market or used for fertiliser manufacture. The fruit that are of acceptable quality are then graded according to size. Grading undertaken at the orchard collection point will be conducted manually. If grading occurs at a sorting house it may be done manually (Lin et al. 2005), or the process may be automated, with the fruit loaded onto a conveyor, which grades the fruit by weight.

**Figure 2.7 Guava fruit in plastic tubs**



**Figure 2.8 Inspection of guava fruit**



After grading, the fruit are placed into plastic lined crates that are colour coded for the relevant weight and export destination. The crates are then taken to a loading area where they are trucked to the packing house.

At the packing house, fruit are unloaded in a dedicated docking area, which is located in a separate area from the processing area of the facility. Pests are prevented from entering the processing area with the use of loading dock seals, air curtains or other pest-excluding devices. All movement through the packing house is linear with a one-way process flow.

### Quality check and re-bagging

The fruit are removed from their outer plastic bag, leaving the foam mesh sleeve intact. The stem is trimmed close to the fruit with pruning shears or scissors, removing any remaining branch and leaf material (Figure 2.9) that are discarded in biosecurity waste bins. The fruit are visually inspected again for defects and pest infestation. Any fruit that are rejected at this stage, and any extraneous stem, leaves or other material that is removed, are placed in a sealed biosecurity bin. The fruit are then placed in new plastic bags for export (Figure 2.10).

**Figure 2.9 Inspecting fruit and trimming stem**



**Figure 2.10 Re-bagging fruit prior to packing**



### Packing and storage

The fruit are packed into cardboard cartons, typically containing around 10 kg per carton, which is approximately 20 fruit. The packed cartons are palletised and transferred to a cool storage area prior to export.

Fruit that are destined for export markets requiring a cold disinfestation phytosanitary treatment are pre-cooled to slowly cool the fruit down to the necessary treatment temperature.

#### 2.7.2 Phytosanitary inspection

Phytosanitary inspection is performed by an APHIA inspection officer at a dedicated area in the packing house. The APHIA officer selects random boxes of fruit for inspection, with the sample size dependent on the export market requirements. The plastic packaging and sleeve are removed to

allow an unobstructed view of the fruit, which is examined using a magnifying lens (Figure 2.11). Fruit that pass inspection are placed back in the sleeve and bag. If necessary, inspectors may cut the fruit using a knife to inspect the inside of the fruit (Figure 2.12).

If the consignment is found free of pests and meets the requirements of the importing country it is issued with a phytosanitary certificate. If a phytosanitary treatment such as cold disinfestation treatment is required, this is verified before the phytosanitary certificate is issued. If the cold treatment is to be conducted in transit, the fruit cartons are loaded into a refrigerated container and an APHIA officer places the probes within the consignment as required. The officer seals the container and checks the temperature reading to ensure the fruit is being held at the required temperature. Once the officer is satisfied the treatment has been set up appropriately, the phytosanitary certificate is issued.

**Figure 2.11** Phytosanitary inspection of guava fruit prior to export



**Figure 2.12** Phytosanitary inspector cutting fruit to inspect for internal pests prior to export



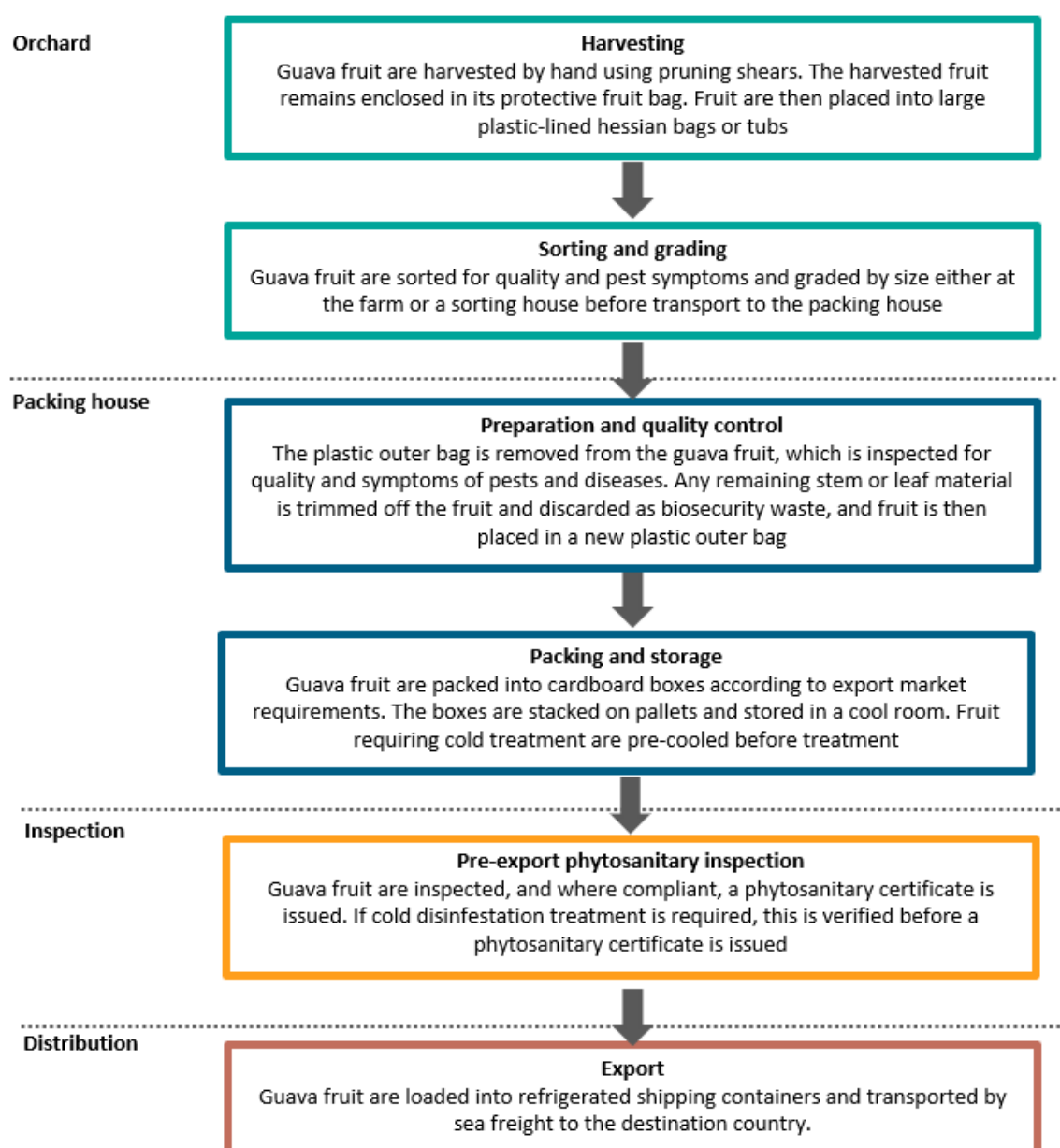
### **2.7.3 Transport**

Guava fruit may be exported from Taiwan by sea or air freight. Sea freight forms the bulk of current exports from Taiwan, and is expected to be the primary method for exports to Australia. When fruit is sent by sea, the consignment is loaded into a refrigerated shipping container that is sealed and transported directly to the seaport.

A summary of the operational steps for guava fruit grown in Taiwan for export is provided in Figure 2.13.



Figure 2.13 Summary of operational steps for guava fruit grown in Taiwan for export



## 2.8 Export capacity

### 2.8.1 Production statistics

There are considerable variations in production area and volumes between different districts in Taiwan. However, the total guava fruit production in Taiwan steadily increased during the period between 2018 and 2022. The planting areas and production volumes for the main guava producing regions are shown in Table 2.1.

**Guava fruit from Taiwan: biosecurity import requirements draft report**  
Commercial production practices for guava in Taiwan

**Table 2.1 Guava fruit production in the main production regions of Taiwan from 2018-2022**

Administrative division	2018		2019		2020		2021		2022	
	Area (ha)	Production (tonne)	Area (ha)	Production (tonne)	Area (ha)	Production (tonne)	Area (ha)	Production (tonne)	Area (ha)	Production (tonne)
Yilan	215	4,557	210	4,563	206	4,430	206	4,684	206	4,495
Taichung	124	2,229	130	2,311	134	2,525	137	2,572	137	2,579
Changhua	1,258	34,723	1,300	36,003	1,343	44,459	1,363	41,602	1,367	41,475
Nantou	173	4,000	178	4,448	183	4,350	186	3,581	184	3,443
Yunlin	295	6,385	304	6,990	314	7,989	340	6,982	346	8,783
Chiayi	346	6,763	359	7,296	367	8,667	376	8,158	385	8,662
Tainan	1,467	32,080	1,499	33,825	1,564	34,689	1,579	30,266	1,611	35,045
Kaohsiung	2,694	67,829	2,711	64,916	2,734	71,468	2,801	68,204	2,842	73,067
Pingtung	540	13,124	536	13,643	564	14,489	583	13,871	613	14,490
Others	330	4,614	355	5,043	358	4,991	360	5,029	387	5,358
<b>Total</b>	<b>7,442</b>	<b>176,304</b>	<b>7,582</b>	<b>179,038</b>	<b>7,767</b>	<b>198,057</b>	<b>7,931</b>	<b>184,950</b>	<b>8,078</b>	<b>197,397</b>

## 2.8.2 Export statistics

Taiwan regularly exports fresh guava fruit to international markets, with the major volumes sent to Canada, Hong Kong, Singapore, USA and China. Other smaller markets include the United Arab Emirates, Malaysia, Bahrain, Türkiye, Palau and the Marshall Islands. Export data for the years 2019 to 2022 are provided in Table 2.2.

**Table 2.2 Guava fruit exports from Taiwan for 2019-2022**

Export market	Volume in tonnes			
	2019	2020	2021	2022
China	729	377	114	3
Canada	2,599	2,283	1,631	983
Hong Kong	850	1,000	446	613
Singapore	467	475	245	119
United Arab Emirates	132	9	>1	1
USA	14	311	215	88
Malaysia	72	20	27	6
Other	9	10	9	9
<b>Total</b>	<b>4,872</b>	<b>4,485</b>	<b>2,688</b>	<b>1,822</b>

## 2.8.3 Export season

There are 2 distinct seasonal peaks in commercial guava fruit production annually in Taiwan, although guava can be grown and exported year-round. The greatest volume of fruit is produced in

the summer season between March and July, although fruit produced in the winter season between October and December is considered better quality.

### 3 Pest risk assessments for quarantine pests

#### 3.1 Summary of outcomes of pest initiation and categorisation

The initiation process (Appendix B) identified 115 pests as being potentially associated with guava in Taiwan. In addition to the 115 pests, Appendix B also included 2 pests, *Drosophila suzukii* and *Austropuccinia psidii*, that are now considered absent from Taiwan to provide further clarity and assurance regarding their status.

Of these 115 pests, the pest categorisation process (Appendix B) identified:

- 52 pests as already present in Australia and not under official control, and therefore not requiring further assessment
- 54 pests as not having potential to enter on the commercially produced guava fruit from Taiwan pathway, and therefore not requiring further assessment

The remaining 9 pests were assessed as having potential to enter, establish, spread and cause consequences in Australia, and therefore requiring further pest risk assessment.

In applying the Group Policies, 1 thrips and 3 mealybugs were identified on the import pathway and listed in the pest categorisation (Appendix B). The application of the GPs to this risk analysis is outlined in Appendix A in section A2.7.

#### 3.2 Pests requiring further pest risk assessment

The 9 pests associated with commercially produced guava fruit for export from Taiwan, identified as requiring further pest risk assessment are listed in Table 3.1.

All 9 pests are quarantine pests. Of these 9 pests:

- 8 are quarantine pests for Australia
- 1 is a regional quarantine pest for Western Australia. Whilst it has been recorded in some regions of Australia, official interstate controls are in place and enforced for this pest.

**Table 3.1 Quarantine pests potentially associated with guava fruit from Taiwan, and requiring further pest risk assessment**

Pest/pest group	Scientific name	Common name	Policy status/region
Fruit flies [Diptera: Tephritidae]	<i>Bactrocera dorsalis</i>	Oriental fruit fly	EP
	<i>Bactrocera occipitalis</i>		EP
	<i>Zeugodacus cucurbitae</i>	Melon fly	EP
	<i>Zeugodacus tau</i>	Pumpkin fruit fly	EP
Mealybugs [Hemiptera: Pseudococcidae]	<i>Planococcus lilacinus</i>	Coffee mealybug	GP
	<i>Planococcus minor</i>	Pacific mealybug	GP, WA
	<i>Pseudococcus jackbeardsleyi</i>	Jack Beardsley mealybug	GP
Thrips [Thysanoptera: Thripidae]	<i>Rhipiphorothrips cruentatus</i>	Grapevine thrips	GP

Pest/pest group	Scientific name	Common name	Policy status/region
Fungi [ <i>Amphisphaeriales</i> : <i>Sporocadaceae</i> ]	<i>Pestalotiopsis psidii</i>	Guava scab	Not previously assessed

**EP:** Species has been assessed previously and import policy already exists. **GP:** Species has been assessed previously in a Group PRA, and the Group PRA has been applied. **WA:** Regional quarantine pest for Western Australia.

### 3.3 Overview of pest risk assessment

This chapter assesses, for each of the pests, or pest groups identified in Table 3.1, the likelihoods of entry, establishment and spread, and the associated potential consequences these species may cause if they were to enter, establish and spread in Australia.

Eight of the 9 identified quarantine pests in Table 3.1 have been assessed previously by the department. Where appropriate, the outcomes of the previous assessments for these pests have been adopted for this risk analysis, unless new information is available that suggests the risk would be different. The acronym 'EP' is used to identify species assessed previously and for which import policy already exists. The process relating to the adoption of outcomes from previous assessments is outlined in Appendix A in section A2.6.

The biosecurity risk posed by thrips and the orthotospoviruses they transmit was previously assessed for all countries in the thrips Group PRA (DAWR 2017a), which has been applied to this assessment of guava fruit from Taiwan, unless specified otherwise.

The biosecurity risk posed by mealybugs and the viruses they transmit was previously assessed for all countries in the mealybugs Group PRA (DAWR 2019a), which has been applied to this assessment of guava fruit from Taiwan.

The acronym 'GP' is used to identify species assessed previously in a Group PRA and for which a Group PRA was applied. The application of the Group PRAs to this risk analysis is outlined in Appendix A in section A2.7. A summary of assessment from the Group PRAs is presented for the relevant quarantine pests and/or regulated articles in this chapter for convenience.

A summary of the likelihood, consequence and URE ratings obtained in each pest risk assessment is provided in Table 3.2. An overview of the decision process at the initiation, pest categorisation and pest risk assessment stages of this PRA is presented diagrammatically in Figure 3.1.



### 3.4 Fruit flies

#### ***Bactrocera dorsalis* (EP), *Bactrocera occipitalis* (EP), *Zeugodacus cucurbitae* (EP), *Zeugodacus tau* (EP)**

The species of fruit flies identified as quarantine pests associated with guava fruit in Taiwan are *Bactrocera dorsalis* (Oriental fruit fly), *Bactrocera occipitalis*, *Zeugodacus cucurbitae* (melon fly) and *Zeugodacus tau* (pumpkin fruit fly). These species belong to the Tephritidae family, a group considered to be among the most damaging pests of horticultural crops. These fruit fly species are not present in Australia and therefore are quarantine pests for Australia.

In this assessment, *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* have been grouped together as they have common biological characteristics and are considered to pose similar risks. In this assessment, the term ‘fruit flies’ is used to refer to these 4 species as a group. The scientific name is used when the information is about a specific species.

*Zeugodacus cucurbitae* and *Z. tau* were formerly placed in the *Bactrocera* genus but, on the basis of phylogenetic relationship analysis, they have been reassigned to the genus *Zeugodacus* (De Meyer et al. 2015; Dooreenweerd et al. 2018; Plant Health Australia 2024; Virgilio et al. 2015). The literature refers to these species under both the former (*B. cucurbitae* and *B. tau*) and current (*Z. cucurbitae* and *Z. tau*) scientific names. This assessment uses the currently accepted names of *Z. cucurbitae* and *Z. tau*.

Tephritid fruit flies have 4 life stages: egg, larva, pupa and adult. Adult females lay eggs in clutches under the skin of host fruits. Once the eggs hatch, the larvae feed on the flesh of the host fruit. On reaching maturity, the fruit fly larvae usually leave the fruit, drop to the ground and pupate in the soil beneath the host plant (Christenson & Foote 1960).

Tephritid fruit flies can produce several generations each year, depending primarily on temperature and host plant availability (Fletcher 1987; Liu & Ye 2009; Liu et al. 2019; Vargas et al. 2000). Adults begin mating within 1 to 2 weeks following emergence, and may live from 1 to 3 months, or up to 12 months in cool conditions (Christenson & Foote 1960). The optimal temperature for development of most tephritid fruit flies is 25°C to 30°C (Danjuma et al. 2014; Dhillon et al. 2005; Liu & Ye 2009; Michel et al. 2021; Vargas et al. 2000). Low survival rates are generally observed at temperatures of 15°C or below and 35°C or above for all developmental stages of tephritid fruit flies (Duyck & Quilici 2002; Duyck, Sterlin & Quilici 2004; Rwomushana et al. 2008).

The major dispersal mechanism of fruit flies is by human-mediated activities, especially transportation of infested fruit (Louzeiro et al. 2021; Putulan et al. 2004). However, adult dispersal by flight is also effective, as they actively search for food and hosts to lay eggs (Fletcher 1989; Kausar et al. 2022; Win et al. 2014).

This assessment for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* for guava from Taiwan builds on previous assessments for these species. *Bactrocera dorsalis*, *Z. cucurbitae* and *Z. tau* have been assessed together in the policies for passionfruit from Vietnam (DAFF 2024b), mango from India (Biosecurity Australia 2008a), and mangoes from Taiwan (Biosecurity Australia 2006). *Bactrocera dorsalis* and *Z. cucurbitae* were also assessed together in the policies for dragon fruit from the Philippines (DAFF 2023a), capsicums from Pacific Island countries (DAWE 2021b), Chinese jujube fruit

from China (Department of Agriculture 2020), dragon fruit from Indonesia (DAWR 2018), dragon fruit from Vietnam (DAWR 2017b), lychee from Taiwan and Vietnam (DAFF 2013), mango from Pakistan (Biosecurity Australia 2011b), and longan and lychee from China and Thailand (DAFF 2004a).

*Bactrocera dorsalis* was assessed in the policies for fresh pomegranate whole fruit and extracted arils from India (DAWE 2020), dates from the Middle East and North Africa (DAWR 2019b), longan fruit from Vietnam (DAWR 2019c), nectarine from China (DAWR 2016a), table grapes from India (DAWR 2016b), mango fruit from Indonesia, Thailand and Vietnam (DAWR 2015), mangosteen from Indonesia (DAFF 2012), table grapes from China (Biosecurity Australia 2011a), apples from China (Biosecurity Australia 2010) and mangosteen from Thailand (DAFF 2004b). *Zeugodacus cucurbitae* has also been assessed in the policy for okra from India (DAFF 2023b). *Bactrocera occipitalis* has been assessed in the policy for Cavendish bananas from the Philippines (Biosecurity Australia 2008b). With the exception of a small number of policies in which the commodities were determined to be non-hosts or conditional non-hosts (Biosecurity Australia 2006, 2008a, b; DAFF 2012), the UREs for the 4 fruit flies in these previous policies did not achieve the ALOP for Australia. Therefore, specific risk management measures were required for these species of fruit flies.

Reassessment of the likelihood of importation for the fruit flies associated with the guava fruit from Taiwan pathway is necessary as the previous assessments were for different commodity pathways. It is likely that there would be differences in the pests' association with the commodities, the horticultural practices applied in the production and export of those commodities, climatic conditions, fruit biology and the pest prevalence in the exporting countries.

Previous assessments for *B. dorsalis*, *Z. cucurbitae* and *Z. tau* in the existing policies rated the likelihood of distribution as High. It is expected that once guava fruit arrives in Australia from Taiwan, it will be distributed to various destinations throughout Australia for wholesale and retail sale. Any fruit fly larvae present in guava fruit may complete development and the adult flies may disperse to new hosts. Most fruit waste would likely be disposed of via municipal waste facilities (Pickin et al. 2022) reducing the risk of fruit flies transferring to a host. However, small quantities may be discarded in the environment. Adult fruit flies are highly mobile and will likely fly to nearby host plants. Fruit flies have wide host ranges and there will likely be hosts present year-round in many parts of Australia.

The likelihood of distribution for *B. occipitalis* was assessed as Negligible in the previous assessment for banana fruit from the Philippines due to the specific conditions during transport and storage that delay ripening of the banana fruit, resulting in eggs failing to hatch and the death of larvae, as well as deterring oviposition in the field. These factors are not considered relevant to guava, as we have found no evidence of a fruit maturity-related resistance to fruit fly oviposition, or developmental barriers to these fruit flies in guava.

The High rating for likelihood of distribution applicable to the other fruit fly species in previous assessment is considered appropriate for *B. occipitalis*. On this basis, the rating of High for the likelihood of distribution is adopted for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* for the guava fruit from Taiwan pathway.

The likelihoods of establishment and spread of *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* in Australia from the guava fruit from Taiwan pathway have been assessed as similar to those of the previous assessments of High and High, respectively. Those likelihoods relate specifically to events

that occur in Australia and are essentially independent of the import pathway. The consequences of the entry, establishment and spread of these 4 species of fruit flies in Australia are also independent of the import pathway and have been assessed as being similar to the previous risk assessments of High. The existing ratings for the likelihoods of establishment and spread, and the rating for the overall consequences for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* in previous assessments have been adopted for the guava from Taiwan pathway.

In addition, the department has reviewed the latest literature – for example, Ahn et al. (2022); Liu et al. (2022); Miller et al. (2022); Herrahmawati, Yuniati and Yasmin (2023); Kausar et al. (2023); He, Xu and Chen (2023), Mullens et al. (2024); Huang et al. (2023); Stockton et al. (2024); and Li et al. (2024). No new information has been identified that would significantly change the risk ratings for distribution, establishment, spread and consequences assessment for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* or *Z. tau* in the existing policies.

The risk scenario of biosecurity concern is that eggs and/or larvae of *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* may be present within guava fruit imported from Taiwan, which could successfully complete development and emerge as adults in Australia, and may result in the establishment and spread of these pests in Australia.

### 3.4.1 Likelihood of entry

The likelihood of entry is considered in 2 parts, the likelihood of importation and the likelihood of distribution, which consider pre-border and post-border issues, respectively.

#### Likelihood of importation

The likelihood that *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* will arrive in Australia in a viable state with the importation of guava fruit from Taiwan is assessed as: **Moderate**.

The likelihood of importation is assessed as Moderate because *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* are all present in Taiwan, and guava is a known host for these species. *Bactrocera dorsalis* is the main fruit fly species that is associated with guava in Taiwan, while *Z. cucurbitae* and *Z. tau* may sometimes infest guava fruit. *Bactrocera occipitalis* is not as common compared to the other fruit flies in Taiwan and is not associated with significant damage to guava grown in Taiwan. The potential for fruit infestation is reduced by pest management practices such as monitoring, trapping and fruit bagging. However, fruit flies may still infest fruit, which in the early stages of infestation may not show visible symptoms and may remain undetected during harvest and post-harvest practices. Additionally, if any immature life stages are present in fruit, they are likely to remain viable during storage and transport.

The following information provides supporting evidence for this assessment.

*Bactrocera dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* are present in Taiwan.

- Nationwide trapping surveys, conducted between 2013 and 2015, indicate that *B. dorsalis* is the most abundant fruit fly species in Taiwan, with 94% of collected specimens identified as *B. dorsalis* (Doorenweerd et al. 2019). However, there is a notable population decline in *B. dorsalis* at elevations above 600 m where the subtropical forest is replaced by warm temperate flora.

- *Zeugodacus cucurbitae* is abundant throughout Taiwan at elevations below 500 m, particularly in the southwestern plains (Lin & Liu 2012). In the surveys conducted by Doorenweerd et al. (2019), *Z. cucurbitae* comprised 3% of the collected specimens.
- *Zeugodacus tau* is less common than *B. dorsalis* and *Z. cucurbitae* in Taiwan, although it is the most prevalent species in some areas of northern Taiwan and in mountain areas above 600 m (Lin & Liu 2012). *Zeugodacus tau* has been reported between sea level and 2161 m elevation in Taiwan (Doorenweerd et al. 2019; Lin & Liu 2012). In the surveys conducted by Doorenweerd et al. (2019), *Z. tau* comprised only 1% of the collected specimens.
- *Bactrocera occipitalis* has been periodically reported in Taiwan but is uncommon. It is predominantly found at elevations below 400 m but can occur at elevations up to 1000 m (Doorenweerd et al. 2019). In the surveys conducted by Doorenweerd et al. (2019), *B. occipitalis* comprised only 0.22% of the collected specimens.

Guava is reported to be a suitable host for these species.

- Fruit flies are reported to be the most important group of pests that attack guava fruit (Lim & Chong 1990; Lin et al. 2005).
- Guava is a preferred host for *B. dorsalis* (Chen et al. 2006; Singh & Sharma 2013) and a main host for *B. occipitalis* (CABI 2025; PHA 2018b). However, trapping surveys in the Philippines suggest that *B. occipitalis* is primarily a forest species that only occurs in low numbers (CABI 2025) and so it may only be a minor pest of guava production, at least in the Philippines.
- Guava is recorded as a host for *Z. cucurbitae* and *Z. tau* (Allwood et al. 1999), although these fruit flies are likely only minor pests of guava (Gould & Raga 2002), typically preferring cucurbits as hosts.
- Guava fruit grown for export in Taiwan could be infested by any of the four fruit fly species, although it is expected that fruit would most frequently be infested by *B. dorsalis*, given that it is the most abundant species in Taiwan (BAPHIQ 2009; Lin et al. 2005) and guava is a preferred host.

Pest management is undertaken to reduce both the fruit fly prevalence in the orchard and the potential for infestation of guava fruit.

- Taiwan guava growers manage fruit flies in their orchards under the guidance of the Taiwan Agricultural Research Institute (TARI) and APHIA.
- During periods of high fruit fly abundance, methyl eugenol traps may be placed in guava orchards to attract and kill male *B. dorsalis* flies. This reduces the potential for females to find a mate and reproduce, thereby suppressing the fruit fly population (Lin et al. 2005).
- Fruit bagging significantly reduces the potential for fruit fly oviposition in guava fruit. Each fruit is wrapped in a plastic bag, fully enclosing the fruit. The fruit is bagged when it is immature (2-3 cm in diameter) well before the fruit matures to a stage that is susceptible to fruit fly infestation.
- Bagged guava fruit are fully protected from fruit fly oviposition, provided the bag remains intact and is not damaged prior to fruit harvest. The plastic bag is not removed until after the fruit is harvested and transported to the secure packing house.

Infested guava fruit may not show obvious symptoms at harvest and may remain undetected during harvest and post-harvest practices.

- Fruit flies lay their eggs beneath the skin of the fruit (Gould & Raga 2002), taking advantage of crevices, pre-existing damage and other oviposition sites (Bateman 1972).
- If fruit are infested, symptoms of fruit fly infestation may not be apparent until larval development is well advanced. Guava fruit showing clear symptoms of distortion and/or rotting would be culled during harvest or post-harvest handling practices.
- However, eggs and early larval instars can be difficult to detect (Cantrell, Chadwick & Cahill 2002; Putulan et al. 2004) and therefore fruit in the early stages of infestation may not be culled during harvest and post-harvest handling practices.

Fruit fly eggs and larvae are likely to remain viable during transport and storage.

- After harvest, guava fruit destined for export are stored and transported at cool temperatures to maintain fruit quality.
- The most common guava variety grown in Taiwan is Pearl. The fruit of this variety, which are less susceptible to chilling injury than most other guava varieties, can be stored at 5°C (Lin et al. 2005).
- The development time of fruit flies is inversely dependent on temperature, with the development time increasing at lower ambient temperatures.
- The lower developmental thresholds of approximately 6.2°C (Michel et al. 2021) and 13.4°C (Mkiga & Mwatawala 2015) are reported for *B. dorsalis* and *Z. cucurbitae* larvae respectively.
- Cool temperatures during transit or storage may slow or halt larval development and could potentially result in some mortality, but are unlikely to be sufficiently low or sustained to significantly affect the survival of fruit flies (BAPHIQ 2009; Lin et al. 2005).

For the reasons outlined, the likelihood of importation of *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* on imported guava fruit from Taiwan is assessed as **Moderate**.

### Likelihood of distribution

The likelihood that the assessed *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* will be distributed within Australia in a viable state as a result of the processing, sale or disposal of guava fruit from Taiwan, and subsequently transfer to a susceptible part of a host is likely to be similar to *B. dorsalis*, *Z. cucurbitae* and *Z. tau* on previously assessed pathways. As indicated, the previous assessment of the likelihood of distribution for *B. occipitalis* on the banana fruit from the Philippines pathway is not considered applicable to guava fruit, as the pathways are not sufficiently similar. Therefore, the same likelihood rating of **High** for the likelihood of distribution for *B. dorsalis*, *Z. cucurbitae* and *Z. tau* in previous assessments is adopted for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* for guava fruit from Taiwan.

### Overall likelihood of entry

The overall likelihood of entry is determined as **Moderate** by combining the re-assessed likelihood of importation of Moderate with the adopted likelihood of distribution of High, using the matrix of rules in Table A.2.

### 3.4.2 Likelihoods of establishment and spread

The likelihoods of establishment and spread for the assessed *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* are independent of the import pathway and are considered similar to those in previously assessed pathways.

Based on the existing import policies for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau*, the likelihoods of establishment and spread are assessed as **High** and **High**, respectively.

### 3.4.3 Overall likelihood of entry, establishment and spread

The overall likelihood of entry, establishment and spread is determined by combining the individual likelihoods of entry, of establishment and of spread using the matrix of rules in Table A.2.

The overall likelihood that *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* will enter Australia as a result of trade in guava fruit from Taiwan, be distributed in a viable state to a susceptible part of a host, establish in Australia and subsequently spread within Australia, is assessed as **Moderate**.

### 3.4.4 Consequences

The potential consequences of the entry, establishment and spread of *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* in Australia are similar to those in the previously assessed pathways. The overall consequences in the previous assessments were assessed as High. The overall consequences for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* on the guava fruit from Taiwan pathway are also assessed as **High**.

### 3.4.5 Unrestricted risk estimate

Unrestricted risk is the result of combining the overall likelihood of entry, establishment and spread with the outcome of overall consequences. The likelihood and consequences are combined using the risk estimation matrix shown in Table A.4.

A summary of the risk assessment for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* is presented in Table 3.2 for convenience.

**Table 3.2 Unrestricted risk estimate for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau***

<b>Unrestricted risk estimate for <i>B. dorsalis</i>, <i>B. occipitalis</i>, <i>Z. cucurbitae</i> and <i>Z. tau</i></b>	
Overall likelihood of entry, establishment and spread	Moderate
Consequences	High
<b>Unrestricted risk</b>	<b>High</b>

The URE for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* on the guava fruit from Taiwan pathway is assessed as **High**, which does not achieve the ALOP for Australia. Therefore, specific risk management measures are required for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* on this pathway.

### 3.5 Mealybugs

#### *Planococcus lilacinus* (GP), *Planococcus minor* (GP, WA), *Pseudococcus jackbeardsleyi* (GP)

Three mealybug species were identified on the guava fruit from Taiwan pathway as quarantine pests for Australia: *Planococcus lilacinus* (coffee mealybug), *Planococcus minor* (Pacific mealybug) and *Pseudococcus jackbeardsleyi* (Jack Beardsley mealybug) (Table 3.3).

*Planococcus lilacinus* and *Pseudococcus jackbeardsleyi* are present in Australia but restricted to the regulated quarantine zone in the northern part of Cape York Peninsula and Torres Strait. Movement restrictions are in place to prevent the spread of these species, which are considered to be under official control (national). *Planococcus minor* is not present in Western Australia and is assessed as a regional quarantine pest for that state (Table 3.3).

The indicative likelihood of entry for all quarantine mealybugs is assessed in the mealybugs Group PRA as Moderate (DAWR 2019a). *Planococcus lilacinus*, *P. minor* and *Pseudococcus jackbeardsleyi* are all reported from Taiwan and are associated with guava fruit (García Morales et al. 2022; Gimpel & Miller 1996; Gould & Raga 2002; Roda et al. 2013; Shao 2020; Wen & Wu 2011). Standard packing house practices and transportation are not expected to eliminate these mealybugs on the pathway. After assessment of relevant pathway-specific factors (sections A2.6 and A2.7) for guava fruit from Taiwan, the likelihood of entry of **Moderate** was verified as appropriate for these mealybug species on this pathway (Table 3.4).

**Table 3.3 Quarantine mealybug species for guava fruit from Taiwan**

Pest	In mealybugs Group PRA	Quarantine pest	On guava fruit pathway	Likelihood of entry
<i>Planococcus lilacinus</i>	Yes	Yes	Yes	Moderate
<i>Planococcus minor</i>	Yes	Yes (WA)	Yes	Moderate
<i>Pseudococcus jackbeardsleyi</i>	Yes	Yes	Yes	Moderate

**WA:** Regional quarantine pest for Western Australia.

A summary of the risk assessment for quarantine mealybugs is presented in Table 3 for convenience.

**Table 3.4 Risk estimates for quarantine mealybugs**

Risk component	Rating for quarantine mealybugs
Likelihood of entry (importation x distribution)	Moderate (High x Moderate)
Likelihood of establishment	High
Likelihood of spread	High
Overall likelihood of entry, establishment and spread	Moderate
Consequences	Low
<b>Unrestricted risk</b>	<b>Low</b>

As assessed in the mealybugs Group PRA, the indicative URE for mealybugs is **Low** (Table 3.4) which does not achieve the ALOP for Australia. This indicative URE is considered to be applicable for the

quarantine mealybugs species present on the guava fruit from Taiwan pathway. Therefore, specific risk management measures are required for the quarantine mealybugs on this pathway.

In the mealybugs Group PRA, viruses of biosecurity concern transmitted by mealybugs were assessed to have an 'indicative' URE of 'Very Low' for plant import pathways, including the fresh fruit pathway. This is because mealybugs can only transmit viruses for a short period of time (semi-persistent transmission) and these viruses also have a limited host range compared to their mealybug vectors. These biological factors make it very unlikely for the viruses vectored by mealybugs on imported fresh fruit to be transmitted to a suitable host plant in Australia. The URE of '**Very Low**' achieves the ALOP for Australia, therefore, no specific risk management measures are required for the viruses transmitted by mealybugs on this pathway.

This risk assessment, which is based on the mealybugs Group PRA, applies to all quarantine mealybugs on the guava fruit from Taiwan pathway, irrespective of their specific identification in this document. This is explained in section A2.7.



### 3.6 Grapevine thrips

#### *Rhipiphorothrips cruentatus* (GP)

*Rhipiphorothrips cruentatus* is present in Taiwan (BAPHIQ 2009) and has been recorded infesting guava fruit (Demissie, Dahiya & Ombir 2001). *Rhipiphorothrips cruentatus* is not present in Australia and is a quarantine pest for Australia.

The indicative likelihood of entry for all quarantine thrips is assessed in the thrips Group PRA as Moderate (DAWR 2017a), which is comprised of indicative likelihoods of importation and distribution of High and Moderate, respectively. The indicative likelihood of importation of High may not be appropriate for *R. cruentatus* on the guava fruit from Taiwan pathway because of specific pest biology and pathway factors. Therefore, the likelihood of importation of *R. cruentatus* on the guava fruit from Taiwan pathway is assessed here.

#### 3.6.1 Likelihood of entry

The likelihood of entry is considered in 2 parts, the likelihood of importation and the likelihood of distribution, which consider pre-border and post-border issues, respectively.

##### Likelihood of importation

The likelihood that *R. cruentatus* will arrive in Australia in a viable state with the importation of guava fruit from Taiwan is assessed as: **Low**.

The likelihood of importation is assessed as Low because *R. cruentatus* is a pest of guava, but primarily in southern Taiwan. It typically prefers to feed on the leaves but can attack the fruit in heavy infestations. Fruit infestation is likely to be uncommon in commercial guava orchards in Taiwan where pests are managed. Infested guava fruit with symptoms of infestation are likely to be identified and removed from the export pathway. However, fruit infested close to harvest, or with only a small number of thrips present, may show no or mild symptoms of infestation. Thrips, may therefore not be detected and removed from the export pathway. This thrips species has poor cold tolerance and its' survival will likely be reduced by the cold temperatures maintained during storage and transport of guava fruit, especially at prolonged duration.

The following information provides supporting evidence for this assessment.

*Rhipiphorothrips cruentatus* is associated with guava in Taiwan.

- Guava is a host of *R. cruentatus* (Demissie, Dahiya & Ombir 2001; Lin et al. 2005).
- *Rhipiphorothrips cruentatus* is present in Taiwan, although it is mainly a pest of guava production in southern Taiwan (Lin et al. 2005).

Guava fruit can be infested by *R. cruentatus*.

- In Taiwan, *R. cruentatus* mainly damages the older guava leaves, sucking sap from the lower leaf surface (Lin et al. 2005).
- In severe infestations, *R. cruentatus* may also move onto and damage the fruits (Lin et al. 2005).

- Demissie et al. (2001) reported that guava fruit in India were infested by *R. cruentatus*, but noted significant variability in the susceptibility of fruit in different guava varieties.

Pest management practices are undertaken in the orchard to reduce the potential for infestation of fruit by *R. cruentatus*.

- Severe thrips infestations in managed commercial orchards is unlikely due to the pest management practices that are undertaken. Thus the potential for fruit infestation is reduced.
- A pesticide spray is typically applied to the crop to suppress thrips numbers, prior to fruit bagging.
- In addition to chemical control, other practices prescribed for reducing thrips population density include removing affected plant parts and clearing weeds in the orchard (Lin et al. 2005).
- Guava fruit are bagged at fruit set. Fruit bagging further significantly reduces the potential for infestation by thrips.

Infested fruit are likely to be detected and removed from the pathway; however some may remain undetected.

- In the unlikely event that fruit are infested despite pest management practices, the adult thrips are likely to be detected during harvest or packhouse practices as they are dark brown and contrast with the fruit colour (CABI, 2025).
- Fruit infested at fruit set or early in its development are also likely to have evident symptoms, such as feeding damage or staining from thrips excrement. Feeding results in the appearance of rust-coloured or dark spots on the guava fruit surface, which can coalesce into rough scabby scars and significantly affect the appearance and quality of the fruit (Demissie, Dahiya & Ombir 2001). Such fruit are likely to be culled during the harvest and post-harvest practices.
- However, symptoms of thrips infestation may be less discernible if the infestation occurs close to harvest time, or if thrips numbers are low. Such fruit would likely only show mild symptoms of infestation which may not be detected, and thus infested fruit may be packed for export.

Conditions in storage and transit may reduce the survival of *R. cruentatus*.

- The most common guava variety grown in Taiwan is Pearl. The fruit of this variety, which are less susceptible to chilling injury than most other guava varieties, can be stored at 5°C (Lin et al. 2005).
- *Rhipiphorothrips cruentatus* has poor cold tolerance, and its' survival will likely be reduced by the cold temperatures maintained during storage and transport of guava fruit, especially at prolonged duration. Under experimental conditions involving exposure to 4°C, 20 percent of *R. cruentatus* adults had perished after 90 minutes, while all adults were dead after 5 hours (Rahman & Bhardwaj 1937).
- In cooler regions, *R. cruentatus* pupae can overwinter in the soil under the host plant, typically at a soil depth of 5 to 18 cm. All the other life stages die off in response to the onset of winter conditions (Rahman & Bhardwaj 1937). The ability of pupae to hibernate during cool storage is not known, but it is considered unlikely that conditions would be favourable.

*Rhipiphorothrips cruentatus* has not been intercepted on imported fresh fruit at the Australian border.

- *Rhipiphorothrips cruentatus* is not known to have been previously detected on goods at the Australian border, although there have been single interceptions of the related species *R. miemsae* and an unidentified *Rhipiphorothrips* sp. on cut flowers from Zimbabwe and India respectively.

For the reasons outlined, the likelihood of importation of *R. cruentatus* on imported guava fruit from Taiwan is assessed as Low.

### Likelihood of distribution

The indicative likelihood of distribution for all thrips is assessed as Moderate in the thrips Group PRA. The likelihood that *R. cruentatus* will be distributed within Australia in a viable state as a result of the processing, sale or disposal of guava fruit from Taiwan, and subsequently transfer to a susceptible part of a host is considered to be similar to thrips on fresh fruit, vegetable, cut flower and foliage imports. The likelihood of distribution of **Moderate** was verified as appropriate for *R. cruentatus* on the guava fruit from Taiwan pathway.

### Overall likelihood of entry

The overall likelihood of entry is determined as **Low** by combining the re-assessed likelihood of importation of Low with the verified likelihood of distribution of Moderate, using the matrix of rules in Table A.2.

A summary of the risk assessment for quarantine thrips is presented in Table 3.5 for convenience.

**Table 3.5 Risk estimates for *Rhipiphorothrips cruentatus***

Risk component	Rating for quarantine thrips	Rating for <i>Rhipiphorothrips cruentatus</i> on guava from Taiwan pathway
Likelihood of entry (importation x distribution)	Moderate (High x Moderate)	Low (Low x Moderate)
Likelihood of establishment	High	High <b>a</b>
Likelihood of spread	High	High <b>a</b>
Overall likelihood of entry, establishment and spread	Moderate	Low
Consequences	Low	Low <b>a</b>
<b>Unrestricted risk</b>	<b>Low</b>	<b>Very Low</b>

**a:** Risk estimates adopted from the thrips Group PRA (DAWR 2017a)

The URE of *R. cruentatus* on the guava fruit from Taiwan pathway is assessed as **Very Low**, which achieves the ALOP for Australia. Therefore, specific risk management measures are not required for *R. cruentatus* on the guava fruit from Taiwan pathway.

### 3.7 Guava scab

#### *Pestalotiopsis psidii*

*Pestalotiopsis psidii* (basionym *Pestalotia psidii*) is a fungal plant pathogen in the family Sporocadaceae (formerly placed in Pestalotiopsidaceae) that causes scab disease (Keith, Velasquez & Zee 2006) and grey leaf spot (Mordue 1976) in guava. The *Pestalotiopsis* genus contains many common phytopathogens, but they are also isolated as endophytes. Many species also persist as saprobes, which may be found in a diverse range of environments (Maharachchikumbura et al. 2014).

*Pestalotiopsis psidii* has been reported in parts of Asia, Africa, Central and South America and Europe (CABI 2025). It is present in Taiwan where it may be found in all guava production areas (Lin et al. 2005). *Pestalotiopsis psidii* is not present in Australia and is a quarantine pest for Australia.

The known host range of *P. psidii* is limited to guava (*Psidium guajava*), cherry guava (*Psidium guineense*) and feijoa (*Acca sellowiana*; syn. *Feijoa sellowiana*) (CABI 2025), which are all in the Myrtaceae plant family. Leaf spot is typically only of minor importance in managed guava production, but when *P. psidii* infects the fruit, scab disease can greatly reduce the market value of the fruit after harvest. Guava scab is therefore considered to be one of the major diseases of guava fruit (Mordue 1976).

Most pestalotioid fungi lack sexual morphs (Maharachchikumbura et al. 2011), thus conidia are the primary structure initiating infection in the plant host. The conidia are dispersed by rain splash, crawling insects, and invade the fruit through natural openings or wounds inflicted during insect feeding, notably by the mirid bug *Helopeltis theivora* (synonym *Helopeltis theobromae*) (Elliott 2006; Lim & Chong 1990). A single report states that *P. psidii* is also spread by wind (Lim & Chong 1990), but no information is provided to support this statement.

Guava fruit are susceptible to infection at all stages of their development (Lim & Chong 1990). If infected early, the fruit remain underdeveloped, malformed and hard, and drop prematurely from the tree (Gazis, Crane & Wasielewski 2024). The disease initially presents as small sunken brown spots, about 2 to 4 mm in size, on the skin of developing guava fruit, which become corky or scabby lesions (Lim & Chong 1990; Lin et al. 2005). The spots can grow and coalesce to form large corky segments where the skin breaks, exposing the fruit flesh and increasing their susceptibility to attack by beetles and fruit flies (Lim & Chong 1990). The fruit pulp can become softened and water-soaked, and initially yellows before turning orange or purple (Lin et al. 2005). If the affected trees suffer from calcium deficiency, then the lower part of diseased fruit may turn corky, and a brown horizontal band gradually forms on the skin around the middle of the fruit (Lin et al. 2005). Fruit affected by guava scab are deformed and have no commercial value (Lim & Chong 1990), although internally the fruit may not be discernibly affected (Montiel 1997).

The risk scenario of biosecurity concern is that guava fruit from Taiwan may be infected with *P. psidii*, which may result in the establishment and spread of this pathogen in Australia.

#### 3.7.1 Likelihood of entry

The likelihood of entry is considered in 2 parts: the likelihood of importation and the likelihood of distribution, which consider pre-border and post-border issues, respectively.

### Likelihood of importation

The likelihood that *P. psidii* will arrive in Australia in a viable state with the importation of guava fruit from Taiwan is assessed as: **Low**.

The likelihood of importation is assessed as Low because, although *P. psidii* is present in all guava production areas in Taiwan and favourable conditions for disease development exist for much of the year, symptoms on fruit are visible and diseased fruit are likely to be removed during harvest, grading and packing house practices. Production practices such as fruit bagging would reduce the potential exposure of guava fruit to the pathogen, as *P. psidii* invades the fruit through wounds in the skin such as those caused by insect feeding. However, infected fruit with no or mild symptoms may not be detected and thus may be packed for export, and the pathogen is likely to survive storage and transport conditions.

The following information provides supporting evidence for this assessment.

*Pestalotiopsis psidii* infects guava fruit in Taiwan.

- *Pestalotiopsis psidii* is one of the most commonly encountered diseases of guava in Taiwan (Lin et al. 2005). *Pestalotiopsis psidii* is present in all guava-producing areas of Taiwan, and fruit infection rates in the field of 11 to 22% have been reported in surveys in some areas (Lin et al. 2005). However, the context for such results is not known, so the data may not reflect the numbers of infections typically found in orchards producing for export.

Conditions are likely to be favourable for guava scab disease for much of the year in most production areas.

- *Pestalotiopsis psidii* thrives in hot, humid conditions, with ideal conditions for disease development occurring at temperatures between 25° to 30°C (Gazis, Crane & Wasielewski 2024), which overlaps with the conditions found in most commercial guava production areas in Taiwan for most parts of the year.
- Guava scab disease occurs throughout the year in Taiwan, with the highest incidence occurring from July to November (Yeh & Shiesh 2017).
- Keith (2006) reported that in the laboratory *P. psidii* grew at temperatures ranging between 10° and 35°C, with optimum growth between 22° and 28°C.
- Sirisha (2023) found that temperature has a major influence on mycelial growth and sporulation of *P. psidii* on guava fruit. Optimal temperatures promote conidial germination, appressoria formation and germ tube penetration into host tissues.

In-field pest management and control practices are likely to limit disease incidence in commercial orchards.

- Preventative broad-spectrum fungicides and pesticides are sprayed every 2-3 weeks, decreasing the incidence of *P. psidii* and feeding insects in the orchard. Targeted sprays are also employed if pest thresholds increase.

- Developing guava fruit is unlikely to become infected by *P. psidii* in the orchard after it has been bagged. Bagging provides protection from insect feeding, reducing the susceptibility of the fruit to infection, as well as reducing its exposure to infectious propagules.
- The fruit is harvested while still within the bag and remain in the bag during sorting and grading. The bag is removed and replaced with a new one at the packing house prior to packing. Therefore, the potential for fruit exposure to *P. psidii* in the orchard is limited.

*Pestalotiopsis psidii* can typically only initiate an infection at sites where the fruit skin is damaged.

- *Pestalotiopsis psidii* invades the fruit through wounds in the skin, which can be inflicted by the feeding action of arthropods such as the mirid bug *Helopeltis theivora* (Lim & Chong 1990).
- Fruit that is mechanically damaged (for example, during harvesting or transport) would also likely be susceptible to infection if the pathogen was present on the fruit surface.

Symptoms of guava scab infection are readily apparent, so symptomatic fruit is likely to be removed during harvest and packing house practices.

- Young fruit that may be infected prior to bagging would likely have fallen from the tree, or have extensive lesions, cracked skin or other symptoms by the time the fruit reaches maturity.
- Infection results in necrosis of the tissue, initially appearing as tiny water-soaked spots on the fruit surface, which darken in colour and form small (1–2 mm) discrete dark brown or black circular spots (Keith, Velasquez & Zee 2006; Lim & Chong 1990). The margins of these spots are raised, giving a crater-like appearance (Gazis, Crane & Wasielewski 2024). If the lesions are abundant, they can coalesce as the fruit develops, forming large scabs and tearing open the necrotic epidermis, resulting in large cracks appearing in the fruit skin (Lim & Chong 1990).
- Infected fruit exhibiting these visible symptoms will likely be removed during harvest, grading or packing practices.

Fruit with no or mild symptoms may not be detected and thus may be packed for export.

- Fruit may incur minor wounds during harvesting or subsequent postharvest handling of the fruit, which could feasibly provide an opportunity for infection to occur if spores came into contact with the wounded tissues. Necrotic symptoms indicative of scab infection are unlikely to have developed by the time the fruit is graded and packed.
- Such a scenario is not considered likely, as fruit showing visible signs of physical damage would typically be removed during sorting and packing house practices. However, fruit with minor physical damage may not be detected and removed.

If *P. psidii* was present on fruit packed for export, it is likely to survive storage and transport conditions.

- *Pestalotiopsis psidii* typically grows at temperatures between 10°C and 35°C (Keith, Velasquez & Zee 2006). Cooler temperatures during storage and transport will likely slow or halt fungal growth, but are not expected to affect the viability of the pathogen.

For the reasons outlined, the likelihood that *P. psidii* will arrive in Australia in a viable state with the importation of guava fruit from Taiwan is assessed as Low.

### Likelihood of distribution

The likelihood that *P. psidii* will be distributed within Australia in a viable state as a result of processing, sale or disposal of guava fruit from Taiwan, and subsequently transfer to a susceptible part of a host is assessed as: **Low**.

The likelihood of distribution is assessed as Low because imported guava fruit are intended for human consumption, and most guava fruit waste will be disposed of in managed waste systems. A small amount of fruit waste may potentially be discarded in the environment where host plants may be present, although this is very unlikely as the identified hosts of *P. psidii* are limited to a few Myrtaceae species, which are not widely grown in Australia. Spores released from acervuli growing in the diseased tissues may disperse from the waste by water or wind, although successful transfer to a susceptible host plant is considered unlikely.

The following information provides supporting evidence for this assessment.

Imported guava fruit are expected to be distributed throughout Australia for wholesale and retail sale. Guava fruit showing symptoms of *P. psidii* infection are likely to be removed from distribution, but some fruit may show no or mild symptoms and may be distributed and sold.

- Imported guava fruit are intended for human consumption and would be distributed throughout Australia. The major population centres are likely to receive most imported fruit.
- Fungal growth may slow or cease while fruit is kept in refrigerated storage but would likely resume once the fruit is returned to ambient temperature at retail outlets.
- Infected fruit showing disease symptoms at retail points are likely to be removed from further distribution and discarded into managed waste systems. Potential exposure and transfer to suitable host plants from waste discarded into managed waste systems is likely to be negligible.
- However, some guava fruit infected with *P. psidii* may show no, or only mild symptoms at the time of retail sale and may be purchased by consumers.

Most fruit waste would be discarded via municipal waste facilities, but some fruit waste infected with *P. psidii* may be discarded into the environment where suitable host plants are present.

- Guava scab is confined to cankers on the skin of the guava fruit and does not penetrate into the flesh (Gazis, Crane & Wasielewski 2024). Therefore, the risk is predominantly associated with the fruit skin.
- The entire guava fruit, including the skin, may be consumed.
- Fruit showing signs of infection or of poor quality may become fruit waste. Most of this waste is likely to be discarded into managed waste systems and disposed of in municipal landfills or processed in organic waste processing facilities (Pickin et al. 2022). Potential transfer of the pathogen to suitable hosts from managed waste systems is likely to be negligible.

However, some consumers may potentially discard small quantities of guava waste into a variety of urban, rural and natural environments, including home composts. Some of this waste could be

discarded where suitable host plants are present. Suitable host plants of *P. psidii* are present in Australia and thus available for transfer of this pathogen. However, they are not widely grown.

- The known host range of *P. psidii* is limited to guava (*Psidium guajava*), feijoa (*Acca sellowiana*) and cherry guava (*Psidium guineense*) (CABI 2025), all of which are known to be present in Australia.
- *Psidium* species are intolerant of frost (Bailey & Bailey 1976; Menzel 1985), with distribution primarily confined to the coastal (wetter) tropical and subtropical areas of eastern Australia (ALA 2025).
- The Australian guava industry is very small and mainly supplies local markets and select retailers. The growing regions for commercial guava are in Queensland, Northern New South Wales and the Northern Territory.
- Feijoa grows in temperate to subtropical climates and can tolerate frost. It is reported to grow well in Victoria, Tasmania, New South Wales and the Adelaide Hills of South Australia (Hariharan 2023), therefore is able to grow in a wider area of Australia than *Psidium* species.
- Commercial feijoa plantations are established in most states of Australia, however these are very small-scale. Feijoa is also grown in some household gardens.
- Information on the prevalence of these hosts in Australia is not available; however, they are likely to be present at low densities in most areas where they are grown.
- Guava is regarded as an environmental weed in Queensland (Queensland Department of Agriculture and Fisheries 2024). While its sale and use are not restricted, it is unlikely to be used for amenity purposes in parks and community gardens or planted as street trees.
- It is not known if the closely-related invasive weed *Psidium cattleianum* (strawberry guava), which is present in northern New South Wales and Queensland (NSW DPI 2024), could be susceptible to guava scab infection, as no reports of host association have been identified.
- It is also not known if native Myrtaceae species are susceptible to guava scab.

It is unlikely that *P. psidii* spores could successfully transfer from discarded waste to a susceptible part of a nearby host plant.

- The fungus invades the fruit surface to a depth of 4-6mm (Patel, Kamat & Hingorani 1950), producing fruiting bodies (acervuli) within the fruit skin (Prakash & Misra 1993). Spores (conidia) are produced within the fruiting bodies, but are only released when the epidermis is ruptured. Not all individual locations of infection on fruit skin will be at the sporulation stage when discarded, thus limiting the number of spores expected to be available for dispersal from the waste.
- Spores, if present on fruit waste, could potentially be dispersed via rain splash (Elliot 2006; Lim & Chong 1990). Transmission via rain splash is likely to result in only localised spread, and requires the host to be in close proximity to the infected fruit waste. In studies on the close relative, *Pestalotiopsis sydowniana*, Hopkins (1996) recorded transmission from water splash up to 50 cm from the source.



- Although Lim and Chong (1990) claimed that *P. psidii* can also be spread by wind, no studies confirming this dispersal method were identified to support this claim. Dispersal via wind has been reported for related species in a paper that focuses on molecular aspects by Prasannath, Galea & Akinsanmi (2021); however, this paper has not provided any sources of information related to spore dispersal. It is uncertain if conidia of *P. psidii* can be dispersed by wind; if yes, it could contribute to the spread of *P. psidii* in Australia.
- However, viability of the pathogen in the environment is likely to be reduced by antagonistic microorganisms (Adhikari, Khadka & Shrestha 2023; Portela et al. 2024; Silva et al. 2020; Widyaningsih & Triasih 2021).
- Given the association of guava scab disease with wounds inflicted by insect feeding, crawling insects have been suggested as potential vectors of *P. psidii* (Lim & Chong 1990) and other *Pestalotiopsis* species (Elliott et al. 2004; Martínez & Plata-Rueda 2013). It has been suggested that these insects carry conidia on their bodies as they move between feeding sites (EFSA Panel on Plant Health et al. 2023). However, insects that typically feed on fruit in the tree canopy are unlikely to visit fruit waste, so transmission from discarded fruit is less likely.
- Detritivores may visit decomposing guava fruit waste but are unlikely to subsequently move onto susceptible host trees.

For the reasons outlined, the likelihood that *P. psidii* will be distributed within Australia in a viable state as a result of processing, sale or disposal of guava fruit from Taiwan, and subsequently transfer to a susceptible part of a host is assessed as Low.

### Overall likelihood of entry

The overall likelihood of entry is determined by combining the likelihood of importation with the likelihood of distribution using the matrix of rules shown in Table A.2.

The likelihood that *P. psidii* will enter Australia as a result of trade in guava fruit from Taiwan and be distributed in a viable state to a susceptible part of a host is assessed as: **Very Low**.

### 3.7.2 Likelihood of establishment

The likelihood that *Pestalotiopsis psidii* will establish within Australia based on a comparison of factors in the source and destination areas that affect pest survival and reproduction is assessed as: **Moderate**.

The likelihood of establishment is assessed as Moderate because susceptible hosts are available in various parts of Australia, although not widely grown. The most favourable environments for establishment are available in tropical areas of Australia. However, suitable environments may also occur in sub-tropical and temperate areas.

The following information provides supporting evidence for this assessment.

Susceptible hosts of *P. psidii* are grown in Australia, but are not widely grown.

- *Psidium guajava*, *Psidium guineense* and *Acca sellowiana* are known hosts of *P. psidii* (CABI 2025).

- Guava and feijoa are both commercially grown in Australia, although the scale of production is small. Guava and feijoa are more widely non-commercially grown in household gardens. Information on their prevalence is not available, but they are likely to be present at low densities in most areas where they are grown.
- Guava trees prefer tropical conditions and typically can only tolerate very light frost (Bailey & Bailey 1976). Exposure to temperatures of  $-2.5^{\circ}\text{C}$  or below results in freezing injury to the leaves (Hao et al. 2009). The distribution of guava is therefore predominantly confined to warmer coastal areas of Australia that do not experience freezing conditions in winter.
- Feijoa is more frost-tolerant than guava, tolerating temperatures as low as  $-10^{\circ}\text{C}$  (Fischer & Parra-Coronado 2020). Conversely, temperatures above  $32^{\circ}\text{C}$  combined with low relative humidity can affect pollination and fruit set and damage the apical sprouts and leaves (Fischer & Parra-Coronado 2020). Feijoa can therefore be grown in colder inland areas of Australia.

Climatic conditions that are conducive for *P. psidii* to complete its lifecycle are experienced in parts of Australia where susceptible host plants are grown.

- *Pestalotiopsis psidii* thrives in hot, humid conditions, with ideal conditions for disease occurring at temperatures between  $25^{\circ}$  to  $30^{\circ}\text{C}$  (Gazis, Crane & Wasielewski 2024).
- In culture studies the optimum temperature for *P. psidii* spore germination was found to be  $30^{\circ}\text{C}$ . It grows at temperatures between  $5^{\circ}\text{C}$  (Mordue 1976) and  $35^{\circ}\text{C}$  Keith (2006), with optimum growth temperatures between  $22^{\circ}\text{C}$  and  $28^{\circ}\text{C}$  (Keith & Zee 2010).
- In order for the fungus to initiate infection on a new host, conidia must land on a susceptible host near wounds or natural opening (e.g. stomata). Further, ideal conditions for germination must exist which include high temperatures (optimum  $26-32^{\circ}\text{C}$ ; (Patel, Kamat & Hingorani 1950)) and high relative humidity (90-100%; (Kaushik, Thakur & Chand 1972)).
- There is overlap between the regions of Australia that experience conditions suitable for *P. psidii* growth and the areas where susceptible hosts are grown. This includes the areas where guava is commercially cultivated.
- Therefore, if *P. psidii* does infect a susceptible host plant in Australia there is a moderate likelihood it will survive, complete its lifecycle and have the potential to infect other host plants.

For the reasons outlined, the likelihood that *P. psidii* will establish within Australia is assessed as Moderate.

### 3.7.3 Likelihood of spread

The likelihood that *Pestalotiopsis psidii* will spread within Australia, based on a comparison of factors in the source and destination areas that affect the expansion of the geographic distribution of the pest is assessed as: **Moderate**.

The likelihood of spread is assessed as Moderate because the known range of host plants susceptible to *P. psidii* infection is limited and, although grown in Australia, those hosts are likely to be relatively uncommon in most areas. *Pestalotiopsis psidii* can spread naturally by water splash, by human assisted movement of infected plants or contaminated material, and may potentially also be spread

by air. However, the climate favourable for the spread of *P. psidii* exists only in some parts of Australia, which will limit the spread of this pathogen.

The following information provides supporting evidence for this assessment.

Suitable hosts are available in parts of Australia that may be climatically favourable for growth of *P. psidii*, but are not overly common.

- *Psidium guajava*, *Psidium guineense* and *Acca sellowiana* are known hosts of *P. psidii* (CABI 2025).
- The known hosts are not commonly grown in Australia, with only small-scale commercial production occurring.
- The distribution of *Psidium* species is restricted to the warmer coastal areas of northern New South Wales and Queensland, particularly in the warmer tropical and subtropical regions. These regions provide the conditions most conducive to growth and spread of *P. psidii*.
- Feijoa are distributed in the cooler temperate to subtropical areas of Victoria, Tasmania, New South Wales and South Australia, which are much less suitable to growth and spread of *P. psidii*.
- The optimum temperature for *P. psidii* spore germination in culture studies was found to be 30°C. Optimum temperatures for growth of the pathogen were reported to be between 22°C (Mordue 1976) and 28°C (Keith & Zee 2010).
- There is some overlap between the regions of Australia that experience conditions suitable for *P. psidii* growth and the areas where susceptible hosts are grown. This overlap is primarily restricted to the areas of Queensland and NSW, where guava is commercially cultivated and where some feijoa may be present. Thus, the likely spread of this pathogen will be limited.

*Pestalotiopsis psidii* may spread between host plants in Australia.

- *Pestalotiopsis* conidia are disseminated over short distances by rain splash or crawling insects (Elliott 2006; Lim & Chong 1990). The capacity for such dispersal would be limited by the prevalence of susceptible hosts in the vicinity of infected plants.
- Although Lim and Chong (1990) claimed that *P. psidii* can also be spread by wind, no studies confirming this dispersal method were identified to support this claim. Dispersal via wind has been reported for related species in a paper that focuses on molecular aspects by Prasannath, Galea & Akinsanmi (2021); however, this paper has not provided any sources of information related to spore dispersal. It is uncertain if conidia of *P. psidii* can be dispersed by wind; if yes, it could potentially contribute to the spread of *P. psidii* in Australia.
- The potential for spread from household gardens may be limited unless other host plants are nearby, but if infection occurred in or near a commercial guava or feijoa orchard then some spread within that area would be likely.

The movement of infected nursery stock could also facilitate the spread of *P. psidii* to new areas.

- Guava and feijoa plants are widely available from commercial nurseries. Pest management procedures may be undertaken in wholesale and retail nurseries that would reduce the likelihood of infected plants being sold. However, the fungus may be present asymptotically

inside twigs or stems (Gazis, Crane & Wasielewski 2024) or on the surface of leaves in minor lesions (Mordue 1976) and may not be detected. The distribution and subsequent planting of these infected plants could facilitate longer distance spread of *P. psidii*.

For the reasons outlined, the likelihood that *P. psidii* will spread within Australia is assessed as Moderate.

### 3.7.4 Overall likelihood of entry, establishment and spread

The overall likelihood of entry, establishment and spread is determined by combining the individual likelihoods of entry, establishment and spread using the matrix of rules in Table A.2.

The overall likelihood that *P. psidii* will enter Australia as a result of trade in guava fruit from Taiwan, be distributed in a viable state to a susceptible part of a host, establish in Australia and subsequently spread within Australia is assessed as: **Very Low**.

### 3.7.5 Consequences

The potential consequences of the establishment of *P. psidii* in Australia has been estimated according to the methods described in Figure A.1.

Based on the decision rules described in Table A.3, that is, where the potential consequences of a pest with respect to one or more criteria are 'C', the overall consequences are estimated to be **Very Low**.

Table 3.6 Consequence ratings for guava scab

Criterion	Estimate and rationale
<b>Direct</b>	
The life or health of plants and plant products	<p>C—Significant at the local level</p> <p>The known hosts of <i>P. psidii</i> are guava, cherry guava and feijoa (CABI 2025), which are all grown in Australia. There is some commercial production of guava and feijoa in Australia.</p> <p><i>Pestalotiopsis psidii</i> is typically a weak secondary pathogen, and leaf spot infections are usually of minor importance. However, under conducive conditions it can cause a drastic reduction in fruit yield prior to harvest, as well as postharvest losses (Lim &amp; Chong 1990). While the cankers on the fruit usually do not penetrate deeply, the damage is sufficient to significantly reduce the market value of the fruit (Lim &amp; Chong 1990; Mordue 1976). Some impacts on guava production in Australia could occur if the disease was not managed.</p> <p>Impacts on feijoa production in Australia are unlikely to be significant as commercial production is predominantly undertaken in southern Australia where the cooler climate would likely limit the potential for disease to occur.</p>
Other aspects of the environment	<p>A—Indiscernible at the local level.</p> <p>There are no known direct consequences of <i>P. psidii</i> on other aspects of the natural environment.</p>
<b>Indirect</b>	
Eradication, control	<p>B—Minor significance at the local level</p> <p>Measures to control <i>P. psidii</i> include application of fungicide, removal of dead and diseased plant parts from guava trees and removal of diseased plant material from orchards (Lin et al. 2005).</p> <p>Several fungicides are known to control <i>Pestalotiopsis</i> species, including captan, iprodione, prochloraz, thiabendazole and triazole (Hedge, Shivanandappa &amp; Govindu 1969).</p>

Criterion	Estimate and rationale
	Effective disease control may be achieved by managing insect pests in the orchard (either through insecticides or bagging fruit), which will reduce the susceptibility of fruit to infection (Lim & Chong 1990).
Domestic trade	A—Indiscernible at the local level. The introduction of <i>P. psidii</i> is unlikely to have a discernible impact on domestic trade. It is unlikely to be cost-beneficial to impose movement controls to prevent the spread of guava scab between properties.
International trade	A—Indiscernible at the local level. Guava production in Australia is very small and focused on supplying local markets and fruit processors. Prospective export opportunities for fresh guava fruit are likely to be very limited.
Non-commercial and environmental	B—Minor significance at the local level. Additional fungicide applications or other control measures may be required to control <i>P. psidii</i> on susceptible hosts and these may have a minor impact on the environment.

### 3.7.6 Unrestricted risk estimate

Unrestricted risk is the result of combining the overall likelihood of entry, establishment and spread with the outcome of overall consequences. The likelihood and consequences are combined using the risk estimation matrix shown in Table A.4.

**Table 3.7 Unrestricted risk estimate for *Pestalotiopsis psidii***

Unrestricted risk estimate for <i>Pestalotiopsis psidii</i>	
Overall likelihood of entry, establishment and spread	Very Low
Consequences	Very Low
<b>Unrestricted risk</b>	<b>Negligible</b>

The URE for *P. psidii* on the guava fruit from Taiwan pathway is assessed as **Negligible**, which achieves the ALOP for Australia. Therefore, specific risk management measures are not required for *P. psidii* on this pathway.

### 3.8 Pest risk assessment conclusions

Likelihood ratings and the consequences estimate for individual quarantine pests are set out in Table 3.28.

Of the 9 pests for which a further pest risk assessment was conducted:

- The UREs for 7 quarantine pests were assessed as not achieving the ALOP for Australia, and thus specific risk management measures are required for these pests on this pathway. These pests are:
  - Oriental fruit fly (*Bactrocera dorsalis*)
  - Fruit fly (*Bactrocera occipitalis*)
  - Melon fly (*Zeugodacus cucurbitae*)
  - Pumpkin fruit fly (*Zeugodacus tau*)
  - Coffee mealybug (*Planococcus lilacinus*)
  - Pacific mealybug (*Planococcus minor*)
  - Jack Beardsley mealybug (*Pseudococcus jackbeardsleyi*)
- The UREs for 2 quarantine pests were assessed as achieving the ALOP for Australia, and no measures are required for these pests on this pathway. These pests are:
  - Grapevine thrips (*Rhipiphorothrips cruentatus*)
  - Guava scab (*Pestalotiopsis psidii*)

An overview of the decision process for the pest risk assessment for guava fruit from Taiwan is presented in Figure 3.1.

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Pest risk assessments for quarantine pests

**Table 3.28** Pest risk assessment conclusions for pests, and pest groups, associated with the pathway of guava fruit from Taiwan

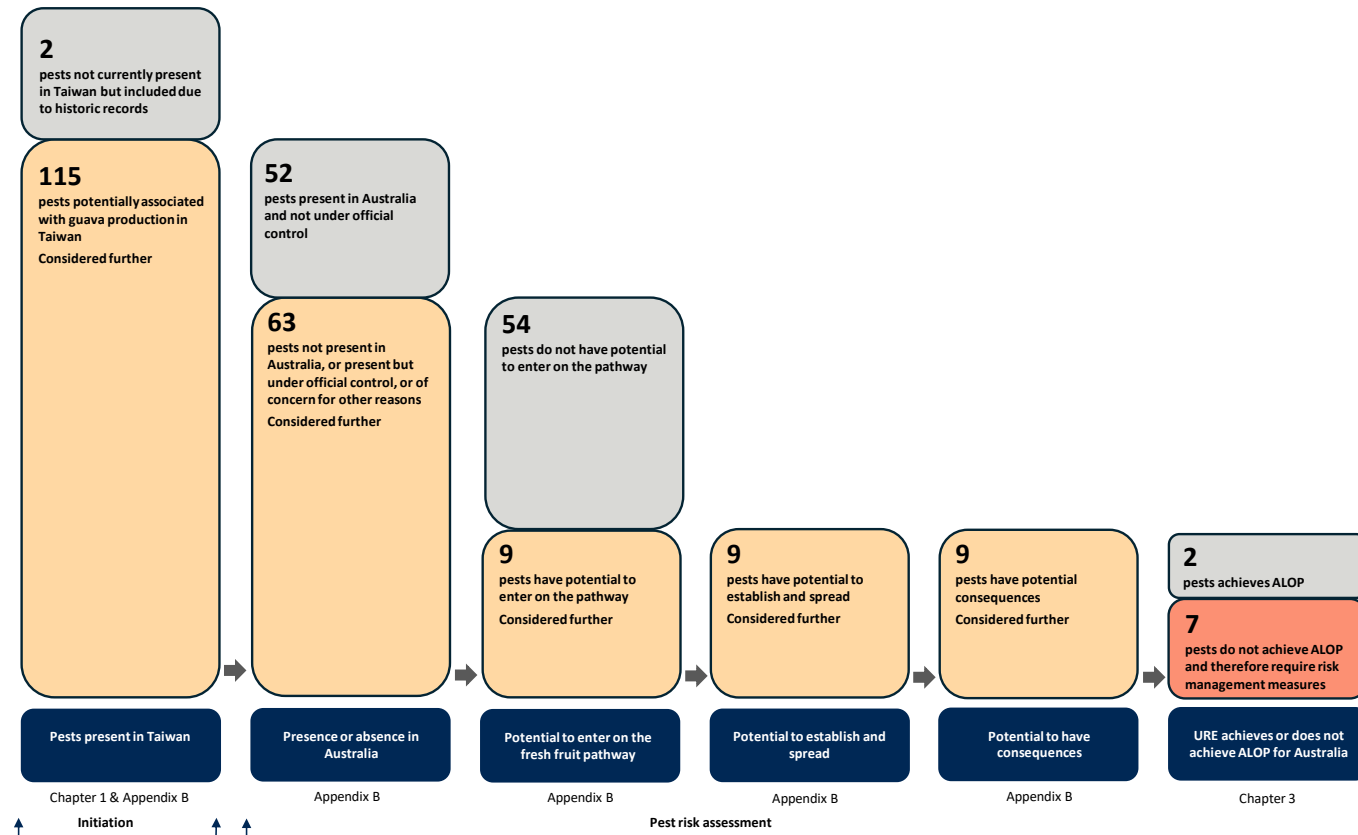
Pest name	Likelihood of						Consequences	URE
	Importation	Distribution	Entry	Establishment	Spread	EES		
Fruit flies [Diptera: Tephritidae]								
<i>Bactrocera dorsalis</i> (EP)	Moderate	High	Moderate	High	High	Moderate	High	High
<i>Bactrocera occipitalis</i> (EP)	Moderate	High	Moderate	High	High	Moderate	High	High
<i>Zeugodacus cucurbitae</i> (EP)	Moderate	High	Moderate	High	High	Moderate	High	High
<i>Zeugodacus tau</i> (EP)	Moderate	High	Moderate	High	High	Moderate	High	High
Mealybugs [Hemiptera: Pseudococcidae]								
<i>Planococcus lilacinus</i> (EP)	High	Moderate	Moderate	High	High	Moderate	Low	Low
<i>Planococcus minor</i> (EP, WA)	High	Moderate	Moderate	High	High	Moderate	Low	Low
<i>Pseudococcus jackbeardsleyi</i> (EP)	High	Moderate	Moderate	High	High	Moderate	Low	Low
Thrips [Thysanoptera: Thripidae]								
<i>Rhipiphorothrips cruentatus</i> (GP)	Low	Moderate	Low	High	High	Low	Low	Very Low
Fungi [Amphisphaeriales: Pestalotiopsidaceae]								
<i>Pestalotiopsis psidii</i>	Low	Low	Very Low	Moderate	Moderate	Very Low	Very Low	Negligible

**EP:** Species has been assessed previously and import policy already exists. **GP:** Species has been assessed previously in a Group PRA, and the Group PRA has been applied. **WA:** Regional quarantine pest for Western Australia. **EES:** Overall likelihood of entry, establishment and spread. **URE:** Unrestricted risk estimate.



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**Figure 3.1 Overview of the decision process for the pest risk assessment for guava fruit from Taiwan**



## 4 Pest risk management

Pest risk management evaluates and selects options for measures for quarantine pests and regulated articles identified in Chapter 3 as posing biosecurity risks that do not achieve the ALOP for Australia. This chapter proposes specific risk management measures for those quarantine pests and regulated articles (section 4.1). It also proposes an operational system for the assurance, maintenance and verification of phytosanitary status (section 4.2). Both specific risk management measures (section 4.1) and the operational system (section 4.2) are required to reduce the risk of introduction of these quarantine pests to achieve the ALOP for Australia. The specific measures and operational system are in addition to existing commercial production practices for guava in Taiwan, as described in Chapter 2, as these practices have been considered in the pest risk assessments presented in Chapter 3.

### 4.1 Pest risk management measures and phytosanitary procedures

Section 4.1.1 provides an overview of the proposed measures and section 4.1.2 outlines the measures for specific pests or pest groups.

#### 4.1.1 Overview of proposed measures

The department has established specific risk management measures for the pests or pest groups assessed in Chapter 3 as posing biosecurity risks that does not achieve the ALOP for Australia. These measures have been determined by the department to be effective to mitigate the biosecurity risk of the pests or pest groups to achieve the ALOP for Australia for other commodities from Taiwan and other countries. There is no available information to suggest that these measures will not manage the biosecurity risk of the pests or pest groups associated with guava fruit from Taiwan to achieve the ALOP for Australia. Therefore, the established measures are proposed for the pests or pest groups associated with guava fruit from Taiwan as described in section 4.1.2.

It is important to note that two risk management measure options are proposed in section 4.1.2 for the fruit flies. APHIA will need to propose which of the options it intends to use for consideration by the department. In addition, APHIA may propose an alternative option, i.e. different from those proposed in section 4.1.2. If this occurs, the department is obliged to consider the alternative option in line with the principle of equivalence as outlined in section 4.1.3. When reviewing risk management measures proposed by APHIA, the department will ensure that the proposal aligns with the relevant ISPMs (as specified in section 4.1.2).

Before trade can commence, the department will require assurance that Taiwan has appropriate systems in place to effectively apply all the required phytosanitary measures in accordance with Australia's requirements. The department obtains assurance via a range of activities including an assessment of the exporting country's historic compliance, desk and/or site audit, and bilateral agreements.

Following trade commencement, the department monitors trade performance on an ongoing basis as part of its assurance program and will take appropriate action where non-compliance is identified (see also section 4.2.8). The department also regularly monitors for new scientific information and will review its import policy if there is information to suggest that the biosecurity risk associated with

guava fruit from Taiwan has changed, or where alternative risk management options become available (see also section 4.4.2).

#### 4.1.2 Risk management measures for quarantine pests associated with guava fruit from Taiwan

Proposed specific risk management measures for the 7 quarantine pests associated with guava fruit from Taiwan are listed in Table 4.1.

**Table 4.1 Proposed risk management measures for quarantine pests potentially associated with guava fruit from Taiwan**

Pest/pest group	Scientific name	Common name	Measures
Fruit flies [Diptera: Tephritidae]	<i>Bactrocera dorsalis</i> [EP]	Oriental fruit fly	PFA, PFPP or PFPS <b>a</b>
	<i>Bactrocera occipitalis</i> [EP]		OR
	<i>Zeugodacus cucurbitae</i> [EP]	Melon fly	Fruit treatment considered effective against all life stages of <i>B. dorsalis</i> , <i>B. occipitalis</i> , <i>Z. cucurbitae</i> and <i>Z. tau</i>
	<i>Zeugodacus tau</i> [EP]	Pumpkin fruit fly	
Mealybugs [Hemiptera: Pseudococcidae]	<i>Planococcus lilacinus</i> [GP]	Coffee mealybug	Pre-export visual inspection and, if found, remedial action <b>b</b>
	<i>Planococcus minor</i> [GP, WA]	Pacific mealybug	
	<i>Pseudococcus jackbeardsleyi</i> [GP]	Jack Beardsley mealybug	

**a:** PFA is pest free areas, PFPP is pest free places of production or PFPS is pest free production sites. **b:** Remedial action may include treatment of the consignment to ensure that the pest is no longer viable or withdrawal of the consignment from export to Australia. **EP:** Species has been assessed previously and import policy already exists. **GP:** Species has been assessed previously in a Group PRA, and the Group PRA has been applied. **WA:** Regional quarantine pest for Western Australia.

The Australian Government Department of Agriculture, Fisheries and Forestry (the department) proposes the following specific risk management measures for the identified quarantine pests:

- For fruit flies
  - pest free areas, pest free places of production or pest free production sites; or
  - fruit treatment considered to be effective against fruit flies (such as cold disinfestation treatment)
- For mealybugs
  - pre-export visual inspection and, if found, remedial action.

#### Measures for fruit flies

For the fruit flies *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau*, the department proposes the options of pest free areas, pest free places of production or pest free production sites, or, a fruit treatment considered to be effective against all life stages associated with guava fruit, such as cold disinfestation. The objective of each option is to reduce the risk associated with these pests to achieve the ALOP for Australia when applied in combination with the operational system outlined in section 4.2.

*Option 1: Pest free areas, pest free places of production or pest free production sites*

The requirements for establishing and maintaining pest free areas are set out in ISPM 4: *Requirements for the establishment of pest free areas* (FAO 2024a) and, more specifically, ISPM 26: *Establishment of pest free areas for fruit flies (Tephritidae)* (FAO 2018a). The requirements for establishing and maintaining pest free places of production (PFPP) and pest free production sites (PFPS) are set out in ISPM 10: *Requirements for the establishment of pest free places of production and pest free production sites* (FAO 2016a).

Monitoring and trapping of fruit flies in the specified export orchards and packing houses would be required, consistent with the procedures recommended in ISPM 26 (FAO 2018a). In the event of the detection of any fruit fly species of economic importance in the identified PFA, PFPP or PFPS, APHIA would be required to notify the department within 48 hours of detection. The department would then assess the pest species, number of flies and specific information on individual flies detected, such as life stage, sex and gravidity of females, and the circumstances of the detection before advising APHIA of any action to be taken. If fruit flies were detected during pre-export inspection or during on-arrival inspection, trade under the PFA, PFPP or PFPS pathway would be suspended immediately, pending the outcome of an investigation.

Should Taiwan wish to use PFA, PFPP or PFPS as a measure to manage the risk posed by fruit flies, APHIA would need to provide a submission demonstrating the establishment of these to the department. The submission demonstrating PFA must fulfil requirements as set out in ISPM 4 (FAO 2024a) and ISPM 26 (FAO 2018a), and the submission demonstrating PFPP or PFPS must fulfil requirements as set out in ISPM 10 (FAO 2016a). The submission is subject to approval by the department.

*Option 2: Fruit treatment*

Fruit treatment known to be effective against fruit flies, such as cold disinfestation treatment, may be used as a phytosanitary measure for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau*.

The department considers cold disinfestation to be an effective treatment for *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* on the guava fruit from Taiwan pathway. This treatment may be applied prior to export or in transit, subject to approval and certification. The requirements for using cold treatment as a phytosanitary measure are set out in ISPM 42: *Requirements for the use of temperature treatments as phytosanitary measures* (FAO 2018b).

A treatment achieving a fruit core temperature of 1°C or below for a minimum of 17 days is proposed. The fruit pulp must be pre-cooled at or below the target temperature prior to loading. This is consistent with the treatment schedule (T107n) (USDA 2024) approved by the USDA for disinfestation of fruit flies (*B. dorsalis*, *Z. cucurbitae* and *Z. tau*) in guava fruit imported into mainland USA from Taiwan.

Data demonstrating the efficacy of cold disinfestation treatment for *B. occipitalis* is not available. However, the proposed treatment schedule for *B. dorsalis*, *Z. cucurbitae* and *Z. tau* of a core temperature of 1°C or below for a minimum of 17 days is considered appropriate for *B. occipitalis* given the close relationship of *B. occipitalis* to *B. dorsalis*. The larvae of *Zeugodacus* species are typically more cold-tolerant than *Bactrocera* species (Regmi, Lin & Yeh 2024). This schedule has been

used by the USA for guava fruit since imports from Taiwan commenced in 2019, with no reports of any live fruit flies being detected.

The practices of fruit bagging and removal of fallen fruit are required to be undertaken in the orchard to reduce fruit fly prevalence and potential infestation prior to treatment.

The department recognises other treatments, such as irradiation, heat (e.g., vapour heat treatment) or fumigation, may also be effective treatments against *B. dorsalis*, *B. occipitalis*, *Z. cucurbitae* and *Z. tau* on the guava fruit from Taiwan pathway. The use of any such treatment option is subject to its approval by the department as an efficacious measure against these fruit flies. Should Taiwan wish to propose a treatment option, APHIA would need to provide a submission, which includes suitable information to support the claimed efficacy of the treatment to manage these fruit flies on the guava fruit from Taiwan pathway, for consideration by the department.

### Measures for mealybugs

For *Planococcus minor*, *Planococcus lilacinus* and *Pseudococcus jackbeardsleyi*, the department proposes the option of pre-export visual inspection and, if found, remedial action. The method used for visual inspection must be able to detect all life stages of these pests, for example using visual aids such as a hand lens, where necessary. The inspection should be consistent with ISPM 23: *Guidelines for inspection* (FAO 2019c) and ISPM 31: *Methodologies for sampling of consignments* (FAO 2016b) and provide a 95% level of confidence that infestation greater than 0.5% will be detected. The objective of this proposed measure is to reduce the risk associated with these pests to achieve the ALOP for Australia when applied in combination with the operational system outlined in section 4.2.

*Proposed measure: Pre-export visual inspection and, if found, remedial action*

All consignments of guava fruit for export to Australia must be inspected by APHIA in accordance with ISPM 23 (FAO 2019c) and ISPM 31 (FAO 2016b). Each consignment must be found free of mealybugs. Export consignments found to contain any of these pests must be subjected to remedial action. Remedial action may include withdrawing the consignment from export to Australia, or application of an approved treatment to ensure that the pest is no longer viable.

#### 4.1.3 Consideration of alternative measures

Consistent with the principle of equivalence detailed in ISPM 11: *Pest risk analysis for quarantine pests* (FAO 2019b), the department will consider any alternative measure proposed by APHIA. Alternative measures must demonstrably manage the target pests to achieve the ALOP for Australia. Evaluation of any such measure will require a technical submission from APHIA that details the proposed measure, including suitable information to support the claimed efficacy, for consideration by the department.

## 4.2 Operational system for the assurance, maintenance and verification of phytosanitary status

A system of operational procedures is necessary to ensure proposed specific risk management measures (section 4.1) are effectively applied, the phytosanitary status of guava fruit from Taiwan is maintained, and these can be verified.

#### 4.2.1 A system of traceability to source orchards

The objectives of this procedure are to ensure that:

- Guava fruit are sourced only from orchards producing commercial quality fruit
- orchards from which guava fruit are sourced can be identified, so that any investigation and corrective action can be targeted in the event that pests of biosecurity concern to Australia are intercepted
- where guava fruit is grown/produced in an approved PFA, PFPP or PFPS, it can be verified that all fruit was sourced from the approved area, place or site and produced and exported under the conditions for that pathway.

APHIA must establish a system to enable traceability to where guava fruit for export to Australia are sourced. APHIA must ensure that export guava fruit growers are aware of pests of biosecurity concern for Australia and have systems in place to produce export quality fruit that meet Australia's requirements.

Where a pest risk management measure involving pest monitoring and controls during production and at harvest (such as PFA, PFPP, PFPS) is used, export orchards must be registered with APHIA. Records of orchard registration and APHIA audits must be kept by APHIA and must be made available to the department.

#### 4.2.2 Registration of packing houses and treatment providers, and auditing of procedures

The objectives of this procedure are to ensure that:

- commercial quality guava fruit are sourced only from packing houses that are approved by APHIA
- where applicable, treatment providers are approved by APHIA and capable of applying a treatment that suitably manages the target pests.

Guava fruit packing houses must be registered with APHIA. APHIA is required to ensure that the registered packing houses are suitably equipped and have a system in place to carry out the specified phytosanitary activities. The list of registered packing houses and records of APHIA audits must be kept by APHIA and must be made available to the department.

In circumstances where guava fruit undergo pre-export treatment, this process must be undertaken by treatment providers that have been registered with and audited by APHIA for that purpose. Records of APHIA registration requirements and audits must be made available to the department.

The approval of treatment providers by APHIA must include verification that suitable systems are in place to ensure compliance with treatment requirements. This may include:

- documented procedures to ensure guava fruit are appropriately treated and safeguarded post treatment
- staff training to ensure compliance with procedures
- record-keeping procedures
- suitability of facilities and equipment

- APHIA's system of oversight of treatment application.

The department provides final approval of facilities, following review of regulatory oversight provided by APHIA and the capability demonstrated by the facility. Site visits may be required for the department to have assurance that treatment can be applied accurately and consistently.

#### 4.2.3 Packaging, labelling and containers

The objectives of this procedure are to ensure that:

- Guava fruit intended for export to Australia, and associated packaging, are not contaminated by quarantine pests or regulated articles (as defined in ISPM 5: *Glossary of phytosanitary terms* (FAO 2024b))
- unprocessed packaging material is not imported with guava fruit from Taiwan. Unprocessed packaging material is not permitted as it may vector pests identified as not being on the pathway, or pests not known to be associated with guava fruit
- all wood material associated with the consignment used in packaging and transport of guava fruit complies with the department's import requirements, as published on BICON
- secure packaging is used for export of guava fruit from Taiwan to Australia, to prevent re-infestation during storage and transport and prevent escape of pests during clearance procedures on arrival in Australia. Packaging must meet Australia's secure packaging options published on BICON
- consignments are made insect proof and secure, by using at least one of the following secure consignment options:
  - **integral cartons:** produce may be packed in integral (fully enclosed) cartons (packages) with boxes having no ventilation holes and lids tightly fixed to the bases
  - **ventilation holes of cartons covered:** cartons (packages) with ventilation holes must have the holes covered/sealed with a mesh/screen of no more than 1.6 mm pore size and not less than 0.16mm strand thickness. Alternatively, the vent holes may be taped over
  - **polythene liners:** vented cartons (packages) with sealed polythene liners/bags within are acceptable (folded polythene bags are acceptable). This option is not permitted for irradiation
  - **meshed or shrink-wrapped pallets or Unit Load Devices (ULDs):** ULDs transporting cartons with open ventilation holes/gaps, or palletised cartons with ventilation holes/gaps must be fully covered or wrapped with polyethylene/plastic/foil sheet or mesh/screen of no more than 1.6 mm diameter pore size and not less than 0.16mm strand thickness
  - **produce transported in fully enclosed containers:** cartons (packages) with holes as loose boxes or on pallets may be transported in fully enclosed containers. Enclosed containers include 6-sided containers with solid sides, or ULDs with tarpaulin sides that have no holes or gaps. The container must be transported to the inspection point intact. This option is not permitted for irradiation
- packaged guava fruit from Taiwan must be labelled with sufficient identification for the purposes of traceability. This may include:
  - for treated product: the treatment facility name/number and treatment identification reference/number



- for guava fruit where the measures include /orchard freedom: the orchard reference number
- for guava fruit where phytosanitary measures are applied at the packing house: the packing house reference/number
- where applicable, packaged guava fruit from Taiwan that has undergone irradiation treatment is labelled with a statement that the guava fruit has been treated with ionising radiation.

Export packing houses and treatment providers (where applicable) must ensure packaging and labelling are suitable to maintain phytosanitary status of the export consignments.

#### **4.2.4 Specific conditions for storage and movement**

The objective of this procedure is to ensure that the quarantine integrity of the guava fruit is maintained during storage and movement.

Treated and/or inspected guava fruit for export to Australia must be kept secure and segregated at all times from any fruit for domestic or other markets, and from untreated/un-inspected product, to prevent mixing or cross-contamination. The area set aside for goods to Australia must be clearly identified with signage.

#### **4.2.5 Freedom from trash**

The objective of this procedure is to ensure that guava fruit for export are free from trash (for example, loose stem and leaf material, seeds, soil, animal matter/parts or other extraneous material) and foreign matter.

Freedom from trash will be confirmed by the inspection procedures. Export lots or consignments found to contain trash or foreign matter must be withdrawn from export unless approved remedial action, such as reconditioning, is available and applied to the export consignment and then re-inspected.

#### **4.2.6 Pre-export phytosanitary inspection and certification by APHIA**

The objective of these procedures is to ensure that Australia's import conditions have been met. All consignments of guava fruit from Taiwan for export to Australia must be inspected by APHIA and found free of pests of biosecurity concern for Australia. Pre-export visual inspection must be undertaken by APHIA in accordance with ISPM 23: *Guidelines for inspection* (FAO 2019c) and consistent with the principles of ISPM 31: *Methodologies for sampling of consignments* (FAO 2016b). Any netting or artificial wrapping material must be removed during the inspection.

All consignments must be inspected prior to export in accordance with official procedures for all visually-detectable quarantine pests and regulated articles (including trash). Sampling and inspection methods should be consistent with ISPM 23 (FAO 2019c) and ISPM 31 (FAO 2016b) and provide a 95% level of confidence that infestation greater than 0.5% will be detected. For a consignment equal to or greater than 1,000 units (one unit being a single guava fruit), this is equivalent to a 600 unit sample randomly selected across the consignment. Any netting or artificial wrapping material must be removed during the inspection.

A phytosanitary certificate must be issued for each consignment upon completion of pre-export inspection and treatment to certify that the required risk management measures have been undertaken prior to export and that the consignment meets Australia's import requirements.

Each phytosanitary certificate must include:

- a description of the consignment (including traceability information)
- details of disinfestation treatments (if required) which includes approved facility name and address, date of treatment and, where irradiation is used, absorbed dose (target and measured)
- additional declarations that may be required such as identification of the consignment as being sourced from a recognised pest free area, pest free place of production or pest free production site.

Some treatments (such as irradiation) may also require treatment certificates that accompany the phytosanitary certificate. BICON will describe when treatment certificates are required.

#### **4.2.7 Phytosanitary inspection by the Department of Agriculture, Fisheries and Forestry**

The objectives of this procedure are to ensure that:

consignments comply with Australian import requirements

consignments are as described on the phytosanitary certificate

quarantine integrity has been maintained.

On arrival in Australia, the department will:

- assess documentation to verify that the consignment is as described on the phytosanitary certificate, that required phytosanitary actions have been undertaken, and that product security has been maintained
- verify that the biosecurity status of consignments of guava fruit from Taiwan meet Australia's import requirements. When inspecting consignments, the department will randomly sample 600 units, or equivalent per phytosanitary certificate and apply an inspection method suitable for the commodity.

#### **4.2.8 Remedial action(s) for non-compliance**

The objectives of remedial action(s) for non-compliance are to ensure that:

any quarantine pest or regulated article, including trash, is addressed by remedial action, as appropriate

non-compliance with import requirements is addressed, as appropriate.

Any consignment that fails to meet Australia's import requirements will be subject to suitable remedial treatment where an effective treatment is available for the identified biosecurity risks. Where an effective treatment is not available, the imported consignment will be exported or destroyed.

Other actions, including partial or complete suspension of the import pathway, may be taken depending on the identity and/or importance of the pest intercepted, for example, fruit flies of economic importance, or pests for which PFAs, PFPPs or PFPs are established.

In the event that consignments of guava fruit from Taiwan are repeatedly non-compliant, the department may require enhanced risk management measures, including mandatory phytosanitary treatment. The department reserves the right to suspend imports (either all imports, or imports from specific pathways) and to conduct an audit of the risk management systems. Imports will be allowed to recommence only when the department is satisfied that appropriate corrective action has been undertaken.

### **4.3 Uncategorized pests**

If an organism that has not been categorised, including a contaminant pest, is detected on guava fruit on arrival in Australia, it will require assessment by the department to determine its quarantine status and whether phytosanitary action is required.

Assessment is also required if the detected species was categorised as not having the potential to be on the import pathway. If the detected species was categorised as being on the pathway but assessed as having an unrestricted risk that achieves the ALOP for Australia, then it may require reassessment. The detection of any pests of biosecurity concern not already identified in the analysis may result in remedial action and/or temporary suspension of trade while a review is conducted to ensure that existing measures continue to provide the ALOP for Australia.

### **4.4 Review of processes**

#### **4.4.1 Verification of protocol**

Prior to or during the first season of trade, the department will verify the implementation of the required import requirements including registration, operational procedures and treatment providers, where applicable. This may involve representatives from the department visiting areas in Taiwan that produce guava fruit for export to Australia.

#### **4.4.2 Review of policy**

The department will review the import policy after a suitable volume of trade has been achieved to ensure import requirements continue to be appropriate to manage the biosecurity risk of the pathway. In addition, the department reserves the right to review the import policy as deemed necessary. This may include if there is reason to believe that the pest or phytosanitary status in Taiwan has changed, or where alternative risk management or compliance-based intervention options become available.

APHIA must inform the department immediately on the detection of any new pests of guava fruit in Taiwan that might be of potential biosecurity concern to Australia.

### **4.5 Meeting Australia's food laws**

In addition to meeting Australia's biosecurity laws, food imported for sale for human consumption must comply with the requirements of the *Imported Food Control Act 1992*, as well as Australian state and territory food laws. Among other things, these laws require all food, including imported food, to be safe and meet the standards set out in the Australia New Zealand Food Standards Code (the Code).

Food Standards Australia New Zealand (FSANZ) is responsible for developing and maintaining the Code. The Code is available at [foodstandards.gov.au/code/Pages/default.aspx](http://foodstandards.gov.au/code/Pages/default.aspx).

The department administers the *Imported Food Control Act 1992* which supports the inspection and testing of imported food to verify its safety and compliance with Australia's food standards, including the Code. This is undertaken through a risk-based border inspection program, the Imported Food Inspection Scheme. More information about this scheme is available at [agriculture.gov.au/biosecurity-trade/import/goods/food/inspection-testing/ifis](http://agriculture.gov.au/biosecurity-trade/import/goods/food/inspection-testing/ifis).

Standards 1.1.1, 1.1.2 and 1.4.4 of the Code specify that a food for sale must not consist of, or have as an ingredient or a component, a prohibited or restricted plant or fungus; unless expressly permitted by the Code. The prohibited and restricted plants and fungi are listed in Schedules 23 and 24 of the Code, respectively.

Standard 1.4.2 and Schedules 20, 21 and 22 of the Code set out the maximum residue limits and extraneous residue limits for agricultural or veterinary chemicals that are permitted in foods for sale, including imported food. Standard 1.1.1 of the Code specifies that a food must not have, as an ingredient or a component, a detectable amount of an agvet chemical, or a metabolite or a degradation product of the agvet chemical; unless expressly permitted by the Code.

Certain imported food, including some minimally processed horticulture products, must be covered by a food safety management certificate to be imported into Australia. The certificate provides evidence that a food has been produced through a food safety management system. This system must have appropriate controls in place to manage food safety hazards. More information about the foods that require a food safety management certificate and how to comply is available at [agriculture.gov.au/biosecurity-trade/import/goods/food/certification/safety-management-certificates](http://agriculture.gov.au/biosecurity-trade/import/goods/food/certification/safety-management-certificates).

## 5 Conclusion

This draft risk analysis was conducted to assess the proposal by Taiwan for market access to Australia for guava fruit for human consumption.

The draft risk analysis was conducted in accordance with Australia's method for pest risk analysis (Appendix A), which is consistent with the International Standards for Phytosanitary Measures (ISPMs), including ISPM 2: *Framework for pest risk analysis* (FAO 2019a) and ISPM 11: *Pest risk analysis for quarantine pests* (FAO 2019b), and the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (WTO 1995).

In conclusion, this draft report proposes that the importation of commercially produced guava fruit to Australia from all commercial production areas of Taiwan be permitted, subject to a range of biosecurity requirements outlined in Chapter 4.

The findings of this draft report are based on a comprehensive analysis of scientific literature and other relevant information.

The department considers that the risk management measures proposed in this report will provide an appropriate level of protection against the quarantine pests identified as associated with the trade of guava fruit from Taiwan.

All fresh fruit, including guava fruit from Taiwan, have been determined by the Director of Biosecurity to be conditionally non-prohibited goods under s174 of the *Biosecurity Act 2015*. Conditionally non-prohibited goods cannot be brought or imported into Australia unless they meet specific import conditions.

This report, upon its finalisation, provides the basis for import conditions for guava fruit from Taiwan for human consumption. The import conditions will be communicated on BICON. The publication of import conditions on BICON is subject to Taiwan being able to demonstrate that processes and procedures are in place to implement the required risk management measures.

## Appendix A: Method for pest risk analysis

This section sets out the method for the pest risk analysis (PRA) used by the Department of Agriculture, Fisheries and Forestry (the department). This method is consistent with the International Standards for Phytosanitary Measures (ISPMs), including ISPM 2: *Framework for pest risk analysis* (FAO 2019a) and ISPM 11: *Pest risk analysis for quarantine pests* (FAO 2019b) and the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (WTO 1995).

A PRA is 'the process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken against it' (FAO 2024b). A pest is 'any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products' (FAO 2024b). A 'quarantine pest' is 'a pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled' (FAO 2024b).

Biosecurity risk consists of 2 major components: the likelihood of a pest entering, establishing and spreading in Australia for a defined import pathway; and the consequences should this happen. These 2 components are combined to give an overall estimate of the pest risk for the defined import pathway.

Unrestricted risk is estimated taking into account, where applicable, the existing commercial production practices of the exporting country and procedures that occur on arrival in Australia. These procedures include verification by the department that the consignment received is as described on the commercial documents and its integrity has been maintained.

Restricted risk is estimated with phytosanitary measure(s) applied. A phytosanitary measure is 'any legislation, regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests' (FAO 2024b).

A PRA is conducted in 3 consecutive stages: initiation (A1), pest risk assessment (A2) and pest risk management (A3).

### A1 Stage 1: Initiation

Initiation identifies the pest(s) and pathway(s) that are of biosecurity concern and should be considered for risk analysis in relation to the identified PRA area.

A pathway is 'any means that allows the entry or spread of a pest' (FAO 2024b). For this risk analysis, the 'pathway' being assessed is defined in Chapter 1 (section 1.2.2).

For this risk analysis, the 'PRA area' is defined as Australia for pests that are absent, or of limited distribution and under official control. For areas with regional freedom from a pest, the 'PRA area' may be defined based on a state or territory of Australia or may be defined as a region of Australia consisting of parts of a state or territory or several states or territories.

According to ISPM 11 (FAO 2019b), the PRA process may be initiated as a result of:

- the identification of a pathway that presents a potential pest hazard. For example, international trade is requested for a commodity not previously imported into the country or a commodity from a new area or new country of origin

- the identification of a pest that may require phytosanitary measures. For example, a new pest risk is identified by scientific research, a pest is repeatedly intercepted, a request is made to import an organism, or an organism is identified as a vector of other pests
- the review or revision of a policy. For example, a country's decision is taken to review phytosanitary regulations, requirements or operations or a new treatment or loss of a treatment system, a new process, or new information impacts on an earlier decision.

The basis for the initiation of this risk analysis is defined in Chapter 1 (section 1.2.1).

The primary elements in the initiation stage are:

- identity of the pests
- potential association of each pest with the pathway being assessed.

The identity of the pests is presented at species level by the species' scientific name in most instances, but a lower taxonomic level may be used where appropriate. Synonyms are provided where the current scientific name differs from that provided by the exporting country's National Plant Protection Organisation (NPPO) or where the cited literature used a different scientific name.

The potential association of each pest with the pathway being assessed considers information on:

- association of the pest with the host plant/commodity and
- the presence or absence of the pest in the exporting country/region relevant to the pathway being assessed.

## A2 Stage 2: Pest risk assessment

The process for pest risk assessment includes 2 sequential steps:

- pest categorisation (A2.1)
- further pest risk assessment, which includes evaluation of the likelihoods of the introduction (entry and establishment) and spread of a pest (A2.2), and evaluation of the magnitude of the associated potential consequences (A2.3).

### A2.1 Pest categorisation

Pest categorisation examines the pests identified in the initiation stage (A1) to determine which of these pests meet the definition of a quarantine pest and require further pest risk assessment.

ISPM 11 (FAO 2019b) states that '*The opportunity to eliminate an organism or organisms from consideration before in-depth examination is undertaken is a valuable characteristic of the categorisation process. An advantage of pest categorisation is that it can be done with relatively little information; however information should be sufficient to adequately carry out the categorisation*'. In line with ISPM 11, the department utilises the pest categorisation step to screen out some pests from further consideration where appropriate. For each pest that is not present in Australia, or is present but under official control, the department assesses its potential to enter (importation and distribution) on the pathway being assessed and, if having potential to enter, its potential to establish and spread in the PRA area. For a pest to cause economic consequences, the pest will need to enter, establish and spread in the PRA area. Therefore, pests that do not have potential to enter on the pathway being assessed, or have potential to enter but do not have potential to establish and spread in the PRA area, are not considered further. The potential for economic consequences is then



assessed for pests that have potential to enter, establish and spread in the PRA area. Further pest risk assessments are then undertaken for pests that have potential to cause economic consequences, i.e., pests that meet the criteria for a quarantine pest.

Pest categorisation uses the following primary elements to identify the quarantine pests and to screen out some pests from further consideration where appropriate for the pathway being assessed:

- presence or absence and regulatory status in the PRA area
- potential for entry, establishment and spread in the PRA area
- potential for economic consequences in the PRA area.

## **A2.2 Assessment of the likelihood of entry, establishment and spread**

ISPM 11 (FAO 2019b) provides details of how to assess the 'probability of entry', 'probability of establishment' and 'probability of spread' of a pest. The SPS Agreement (WTO 1995) uses the term 'likelihood' rather than 'probability' for these estimates. In qualitative PRAs, the department uses the term 'likelihood' as the descriptor. The use of the term 'probability' is limited to the direct quotation of ISPM definitions.

A summary of the assessment process is given here, followed by a description of the qualitative methodology used in this risk analysis.

### **A2.2.1 Likelihood of entry**

The likelihood of entry describes the likelihood that a quarantine pest will enter Australia when a given commodity is imported, be distributed in a viable state in the PRA area and subsequently be transferred to a host.

For the purpose of considering the likelihood of entry, the department divides this step into 2 components:

- **Likelihood of importation** – the likelihood that a pest will arrive in Australia in a viable state when a given commodity is imported
- **Likelihood of distribution** – the likelihood that the pest will be distributed in a viable state, as a result of the processing, sale or disposal of the commodity, in the PRA area and subsequently transfer to a susceptible part of a host.

Factors to be considered in the likelihood of importation may include:

- likelihood of the pest being associated with the pathway at origin
  - prevalence of the pest in the source area
  - occurrence of the pest in a life-stage that would be associated with the commodity
  - mode of trade (for example, bulk, packed)
  - volume and frequency of movement along each pathway
  - seasonal timing of imports
  - pest management, cultural and commercial procedures applied at the place of origin (for example, application of plant protection products, handling, culling, and grading)

- likelihood of survival of the pest during transport or storage
  - speed and conditions of transport and duration and conditions of storage compared with the duration of the life cycle of the pest
  - vulnerability of the life-stages of the pest during transport or storage
  - prevalence of the pest likely to be associated with a consignment
  - commercial procedures (for example, refrigeration) applied to consignments during transport and storage in the country of origin, and during transport to Australia
- likelihood of pest surviving existing pest management procedures.

Factors to be considered in the likelihood of distribution may include:

- commercial procedures (for example, refrigeration) applied to consignments during distribution in Australia
- dispersal mechanisms of the pest, including vectors, to allow movement from the pathway to a suitable host
- whether the imported commodity is to be sent to a few or many destination points in the PRA area
- proximity of entry, transit and destination points to suitable hosts
- time of year at which import takes place
- intended use of the commodity (for example, for planting, processing or consumption)
- risks from by-products and waste.

#### **A2.2.2 Likelihood of establishment**

Establishment is defined as the ‘perpetuation, for the foreseeable future, of a pest within an area after entry’ (FAO 2024b). In order to estimate the likelihood of establishment of a pest, reliable biological information (for example, lifecycle, host range, epidemiology, survival) is obtained from the areas where the pest currently occurs. The situation in the PRA area can then be compared with that in the areas where it currently occurs and expert judgement used to assess the likelihood of establishment.

Factors to be considered in the likelihood of establishment in the PRA area may include:

- availability of suitable hosts, alternate hosts and vectors in the PRA areas
  - prevalence of hosts and alternate hosts in the PRA area
  - whether hosts and alternate hosts occur within sufficient geographic proximity to allow the pest to complete its life cycle
  - whether there are other plant species, which could prove to be suitable hosts in the absence of usual host species
  - whether a vector, if needed for dispersal of the pest, is already present in the PRA area or likely to be introduced
- suitability of environment in the PRA area
  - factors in the environment in the PRA area (for example, suitability of climate, soil, pest and host competition) that are critical to the development of the pest, its host and if

applicable its vector, and to their ability to survive periods of climatic stress and complete their life cycles

- cultural practices and control measures in the PRA area that may influence the ability of the pest to establish
- other characteristics of the pest
  - reproductive strategy of the pest and method of pest survival
  - potential for adaptation of the pest
  - minimum population needed for establishment.

### A2.2.3 Likelihood of spread

Spread is defined as ‘the expansion of the geographical distribution of a pest within an area’ (FAO 2024b). The likelihood of spread considers the factors relevant to the movement of the pest, after establishment on a host plant or plants, to other susceptible host plants of the same or different species in other areas. In order to estimate the likelihood of spread of the pest, reliable biological information is obtained from areas where the pest currently occurs. The situation in the PRA area is then carefully compared with that in the areas where the pest currently occurs and expert judgement used to assess the likelihood of spread.

Factors to be considered in the likelihood of spread may include:

- suitability of the natural and/or managed environment for natural spread of the pest
- presence of natural barriers
- potential for movement with commodities, conveyances or by vectors
- intended use of the commodity
- potential vectors of the pest in the PRA area
- potential natural enemies of the pest in the PRA area.

### A2.2.4 Assigning likelihoods for entry, establishment and spread

Likelihoods are assigned to each step of entry, establishment and spread. Six qualitative likelihood descriptors are used: High; Moderate; Low; Very Low; Extremely Low; and Negligible. Definitions for these descriptors and their indicative ranges are given in Table A.1. The indicative ranges are only provided to illustrate the boundaries of the descriptors and are not used beyond this purpose in qualitative PRAs. These indicative ranges provide guidance to the risk analyst and promote consistency between different pest risk assessments.

**Table A.1 Nomenclature of likelihoods**

Likelihood	Descriptive definition	Indicative range
High	The event would be very likely to occur	$0.7 < \text{to} \leq 1$
Moderate	The event would occur with an even likelihood	$0.3 < \text{to} \leq 0.7$
Low	The event would be unlikely to occur	$0.05 < \text{to} \leq 0.3$
Very Low	The event would be very unlikely to occur	$0.001 < \text{to} \leq 0.05$
Extremely Low	The event would be extremely unlikely to occur	$0.000001 < \text{to} \leq 0.001$
Negligible	The event would almost certainly not occur	$0 < \text{to} \leq 0.000001$

### A2.2.5 Combining likelihoods

The likelihood of entry is determined by combining the likelihood that the pest will be imported into the PRA area and the likelihood that the pest will be distributed within the PRA area, using a matrix of rules (Table A.2). This matrix is then used to combine the likelihood of entry and the likelihood of establishment, and the likelihood of entry and establishment is then combined with the likelihood of spread to determine the overall likelihood of entry, establishment and spread.

For example, if a descriptor of Low is assigned for the likelihood of importation, Moderate for the likelihood of distribution, High for the likelihood of establishment and Very Low for the likelihood of spread, then the likelihood of importation of Low and the likelihood of distribution of Moderate are combined to give a likelihood of Low for entry. The likelihood for entry is then combined with the likelihood assigned for establishment of High to give a likelihood for entry and establishment of Low. The likelihood for entry and establishment is then combined with the likelihood assigned for spread of Very Low to give the overall likelihood for entry, establishment and spread of Very Low. This can be summarised as:

importation x distribution = entry [E]

**Low x Moderate = Low**

entry x establishment = [EE]

**Low x High = Low**

[EE] x spread = [EES]

**Low x Very Low = Very Low**

**Table A.2 Matrix of rules for combining likelihoods**

	High	Moderate	Low	Very Low	Extremely Low	Negligible
High	High	Moderate	Low	Very Low	Extremely Low	Negligible
Moderate	–	Low	Low	Very Low	Extremely Low	Negligible
Low	–	–	Very Low	Very Low	Extremely Low	Negligible
Very Low	–	–	–	Extremely Low	Extremely Low	Negligible
Extremely Low	–	–	–	–	Negligible	Negligible
Negligible	–	–	–	–	–	Negligible

### Time and volume of trade

One factor affecting the likelihood of entry is the volume and duration of trade. If all other conditions remain the same, the overall likelihood of entry will increase as time passes and the overall volume of trade increases.

The department normally considers the likelihood of entry on the basis of the estimated volume of one year's trade. This is a convenient value for the analysis that is relatively easy to estimate and allows for expert consideration of seasonal variations in pest presence, incidence and behaviour to be taken into account. The consideration of the likelihood of entry, establishment and spread and subsequent consequences takes into account events that might happen over a number of years even though only one year's volume of trade is being considered. This difference reflects biological and

ecological facts, for example where a pest or disease may establish in the year of import but spread may take many years.

The use of a one year volume of trade has been taken into account when setting up the matrix that is used to estimate the risk and therefore any policy based on this analysis does not simply apply to one year of trade. Policy decisions that are based on the department's method that uses the estimated volume of one year's trade are consistent with Australia's policy on appropriate level of protection and meet the Australian Government's requirement for ongoing quarantine protection. If there are substantial changes in the volume and nature of the trade in specific commodities then the department will review the risk analysis and, if necessary, provide updated policy advice.

In assessing the volume of trade in this risk analysis, the department assumed that a substantial volume of trade will occur.

### **A2.3 Assessment of potential consequences**

In estimating the potential consequences of a pest if the pest were to enter, establish and spread in Australia, the department uses a 2-step process. In the first step, a qualitative descriptor of the impact is assigned to each of the direct and indirect criteria in terms of the *level of impact* and the *magnitude of impact*. The second step involves combining the impacts for each of the criteria to obtain an 'overall consequences' estimation.

#### **Step 1: Assessing direct and indirect impacts**

Direct pest impacts are considered in the context of the impacts on:

- the life or health of plants and plant products  
This may include pest impacts on the life or health of the plants and production effects (yield or quality) either at harvest or during storage.
  - Where applicable, pest impacts on the life or health of humans or of animals and animal products may also be considered.
- other aspects of the environment.

Indirect pest impacts are considered in the context of the impacts on:

- eradication and control  
This may include pest impacts on new or modified eradication, control, surveillance or monitoring and compensation strategies or programs.
- domestic trade  
This may include pest impacts on domestic trade or industry, including changes in domestic consumer demand for a product resulting from quality changes and effects on other industries supplying inputs to, or using outputs from, directly affected industries.
- international trade  
This may include pest impacts on international trade, including loss of markets, meeting new technical requirements to enter or maintain markets and changes in international consumer demand for a product resulting from quality changes.
- non-commercial and environment

This may include pest impacts on the community and environment, including reduced tourism, reduced rural and regional economic viability, loss of social amenity, and any 'side effects' of control measures.

For each of these direct and indirect criteria, the level of impact is estimated over 4 geographic levels, defined as:

- **Local**—an aggregate of households or enterprises (a rural community, a town or a local government area)
- **District**—a geographically or geopolitically associated collection of aggregates (generally a recognised section of a state or territory, such as 'Far North Queensland')
- **Regional**—a geographically or geopolitically associated collection of districts in a geographic area (generally a state or territory, although there may be exceptions with larger states such as Western Australia)
- **National**—Australia wide (Australian mainland states and territories and Tasmania).

For each criterion, the magnitude of impact at each of these geographic levels is described using 4 categories, defined as:

- **Unlikely to be discernible**—pest impact is not usually distinguishable from normal day-to-day variation in the criterion
- **Minor significance**—expected to lead to a minor increase in mortality/morbidity of hosts or a minor decrease in production but not expected to threaten the economic viability of production. Expected to decrease the value of non-commercial criteria but not threaten the criterion's intrinsic value. Effects would generally be reversible.
- **Significant**—expected to threaten the economic viability of production through a moderate increase in mortality/morbidity of hosts, or a moderate decrease in production. Expected to significantly diminish or threaten the intrinsic value of non-commercial criteria. Effects may not be reversible.
- **Major significance**—expected to threaten the economic viability through a large increase in mortality/morbidity of hosts, or a large decrease in production. Expected to severely or irreversibly damage the intrinsic 'value' of non-commercial criteria.

Each individual direct or indirect impact is given an impact score (A–G) using the decision rules in Figure A.1. This is done by determining which of the shaded cells with bold font in Figure A.1 correspond to the level and magnitude of the particular impact.

The following are considered during this process:

- At each geographic level below 'National', an impact more serious than 'Minor significance' is considered at least 'Minor significance' at the level above. For example, a 'Significant' impact at the state or territory level is considered equivalent to at least a 'Minor significance' impact at the national level.
- If the impact of a pest at a given level is in multiple states or territories, districts or regions or local areas, it is considered to represent at least the same magnitude of impact at the next highest geographic level. For example, a 'Minor significance' impact in multiple states or territories represents a 'Minor significance' impact at the national level.

- The geographic distribution of an impact does not necessarily determine the impact. For example, an outbreak could occur on one orchard/farm, but the impact could potentially still be considered at a state or national level.

Figure A.1 Decision rules for determining the impact score for each direct and indirect criterion, based on the *level of impact* and the *magnitude of impact*

Impact score	G				Major significance
	F			Major significance	Significant
	E		Major significance	Significant	Minor significance
	D	Major significance	Significant	Minor significance	Unlikely to be discernible
	C	Significant	Minor significance	Unlikely to be discernible	
	B	Minor significance	Unlikely to be discernible		
	A	Unlikely to be discernible			
		Local	District	Regional	National
		Geographic level			

For each criterion:

the *level of impact* is estimated over 4 geographic levels: local, district, regional and national

the *magnitude of impact* at each of the 4 geographic levels is described using 4 categories: unlikely to be discernible, minor significance, significant and major significance

an impact score (A–G) is assigned by determining which of the shaded cells with bold font correspond to the level and magnitude of impact.

## Step 2: Combining direct and indirect impacts

The overall consequence for each pest or each group of pests is achieved by combining the impact scores (A–G) for each direct and indirect criterion using the decision rules in Table A.3. These rules are

mutually exclusive, and are assessed in numerical order until one applies. For example, if the first rule does not apply, the second rule is considered, and so on.

**Table A.3 Decision rules for determining the overall consequence rating for each pest**

Rule	The impact scores for consequences of direct and indirect criteria	Overall consequence rating
1	Any criterion has an impact of 'G'; or more than one criterion has an impact of 'F'; or a single criterion has an impact of 'F' and each remaining criterion an 'E'.	Extreme
2	A single criterion has an impact of 'F'; or all criteria have an impact of 'E'.	High
3	One or more criteria have an impact of 'E'; or all criteria have an impact of 'D'.	Moderate
4	One or more criteria have an impact of 'D'; or all criteria have an impact of 'C'.	Low
5	One or more criteria have an impact of 'C'; or all criteria have an impact of 'B'.	Very Low
6	One or more but not all criteria have an impact of 'B', and all remaining criteria have an impact of 'A'; or all criteria have an impact of 'A'.	Negligible

## A2.4 Estimation of the unrestricted risk

Once the assessment of the likelihood of entry, establishment and spread and for potential consequences are completed, the unrestricted risk can be determined for each pest or each group of pests. This is determined by using a risk estimation matrix (Table A.4) to combine the estimates of the likelihood of entry, establishment and spread and the overall consequences of pest establishment and spread.

When interpreting the risk estimation matrix, note the descriptors for each axis are similar (for example, Low, Moderate, High) but the vertical axis refers to likelihood and the horizontal axis refers to consequences. Accordingly, a Low likelihood combined with High consequences, is not the same as a High likelihood combined with Low consequences—the matrix is not symmetrical. For example, the former combination would give an unrestricted risk rating of Moderate, whereas the latter would give a Low rating.

**Table A.4 Risk estimation matrix**

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



## **A2.5 The appropriate level of protection (ALOP) for Australia**

The SPS Agreement defines the concept of an ‘appropriate level of sanitary or phytosanitary protection (ALOP)’ as the level of protection deemed appropriate by the WTO Member establishing a sanitary or phytosanitary measure to protect human, animal or plant life or health within its territory.

Like many other countries, Australia expresses its ALOP in qualitative terms. The ALOP for Australia, which reflects community expectations through government policy, is currently expressed as providing a high level of sanitary or phytosanitary protection aimed at reducing risk to a very low level, but not to zero. The band of cells in Table A.4 marked ‘Very Low risk’ represents the ALOP for Australia.

## **A2.6 Adoption of outcomes from previous assessments**

Outcomes of previous risk assessments have been adopted in this assessment for pests for which the risk profile is assessed as comparable to previously assessed situations.

The prospective adoption of previous risk assessment ratings for the likelihood of importation and the likelihood of distribution is considered on a case-by-case basis by comparing factors relevant to the pathway being assessed with those assessed previously. For assessment of the likelihood of importation, factors considered/compared include the commodity type, the prevalence of the pest and commercial production practices in the exporting country/region. For assessment of the likelihood of distribution of a pest the factors considered/compared include the commodity type, the ways the imported produce will be distributed within Australia as a result of the processing, sale or disposal of the imported produce, and the time of year when importation occurs and the availability and susceptibility of hosts at that time. After comparing these factors and reviewing the latest literature, previously determined ratings may be adopted if the department considers the likelihoods for the pathway being assessed to be comparable to those assigned in the previous assessment(s), and there is no new information to suggest that the ratings assigned in the previous assessment(s) have changed.

The likelihoods of establishment and of spread of a pest species in the PRA area will be comparable between risk assessments, regardless of the import pathway through which the pest has entered the PRA area. This is because these likelihoods relate specifically to conditions and events that occur in the PRA area, and are independent of the import pathway. Similarly, the estimate of potential consequences associated with a pest species is also independent of the import pathway. Therefore, the likelihoods of establishment and of spread of a pest, and the estimate of potential consequences, are directly comparable between assessments. If there is no new information available that would significantly change the ratings for establishment or spread or the consequences the pests may cause, the ratings assigned in the previous assessments for these components may be adopted with confidence.

## **A2.7 Application of Group PRAs to this risk analysis**

The Group PRAs that were applied to this risk analysis are:

- the *Final group pest risk analysis for thrips and orthotospoviruses on fresh fruit, vegetable, cut-flower and foliage imports* (thrips Group PRA) (DAWR 2017a)

- the *Final group pest risk analysis for mealybugs and the viruses they transmit on fresh fruit, vegetable, cut-flower and foliage imports* (mealybugs Group PRA) (DAWR 2019a)
- the *Final group pest risk analysis for soft and hard scale insects on fresh fruit, vegetable, cut-flower and foliage imports* (scales Group PRA) (DAWE 2021a)
- the *Final report for a review of pest risk assessments for spider mites (Acari: Trombidiformes: Tetranychidae)* (spider mite review) (DAFF 2024a).

The Group PRA approach is consistent with relevant international standards and requirements—including ISPM 2: *Framework for Pest Risk Analysis* (FAO 2019a), ISPM 11: *Pest Risk Analysis for Quarantine Pests* (FAO 2019b) and the SPS Agreement (WTO 1995). ISPM 2 states that ‘Specific organisms may ... be analysed individually, or in groups where individual species share common biological characteristics.’

Risk estimates derived from a Group PRA are ‘indicative’ in character. This is because the likelihood of entry (the combined likelihoods of importation and distribution) can be influenced by a range of pathway-specific factors, as explained in section A2.6. Therefore, the indicative likelihood of entry from a Group PRA needs to be verified on a case-by-case basis.

In contrast, and as noted in section A2.6, the risk factors considered in the likelihoods of establishment and spread, and the potential consequences associated with a pest species are not pathway-specific, and are therefore comparable across all import pathways within the scope of the Group PRA. This is because at these latter stages of the risk analysis the pest is assumed to have already found a host within Australia at or beyond its point of entry. Therefore, unless there is specific evidence to suggest otherwise, a Group PRA assessment can be applied as the default outcome for any pest species on a plant import pathway once the previously assigned likelihood of entry has been verified.

In a scenario where the likelihood of entry for a pest species on a commodity is assessed as different to the indicative estimate, the Group PRA-derived likelihoods of establishment and spread and the estimate of consequences can still be used, but the overall risk rating (the URE) may change.

Application of Group policy involves identification of up to 3 species of each relevant group associated with the import pathway. However, if any other quarantine pests or regulated articles not included in this risk analysis and/or in the relevant group policies are detected at pre-export or on arrival in Australia, the relevant Group policy will also apply.

### **A3 Stage 3: Pest risk management**

Pest risk management describes the process of identifying and implementing phytosanitary measures to manage risks to achieve the ALOP for Australia, while ensuring that any negative effects on trade are minimised.

The conclusions from pest risk assessment are used to decide whether risk management is required and if so, the appropriate measures to be used. Where the unrestricted risk estimate does not achieve the ALOP for Australia, risk management measures are required to reduce this risk to a very low level. The guiding principle for risk management is to manage risk to achieve the ALOP for Australia. The effectiveness of any proposed/recommended phytosanitary measures (or combination

of measures) is evaluated, using the same approach as used to evaluate the unrestricted risk. This ensures the restricted risk for the relevant pest or pests achieves the ALOP for Australia.

ISPM 11 (FAO 2019b) provides details on the identification and selection of appropriate risk management options and notes that the choice of measures should be based on their effectiveness in reducing the likelihood of entry of the pest.

Examples given of measures commonly applied to traded commodities include:

- options for consignments—for example, inspection or testing for freedom from pests, prohibition of parts of the host, a pre-entry or post-entry quarantine system, specified conditions on preparation of the consignment, specified treatment of the consignment, restrictions on end-use, distribution and periods of entry of the commodity
- options preventing or reducing infestation in the crop—for example, treatment of the crop, restriction on the composition of a consignment so it is composed of plants belonging to resistant or less susceptible species, harvesting of plants at a certain age or specified time of the year, production in a certification scheme
- options ensuring that the area, place or site of production or crop is free from the pest—for example, pest-free area, pest-free place of production or pest-free production site
- options for other types of pathways—for example, consider natural spread, measures for human travellers and their baggage, cleaning or disinfestations of contaminated machinery
- options within the importing country—for example, surveillance and eradication programs
- prohibition of commodities—if no satisfactory measure can be found.

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The pest categorisation table does not represent a comprehensive list of all the pests associated the entire guava plant, grown in Taiwan. Reference to soil-borne nematodes, soil-borne pathogens, wood-borer pests, root pests or pathogens, and secondary pests has not been made, as they are not directly related to the export pathway of guava fruit and would be addressed by Australia's current approach to contaminating pests.

The steps in the initiation and categorisation processes are considered sequentially, with the assessment terminating at 'Yes' for column 3 (except for pests that are present, but under official control), or at the first 'No' for columns 4, 5, 6 or 7. In the final column of the table (column 8) the acronyms 'EP', 'GP', 'and 'WA' are used. The acronym 'EP' (existing policy) is used for pests that have been assessed by Australia and for which a policy exists. The acronym 'GP' (Group policy) is used for pests that have been assessed by Australia in a Group policy. The acronym for the state or territory for which regional pest status is considered, such as 'WA' (Western Australia), is used to identify organisms that have been recorded in some regions of Australia, and due to interstate quarantine regulations are considered regional quarantine pests.

The *Final group pest risk analysis for thrips and orthotospoviruses on fresh fruit, vegetable, cut-flower and foliage imports* (DAWR 2017a), the *Final group pest risk analysis for mealybugs and the viruses they transmit on fresh fruit, vegetable, cut-flower and foliage imports* (DAWR 2019a), the *Final group pest risk analysis for soft and hard scale insects on fresh fruit, vegetable, cut-flower and foliage imports* (DAWE 2021a) and the *Final report for a review of pest risk assessments for spider mites (Acari: Trombidiformes: Tetranychidae)* (DAFF 2024a) have been applied in this risk analysis. Application of Group policy involves identification of up to 3 species of each relevant group associated with the commodity pathway. However, if any other quarantine pests or regulated articles not included in this risk analysis and/or in the relevant Group policies are detected at pre-export or on-arrival in Australia, the relevant Group policy will also apply.

The department is aware of the changes in fungal nomenclature which ended the separate naming of different states of fungi with a pleomorphic life cycle. However, as the nomenclature for these fungi is in a phase of transition and many priorities of names are still to be resolved, this report uses the generally accepted names and provides alternatively used names as synonyms, where required. The department is also aware of the changes in nomenclature of arthropod species based on the latest morphological and molecular reviews. As official lists of accepted fungus and arthropod names become available, these accepted names will be adopted.

The department is aware of the changes to viral nomenclature which transitioned to a binomial naming convention. This transition is still ongoing at the time of drafting this report and as such the department has decided to include the former species name alongside the binomial names for all listed viruses to avoid confusion.

A detailed description of the method used for a pest risk analysis is provided in Appendix A.

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Appendix B: Initiation and categorisation for pests of guava from Taiwan

Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
ARTHROPODS							
Coleoptera							
<i>Adoretus sinicus</i> Burmeister, 1855 [Scarabaeidae] Chinese rose beetle	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>A. sinicus</i> (Shigeura & Bullock 1983), but the adults feed on the young foliage, consuming only the interveinal tissues (Ebesu 2003; Shigeura & Bullock 1983). The eggs are laid in the soil and after hatching, the soil-dwelling larvae feed on roots of host plants and dead plant tissue (Habeck 1964).	Assessment not required	Assessment not required	Assessment not required	No
<i>Hypomeces pulviger</i> (Herbst, 1795) Synonym: <i>Hypomeces squamosus</i> (Fabricius, 1792) [Curculionidae] Green weevil	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>H. pulviger</i> (Gould & Raga 2002), but the adults feed on the leaf margins of host plants (Hill 2008). Larvae live in the soil and feed on the roots of host plants (Hill 2008).	Assessment not required	Assessment not required	Assessment not required	No
Diptera							
<i>Bactrocera dorsalis</i> (Hendel, 1912) Synonyms: <i>Bactrocera invadens</i> Drew, Tsuruta & White, 2005, <i>B. papayae</i> Drew & Hancock, 1994 and	Yes (BAPHIQ 2009; CABI 2025)	No. Eradicated from mainland Australia (Hancock et al. 2000).	Yes. Guava is a preferred host of <i>B. dorsalis</i> , which has been recorded ovipositing and developing in guava fruit (Chen et al. 2006; Singh & Sharma 2013). The adult female lays eggs beneath the	Yes. Imported guava fruit may be widely distributed within Australia, although the volume of	Yes. <i>Bactrocera dorsalis</i> is a highly polyphagous species with a host range of over 250 cultivated and wild fruit species (CABI 2025; Clarke et al. 2005; Mau	Yes. <i>Bactrocera dorsalis</i> is one of the world’s most destructive fruit fly pests (CABI 2025; Clarke et	Yes (EP)

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>B. philippinensis</i> Drew & Hancock, 1994 have been synonymised with <i>B. dorsalis</i> (Schutze et al. 2014) (Schutze et al. 2015). [Tephritidae] Oriental fruit fly			skin of fruit hosts (Bateman 1972; White & Elson-Harris 1992). After hatching, the larvae feed and develop within the fruit (Christenson & Foote 1960; Mutamiswa et al. 2021).	imported fruit is likely to be modest. If there were viable eggs and larvae in fruit, they could potentially survive fruit storage and transport conditions and develop into adults. Adults are highly likely to find new hosts as they can fly and the species is polyphagous, with a wide range of hosts, including avocado, citrus and mango (CABI 2025). Many hosts are widespread across Australia.	& Martin Kessing 2007). <i>Bactrocera dorsalis</i> is highly invasive, having spread rapidly around the world to 75 countries (Zeng et al. 2018). It is widely distributed across sub-Saharan Africa, Asia, Papua New Guinea and several islands in the Pacific Islands (CABI 2025; Jiang et al. 2014; Vargas, Piñero & Leblanc 2015), which have similar climates to parts of Australia. Climatic conditions favourable for the establishment and spread of the pest are present in some parts of Australia. It has previously established in areas of Australia (North Queensland and Torres Strait islands) before being eradicated. Its wide host range and geographic distribution suggest that <i>B. dorsalis</i> could establish and spread in Australia.	al. 2005; Mau & Martin Kessing 2007; Qin et al. 2018). <i>Bactrocera dorsalis</i> is highly polyphagous and a major pest of many fruit species, including avocado, citrus, and mango (CABI 2025; Follett, Haynes & Dominiak 2021), which are all commercial crops of economic importance in Australia. The larvae cause premature fruit ripening, rot and drop (Allwood & Drew 1997; Radonjić, Hrnčić & Perović 2019). Significant indirect loss also could result from the loss of market access	

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
						opportunities (Dohino et al. 2017; Heather & Hallman 2008). A previous incursion near Cairns in 1995 was estimated to have cost industry \$100 million. The eradication campaign cost \$33.5 million, and took nearly 4 years (Cantrell, Chadwick & Cahill 2002).	

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Bactrocera occipitalis</i> (Bezzi, 1919) [Tephritidae]	Yes (Shao 2020)	No records found	Yes. Guava is a main host of <i>B. occipitalis</i> (Plant Health Australia 2016). <i>Bactrocera occipitalis</i> larvae have been found in guava fruit imported into Japan (Iwaizumi 2004).	Yes. Imported guava fruit may be widely distributed within Australia, although the volume of imported fruit is likely to be modest. If there were viable eggs and larvae in fruit, they could potentially survive fruit storage and transport conditions and develop into adults. Adults are highly likely to find new hosts as they can fly and the species is polyphagous, with a wide range of hosts, including citrus and mango. Some hosts are common in many parts of Australia.	Yes. <i>Bactrocera occipitalis</i> could establish and spread in Australia. <i>Bactrocera occipitalis</i> is a polyphagous fruit pest that has been recorded infesting hosts from four families (Plant Health Australia 2016), although only limited research on host range has been conducted to date. <i>Bactrocera occipitalis</i> is present in some parts of Asia (Drew & Hancock 1994). Whilst restricted in its geographic distribution, it is a destructive specialist with invasive potential (Doorenweerd et al. 2019). It is likely that climatic conditions favourable for the establishment and spread of the pest are present in some parts of Australia.	Yes. <i>Bactrocera occipitalis</i> is a pest of economically important crops including mango, citrus and guava (Plant Health Australia 2016), all of which are commercially grown in Australia. Tephritidae within the <i>B. dorsalis</i> species complex, have been recorded causing significant damage (in some cases complete loss) to fruit production in Asia (Drew & Hancock 1994).	Yes



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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Drosophila suzukii</i> (Matsumura, 1931) [Drosophilidae] Spotted wing drosophila	No. <i>Drosophila suzukii</i> has only been reported as present in Taiwan in one study from 1977 (Lin, Tseng & Lee 1977). This study refers to unreliable records, unsupported by specimens. A 1976 paper, also often cited as a record of <i>D. suzukii</i> in Taiwan, does not actually list a record or cite presence of <i>D. suzukii</i> in Taiwan (Okada 1976). <i>Drosophila suzukii</i> has not been detected in targeted surveys of Drosophilidae, conducted between 2015 and 2019 in Taiwan (APHIA, 2025, pers. comm.). <i>Drosophila suzukii</i> is a declared quarantine pest for Taiwan. The pest is considered absent from Taiwan and the pest records invalid.	Assessment not required	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Zeugodacus cucurbitae</i> (Coquillett, 1899) Synonym: <i>Bactrocera cucurbitae</i> (Coquillett, 1899) [Tephritidae] Melon fly	Yes (CABI 2025)	No records found	Yes. Guava is reported as a minor host of <i>Z. cucurbitae</i> (Gould & Raga 2002). The adult female lays eggs in the fruit, and after hatching the larvae subsequently feed in the fruit (McQuate & Teruya 2015).	Yes. Imported guava may be widely distributed within Australia, although the volume of imported fruit is likely to be modest. If there were viable eggs and larvae in fruit, they could potentially survive fruit storage and transport conditions and develop into adults. Adults are highly likely to find new hosts as they can fly and the species is polyphagous, with a wide range of hosts, including papaya, peach, pear and mango (Dhillon et al. 2005). Many plants are widely distributed and	Yes. <i>Zeugodacus cucurbitae</i> is a highly polyphagous pest that infests many plants including cultivated and wild cucurbitaceous vegetables, beans, eggplant and fruit crops, including papaya, peach, pear and mango (Dhillon et al. 2005). (McQuate & Teruya 2015; White & Elson-Harris 1992). Many hosts are common and widespread in Australia. <i>Zeugodacus cucurbitae</i> is widely distributed throughout India, South East Asia and Central Africa (CABI 2025); Dhillon et al. 2005), which have similar climatic conditions to many parts of Australia. Its wide host range and geographic distribution across a range of climates suggest that <i>Z. cucurbitae</i> could establish and spread in Australia.	Yes. At least 81 plant species are reported as hosts of <i>Z. cucurbitae</i> (Allwood et al. 1999; CABI 2025; Dhillon et al. 2005; FDACS 2017), causing crop losses of up to 100% depending on host species and the season (CABI 2025; Dhillon et al. 2005). <i>Zeugodacus cucurbitae</i> is a major pest of cucurbit crops including melons and pumpkins, as well as beans, which are all commercial crops of economic importance to Australia.	Yes (EP)

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
				common in many parts of Australia.			

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<p><i>Zeugodacus tau</i> (Walker, 1849) Synonym: <i>Bactrocera</i> (<i>Zeugodacus</i>) <i>tau</i> (Walker, 1849) [Tephritidae] Pumpkin fruit fly</p>	Yes (CABI 2025)	No records found	Yes. <i>Zeugodacus tau</i> infests guava fruit, although it is considered to be a minor pest of guava (Gould & Raga 2002). The adult female oviposits eggs into the flesh of the fruit. After hatching <i>Z. tau</i> larvae burrow and feed under the surface of fruit as they develop (Hasyim, Muryati & de Kogel 2008).	Yes. Imported guava fruit may be widely distributed within Australia, although the volume of imported fruit is likely to be modest. If there were viable eggs and larvae in fruit, they could potentially survive fruit storage and transport conditions and develop into adults. Adults are highly likely to transfer to new hosts as they can fly and the species is polyphagous, with a wide range of hosts, including several crop species (predominantly cucurbits, e.g., cucumber, gourd, luffa, pumpkin, squash) (Allwood et al. 1999), that are widespread across Australia.	Yes. <i>Zeugodacus tau</i> has a broad host range and has been reported infesting 62 plant species from more than 20 families including Cucurbitaceae, Fabaceae, Myrtaceae, Rutaceae, Solanaceae and Vitaceae (Allwood et al. 1999; PHA 2018a; Yong et al. 2017). <i>Zeugodacus tau</i> has established and spread from its native range in southeast China throughout tropical and subtropical Asia and the South Pacific region (Shi, Kerdelhué & Ye 2014), which have similar climates to Australia. Its wide host range and geographic distribution suggest that <i>Z. tau</i> could establish and spread in Australia.	Yes. <i>Zeugodacus tau</i> is a polyphagous fruit pest of economic importance in Asia (Yong et al. 2017) and a major economic pest on cucurbitaceous plants, tomatoes and other fleshy fruits (Huang et al. 2020), which are all commercial crops of economic importance to Australia. Fruit loss caused by <i>Z. tau</i> in agricultural crops is estimated to be as high as 40% of production (Hasyim, Muryati & de Kogel 2008; Jaleel, Lu & He 2018).	Yes (EP)
Hemiptera							

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Aleurocanthus spiniferus</i> (Quaintance, 1903) [Aleyrodidae] Spiny whitefly	Yes (Shao 2020)	Yes (APPD 2025). Under official control (regional) for WA (Government of Western Australia 2024). Present in NSW, NT and Qld (APPD 2025).	No. Not known to be associated with guava fruit. Guava is a host of <i>A. spiniferus</i> (EFSA Panel on Plant Health et al. 2018). Nymphs feed on the leaves of host plants (Radonjić, Hrnčić & Malumphy 2014). Eggs are laid on the undersides of leaves (Radonjić, Hrnčić & Malumphy 2014).	Assessment not required	Assessment not required	Assessment not required	No
<i>Aleurocanthus woglumi</i> Ashby, 1915 [Aleyrodidae] Citrus blackfly	Yes (CABI 2025)	No. Recorded from Australian territories of Christmas and Cocos Islands (Bellis et al. 2004).	No. Not known to be associated with guava fruit. Guava is a host of <i>A. woglumi</i> (EFSA Panel on Plant Health et al. 2018). Nymphs feed on the leaves of host plants (Enkerlin 1976). Eggs are laid on the undersides of leaves (Nguyen, Hamon & Fasulo 2010).	Assessment not required	Assessment not required	Assessment not required	No
<i>Aleuroclava guyavae</i> (Takahashi, 1932) Synonym: <i>Aleurotuberculatus guyavae</i> Takahashi, 1932 [Aleyrodidae] Guava black stick mealybug	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>A. guyavae</i> (Evans 2007), but this species feeds on leaves of host plants (Lim & Chong 1990). Eggs are usually laid on the undersides of leaves (Gavrilov-Zimin & Borisov 2020).	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Aleuroclava psidii</i> (Singh, 1931) Synonym: <i>Aleurotuberculatus psidii</i> (Singh, 1931) [Aleyrodidae] Asian guava whitefly	Yes (CABI 2025)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>A. psidii</i> (CABI 2025). The adults and nymphs occur on the leaves of host plants (Guastella et al. 2014). <i>Aleuroclava psidii</i> has been intercepted on guava leaves (used for packing of fruit) imported into the UK (Malumphy & Eyre 2011).	Assessment not required	Assessment not required	Assessment not required	No
<i>Aleurodicus dispersus</i> Russell, 1965 [Aleyrodidae] Spiralling whitefly	Yes (Shao 2020)	Yes (APPD 2025). Under official control (Regional) for WA (Government of Western Australia 2024) and Tas. (DNRE Tasmania 2024). Present in NT and Qld (APPD 2025; DPIR 2018; Lambkin 1999).	No. Not known to be associated with guava fruit. Guava is a host of <i>A. dispersus</i> (Lambkin 1999). Nymphs and adults feed on the leaves of host plants (UH-CTAHR Department of Entomology & Hawaii Department of Agriculture 2024). Eggs are laid onto the leaves of host plants (UH-CTAHR Department of Entomology & Hawaii Department of Agriculture 2024).	Assessment not required	Assessment not required	Assessment not required	No
<i>Aleurodicus pulvinatus</i> (Maskell, 1896) [Aleyrodidae] Coconut whitefly	Yes (CABI 2025)	No records found	No. Not known to be associated with guava fruit. Although guava is a host of <i>A. pulvinatus</i> (Lopez et al. 2005), this species infests guava leaves, with eggs, larvae, pupae and adults all found on the leaf surface (Lopez et al. 2005).	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Aleurodicus rugioperculatus</i> Martin, 2004 [Aleyrodidae] Rugose spiralling whitefly	Yes (Devi, Emmanuel & Sekhar 2023)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>A. rugioperculatus</i> (Devi, Emmanuel & Sekhar 2023). It typically oviposits and feeds on the underside of the leaves of host plants but may infest the upper leaf surface when population levels are high (Chakravarthy et al. 2017; Devi, Emmanuel & Sekhar 2023; Rao et al. 2018).	Assessment not required	Assessment not required	Assessment not required	No
<i>Aleurolobus rhododendri</i> Takahashi, 1934 [Aleyrodidae] Rhododendron whitefly	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is reported as a host (Evans 2007), but no information indicating an association with fruit has been identified. The pupae occur on the undersides of the leaves of host plants (Dubey & Ko 2009).	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Aleurolobus setigerus</i> Quaintance & Baker, 1917 [Aleyrodidae]	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is reported as a host (Tao 1979), but no information indicating an association with fruit has been identified. There is limited information on <i>A. setigerus</i> , however other <i>Aleurolobus</i> species infest the leaves of host plants (Dubey & Ko 2009).	Assessment not required	Assessment not required	Assessment not required	No
<i>Aleurothrixus floccosus</i> (Maskell, 1896) [Aleyrodidae] Woolly whitefly	Yes (CABI 2025)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>A. floccosus</i> (Evans 2007). The eggs are laid on the underside of leaves (Kerns, Wright & Loghry 2004). Nymphs feed on the leaves of host plants as they develop through different instars (Kerns, Wright & Loghry 2004).	Assessment not required	Assessment not required	Assessment not required	No
<i>Aphis aurantii</i> (Boyer de Fonscolombe 1841) Synonym: <i>Toxoptera aurantii</i> (Boyer de Fonscolombe, 1841) [Aphididae] Black citrus aphid	Yes (Shao 2020)	Yes (APPD 2025; ALA 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No



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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Aphis craccivora</i> Koch, 1854 [Aphididae] Cowpea aphid	Yes (Shao 2020)	Yes (APPD 2025; ALA 2025). <i>Aphis craccivora</i> is a potential regulated article for Australia due to its vectoring of viruses of quarantine concern, and therefore requires further assessment.	No. Unlikely to be imported on guava fruit. Guava is reported as a host of <i>A. craccivora</i> (Blackman & Eastop 2023), but information on the association with guava fruit is lacking. On other hosts it prefers to feed on stems (Nalam et al. 2021), young leaves, shoots, flowers and immature seed pods (CABI 2025). They are unlikely to feed on mature fruit.	Assessment not required	Assessment not required	Assessment not required	No
<i>Aphis gossypii</i> Glover, 1877 [Aphididae] Cotton aphid	Yes (CABI 2025)	Yes (CABI 2025). <i>Aphis gossypii</i> is a potential regulated article for Australia due to its vectoring of viruses of quarantine concern, and therefore requires further assessment.	No. Not known to be associated with guava fruit. Guava is a host of <i>A. gossypii</i> (CABI 2025). On guava plants, the nymphs and adults often live in groups on new buds, young leaves and leaf undersides where they feed on sap (Lin et al. 2005). They are unlikely to feed on mature fruit.	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Bemisia tabaci</i> species complex (Gennadius, 1889) [Aleyrodidae] Tobacco whitefly	Yes (CABI 2025; EPPO 2025)	Yes. However, only 3 members of the species complex (AUS1, AUS II and MEAM 1) are known to be present in Australia, while most species in the complex remain absent from Australia. The <i>B. tabaci</i> species complex is a known vector of begomoviruses, several of which are quarantine pests of concern for Australia (Fiallo-Olivé et al. 2020). Therefore, the <i>B. tabaci</i> species complex, including those known to be present in Australia, are assessed further as regulated articles for Australia.	No. Unlikely to be imported on guava fruit. Guava is reported as a host (Li et al. 2011). Eggs and the larval stages of <i>B. tabaci</i> are found on the underside of leaves of host plants (CABI 2025; Li et al. 2011). <i>Bemisia tabaci</i> adults and nymphs feed on the phloem tissue in leaves and stems of hosts (McAuslane 2000) and are unlikely to feed on the fruit. Adult whiteflies are very active and if they settle on the fruit, they are unlikely to remain there when disturbed during harvesting and packing house practices.	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Chrysomphalus dictyospermi</i> (Morgan, 1889) [Diaspididae] Dictyospermum scale	Yes (García Morales et al. 2024)	Yes (APPD 2025; ALA 2025). Under official control (Regional) for WA (Government of Western Australia 2024). Present in NSW, NT, Qld (APPD 2025), SA (ALA 2025).	No. Unlikely to be imported on guava fruit. Guava is a host of <i>C. dictyospermi</i> (García Morales et al. 2024; Williams & Watson 1988), which mainly attacks the leaves (Hall 1925). On other hosts it can sometimes be found on branches and fruit (Danzig & Pellizzari 1998; Miller & Davidson 2005). However, no reports indicating infestation of guava fruit have been identified. It has only been found attacking leaves of guava in Taiwan (APHIA, 2024 pers. comm.)	Assessment not required	Assessment not required	Assessment not required	No
<i>Coccus longulus</i> (Douglas, 1887) [Coccidae] Long brown scale	Yes (Shao 2020)	Yes (ABRS 2024; García Morales et al. 2024; Government of Western Australia 2024)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Drepanococcus chiton</i> (Green, 1909) Synonym: <i>Ceroplastodes chiton</i> (Green, 1909). [Coccidae] Longan soft scale	Yes (García Morales et al. 2024)	No record found	No. Not known to be associated with guava fruit. Guava is reported as a host, but infestation is confined to the lower surface of the leaves and shoots (Mani 2016).	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Dialeurodes citri</i> (Ashmead, 1885) [Aleyrodidae] Citrus whitefly	Yes (EPPO 2025; Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>D. citri</i> (Singh, Reddy & Deka 2020). The eggs are laid on the underside of leaves (Bellows & Meisenbacher 2007; CABI 2025) and the larvae feed on leaves (Bellows & Meisenbacher 2007; CABI 2025). Adult whiteflies are very active and if they settle on the fruit, they are unlikely to remain there when disturbed during harvesting and packing house practices.	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Erthesina fullo</i> (Thunberg, 1783) [Pentatomidae] Yellow spotted stink bug	Yes (CABI 2025; EPPO 2025)	No records found	No. Unlikely to be present on imported guava fruit. <i>Erthesina fullo</i> feeds on young shoots, leaves, flowers and fruit of host plants, including guava (Mi et al. 2020). Feeding on fruit causes the skin to become, dry, corky and distorted (Mi et al. 2020). Eggs are laid on leaves, calyces or the base of fruit in conspicuous clusters (Mi et al. 2020). Feeding damage on the fruit and egg masses are visible, therefore infested fruit are likely to be removed during packing house practices. Both adults and nymphs are conspicuous, highly mobile and easily disturbed (Mi et al. 2020) and are unlikely to remain on fruit at harvest or during packing house practices.	Assessment not required	Assessment not required	Assessment not required	No
<i>Eucalymnatus tessellatus</i> (Signoret, 1873) [Coccidae] Tessellated scale	Yes (Shao 2020)	Yes (APPD 2025). Under official control (Regional) for WA (Government of Western Australia 2024). Present in NT, NSW, Qld (APPD 2025).	No. Not known to be associated with guava fruit. Although guava is a host of <i>E. tessellatus</i> , this species only infests the leaves and stems of host plants (Hamon & Williams 1984; Kosztarab 1997).	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Greenidea ficicola</i> Takahashi, 1921 [Aphididae] Hairy-tailed fig aphid	Yes (CABI 2025; EPPO 2025)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Greenidea psidii</i> Van der Groot, 1917 Synonym: <i>Greenidea formosana</i> [Aphididae] Hairy-tailed guava aphid	Yes (Shao 2020)	No. A report suggesting presence in Australia (Halbert 2004) has not been verified (Brumley 2020).	No. Not known to be associated with guava fruit. This species is found on young shoots and the undersides of leaves of guava (Blackman & Eastop 1994).	Assessment not required	Assessment not required	Assessment not required	No
<i>Hemiberlesia cyanophylli</i> (Signoret, 1869) Synonym: <i>Abgrallaspis cyanophylli</i> (Signoret, 1869) [Diaspididae] Cyanophyllum scale	Yes (García Morales et al. 2024)	Yes (APPD 2025). Under official control (Regional) for WA (Government of Western Australia 2024). Present in NT (APPD 2025), NSW, Qld (ABRS 2024).	No. Unlikely to be present on imported guava fruit. Guava is a host of <i>H. cyanophylli</i> (Williams & Watson 1988). Larvae are typically present on the underside of leaves, but on some hosts, it can sometimes be found on the stems and fruit (Miller & Davidson 2005). However, no reports indicating infestation of guava fruit have been identified.	Assessment not required	Assessment not required	Assessment not required	No
<i>Leptocorisa acuta</i> (Thunberg, 1783) [Alydidae] Rice seed bug	Yes (EPPO 2025)	Yes (APPD 2025; Government of Western Australia 2024)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Morganella longispina</i> (Morgan, 1889) [Diaspididae] Maskell scale	Yes (García Morales et al. 2024)	Yes (APPD 2025). Under official control (Regional) for WA (Government of Western Australia 2024). Present in Qld (García Morales et al. 2024).	No. Unlikely to be present on imported guava fruit. Guava is a host of <i>M. longispina</i> (García Morales et al. 2024; Williams & Watson 1988). It infests the bark, branches and twigs, and occasionally the fruit of some hosts (Watson 2024). However, no reports indicating infestation of guava fruit have been identified.	Assessment not required	Assessment not required	Assessment not required	No
<i>Myzus persicae</i> (Sulzer, 1775) [Aphididae] Green peach aphid	Yes (CABI 2025; EPPO 2025)	Yes (APPD 2025; Martyn & Miller 1963). <i>Myzus persicae</i> is a potential regulated article for Australia due to its vectoring of viruses of quarantine concern, and therefore requires further assessment.	No. Not known to be associated with guava fruit. Although guava is a host of <i>M. persicae</i> , it feeds on the leaves, inflorescences, growing points and stems of host plants (CABI 2025).	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Parabemisia myricae</i> (Kuwana, 1927) [Aleyrodidae] Bayberry whitefly	Yes (CABI 2025; EPPO 2025)	Yes (APPD 2025). Under official control (Regional) for WA (Government of Western Australia 2024). Present in Qld (APPD 2025).	No. Unlikely to be present on imported guava fruit. Guava is a host of <i>P. myricae</i> (CABI 2025). The pest selectively utilizes new foliage for oviposition and feeding. Nymphal survival is extremely low on mature leaves (Walker & Aitken 1985). The mobile crawler stage of the first instar usually migrates to the underside of the leaf to feed, but some remain on the upper leaf surface (Rose, DeBach & Woolley 1981). At high population densities, oviposition has been reported on young citrus fruit and on young shoots (Uygun, Ohnesorge & Ulusoy 1990). However, no reports indicating infestation of guava fruit have been identified.	Assessment not required	Assessment not required	Assessment not required	No
<i>Paraleyrodes bondari</i> Peracchi, 1971 [Aleyrodidae] Bondar's nesting whitefly	Yes (CABI 2025)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>P. bondari</i> . The adults and nymphs infest leaves, forming a waxy nest where they feed within, and females oviposit eggs (Stocks 2012; Vidya et al. 2019).	Assessment not required	Assessment not required	Assessment not required	No



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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Planococcus lilacinus</i> (Cockerell, 1905) [Pseudococcidae] Coffee mealybug	Yes (Shao 2020)	Yes, but restricted to the regulated quarantine zone in the northern part of Cape York Peninsula and Torres Strait. Under official control (National). Movement restrictions are in place to prevent the spread of this species (Business Queensland 2024).	Yes. <i>Planococcus lilacinus</i> is a pest of guava, feeding on the fruit and leaves (CABI 2025; Gould & Raga 2002). <i>Planococcus lilacinus</i> is small, (1-3 mm long) (Business Queensland 2024) and it is possible that <i>P. lilacinus</i> on guava fruit may remain undetected and be present on the pathway.	Yes. Imported guava fruit may be widely distributed within Australia. If mealybugs are present on guava fruit they could potentially disperse to a new host in close proximity as crawlers and early nymphal stages have the ability to crawl or be passively transferred to a host plant with the assistance of wind (DAWR 2019a). <i>Planococcus lilacinus</i> is highly polyphagous (Mani & Shivaraju 2016), with many suitable hosts present in Australia.	Yes. Assessed in the mealybugs Group PRA (DAWR 2019a)	Yes. Assessed in the mealybugs Group PRA (DAWR 2019a)	Yes (GP)

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
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<i>Planococcus minor</i> (Maskell, 1897) [Pseudococcidae] Pacific mealybug; passionvine mealybug	Yes (BAPHIQ 2009)	Yes (APPD 2025). Under official control (Regional) for WA (Government of Western Australia 2024). Present in ACT, Qld, NT, NSW, Vic. and SA (ABRS 2024; APPD 2025; CSIRO 2024).	Yes. <i>Planococcus minor</i> is a pest of guava, feeding on the fruit, flowers and leaves (Gould & Raga 2002; Roda et al. 2013; Wen & Wu 2011). The species feeds on host plants by sucking phloem sap from the plant tissue (Roda et al. 2013). <i>Planococcus minor</i> is small (1-3 mm long) (Roda et al. 2013) and it is possible that <i>P. minor</i> on guava fruit may remain undetected and be present on the pathway.	Yes. Imported guava fruit may be widely distributed within Australia. If mealybugs are present on guava fruit they could potentially disperse to a new host in close proximity as crawlers and early nymphal stages have the ability to crawl or be passively transferred to a host plant with the assistance of wind (DAWR 2019a). . <i>Planococcus minor</i> is highly polyphagous (Mani & Shivaraju 2016), with many suitable hosts present in Australia.	Yes. Assessed in the mealybugs Group PRA (DAWR 2019a)	Yes. Assessed in the mealybugs Group PRA (DAWR 2019a)	Yes (GP, WA)

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Pseudococcus jackbeardsleyi</i> Gimpel & Miller 1996 [Pseudococcidae] Jack Beardsley mealybug	Yes (García Morales et al. 2024; Shao 2020)	Yes, but restricted to the regulated quarantine zone in the northern part of Cape York Peninsula and Torres Strait. Under official control (National). Movement restrictions are in place to prevent the spread of this species (QDAF 2023).	Yes. Guava is a host of <i>P. jackbeardsleyi</i> (Gimpel & Miller 1996). It has been reported infesting the fruit, leaves and stems of host plants (CABI 2025; Gimpel & Miller 1996). <i>Pseudococcus jackbeardsleyi</i> is small, (1-3 mm long) (Business Queensland 2024) and it is possible that <i>P. jackbeardsleyi</i> on guava fruit may remain undetected and be present on the pathway.	Yes. Imported guava fruit may be widely distributed within Australia. If mealybugs are present on guava fruit they could potentially disperse to a new host in close proximity as crawlers and early nymphal stages have the ability to crawl or be passively transferred to a host plant with the assistance of wind (DAWR 2019a). . <i>Pseudococcus jackbeardsleyi</i> is highly polyphagous (Mani & Shivaraju 2016), with many suitable hosts present in Australia.	Yes. Assessed in the mealybugs Group PRA (DAWR 2019a)	Yes. Assessed in the mealybugs Group PRA (DAWR 2019a)	Yes (GP)

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
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<i>Russellaspis pustulans</i> <i>pustulans</i> (Cockerell, 1892) [Asterolecaniidae] Oleander pit scale	Yes (Shao 2020)	No records found	No. Unlikely to be present on imported guava fruit. Guava is recorded as a host for <i>R. pustulans pustulans</i> (García Morales et al. 2024). This species prefers to feed on branches and stems, but can infest leaves and fruit of some hosts (Moursi et al. 2007). However, no reports indicating infestation of guava fruit have been identified.	Assessment not required	Assessment not required	Assessment not required	No
<i>Sophonia orientalis</i> (Matsumura, 1912) [Cicadellidae] Two spotted leafhopper	Yes (CABI 2025)	No records found	No. Not known to be associated with guava fruit. <i>Sophonia orientalis</i> feeds and oviposits on the leaves of guava and other hosts (Aguin-Pombo, Aguiar & Kuznetsova 2007; Jones et al. 1998).	Assessment not required	Assessment not required	Assessment not required	No
<i>Trialeurodes vaporariorum</i> (Westwood, 1856) [Aleyrodidae] Greenhouse whitefly	Yes (CABI 2025; Shao 2020)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<b>Lepidoptera</b>							
<i>Achaea janata</i> (Linnaeus, 1758) [Erebidae] Castor oil looper	Yes (Shao 2020)	Yes (ALA 2025; APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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<i>Adoxophyes privatana</i> (Walker, 1863) [Tortricidae] Apple leaf-curling moth	Yes (Shao 2020)	No records found	No. Unlikely to be present on imported guava fruit. Guava is a host for <i>A. privatana</i> (Pathania et al. 2020). On host plants, the larvae web several leaves, or leaves and fruit, together, to form a nest in which to feed and pupate (Meijerman & Ulenberg 2024; Vang et al. 2013). However, the larvae are very active and abandon their feeding site when disturbed (Meijerman & Ulenberg 2024). Webbing on the fruit is conspicuous, and any infested fruit would likely be detected and removed during harvest and packing house practices.	Assessment not required	Assessment not required	Assessment not required	No
<i>Aloa lactinea</i> (Cramer, 1777) Synonym: <i>Amsacta lactinea</i> (Cramer, 1777) [Erebidae] Red tiger moth	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is a host for <i>A. lactinea</i> (Waterhouse 1993). The larvae only feed on the leaves (Meena et al. 2014; Waterhouse 1993), and the eggs are laid indiscriminately on the leaves (Mehra & Sah 1977).	Assessment not required	Assessment not required	Assessment not required	No
<i>Asota caricae</i> (Fabricius, 1775) [Erebidae] Tropical tiger moth	Yes (Shao 2020)	Yes (APPD 2025; CSIRO 2018)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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<i>Attacus atlas</i> (Linnaeus, 1758) [Saturniidae] Atlas moth	Yes (CABI 2025; EPPO 2025)	No records found	No. Not known to be associated with guava fruit. Guava is a host for <i>A. atlas</i> (Waterhouse 1993). The larvae feed on mature leaves of host plants. Eggs are laid on the underside of the leaves (CABI 2025).	Assessment not required	Assessment not required	Assessment not required	No
<i>Cadra cautella</i> (Walker, 1863) [Pyralidae] Dried currant moth	Yes (CABI 2025; Saturniidae-web-team 2012)	Yes (APPD 2025; Herbison-Evans & Crossley 2024)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Conogethes punctiferalis</i> (Guenée, 1854) [Crambidae] Yellow peach moth	Yes (CABI 2025)	Yes (APPD 2025; Herbison-Evans & Crossley 2024)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Dudua aprobola</i> (Meyrick, 1886) [Tortricidae] Mango flower webworm	Yes (Shao 2020)	Yes (APPD 2025; Herbison-Evans & Crossley 2024)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Euchrysops cnejus</i> Fabricius, 1798 [Lycaenidae] Gram blue	Yes (Shao 2020)	Yes (ABRS 2024)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Eudocima phalonia</i> (Linnaeus, 1763) Synonym: <i>Eudocima fullonia</i> (Clerck, 1764) [Erebidae] Fruit-piercing moth	Yes (Shao 2020)	Yes (APPD 2025; CSIRO 2018; Herbison-Evans & Crossley 2024)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Eumeta minuscula</i> Butler, 1881 Synonym: <i>Clania minuscula</i> Butler, 1881 [Psychidae] Tea bagworm	Yes (Shao 2020)	No records found	No. Unlikely to be present on imported guava fruit. Guava is a host for <i>E. minuscula</i> . It is typically associated with the leaves (Gould & Raga 2002), although feeding on fruit skin is reported in citrus (Kim, Kwon & Kim 2000). Larvae are highly conspicuous because, soon after hatching, they construct a bag of silk, twigs and leaves in which to shelter (Nishida 1983). Any infested fruit would be conspicuous and are likely to be removed during harvest and packing house practices.	Assessment not required	Assessment not required	Assessment not required	No
<i>Eumeta variegata</i> (Snellen, 1879) Synonyms: <i>Clania variegata</i> (Snellen, 1879; <i>Cryptothelea variegata</i> (Snellen, 1879) [Psychidae] Coffee bagworm	Yes (Shao 2020)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Euproctis taiwana</i> Shiraki 1913 [Erebidae] Tussock moth	Yes (Shao 2020)	No records found	No. Unlikely to be imported on guava fruit. Guava is a host of <i>E. taiwana</i> (Wen & Wu 2011). The larvae initially feed on leaves, but third instar larvae disperse to also feed on flowers and young fruit (Wen & Wu 2011). Feeding damage on the fruit is conspicuous (Wen & Wu 2011) and infested fruit would likely be detected and removed during packing house practices.	Assessment not required	Assessment not required	Assessment not required	No
<i>Helicoverpa armigera</i> (Hübner, 1808) [Erebidae] Cotton bollworm	Yes (Shao 2020)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Homona coffearia</i> (Nietner, 1861) Synonym: <i>Homona menciara</i> (Walker, 1863) [Tortricidae] Tea tortrix	Yes (CABI 2025; Wen & Wu 2011)	No. An Australian population previously synonymised with <i>Homona coffearia</i> is now recognised as a separate species, <i>Homona spargotis</i> (Whittle et al. 1987).	No. Not known to be associated with guava fruit. Guava is a host of <i>H. coffearia</i> (CABI 2025). Larvae feed on leaves. Leaves are webbed together in larval nests, which eventually become blackened masses of leaf fragments, silken threads and frass (CABI 2025).	Assessment not required	Assessment not required	Assessment not required	No



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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Hyposidra infixaria</i> (Walker, 1860) [Geometridae]	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>H. infixaria</i> (Holloway 1993). Eggs are laid on the trunks, and larvae feed on the leaves of host plants (Antony 2013; Robinson et al. 2001).	Assessment not required	Assessment not required	Assessment not required	No
<i>Hyposidra talaca</i> (Walker, 1860) [Geometridae] Black looper	Yes (Shao 2020)	Yes (ALA 2025). Under official control (Regional) for WA (Government of Western Australia 2024). Present in NSW, Qld (ALA 2025; Herbison-Evans & Crossley 2024).	No. Not known to be associated with guava fruit. <i>Hyposidra talaca</i> eggs are laid under scales, cracks and crevices of the bark of host trees (Roy et al. 2017). Larvae feed on leaves and occasionally the stems of host plants, and burrow into the soil to pupate (Roy et al. 2017).	Assessment not required	Assessment not required	Assessment not required	No
<i>Lymantria monacha</i> (Linnaeus, 1758) [Erebidae] Nun moth	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is a host for <i>L. monacha</i> (Gould & Raga 2002). Egg masses are laid in bark crevices and larvae feed on the leaves of host plants (Keena 2003).	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Lymantria xyliana</i> Swinhoe, 1903 [Erebidae] Casuarina tussock moth	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is a host for <i>L. xyliana</i> (Chao et al. 1996). Egg masses are laid on the branches and stems and larvae feed on the leaves of host plants (USDA 2014).	Assessment not required	Assessment not required	Assessment not required	No
<i>Oraesia emarginata</i> (Fabricius, 1794) [Erebidae] Fruit piercing moth	Yes (Shao 2020)	Yes (APPD 2025). Under official control (Regional) for WA (Government of Western Australia 2024). Present in Qld (APPD 2025; CSIRO 2018).	No. Unlikely to be present on imported guava fruit. Guava is a host of <i>O. emarginata</i> (Zhang 1994). The larvae and adults are inactive during the day, hiding amongst foliage or leaf litter. At night, larvae feed on leaves and adults feed on fruit, preferably overripe or fermenting fruit (Common 1990; Hattori 1969).	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Orgyia postica</i> (Walker, 1855) Synonyms: <i>Orgyia australis postica</i> (Walker, 1855; <i>Notolophus australis posticus</i> (Walker, 1855) [Erebidae] Cocoa tussock moth	Yes (BAPHIQ 2009)	No records found. A closely related species, <i>O. australis</i> , is present in eastern and northern Australia (ALA 2025). Some authors consider <i>O. postica</i> to be a subspecies of <i>O. australis</i> , so the relationship requires further investigation (CABI 2025).	No. Unlikely to be present on imported guava fruit. Guava is a host of <i>O. postica</i> (Robinson et al. 2023). The larvae feed on leaves of host plants (Sanchez & Laigo 1968), although damage to mango fruit has also been reported (Fasih et al. 1989). Infestation of guava fruit has not been reported. The larvae are very hairy and colourful (CAAS 1992; PHA 2015), so if larvae were present, they are likely to be readily detected and affected fruit removed during packing house practices.	Assessment not required	Assessment not required	Assessment not required	No
<i>Pingasa ruginaria</i> Guenée, 1857 [Geometridae]	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>P. ruginaria</i> (Robinson et al. 2023). The larvae feed on the flowers and young leaves of host plants (Kuroko & Lewvanich 1993).	Assessment not required	Assessment not required	Assessment not required	No
<i>Polyphagozerra coffeae</i> Nietner, 1861 Synonym: <i>Zeuzera coffeae</i> Nietner, 1861 [Cossidae] Coffee borer	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>P. coffeae</i> (Tavares et al. 2020). Eggs are laid in crevices of the bark and larvae bore into the stem and branches of host plants to feed and develop (Mannakkara 2006; Tavares et al. 2020).	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Setomorpha rutella</i> Zeller, 1852 Synonym: <i>Setomorpha calcularis</i> Meyrick, 1906 [Tineidae] Tropical tobacco moth	Yes (Shao 2020)	Yes (CSIRO 2018)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Somena scintillans</i> Walker 1856 Synonym: <i>Euproctis scintillans</i> (Walker, 1856) [Erebidae] Hairy tussock caterpillar	Yes (Shao 2020)	No records found	No. Unlikely to be imported on guava fruit. <i>Somena scintillans</i> larvae have been reported feeding on guava fruit (Suroshe et al. 2016). The larvae are large (8–28mm) (Gupta, Tara & Pathania 2013), and if present on the fruit surface they will be highly visible and likely removed during packing house practices.	Assessment not required	Assessment not required	Assessment not required	No
<i>Spodoptera litura</i> (Fabricius, 1775) [Noctuidae] Common cutworm	Yes (Shao 2020)	Yes (ABRS 2024; APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Strepsicrates rhothia</i> (Meyrick, 1910) [Tortricidae] Guava leaf roller	Yes (Shao 2020)	No records found	No. Not known to be associated with guava fruit. Guava is a host of <i>S. rhothia</i> (Ahmad 1972). The larvae feed on the leaves, leaf buds and flower buds of host plants (Ahmad 1972; Butani 1993).	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Trabala vishnou</i> (Lefebvre, 1827) [Lasiocampidae] Rose-myrtle lappet moth	Yes (Shao 2020)	No records found	No. Unlikely to be present on imported guava fruit. Guava is a host of <i>T. vishnou</i> (Kumar et al. 2013). The larvae feed on the leaves of hosts, and pupation occurs inside a cocoon, usually attached to a leaf petiole. The eggs are laid in conspicuous masses on leaves but have also been reported in the calyx of pomegranate fruit (Kumar et al. 2013). The eggs hatch in 8 to 10 days (Kumar et al. 2013), so in the unlikely event eggs were laid on fruitlets prior to bagging, they would have hatched long before harvest, and any larvae or symptoms of infestation would be evident and infested fruit would be removed during packing house practices.	Assessment not required	Assessment not required	Assessment not required	No
<i>Xanthodes transversa</i> (Guenée, 1852) [Nolidae]	Yes (Shao 2020)	Yes (ALA 2025; APPD 2025; Common 1990; CSIRO 2018; Herbison-Evans & Crossley 2024)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<b>Thysanoptera</b>							

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Rhipiphorothrips cruentatus</i> Hood, 1919 [Thripidae] Grapevine thrips	Yes (BAPHIQ 2009)	No records found	Yes. <i>Rhipiphorothrips cruentatus</i> has been recorded infesting guava fruit, damaging and scarring the fruit (Demissie, Dahiya & Ombir 2001).	Yes. Imported guava fruit may be widely distributed within Australia, although the volume of imported fruit is likely to be modest. Thrips present on imported guava fruit could potentially disperse to a new host within close proximity. <i>Rhipiphorothrips cruentatus</i> is a polyphagous pest (CABI 2025), with many hosts present in Australia.	Yes. <i>Rhipiphorothrips cruentatus</i> is a polyphagous species attacking commercial plant species including cashew, sugar apple, mango, pomegranate and guava (CABI 2025; Dahiya & Lakra 2001), some of which are cultivated in Australia. <i>Rhipiphorothrips cruentatus</i> is found in Afghanistan, Bangladesh, China, India, Myanmar, Pakistan, Sri Lanka, Taiwan and Thailand (CABI 2025), with climates similar to various parts of Australia. Its wide host range and geographic distribution suggest that <i>R. cruentatus</i> could establish and spread in Australia	Yes. <i>Rhipiphorothrips cruentatus</i> is a serious pest of grapevine in India, sucking sap from the lower surface of the leaves and causing russetting and scarring of grapes (Batra et al. 1980; CABI 2025). This has caused losses in India, and Australia's wine, table and dried grape industries would be vulnerable to considerable economic losses should <i>R. cruentatus</i> become established in Australia.	Yes (GP)

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<i>Scirtothrips dorsalis</i> Hood, 1919 [Thripidae] Chilli thrips	Yes (CABI 2025; EPPO 2025; Shao 2020) Shao 2020; Kumar 2013).	Yes (Government of Western Australia 2024; Mound, Tree & Paris 2024). <i>Scirtothrips dorsalis</i> is a vector of <i>Orthotospovirus arachiflavi</i> , which is present in Taiwan (Chen & Chiu 1996). However, guava is not a host for the virus. Any <i>S. dorsalis</i> present on guava fruit are unlikely to have acquired the virus from a guava orchard, and viruliferous adult thrips cannot pass the virus to their offspring. As guava are not produced in mixed cropping with <i>O. arachiflavi</i> hosts, it is unlikely that viruliferous thrips could transfer from an infected host to commercially produced guava for export. Therefore, this thrips species does not need to be	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
		considered as a regulated article.					
<b>Trombidiformes</b>							
<i>Brevipalpus californicus</i> (Banks, 1904) [Tenuipalpidae] Citrus flat mite	Yes (Shao 2020)	Yes (ALA 2025; APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No



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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Brevipalpus phoenicis</i> species complex (Geijskes, 1939) [Tenuipalpidae] Red and black flat mite	Yes (CABI 2025; Lo & Hsia 1968). There are at least 8 species in the complex (Beard et al. 2015), but it is unknown which of these species are present in Taiwan.	Yes, but only 2 species ( <i>B. papayensis</i> and <i>B. yothersi</i> ) are considered present (Beard et al. 2015).	No. Unlikely to be present on imported guava fruit. Guava is a host (Jeppson, Keifer & Baker 1975). APHIA reports that <i>Brevipalpus phoenicis sensu lato</i> rarely occurs in commercial guava production in Taiwan, and when it is found, it is infesting leaves (APHIA, 2024 pers. comms.). <i>Brevipalpus phoenicis</i> prefers the lower surface of leaves, but reports from other countries indicate guava fruit can be infested just after fruit set (Devi, Challa & Mahesh 2019; El-Halawany & El-Sayed 2013; Rivero et al. 2010). Feeding results in conspicuous discolouration and deformation of the fruit as it matures (Devi, Challa & Mahesh 2019; El-Halawany & El-Sayed 2013), which would render it unsuitable for export. Therefore, affected fruit would likely be removed during harvest and packing house practices.	Assessment not required	Assessment not required	Assessment not required	No
<i>Eutetranychus orientalis</i> (Klein, 1936) [Tetranychidae] Citrus brown mite	Yes (CABI 2025; EPPO 2025)	Yes (ABRS 2024; APPD 2025; CABI 2025; Citrus Australia 2022)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Oligonychus biharens</i> (Hirst, 1924) [Tetranychidae] Cassava red mite	Yes (Shao 2020)	Yes. Under official control (Regional) for WA (Government of Western Australia 2024). Present in Qld (Halliday 2000).	No. Not known to be associated with guava fruit. Although guava is a host of <i>O. biharens</i> (Bolland, Gutierrez & Flechtmann 1998), it feeds on the leaves of host plants. It is commonly found on the lower side of the leaf, feeding in the interveinal area (Lim & Chong 1990). It rarely moves from the shelter of webs spun on the leaves (Vacante 2016). Oviposition occurs close to leaf midveins under webbing (Kaimal 2016).	Assessment not required	Assessment not required	Assessment not required	No
<i>Oligonychus coffeae</i> (Neitner, 1861) [Tetranychidae] Tea red spider mite	Yes (EPPO 2025)	Yes (APPD 2025; Government of Western Australia 2024)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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<i>Oligonychus litchii</i> Lo & Ho, 1989 [Tetranychidae] Litchi spider mite	Yes (Shao 2020)	No records found	No. Unlikely to be present on imported guava fruit. Guava is a host of <i>O. litchii</i> (Bolland, Gutierrez & Flechtmann 1998), however this pest is predominantly associated with the leaves (Lin et al. 2005; Wen & Wu 2011). The mites feed along the central vein of the leaf, but can gradually spread over the entire leaf surface as the population increases (Lin et al. 2005) (Chen, Li & Chang 2016). A single reference cites association of this mite with immature guava fruit, in which eggs are laid on young fruit (Yeh, Chang & Liao 2008). Once hatched, the juveniles reportedly hide in the depressions associated with the stem or the flower (Yeh, Chang & Liao 2008). More recent literature, however, refers only to <i>O. litchii</i> being a pest on leaves (Chen, Li & Chang 2016; Quan, Xu & Chen 2019; Xu et al. 2017; Yao et al. 2019). In the event that guava fruit does become infested by <i>O. litchii</i> , the infestation would be evident due to the dark body colour of the mite, as well as the presence of excrement and webbing. In addition, Yeh (2008) reports that when feeding on the fruit, <i>O. litchii</i> causes water-soaked spots to appear on the	Assessment not required	Assessment not required	Assessment not required	No
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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
			skin which can turn brown and, in severe cases, coalesce to form dark patches. Infested fruit would likely be removed during harvest and packing house practices.				
<i>Oligonychus mangiferus</i> (Rahan & Sapra, 1940) [Tetranychidae] Mango spider mite	Yes (Shao 2020)	Yes (APPD 2025; Government of Western Australia 2024)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Phyllocoptruta sp.</i> [Eriophyidae] Rust mite	Yes (Yeh, Chang & Liao 2008)	Uncertain, as species not identified	No. Unlikely to be present on imported guava fruit. There is a single report of <i>Phyllocoptruta sp.</i> mites on guava in Taiwan, feeding on young fruit, leaves and twigs (Yeh, Chang & Liao 2008). No further information has been identified to indicate this mite is a pest of any significance in commercial guava production.		Assessment not required	Assessment not required	No
<i>Polyphagotarsonemus latus</i> (Banks, 1904) [Tarsonemidae] Broad mite	Yes (Shao 2020)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Tetranychus neocaledonicus</i> (André, 1933) [Tetranychidae] Vegetable spider mite	Yes (Migeon & Dorkeld 2024)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Tetranychus truncatus</i> Ehara, 1956 [Tetranychidae] Okra mite	Yes (Migeon & Dorkeld 2024; Shao 2020)	No records found	No. Not associated with guava fruit. Guava is a host of <i>T. truncatus</i> (Bolland, Gutierrez & Flechtmann 1998). It feeds and lays eggs on the underside of the leaves of host plants (NAPPO 2014; Sakunwarin, Chandrapatya & Baker 2003).	Assessment not required	Assessment not required	Assessment not required	No
<i>Tetranychus urticae</i> Koch, 1836 [Tetranychidae] Two-spotted spider mite	Yes (CABI 2025; Shao 2020)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<b>ALGAE</b>							
<i>Cephaleuros virescens</i> Kunze ex E.M. Fries [Trentepohliales: Trentepohliaceae] Algal leaf spot	Yes (CABI 2025; GBIF Secretariat 2025; Guiry & Guiry 2024; Shao 2020)	Yes (APPD 2025; Government of Western Australia 2024)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<b>CHROMALVEOLATA</b>							
<i>Phytophthora citricola</i> Sawada [Peronosporales: Peronosporaceae] Fruit rot	Yes (Ann 2000; Ho 1990)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Phytophthora nicotianae</i> Breda de Haan [Peronosporales: Peronosporaceae] Fruit rot	Yes (Ho 1990)	Yes (Burgess et al. 2021)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<b>FUNGI</b>							
<i>Albonectria rigidiuscula</i> (Berk. & Broome) Rossman & Samuels Synonym: <i>Fusarium decemcellulare</i> Brick. [Hypocreales: Nectriaceae] Green point gall	Yes (GBIF Secretariat 2025; Shao 2020)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Alternaria alternata</i> (Fr.) Keissl. [Pleosporales: Pleosporaceae] Black rot; Black spot	Yes (GBIF Secretariat 2025; Shao 2020)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Aspergillus awamori</i> Nakaz. [Eurotiales: Aspergillaceae] Fruit rot	Yes (GBIF Secretariat 2025; Shao 2020)	Yes (Perera et al. 2021; Leong 2005)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Aspergillus parasiticus</i> Speare [Eurotiales: Aspergillaceae]	Yes (Farr & Rossman 2025; GBIF Secretariat 2025; Shao 2020)	Yes (APPD 2025; GBIF Secretariat 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Austropuccinia psidii</i> (G. Winter) Beenken Synonym: <i>Puccinia psidii</i> G. Winter [Pucciniales: Sphaerophragmiaceae] Myrtle rust	No, unreliable record (EPPO 2025). Reported once from Taiwan but not definitively identified and appears not to have established (Glen et al. 2007)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Botryosphaeria dothidea</i> (Moug.) Ces. & De Not [Botryosphaeriales: Botryosphaeriaceae] Stylar end rot	Yes (Farr & Rossman 2025; GBIF Secretariat 2025)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Botrytis cinerea</i> Pers. [Helotiales: Sclerotiniaceae] Grey mould	Yes (CABI 2025)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Cladosporium oxysporum</i> Berk. & M.A. Curtis [Cladosporiales: Cladosporiaceae] Leaf spot	Yes (Farr & Rossman 2025; GBIF Secretariat 2025)	Yes (APPD 2025; Farr & Rossman 2025; GBIF Secretariat 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Colletotrichum fructicola</i> Prihastuti, L. Cai & K.D. Hyde [Glomerellales: Glomerellaceae] Anthracnose	Yes (Tsai, Chen & Huang 2021)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Colletotrichum gloeosporioides</i> (Penz.) Penz. & Sacc. Synonym: <i>Glomerella cingulata</i> (Stoneman) Spauld. & H. Schrenk [Glomerellales: Glomerellaceae] Anthracnose	Yes (CABI 2025; Yeh & Shiesh 2017)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Colletotrichum siamense</i> Prihast., L. Cai & K.D. Hyde [Glomerellales: Glomerellaceae] Anthracnose	Yes (Tsai, Chen & Huang 2021)	Yes (Shivas et al. 2016)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Colletotrichum tropicale</i> Rojas, Rehner & Samuels [Glomerellales: Glomerellaceae] Anthracnose	Yes (Tsai, Chen & Huang 2021)	Yes (Jabeen 2016)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No



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Appendix B: Initiation and categorisation for pests of guava from Taiwan

Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Curvularia tuberculata</i> B.L. Jain [Pleosporales: Pleosporaceae] Curvularia rot	Yes (Farr & Rossman 2025; GBIF Secretariat 2025)	Yes (ALA 2025; APPD 2025; GBIF Secretariat 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Cylindrocladiella parva</i> (P.J. Anderson) Boesew. [Hypocreales: Nectriaceae] Cylindrocladium fruit rot	Yes (GBIF Secretariat 2025; Shao 2020)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Fusarium verticillioides</i> (Sacc.) Nirenberg [Hypocreales: Nectriaceae] Crown rot	Yes (Farr & Rossman 2025; GBIF Secretariat 2025)	Yes (APPD 2025; ALA 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Lasiodiplodia theobromae</i> (Pat.) Griffon & Maubl. [Botryosphaeriales: Botryosphaeriaceae] Guava stem canker	Yes (Deng et al. 2015; Wang et al. 2006; GBIF Secretariat 2025)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Meliola psidii</i> Fr. [Meliolales: Meliolaceae] Guava sooty mould	Yes (Chen & Chou 2011)	No records found	No. Unlikely to be present on imported guava fruit. The mycelia of <i>M. psidii</i> grows on the surface of guava leaves and fruit, appearing as dark brown spots or patches, but does not damage the underlying host tissue. <i>Meliola psidii</i> is associated with honeydew from infestation by insects such as scales, aphids and whiteflies (Chen & Chou 2011). Symptoms of sooty mould are usually highly visible, and affected fruit are likely be removed during packing house practices. Fruit bagging practices also greatly reduces incidence of both honeydew deposition from pests and sooty mould growth on guava fruit.	Assessment not required	Assessment not required	Assessment not required	No
<i>Mucor hiemalis</i> Wehmer [Mucorales: Mucoraceae] Mucor rot	Yes (GBIF Secretariat 2025; Shao 2020)	Yes (APPD 2025; HerbIMI 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Nalanthamala psidii</i> (Sawada & Kuros.) Schroers & M.J. Wingf. [Hypocreales: Nectriaceae] Guava damping off	Yes (Hong et al. 2015; Yeh & Shiesh 2017)	No records found	No. Not known to be associated with guava fruit. <i>Nalanthamala psidii</i> is associated with decaying twigs or trunks of guava trees (Schroers et al. 2005).	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Neofusicoccum parvum</i> (Pennycook & Samuels) Crous, Slippers & A.J.L. Phillips [Botryosphaeriales: Botryosphaeriaceae] Stylar end rot	Yes (Farr & Rossman 2025; GBIF Secretariat 2025)	Yes (APPD 2025; Farr & Rossman 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Neoscytalidium dimidiatum</i> (Penz.) Crous & Slippers [Botryosphaeriales: Botryosphaeriaceae] Fruit rot	Yes (CABI 2025)	Yes (APPD 2025; Ray, Burgess & Lanoiselet 2010)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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<p><i>Pestalotiopsis psidii</i> (Pat.) Mordue</p> <p>Synonym(s): <i>Pestalotia psidii</i> Pat.</p> <p>[Amphisphaeriales: Sporocadaceae]</p> <p>Guava scab, scabby canker</p>	<p>Yes (Chu &amp; Chang 2017; Deng et al. 2015; Shao 2020; Yeh &amp; Shiesh 2017)</p>	<p>No records found</p>	<p>Yes. <i>Pestalotiopsis psidii</i> can infect guava fruit (Keith, Velasquez &amp; Zee 2006) and is responsible for postharvest damage to ripe fruit (Kaushik, Thakur &amp; Chand 1972). Typical symptoms on guava fruit include water-soaked brown lesions that gradually enlarge with black conidia or irregular, brown, dry rot lesions on the fruit surface (Lin et al. 2021). Fruit showing symptoms are readily detected and likely to be removed during harvest and packing house practices. However, asymptomatic fruit and fruit with mild symptoms may not be excluded for export.</p>	<p>Yes. Imported guava fruit may be widely distributed within Australia. Known hosts are <i>Acca sellowiana</i>, <i>Psidium guineense</i> and <i>Psidium guajava</i>. These host species are not widely grown in Australia but are present in parts of Australia. The spores of <i>P. psidii</i> are reported to be dispersed via rain splash (Hopkins 1996; Ploetz et al. 2003). However, dispersal via wind is reported for related species (Prasannath, Galea &amp; Akinsanmi 2021; Xu et al. 1999), and could potentially also contribute to transfer of <i>P. psidii</i> to suitable hosts in Australia.</p>	<p>Yes. The climatic conditions in tropical and subtropical areas in Australia are likely to be most suitable for the establishment and spread of <i>P. psidii</i> (Prakash &amp; Misra 1993). The main hosts <i>A. sellowiana</i>, <i>Psidium guajava</i> and <i>Psidium guineense</i> are present in Australia although at low densities in most areas where they are grown. There are hosts and climatic conditions in Australia that suggest <i>P. psidii</i> could establish and spread in Australia.</p>	<p>Yes. The major impacts of the disease on guava production are reduction in overall yield and reduction in export quality fruit (Kaushik, Thakur &amp; Chand 1972). The pathogen has the potential to have an impact on guava and feijoa production in Australia.</p>	<p>Yes</p>
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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Phomopsis</i> sp. [Diaporthales: Diaporthaceae] Phomopsis fruit rot	Yes. An undescribed <i>Phomopsis</i> species has been reported affecting guava fruit in Taiwan (Lin et al. 2005)	Uncertain, as species not described	No. Unlikely to be present on imported guava fruit. Dark lesions form on immature fruit and expand as the fruit develops. These lesions become soft and sunken (Lin et al. 2005; Rao, Agrawal & Saksena 1976), which would render the fruit unsuitable for export. Symptoms of affected fruit are highly visible; therefore, any infected fruit are likely to be removed during packing house practices. Infection of fruit at later or more mature stages is unlikely, as this occurs through wounds (Tsai, Chen & Huang 2021) likely made in field typically by birds, insects and mechanical damage due to winds. Bagging of guava fruit at an early stage reduces the likelihood of damage and subsequent infection by <i>Phomopsis</i> sp.	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Phyllosticta capitalensis</i> Henn. Synonym(s): <i>Phyllosticta psidiicola</i> (Petr.) Aa; <i>Guignardia psidii</i> Ullasa & Rawal [Botryosphaerales: Phyllostictaceae] Black spot phyllosticta rot	Yes (Deng et al. 2015; Yeh & Shiesh 2017)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Pseudocercospora sawadae</i> (W. Yamam.) Goh & W.H. Hsieh [Mycosphaerellales: Mycosphaerellaceae] Leaf spot	Yes (Farr & Rossman 2025; Shao 2020)	Yes (APPD 2025; HerbIMI 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Rhizopus arrhizus</i> A. Fisch. Synonym: <i>Rhizopus oryzae</i> Went & Prins. Geerl. [Mucorales: Mucoraceae] Soft rot	Yes (GBIF Secretariat 2025; Shao 2020)	Yes (APPD 2025; HerbIMI 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Rhizopus microsporus</i> Tiegh. [Mucorales: Mucoraceae]	Yes (Shao 2020)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No

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Pest	Present in Taiwan	Present within Australia	Potential to enter on pathway		Potential for establishment and spread	Potential for economic consequences	Pest risk assessment required
			Potential for importation	Potential for distribution			
<i>Rhizopus stolonifer</i> (Ehrenb.) Vuill. [Mucorales: Mucoraceae] Rhizopus fruit rot	Yes (CABI 2025; Farr & Rossman 2025)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<b>VIRUSES</b>							
<i>Cucumovirus CMV</i> [Martellivirales: Bromoviridae] Former species name: <i>Cucumber mosaic virus</i> (CMV) Common name: cucumber mosaic virus (CMV)	Yes (Shao 2020)	Yes (APPD 2025)	Assessment not required	Assessment not required	Assessment not required	Assessment not required	No
<i>Orthotospovirus arachiflavi</i> [Elliovirales: Tospoviridae] Former species name: <i>Groundnut chlorotic fan spot orthotospovirus</i> (GCFSVO) Common name: groundnut chlorotic fan spot virus (GCFSV)	Yes (Chen & Chiu 1996)	No records found	No. <i>Orthotospovirus arachiflavi</i> is included in this categorisation because it can be vectored by the thrips <i>Scirtothrips dorsalis</i> (Chen & Chiu 1996), which is present in Taiwan and associated with guava fruit. However, guava is not recorded as a host for <i>O. arachiflavi</i> , therefore it is unlikely to be imported on guava fruit.	Assessment not required	Assessment not required	Assessment not required	No

## Glossary, acronyms and abbreviations

Term or abbreviation	Definition
Acervuli	Small asexual fruiting bodies that develop below the epidermis of parasitised host plants, breaking through the surface of the host plant to release their spores.
APHIA	Taiwan's Animal and Plant Health Inspection Agency
ACT	Australian Capital Territory
Additional declaration	A statement that is required by an importing country to be entered on a phytosanitary certificate and which provides specific additional information on a consignment in relation to regulated pests or regulated articles (FAO 2024b).
Appropriate level of protection (ALOP)	The level of protection deemed appropriate by the Member establishing a sanitary or phytosanitary measure to protect human, animal or plant life or health within its territory (WTO 1995).
Appropriate level of protection (ALOP) for Australia	The <i>Biosecurity Act 2015</i> defines the appropriate level of protection (or ALOP) for Australia as a high level of sanitary and phytosanitary protection aimed at reducing biosecurity risks to very low, but not to zero.
Area	An officially defined country, part of a country or all or parts of several countries (FAO 2024b).
Area of low pest prevalence	An area, whether all of a country, part of a country, or all or parts of several countries, as identified by the competent authorities, in which a specific pest is present at low levels and which is subject to effective surveillance or control (FAO 2024b).
Arthropod	The largest phylum of animals, including the insects, arachnids and crustaceans.
Asexual reproduction	The development of a new individual from a single cell or group of cells in the absence of meiosis.
Australian territory	Australian territory as referenced in the <i>Biosecurity Act 2015</i> refers to Australia, Christmas Island and Cocos (Keeling) Islands and any external Territory to which that provision extends.
BA	Biosecurity Advice
BICON	Australia's Biosecurity Import Conditions system <a href="https://bicon.agriculture.gov.au/BiconWeb4.0">bicon.agriculture.gov.au/BiconWeb4.0</a>
Biosecurity	The prevention of the entry, establishment or spread of unwanted pests and infectious disease agents to protect human, animal or plant health or life, and the environment.
Biosecurity import risk analysis (BIRA)	The <i>Biosecurity Act 2015</i> defines a BIRA as an evaluation of the level of biosecurity risk associated with particular goods, or a particular class of goods, that may be imported, or proposed to be imported, into Australian territory, including, if necessary, the identification of conditions that must be met to manage the level of biosecurity risk associated with the goods, or the class of goods, to a level that achieves the ALOP for Australia. The risk analysis process is regulated under legislation.
Biosecurity measures	The <i>Biosecurity Act 2015</i> defines biosecurity measures as measures to manage any of the following: biosecurity risk, the risk of contagion of a listed human disease, the risk of listed human diseases entering, emerging, establishing themselves or spreading in Australian territory, and biosecurity emergencies and human biosecurity emergencies.
Biosecurity risk	The <i>Biosecurity Act 2015</i> refers to biosecurity risk as the likelihood of a disease or pest entering, establishing or spreading in Australian territory, and the potential for the disease or pest causing harm to human, animal or plant health, the environment, economic or community activities.
Calyx	A collective term referring to all of the sepals in a flower.



Term or abbreviation	Definition
Consignment	A quantity of plants, plant products or other articles being moved from one country to another and covered, when required, by a single phytosanitary certificate (a consignment may be composed of one or more commodities or lots) (FAO 2024b).
Control (of a pest)	Suppression, containment or eradication of a pest population (FAO 2024b).
Crawler	Intermediate mobile nymph stage of certain arthropods.
Endangered area	An area where ecological factors favour the establishment of a pest whose presence in the area will result in economically important loss (FAO 2024b).
Endemic	Belonging to, native to, or prevalent in a particular geography, area or environment.
Endophyte	a biological agent, which lives within the tissues of a plant for at least part of it's lifecycle without, for at least part of it's lifecycle, causing disease.
Entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO 2024b).
EP	Existing policy. This denotes that a pest species has previously been assessed in another policy published by the department.
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO 2024b).
FAO	Food and Agriculture Organization of the United Nations
Fresh	Living; not dried, deep-frozen or otherwise conserved (FAO 2024b).
FSANZ	Food Standards Australia New Zealand ( <a href="https://www.foodstandards.gov.au/Pages/default.aspx">foodstandards.gov.au/Pages/default.aspx</a> ) and the Australia New Zealand Food Standards Code ( <a href="https://www.foodstandards.gov.au/code/Pages/default.aspx">foodstandards.gov.au/code/Pages/default.aspx</a> )
Fumigation	A method of pest control that completely fills an area with gaseous pesticides to suffocate or poison the pests within.
General surveillance	An official process whereby information on pests in an area is obtained through various non-official or official sources other than surveys (FAO 2024b).
Genus	A taxonomic category ranking below a family and above a species and generally consisting of a group of species exhibiting similar characteristics. In taxonomic nomenclature the genus name is used, either alone or followed by a Latin adjective or epithet, to form the name of a species.
Goods	The <i>Biosecurity Act 2015</i> defines goods as an animal, a plant (whether moveable or not), a sample or specimen of a disease agent, a pest, mail or any other article, substance or thing (including, but not limited to, any kind of moveable property).
GP	Group policy. This refers to the <i>Final group pest risk analysis for thrips and orthotospoviruses on fresh fruit, vegetable, cut-flower and foliage imports</i> (thrips Group PRA) (DAWR 2017a), the <i>Final group pest risk analysis for mealybugs and the viruses they transmit on fresh fruit, vegetable, cut-flower and foliage imports</i> (mealybugs Group PRA) (DAWR 2019a), the <i>Final group pest risk analysis for soft and hard scale insects on fresh fruit, vegetable, cut-flower and foliage imports</i> (scales Group PRA) (DAWE 2021a) and the <i>Final report for a review of pest risk assessments for spider mites (Acari: Trombidiformes: Tetranychidae)</i> (DAFF 2024a).
Host	An organism that harbours a parasite, mutual partner, or commensal partner, typically providing nourishment and shelter.
Host range	Species capable, under natural conditions, of sustaining a specific pest or other organism (FAO 2024b).
Import permit	Official document authorising importation of a commodity in accordance with specified phytosanitary import requirements (FAO 2024b).

Term or abbreviation	Definition
Infection	The internal 'endophytic' colonisation of a plant, or plant organ, and is generally associated with the development of disease symptoms as the integrity of cells and/or biological processes are disrupted.
Infestation (of a commodity)	Presence in a commodity of a living pest of the plant or plant product concerned. Infestation includes infection (FAO 2024b).
Inspection	Official visual examination of plants, plant products or other regulated articles to determine if pests are present or to verify conformity with phytosanitary requirements (FAO 2024b).
Intended use	Declared purpose for which plants, plant products or other articles are imported, produced or used (FAO 2024b).
Interception (of a pest)	The detection of a pest during inspection or testing of an imported consignment (FAO 2024b).
International Plant Protection Convention (IPPC)	The IPPC is an international plant health agreement, established in 1952, that aims to protect cultivated and wild plants by preventing the introduction and spread of pests. The IPPC provides an international framework for plant protection that includes developing International Standards for Phytosanitary Measures (ISPMs) for safeguarding plant resources.
International Standard for Phytosanitary Measures (ISPM)	An international standard adopted by the Conference of FAO, the Interim Commission on Phytosanitary Measures or the Commission on Phytosanitary Measures, established under the IPPC (FAO 2024b).
Introduction (of a pest)	The entry of a pest resulting in its establishment (FAO 2024b).
Larva	A juvenile form of animal with indirect development, undergoing metamorphosis (for example, insects or amphibians).
Lot	A number of units of a single commodity, identifiable by its homogeneity of composition, origin etc., forming part of a consignment (FAO 2024b). Within this report a 'lot' refers to a quantity of fruit of a single variety, harvested from a single production site during a single pick and packed at one time.
Mature fruit	Commercial maturity is the start of the ripening process. The ripening process will then continue and provide a product that is acceptable to consumers. Maturity assessments include colour, starch, index, soluble solids content, flesh firmness, acidity, and ethylene production rate.
National Plant Protection Organization (NPPO)	Official service established by a government to discharge the functions specified by the IPPC (FAO 2024b).
NSW	The state of New South Wales in Australia.
NT	The Northern Territory of Australia.
Nymph	The immature form of some insect species that undergoes incomplete metamorphosis. It is not to be confused with larva, as its overall form is already that of the adult.
Official control	The active enforcement of mandatory phytosanitary regulations and the application of mandatory phytosanitary procedures with the objective of eradication or containment of quarantine pests or for the management of regulated non-quarantine pests (FAO 2024b).
Pathogen	A biological agent that can cause disease to its host.
Pathway	Any means that allows the entry or spread of a pest (FAO 2024b).
Peduncle	The short stalk connecting a flower (or subsequent fruit) to a stem
Pest	Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products (FAO 2024b).
Pest categorisation	The process for determining whether a pest has or has not the characteristics of a quarantine pest or those of a regulated non-quarantine pest (FAO 2024b).

Term or abbreviation	Definition
Pest free area (PFA)	An area in which a specific pest is absent as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained (FAO 2024b).
Pest free place of production (PFPP)	Place of production in which a specific pest is absent as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained for a defined period (FAO 2024b).
Pest free production site (PFPS)	A production site in which a specific pest is absent, as demonstrated by scientific evidence, and in which, where appropriate, this condition is being officially maintained for a defined period (FAO 2024b).
Pest risk analysis (PRA)	The process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken against it (FAO 2024b).
Pest risk assessment (for quarantine pests)	Evaluation of the probability of the introduction and spread of a pest and the magnitude of the associated potential economic consequences (FAO 2024b).
Pest risk assessment (for regulated non-quarantine pests)	Evaluation of the probability that a pest in plants for planting affects the intended use of those plants with an economically unacceptable impact (FAO 2024b).
Pest risk management (for quarantine pests)	Evaluation and selection of options to reduce the risk of introduction and spread of a pest (FAO 2024b).
Pest risk management (for regulated non-quarantine pests)	Evaluation and selection of options to reduce the risk that a pest in plants for planting causes an economically unacceptable impact on the intended use of those plants (FAO 2024b).
Pest status (in an area)	Presence or absence, at the present time, of a pest in an area, including where appropriate its distribution, as officially determined using expert judgement on the basis of current and historical pest records and other information (FAO 2024b).
Phytopathogen	A biological agent that can cause disease to plant hosts.
Phytosanitary action	An official operation, such as inspection, testing, surveillance of treatment, undertaken to implement phytosanitary measures or to enable phytosanitary certification (FAO 2024b).
Phytosanitary certificate	An official paper document or its official electronic equivalent, consistent with the model certificates of the IPPC, attesting that a consignment meets phytosanitary import requirements (FAO 2024b).
Phytosanitary certification	Use of phytosanitary procedures leading to the issue of a phytosanitary certificate (FAO 2024b).
Phytosanitary measure	Phytosanitary relates to the health of plants. Any legislation, regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests (FAO 2024b). In this risk analysis the term 'phytosanitary measure' and 'risk management measure' may be used interchangeably.
Phytosanitary procedure	An official method on how to perform a phytosanitary action (FAO 2024b).
Phytosanitary regulation	Official rule to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests, including establishment of procedures for phytosanitary certification (FAO 2024b).
Polyphagous	Feeding on a relatively large number of hosts from different plant family and/or genera.
PRA area	Area in relation to which a pest risk analysis is conducted (FAO 2024b).
Production site	In this report, a production site is a continuous planting of guava plants treated as a single unit for pest management purposes. If a property is subdivided into one or more units for pest management purposes, then each unit is a production site.
Qld	The state of Queensland in Australia.

Term or abbreviation	Definition
Quarantine	Official confinement of regulated articles, pests or beneficial organisms for inspection, testing, treatment, observation or research (FAO 2024b).
Quarantine pest	A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (FAO 2024b).
Regulated article (RA)	Any plant, plant product, storage place, packaging, conveyance, container, soil and any other organism, object or material capable of harbouring or spreading pests, deemed to require phytosanitary measures, particularly where international transportation is involved (FAO 2024b).
Regulated non-quarantine pest	A non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party (FAO 2024b).
Regulated pest	A quarantine pest or a regulated non-quarantine pest (FAO 2024b).
Restricted risk	Restricted risk is the risk estimate when risk management measures are applied.
Risk analysis	Refers to the technical or scientific process for assessing the level of biosecurity risk associated with the goods, or the class of goods, and if necessary, the identification of conditions that must be met to manage the level of biosecurity risk associated with the goods, or class of goods to a level that achieves the ALOP for Australia.
Risk management measure	Conditions that must be met to manage the level of biosecurity risk associated with the goods or the class of goods, to a level that achieves the ALOP for Australia. In this risk analysis, the term 'risk management measure' and 'phytosanitary measure' may be used interchangeably.
SA	The state of South Australia.
Saprophyte	An organism deriving its nourishment from dead organic matter.
Specific surveillance	An official process whereby information on pests in an area is obtained through surveys (FAO 2024b).
Spread (of a pest)	Expansion of the geographical distribution of a pest within an area (FAO 2024b).
SPS Agreement	WTO Agreement on the Application of Sanitary and Phytosanitary Measures.
Stakeholders	Government agencies, individuals, community or industry groups or organizations, whether in Australia or overseas, including the proponent/applicant for a specific proposal, who have an interest in the policy issues.
Surveillance	An official process whereby information on pests in an area is obtained through general surveillance, specific surveillance or a combination of both (FAO 2024b).
Survey (of pests)	An official procedure conducted over a defined period to determine the presence or absence of pests, or the boundaries or characteristics of a pest population, in an area, place of production or production site (FAO 2024b).
TARI	Taiwan Agricultural Research Institute
Tas.	The state of Tasmania in Australia.
Trash	Soil, splinters, twigs, leaves and other plant material, other than fruit as defined in the scope of this risk analysis. For example, stem and leaf material, seeds, soil, animal matter/parts or other extraneous material
Treatment (as a phytosanitary measure)	Official procedure for killing, inactivating, removing, rendering infertile or devitalising regulated pests (FAO 2024b).
Unrestricted risk	Unrestricted risk estimates apply in the absence of risk management measures.
Vector	In this report, a vector is an organism that is capable of harbouring and spreading a pest from one host to another.

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Glossary, acronyms and abbreviations

Term or abbreviation	Definition
Viable	Alive, able to germinate or capable of growth and/or development.
Vic.	The state of Victoria in Australia.
WA	The state of Western Australia.
WTO	World Trade Organization.

## References

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