



Australian Government
Department of Agriculture,
Fisheries and Forestry

Melon fruit from Japan: biosecurity import requirements final report

September 2025



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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.

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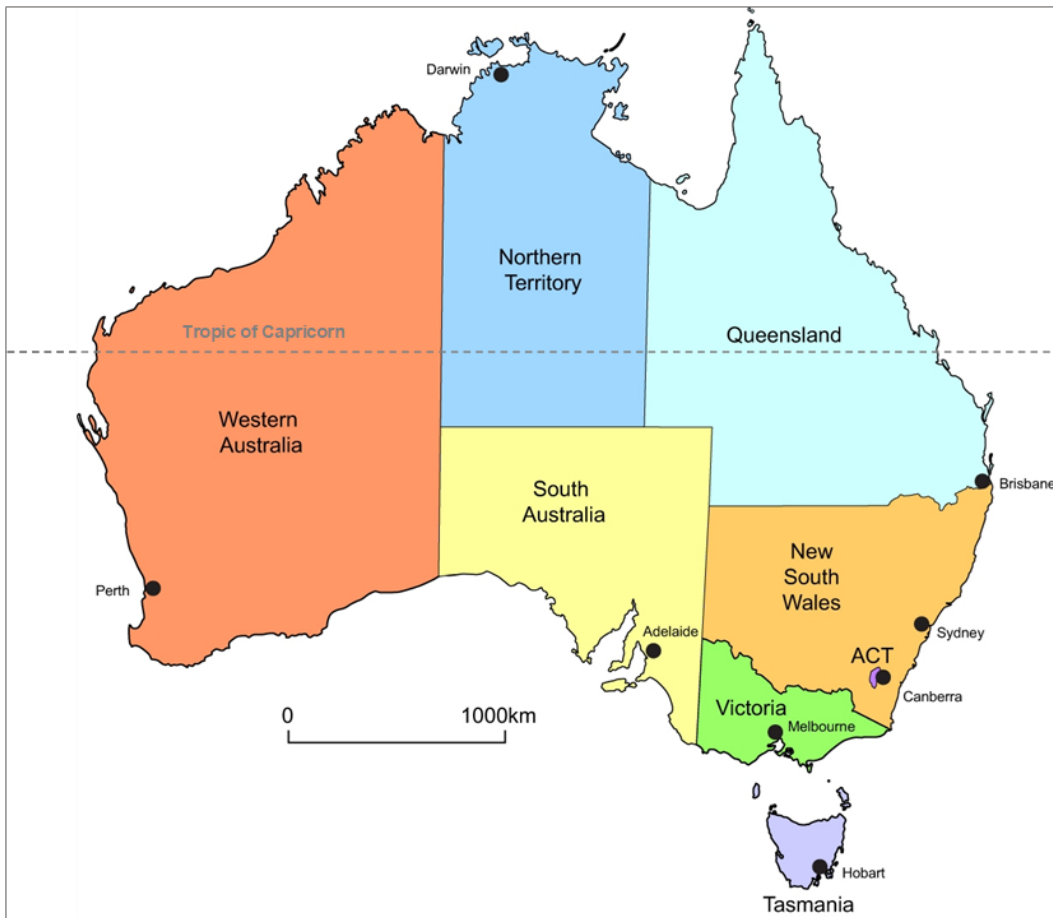
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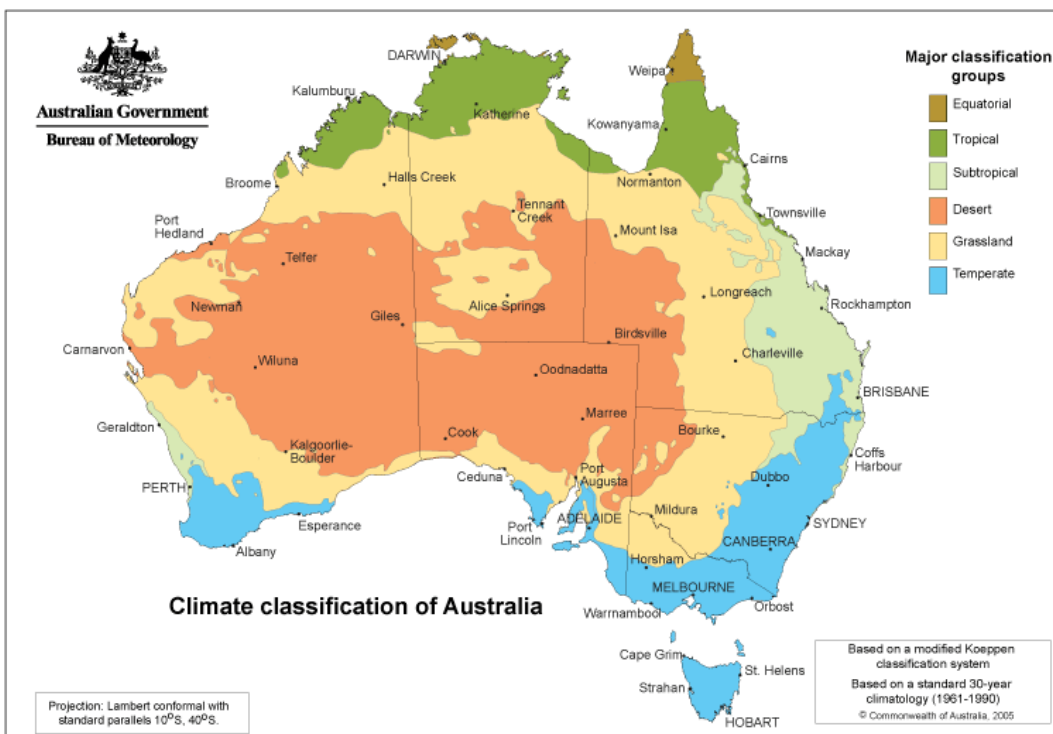
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Melon fruit from Japan: biosecurity import requirements final report
 Maps of Australia

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 final report to assess the proposal by Japan for market access to Australia for melon fruit for human consumption.

Australia currently permits the importation of fresh rockmelon and honeydew melon fruit from European countries, New Zealand, and the United States of America (except Hawaii) and fresh rockmelon and oriental melon fruit from the Republic of Korea for human consumption, provided Australian biosecurity import conditions are met.

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

This final report contains details of plant pests that are of biosecurity concern to Australia and are potentially associated with the importation of melon fruit from Japan. The term 'pests' includes both arthropod pests and pathogens. This report also contains risk assessments for the identified quarantine pests and regulated articles, and, where required, recommended risk management measures to reduce the biosecurity risk to an acceptable level, that is, to achieve the appropriate level of protection (ALOP) for Australia.

Four 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 fly: pumpkin fruit fly (*Zeugodacus tau*)
- thrips: intonsa flower thrips (*Frankliniella intonsa*), western flower thrips (*Frankliniella occidentalis*) and melon thrips (*Thrips palmi*).

Of these 4 pests:

- Three are quarantine pests (pumpkin fruit fly, intonsa flower thrips and melon thrips). Intonsa flower thrips and melon thrips are also identified as regulated articles as they are capable of harbouring and spreading orthospoviruses that are quarantine pests for Australia
- one is a non-quarantine pest (western flower thrips) but is identified as a regulated article as it is capable of harbouring and spreading orthospoviruses that are quarantine pests for Australia.

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.

In this final report the department recommends risk management measures, combined with operational systems, to reduce the risks posed by the 4 identified species to achieve the ALOP for Australia. The recommended measures are:

- for pumpkin fruit fly:
 - pest free areas, pest free places of production or pest free production sites; or
 - fruit treatment considered to be effective against fruit flies
- for thrips:

- pre-export visual inspection and, if found, remedial action.

The department received submissions from 5 stakeholders on the draft report. The department has made changes to the risk analysis report following consideration of the stakeholder comments and a subsequent review of literature. The department has also made changes to the risk analysis report in response to changes in pest status in Japan or in Australia. These changes include:

- amendments to Chapter 2, to clarify that:
 - ‘hats’ used to protect greenhouse-grown melon fruit from sun damage may be made from materials other than newspaper (section 2.4.2)
 - the description of melon production in the report represents current practices in Japan that are relevant to biosecurity. Additional steps may be required to meet Australian food safety standards (section 2.6.3)
- addition of a pest risk assessment for pumpkin fruit fly in Chapter 3 (section 3.4) and amendments to relevant sections of the report, as *Z. tau* has now been detected in Okinawa Prefecture
- revision to the pest status assessment of western flower thrips (section 3.5). It is no longer assessed as a regional quarantine pest as it is now considered to be present in Australia and no longer under official control in the Northern Territory. It is still assessed as a regulated article for Australia
- revisions to section 4.1.1 to better reflect the intended purpose of this section
- amendment to *Pantoea ananatis* (internal fruit rot) entry in Appendix B. The ‘Potential for importation’ has been edited for clarity in response to a stakeholder comment
- update to virus species names in Appendix B to align with recent changes to virus nomenclature
- addition of ‘Appendix C: Stakeholder comments’, which summarises the key technical issues raised by stakeholders, and how these issues have been considered in this final report
- minor corrections, rewording, editorial changes and formatting updates for consistency, accuracy, clarity and web-accessibility.

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 recommended 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.

1.2 This risk analysis

1.2.1 Background

Japan's Ministry of Agriculture, Forestry and Fisheries (MAFF) formally requested market access to Australia for melon fruit (except oriental melon and oriental pickling melon) for human consumption in a submission received in November 2022. This submission provided information on the pests associated with melon fruit in Japan, including the plant parts affected. Information was also provided on the standard commercial production practices for melon fruit in Japan.

On 30 August 2023, the department notified stakeholders of the decision to progress a request for market access for melon fruit from Japan as a review of biosecurity import requirements. This analysis is conducted in accordance with the *Biosecurity Act 2015*.

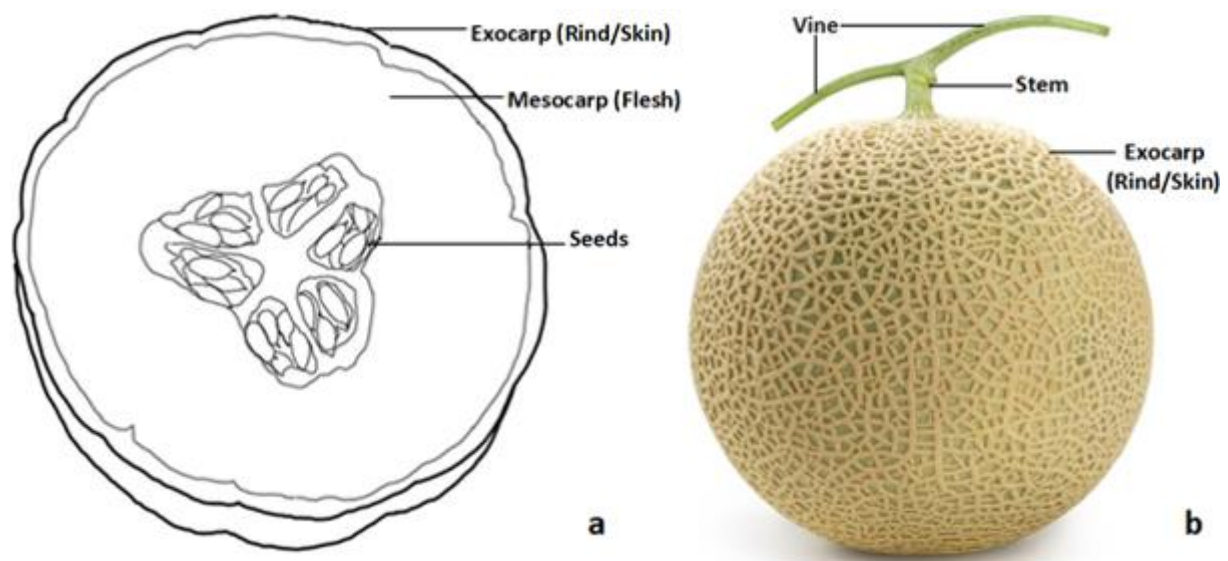
In October 2023, officers from the department visited production areas for melon fruit from Japan. The objective of this visit was to observe commercial production, pest management and other export practices.

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 melon fruit (*Cucumis melo*), except oriental melon (*C. melo* var. *makuwa*) and oriental pickling melon (*C. melo* var. *utilissimus*) from Japan, produced using standard commercial production practices as described in Chapter 2, for human consumption in Australia.

In this risk analysis, melon fruit are defined as the entire fruit comprising skin, flesh and seed, with the stem and a portion of vine attached (Figure 1.1). This risk analysis covers all varieties of *Cucumis melo*, except *C. melo* var. *makuwa* (oriental melon) and *C. melo* var. *utilissimus* (synonym *C. melo* var. *conomon*) (oriental pickling melon) from all production regions in Japan.

Figure 1.1 Diagram of melon fruit



a: Cross-section of a melon fruit. b: Whole melon fruit

1.2.3 Existing policy

International policy

Australia currently permits fresh oriental melon and rockmelon fruit imports from Korea (DAFF 2023a) and fresh rockmelon fruit imports from European countries, New Zealand and the United States of America (except Hawaii). Australia also imports the following horticultural commodities from Japan: fresh strawberries (DAWE 2020a) and persimmons (DAFF 2004).

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.

The department has reviewed all the pests and pest groups previously identified in 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 this new information in this risk analysis.

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

The biosecurity risk posed 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 review) (DAFF 2024a).

The Group policies (GPs) for thrips and spider mites are applicable for the melon fruit from Japan pathway. The department has determined that the information in those Group policies can be adopted for the species under consideration in this risk analysis. These GPs and their adoption are further explained in Chapter 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 melon fruit from Japan 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 30 August 2023, the department notified stakeholders, in Biosecurity Advice 2023-P07, of the commencement of a review of biosecurity import requirements to assess a proposal by Japan for market access to Australia for melon fruit for human consumption.

Prior to, and following the announcement of this decision, the department engaged with the Australian melon industry.

The department has also consulted with the government of Japan and Australian state and territory governments during the preparation of this report.

The draft report was released on 17 October 2024 (Biosecurity Advice 2024-P04) for a stakeholder consultation period of 60 days that concluded on 16 December 2024.

The department received submissions from 5 stakeholders on the draft report. All submissions received during the consultation period, and issues raised by stakeholders throughout the risk analysis process, were carefully considered and, where relevant, changes were made to the final report. A summary of key technical stakeholder comments and how they were considered is provided in Appendix C.

1.2.6 Overview of this pest risk analysis

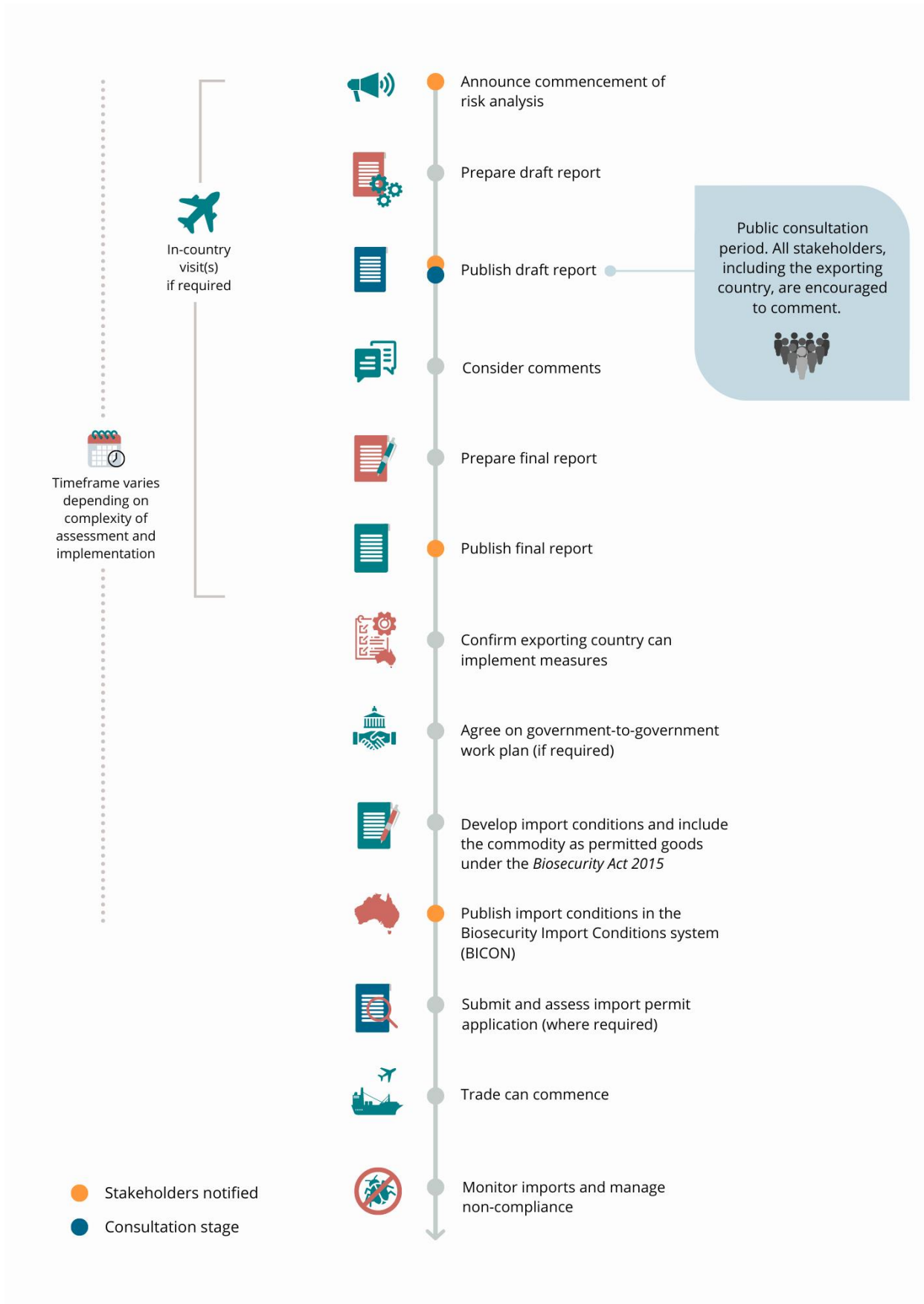
A pest risk analysis (PRA) is 'the process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken against it'. A pest is 'any species, strain or biotype of 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 is provided in Figure 1.2.

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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 melon fruit in Japan 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 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.

Before any trade in melon fruit from Japan commences, the department will verify that Japan can implement the required pest risk management measures (as specified in section 4.1), and has established operational systems for the assurance, maintenance and verification of the phytosanitary status of goods (as specified in section 4.2). On verification of these requirements, the import conditions for melon fruit from Japan will be published on BICON.

2 Commercial production practices for melon fruit in Japan

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

2.1 Considerations used in estimating unrestricted risk

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

In October 2023 officers from the department visited melon fruit farms, greenhouses and packing houses in Shizuoka and Ibaraki Prefectures to observe pest management and production practices. The observations made by these officers during the visit, and additional information provided during and after the visits confirmed the production, harvest, processing and packing procedures described in this chapter as standard commercial production practices for melon fruit for export.

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

In estimating the likelihood of pest introduction, it was considered that the pre-harvest, harvest and post-harvest production practices for melon fruit, as described in this chapter, are implemented by all growers and packing houses for all varieties of *Cucumis melo* (except *C. melo* var. *akuwa* and *C. melo* var. *utilissimus*) produced for export.

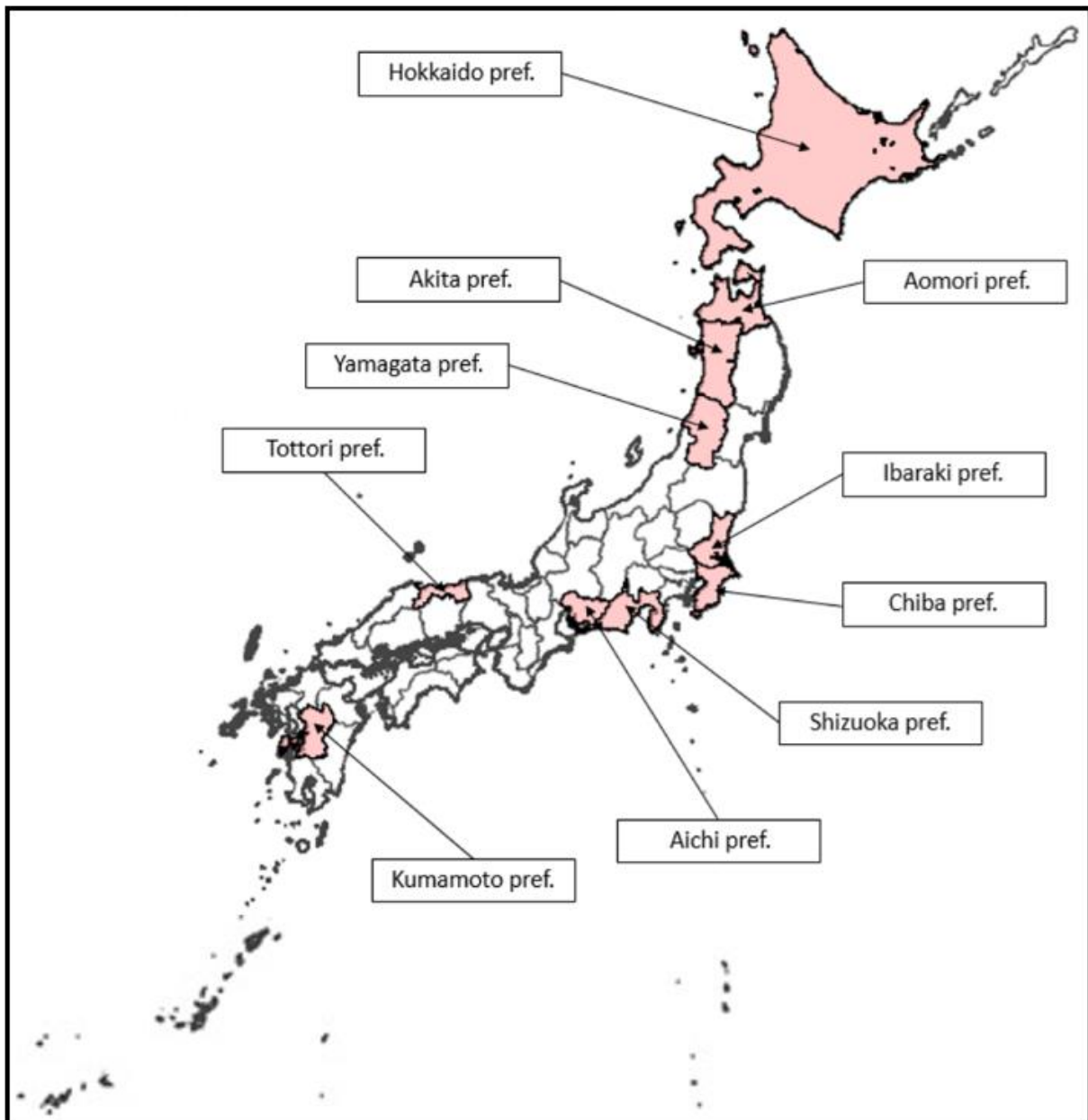
2.2 Production areas of melon fruit

Melons are widely grown throughout Japan, with major production areas in several prefectures across the country (MAFF 2022).

In 2020, a total of 147,900 tonnes of melon fruit was produced from all melon production areas of Japan, with the top ten melon fruit producing prefectures being Aichi, Akita, Aomori, Chiba, Hokkaido, Ibaraki, Kumamoto, Shizuoka, Tottori and Yamagata (MAFF 2022).

The locations of these prefectures are identified in Map 3.

Map 3 Main production areas of melon fruit in Japan



Source: MAFF (2022)

2.3 Climate in production areas

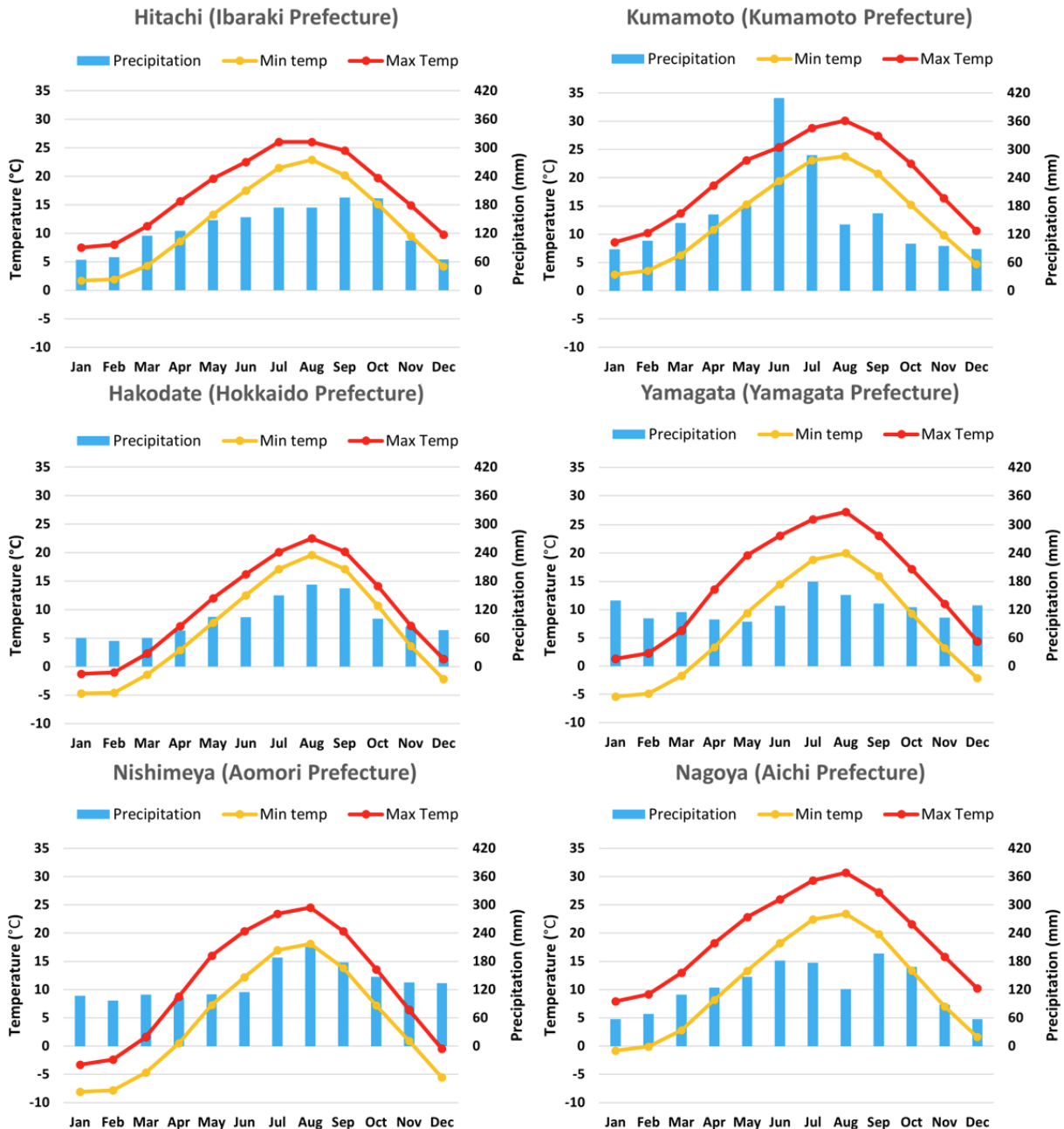
Japan has a variety of climatic zones ranging from subarctic in the northern parts of the country to subtropical in the south.

The summers are warm in the northern parts of the country, with mean monthly temperatures ranging from 17°C to 24°C, whereas other regions of Japan experience hot and humid summer conditions, with temperatures ranging from 20°C to 30°C. The winters are quite cold in the northern and eastern parts of the country, with mean monthly temperatures ranging from -6°C to 0°C, while the western and southern parts of Japan experience a milder winter, with temperatures ranging from 2°C to 10°C (Japan Meteorological Agency 2025).

The mean annual precipitation in Japan’s main melon producing prefectures ranges from approximately 1,209 mm to 2,569 mm, with more rain occurring in the southern, subtropical regions of Japan and the rainy season beginning mid-May and continuing to late July (Japan Meteorological Agency 2025).

Figure 2.1 presents the mean monthly minimum and maximum temperatures, as well as mean monthly precipitation in the 6 major melon-producing prefectures of Japan.

Figure 2.1 Mean monthly minimum and maximum temperatures and mean monthly precipitation in the main production areas of melon fruit in Japan



Source: Climate-data.org (2025)

2.4 Pre-harvest

2.4.1 Cultivars

Cucumis melo is an annual plant with ovate leaves 2–9 cm long and 3–8 cm wide, and vines that can grow up to 5 metres long (PlantNet 2025). The fruit vary greatly in appearance depending on variety (Lim 2012). Fruit shape ranges from spherical, through globose and oval to oblong ellipsoid, growing to 15–30 cm long and 1.5–3.6 kg in weight. The fruit skin can be white, tan, light green or yellow, with a texture that is smooth, hairy or with a netted ridge pattern (Lim 2012).

Commercial melon fruit production in Japan focuses on growing high-quality fruit of premium varieties, and several different varieties of melons are produced. Melons can be grown in greenhouses throughout the year, while the growing season for field-grown melon fruit is extended by growing different varieties of melons with different climatic requirements. Ibaraki Prefecture, one of the prefectures visited by officers from the department, grows 5 main commercial melon varieties. Pictures of these main varieties are presented in Figure 2.2 and characteristics of each variety are presented in Table 2.1. All five varieties are grown in the field, though the Earl’s muskmelon, also known as Arus in Japan, is also grown in greenhouses. This non-hybrid variety of melon is derived from the Earl’s Favourite variety introduced to Japan from England in 1900 (Shizuoka Crown Melon 2023).

Figure 2.2 Five main commercial varieties of melon fruit grown in Ibaraki Prefecture



a: Kinshou. b: Prince. c: Takami. d: Takami red. e: Earl’s muskmelon. Source: JA Joso Hikari Agricultural Cooperative

Table 2.1 Characteristics of main commercial varieties of melon fruit grown in Ibaraki Prefecture

| Variety | Harvest time | Fruit description |
|------------------|--|---|
| Kinshou | Early May to mid-June | Oval melon with smooth yellow skin and white flesh that is moderately sweet with a crispy texture. |
| Prince | Late May to early July | Spherical melon with white skin and light green flesh that is sweet with a firm texture. This variety has a long shelf life. |
| Takami | Early June to mid-July | Spherical melon with netted skin and light green flesh with a high sugar content. This is one of the most commonly cultivated varieties in Ibaraki and has a long shelf life. |
| Takami red | Early June to mid-July | Spherical melon with netted skin and light orange to red flesh that is moderately sweet with a firm texture. |
| Earl’s muskmelon | Late August to early November (when grown in fields) | Spherical melon with netted skin and light green flesh. |

Source: JA Joso Hikari Agricultural Cooperative

2.4.2 Cultivation practices

Melon fruit production in Japan occurs according to cultivation calendars formulated by the Japan Agricultural Cooperatives (JA) for each prefecture (MAFF 2022). These calendars inform growers when to plant, apply pest management measures and harvest melon crops.

Melon seedling production

Melon seeds are produced and heat-sanitised in MAFF-registered nurseries and grown out to seedlings in greenhouses before being provided to farms (MAFF 2022). Seedlings may be self-rooted or grafted onto pumpkin root stock. Around 20–25 days after germination, the established melon seedlings can be transplanted from the nursery to a field or greenhouse on a production farm.

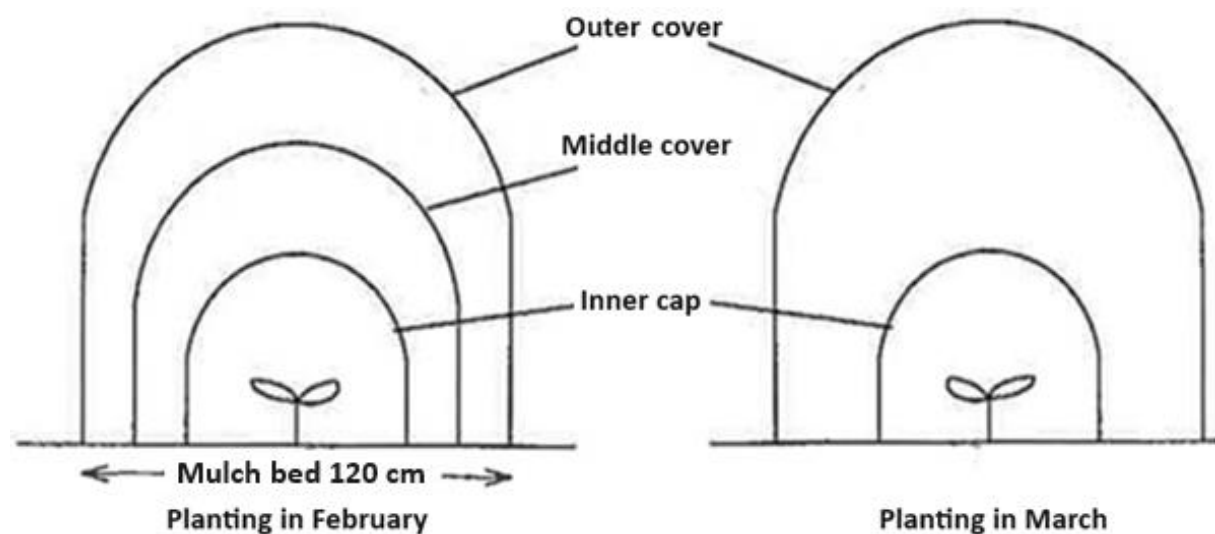
Melon fruit production

Melons produced in the field are usually grown from February to November, as this is when temperatures are suitable, or can be made suitable using sheltered growing practices, for growing melons across Japan. This melon growing season overlaps with the rainy season in Japan (mid-May to late July) (Japan Meteorological Agency 2025; MAFF 2022). Therefore, melons are grown in greenhouses or under plastic tunnels in the field to protect them from rain damage and associated diseases. By growing different varieties and utilising the greater control over temperature and moisture afforded by plastic tunnels, Japan can produce field-grown melon fruit for harvest from May to November. The greater temperature and humidity control offered by greenhouses allows melon production to occur year-round in Japan (MAFF 2022).

Field production under plastic tunnels

Farmers practice crop rotation, and plant different field crops (e.g., celery, Chinese cabbage) according to the season. The soil is sterilised with a chemical solution between harvesting one crop and planting another. After sterilisation, fertiliser is applied to the field and beds of mulch are laid down in 120 cm wide rows separated by furrows, in accordance with the cultivation standards established by JA (JA Joso Hikari 2023).

Figure 2.3 Example of plastic tunnel set ups for field-grown melons planted in Ibaraki Prefecture in February and March



Source: Modified from JA Joso Hikari (2023)

When established melon seedlings are planted in the field, plastic sheeting is placed on the ground over the rows of mulch beds. The seedlings are planted through small holes in the ground sheet every 60–70 cm along each row (JA Joso Hikari 2023). Each row is covered with plastic sheeting, which is stretched over a metal frame above the plants to protect the fruit from dust and direct rain.

Depending on the season, plants may be covered with additional layers of plastic to protect them from the cold. For example, in Ibaraki Prefecture, seedlings planted in February are placed under 3 layers of plastic (2 tunnels and a cap), while those planted in March are under 2 layers (one tunnel and a cap) (Figure 2.3) (JA Joso Hikari 2023). The cap is removed as the vines grow and the temperature rises. The plastic sheeting over the metal frame can be drawn back to allow for greater air circulation and to manage the temperature and humidity within the tunnels on hot days later in the season (Figure 2.4). As melon fruit develop, stands are placed under the growing melons to keep them off the ground and allow air to circulate under the fruit (Figure 2.5).

Figure 2.4 Field-grown melons with protective plastic tunnels partially raised



Source: JA Joso Hikari Agricultural Cooperative

Figure 2.5 Two examples of field-grown melon fruit on stands



Source: JA Joso Hikari Agricultural Cooperative

Greenhouse production

Greenhouses are permanent structures with concrete flooring. Established melon seedlings are planted in isolated raised garden beds full of soil (Figure 2.6). This allows for easy access to the vines for watering and maintenance as they grow (Shizuoka Crown Melon 2023). Greenhouse air temperatures are maintained at around 28°C during the day, or 24°C at night. Greenhouse windows are fitted with fine mesh so they can be used for ventilation in summer. The areas immediately around the greenhouses are kept clear of weeds and other plants.

Figure 2.6 Melon vines in raised garden beds in a greenhouse



Flowering generally occurs 25 days after seedlings are transplanted to the greenhouse, and pollination is done by hand using brushes. Each plant will set 2–4 fruit and for high-end melon

production, particularly the Earl's variety, fruit will then be thinned to one melon per plant so that the selected fruit receives the maximum amount of nutrients (Shizuoka Crown Melon 2023). Melon fruit are suspended by string from a trellis so as not to touch the soil, and each fruit is covered with a 'hat' made of paper or other material (Figure 2.7). These hats help to protect fruit from damage caused by direct sunlight and prevent the melon skin from becoming discoloured.

Figure 2.7 Example of covered melon fruit growing in a greenhouse



After harvesting, all plant material from the old vines is removed and the soil is sterilised by sealing the raised garden beds under waterproof material and treating each one with steam (Figure 2.8).

Figure 2.8 Soil in a greenhouse being steam-sterilised



2.4.3 Pest management

Growers manage pests and diseases throughout the production season through the application of commercial insecticides, fungicides and miticides (see Table 2.2). The chemicals used are cycled between applications to prevent pests developing resistance and follow the cultivation calendars formulated by the JA for each prefecture (MAFF 2022). Due to the sheltered and climate-controlled conditions, melon fruit can be produced at any time of year. Therefore, spray calendars are generally calculated from the initial planting of the seedlings in the field or greenhouse instead of particular months or seasons. Pesticide applications can occur up to the day before harvest, therefore post-harvest application in the packing house may not be necessary.

Table 2.2 Example pest management schedule for melon fruit from Japan

| Period | Chemical spray | Pest/pathogen |
|------------------------|----------------|---|
| Before planting | fungicide | damping-off disease |
| At planting | insecticide | aphids |
| 10 days after planting | fungicide | gummy stem blight, downy mildew |
| 30 days after planting | fungicide | gummy stem blight, powdery mildew |
| | insecticide | aphids |
| 45 days after planting | fungicide | gummy stem blight, downy mildew, powdery mildew |
| | insecticide | aphids |
| 60 days after planting | fungicide | downy mildew |
| | miticide | spider mites |
| 70 days after planting | insecticide | cotton bollworm |
| 75 days after planting | fungicide | gummy stem blight, powdery mildew |
| | insecticide | aphids |
| 90 days after planting | fungicide | gummy stem blight, downy mildew, powdery mildew |

Source: MAFF (2022)

Growers regularly monitor for pests and diseases in fields and greenhouses. Monitoring includes visually inspecting crops for signs of pests or pest damage. In seedling production greenhouses, hanging sticky traps in various colours are also used to detect the presence of flying insect pests. Figure 2.9 shows traps in a greenhouse producing seedlings before they are transferred to another greenhouse for growing melon fruit. The JA for each prefecture also runs a pest forecasting service, monitoring the presence and abundance of pests across a variety of crops in their region. This information is provided to growers to assist them in identifying pests that are present in their area. Growers also have access to technical support from JA staff.

Figure 2.9 Sticky traps in a seedling production greenhouse



2.5 Harvesting and handling procedures

As with other aspects of melon fruit production in Japan, harvest time is informed by the cultivation calendars formulated by the JA for each prefecture (MAFF 2022). Harvest generally occurs around 50 days after pollination. The exact harvest date is determined by farmers based on inspection of the growing fruit and sometimes brix testing of sample fruit (JA Joso Hikari 2023). In general, field-grown melon fruit are typically harvested from May to November, while greenhouse-grown melon fruit can be harvested year-round.

Melon fruit are picked by hand using scissors or sharp blades, often cutting the vine to leave a T-shaped stem attached to the fruit. Each melon fruit is assigned a grade by the grower before being placed in boxes (4–7 fruit per box) marked with the grade of the contained fruit. An example of a melon fruit grading system used in some areas is provided in Table 2.3. A sample of melon fruit from the harvest may also be tested for sweetness with a Brix meter and by tasting before leaving the farm. Boxes of harvested melons are transported by truck to nearby packing houses.

Table 2.3 Example grading system used for melon fruit in Japan

| Classification name | Approximate % of fruit meeting grade | Sugar content in fruit | Criteria |
|---------------------|--------------------------------------|---|--|
| Fuji | 0.1% | over 14% | Strict rules for shape, skin pattern, weight and uniformity of melons within each box. |
| Yama | 25% | over 13.5% | Strict rules for shape, skin pattern and uniformity. |
| Shiro | 55% | over 13% | Strict rules for shape, skin pattern and uniformity. |
| Yuki | 5–10% | over 12% | Strict rules for shape and skin pattern. |
| Damaged/unqualified | 5–10% | Damaged/unqualified fruit are sent for processing into other products, not for packing. | |

Source: Shizuoka Crown Melon (2023)

2.6 Post-harvest

2.6.1 Packing house processes

Receival and cleaning

Once the truck arrives at the packing house, fruit are unpacked from the harvest boxes and undergo post-harvest processing. If fruit are not processed immediately on arrival at the packing house, the fruit are removed from the harvest boxes and placed on plastic sheeting laid over tatami matting so as not to directly contact the ground.

The melon fruit are machine brushed with rollers and washed if necessary. Melon fruit are protected from dust and dirt while growing, so they do not typically require washing after harvest. However, occasionally there may be soil on the fruit following adverse weather events in the field. A typical cleaning machine is shown in Figure 2.10. This machine brushes the fruit and can be fitted with a washing attachment which sprays the fruit with water as they pass over the rollers. Melons may also be hand polished by packing house staff using fungicide-treated gloves.

Figure 2.10 Machine for brushing and cleaning melon fruit



Grading and sorting

A quality check is performed at the packing house. Each melon fruit is individually inspected by packing house staff for damage and imperfections, including signs of pests or disease, and the grades assigned in the field are verified according to fruit size, colour, shape and appearance of skin netting. If melons were not tested for sweetness on the farm at time of harvest, a sample of fruit is selected and tested by taste and a Brix meter at the packing house. The sorting and grade-verification process may be assisted by automatic sorting machines (MAFF 2022).

Packing

The graded melon fruit are packed into boxes according to market requirements and the grade of the fruit is recorded on each box. The boxes are then secured with plastic straps by a machine (Figure 2.11) and moved via conveyor belt to the loading area.

Figure 2.11 Packaging machine and sealed box on conveyor belt



Storage and transport

If storage is required prior to transport to the inspection centre, the fruit is kept in sealed storage rooms at 4°C to 10°C. Once ready for transport, packed melon fruit are loaded into hermetically sealed trucks (Figure 2.12) and maintained at 4°C to 10°C while being transported to an inspection centre (MAFF 2022).

Figure 2.12 Truck at packing house loading dock ready to take melon fruit to an inspection centre



2.6.2 Phytosanitary inspection

Upon arrival at the inspection centre, melon fruit are inspected by MAFF officers, as described in section 4.2.6. If the sample is found to be free of pests and meets the requirements of the importing country, the consignment is issued with a phytosanitary certificate. If storage is required prior to transport to export facilities, the fruit is kept in sealed storage rooms at 4°C to 10°C.

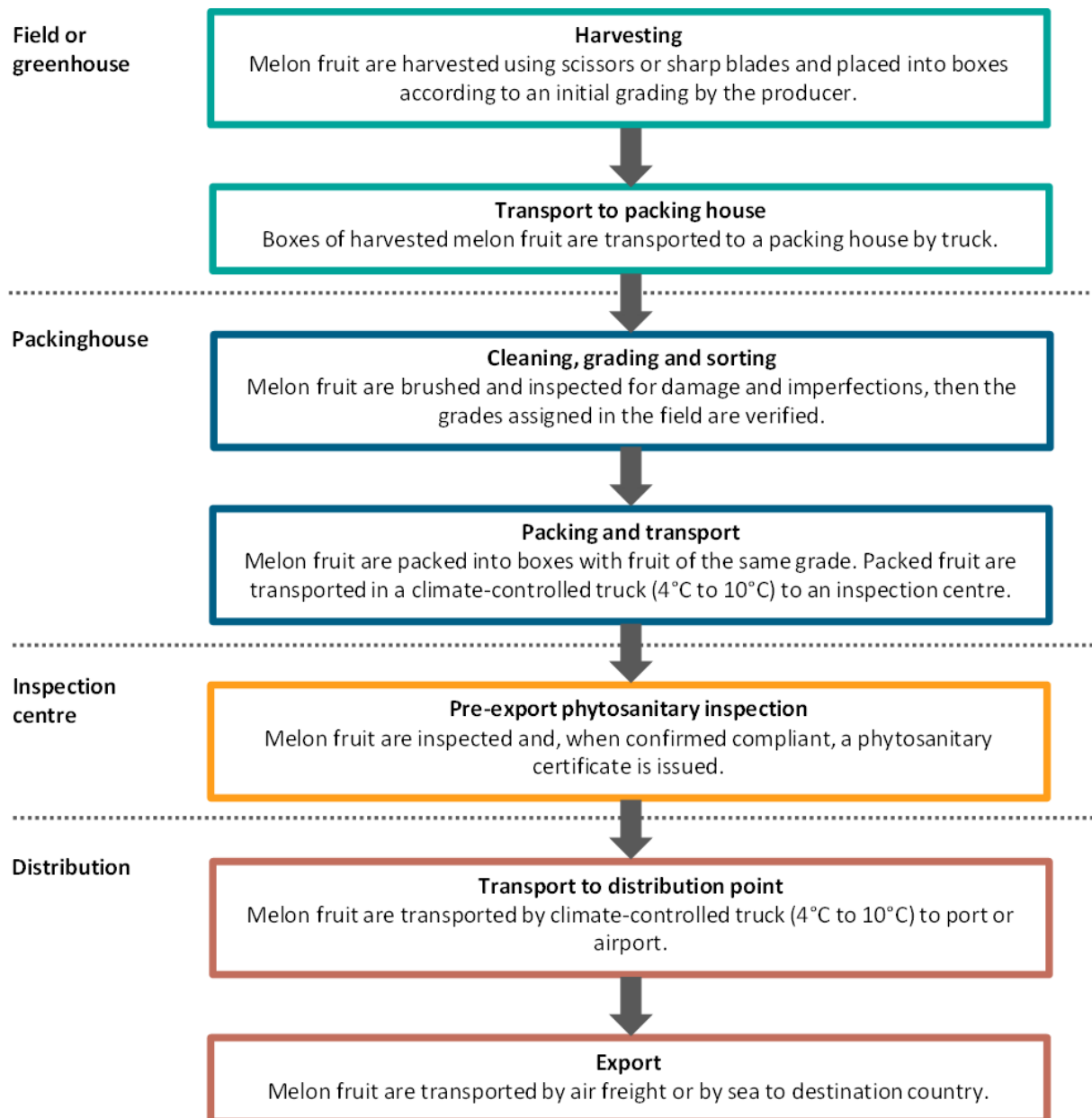
2.6.3 Transport

Melon fruit from Japan can be exported to Australia by sea or air. Melon fruit are transported to ports and airports in climate-controlled sealed trucks of the same kind used for transport to the inspection centre.

A summary of the operational steps for melon fruit grown in Japan for export is provided in Figure 2.13. These steps represent current practice in Japan and have been considered in the assessment of the biosecurity risks associated with this pathway.

Additional steps may be required to meet Australian food safety standards.

Figure 2.13 Summary of operational steps for melon fruit grown in Japan for export



2.7 Export capacity

2.7.1 Production statistics

Melons are produced throughout Japan, with a total production of 145,200 tonnes in 2023 (APPRES 2025). Production for the main melon producing prefectures in Japan from 2021 to 2023 is shown in Table 2.4.

Table 2.4 Melon fruit production in Japan's 10 largest producing prefectures

| Prefecture | Yield (tonnes) | | |
|------------|----------------|--------|--------|
| | 2021 | 2022 | 2023 |
| Ibaraki | 36,500 | 33,700 | 37,500 |
| Kumamoto | 25,400 | 24,400 | 24,100 |
| Hokkaido | 20,400 | 19,900 | 19,400 |
| Yamagata | 10,400 | 9,550 | 9,790 |
| Aomori | 9,650 | 8,020 | 7,820 |
| Aichi | 9,610 | 9,870 | 8,890 |
| Chiba | 7,880 | 7,480 | 8,060 |
| Shizuoka | 6,470 | 6,140 | 5,760 |
| Akita | 2,980 | 3,070 | 3,260 |
| Tottori | 983 | NA | 1,130 |

Source: APPRES (2025); MAFF (2022)

2.7.2 Export statistics

Japan exports melon fruit to a variety of markets, including Singapore, Malaysia, Hong Kong, Taiwan and a small amount to Hawaii. In 2024, Japan exported 965 tonnes of melons to Hong Kong, 90 tonnes to Singapore and 38 tonnes to Taiwan (International Trade Centre 2025).

2.7.3 Export season

With the protection provided by the plastic covering, field-grown melon fruit can be produced for harvest between May and November in Japan, while greenhouse melon fruit can be produced year-round (MAFF 2022). Although it is expected that exports to Australia would occur throughout the year, exports could potentially increase in volume during the months when field-grown melon fruit are harvested.

3 Pest risk assessments for quarantine pests

3.1 Summary of outcomes of pest initiation and categorisation

The initiation process (Appendix B) identified 191 pests as being potentially associated with melon plants in Japan.

Of these 191 pests, the pest categorisation process (Appendix B) identified:

- 3 pests as not present in Japan, as previous detections have since been eradicated or were based on misidentifications, and therefore not requiring further assessment
- 141 pests as already present in Australia and not under official control, and therefore not requiring further assessment
- 34 pests as not having potential to enter on the commercially produced melon fruit from Japan pathway, and therefore not requiring further assessment
- 1 pest as not having potential to cause economic consequences in Australia, and therefore not requiring further assessment.

The remaining 12 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 PRAs, 3 thrips and 3 spider mites were identified on the import pathway and listed in the pest categorisation (Appendix B). The application of the Group PRAs to this risk analysis is outlined in Appendix A in section A2.7.

3.2 Pests requiring further pest risk assessment

The 12 pests associated with commercially produced melon fruit for export from Japan identified as requiring further pest risk assessment are listed in Table 3.1. Of these 12 pests:

- 11 are quarantine pests and one (western flower thrips) is present in Australia but is a regulated article for Australia as it vectors quarantine orthospoviruses
 - 2 of the 11 quarantine pests (intonsa flower thrips and melon thrips) are also regulated articles for Australia as they can vector quarantine orthospoviruses
 - 2 of the 11 quarantine pests (melon thrips and Kanzawa spider mite) are regional quarantine pests as, while they have been recorded in some regions of Australia, interstate quarantine regulations are in place and enforced.

Table 3.1 Quarantine pests and regulated articles potentially associated with melon fruit from Japan, and requiring further pest risk assessment

| Pest/pest group | Scientific name | Common name | Policy status/region |
|---|---------------------------------------|--|-----------------------------|
| Fruit flies [Diptera: Tephritidae] | <i>Zeugodacus tau</i> | pumpkin fruit fly | EP |
| Thrips [Thysanoptera: Thripidae] | <i>Frankliniella intonsa</i> a | intonsa flower thrips | GP |
| | <i>Frankliniella occidentalis</i> | western flower thrips | GP, RA |
| | <i>Thrips palmi</i> a | melon thrips | GP, SA, Tas., WA |
| Spider mites [Trombidiformes: Tetranychidae] | <i>Tetranychus kanzawai</i> | Kanzawa spider mite | GP, WA |
| | <i>Tetranychus piercei</i> | Pierce's spider mite | GP |
| | <i>Tetranychus truncatus</i> | okra mite | GP |
| Anthrachnose [Glomerellales: Glomerellaceae] | <i>Colletotrichum aenigma</i> | fruit rot | EP |
| Late blight [Peronosporales: Peronosporaceae] | <i>Phytophthora melonis</i> | late blight | EP |
| Tobamoviruses [Martellivirales: Virgaviridae] | <i>Tobamovirus viridimaculae</i> | cucumber green mottle mosaic virus (CGMMV) | EP |
| | <i>Tobamovirus kyuri</i> | kyuri green mottle mosaic virus (KGMMV) | EP |
| Gammacarmoviruses [Tolivirales: Tombusviridae] | <i>Gammacarmovirus melonis</i> | melon necrotic spot virus (MNSV) | EP |

a: Quarantine pest species that is also identified as a regulated article for Australia as it vectors quarantine viruses.

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. **RA:** Regulated article. **SA:** Regional quarantine pest for South Australia.

Tas.: Regional quarantine pest for Tasmania. **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.

All of the pests or pest groups identified 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 melon fruit from Japan.

The biosecurity risk posed by spider mites was re-assessed by the department in the spider mites review (DAFF 2024a), which has been applied to this assessment of melon fruit from Japan. The approach used in the spider mites review is consistent with that applied to the Group PRAs for thrips (DAWR 2017a), mealybugs (DAWR 2019) and scale insects (DAWE 2021). Therefore, the spider mites review is regarded as a Group PRA for spider mites.

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 3.7. 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 Pumpkin fruit fly

Zeugodacus tau (EP)

Zeugodacus tau belongs to the Tephritidae family, a group considered to be among the most damaging pests of horticultural crops. This fruit fly species is not present in Australia and is a quarantine pest for Australia.

Zeugodacus tau was formerly placed in the *Bactrocera* genus but, on the basis of phylogenetic relationship analysis, it has been reassigned to the genus *Zeugodacus* (Virgilio et al. 2015). This assessment uses the currently accepted name of *Z. tau*. This species is commonly known as the pumpkin fruit fly, or tau fruit fly, although in Japan, *Z. tau* is also known as melon fly, a name typically attributed to *Z. cucurbitae*. A related species, *Zeugodacus depressus*, is also widely known as pumpkin fruit fly, so care is needed when interpreting reports where only common names are used.

The draft report for melon fruit from Japan assessed *Z. tau* as absent from Japan, although noted there had been previous detections on Ishigaki Island in Okinawa Prefecture in 1998 and 2003, which failed to become an established population (Ohno et al. 2008).

After the release of the draft report, an incursion of *Z. tau* was detected in part of Okinawa Prefecture and officially reported by MAFF on 10 April 2025. As stated in the IPPC pest notification, Japan has implemented control measures, including restrictions on movement of host fruits from the infested area to prevent the spread of *Z. tau* within Japan. *Zeugodacus tau* remains a quarantine pest for Japan.

The department acknowledges the steps taken by Japan to control and eradicate *Z. tau*, which will likely prevent fruit from infested areas being exported to Australia. However, it is considered necessary to assess the potential risks to determine whether additional risk management measures are required to ensure melon fruit from infested areas is not exported to Australia or is subject to appropriate treatment prior to export.

This assessment for *Z. tau* for melon fruit from Japan builds on previous assessments for this species. *Zeugodacus tau* has been assessed previously by the department in the policies for mangoes from Taiwan (Biosecurity Australia 2006), passionfruit from Vietnam (DAFF 2023b) and pomelo fruit from Vietnam (DAFF 2024b).

Reassessment of the likelihood of importation for *Z. tau* associated with the melon fruit from Japan pathway is necessary because there may be differences in pest prevalence, the pest's association with the host commodities and the commercial production practices between the previously assessed commodity/country pathways and melon fruit from Japan.

Previous assessments for *Z. tau* rated the likelihood of distribution as High.

Melon fruit from Japan is expected to be distributed in Australia in a similar way to the previously assessed commodity/country pathways. It is expected that once melon fruit arrives in Australia from Japan, it will be distributed to various destinations throughout Australia for wholesale and retail sale. Most fruit waste would likely be disposed of via municipal waste facilities (Pickin et al. 2022). However, small quantities of fruit waste may be discarded in the environment, increasing the likelihood of larvae completing development and the adult flies dispersing to a host. Adult *Z. tau* flies are highly mobile and will likely fly to nearby host plants, attracted by volatile compounds produced by host fruits (Jia et al. 2023). *Zeugodacus tau* has a wide host range, with a preference for the fruit

of plants in the Cucurbitaceae, Moraceae, Myrtaceae, Sapotaceae, and Solanaceae families (Jia et al. 2023). There may be fruiting hosts present throughout the year in many parts of Australia.

On this basis, the same rating of High for the likelihood of distribution for *Z. tau* in previous assessments is adopted for *Z. tau* for the melon fruit from Japan pathway.

The likelihoods of establishment and spread of *Z. tau* in Australia from the melon fruit from Japan 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 *Z. tau* 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 *Z. tau* in previous assessments have been adopted for the melon fruit from Japan pathway.

In addition, the department has reviewed the latest literature – for example, He, Xu and Chen (2023); Huang, Hong and Chou (2023); Jia et al. (2023); Kausar et al. (2023) and Liu et al. (2022). No new information has been identified that would significantly change the risk ratings for distribution, establishment, spread and consequences assessment for *Z. tau* in the existing policies.

The risk scenario of biosecurity concern is that eggs or larvae of *Z. tau* may be present in melon fruit imported from Japan, successfully complete development and emerge as adults in Australia, which may result in the establishment and spread of this pest 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 *Z. tau* will arrive in Australia in a viable state with the importation of melon fruit from Japan is assessed as: **Very low**.

The likelihood of importation is assessed as Very low because *Z. tau* has very limited distribution within Japan, it is under official control to prevent its spread, and measures have been implemented to eradicate the pest. However, as this risk analysis covers all commercial production areas in Japan, there is a small potential for *Z. tau* to arrive in Australia. Melons are a known host for *Z. tau*, fruit in the early stages of infestation may not show symptoms and could be packed for export, and any fruit fly eggs and larvae in the fruit are likely to remain viable during storage and transport.

The following information provides supporting evidence for this assessment.

Melon is recorded as a host for *Z. tau*.

- *Zeugodacus tau* has been reported infesting melons (*Cucumis melo*) (Allwood et al. 1999; Lin 2006), including rockmelons (Lin 2006), although other cucurbits such as cucumber, ivy gourd, bitter melon and squash may be preferred if available.

Zeugodacus tau is present in Japan, but with limited distribution.

- *Zeugodacus tau* is present on Okinawa Island, and some surrounding islands in Okinawa Prefecture, following an incursion in 2024. Its official pest status is present, but not widely distributed and under official control.
- Ongoing surveillance trapping has not detected *Z. tau* in other parts of Japan.
- There have been previous minor incursions of *Z. tau* on Ishigaki Island in Okinawa Prefecture in 1998 and 2003, which failed to establish a population (Ohno et al. 2008).

Melons are unlikely to be exported to Australia from areas where *Z. tau* is known to be present.

- *Zeugodacus tau* is not present in the main melon production areas in Japan located on the islands of Honshu, Hokkaido and Kyushu. These production areas are a significant distance from Okinawa Prefecture, which is located more than 500 km south-west of Kyushu.
- Movement restrictions have been applied to a wide range of fresh fruit and flowers of potential host plants within the identified control area in Okinawa Prefecture. This includes melons and other cucurbits.
- Infested host fruit, or host fruit that are likely to be infested, within the control zone are to be destroyed in accordance with instructions from relevant officials (MAFF 2025).
- *Zeugodacus tau* remains a quarantine pest for Japan and restrictions are in place at points of entry to prevent its introduction.
- It is unlikely that melon fruit sourced from areas where *Z. tau* was known to be present would be exported to Australia.

Infested melon fruit may not show obvious symptoms at the time of harvest and fruit flies may be undetected during post-harvest practices.

- Fruit flies lay their eggs beneath the skin of the fruit (Liu & Ji 2024), 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. Melon 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 (Putulan et al. 2004) and therefore fruit in the early stages of infestation may not be culled during harvest and post-harvest handling practices.
- In a laboratory study, *Z. tau* preferred to oviposit in fresh fruits and neglected damaged and rotting fruit (Lin 2006). In the same study, *Z. tau* also avoided ovipositing in fruit that was already infested by third instar larvae of *Z. tau* or *Z. cucurbitae* (Lin 2006).

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

- After harvest, melon fruit destined for export are stored and transported at cool temperatures, typically at 4°C to 10°C, to maintain fruit quality.
- The development rate of *Z. tau* is significantly influenced by temperature, with the development time increasing at lower ambient temperatures (Liu & Ji 2024).
- 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 *Z. tau* (Liu et al. 2022).

For the reasons outlined, the likelihood of importation of *Z. tau* on imported melon fruit from Japan is assessed as **Very low**.

Likelihood of distribution

The likelihood that the *Z. tau* will be distributed within Australia in a viable state as a result of the processing, sale or disposal of melon fruit from Japan, and subsequently transfer to a susceptible part of a host is likely to be similar to *Z. tau* on previously assessed pathways. Therefore, the same likelihood rating of **High** for the likelihood of distribution for *Z. tau* in previous assessments is adopted for *Z. tau* for melon fruit from Japan.

Overall likelihood of entry

The overall likelihood of entry is determined as **Very low** by combining the re-assessed likelihood of importation of Very low 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 *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 *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 *Z. tau* will enter Australia as a result of trade in melon fruit from Japan, 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**.

3.4.4 Consequences

The potential consequences of the entry, establishment and spread of *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 *Z. tau* on the melon fruit from Japan 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.

| Unrestricted risk estimate for <i>Zeugodacus tau</i> | |
|---|----------|
| Overall likelihood of entry, establishment and spread | Very low |
| Consequences | High |
| Unrestricted risk | Low |

The URE for *Zeugodacus tau* on the melon fruit from Japan pathway is assessed as **Low**, which does not achieve the ALOP for Australia. Therefore, specific risk management measures are required for *Z. tau* on this pathway.

3.5 Thrips

***Frankliniella intonsa* (GP), *Frankliniella occidentalis* (GP, RA), *Thrips palmi* (GP, SA, Tas., WA)**

Three thrips species were identified on the melon fruit from Japan pathway as quarantine pests and/or regulated articles for Australia: *Frankliniella intonsa*, *F. occidentalis* and *Thrips palmi* (Table 3.2).

Frankliniella intonsa is not present in Australia and is a quarantine pest for all of Australia.

Thrips palmi is not present in South Australia or Tasmania and is assessed as a regional quarantine pest for those states. *Thrips palmi* is present but not widely distributed in Western Australia and is assessed as a regional quarantine pest for all areas of Western Australia outside the Ord River Irrigation Area (Shire of Wyndham-East Kimberley).

Frankliniella occidentalis is present in Australia and is not under official control, therefore is not a quarantine pest for Australia. *Frankliniella occidentalis* was assessed as a regional quarantine pest for the Northern Territory in the draft report. However, domestic movement controls have been revoked and *F. occidentalis* is no longer under official control.

Frankliniella occidentalis, *F. intonsa* and *T. palmi* are identified as regulated articles for Australia because they are capable of harbouring and spreading (vectoring) orthotospoviruses that are quarantine pests for Australia, as detailed in the thrips Group PRA (DAWR 2017a).

A regulated article is defined by the IPPC as '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).

The indicative likelihood of entry for all quarantine thrips and all thrips that were identified as regulated articles is assessed in the thrips Group PRA as Moderate (DAWR 2017a). *Frankliniella intonsa*, *F. occidentalis* and *T. palmi* are reported from Japan and are associated with melon fruit (Barba-Alvarado et al. 2020; Childers 1997; JSAEZ 1987; Kawai 1990; MAFF 2022; Papadaki, Harizanova & Bournazakis 2008). Standard packing house processes and transportation are not expected to eliminate these thrips species on the melon fruit from Japan pathway. After assessment of relevant pathway-specific factors (sections A2.6 and A2.7) for melon fruit from Japan, the likelihood of entry of Moderate was verified as appropriate for these thrips on this pathway (Table 3.2).

Table 3.2 Thrips species identified as a quarantine pest and/or a regulated article for melon fruit from Japan

| Pest | In thrips Group PRA | Quarantine pest | Regulated article | On melon fruit pathway | Likelihood of entry |
|-----------------------------------|----------------------------|------------------------|--------------------------|-------------------------------|----------------------------|
| <i>Frankliniella intonsa</i> | Yes | Yes | Yes | Yes | Moderate |
| <i>Frankliniella occidentalis</i> | Yes | No | Yes | Yes | Moderate |
| <i>Thrips palmi</i> | Yes | Yes (SA, Tas., WA) | Yes | Yes | Moderate |

SA: Regional quarantine pest for South Australia. **Tas.:** Regional quarantine pest for Tasmania. **WA:** Regional quarantine pest for Western Australia.

A summary of the risk assessment for quarantine thrips is presented in Table 3.3 for convenience.

Table 3.3 Risk estimates for quarantine thrips

| Risk component | Rating for quarantine thrips |
|---|-------------------------------------|
| 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 |
| Unrestricted risk | Low |

As assessed in the thrips Group PRA, the indicative URE for quarantine thrips is Low (Table 3.3) which does not achieve the ALOP for Australia. This indicative URE is considered to be applicable for *F. intonsa* and *T. palmi* present on the melon fruit from Japan pathway. Therefore, specific risk management measures are required for the thrips on this pathway.

As the thrips species *F. intonsa*, *F. occidentalis* and *T. palmi* vector orthotospoviruses that are quarantine pests for Australia, a summary of the risk assessment for quarantine orthotospoviruses transmitted by thrips is presented in Table 3.4 for convenience.

Table 3.4 Risk estimates for quarantine orthotospoviruses vectored by thrips

| Risk component | Rating for quarantine orthotospoviruses (a) |
|---|--|
| Likelihood of entry (importation x distribution) | Low (Moderate x Moderate) |
| Likelihood of establishment | Moderate |
| Likelihood of spread | High |
| Overall likelihood of entry, establishment and spread | Low |
| Consequences | Moderate |
| Unrestricted risk | Low |

a: Risk estimates for quarantine orthotospoviruses adopted from the thrips Group PRA (DAWR 2017a).

As assessed in the thrips Group PRA, the URE for quarantine orthotospoviruses transmitted by thrips is Low (Table 3.4), which does not achieve the ALOP for Australia.

This URE is considered to be applicable for the orthotospoviruses known to be vectored by *F. intonsa*, *F. occidentalis* and *T. palmi* present on the melon fruit from Japan pathway. Therefore, specific risk management measures are required for these thrips species to mitigate the risks posed by quarantine orthotospoviruses in order to achieve the ALOP for Australia.

This risk assessment, which is based on the thrips Group PRA, applies to all phytophagous quarantine thrips and all thrips identified as regulated articles on the melon fruit from Japan pathway, irrespective of their specific identification in this document. This is explained in section A2.7.

3.6 Spider mites

***Tetranychus kanzawai* (GP, WA), *Tetranychus piercei* (GP), *Tetranychus truncatus* (GP)**

Three spider mite species on the melon fruit from Japan pathway were identified as of biosecurity concern to Australia: *Tetranychus kanzawai*, *T. piercei* and *T. truncatus* (Table 3.5).

Tetranychus piercei and *T. truncatus* are not present in Australia and are quarantine pests for all of Australia.

Tetranychus kanzawai is not present in Western Australia and is assessed as a regional quarantine pest for that state.

Tetranychus kanzawai, *T. piercei* and *T. truncatus* belong to the family Tetranychidae. All members of Tetranychidae are commonly referred to as spider mites or tetranychids.

The biosecurity risk posed by 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 review) (DAFF 2024a). The spider mites review examines and evaluates all previous pest risk assessments conducted by the department on species of Tetranychidae. The review concludes that those spider mite species share several biological characteristics relevant to biosecurity risk and are expected to pose similar risk, with similar likelihoods of entry, establishment and spread, and with comparable overall consequences.

The spider mites review recommends that a likelihood rating of High for establishment, a likelihood rating of High for spread and an estimate of Low for overall consequences are appropriate for all spider mite species previously assessed by the department. These ratings will also be applied to other spider mite species in future assessments unless counter evidence is available. The spider mites review also recommends an indicative likelihood rating of High for importation (pathway specific) and an indicative likelihood rating of Moderate for distribution (pathway and/or species specific) for all spider mite species in future assessments. The indicative ratings mean that factors relevant to likelihoods of importation and distribution should be examined to determine whether the indicative rating can be verified. This approach is consistent with that applied to the Group PRAs for thrips (DAWR 2017a), mealybugs (DAWR 2019) and scale insects (DAWE 2021). Therefore, the spider mites review is regarded as a Group policy (GP) for spider mites and is adopted in this pest risk assessment.

The indicative likelihood of entry for all quarantine spider mites is recommended in the spider mites review to be Moderate (High for importation, Moderate for distribution) (DAFF 2024a). After assessment of relevant pathway-specific factors (section A2.6) for the melon fruit from Japan pathway, the indicative likelihood of importation of High was not verified as appropriate for spider mite species on the melon fruit from Japan pathway due to the following reasons:

- Spider mites are mainly associated with the foliage of melon plants, though they may sometimes occur on other plant parts, including fruit, particularly when infestation levels are high (Ho & Chen 1994; Jeppson, Keifer & Baker 1975; Seeman & Beard 2005).
- Due to pest management practices implemented in melon production in Japan, such as pest monitoring and pesticide sprays, high infestation is very unlikely to occur.

- No records of these 3 spider mite species being associated with melon fruit in Japan could be found.
- If spider mites are present on fruit, packing house processes of cleaning the fruit and removal of damaged or infested fruit are likely to reduce any infestation on the fruit.
- If spider mites are present on packed fruit, they may survive cold storage and transport to Australia, due to their ability to overwinter and survive sub-zero temperatures (Jeppson, Keifer & Baker 1975).

For these reasons, the likelihood of importation for spider mites on imported melon fruit from Japan is assessed as Low (Table 3.5).

After assessment of relevant pathway-specific factors (sections A2.6 and A2.7) for melon fruit from Japan, the indicative likelihood of distribution of **Moderate** was verified as appropriate for spider mite species on this pathway (Table 3.5).

Table 3.5 Likelihood of entry for spider mites species identified as a quarantine pest for melon fruit from Japan

| Pest | In spider mites review | Quarantine pest | On melon fruit pathway | Likelihood of entry (importation x distribution) |
|------------------------------|------------------------|-----------------|------------------------|--|
| <i>Tetranychus kanzawai</i> | Yes | Yes (WA) | Yes | Low (Low x Moderate) |
| <i>Tetranychus piercei</i> | Yes | Yes | Yes | Low (Low x Moderate) |
| <i>Tetranychus truncatus</i> | Yes | Yes | Yes | Low (Low x Moderate) |

WA: Regional quarantine pest for Western Australia

A summary of the risk assessment for quarantine spider mites is presented in Table 3.6 for convenience.

Table 3.6 Risk estimates for quarantine spider mites on melon fruit from Japan

| Risk component | Rating for quarantine spider mites |
|---|------------------------------------|
| Likelihood of entry (importation x distribution) | Low (Low x Moderate) |
| Likelihood of establishment | High |
| Likelihood of spread | High |
| Overall likelihood of entry, establishment and spread | Low |
| Consequences | Low |
| Unrestricted risk | Very Low |

The URE for *T. kanzawai*, *T. piercei* and *T. truncatus* on the melon fruit from Japan pathway is assessed as Very Low (Table 3.6) which achieves the ALOP for Australia. Therefore, specific risk management measures are not required for *T. kanzawai*, *T. piercei* and *T. truncatus* on this pathway.

3.7 Anthracnose

Colletotrichum aenigma (EP)

The genus *Colletotrichum* comprises 340 species across 20 species complexes, many of which are pathogens of crops (Talhinhas & Baroncelli 2023). *Colletotrichum aenigma* belongs to the *C. gloeosporioides* species complex and was first described in 2012 from isolates collected from avocado in Israel and from Asian pear in Japan (Weir, Johnston & Damm 2012). Anthracnose is the common name used for diseases caused by members of the genus *Colletotrichum*.

Multi-gene DNA sequence analysis has led to the re-identification of some fungal isolates associated with melon anthracnose in Japan from *C. gloeosporioides* to *C. aenigma* (Sato et al. 2017). With the exception of *C. aenigma*, the *Colletotrichum* species associated with melon are present in Australia (Shivas et al. 2016). *Colletotrichum aenigma* is not recorded in Australia and is a quarantine pest for all of Australia.

In addition to Japan, *C. aenigma* has also been reported from Brazil, China, Colombia, Iran, Italy, Korea, Malaysia, Thailand and the UK (CABI 2025; EFSA Panel on Plant Health (PLH) et al. 2022).

Colletotrichum species have been isolated from diseased tissues on leaves, petioles, stems and fruit of melon (Kanno & Moriwaki 2000). Species associated with anthracnose of melon plants include *Colletotrichum orbiculare*, *C. fructicola*, *C. aenigma*, *C. chlorophyti*, *C. karsti*, *C. truncatum* and *C. gloeosporioides* (Damm et al. 2012; Jiang et al. 2023; Kanno & Moriwaki 2000; USDA-APHIS 2020). Symptoms of anthracnose on melon plants are described as necrotic spots or lesions, which are circular on leaves and oval and sunken on stems and petioles (Kanno & Moriwaki 2000; MAFF 2022). On melon fruit, anthracnose causes round to oval shaped concave yellow brown spots (MAFF 2022).

Limited biological information is available for *C. aenigma*. *Colletotrichum aenigma* shares common biological and pathogenic characteristics with other species in the genus *Colletotrichum*, particularly the *C. gloeosporioides* species complex (EFSA Panel on Plant Health (PLH) et al. 2022). In general, species of *Colletotrichum* exhibit both asexual and sexual morphs in their life cycle, and are soil borne, persisting on plant residues in the soil (Business Queensland 2022; Jayawardena et al. 2021). Dispersal of *Colletotrichum* species is primarily through asexual conidiospores, which spread in water droplets (Rajasab & Chawda 1994). Sporulation, germination and growth of *Colletotrichum* species are favoured by warm and humid conditions (Coates, Cooke & Forsberg 2016). While some species of *Colletotrichum* are also seed-borne, including melon-associated species *C. orbiculare* and *C. truncatum*, there is no evidence indicating that *C. aenigma* is seed-borne (EFSA Panel on Plant Health (PLH) et al. 2022).

Colletotrichum aenigma has been isolated from a number of hosts. In addition to melons, fruit affected by *C. aenigma* include kiwi berries (Wang et al. 2019), olives (Schena et al. 2014), apples (Lee et al. 2021), miracle fruit (Truong et al. 2018), dragon fruit (Meetum, Leksomboon & Kanjanamaneesathian 2015), grapes (Kim et al. 2021), mangoes (NARO 2024a), capsicums (Sharma et al. 2022) and walnuts (Wang et al. 2021). *Colletotrichum aenigma* is also associated with leaf disease of economically important food crops including watermelons (Guo et al. 2022), strawberries (Han et al. 2016), cherries (Zhou et al. 2023), pecans (Zhao et al. 2024) and tea (Lin et al. 2023) as well as being recorded from weeds and landscaping plants (Chen et al. 2019; Li et al. 2023; Qiao et al. 2023).

Colletotrichum aenigma is often reported occurring on crops with other *Colletotrichum* species (Diao et al. 2017; Han et al. 2016; Ye et al. 2023), therefore, it is not always possible to assess the contribution of this species to anthracnose symptoms. For example, *C. aenigma* has been isolated from fruit rot on oriental pickling melon along with 3 other *Colletotrichum* species (Jiang et al. 2023).

Colletotrichum aenigma has been assessed previously in the existing policy for fresh strawberry fruit from Japan (DAWE 2020a). In that policy, the URE for *C. aenigma* was assessed as Negligible, which achieves the ALOP for Australia. Therefore, no specific risk management measures are required for *C. aenigma* on that pathway.

However, there may be differences in the commodity and horticultural practices between the previously assessed pathway, and melon fruit from Japan. These potential differences make it necessary to re-assess the likelihood that *C. aenigma* will arrive in Australia in a viable state on the melon fruit from Japan pathway.

Previous assessments for *C. aenigma* in the existing policies rated the likelihood of distribution as Low.

Melon fruit from Japan are expected to be distributed in Australia in a similar way to strawberry fruit from Japan. It is expected that once the melon fruit have arrived in Australia from Japan, they will be distributed throughout Australia for wholesale or retail sale. Fruit arriving at sale points that are unmarketable are likely to be removed from further distribution and discarded into managed waste systems. Potential transfer of *C. aenigma* to suitable host plants from managed waste systems is likely to be negligible. However, infected fruit with no obvious symptoms may be sold to consumers and infected fruit and fruit waste may be disposed of into urban, peri-urban or areas of natural vegetation in close proximity to a suitable host. There are limited opportunities for *C. aenigma* to transfer to a suitable host from discarded infected fruit or fruit waste, including through fruit waste discarded in compost. As melon fruit have thick skin, melon waste may take longer to break down in the environment than strawberry fruit waste. However, this is not considered to significantly increase the probability of successful transmission to a new host. On this basis, the same rating of Low for the likelihood of distribution for *C. aenigma* in the previous assessment is adopted for the melon fruit from Japan pathway.

The likelihoods of establishment and spread of *C. aenigma* in Australia from the melon fruit from Japan pathway have also been assessed as similar to those of the previous assessment for strawberry fruit from Japan of Moderate for both likelihoods. 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 *C. aenigma* in Australia are also independent of the import pathway and have been assessed as being similar to the previous risk assessment for strawberry fruit from Japan of Low. The existing ratings for the likelihoods of establishment and spread, and the rating for the overall consequences for *C. aenigma* in previous assessments have been adopted for the melon fruit from Japan pathway.

In addition, the department has reviewed the latest literature—for example, EFSA Panel on Plant Health (PLH) et al. (2022); EFSA Panel on Plant Health (PLH) et al. (2023b); Fan et al. (2023); Guo et al. (2022) and Jiang et al. (2023). No new information has been identified that would significantly

change the risk ratings for distribution, establishment, spread and consequences as set out for *C. aenigma* in the existing policies.

The risk scenario of biosecurity concern is that *C. aenigma* may be imported on symptomless melon fruit from Japan, 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 *C. aenigma* will arrive in Australia in a viable state with the importation of melon fruit from Japan is assessed as: **Low**.

The likelihood of importation is assessed as Low because, while *C. aenigma* is present in Japan on *C. melo*, standard commercial practices including soil sterilisation, humidity control, protection of fruit from direct soil contact and rain splash, and fungicide application would greatly reduce the likelihood of melon fruit being infected with *C. aenigma*. Any infected fruit with visible symptoms would likely be detected and discarded during harvest and packing house processes. However, fruit with no or mild symptoms may be packed for export. The pathogen could survive post-harvest cool storage and transport conditions.

The following information provides supporting evidence for this assessment.

Colletotrichum aenigma is present in Japan and is associated with melon fruit.

- In Japan, *C. aenigma* was isolated from *Cucumis melo* fruit in 1996 (NARO 2024b) and from oriental pickling melon (*C. melo* var. *conomon*) fruit in 2010 (Jiang et al. 2023).
- The isolate from oriental pickling melon was found along with *C. orbiculare*, *C. fruticola* and *C. chlorophyti*. The contribution of each species to anthracnose of melon plants is unknown (Jiang et al. 2023).

Commercial melon production practices followed in Japan are likely to reduce *C. aenigma* in production areas and on melon fruit.

- Commercial pre-planting and production practices for melon fruit are likely to reduce the incidence of the pathogen in production areas.
 - Transmission of anthracnose between crops occurs when pathogens persist on plant residues in the soil (Business Queensland 2022). In production areas, the soil is steam-sterilised in the greenhouse or chemically sterilised in the field prior to planting of seedlings (MAFF 2022; Shizuoka Crown Melon 2023), greatly reducing the likelihood of *C. aenigma* being present in the soil.
 - Hygiene practices, such as sanitation of equipment may prevent the introduction of *C. aenigma* to the crop and the spread of the pathogen through contaminated equipment.
 - *Colletotrichum aenigma* has a wide host range, therefore weed control in the greenhouse and around fields may prevent the introduction of *C. aenigma* to the melon crop.

- *Colletotrichum* spores may be carried in rain splash (Business Queensland 2022; Rajasab & Chawda 1994). Melons in Japan are grown in protected environments (in greenhouses or plastic tunnels) which reduces the possibility of infection spreading through contaminated rain splash (MAFF 2022).
- Warm and humid conditions favour infection, growth and spread of *Colletotrichum* species. In greenhouses, humidity is controlled by opening mesh-covered windows, while in plastic tunnels the sheeting is drawn back to provide air circulation to create conditions less favourable to growth and transmission of *Colletotrichum*.
- Greenhouse-grown melons are suspended by string from trellises in isolated raised garden beds above the concrete floor of the greenhouse (Shizuoka Crown Melon 2023). This technique ensures the fruit does not touch the soil. Melons grown under plastic tunnels in the field grow in mulch beds covered with plastic sheeting and the fruit sit on individual stands. This reduces the likelihood of *C. aenigma* coming into contact with the fruit if the pathogen is present in the soil.
- Fungicides are applied regularly from the planting stage to harvest and are applied either to the plant or directly to the fruit surface. This management practice reduces the likelihood of *C. aenigma* infecting fruit if present at the production site.
- Melons grown in Japan are intensively managed for pests and diseases (Shizuoka Crown Melon 2023), therefore, infected plants are likely to be detected and removed through the regular monitoring of crops by growers.
 - Host plants infected with anthracnose exhibit visible symptoms including dark, sunken spots or lesions on affected foliage, stems and fruit (Business Queensland 2022; MAFF 2022).
 - If symptoms of anthracnose infection are detected, the infected plant would be removed from production and disposed of, which reduces the likelihood of further spread of the disease through the production area.

If *C. aenigma* is present at a production site in Japan, it is possible that asymptomatic infected fruit, or fruit with no visible external symptoms, could escape detection during commercial harvesting and packing house processes and be packed for export.

- Symptoms of anthracnose on melon fruit include deeply concave, round to oval yellow-brown spots. Any fruit showing visible signs of infection would be excluded at harvest or during the grading and packing process.
- *Colletotrichum* species can have a latent period in fruit. Fruit with early stages of infection by *C. aenigma* may not show visible symptoms at the time of harvest or during sorting and grading, and therefore may not be detected and may be packed for export.

Colletotrichum aenigma could survive conditions during postharvest storage and transport to Australia.

- Japanese melons are stored and transported under controlled conditions, with an average storage temperature of 4°C to 10°C (MAFF 2022). The optimum temperature for growth of *C. aenigma* mycelia is 25°C to 27°C with little growth occurring below 10°C (Ye et al. 2023), therefore symptoms may not develop during transportation.
- No evidence was found of the effect of low temperatures on survival of *C. aenigma*. However, other *Colletotrichum* species remain viable and are able to infect fruit following cold storage (Everett 2003).

For the reasons outlined, the likelihood of importation of *C. aenigma* on imported melon fruit from Japan is assessed as Low.

Likelihood of distribution

The likelihood that the assessed pathogen will be distributed within Australia in a viable state as a result of the processing, sale or disposal of melon fruit from Japan, and subsequently transfer to a susceptible part of a host is likely to be similar to the assessment of *C. aenigma* on the strawberry fruit from Japan pathway. The same rating of **Low** for the likelihood of distribution for *C. aenigma* in previous assessments is adopted for melon fruit from Japan.

Overall likelihood of entry

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

3.7.2 Likelihoods of establishment and spread

The likelihoods of establishment and spread for the *C. aenigma* is independent of the import pathway and are considered similar to those in previously assessed pathways.

Based on the existing import policies for *C. aenigma*, the likelihoods of establishment and spread are assessed as **Moderate** and **Moderate**, respectively.

3.7.3 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 *C. aenigma* will enter Australia as a result of trade in melon fruit from Japan, 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**.

3.7.4 Consequences

The potential consequences of the entry, establishment and spread of *C. aenigma* in Australia are similar to those in the strawberry fruit from Japan pathway. The overall consequences in the previous assessments were assessed as Low. The overall consequences for the *C. aenigma* on the melon fruit from Japan pathway are also assessed as **Low**.

3.7.5 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.

| Unrestricted risk estimate for <i>Colletotrichum aenigma</i> | |
|---|------------|
| Overall likelihood of entry, establishment and spread | Very Low |
| Consequences | Low |
| Unrestricted risk | Negligible |

The URE for *Colletotrichum aenigma* on the melon fruit from Japan pathway is assessed as **Negligible**, which achieves the ALOP for Australia. Therefore, no specific risk management measures are required for *C. aenigma* on this pathway.

3.8 Late blight

***Phytophthora melonis* (EP)**

Phytophthora melonis (synonym: *P. sinensis*) is an important soil-borne pathogen of cucurbits, and can cause heavy damage to crops (Guharoy et al. 2006; Mirtalebi & Banihashemi 2019; Sangeetha et al. 2016). *Phytophthora melonis* has been recorded from cucurbits in Japan (Mills, Förster & Coffey 1991; Rahman et al. 2014). *Phytophthora melonis* is not recorded in Australia and is a quarantine pest for Australia.

The main hosts of *P. melonis* are cucurbits, particularly cucumber (*Cucumis sativa*), but also melon (*C. melo*) (Ho, Gallegly & Hong 2007; Mills, Förster & Coffey 1991), watermelon (*Citrullus lanatus*), pumpkin (*Cucurbita moschata*) (Chehri et al. 2010) and pointed gourd (*Trichosanthes dioica*) (Sangeetha et al. 2016). It has also been isolated from diverse hosts such as pistachio (*Pistacia vera*) (Mirabolfathy et al. 2001; Mirsoleimani & Mostowfizadeh-Ghalamfarsa 2013), juniper (*Juniperus phoenicea*) (Scanu et al. 2015) and cassava (*Manihot esculenta*) (de Oliveira et al. 2016).

In addition to Japan, *P. melonis* has also been recorded from cucurbits in Korea (Kim & Koo 2009), China, Taiwan (Mills, Förster & Coffey 1991), Iran (Mirabolfathy et al. 2001; Mostowfizadeh-Ghalamfarsa & Banihashemi 2015), India (Guharoy et al. 2006), Iraq (Muhammed & Mohamed 2023), Egypt and Turkey (Ho, Gallegly & Hong 2007). On other hosts, it has been recorded in Iran (on pistachio) (Mirabolfathy et al. 2001; Mostowfizadeh-Ghalamfarsa & Banihashemi 2015), Italy (on juniper) (Scanu et al. 2015), and Brazil (on cassava) (de Oliveira et al. 2016). Iran is the only country where *P. melonis* has been recorded on more than one host family (Cucurbitaceae and Anacardiaceae).

The primary means of reproduction and dispersal in *Phytophthora* vary between species. *Phytophthora melonis* can have 5 different life stages: mycelium (hyphae), sporangia, zoospores, oospores and, in some species, chlamydospores (Erwin & Ribeiro 1996). *Phytophthora melonis* is not thought to produce chlamydospores (asexual resting spores) (Ho, Gallegly & Hong 2007) and is not self-fertile. It requires the meeting of 2 opposite mating types in order to produce oospores (sexually produced resting spores) (Erwin & Ribeiro 1996; Judelson & Blanco 2005). Both mating types do not necessarily occur within the same geographical area (Ann, Kao & Ko 1986; Drenth, Turkensteen & Govers 1993; Judelson & Blanco 2005; Zentmyer et al. 1973). While oospores may be readily produced under laboratory conditions, they are relatively uncommon in the natural environment (Abad et al. 2023).

Phytophthora melonis disperses mainly via motile zoospores, which are soil-borne and generally infect roots (Erwin & Ribeiro 1996; Yakabe et al. 2009). They disperse through water or water films in soil and are attracted to chemicals released by roots (Judelson & Blanco 2005). Zoospores encyst permanently on contact with any solid object (Erwin & Ribeiro 1996; Hardham 2007; Judelson & Blanco 2005). If they make contact with a suitable host, they germinate and colonise the host tissue (Judelson & Blanco 2005).

Phytophthora melonis can spread through soil, irrigation water, rain splash or human-assisted movement (Erwin & Ribeiro 1996; Judelson & Blanco 2005; Zitter, Hopkins & Thomas 1996) and can infect any part of the host plant at any growth stage (Ho, Gallegly & Hong 2007). Infection occurs in wet conditions and usually begins at the stem collar of the host plant, where the roots meet the

stem, when water pooling around the stem allows the pathogen to invade the host tissue (Erwin & Ribeiro 1996). The stem becomes discoloured and softens, and the plant eventually collapses and dies (Erwin & Ribeiro 1996; Ho, Gallegly & Hong 2007). In fruit, infection appears as dark green, water-soaked lesions and eventually develops into soft rot of the fruit. If the environment remains moist, white mycelial growth and powdery sporangia become visible on the fruit surface (Erwin & Ribeiro 1996; Guharoy et al. 2006; Zitter, Hopkins & Thomas 1996).

Phytophthora melonis has been assessed previously in the existing policy for oriental melon and rockmelon fruit from Korea (DAFF 2023a). In that policy, the URE for *P. melonis* was assessed as Negligible, which achieves the ALOP for Australia. Therefore, no specific risk management measures are required for *P. melonis* on that pathway.

However, there may be differences in pest prevalence, climatic conditions and horticultural practices between the previously assessed oriental melon and rockmelon fruit from Korea pathway, and melon fruit from Japan. These potential differences make it necessary to re-assess the likelihood that *P. melonis* will arrive in Australia in a viable state on the melon fruit from Japan pathway.

Previous assessments for *P. melonis* on the oriental melon and rockmelon fruit from Korea pathway rated the likelihood of distribution as Very Low.

Melon fruit from Japan are expected to be distributed in Australia in a similar way to oriental melon and rockmelon fruit from Korea. It is expected that once melon fruit have arrived in Australia from Japan, they will be distributed throughout Australia for wholesale or retail sale. Fruit that are unmarketable are likely to be discarded into managed waste systems. Potential transfer of *P. melonis* to suitable host plants from managed waste systems is likely to be negligible. However, infected fruit with no obvious symptoms may be sold to consumers and infected fruit and fruit waste may be disposed of into urban, peri-urban or areas of natural vegetation in close proximity to a suitable host. Spores may be carried from infected fruit or fruit waste in moving water or by human-assisted movement. While known host plants and possibly unidentified hosts of *P. melonis* are present in Australia, it is unlikely that *P. melonis* spores would reach any host plant before dying or encysting on an unsuitable surface. On this basis, the same rating of Very Low for the likelihood of distribution for *P. melonis* in previous assessments is adopted for the melon fruit from Japan pathway.

The likelihoods of establishment and spread of *P. melonis* in Australia from the melon fruit from Japan pathway have also been assessed as similar to those of the previous assessment of Moderate and Moderate, 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 *P. melonis* in Australia are also independent of the import pathway and have been assessed as being similar to those previous risk assessment of Low. The existing ratings for the likelihoods of establishment and spread, and the rating for the overall consequences for *P. melonis* in previous assessments have been adopted for the melon fruit from Japan pathway.

In addition, the department has reviewed the latest literature—for example, Ahmad et al. (2022); Cai et al. (2022); Lu et al. (2022) and Muhammed and Mohamed (2023). No new information has been identified that would significantly change the risk ratings for distribution, establishment, spread and consequences as set out for *P. melonis* in the existing policies.

The risk scenario of biosecurity concern is that *P. melonis* may be imported with asymptomatic melon fruit from Japan, which may result in the establishment and spread of this pathogen in Australia.

3.8.1 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. melonis* will arrive in Australia in a viable state with the importation of melon fruit from Japan is assessed as: **Low**.

The likelihood of importation is assessed as Low because *P. melonis* is present in Japan on *C. melo*, although commercial production and pest management practices such as humidity control, crop rotation, soil sterilisation, protecting the fruit from direct soil contact and rain splash, and use of fungicide would reduce the likelihood of *P. melonis* being present in melon fruit for export to Australia. Symptoms on mature fruit are visible, and symptomatic fruit would likely be detected and removed during harvest or through the grading, sorting and quality inspection practices at the packing house. However, fruit infected shortly before harvest may not show symptoms and be packed for export. *Phytophthora melonis* could survive storage and transport conditions.

The following information provides supporting evidence for this assessment.

Phytophthora melonis is present in Japan and is associated with melon fruit.

- *Phytophthora melonis* is an important soil-borne pathogen of cucurbits, including melon (Mirtalebi & Banihashemi 2019).
- *Phytophthora melonis* causes symptoms in cucurbit fruits including dark, water-soaked lesions, soft rot and, if the environment remains moist, powdery sporangia on the fruit surface (Guharoy et al. 2006; Hashemi et al. 2020; INRAE 2024; Lu et al. 2022).
- *Phytophthora melonis* has been isolated from fruit of *Cucumis melo* in the Miyazaki and Kumamoto prefectures of Japan (Rahman et al. 2014).

Commercial melon production practices followed in Japan are likely to reduce the likelihood of *P. melonis* being present in production sites and on the melon fruit.

- Standard commercial pre-planting and production practices for melon fruit would reduce the incidence of *P. melonis* in production areas.
 - Seedlings are sourced from MAFF-registered nurseries and treated with fungicide before planting.
 - Soil is sterilised by steam or chemical treatment between cropping cycles.
 - In the field, melons are rotated with other crops such as celery and Chinese cabbage. These are not hosts of *P. melonis* and therefore any soil inoculum would be reduced.
- *Phytophthora melonis* can spread from infected soil or plants through water (Judelson & Blanco 2005). Melons in Japan are grown in protected environments (in greenhouses or plastic tunnels) which reduces the possibility of infection through contaminated rain splash (MAFF 2022).

- Greenhouse-grown melons are suspended by string from trellises in isolated raised garden beds above the concrete floor of the greenhouse (Shizuoka Crown Melon 2023). This technique ensures the fruit does not touch the soil. Melons grown under plastic tunnels in the field grow in mulch beds covered with plastic sheeting and the fruit sit on individual stands. This reduces the likelihood of *Phytophthora* coming into contact with the fruit if the pathogen is present in the soil.
- Warm and humid conditions favour infection, growth and spread of *Phytophthora* species. In greenhouses humidity is controlled by opening mesh-covered windows, while in plastic tunnels the sheeting is drawn back to provide air circulation to create conditions less favourable to growth and transmission of *Phytophthora*.
- Fungicides are applied regularly to manage pathogens in production areas. Fungicides applied to the fruit surface prior to harvest will likely reduce *P. melonis* if present on melon fruit.
- Melons grown in Japan are intensively managed (Shizuoka Crown Melon 2023), therefore, infected plants are likely to be detected through the regular monitoring and management of crops by growers.
 - Infected plants exhibit visible symptoms including discolouration and softening of the stem which can eventually lead to the collapse and death of the plant (Erwin & Ribeiro 1996; Ho, Gallegly & Hong 2007). These plants would be removed from production and carefully disposed of to prevent spread of the disease.

Melon fruit with visible symptoms of *P. melonis* infection are likely to be removed during harvest and packing house procedures. If spores or hyphae were present on the fruit surface they would likely be removed during processing.

- In fruit, infection generally appears as dark green, water-soaked lesions and eventually soft rot of the fruit. If the environment remains moist, white mycelial growth and powdery sporangia become visible on the fruit surface (Erwin & Ribeiro 1996; Guharoy et al. 2006; Zitter, Hopkins & Thomas 1996).
- Any fruit showing visible signs of infection would likely be detected and removed at harvest or during quality inspection, grading and sorting processes at the packing house (MAFF 2022).
- Spores situated externally on the fruit are likely to be removed during standard procedures such as applying fungicide to the fruit surface prior to harvest, and post-harvest brushing.

Some fruit may not exhibit symptoms at the time of harvest, and infected fruit could escape detection.

- *Phytophthora melonis* can infect a plant at any growth stage (Ho, Gallegly & Hong 2007). Therefore, mature fruit infected shortly before harvest may not show symptoms at the time of harvest or during sorting. As a result, infected fruit may not be detected and may be packed for export.
- Some *P. melonis* spores on the surface of harvested fruit may survive standard commercial packing house processes and remain with the fruit.

Phytophthora melonis could survive post-harvest storage and transport conditions.

- Melons are transported and stored under controlled conditions, with an average storage temperature of 4°C to 10°C (MAFF 2022).
- The growth rate of *P. melonis* slows at lower temperatures (Mills, Förster & Coffey 1991) and it does not grow at temperatures below 9°C (Erwin & Ribeiro 1996).

- Mills, Förster and Coffey (1991) noted that *P. melonis* isolates 'did not survive long-term storage at 5°C' but did not state the period of storage.
- This suggests that the pathogen could survive storage and transport conditions.

For the reasons outlined, the likelihood of importation of *P. melonis* on imported melon fruit from Japan is assessed as Low.

Likelihood of distribution

The likelihood that the assessed *P. melonis* will be distributed within Australia in a viable state as a result of the processing, sale or disposal of melon fruit from Japan, and subsequently transfer to a susceptible part of a host is likely to be similar to *P. melonis* on the previously assessed oriental melon and rockmelon fruit from Korea pathway. The same rating of **Very Low** for the likelihood of distribution for *P. melonis* in the previous assessment is adopted for melon fruit from Japan.

Overall likelihood of entry

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

3.8.2 Likelihoods of establishment and spread

The likelihoods of establishment and spread for the *P. melonis* are independent of the import pathway and are considered similar to those in previously assessed pathways.

Based on the existing import policies for *P. melonis*, the likelihoods of establishment and spread are assessed as **Moderate** and **Moderate**, respectively.

3.8.3 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 *P. melonis* will enter Australia as a result of trade in melon fruit from Japan, 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**.

3.8.4 Consequences

The potential consequences of the entry, establishment and spread of *P. melonis* in Australia are similar to those in the previously assessed oriental melon and rockmelon fruit from Korea pathway. The overall consequences in the previous assessment were assessed as Low. The overall consequences for the assessed *P. melonis* on the melon fruit from Japan pathway are also assessed as **Low**.

3.8.5 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.

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Unrestricted risk estimate for *Phytophthora melonis*

| | |
|---|------------|
| Overall likelihood of entry, establishment and spread | Very Low |
| Consequences | Low |
| Unrestricted risk | Negligible |

The URE for *Phytophthora melonis* on the melon fruit from Japan pathway is assessed as **Negligible**, which achieves the ALOP for Australia. Therefore, no specific risk management measures are required for *P. melonis* on this pathway.

3.9 Cucumber green mottle mosaic virus (CGMMV)

***Tobamovirus viridimaculae* (EP)**

Cucumber green mottle mosaic virus (CGMMV) belongs to the genus *Tobamovirus* in the family *Virgaviridae* (Adams, Antoniw & Kreuze 2009). The virus was first described in the 1930s in cucumber and was named Cucumber virus 3 and Cucumber virus 4 (Ainsworth 1935; Ugaki et al. 1991). CGMMV is a rod-shaped virus and contains a single-stranded RNA genome (Hollings, Komuro & Tochiara 1975; Lecoq & Desbiez 2012).

Since first reported in the United Kingdom in the 1930s (Ainsworth 1935; Ugaki et al. 1991), CGMMV has spread among cucurbit crops worldwide (Reingold et al. 2015) and is now reported to occur on most continents and in over 30 countries (CABI 2025), including Japan (Komuro et al. 1968).

CGMMV was first detected in the NT in September 2014. Emergency measures were subsequently introduced to manage the risk of any further introductions of CGMMV into Australia. There have been several subsequent incidents of CGMMV in Australia, including detections in NSW, Qld, SA and WA. Given the isolated occurrences of the virus, import conditions in place to reduce the risk of further introduction and continuing measures in place to prevent its spread within Australia, CGMMV is considered present but under official control in Australia. Therefore, CGMMV is a quarantine pest of concern for Australia.

Many strains and isolates of CGMMV have been reported in the literature. Different authors have described CGMMV strains based on geographic distribution, host range, symptoms on natural host plants, serological and molecular methods, or by differential responses on indicator plants such as *Chenopodium amaranticolor* and *Datura stramonium* (Antignus et al. 2001; Boubourakas et al. 2004; Hollings, Komuro & Tochiara 1975). Some isolates formerly classified as strains of CGMMV are now accepted as being separate virus species. For instance, Yodo strain (CGMMV-Y) and Cucumber strain (CGMMV-C or CGMMV-Cu) were both previously considered to be strains of CGMMV but are now considered to be strains of Kyuri green mottle mosaic virus (KGMV) (Antignus et al. 2001; Varveri, Vassilakos & Bem 2002).

The host range of CGMMV includes many species within the Cucurbitaceae family including hosts of economic importance such as watermelon (*Citrullus lanatus*), melon (*Cucumis melo*), cucumber (*Cucumis sativus*), pumpkin (*Cucurbita maxima* and *Cucurbita moschata*) and zucchini (*Cucurbita pepo*) (Dombrovsky, Tran-Nguyen & Jones 2017; Hollings, Komuro & Tochiara 1975). Weed species within the Cucurbitaceae, Apiaceae, Boraginaceae, Lamiaceae, Solanaceae, Amaranthaceae, Chenopodiaceae, Portulacaceae and Euphorbiaceae families have also been identified as natural hosts of CGMMV (Dombrovsky, Tran-Nguyen & Jones 2017).

CGMMV can persist in seeds (Reingold et al. 2015; Tian et al. 2014), pollen (Liu et al. 2014) and infected plant debris in the soil (Choi 2001; Hollings, Komuro & Tochiara 1975; Rao & Varma 1984). CGMMV can be mechanically transmitted and infect host plants through wounds caused by pruning or harvesting (Hollings, Komuro & Tochiara 1975; Lecoq & Desbiez 2012).

CGMMV can cause a range of symptoms in host plants but may also infect plants asymptotically. In cucurbits, CGMMV symptoms typically include leaf mottling, mosaic symptoms on the leaves and fruit mottling or distortion (Reingold et al. 2015). The virus may also symptomatically infect some

non-cucurbit crops. For instance, *Heracleum moellendorffii* (Apiaceae) plants naturally infected with CGMMV have shown leaf mottling and mosaic symptoms (Cho, Kim & Jeon 2015). CGMMV symptoms may vary with host tissue type, growth stage, virus isolate, strain, season, host and environmental conditions (ASTA 2014).

CGMMV has been assessed previously in the pest risk analysis for CGMMV (DAWR 2017b), and in the existing policies for cucurbitaceous vegetable seeds for sowing (DAWE 2020b) and oriental melon and rockmelon fruit from Korea (DAFF 2023a). Of these policies, the oriental melon and rockmelon fruit from Korea pathway is most similar to the melon fruit from Japan pathway, being fresh fruit for human consumption. In that policy, the URE for CGMMV was assessed as Very Low, which achieves the ALOP for Australia. Therefore, no specific risk management measures are required for CGMMV on that pathway.

However, there may be differences in the pest prevalence, climatic conditions and horticultural practices between the previously assessed oriental melon and rockmelon fruit from Korea pathway, and melon fruit from Japan. These potential differences make it necessary to re-assess the likelihood that CGMMV will arrive in Australia in a viable state on the melon fruit from Japan pathway.

The previous assessment for CGMMV on the oriental melon and rockmelon fruit from Korea pathway rated the likelihood of distribution as Low.

Melon fruit from Japan are expected to be distributed in Australia in a similar way to oriental melon and rockmelon fruit from Korea. It is expected that once the melon fruit have arrived in Australia from Japan, they will be distributed throughout Australia for wholesale or retail sale. Fruit arriving at sale points that are unmarketable are likely to be removed from further distribution and discarded into managed waste systems. Potential transfer of CGMMV to suitable host plants from managed waste systems is likely to be negligible. However, infected fruit with no obvious symptoms may be sold to consumers and infected fruit and fruit waste may be disposed of into urban, peri-urban or areas of natural vegetation in close proximity to a suitable host. There are limited opportunities for the virus to transfer to a suitable host from discarded infected fruit or fruit waste, including through fruit waste discarded in compost. While CGMMV is reported to be seed-borne, seed-to-seedling transmission rate is likely to be very low. On this basis, the same rating of Low for the likelihood of distribution for CGMMV in the previous assessment is adopted for the melon fruit from Japan pathway.

The likelihoods of establishment and spread of CGMMV in Australia from the melon fruit from Japan pathway have also been assessed as similar to those of the previous assessments of High and Moderate, 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 CGMMV in Australia are also independent of the import pathway and have been assessed as being similar to those previous risk assessment of Moderate. The existing ratings for the likelihoods of establishment and spread, and the rating for the overall consequences for CGMMV in previous assessments have been adopted for the melon fruit from Japan pathway.

In addition, the department has reviewed the latest literature—for example, He, He and Ding (2023); Lovelock et al. (2023) and Mackie et al. (2023). No new information has been identified that would

significantly change the risk ratings for distribution, establishment, spread and consequences as set out for CGMMV in the existing policies.

The risk scenario of biosecurity concern is that CGMMV may be imported with melon fruit from Japan with no visible external symptoms, which may result in the establishment and spread of this virus in Australia.

3.9.1 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 CGMMV will arrive in Australia in a viable state with the importation of melon fruit from Japan is assessed as: **Low**.

The likelihood of importation is assessed as Low because, while CGMMV is present in Japan in major melon production areas, commercial production practices such as the use of domestically produced clean seeds, field and greenhouse hygiene, and soil sanitisation, are likely to reduce the disease incidence. Symptoms on fruit are visible and any symptomatic fruit are likely to be detected and discarded during pest monitoring, at harvest or through the grading and quality inspection practices at the packing house. However, asymptomatic infected fruit may be packed for export and CGMMV could survive storage and transport conditions.

The following information provides supporting evidence for this assessment.

CGMMV is associated with melon fruit and is present in Japan.

- CGMMV has been reported to naturally infect many species within the Cucurbitaceae family, including melon (*Cucumis melo*) (DAWR 2017b; Li et al. 2015; Liu et al. 2020; Park et al. 2017; Park et al. 2011).
- CGMMV infects its cucurbit hosts systemically (Dombrovsky, Tran-Nguyen & Jones 2017); all plant tissues of infected plants, including fruit and seeds, may contain the virus.
- CGMMV is known to be present in melon production areas of Japan (Furuiki 1973; Komuro et al. 1971; Rajamony et al. 1990; Sugiyama, Ohara & Sakata 2006, 2007).
 - In 1973, CGMMV was isolated from the melon cultivar Earl's Favourite in Shizuoka (Furuiki 1973; Sugiyama, Ohara & Sakata 2007).
 - Despite several studies published on resistance to CGMMV in melons grown in Japan (Rajamony et al. 1990; Sugiyama, Ohara & Sakata 2006, 2007), CGMMV is still considered one of the major viral diseases affecting melons and watermelons in Japan (Sugiyama 2013).

Commercial production practices are likely to reduce CGMMV in production areas on the melon fruit.

- Commercial pre-planting and production practices of sourcing clean planting material, soil sanitisation, and crop hygiene practices followed for melon production are likely to reduce the incidence of the virus in production areas.
 - Seedlings are sourced from MAFF-registered nurseries that produce seedlings from heat-sanitised seed.

- The soil is steam-sterilised in the greenhouse or chemically sterilised in the field prior to planting of seedlings (MAFF 2022; Shizuoka Crown Melon 2023), greatly reducing the likelihood of CGMMV being present in the soil of production areas.
- Weeds, as alternative hosts and a potential reservoir of CGMMV, are controlled in and around production sites. The removal of weeds would greatly reduce the likelihood of CGMMV being transferred to melon plants.
- Hygiene practices including sanitation of equipment would prevent the introduction and spread of CGMMV in the melon crop.
- Melons that are produced in greenhouses are grown on trellises. This technique ensures the fruit does not touch the ground. Melons produced in plastic tunnels are grown on the ground, however, plastic sheeting is used to cover the soil and fruit sit on individual stands, preventing direct contact between fruit and the soil (MAFF 2022; Shizuoka Crown Melon 2023). These growing practices reduce the likelihood of CGMMV coming into contact with the fruit if the pathogen is present in the soil.
- Grafting onto pumpkin rootstock is a common cultivation practice used for melons grown in Japan. The practice of grafting on resistant rootstocks has proven to be an efficient method for protecting melons from soil-borne viruses, such as CGMMV (Lecoq & Katis 2014).
- Melons grown in Japan are intensively managed (Shizuoka Crown Melon 2023), therefore, infected plants are likely to be detected through the regular monitoring and management of crops by growers.
 - Symptom development in CGMMV-infected cucurbit plants is affected by environmental conditions, plant growth stage at time of infection and viral strain. Infection at early growth stages induces more severe and visible disease symptoms. Plants showing symptoms are likely to be removed from production and carefully disposed of to prevent spread of the virus.
 - It is possible that plants infected at later stages of plant growth may not show any symptoms (Dombrovsky, Tran-Nguyen & Jones 2017) and therefore could potentially escape detection.

If CGMMV is present in a production site in Japan, it is possible that asymptomatic infected fruit, or fruit with no visible external symptoms, could escape detection during commercial harvest and packing house processes and be packed for export.

- Melon fruit infected with CGMMV develop different degrees of malformation, mottling and surface netting (Dombrovsky, Tran-Nguyen & Jones 2017). Any fruit showing visible signs of infection would be excluded at harvest or during the grading, sorting, quality inspection and packing processes.
- Infected fruit do not always show symptoms (ASTA 2014; Crespo et al. 2017). In some cases, fruit may be internally discoloured or necrotic but show no external symptoms. Fruit showing no external symptoms may be harvested and packed for export.

CGMMV could survive conditions during postharvest cool storage and transport to Australia.

- Melons are stored and transported under controlled conditions, with an average temperature of 4°C to 10°C (MAFF 2022). These conditions are not expected to affect the viability of CGMMV.
- CGMMV particles are very stable (Dombrovsky, Tran-Nguyen & Jones 2017). Hollings, Komuro and Tochihara (1975) reported that CGMMV can retain nearly all serological activity at as low as 2°C for at least 6 years.

For the reasons outlined, the likelihood of importation of CGMMV on imported melon fruit from Japan is assessed as Low.

Likelihood of distribution

The likelihood that the assessed CGMMV will be distributed within Australia in a viable state as a result of the processing, sale or disposal of melon fruit from Japan, and subsequently transfer to a susceptible part of a host is likely to be similar to CGMMV on the previously assessed oriental melon and rockmelon fruit from Korea pathway. The same rating of **Low** for the likelihood of distribution for CGMMV in the previous assessment is adopted for melon fruit from Japan.

Overall likelihood of entry

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

3.9.2 Likelihoods of establishment and spread

The likelihoods of establishment and spread for the assessed CGMMV are independent of the import pathway and are considered similar to those in previously assessed pathways.

Based on the existing import policies for CGMMV, the likelihoods of establishment and spread are assessed as **High** and **Moderate**, respectively.

3.9.3 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 CGMMV will enter Australia as a result of trade in melon fruit from Japan, 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**.

3.9.4 Consequences

The potential consequences of the entry, establishment and spread of CGMMV in Australia are similar to those in the previously assessed pathways. The overall consequences in the previous assessments were assessed as Moderate. The overall consequences for CGMMV on the melon fruit from Japan pathway are also assessed as **Moderate**.

3.9.5 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.

| Unrestricted risk estimate for Cucumber green mottle mosaic virus | |
|--|----------|
| Overall likelihood of entry, establishment and spread | Very Low |
| Consequences | Moderate |
| Unrestricted risk | Very Low |

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The URE for Cucumber green mottle mosaic virus on the melon fruit from Japan pathway is assessed as **Very Low**, which achieves the ALOP for Australia. Therefore, no specific risk management measures are required for CGMMV on this pathway.

3.10 Kyuri Green Mottle Mosaic Virus (KGMMV)

***Tobamovirus kyuri* (EP)**

Kyuri green mottle mosaic virus (KGMMV) belongs to the genus *Tobamovirus* in the family *Virgaviridae* (Adams, Antoniw & Kreuze 2009). Prior to its characterisation, KGMMV was considered to be a strain of Cucumber green mottle mosaic virus (CGMMV). KGMMV is not recorded in Australia and is a quarantine pest for Australia.

KGMMV was first reported in 1967 as CGMMV cucumber strain (CGMMV-C) in Japan (Inouye et al. 1967). Subsequently, CGMMV Yodo strain (CGMMV-Y) was isolated from cucumbers in Japan in 1969 (Antignus et al. 2001; Varveri, Vassilakos & Bem 2002). Francki, Hu and Palukaitis (1986) indicated that the CGMMV cucumber strain was taxonomically different from the CGMMV watermelon strain, based on serological analysis and RNA-cDNA hybridisation. Consequently, the cucumber strains (CGMMV-C and CGMMV-Y) were re-examined and named KGMMV as a distinct species in the genus *Tobamovirus* (Antignus et al. 2001; Tan et al. 2000).

Since its first detection in Japan, KGMMV has been reported to occur in Korea (Lee et al. 2000), Indonesia (Daryono, Somowiyarjo & Natsuaki 2005a) and Thailand (Daryono & Natsuaki 2012). Recently, the virus has been detected for the first time in Turkey (Balsak 2023). The host range of KGMMV is limited to the Cucurbitaceae family. It is known to infect watermelon (*Citrullus lanatus*), melon (*Cucumis melo*), cucumber (*Cucumis sativus*), African horned cucumber (*Cucumis metuliferus*), zucchini (*Cucurbita pepo*) and angled luffa (*Luffa acutangula*) (Daryono & Natsuaki 2012; Daryono, Somowiyarjo & Natsuaki 2003, 2005a; Kim, Lee & Natsuaki 2009; Kwon et al. 2014; Lecoq & Katis 2014). In Japan, KGMMV is considered a major pest, causing severe yield reduction in cucumber (Fukuta et al. 2012).

KGMMV shares similar biology and transmission pathways with other cucurbit infecting tobamoviruses such as CGMMV. KGMMV is seed-borne and can be transmitted to seedlings (Balsak 2023). It is a stable virus and can be transmitted through infected soil or mechanically by direct contact between plants and cultural practices such as pruning (Daryono, Somowiyarjo & Natsuaki 2005b).

The severity of symptoms on fruit varies between cucurbit cultivars, but generally includes fruit distortion and mottle mosaic symptoms (Daryono, Somowiyarjo & Natsuaki 2005a; Yoon et al. 2001).

KGMMV has been assessed previously in the existing policies for cucurbitaceous vegetable seeds for sowing (DAWE 2020b) and oriental melon and rockmelon fruit from Korea (DAFF 2023a). Of these policies, the oriental melon and rockmelon fruit from Korea pathway is most similar to the melon fruit from Japan pathway, being fresh fruit for human consumption. In that policy, the URE for KGMMV was assessed as Very Low, which achieves the ALOP for Australia. Therefore, no specific risk management measures are required for KGMMV on that pathway.

However, there may be differences in the pest prevalence, climatic conditions and horticultural practices between the previously assessed oriental melon and rockmelon fruit from Korea pathway, and melon fruit from Japan. These potential differences make it necessary to re-assess the likelihood that KGMMV will arrive in Australia in a viable state on the melon fruit from Japan pathway.

The previous assessment for KGMMV on the oriental melon and rockmelon fruit from Korea pathway rated the likelihood of distribution as Very Low.

Melon fruit from Japan are expected to be distributed in Australia in a similar way to oriental melon and rockmelon fruit from Korea. It is expected that once the melon fruit have arrived in Australia from Japan, they will be distributed throughout Australia for wholesale or retail sale. Fruit arriving at sale points that are unmarketable are likely to be removed from further distribution and discarded into managed waste systems. Potential transfer of KGMMV to suitable host plants from managed waste systems is likely to be negligible. However, infected fruit with no obvious symptoms may be sold to consumers and infected fruit and fruit waste may be disposed of into urban, peri-urban or areas of natural vegetation in close proximity to a suitable host. There are limited opportunities for the virus to transfer to a suitable host from discarded infected fruit or fruit waste, including through fruit waste discarded in compost. On this basis, the same rating of Very Low for the likelihood of distribution for KGMMV in the previous assessment is adopted for the melon fruit from Japan pathway.

The likelihoods of establishment and spread of KGMMV in Australia from the melon fruit from Japan pathway have also been assessed as similar to those of the previous assessments of High and Moderate, 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 KGMMV in Australia are also independent of the import pathway and have been assessed as being similar to those previous risk assessments of Moderate. The existing ratings for the likelihoods of establishment and spread, and the rating for the overall consequences for KGMMV in previous assessments have been adopted for the melon fruit from Japan pathway.

In addition, the department has reviewed the latest literature—for example, Balsak (2023) and He, He and Ding (2023). No new information has been identified that would significantly change the risk ratings for distribution, establishment, spread and consequences as set out for KGMMV in the existing policies.

The risk scenario of biosecurity concern is that KGMMV may be imported with melon fruit from Japan with no visible external symptoms, which may result in the establishment and spread of this virus in Australia.

3.10.1 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 KGMMV will arrive in Australia in a viable state with the importation of melon fruit from Japan is assessed as: **Low**.

The likelihood of importation is assessed as Low because KGMMV is present in Japan including in the major melon production areas, and melon is a host. However, KGMMV has not been recorded causing disease on melon in Japan. Commercial production practices, such as the use of domestically produced clean seeds, field and greenhouse hygiene and soil sanitisation practices are likely to

reduce the disease incidence in production areas. Symptoms on fruit are visible and symptomatic fruit are likely to be detected and discarded during harvest and grading practices. KGMMV can cause latent infection in some varieties of melon, therefore, if KGMMV is present in a production site, asymptomatic infected melon fruit may be packed for export. KGMMV could survive storage and transport conditions from Japan to Australia.

The following information provides supporting evidence for this assessment.

KGMMV is known to infect melon fruit and is present in Japan.

- KGMMV has been reported to naturally infect several crops within the Cucurbitaceae family, including melon (*Cucumis melo*) in Indonesia (Daryono & Natsuaki 2012; Daryono, Somowiyarjo & Natsuaki 2003, 2005b) and oriental melon (*C. melo* var. *makuwa*) in Korea (Kim, Lee & Natsuaki 2009).
- KGMMV infects its cucurbit hosts systemically (Kim, Lee & Natsuaki 2009; Tan et al. 2000); all tissues of infected plants, including fruit and seeds, may contain the virus.
- KGMMV was first reported occurring widely in the west of Japan in cucumber production (Inouye et al. 1967) and continues to reduce cucumber yields in Japan (Fukuta et al. 2012).
- While KGMMV has not been reported affecting melon in Japan, it is present where melon production occurs. The second highest melon producing prefecture, Kumamoto, is on the island of Kyushu where KGMMV was reported to occur widely in cucumber (Inouye et al. 1967).

Commercial production practices followed in Japan are likely to reduce the likelihood of KGMMV being present in production areas and on the melon fruit.

- Commercial pre-planting and production practices of sourcing clean planting material, soil sanitisation and crop hygiene practices followed for melon production are likely to reduce the incidence of the virus in production areas.
 - Seedlings are sourced from MAFF-registered nurseries that produce seedlings from heat-sanitised seed.
 - The soil is steam-sterilised in the greenhouse or chemically sterilised in the field prior to planting of seedlings (MAFF 2022; Shizuoka Crown Melon 2023), greatly reducing the likelihood of KGMMV being present in the soil of production areas.
 - Weeds, as alternative hosts and a potential reservoir of KGMMV, are controlled in and around production sites. The removal of weeds would greatly reduce the likelihood of KGMMV being transferred to melon plants.
 - Hygiene practices, including sanitation of equipment, would prevent the introduction and spread of KGMMV in the melon crop.
- Melons that are produced in greenhouses are grown on trellises. This technique ensures the fruit does not touch the ground. Melons produced in plastic tunnels are grown on the ground, however, plastic sheeting is used to cover the soil and fruit sit on individual stands, preventing direct contact between fruit and the soil (MAFF 2022; Shizuoka Crown Melon 2023). These growing practices reduce the likelihood of KGMMV coming into contact with the fruit if the pathogen is present in the soil.
- Grafting onto pumpkin rootstock is a common cultivation practice used for melons grown in Japan. The practice of grafting on resistant rootstocks has proven to be an efficient method for protecting melons from soil-borne viruses, such as tobamoviruses (Lecoq & Katis 2014).

- Melons grown in Japan are intensively managed (Shizuoka Crown Melon 2023). If KGMMV is present in a melon production site in Japan, infected plants are likely to be detected through the regular monitoring and management of crops by growers.
 - Symptoms of KGMMV infection on melon plants include chlorotic mottling of leaves, mosaic symptoms and leaf deformation (Daryono et al. 2016). Plants displaying symptoms would be removed from production and carefully disposed of to prevent spread of the virus.
 - Latent infection of KGMMV has been reported on oriental melon (Kim, Lee & Natsuaki 2009). There is no evidence of latent infection in other melon varieties, however it is possible that, as for oriental melons, plants infected at later growth stages may not show any symptoms.

If KGMMV is present in a melon production site in Japan, it is possible that asymptomatic infected fruit, or fruit with no visible external symptoms, could escape detection during commercial harvesting and packing house processes and be packed for export.

- KGMMV causes fruit deformation and mosaic symptoms in melon (Daryono, Somowiyarjo & Natsuaki 2005a). Any fruit showing visible signs of infection would be excluded at harvest or during the grading and packing process.
- Like other *Tobamovirus* species (for example, CGMMV), infected fruit do not always show symptoms (ASTA 2014; Crespo et al. 2017). In some cases, fruit may be internally discoloured or necrotic but show no external symptoms. Fruit showing no external symptoms may be harvested and packed for export.

KGMMV could survive conditions during postharvest storage and transport to Australia.

- Transport and storage of melons is done under controlled conditions with an average temperature of 4°C to 10°C (MAFF 2022). These conditions are not expected to affect the viability of KGMMV.
- As a member of the genus *Tobamovirus*, KGMMV is characterized by high stability and long persistence (Daryono, Somowiyarjo & Natsuaki 2005b; Lecoq & Katis 2014). Therefore, it is likely that KGMMV could survive storage and transport temperature conditions.

For the reasons outlined, the likelihood of importation of KGMMV on imported melon fruit from Japan is assessed as Low.

Likelihood of distribution

The likelihood that KGMMV will be distributed within Australia in a viable state as a result of the processing, sale or disposal of melon fruit from Japan, and subsequently transfer to a susceptible part of a host is likely to be similar to KGMMV on the previously assessed oriental melon and rockmelon fruit from Korea pathway. The same rating of **Very Low** for the likelihood of distribution for KGMMV in the previous assessment is adopted for melon fruit from Japan.

Overall likelihood of entry

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

3.10.2 Likelihoods of establishment and spread

The likelihoods of establishment and spread for KGMMV are independent of the import pathway and are considered similar to those in previously assessed pathways.

Based on the existing import policies for KGMMV, the likelihoods of establishment and spread are assessed as **High** and **Moderate**, respectively.

3.10.3 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 KGMMV will enter Australia as a result of trade in melon fruit from Japan, 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**.

3.10.4 Consequences

The potential consequences of the entry, establishment and spread of KGMMV in Australia are similar to those in the previously assessed pathways. The overall consequences in the previous assessments were assessed as Moderate. The overall consequences for KGMMV on the melon fruit from Japan pathway are also assessed as **Very Low**.

3.10.5 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.

| Unrestricted risk estimate for Kyuri green mottle mosaic virus | |
|---|----------|
| Overall likelihood of entry, establishment and spread | Very Low |
| Consequences | Moderate |
| Unrestricted risk | Very Low |

The URE for Kyuri green mottle mosaic virus on the melon fruit from Japan pathway is assessed as **Very Low**, which achieves the ALOP for Australia. Therefore, no specific risk management measures are required for KGMMV on this pathway.

3.11 Melon Necrotic Spot Virus (MNSV)

***Gammacarmovirus melonis* (EP)**

Melon necrotic spot virus (MNSV) belongs to the genus *Gammacarmovirus* in the family *Tombusviridae* and is a soil- and water-borne virus. It was first recorded in Japan on melon plants (Kishi 1966) and has since been reported in Europe, USA, South America, Africa and Asia (Avgelis 1989; Gonzalez-Garza et al. 1979; Herrera, Cebrián & Jordá 2006; Kwak et al. 2015; Ruiz et al. 2016; Yakoubi et al. 2008).

Melon necrotic spot virus (MNSV) has been detected sporadically in Australia, with outbreaks in NSW in 2012, Vic. in 2016 and Qld in 2018 (Business Queensland 2021; IPPC 2016), and a subsequent detection in NSW (Mulholland et al. 2023). Unlike detections in other parts of the world, MNSV infection has not persisted after detection in Australia (Business Queensland 2021). Given the isolated occurrences of the virus and the continuing measures to prevent its spread within Australia, MNSV is considered to be under official control in Australia and is a quarantine pest for Australia.

Transmission of MNSV mainly occurs via the fungal vector *Oplidium bornovanus* (Mackie et al. 2020). MNSV is also seed-borne, though rates of transmission from infected seed to seedling are low in the absence of the fungal vector (Campbell, Wipf-Scheibel & Lecoq 1996). Virus particles are released from the seed coat and bind to the surface of the motile zoospores produced by *O. bornovanus*. When the zoospore penetrates the new plant root tissue the virus is transmitted to the plant (Lecoq & Desbiez 2012), starting a new cycle of infection. MNSV may remain infective on contaminated seeds, plant debris in the soil or in the resting spores of *O. bornovanus*, which may persist for several years in soil (Lecoq & Desbiez 2012; Tomlinson & Thomas 1986). *Oplidium bornovanus* is present in Australia but its current distribution is unknown (Business Queensland 2021; Mackie et al. 2020).

MNSV infects members of the Cucurbitaceae family and has been reported in melon (*Cucumis melo*), cucumber (*C. sativa*), summer squash (*Cucurbita pepo*), watermelon (*Citrullus lanatus*), fluted gourd (*Telfairia occidentalis*) and calabash (*Lagenaria siceraria*) (Business Queensland 2021; Kishi 1966; Koç, Fidan & Baloğlu 2014; Lecoq & Desbiez 2012; Tomlinson & Thomas 1986).

MNSV is characterised by necrotic spots and streaks on the leaves, stems and fruit, sometimes leading to the collapse and death of the plant (Choi, Kim & Kim 2003; Kishi 1966; Kwak et al. 2015; Lecoq & Desbiez 2012; Ruiz et al. 2016). Where the plants survive, there is severe reduction in yield (Hibi & Furuki 1985). Infected fruit may be small and misshapen with spotted rind, and may have reduced sugar content (Hibi & Furuki 1985; Lecoq & Desbiez 2012).

MNSV mainly occurs in crops grown in greenhouses, but may also occur in field-grown crops (Hibi & Furuki 1985; Stanghellini, Mathews & Misaghi 2010).

MNSV has been assessed previously in the existing policies for cucurbitaceous vegetable seeds for sowing (DAWE 2020b) and oriental melon and rockmelon fruit from Korea (DAFF 2023a). Of these policies, the oriental melon and rockmelon fruit from Korea pathway is most similar to the melon fruit from Japan pathway, being fresh fruit for human consumption. In that policy, the URE for MNSV was assessed as Very Low, which achieves the ALOP for Australia. Therefore, no specific risk management measures are required for MNSV on that pathway.

However, there may be differences in the pest prevalence, climatic conditions and horticultural practices between the previously assessed oriental melon and rockmelon fruit from Korea pathway, and melon fruit from Japan. These potential differences make it necessary to re-assess the likelihood that MNSV will arrive in Australia in a viable state on the melon fruit from Japan pathway.

The previous assessment for MNSV on the oriental melon and rockmelon fruit from Korea pathway rated the likelihood of distribution as Very Low.

Melon fruit from Japan are expected to be distributed in Australia in a similar way to oriental melon and rockmelon fruit from Korea. It is expected that once the melon fruit have arrived in Australia from Japan, they will be distributed throughout Australia for wholesale or retail sale. Fruit arriving at sale points that are unmarketable are likely to be removed from further distribution and discarded into managed waste systems. Potential transfer of MNSV to suitable host plants from managed waste systems is likely to be negligible. However, infected fruit with no obvious symptoms may be sold to consumers and infected fruit and fruit waste may be disposed of into urban, peri-urban or areas of natural vegetation in close proximity to a suitable host. There are limited opportunities for the virus to transfer to a suitable host from discarded infected fruit or fruit waste, including through fruit waste discarded in compost. On this basis, the same rating of Very Low for the likelihood of distribution for MNSV on oriental melon and rockmelon fruit from Korea is adopted for the melon fruit from Japan pathway.

The likelihoods of establishment and spread of MNSV in Australia from the melon fruit from Japan pathway have also been assessed as similar to those of the previous assessments of High and Moderate, 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 MNSV in Australia are also independent of the import pathway and have been assessed as being similar to those previous risk assessments of Moderate. The existing ratings for the likelihoods of establishment and spread, and the rating for the overall consequences for MNSV in previous assessments have been adopted for the melon fruit from Japan pathway.

In addition, the department has reviewed the latest literature—for example, Lim (2022) and Mulholland et al. (2023). No new information has been identified that would significantly change the risk ratings for distribution, establishment, spread and consequences as set out for MNSV in the existing policies.

The risk scenario of biosecurity concern is that MNSV may be imported with asymptomatic melon fruit from Japan, which may result in the establishment and spread of this virus in Australia.

3.11.1 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 MNSV will arrive in Australia in a viable state with the importation of melon fruit from Japan is assessed as: **Low**.

The likelihood of importation is assessed as Low because MNSV is present in Japan including in the melon production areas. Commercial production and pest management practices, such as the use of domestically produced clean seeds, field and greenhouse hygiene and soil sanitisation practices are likely to reduce the disease incidence in production areas. Symptoms on fruit are visible, and symptomatic fruit are likely to be detected and discarded during harvest and packing house processes. However, asymptomatic infected fruit may be packed for export. MNSV is likely to survive storage and transport conditions from Japan to Australia.

The following information provides supporting evidence for this assessment.

MNSV is associated with melon fruit and is present in Japan.

- MNSV infects members of the Cucurbitaceae family, including melon (Choi, Kim & Kim 2003; Gonzalez-Garza et al. 1979; Kishi 1966; Lecoq & Desbiez 2012).
- In melon, the infection is generally systemic and may be present in fruit (Gonzalez-Garza et al. 1979; Hibi & Furuki 1985; Lecoq & Desbiez 2012).
- MNSV has been recorded in major melon production areas in Japan including Hokkaido, Shizuoka, Chiba, Aomori and Ibaraki prefectures (Matsuo, Kameya-Iwaki & Ota 1991; NARO 2024b).

Commercial production practices are likely to reduce MNSV in production areas and on the melon fruit.

- Commercial pre-planting and production practices of sourcing clean planting material, soil sanitisation, and crop hygiene practices followed for melon production are likely to reduce the incidence of the virus in production areas.
 - Seedlings are sourced from MAFF-registered nurseries that produce seedlings from heat-sanitised seed.
 - The soil is steam-sterilised in the greenhouse or chemically sterilised in the field prior to planting of seedlings (MAFF 2022; Shizuoka Crown Melon 2023) greatly reducing the likelihood of MNSV, and its fungal vector, *Olpidium bornovanus*, being present in the soil of production areas.
 - Weeds, as alternative hosts and a potential reservoir of MNSV, are controlled in and around production sites. The removal of weeds would greatly reduce the likelihood of MNSV being transferred to melon plants.
 - Hygiene practices including sanitation of equipment would prevent the introduction and spread of MNSV in the melon crop.
- Greenhouse-grown melons are suspended by string from trellises in isolated raised garden beds above the concrete floor of the greenhouse (Shizuoka Crown Melon 2023). This technique ensures the fruit does not touch the soil. Melons grown under plastic tunnels in the field grow in mulch beds covered with plastic sheeting and the fruit sit on individual stands. This reduces the likelihood of MNSV coming into contact with the fruit if the pathogen is present in the soil.
- Grafting onto pumpkin rootstock is a common cultivation practice used for melons grown in Japan. The practice of grafting on resistant rootstocks has proven to be an efficient method for protecting melons from soil-borne viruses, such as MNSV (Lecoq & Katis 2014).

- Melons grown in Japan are intensively managed (Shizuoka Crown Melon 2023). Therefore, infected plants are likely to be detected through the regular monitoring and management of crops by growers.
 - Infection is usually evident first on leaves and stems before visible symptoms appear on the fruit or the plant collapses (Avgelis 1989; Choi, Kim & Kim 2003; Kwak et al. 2015). Plants showing symptoms are likely to be removed from production and carefully disposed of to prevent spread of the virus.

If MNSV is present in a production site in Japan, it is possible that asymptomatic infected fruit, or fruit with no visible external symptoms, could escape detection during commercial harvesting and packing house processes and be packed for export.

- Melon fruit infected with MNSV can develop indentations and brown spots (Agriculture Victoria 2015). Any fruit showing visible signs of infection would be excluded at harvest or during the grading, sorting, quality inspection and packing processes.
- Symptom development in MNSV-infected melons can be affected by temperature (Kido et al. 2008b), breeding line or cultivar, and age of the plant. Symptoms are more likely to be visible in older plants and at cooler temperatures (Gonzalez-Garza et al. 1979; Lecoq & Desbiez 2012). It is possible that infected plants under certain conditions may not show any symptoms.
- In laboratory conditions, plants infected with MNSV can take 25–60 days to show symptoms (Campbell, Wipf-Scheibel & Lecoq 1996; Coudriet, Kishaba & Carroll 1979). Fruit infected shortly prior to harvesting may not have developed visible symptoms and may not be detected during harvest or packing house processes and may be packed for export.

MNSV could survive conditions during postharvest cool storage and transport to Australia

- Melons are stored and transported under controlled conditions, with an average temperature of 4°C to 10°C (MAFF 2022). These conditions are not expected to affect the viability of MNSV.
- MNSV particles are very stable, and they can remain infective in the sap of *C. melo* plants for up to 32 days at room temperature and for 131 days at 4°C (Herrera-Vásquez et al. 2009; Hibi & Furuki 1985).

For the reasons outlined, the likelihood of importation of MNSV on imported melon fruit from Japan is assessed as Low.

Likelihood of distribution

The likelihood that MNSV will be distributed within Australia in a viable state as a result of the processing, sale or disposal of melon fruit from Japan, and subsequently transfer to a susceptible part of a host is likely to be similar to MNSV on the previously assessed oriental melon and rockmelon fruit from Korea pathway. The same rating of **Very Low** for the likelihood of distribution for MNSV in previous assessments is adopted for melon fruit from Japan.

Overall likelihood of entry

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

3.11.2 Likelihoods of establishment and spread

The likelihoods of establishment and spread for MNSV are independent of the import pathway and are considered similar to those in previously assessed pathways.

Based on the existing import policies for MNSV, the likelihoods of establishment and spread are assessed as **High** and **Moderate**, respectively.

3.11.3 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 MNSV will enter Australia as a result of trade in melon fruit from Japan, 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**.

3.11.4 Consequences

The potential consequences of the entry, establishment and spread of MNSV in Australia are similar to those in the previously assessed pathways. The overall consequences in the previous assessments were assessed as Moderate. The overall consequences for MNSV on the melon fruit from Japan pathway are also assessed as **Moderate**.

3.11.5 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.

| Unrestricted risk estimate for Melon necrotic spot virus | |
|---|----------|
| Overall likelihood of entry, establishment and spread | Very Low |
| Consequences | Moderate |
| Unrestricted risk | Very Low |

The URE for Melon necrotic spot virus on the melon fruit from Japan pathway is assessed as **Very Low**, which achieves the ALOP for Australia. Therefore, no specific risk management measures are required for MNSV on this pathway.

3.12 Pest risk assessment conclusions

Likelihood ratings and the consequences estimate for individual quarantine pests and regulated articles are set out in Table 3.7.

Of the 12 pests for which a further pest risk assessment was conducted:

- The UREs for 3 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:
 - pumpkin fruit fly (*Zeugodacus tau*)
 - intonsa flower thrips (*Frankliniella intonsa*)
 - melon thrips (*Thrips palmi*)
- The URE for quarantine orthotospoviruses transmitted by thrips was assessed in the thrips group PRA (DAWR 2017a) as not achieving the ALOP for Australia. Three thrips species were assessed as regulated articles for Australia due to their potential to introduce quarantine orthotospoviruses into Australia (DAWR 2017a), and thus specific risk management measures are required for these regulated articles on this pathway. These pests are:
 - intonsa flower thrips (*Frankliniella intonsa*)
 - western flower thrips (*Frankliniella occidentalis*)
 - melon thrips (*Thrips palmi*)

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

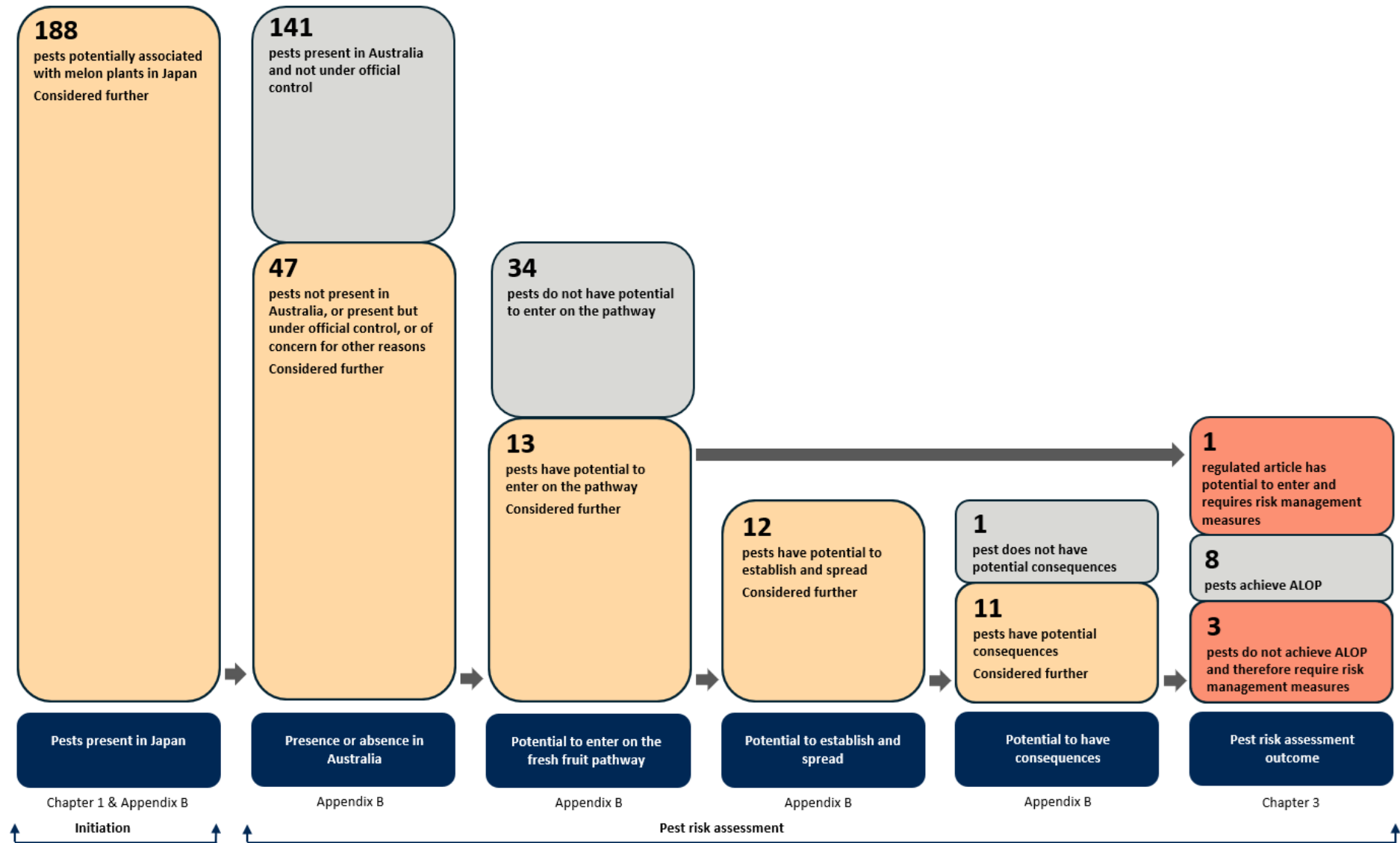
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Table 3.7 Pest risk assessment conclusions for pests, and pest groups, associated with the pathway of melon fruit from Japan

| Pest name | Likelihood of | | | | | | Consequences | URE |
|--|---------------|--------------|-----------------|---------------|----------|----------|--------------|-------------------|
| | Importation | Distribution | Entry | Establishment | Spread | EES | | |
| Fruit flies [Diptera: Tephritidae] | | | | | | | | |
| <i>Zeugodacus tau</i> (EP) | Very low | High | Very low | High | High | Very low | High | Low |
| Thrips [Thysanoptera: Thripidae] | | | | | | | | |
| <i>Frankliniella intonsa</i> (GP) a | High | Moderate | Moderate | High | High | Moderate | Low | Low |
| <i>Frankliniella occidentalis</i> (GP, RA) | High | Moderate | Moderate | N/A | N/A | N/A | N/A | N/A |
| <i>Thrips palmi</i> (GP, SA, Tas., WA) a | High | Moderate | Moderate | High | High | Moderate | Low | Low |
| Spider mites [Trombidiformes: Tetranychidae] | | | | | | | | |
| <i>Tetranychus kanzawai</i> (GP, WA) | Low | Moderate | Low | High | High | Low | Low | Very Low |
| <i>Tetranychus piercei</i> (GP) | Low | Moderate | Low | High | High | Low | Low | Very Low |
| <i>Tetranychus truncatus</i> (GP) | Low | Moderate | Low | High | High | Low | Low | Very Low |
| Anthracnose [Glomerellales: Glomerellaceae] | | | | | | | | |
| <i>Colletotrichum aenigma</i> (EP) | Low | Low | Very Low | Moderate | Moderate | Very Low | Low | Negligible |
| Late blight [Peronosporales: Peronosporaceae] | | | | | | | | |
| <i>Phytophthora melonis</i> (EP) | Low | Very Low | Very Low | Moderate | Moderate | Very Low | Low | Negligible |
| Tobamoviruses [Martellivirales: Virgaviridae] | | | | | | | | |
| Cucumber green mottle mosaic virus (EP) | Low | Low | Very Low | High | Moderate | Very Low | Moderate | Very Low |
| Kyuri green mottle mosaic virus (EP) | Low | Very Low | Very Low | High | Moderate | Very Low | Moderate | Very Low |
| Gammacarmoviruses [Tolivirales: Tombusviridae] | | | | | | | | |
| Melon necrotic spot virus (EP) | Low | Very Low | Very Low | High | Moderate | Very Low | Moderate | Very Low |
| Orthospoviruses [Elliovirales: Tospoviridae] vectored by <i>Frankliniella intonsa</i>, <i>F. occidentalis</i> and <i>Thrips palmi</i> | | | | | | | | |
| Listed in the thrips group PRA (GP) | Moderate | Moderate | Low | Moderate | High | Low | Moderate | Low |

a: Quarantine thrips species that is also identified as a regulated article for Australia as it vectors quarantine orthospoviruses; this table also presents the risk estimates for these viruses from the thrips Group PRA (DAWR 2017a). **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. **N/A:** Not assessed beyond entry as *F. occidentalis* is assessed as a regulated article but is not a quarantine pest. **RA:** Regulated article. **SA:** Regional quarantine pest for South Australia. **Tas.:** Regional quarantine pest for Tasmania. **Vic.:** Regional quarantine pest for Victoria. **WA:** Regional quarantine pest for Western Australia. **EES:** Overall likelihood of entry, establishment and spread. **URE:** Unrestricted risk estimate.

Figure 3.1 Overview of the decision process for the pest risk assessment for melon fruit from Japan



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 recommends specific risk management measures for those quarantine pests and regulated articles (section 4.1). It also recommends 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 and regulated articles to achieve the ALOP for Australia. The specific measures and operational systems are in addition to existing commercial production practices for melon fruit in Japan, 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 recommended measures and section 4.1.2 outlines the measures for specific pests or pest groups.

4.1.1 Overview of recommended measures

The department has established specific risk management measures for the pests or pest groups assessed in Chapter 3 as posing a biosecurity risk 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 the same and/or similar commodities from 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 melon fruit from Japan to achieve the ALOP for Australia. Therefore, the established measures are recommended for the pests or pest groups associated with melon fruit from Japan as described in section 4.1.2.

It is important to note that 2 risk management measure options are recommended in section 4.1.2 for *Zeugodacus tau*. MAFF will need to propose which of the options it intends to use for consideration by the department. In addition, MAFF may propose an alternative option, i.e. different from those recommended 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 MAFF, 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 Japan 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 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

melon fruit from Japan has changed, or where alternative risk management options become available (see section 4.4.2).

4.1.2 Risk management measures for quarantine pests and regulated articles associated with melon fruit from Japan

Recommended specific risk management measures for the 3 quarantine pests (2 of which are also regulated articles) and one regulated article associated with melon fruit from Japan are listed in Table 4.1.

Table 4.1 Recommended risk management measures for quarantine pests and regulated articles potentially associated with melon fruit from Japan

| Pest/pest group | Scientific name | Common name | Measures |
|---------------------------------------|--|-----------------------|--|
| Fruit flies [Diptera: Tephritidae] | <i>Zeugodacus tau</i> [EP] | pumpkin fruit fly | PFA, PFPP or PFPS a OR Fruit treatment considered to be effective against all life stages of <i>Z. tau</i> |
| Thrips [Thysanoptera: Thripidae] | <i>Frankliniella intonsa</i> [GP] b | intonsa flower thrips | Pre-export visual inspection and, if found, remedial action c |
| | <i>Frankliniella occidentalis</i> [GP, RA] | western flower thrips | |
| | <i>Thrips palmi</i> [GP, SA, Tas., WA] b | melon thrips | |

a: PFA is a pest free area; PFPP is a pest free place of production; PFPS is a pest free production site. **b:** Quarantine thrips species that is also identified as a regulated article for Australia as it vectors quarantine orthospoviruses assessed in the thrips Group PRA (DAWR 2017a) as posing an unrestricted risk that does not achieve the ALOP for Australia. **c:** 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. **RA:** Regulated article. **SA:** Regional quarantine pest for South Australia. **Tas.:** Regional quarantine pest for Tasmania. **WA:** Regional quarantine pest for Western Australia.

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

- for *Zeugodacus tau*
 - pest free areas, pest free places of production or pest free production sites, or
 - fruit treatment.
- for thrips
 - pre-export visual inspection and, if found, remedial action.

Measures for *Zeugodacus tau*

The department recognises that *Z. tau* is absent from most parts of Japan and where present, is under official control. Measures for *Z. tau* are only applicable to melon fruit exported from areas where the pest is known to be present, which is restricted to part of Okinawa Prefecture. MAFF is responsible for maintaining freedom from *Z. tau* in other parts of Japan where the pest is absent, which includes monitoring and trapping and regulating the movement of risk material on an ongoing basis, or until *Z. tau* is declared eradicated from Japan. MAFF is required to notify the department within 48 hours of an expansion of the distribution of *Z. tau* within Japan.

For *Z. tau* the department recommends 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 of *Z. tau*. The objective of each of the measures is to reduce the risk associated with this pest to achieve the ALOP for Australia.

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

The requirements for establishing pest free areas (PFA) 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 2018). The requirements for establishing 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).

Should Japan wish to use PFA, PFPP or PFPS as a measure to manage the risk posed by fruit flies, MAFF 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 2018), 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 applied pre-export may be used as a phytosanitary measure for *Z. tau*.

The department recognises treatments, such as cold, heat (for example, vapour heat treatment) or irradiation, are effective treatments against *Z. tau*. The use of any such treatment option is subject to its approval by the department as an efficacious measure against *Z. tau*. Should Japan wish to propose a treatment option, MAFF would need to provide a submission, which includes suitable information to support the claimed efficacy of the treatment to manage *Z. tau* on the melon fruit from Japan pathway, for consideration by the department.

Measures for thrips

The department recommends pre-export visual inspection and, if found, remedial action for *Frankliniella intonsa*, *F. occidentalis* and *Thrips palmi*. The method used for visual inspection must be able to detect all life stages of these pests, for example by using 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 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.

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

All consignments of melon fruit for export to Australia must be inspected by MAFF in accordance with ISPM 23 (FAO 2019c) and ISPM 31 (FAO 2016b). The inspection technique must be capable of detecting all life stages of these pests. Each consignment must be found free of *Frankliniella intonsa*, *F. occidentalis* and *Thrips palmi* or any other thrips identified as quarantine pests or regulated articles that are not specifically identified in this import risk analysis. 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 MAFF. 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 MAFF 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 specific risk management measures (section 4.1) are effectively applied, the phytosanitary status of melon fruit from Japan is maintained, and these can be verified.

4.2.1 A system of traceability to source production sites

The objectives of this procedure are to ensure that:

- melon fruit are sourced only from production sites producing commercial quality fruit
- production sites from which melon 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 melon 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.

MAFF must establish a system to enable traceability to where melon fruit for export to Australia are sourced. MAFF must ensure that export melon 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 production sites must be registered with MAFF. Records of registered production sites and MAFF audits must be kept by MAFF 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 melon fruit are sourced only from packing houses that are approved by MAFF
- where applicable (e.g., if treatment is used in the future), treatment providers used to treat melon fruit to manage the target pests are approved by MAFF and capable of applying a treatment that suitably manages the target pests.

Packing houses must be registered with MAFF. MAFF 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 MAFF audits must be kept by MAFF and must be made available to the department.

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

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

- documented procedures to ensure melon fruit are appropriately treated and safeguarded post treatment
 - staff training to ensure compliance with procedures
 - record-keeping procedures
 - suitability of facilities and equipment
 - MAFF's system of oversight of treatment application.

The department provides final approval of facilities, following review of regulatory oversight provided by MAFF 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:

- melon 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 melon fruit from Japan. 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 melon fruit
- all wood material associated with the consignment used in packaging and transport of melon fruit complies with the department's import requirements, as published on BICON
- secure packaging is used for export of melon fruit from Japan 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 melon fruit from Japan 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 melon fruit where the measures include pre-harvest controls/ production site freedom: the production site reference number
 - for melon fruit where phytosanitary measures are applied at the packing house: the packing house reference/number

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 melon fruit is maintained during storage and movement.

Treated and/or inspected melon 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 melon 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 MAFF

The objective of these procedures is to ensure that Australia's import conditions have been met. All consignments of melon fruit from Japan for export to Australia must be inspected by MAFF and found free of pests of biosecurity concern for Australia. Pre-export visual inspection must be undertaken by MAFF 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 melon), 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 the treatment applied
- additional declarations that may be required, as published on BICON.

Some treatments 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 melon fruit from Japan 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 PFPSs are established.

In the event that consignments of melon fruit from Japan 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 melon 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 Japan that produce melon 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 Japan has changed, or where alternative risk management or compliance-based intervention options become available.

MAFF must inform the department immediately on the detection of any new pests of melon fruit in Japan 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.

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.

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.

5 Conclusion

This final risk analysis report was conducted to assess the proposal by Japan for market access to Australia for melon fruit for human consumption. It 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 final report recommends that the importation of commercially produced melon fruit to Australia from all commercial production areas of Japan be permitted, subject to a range of biosecurity requirements outlined in Chapter 4.

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

The department considers that the risk management measures recommended in this report will provide an appropriate level of protection against the quarantine pests and regulated articles identified as associated with the trade of melon fruit from Japan.

All fresh fruit, including melon fruit from Japan, 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 melon fruit from Japan for human consumption. The import conditions will be communicated on BICON. The publication of import conditions on BICON is subject to Japan 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 1.2.2).

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 < to ≤ 1 |
| Moderate | The event would occur with an even likelihood | 0.3 < to ≤ 0.7 |
| Low | The event would be unlikely to occur | 0.05 < to ≤ 0.3 |
| Very Low | The event would be very unlikely to occur | 0.001 < to ≤ 0.05 |
| Extremely Low | The event would be extremely unlikely to occur | 0.000001 < to ≤ 0.001 |
| Negligible | The event would almost certainly not occur | 0 < to ≤ 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 2019)

- 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 2021)
- 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.

Appendix B: Initiation and categorisation for pests of melon fruit from Japan

The pest categorisation table does not represent a comprehensive list of all the pests associated with the entire melon plant grown in Japan. 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 melon 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', 'SA', 'Tas.' 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 'Tas.' (Tasmania) or '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 orthospoviruses 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 2019) and the *Final group pest risk analysis for soft and hard scale insects on fresh fruit, vegetable, cut-flower and foliage imports* (DAWE 2021) 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 *Final report for a review of pest risk assessments for spider mites (Acari: Trombidiformes: Tetranychidae)* (DAFF 2024a) has also been applied in this risk analysis as explained in Chapter 3 (section 3.3).

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.

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

Melon fruit from Japan: biosecurity import requirements final report
Appendix B: Initiation and categorisation for pests of melon fruit from Japan

| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | Potential for economic consequences | Pest risk assessment required |
|---|--|--------------------------|--|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | | |
| ARTHROPODS | | | | | | | |
| Coleoptera | | | | | | | |
| <i>Anomala cuprea</i> (Hope, 1839) [Scarabaeidae] | Yes (Tadauchi & Kamitani 2016; Yano 2021). | No records found. | No. Eggs are laid in the soil and the soil-dwelling larvae feed on roots of host plants. Adults feed on leaves (Dunlap et al. 2016; Fujiyama, Kasuga & Takahashi 1979). | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Aulacophora indica</i> (Gmelin, 1790) [Chrysomelidae] Pumpkin beetle | Yes (Abe & Matsuda 2005; MAFF 2022). | No records found. | No. Adults feed on the leaves and sometimes flowers of cucurbit hosts, including melon (Abe & Matsuda 2005). Eggs are laid in the soil, and the soil-dwelling larvae feed on the roots and lower parts of the stem of host plants (CABI 2025). | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Epilachna vigintioctomaculata</i> (Motschulsky, 1857) Synonym: <i>Henosepilachna vigintioctomaculata</i> (Motschulsky, 1857) [Coccinellidae] Large 28-spotted lady beetle | Yes (Katakura 1997). | No records found. | No. This species feeds on leaves of plants (Kwon, Kim & Kim 2010; Matsishina et al. 2019). Its main hosts are in the family Solanaceae (Katakura 1981), particularly potato. When preferred host plants are unavailable adults may feed on other plants, including melon. However, eggs and larvae are not known to occur on melon plants (Katakura 1981). | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|--|---|---|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Epilachna vigintioctopunctata</i> (Fabricius, 1775) Synonym: <i>Henosepilachna vigintioctopunctata</i> (Fabricius, 1775) [Coccinellidae] Hadda beetle | Yes (Shirai & Katakura 1999). | Yes. NSW, NT, Qld, Tas., WA (APPD 2025; Li 1993). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Scepticus griseus</i> (Roelofs, 1873) [Curculionidae] Rusty gourd-shaped weevil | Yes (Murakami, Tsuda & Kusigemati 2000). | No records found. | No. Eggs are laid on the soil surface and on plant trichomes, and larvae feed on roots of host plants (Oida, Fukuda & Suzuki 2021). Adults are associated with leaves of melon (Murakami, Tsuda & Kusigemati 2000). | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| Diptera | | | | | | | |
| <i>Atherigona orientalis</i> (Schiner, 1868) [Muscidae] Pepper fruit fly | Yes (Pont 1992). | Yes. NSW, NT, Qld, WA (Pont 1992). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|--|---|---|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <p><i>Bactrocera dorsalis</i> (Hendel, 1912) Synonyms: <i>Bactrocera invadens</i> (Drew, Tsuruta & White, 2005), <i>B. papayae</i> Drew & Hancock, 1994 and <i>B. philippinensis</i> Drew & Hancock, 1994 have been synonymised with <i>B. dorsalis</i>. [Tephritidae] Oriental fruit fly</p> | No. Absent, pest eradicated (EPPO 2025). | No. Absent, pest eradicated from mainland Australia (EPPO 2025; Hancock et al. 2000). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Bactrocera latifrons</i> (Hendel, 1915) [Tephritidae] Solanum fruit fly</p> | Yes. Present, restricted distribution (EPPO 2025). | No records found. | No. Oriental pickling melon (<i>Cucumis melo</i> var. <i>utilissimus</i>) is the only melon variety from which this species has been recorded (Clausen, Clancy & Chock 1965). This variety is out of scope for this assessment. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Bradysia impatiens</i> (Johannsen, 1912) Synonym: <i>Bradysia difformis</i> Frey, 1948 [Sciaridae] Black fungus gnat</p> | Yes (Menzel, Smith & Colauto 2003). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (Broadley, Kauschke & Mohrig 2018). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Chromatomyia horticola</i> (Goureaux, 1851) Synonym: <i>Phytomyza horticola</i> Goureaux, 1851 [Agromyzidae] Pea leafminer</p> | Yes (Saito 2004). | No records found. | No. Eggs are laid in the leaves of host plants (Yoshida & Sasakawa 1975). The larvae feed within mines excavated in leaf tissue (Pitkin et al. 2019). | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|--|--|--|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Delia platura</i> (Meigen, 1826) [Anthomyiidae] Bean seed fly | Yes (Iwasaki, Miyake & Takezawa 2006). | Yes. NSW, Qld, SA, Tas., Vic., WA (ABRS 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Liriomyza bryoniae</i> (Kaltenbach, 1858) [Agromyzidae] Tomato leafminer | Yes (Abe 2006). | No records found. | No. <i>Liriomyza bryoniae</i> is primarily associated with the leaves of host plants. Adult females in this genus feed on, and oviposit into, the leaves of host plants. The larvae feed within mines excavated in the leaf tissue and usually pupate in the soil (Parrella 1987). | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Liriomyza huidobrensis</i> (Blanchard, 1926) [Agromyzidae] Pea leafminer | Yes (Shindo et al. 2005). | Yes. Under official control (Regional) for WA (DPIRD 2025). Present in NSW, Qld, Vic. (Agriculture Victoria 2022; IPPC 2021a). | No. <i>Liriomyza huidobrensis</i> is primarily associated with the leaves of host plants. Adult females in this genus feed on, and oviposit into, the leaves of host plants. The larvae feed within mines or blotches in the leaf tissue, and usually pupate in the soil (Mujica, Carhuapoma & Kroschel 2016). | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|--|---|---|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Liriomyza sativae</i> Blanchard, 1938 [Agromyzidae] Vegetable leaf miner | Yes (Tokumaru et al. 2007). | Yes. Under official control (National). Present with restricted distribution in Qld (IPPC 2017). | No. <i>Liriomyza sativae</i> is primarily associated with the leaves of host plants. Adult females feed on, and oviposit into, the leaves of host plants. The larvae feed within mines excavated in the leaf tissue and usually pupate in the soil (Capinera 2020b; Mujica et al. 2016; Palumbo & Kerns 1998; Parrella 1987). | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Liriomyza trifolii</i> (Burgess 1880) [Agromyzidae] American serpentine leafminer | Yes (Abe 2006). | Yes. Qld, WA (IPPC 2023). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Zeugodacus cucurbitae</i> (Coquillett, 1899) Synonym: <i>Bactrocera cucurbitae</i> (Coquillett) [Tephritidae] Melon fly | No. Absent, pest eradicated (EPPO 2025; Norrbom 2025). | No records found on mainland Australia (CABI 2025; Queensland Government 2020). | 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 melon fruit from Japan

| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|---|--------------------------|---|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Zeugodacus depressus</i> (Shiraki, 1933) Synonym: <i>Bactrocera depressa</i> (Shiraki, 1933) [Tephritidae] Pumpkin fruit fly | Yes (MAFF 2022; Shin-etsu Broadcasting 1997). | No records found. | No. <i>Zeugodacus depressus</i> is a pest infesting pulp of cucurbitaceous fruits (Han, Choi & Ro 2017). Among melons, this species has only been recorded on oriental melon (<i>Cucumis melo</i> var. <i>makuwa</i>) (Han et al. 1994) and oriental pickling melon (<i>C. melo</i> var. <i>utilissimus</i>) (Shin-etsu Broadcasting 1997). These varieties are out of scope for this assessment. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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Appendix B: Initiation and categorisation for pests of melon fruit from Japan

| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|---|---|--|---|--|---|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <p><i>Zeugodacus tau</i> (Walker, 1849) Synonym: <i>Bactrocera tau</i> Walker, 1849 [Tephritidae]</p> | <p>Yes. Not widely distributed and under official control. Only present on Okinawa Island (IPPC 2025), and under eradication.</p> | <p>No records found.</p> | <p>Yes. <i>Zeugodacus tau</i> infests melon fruit, although other cucurbits may be preferred if available (Lin 2006). The adult female oviposits into the flesh of fruit (Liu & Ji 2024). After hatching <i>Z. tau</i> larvae feed under the surface of fruit as they develop, causing fruit deformity or causing the fruit to rot and drop (Liu & Ji 2024). Symptoms may not be visible on melon fruit before or soon after eggs hatch.</p> | <p>Yes. Imported melon 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.</p> | <p>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.</p> | <p>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).</p> | <p>Yes (EP)</p> |
| Hemiptera | | | | | | | |
| <p><i>Aphis craccivora</i> Koch, 1854 [Aphididae] Cow pea aphid</p> | <p>Yes (Komazaki, Shigehara & Toda 2010).</p> | <p>Yes. NSW, NT, Qld, Tas., Vic., WA (APPD 2025).</p> | <p>Assessment not required.</p> | <p>Assessment not required.</p> | <p>Assessment not required.</p> | <p>Assessment not required.</p> | <p>No.</p> |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|--|---|---|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Aphis fabae</i> Scopoli, 1763 [Aphididae] Black bean aphid | Yes (Komazaki, Shigehara & Toda 2010). | No records found. | No. <i>Aphis fabae</i> feeds on sap in leaves, preferring foliage closer to the ground (Fericean et al. 2012). Some life stages of aphids are able to fly, but any individuals occurring incidentally on fruit, including any attached stems, would be visible and likely to be removed during harvest and packing house processes. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Aphis gossypii</i> Glover, 1877 [Aphididae] Melon aphid | Yes (MAFF 2022; Takada 2002). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Aulacaspis tubercularis</i> Newstead, 1906 [Diaspididae] Mango scale | Yes (Mito & Uesugi 2004). | Yes. NSW, NT, Qld, WA (APPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Aulacorthum solani</i> (Kaltenbach, 1843) [Aphididae] Foxglove aphid | Yes (Takada 2002). | Yes. NSW, Qld, SA, Tas., Vic., WA (ABRS 2025; Berlandier 1997). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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|---|--|---|---|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Bemisia tabaci</i> (Gennadius, 1889) complex [Aleyrodidae] Silverleaf whitefly | Yes. Putative species including MED, JpL and Asia II 6 are present in Japan (Fujiwara, Maekawa & Tsuchida 2015). | No. Only some members of the complex are known to be present in Australia. Other species in the complex remain absent from Australia. The <i>B. tabaci</i> complex is a known vector for begomoviruses, several of which are quarantine pests of concern for Australia (Fiallo-Olivé et al. 2020). Therefore, the <i>B. tabaci</i> complex, including those species known to be present in Australia, are regulated articles for Australia. | No. <i>Bemisia tabaci</i> eggs are laid on the underside of leaves (CABI 2025), and nymphs and adults feed on the leaf sap (McAuslane 2009). On melon they infest leaves and stems, and heavy infestations lead to obvious symptoms (distorted chlorotic leaves and premature leaf drop) (Alegbejo & Banwo 2005). Although some melon fruit from Japan will include attached stem, whiteflies are very active and are unlikely to remain on the fruit when disturbed during harvesting and packing house processes. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Dolycoris baccarum</i> (Linnaeus, 1758) [Pentatomidae] Sloe bug | Yes (JSAEZ 1987). | No records found. | No. This species is associated with the leaves of melon (APQA 2019). | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Ferrisia virgata</i> (Cockerell, 1893) [Pseudococcidae] Grey mealybug | Yes (Yasuda 1990). | Yes. NSW, NT, Qld, WA (ABRS 2025; APPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|--------------------------------|---|---|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Leptoglossus gonagra</i> (Fabricius, 1775) Synonym: <i>Leptoglossus australis</i> (Fabricius, 1775) [Coreidae] Passionvine bug | Yes (Yasuda 1990). | Yes. NSW, NT, Qld, WA (ABRS 2025; APPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Lygus rugulipennis</i> Poppius, 1911 [Miridae] European tarnished plant bug | Yes (Iwasaki 2001; MAFF 2022). | No records found. | No. There is one record from 1996 of an unusual outbreak of adult and late instar juvenile <i>L. rugulipennis</i> in a melon farm in Japan. The bugs caused obvious feeding damage to tunnel-grown melons, rendering the fruit unmarketable. The bugs were found in tunnels at the field perimeter and were thought to have migrated from neighbouring potato or wheat fields (Hokkaido Plant Protection Office 2023). No subsequent records of this species occurring on melon were found. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Macrosiphum euphorbiae</i> (Thomas, 1878) [Aphididae] Potato aphid | Yes (Takada 2002). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (ABRS 2025; APPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|--|---|---|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Megymenum gracilicorne</i> Dallas, 1851 [Dinidoridae] Cucurbit shield bug, saw-toothed stinkbug | Yes (Nishino et al. 2021). | No records found. | No. Members of this family feed on sap (ALA 2025) and <i>Megymenum gracilicorne</i> is associated with leaves of melon (APQA 2019). | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Myzus persicae</i> (Sulzer, 1776) [Aphididae] Green peach aphid | Yes (Takada 2002). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (ABRS 2025; APPD 2025; Martyn & Miller 1963). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Phenacoccus solenopsis</i> Tinsley, 1898 [Pseudococcidae] Solenopsis mealybug | Yes (Tanaka & Uesato 2012). | Yes. NSW, NT, Qld, WA (ABRS 2025; APPD 2025; Martyn & Miller 1963). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Planococcus citri</i> (Risso, 1813) [Pseudococcidae] Citrus mealybug | Yes (García Morales et al. 2025). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; García Morales et al. 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Trialeurodes vaporariorum</i> (Westwood, 1856) [Aleyrodidae] Greenhouse whitefly | Yes (Kajita 2000; Taki & Nomura 2004). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; Waterhouse & Sands 2001). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Tropidothorax cruciger</i> (Motschulsky, 1860) [Lygaeidae] Lygaeid bug | Yes (Kato & Miura 1996). | No records found. | No. This species feeds on sap from buds and leaves of host plants (Kim et al. 2001). | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | Potential for economic consequences | Pest risk assessment required |
|--|-----------------------------|---|--|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | | |
| Lepidoptera | | | | | | | |
| <i>Agrotis ipsilon</i> (Hufnagel, 1766) [Noctuidae] Black cutworm | Yes (Wakamura et al. 1986). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (ABRS 2025; APPD 2025; Museums Victoria 2024). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Agrotis segetum</i> (Denis & Schiffermüller, 1775) [Noctuidae] Turnip moth | Yes (Komai 2011). | No records found. | No. Eggs sometimes occur on the underside of leaves of host seedlings, but are most commonly laid in the soil (Esbjerg & Lauritzen 2010; Moir et al. 2007). Larvae feed externally on roots, stems and leaves, causing visible damage (Moir et al. 2007). Therefore, any larvae present are likely to be removed during harvest and packing house processes. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Anadevidia peponis</i> (Fabricius, 1775) [Noctuidae] Snake gourd semilooper | Yes (Komoda et al. 2000). | Yes. Under official control (Regional) for WA (DPIRD 2025). Present in NSW, Qld (APPD 2025; Common 1990). | No. <i>Anadevidia peponis</i> females oviposit on the underside of leaves of cucurbit hosts (Herbison-Evans & Crossley 2025). Larvae in the subfamily Plusiinae generally feed on foliage, and occasionally flowers (Common 1990). | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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|--|---|--|--|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Athetis stellata</i> Moore, 1882 [Noctuidae] | Yes (GBIF Secretariat 2025; MAFF 2022). | No records found. | No. There was one report in 2013 of this species feeding on melon and pumpkin fruit in Japan, causing obvious damage and rendering the fruit unmarketable (Hokkaido Plant Protection Office 2023; MAFF 2022). No subsequent records of this species occurring on melon were found. While very little information is available on the biology of this species, larvae mainly feed on leaves of herbaceous plants such as dandelions and sorrel (Hokkaido Plant Protection Office 2023; Kagamania, Yui & Love 2023; Kamikura & Sakata 2019). | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Chrysodeixis eriosoma</i> (Doubleday, 1843) [Noctuidae] Green garden looper | Yes (Komoda et al. 2000). | Yes. NSW, NT, Qld, Tas., Vic., WA (APPD 2025; DPIRD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Ctenoplusia agnata</i> (Staudinger, 1892) Synonyms: <i>Acanthoplusia agnata</i> (Staudinger, 1892); <i>Chrysodeixis agnata</i> (Staudinger, 1892) [Noctuidae] Three-spotted plusia | Yes (Komai 2011). | No records found. | No. This species is associated with the leaves of melon (APQA 2019). | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|--|---|--|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Diaphania indica</i> (Saunders, 1851) [Crambidae] Cotton caterpillar | Yes (Komai 2011). | Yes. NSW, NT, Qld, WA (APPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Eudocima phalonia</i> Linnaeus, 1763 Synonyms: <i>Eudocima fullonia</i> (Clerk, 1764); <i>Ophideres fullonica</i> (Linnaeus, 1767) [Erebidae] Fruit-piercing moth | Yes (Shiraki 1952). | Yes. NSW, NT, Qld, Vic., WA (ALA 2025; APPD 2025; CABI 2025; DPIRD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Helicoverpa armigera</i> (Hübner, 1808) [Noctuidae] Cotton bollworm | Yes (Jallow, Matsumura & Suzuki 2001). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (ABRS 2025; APPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Helicoverpa assulta</i> (Guenée, 1852) [Noctuidae] Oriental tobacco budworm | Yes (Komai 2011). | Yes. NSW, NT, Qld, WA (ABRS 2025; APPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Peridroma saucia</i> (Hübner, 1808) [Noctuidae] Variegated cutworm | Yes (Komai 2011). | No records found. | No. <i>Peridroma saucia</i> lays eggs on twigs and stems of host plants. Larvae feed on flowers, leaves and developing fruits, often cutting plant stems off at the base (CABI 2025; Mau & Martin Kessing 2007). This species is not known to be associated with mature melon fruit. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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|---|------------------------------|--|---|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Scopula superior</i> (Butler, 1878) [Geometridae] Yellow rippled white looper moth | Yes (Komai 2011). | No records found. | No. This species is associated with leaves of melon (APQA 2019). | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Spodoptera exigua</i> (Hübner, 1808) [Noctuidae] Lesser armyworm | Yes (Wakamura & Takai 1995). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (ABRS 2025; APPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Spodoptera frugiperda</i> (Smith, 1797) [Noctuidae] Fall armyworm | Yes (Wu et al. 2022). | Yes. NSW, NT, Qld, Tas., Vic., WA (ABRS 2025; CABI 2025; DPIRD 2025; IPPC 2021b). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Spodoptera litura</i> (Fabricius, 1775) [Noctuidae] Taro caterpillar | Yes (Murata et al. 1998). | Yes. NSW, NT, Qld, Tas., Vic., WA (ABRS 2025; Agriculture Victoria 2024; APPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Spoladea recurvalis</i> (Fabricius, 1775) [Crambidae] Hawaiian beet webworm | Yes (Komai 2011). | Yes. NSW, NT, Qld, SA, Vic., WA (ALA 2025; APPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Trichoplusia ni</i> (Hübner, 1802) [Noctuidae] Cabbage looper | Yes (Komai 2011). | No records found. | No. Eggs are laid on leaves of host plants and larvae feed on foliage (Capinera 2020a). | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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|--|------------------------------|---|---|--|---|---|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Vanessa cardui</i> (Linnaeus, 1758) Synonym: <i>Cynthia cardui</i> (Linnaeus, 1758) [Nymphalidae] Painted lady | Yes (Shields 1992). | Yes. WA (ABRS 2025; APPD 2025; DPIRD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| Thysanoptera | | | | | | | |
| <i>Frankliniella intonsa</i> (Trybom, 1895) [Thripidae] Intonsa flower thrips | Yes (JSAEZ 1987; MAFF 2022). | No records found. | Yes. <i>Frankliniella intonsa</i> lays eggs and feeds on fruit, flowers and leaves of hosts (CABI 2025) and has been recorded on melon (Barba-Alvarado et al. 2020). Members of this genus are routinely intercepted on horticultural products at the Australian border (DAWR 2017a). | Yes. <i>Frankliniella intonsa</i> has a wide host range, including crop plants and ornamentals (Miyazaki & Kudo 1989), and many hosts are available in Australia. Imported melons will likely be distributed throughout Australia via the wholesale and retail trade pathways. Thrips present on melon fruit or waste could potentially disperse to a new host within close proximity. | Yes. Assessed in the thrips Group PRA (DAWR 2017a). | Yes. Assessed in the thrips Group PRA (DAWR 2017a). | Yes (GP). |

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| Pest | Present in Japan | 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>Frankliniella occidentalis</i> (Pergande, 1895) [Thripidae] Western flower thrips | Yes (Kawai 1990; MAFF 2016). | Yes. NSW, Qld, Tas., Vic., WA (APPD 2025). <i>Frankliniella occidentalis</i> has been assessed in the thrips group PRA as a vector of quarantine orthospoviruses. Therefore, it is a regulated article for Australia (DAWR 2017a) and potential for entry must be assessed. | Yes. <i>Frankliniella occidentalis</i> occurs on flowers, fruits, stems and leaves of host plants, often hiding under the calyx on the fruit or in places of contact between fruit and stems or leaves (Demirozer et al. 2012). <i>Frankliniella occidentalis</i> has been recorded on melon plants in greenhouses (Papadaki, Harizanova & Bournazakis 2008). Members of this genus are routinely intercepted on horticultural products at the Australian border (DAWR 2017a). | Yes. <i>Frankliniella occidentalis</i> has a wide host range including crop plants and ornamentals (CABI 2025), and many hosts are available in Australia. Imported melons will likely be distributed throughout Australia via the wholesale and retail trade pathways. Thrips present on melon fruit or waste could potentially disperse to a new host within close proximity. | Not applicable to vector. However, the emerging quarantine orthospoviruses vectored by this thrips have potential for establishment and spread. Assessed in the thrips Group PRA (DAWR 2017a). | Not applicable to vector. However, the emerging quarantine orthospoviruses vectored by this thrips have potential for consequences. Assessed in the thrips Group PRA (DAWR 2017a). | Thrips Group PRA applied |

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|--|---|---|---|--|---|---|-------------------------------|
| | | | Potential for importation | Potential for distribution | | | |
| <i>Thrips palmi</i> Karny, 1925 [Thripidae] Melon thrips | Yes (JSAEZ 1987; Kawai 1990). | Yes. Under official control (Regional) for SA (PIRSA 2024), Tas. (Biosecurity Tasmania 2024) and WA (DPIRD 2025). Present in NSW, NT, Qld (APPD 2025). | Yes. <i>Thrips palmi</i> feeds primarily on leaves but also on stems, flowers and fruits of melon (Childers 1997). Feeding on leaves and stems occurs at or near regions of new growth. <i>Thrips palmi</i> can also occur amongst the petals and developing ovaries in flowers and on the surface of host fruit (CABI 2025). Members of this genus are frequently intercepted on horticultural products at the Australian border (DAWR 2017a). | Yes. <i>Thrips palmi</i> is a polyphagous species that attacks many hosts in the Cucurbitaceae, Solanaceae, and Fabaceae families (CABI 2025; Young & Zhang 1998), and many hosts are available in Australia. Imported melons will likely be distributed throughout Australia via the wholesale and retail trade pathways. Thrips present on melon fruit or waste could potentially disperse to a new host within close proximity. | Yes. Assessed in the thrips Group PRA (DAWR 2017a). | Yes. Assessed in the thrips Group PRA (DAWR 2017a). | Yes (GP, SA, Tas., WA). |
| Trombidiformes | | | | | | | |
| <i>Brevipalpus californicus</i> (Banks, 1904) Synonym: <i>Tenuipalpus californicus</i> Banks, 1904 [Tenuipalpidae] Citrus flat mite | Yes (Mito & Uesugi 2004). | Yes. NSW, NT, Qld, SA, Vic., WA (APPD 2025; EPPD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Bryobia praetiosa</i> Koch, 1836 [Tetranychidae] Clover mite | Yes (Beard 2018; MAFF 2022; Migeon & Dorkeld 2025). | Yes. NSW, Tas., Vic., WA (APPD 2025; Miller 1966). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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|--|------------------------------|--|--|---|---|--|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Bryobia pritchardi</i> Rimando, 1962 [Tetranychidae] | Yes (Ehara 1999). | No records found. | Yes. There is one record of this species occurring on melon fruit (Ehara 1999). No subsequent records of this species occurring on melon were found. | Yes. This species occurs on tropical chickweed, <i>Drymaria cordata</i> (Li et al. 2019), which is a vigorous weed of pastures and gardens in NSW and Qld (PlantNet 2025). Imported melons will likely be distributed throughout Australia via the wholesale and retail trade pathways. Spider mites present on melon fruit or waste could potentially disperse to a new host within close proximity. | Yes. Hosts of this species are available in Australia. <i>Bryobia pritchardi</i> is common in China and East Asia (Li et al. 2019). Climatic environments similar to these regions exist in various parts of Australia, suggesting that <i>B. pritchardi</i> has the potential to establish and spread in this country. | No. Although <i>B. pritchardi</i> is common where it occurs (Li et al. 2019) no evidence was found of this species having economic impact. | No. |
| <i>Eutetranychus orientalis</i> (Klein, 1936) [Tetranychidae] Citrus brown mite | Yes (Migeon & Dorkeld 2025). | Yes. NT, Qld, WA (APPD 2025; DPIRD 2025; Walter, Halliday & Smith 1995). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Petrobia latens</i> (Müller, 1776) [Tetranychidae] Brown wheat mite | Yes (Ehara 1999). | Yes. NSW, Qld, Tas., WA (APPD 2025; CABI 2025; Halliday 1998; Poole 2010). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Polyphagotarsonemus latus</i> (Banks, 1904) [Tarsonemidae] Broad mite | Yes (MAFF 2022). | Yes. NSW, NT, Qld, SA, Vic., WA (APPD 2025). | 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 melon fruit from Japan

| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|--|--|---|---|--|--|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Tetranychus desertorum</i> Banks, 1900 [Tetranychidae] Red spider mite | No, pest records invalid. Previous records in Japan were misidentifications of <i>T. ludeni</i> (Ehara & Masaki 1989). | No, pest records invalid. Previous records in Australia could not be verified or were misidentifications (Seeman & Beard 2011). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Tetranychus gloveri</i> Banks, 1900 Synonym: <i>Tetranychus okinawanus</i> Ehara, 1995 [Tetranychidae] Glover's spider mite | Yes (Ehara 1999; Takafuji et al. 1996). | Yes. NT (APPD 2025; Sharkey et al. 2022). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Tetranychus kanzawai</i> Kishida, 1927 [Tetranychidae] Kanzawa spider mite | Yes (Ehara 1999; Ohno et al. 2009; Ohno et al. 2011). | Yes. Under official control (Regional) for WA (DPIRD 2025). Present in NSW, Qld (Gutierrez & Schicha 1983; Seeman & Beard 2011). | Yes. <i>Tetranychus kanzawai</i> infests the leaves and stems of several species of host plants, which include melon (Vacante 2016). While principally found on the leaves of host plants, spider mites may occasionally spread to other plant parts including fruit, particularly if population densities are high (Ho & Chen 1994; Jeppson, Keifer & Baker 1975). | Yes. <i>Tetranychus kanzawai</i> has a host range of over 190 wild and cultivated plant species (Migeon & Dorkeld 2025; Yano, Kanaya & Takafuji 2003), and many hosts are available in Australia. Imported melons will likely be distributed throughout WA via the wholesale and retail trade pathways. Spider mites present on melon fruit or waste could potentially disperse to a new host within close proximity. | Yes. Hosts of <i>T. kanzawai</i> are widely available in WA. <i>Tetranychus kanzawai</i> has been recorded from at least 24 countries (Migeon & Dorkeld 2025). It has successfully established in Qld and NSW (Gutierrez & Schicha 1983). Climatic environments similar to these regions exist in various parts of WA, suggesting that <i>T. kanzawai</i> has the potential to establish and spread in WA. | Yes. <i>Tetranychus kanzawai</i> is a significant polyphagous pest subject to quarantine measures in many parts of the world (Navajas et al. 2001). It is considered a pest of economic concern in Japan, Korea, Taiwan and China, where it causes serious damage to several agricultural crops (Kondo 2004; Takafuji et al. 2000) particularly when infestation levels are high (Ho 2000). Damage from feeding can lead to wilting, defoliation, and reduced growth (Cheng 2007). | Yes (GP, WA). |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|--|---|--|--|---|---|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Tetranychus ludeni</i> Zacher, 1913 [Tetranychidae] | Yes (Ehara & Masaki 1989). | Yes. NSW, NT, Qld, Tas., Vic., WA (APPD 2025; Seeman & Beard 2011). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Tetranychus neocaledonicus</i> Andre, 1933 [Tetranychidae] Vegetable mite | Yes (Ohno et al. 2009). | Yes. NSW, NT, Qld, WA (Botha, Bennington & Poole 2014; Gutierrez & Schicha 1983; Zhang 2008). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Tetranychus piercei</i> McGregor, 1950 [Tetranychidae] Pierce's spider mite | Yes (Ehara 1999; Matsuda et al. 2013). | No records found. | Yes. <i>Tetranychus piercei</i> has been recorded on leaves of melon in Japan (Ohno et al. 2009). Although this species is associated with foliage (Seeman & Beard 2005), wandering individuals could occur incidentally on fruit or stems, and overwintering females may hide in natural cavities or other shelters in produce (NAPPO 2014; Seeman & Beard 2011). | Yes. Imported melons will be distributed across Australia for sale and could potentially carry mite nymphs and/or adults. <i>Tetranychus piercei</i> has a host range of at least 88 plant species (NAPPO 2014). Spider mites present on melon fruit or waste could potentially disperse to a new host within close proximity. | Yes. This species occurs in tropical and warm subtropical regions of Asia (Seeman & Beard 2011). Climatic environments similar to these exist in various parts of Australia, suggesting that <i>T. piercei</i> has the potential to establish and spread in this country. | Yes. While in general this species is probably a minor pest (Seeman & Beard 2005), it has been recorded as a serious pest of banana, resulting in yield loss, delayed harvest and reduced fruit quality (Fu et al. 2002). | Yes (GP). |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|-----------------------------|--|---|--|--|---|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Tetranychus truncatus</i> Ehara, 1956 [Tetranychidae] Okra mite; cassava mite | Yes (Ehara 1999). | No records found. | Yes. <i>Tetranychus truncatus</i> has been recorded on melon in Japan (Ehara 1999). Although this species generally occurs on the undersides of leaves (Sakunwarin, Chandrapatya & Baker 2003; Seeman & Beard 2005; Win et al. 2018), wandering individuals could occur incidentally on fruit or stems. | Yes. Imported melons will be distributed across Australia for sale and could potentially carry mite nymphs and/or adults. <i>Tetranychus truncatus</i> has a host range of at least 80 plant species (NAPPO 2014). Spider mites present on melon fruit or waste could potentially disperse to a new host within close proximity. | Yes. <i>Tetranychus truncatus</i> occurs in tropical and temperate zones in Asia (Seeman & Beard 2011). Climatic environments similar to these exist in various parts of Australia, suggesting that <i>T. truncatus</i> has the potential to establish and spread in this country. | Yes. <i>Tetranychus truncatus</i> is a polyphagous spider mite that can cause economic damage to important crops including cotton, maize, and many vegetable crops (Jin et al. 2018; NAPPO 2014). | Yes (GP). |
| <i>Tetranychus urticae</i> Koch, 1835 [Tetranychidae] Two-spotted mite | Yes (Takafuji et al. 2000). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; Seeman & Beard 2011). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| BACTERIA | | | | | | | |
| <i>Agrobacterium rhizogenes</i> (Riker et al. 1930) Conn 1942 Synonym: <i>Rhizobium rhizogenes</i> (Riker et al. 1930) Young et al. 2001 [Rhizobiales: Rhizobiaceae] Crown gall | Yes (Shiomi et al. 1987). | Yes. NSW, SA, Vic., WA (APPD 2025; Eppo 2025; Hoque, Broadhurst & Thrall 2011; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|--|---|-------------------------------|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <p><i>Agrobacterium tumefaciens</i> (Smith and Townsend 1907) Conn 1942</p> <p>Synonym: <i>Rhizobium radiobacter</i> (Beijerinck & van Delden 1902) Young et al. 2001</p> <p>[Rhizobiales: Rhizobiaceae]</p> <p>Crown gall; Hairy root</p> | Yes (Wu et al. 2021). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Cook & Dubé 1989; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Dickeya chrysanthemi</i> (Burkholder et al. 1953) Samson et al. 2005</p> <p>Synonyms: <i>Pectobacterium chrysanthemi</i> (Burkholder et al. 1953) Brenner et al. 1973; <i>Erwinia chrysanthemi</i> (Burkholder et al. 1953) Young et al. 1978</p> <p>[Enterobacteriales: Enterobacteriaceae]</p> <p>Bacterial wilt; soft rot</p> | Yes (Suharjo, Sawada & Takikawa 2014). | Yes. NSW, WA (Chapman 2016; DPIRD 2025). | 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 melon fruit from Japan

| Pest | Present in Japan | 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 | | | |
| <p><i>Erwinia tracheiphila</i> (Smith 1895) Bergey et al. 1923</p> <p>[Enterobacteriales: Enterobacteriaceae]</p> <p>Bacterial wilt (cucurbits); Vascular wilt (cucurbits)</p> | Yes (Bradbury 1986; Vrisman et al. 2016). | No records found. | Yes. <i>Erwinia tracheiphila</i> causes bacterial wilt of cucurbits. The pathogen invades the plant when the frass of vector beetles enters feeding wounds made in leaves, stems or flowers (Liu 2015; Liu et al. 2018; Sasu et al. 2010). Symptoms begin at the leaves and spread through the plant (Rojas et al. 2015). Once wilt symptoms appear, fruit are usually of such poor quality as to be unmarketable (CABI 2025). However, symptoms may take up to 21 days to manifest (Liu 2015; Rojas et al. 2015) therefore it may be possible for asymptomatic fruit to be harvested and packed for export. | No. <i>Erwinia tracheiphila</i> is only known to be transmitted by beetles in the family Chrysomelidae, (CABI 2025; Ferreira & Boley 1992; Rand & Enlows 1916), primarily <i>Acalymma vittatum</i> and some <i>Diabrotica</i> species (Liu et al. 2018; Sasu et al. 2010; Vrisman et al. 2016). These species do not occur in Australia. In addition, being leaf-feeders, other chrysomelid beetles present in Australia are unlikely to feed on melon fruit or waste. Therefore, it is unlikely that this pathogen could reach a new host in Australia. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|--|--|--|---------------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <p><i>Pantoea ananatis</i> (Serrano, 1928) Mergaert et al. 1993 (Group II strains) Synonym: <i>Erwinia ananas</i> Serrano 1928 [Enterobacteriales: Enterobacteriaceae] Internal fruit rot</p> | <p>Yes (Kido et al. 2008a; MAFF 2022).</p> | <p>No records found. While this species is present (APPD 2025; Cother et al. 2004), there is no record of the Group II strains associated with melon being present in Australia.</p> | <p>No. Group II strains were reported from Kochi Prefecture, affecting Earls melon grown in greenhouses (Kido et al. 2008a; Kido et al. 2010). The pathogen causes internal water soaking of the fruit (Kido et al. 2008a). Initial disease prevalence was 0.2% in infected crops (Kido et al. 2008a). Group II strains have not been reported elsewhere in Japan, or on other melon varieties. It is unclear whether internal rot symptoms are due to the characteristics of this strain, or growing practices in the production system where it has been found. Infected melon fruit have an unpleasant acidic odour (Kido et al. 2008a) and there may also be subtle abnormalities in net formation (Kido & Takikawa 2009). As fruit are individually picked, quality checked and packed, infected fruit are likely to be removed during standard harvest, packing house and export procedures.</p> | <p>Assessment not required.</p> | <p>Assessment not required.</p> | <p>Assessment not required.</p> | <p>No.</p> |

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|---|--|---|-------------------------------|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Pectobacterium carotovorum</i> (Jones 1901) Waldee 1945 Synonym: <i>Pectobacterium carotovorum</i> subsp. <i>carotovorum</i> (Jones 1901) Hauben et al. 1999 [Enterobacteriales: Enterobacteriaceae] Blackleg; Soft rot | Yes (Hirata et al. 2016; MAFF 2022). | Yes. NSW, Qld, SA, Vic., WA (APPD 2025; Peltzer & Sivasithamparam 1985; Persley, Cooke & House 2010). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Pseudomonas cichorii</i> (Swingle 1925) Stapp 1928 [Pseudomonadales: Pseudomonadaceae] Bacterial black spot | Yes (Kanehashi et al. 2006). | Yes. NSW, NT, Qld, Vic., WA (APPD 2025; DPIRD 2025; Persley, Cooke & House 2010). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Pseudomonas marginalis</i> pv. <i>marginalis</i> (Brown 1918) Stevens 1925 [Pseudomonadales: Pseudomonadaceae] Bacterial leaf rot; Bacterial soft rot; Butt-rot | Yes (Kijima, Ishihara & Kobayashi 1989). | Yes. NSW, NT, Qld, SA, Tas., Vic. (EPPO 2025; Persley, Cooke & House 2010). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Pseudomonas syringae</i> pv. <i>aptata</i> (Brown & Jamieson 1913) Young et al. 1978 Synonym: <i>Pseudomonas aptata</i> (Brown & Jamieson) Stevens 1925 [Pseudomonadales: Pseudomonadaceae] Bacterial leaf spot | Yes (Bradbury 1986; Tominaga 1967). | Yes. NSW, Qld, Vic. (APPD 2025; Moffett 1983; O'Brien & Sparshott 1999). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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|--|--|--|-------------------------------|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Pseudomonas syringae</i> pv. <i>lachrymans</i> (Smith & Bryan 1915) Young et al. 1978 [Pseudomonadales: Pseudomonadaceae] Cucurbit angular leaf spot | Yes (MAFF 2022; Watanabe & Ohuchi 1983). | Yes. NSW, Qld, Tas., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Pseudomonas syringae</i> pv. <i>syringae</i> van Hall 1902 [Pseudomonadales: Pseudomonadaceae] Bacterial canker or blast | Yes (Kondo & Tsuji 2020). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Pseudomonas syringae</i> pv. <i>tabaci</i> (Wolf & Foster 1917) Young et al. 1978 Synonym: <i>Pseudomonas amygdali</i> pv. <i>tabaci</i> [Pseudomonadales: Pseudomonadaceae] Angular leaf spot | Yes (Matsui et al. 2021). | Yes. NSW, Qld, WA (APPD 2025; Bradbury 1986; DPIRD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Pseudomonas viridiflava</i> (Burkholder 1930) Dowson 1939 [Pseudomonadales: Pseudomonadaceae] Bacterial streak and rot | Yes (Tsuji & Fuji 2021). | Yes. NSW, Qld, Tas., Vic., WA (APPD 2025; DPIRD 2025; Padaga et al. 2000). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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|---|---|--|-------------------------------|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <p><i>Xanthomonas cucurbitae</i> (ex Bryan 1926) Vauterin et al. 1995</p> <p>Synonym: <i>Xanthomonas campestris</i> pv. <i>cucurbitae</i> (Bryan 1926) Dye 1978</p> <p>[Xanthomonadales: Xanthomonadaceae]</p> <p>Bacterial leaf spot</p> | Yes (Bradbury 1986; NARO 2024a). | Yes. NSW, Qld (APPD 2025; Persley, Cooke & House 2010). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| FUNGI | | | | | | | |
| <p><i>Agroathelia rolfsii</i> (Sacc.) Redhead & Mullineux</p> <p>Synonyms: <i>Athelia rolfsii</i> (Sacc.) C.C. Tu & Kimbr.; <i>Sclerotium rolfsii</i> Sacc.</p> <p>[Atheliales: Atheliaceae]</p> <p>Fruit rot</p> | Yes (Okabe, Norikawa & Matsumoto 2000). | Yes. NSW, NT, Qld, SA, Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Albifimbria verrucaria</i> (Albertini & Schweinitz) L. Lombard & Crous</p> <p>Synonym: <i>Myrothecium verrucaria</i> (Alb. & Schwein.) Ditmar.</p> <p>[Hypocreales: Stachybotryaceae]</p> <p>Myrothecium blotch</p> | Yes (Farr & Rossman 2025; NARO 2024b). | Yes. NSW, Qld, Vic., WA (APPD 2025; Lenne 1990; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Alternaria alternata</i> (Fr.) Keissl. Synonym: <i>Alternaria tenuis</i> Nees [Pleosporales: Pleosporaceae] Alternaria leaf blight | Yes (Nishikawa & Nakashima 2020). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; Barkat et al. 2016; Persley, Cooke & House 2010; Sampson & Walker 1982). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Alternaria brassicae</i> (Berk.) Sacc. [Pleosporales: Pleosporaceae] Alternaria blight | Yes (Nishikawa & Nakashima 2020). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Alternaria brassicicola</i> (Schwein.) Wiltshire [Pleosporales: Pleosporaceae] Dark leaf spot | Yes (Nishikawa & Nakashima 2020). | Yes. NSW, NT, Qld, Tas., Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Alternaria cucumerina</i> (Ellis & Everh.) J.A. Elliott [Pleosporales: Pleosporaceae] Cucumber blight | Yes (Nishikawa & Nakashima 2020). | Yes. NSW, NT, Qld, WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Apiospora arundinis</i> (Corda) Pintos & P. Alvarado Synonym: <i>Arthrinium arundinis</i> (Corda) Dyko & B. Sutton [Xylariales: Apiosporaceae] Kernel blight | Yes (Amasya, Narisawa & Watanabe 2015). | Yes. NSW, Qld (APPD 2025; HerbIMI 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Aspergillus flavus</i> Link [Eurotiales: Aspergillaceae] | Yes (Takahashi, Kamimura & Ichinoe 2004). | Yes. NSW, Qld, Vic., WA (APPD 2025; DPIRD 2025; Pitt & Hocking 2006). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Aspergillus niger</i> Tiegh. [Eurotiales: Aspergillaceae] Black mould | Yes (Farr & Rossman 2025; Watanabe 2002). | Yes. NSW, NT, Qld, SA, Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Berkeleyomyces basicola</i> (Berk. & Broome) W.J. Nel, Z.W. de Beer, T.A. Duong & M.J. Wingf. Synonym: <i>Thielaviopsis basicola</i> (Berk. & Broome) Ferraris [Microascales: Ceratocystidaceae] Black root rot | Yes (Miki & Katsuya 1998). | Yes. NSW, Qld, SA, Tas., Vic., WA (ALA 2025; APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Boeremia exigua</i> var. <i>exigua</i> (Desm.) Aveskamp, Gruyter & Verkley Synonym: <i>Phoma exigua</i> Desm. [Pleosporales: Pleosporaceae] Leaf spot | Yes (Kubota & Abiko 2002). | Yes. Tas., WA (Li et al. 2012; Sampson & Walker 1982). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Botryosphaeria dothidea</i> (Moug.) Ces & De Not. [Botryosphaeriales: Botryosphaeriaceae] | Yes (NARO 2024b; Slippers et al. 2007). | Yes. NSW, Qld, Vic., WA (Burgess et al. 2019). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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|---|-------------------------------|--|--|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Botrytis cinerea</i> Pers. [Helotiales: Sclerotiniaceae] Grey mould; Botrytis bunch rot | Yes (Ajitomi et al. 2022). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Cercospora cf. flagellaris</i> Ellis & G. Martin [Mycosphaerellales: Mycosphaerellaceae] | Yes (Groenewald et al. 2013). | No records found. | No. <i>Cercospora cf. flagellaris</i> causes leaf spot on melon (Bakhshi et al. 2020; Park, Back & Park 2020). | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Cercospora cf. malloti</i> Ellis & Everhart [Mycosphaerellales: Mycosphaerellaceae] | Yes (Groenewald et al. 2013). | No records found. | No. <i>Cercospora cf. malloti</i> causes leaf spot on hosts, which include melon (Groenewald et al. 2013; NARO 2024a). | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Choanephora cucurbitarum</i> (Berk. & Ravenel) Thaxt. Synonym: <i>Choanephora infundibulifera</i> f. <i>cucurbitarum</i> (Berk. & Ravenel) Schipper [Mucorales: Choanephoraceae] Choanephora wet rot | Yes (Oikawa et al. 1986). | Yes. NSW, NT, Qld (APPD 2025; Department of Primary Industry and Fisheries 2014). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Cladosporium cladosporioides</i> (Fresen.) G.A. de Vries [Capnodiales: Cladosporiaceae] Mould | Yes (Watanabe et al. 2011). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; Bensch et al. 2012; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|---|--|---|--|--|---|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Cladosporium oxysporum</i> Berk. & M.A. Curtis [Capnodiales: Cladosporiaceae] Leaf spot | Yes (NARO 2024b). | Yes. NSW, NT, Qld, Vic., WA (APPD 2025; Bensch et al. 2012). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Colletotrichum aenigma</i> B.S. Weir & P.R. Johnston [Glomerellales: Glomerellaceae] Anthracnose; fruit rot | Yes (Gan et al. 2017; MAFF 2022; Truong et al. 2018). | No records found. | Yes. <i>Colletotrichum aenigma</i> is associated with anthracnose of a variety of hosts, which include melon (NARO 2024a; Truong et al. 2018). Fruit can be infected (Sharma et al. 2022) but usually displays symptoms of rot/disease. As part of Japan's export process, any melon fruit showing visible symptoms of infection at the packhouse are discarded and are not considered suitable for export. However, asymptomatic fruit or stems may be missed. | Yes. Conidia are spread by water splash, rain or insects (Maas 1998). If present in fruit waste, the conidia could potentially enter the environment and transfer to a new host. | Yes. <i>Colletotrichum aenigma</i> has been isolated from a variety of hosts including pear, grapevine, strawberry, apple and melon (Jayawardena et al. 2016; Wang et al. 2015), which are widely grown in Australia. Environments with climates similar to Japan's exist in various parts of Australia suggesting that <i>Colletotrichum aenigma</i> has the potential to establish and spread in Australia. | Yes. Anthracnose caused by <i>C. aenigma</i> is a minor disease of strawberry in Japan and is reported to cause economic losses in apple (Wang et al. 2015). | Yes (EP). |
| <i>Colletotrichum chlorophyti</i> S. Chandra & Tandon [Glomerellales: Glomerellaceae] Anthracnose | Yes (Jiang et al. 2023). | Yes. Qld (Shivas et al. 2016). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Colletotrichum fruticola</i> Prihastuti, L. Cai & K.D. Hyde [Glomerellales: Glomerellaceae] | Yes (Gan et al. 2017). | Yes. Qld (Shivas et al. 2016). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| <p><i>Colletotrichum gloeosporioides</i> (Penz.) Penz. & Sacc. Synonym: <i>Glomerella cingulata</i> (Stoneman) Spauld. & H. Schrenk. [Glomerellales: Glomerellaceae] Anthracnose</p> | Yes (MAFF 2022; Suzuki et al. 2010). | Yes. NSW, Vic., WA (Shivas et al. 2016). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Colletotrichum karsti</i> Y.L. Yang, Zou Y. Liu, K.D. Hyde & L. Cai Synonym: <i>Colletotrichum karstii</i> (orthographic variant) Y.L. Yang, Zou Y. Liu, K.D. Hyde & L. Cai [Glomerellales: Glomerellaceae] Anthracnose</p> | Yes (Truong et al. 2018). | Yes. NSW, Qld, WA (DPIRD 2025; Shivas et al. 2016). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Colletotrichum orbiculare</i> Damm, P.F. Cannon & Crous Synonym: <i>Colletotrichum orbiculare</i> (Berk.) Arx [Glomerellales: Glomerellaceae] Anthracnose (cucurbits)</p> | Yes (MAFF 2022; Matsuo et al. 2022). | Yes. NSW, WA (DPIRD 2025; Shivas et al. 2016). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| <p><i>Colletotrichum truncatum</i> (Schwein.) Andrus & W.D. Moore Synonym: <i>Colletotrichum capsici</i> (Syd. & P. Syd) E.J. Butler & Bisby [Glomerellales: Glomerellaceae] Anthracnose</p> | Yes (Sato, Moriwaki & Kaneko 2015). | Yes. NSW, NT, Qld (Shivas et al. 2016). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Corynespora cassiicola</i> (Berk. & M.A. Curtis) C.T. Wei [Pleosporales: Corynesporascaceae] Corynespora leaf spot; Target leaf spot</p> | Yes (Miyamoto et al. 2009). | Yes. NSW, NT, Qld, Vic., WA (APPD 2025; Silva et al. 1995). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Curvularia lunata</i> (Wakker) Boedijn Synonym: <i>Cochliobolus lunatus</i> R.R. Nelson & F.A. Haasis [Pleosporales: Pleosporaceae] Black kernel</p> | Yes (Watanabe 2002). | Yes. NSW, NT, Qld, Vic., WA (APPD 2025; Hyde & Alcorn 1993; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Curvularia verruculosa</i> Tandon & Bilgrami ex M.B. Ellis [Pleosporales: Pleosporaceae] Leaf blight</p> | Yes (NARO 2024a; Tsukiboshi 2018). | Yes. NSW, Qld, WA (APPD 2025; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| <p><i>Diaporthe sclerotioides</i> (Kesteren) Udayanga, Crous & K.D. Hyde Synonym: <i>Phomopsis sclerotioides</i> Kesteren [Diaporthales: Diaporthaceae] Black root rot</p> | Yes (Shishido, Ohashi & Momma 2014). | Yes. NSW (Tesoriero & Bertus 2004). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Diaporthe sojae</i> Lehman Synonyms: <i>Diaporthe kochmanii</i> R.G. Shivas, S.M. Thompsen & A.J. Young; <i>Diaporthe melonis</i> var. <i>brevistylospora</i> Ts. Kobay. & Tak. Ohsawa [Diaporthales: Diaporthaceae]</p> | Yes (Udayanga et al. 2015). | Yes. NSW, Qld (APPD 2025; Udayanga et al. 2015). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Epicoccum nigrum</i> Link Synonym: <i>Epicoccum purpurascens</i> Kunze ex Schltdl. [Pleosporales: Didymellaceae]</p> | Yes (Watanabe 2002). | Yes. NSW, Qld, Tas., Vic., WA (APPD 2025; Brown, Hyde & Guest 1998). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Erysiphe cruciferarum</i> Opiz ex L. Junell [Erysiphales; Erysiphaceae] Powdery mildew</p> | Yes (Oku, Arie & Kishira 1993). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Cunnington et al. 2003; DPIRD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| <i>Fusarium acuminatum</i> Ellis & Everh. Synonym: <i>Gibberella acuminata</i> Wollenw. [Hypocreales: Nectriaceae] Fusarium blight | Yes (Osawa et al. 2020). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Shivas 1989; Summerell et al. 2011). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Fusarium avenaceum</i> (Fr.) Sacc. Synonym: <i>Gibberella avenacea</i> R.J. Cook [Hypocreales: Nectriaceae] Fusarium blight | Yes (Farr & Rossman 2025; HerblIMI 2025; Nakata, Yokoyama & Nakamura 2018). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Shivas 1989; Summerell et al. 2011). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Fusarium graminearum</i> Schwabe Synonym: <i>Gibberella zeae</i> (Schwein.) Petch [Hypocreales: Nectriaceae] Root rot | Yes (Suga et al. 2008). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Shivas 1989; Summerell et al. 2011). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Fusarium incarnatum</i> (Roberge ex Desm.) Sacc. Synonym: <i>Fusarium semitectum</i> Berk. & Ravenel [Hypocreales: Nectriaceae] | Yes (Watanabe et al. 2011). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Shivas 1989; Summerell et al. 2011). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Fusarium oxysporum</i> f. sp. <i>cucumerinum</i> J.H. Owen [Hypocreales: Nectriaceae] Fusarium wilt of cucurbits | Yes (Namiki, Nishi & Tsuge 1996). | Yes. SA (Summerell et al. 2011; Wicks, Volle & Baker 1978). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| <i>Fusarium oxysporum</i> f. sp. <i>melonis</i> W.C. Snyder & H. N. Hansen [Hypocreales: Nectriaceae] Melon fusarium wilt | Yes (Namiki, Nishi & Tsuge 1996). | Yes. Qld, SA, WA (DPIRD 2025; Summerell et al. 2011). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Fusarium sambucinum</i> Fuckel Synonym: <i>Fusarium roseum</i> Link [Hypocreales: Nectriaceae] Postharvest rot | Yes (Kitabayashi et al. 2022; MAFF 2022). | Yes. WA (Tan et al. 2011). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Geotrichum candidum</i> Link [Saccharomycetales: Dipodascaceae] Sour rot | Yes (Watanabe 2002). | Yes. NSW, NT, Qld, Tas., Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Gibellulopsis nigrescens</i> (Pethybr.) Zare, W. Gams & Summerb. Synonym: <i>Verticillium nigrescens</i> Pethybr. [Glomerellales: Plectosphaerellaceae] | Yes (Kitazawa & Sato 1984). | Yes. NSW, Qld, Tas., Vic. (APPD 2025; Nair et al. 2019; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Golovinomyces cichoracearum</i> (DC.) V.P. Heluta Synonym: <i>Erysiphe cichoracearum</i> DC. [Erysiphales: Erysiphaceae] Powdery mildew | Yes (Matsuda & Takamatsu 2003). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Persley, Cooke & House 2010). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| <i>Golovinomyces orontii</i> (Castagne) V.P. Heluta Synonym: <i>Erysiphe orontii</i> Castagne [Erysiphales: Erysiphaceae] Cucurbit powdery mildew (CPM) | Yes (Matsuda & Takamatsu 2003). | Yes. NSW, NT, Qld, SA, Tas., Vic. (APPD 2025; Cunnington 2003; Liberato & Shivas 2012). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Lasiodiplodia theobromae</i> (Pat.) Griffon & Maubl. Synonym: <i>Botryodiplodia theobromae</i> Pat. [Botryosphaeraiales: Botryosphaeriaceae] Stem end rot | Yes (Hattori, Nakano & Nakashima 2023). | Yes. NSW, NT, Qld, WA (Burgess et al. 2019). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Leveillula taurica</i> (Lév.) G. Arnaud [Erysiphales: Erysiphaceae] Powdery mildew | Yes (Kunoh, Takeshima & Ishizaki 1981). | Yes. NSW, NT, Qld, SA, Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Macrophomina phaseolina</i> (Tassi) Goid [Botryosphaeraiales: Botryosphaeriaceae] Charcoal root rot | Yes (Fujinaga et al. 2002). | Yes. NSW, NT, Qld, SA, Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| <i>Monosporascus cannonballus</i> Pollack & Uecker [Xylariales: Diatrypaceae] Melon root rot | Yes (Uematsu, Onogi & Watanabe 1985). | No records found. | No. <i>Monosporascus cannonballus</i> causes root rot and vine decline of melons (Martyn & Miller 1996). It is a soil-borne fungus which colonises the roots and base of the stem (EPPO 1999; Markakis et al. 2018). This fungus is not known to be associated with melon fruit. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Neocosmospora cucurbitae</i> Sand.-Den., L. Lombard & Crous Synonym: <i>Fusarium solani</i> f. sp. <i>cucurbitae</i> Snyder & Hansen [Hypocreales: Nectriaceae] | Yes (Sakoda & Kobayashi 2001). | Yes. NSW, WA (ALA 2025; Shivas 1989; Zitter, Hopkins & Thomas 1996). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Neocosmospora solani</i> (Mart.) L. Lombard & Crous Synonym: <i>Fusarium solani</i> (Mart.) Sacc. [Hypocreales: Nectriaceae] | Yes (NARO 2024b; Watanabe 2002). | Yes. NSW, NT, Qld, Vic., WA (HerbIMI 2025; Summerell et al. 2011). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Neofusicoccum parvum</i> (Pennycook & Samuels) Crous, Slippers & A.J.L. Phillips [Botryosphaerales: Botryosphaeriaceae] | Yes (Slippers et al. 2007). | Yes. NSW, Qld, SA, Vic., WA (Burgess et al. 2019). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Olpidium bornovanus</i> (Sahtiy.) Karling [Olpidiales: Olpidiaceae] | Yes (Sasaya & Koganezawa 2006). | Yes. NSW, Vic. (Mackie et al. 2020; Plant Health Australia 2016). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| <i>Paramyothecium roridum</i> (Tode) L. Lombard & Crous Synonym: <i>Myrothecium roridum</i> Tode. [Hypocreales: Stachybotriaceae] Leaf spot | Yes (Murakami, Shirata & Inoue 1998). | Yes. NSW, NT, Qld, SA, Vic., WA (APPD 2025; Cook & Dubé 1989; Davison, Davison & Brims 2008; HerbIMI 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Penicillium chrysogenum</i> Thom [Eurotiales: Trichomaceae] Mould | Yes (NARO 2024b; Saito 2007). | Yes. NSW, Qld, Tas., Vic., WA (APPD 2025; DPIRD 2025; Yip & Weste 1985). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Penicillium citrinum</i> Thom [Eurotiales: Trichomaceae] Post-harvest decay | Yes (NARO 2024b; Watanabe et al. 2011). | Yes. NSW, Qld, Vic., WA (APPD 2025; HerbIMI 2025; Markovina et al. 2005). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Penicillium digitatum</i> (Pers.) Sacc. [Eurotiales: Trichomaceae] Green mould | Yes (Watanabe et al. 2011). | Yes. NSW, Qld, SA, Vic., WA (APPD 2025; Cook & Dubé 1989; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Penicillium expansum</i> Link [Eurotiales: Trichomaceae] Blue mould | Yes (NARO 2024b; Suzuki, Ito & Kanematsu 2008). | Yes. NSW, Qld, Vic., Tas., WA (APPD 2025; Cook & Dubé 1989; Sampson & Walker 1982; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Penicillium italicum</i> Wehmer [Eurotiales: Trichomaceae] Blue mould | Yes (NARO 2024a; Shishiyama et al. 1996). | Yes. NSW, Qld, SA, Vic., WA (APPD 2025; Cook & Dubé 1989; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| <i>Penicillium oxalicum</i> Currie & Thom [Eurotiales: Trichocomaceae] Blue mould; Cucumber rot | Yes (Watanabe et al. 2011). | Yes. NSW, Qld (HerbIMI 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Penicillium viridicatum</i> Westling Synonym: <i>Penicillium aurantiogriseum</i> var. <i>viridicatum</i> (Westling) Frisvad & Filtenborg [Eurotiales: Trichocomaceae] | Yes (NARO 2024b; Saito 2007). | Yes. Vic., WA (APPD 2025; DPIRD 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Plectosphaerella cucumerina</i> (Lindf.) W. Gams Synonyms: <i>Fusarium tabacinum</i> (Beyma) W. Gams; <i>Plectosporium tabacinum</i> (J.F.H. Beyma) M.E. Palm, W. Gams & Nirenberg [Glomerellales: Plectosphaerellaceae] | Yes (NARO 2024b; Satou 2016). | Yes. NSW, Qld, SA, Vic., WA (APPD 2025; Palm, Gams & Nirenberg 1995; Pascoe, Nancarrow & Copes 1984). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Plectosphaerella melonis</i> (Watan & Sato) Phillips et al. Synonym: <i>Acremonium cucurbitacearum</i> Alfaro-García et al.) [Glomerellales: Plectosphaerellaceae] Melon root rot | Yes (Martínez-Culebras, Abad-Campos & García-Jiménez 2004). | No records found. | No. This fungus infects the roots of melon, causing collapse of the plant before fruit maturity (Martínez-Culebras, Abad-Campos & García-Jiménez 2004). | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| <i>Podosphaera fuliginea</i> (Schltld.) U. Braun & S. Takam Synonym: <i>Sphaerotheca fuliginea</i> (Schltld.) Pollacci [Erysiphales: Erysiphaceae] Powdery mildew | Yes (Homma 1937; MAFF 2022; NARO 2024a). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; Cook & Dubé 1989; Sampson & Walker 1982). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Podosphaera fusca</i> (Fr.) Braun & Shishkoff Synonyms: <i>Podosphaera xanthii</i> (Castagne) Braun & Shishkoff; <i>Sphaerotheca fusca</i> (Fr.) S. Blumer [Erysiphales: Erysiphaceae] Powdery mildew | Yes (CABI 2025; NARO 2024a). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; DPIRD 2025; Persley, Cooke & House 2010). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Rhizoctonia solani</i> J.G. Kühn Synonym: <i>Thanatephorus cucumeris</i> (A.B. Frank) Donk [Cantharellales: Ceratobasidiaceae] Root rot; Damping off; Thread blight | Yes (Ogoshi 1987). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | 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: Rhizopodaceae] Soft rot | Yes (Yoshida et al. 2001). | Yes. NSW, Qld, Vic., WA (APPD 2025; HerbIMI 2025; Simmonds 1966). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| <i>Rhizopus stolonifer</i> (Ehrenb.) Vuill. [Mucorales: Rhizopodaceae] Fruit rot; Bulb rot | Yes (Okada & Oue 2007). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; Cook & Dubé 1989; Sampson & Walker 1982; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Sclerotinia sclerotiorum</i> (Lib.) de Bary [Helotiales: Sclerotiniaceae] Sclerotinia stem rot | Yes (Ajitomi et al. 2018). | Yes. NSW, Qld, SA, Tas., Vic., WA (Ekins et al. 2011; Mu et al. 2018). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Septoria apiicola</i> Speg. [Capnodiales: Mycosphaerellaceae] Black blight | Yes (NARO 2024a). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Setophoma terrestris</i> (H.N. Hansen) Gruyter, Aveskamp & Verkley Synonyms: <i>Phoma terrestris</i> H.N. Hansen; <i>Pyrenochaeta terrestris</i> (H.N. Hansen) Gorenz, J.C. Walker & Larson [Pleosporales: Didymellaceae] Pink root | Yes (Yoshida 2021). | Yes. NSW, Qld, Tas., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | 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 melon fruit from Japan

| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|------------------------------|---|-------------------------------|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Stagonosporopsis cucurbitacearum</i> (Fr.) Aveskamp, Gruyter & Verkley Synonym: <i>Didymella bryoniae</i> (Auersw.) Rehm [Pleosporales: Didymellaceae] Gummy stem blight (cucurbits) | Yes (Wako et al. 2002). | Yes. NSW, NT, Qld, SA, Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Trichothecium roseum</i> (Pers.) Link [Hypocreales: Myrotheciomyetaceae] Pink mould fruit rot; Pink fruit rot | Yes (Takahashi et al. 1995). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; DPIRD 2025; Persley, Cooke & House 2010). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Verticillium dahliae</i> Kleb. [Glomerellales: Plectosphaerellaceae] Verticillium wilt | Yes (Koike et al. 1997). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Nair et al. 2019; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| FUNGUS-LIKE ORGANISMS | | | | | | | |
| <i>Fuligo gyrosa</i> (Rostaf.) E. Jahn Synonym: <i>Physarum gyrosum</i> Rostafinski [Physarales: Physaraceae] Mould | Yes (NARO 2024a). | Yes. NSW, NT, Vic., WA (Stephenson 2021). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|--|---|-------------------------------|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Globisporangium debaryanum</i> (Hesse) Uzuhashi, Tojo & Kakish. Synonym: <i>Pythium debaryanum</i> Hesse [Peronosporales: Pythiaceae] Damping-off | Yes (CABI 2025; NARO 2024a). | Yes. NSW, Qld, SA, Vic., WA (APPD 2025; Cook & Dubé 1989; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Globisporangium irregulare</i> (Buisman) Uzuhashi, Tojo & Kakish Synonym: <i>Pythium irregulare</i> Buisman [Peronosporales: Pythiaceae] Root rot | Yes (Uzuhashi, Kakishima & Tojo 2010). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Cook & Dubé 1989; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Globisporangium spinosum</i> (Sawada) Uzuhashi, Tojo & Kakish. Synonym: <i>Pythium spinosum</i> Sawada [Peronosporales: Pythiaceae] Damping off | Yes (Uzuhashi, Kakishima & Tojo 2010). | Yes. NSW, Qld, WA (APPD 2025; Shivas 1989; Zahid et al. 2001). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Globisporangium ultimum</i> (Trow) Uzuhashi, Tojo & Kakish. Synonym: <i>Pythium ultimum</i> Trow [Peronosporales: Pythiaceae] Damping off | Yes (Fukunishi et al. 2021). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; HerbIMI 2025; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|------------------------------|---|-------------------------------|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Hyaloperonospora parasitica</i> (Pers.) Constant. Synonym: <i>Peronospora parasitica</i> (Pers.) de Bary [Peronosporales: Peronosporaceae] Downy mildew | Yes (Yamauchi & Satou 2017). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Physarum cinereum</i> (Batsch) Pers. [Physarales: Physaraceae] | Yes (NARO 2024a). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (ALA 2025; APPD 2025; Cook & Dubé 1989; Sampson & Walker 1982). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Phytophthora cactorum</i> (Lebert & Cohn) J. Schröt [Peronosporales: Peronosporaceae] | Yes (Rahman et al. 2014). | Yes. NSW, Qld, SA, Tas., Vic., WA (Burgess et al. 2021). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Phytophthora capsici</i> Leonian [Peronosporales: Peronosporaceae] | Yes (Rahman et al. 2014). | Yes. NSW, Qld, WA (APPD 2025; DPIRD 2025; Weinert et al. 1998). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Phytophthora citrophthora</i> (R.E. Sm. & E.H. Sm.) Leonian [Peronosporales: Peronosporaceae] Crown and trunk canker | Yes (Rahman et al. 2014). | Yes. NSW, Qld, SA, Vic., WA (Burgess et al. 2021). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Phytophthora cryptogea</i> Pethybr. & Laff. [Peronosporales: Peronosporaceae] Crown and root rot | Yes (Rahman et al. 2014). | Yes. NSW, Qld, SA, Tas., Vic., WA (Burgess et al. 2021). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | 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 | | | |
| <p><i>Phytophthora melonis</i> Katsura</p> <p>Synonym: <i>Phytophthora sinensis</i> Yu & Zhuang</p> <p>[Peronosporales: Peronosporaceae]</p> <p>Late blight; Foot rot</p> | Yes (Rahman et al. 2014). | No records found. | <p>Yes. <i>Phytophthora melonis</i> is primarily a soil-borne disease, causing root rot of melon (Mirtalebi & Banihashemi 2019). However, it is known to infect all parts of cucurbit hosts (Chen et al. 2012; Ho, Lu & Gong 1984; Mirtalebi & Banihashemi 2019). Fruit infection of cucurbits results in dark green, water-soaked lesions causing soft rot of the fruit (Erwin & Ribeiro 1996; Guharoy et al. 2006; Zitter, Hopkins & Thomas 1996).</p> | <p>Yes. <i>Phytophthora melonis</i> produces motile zoospores which can travel to new host plant tissues through soil or water (Erwin & Ribeiro 1996; Ho, Lu & Gong 1984). These zoospores could potentially enter the environment from discarded waste and transfer to a host.</p> | <p>Yes. Hosts of <i>P. melonis</i> are mainly cucurbits (Farr & Rossman 2025; Ho, Gallegly & Hong 2007; Mills, Förster & Coffey 1991), which are grown widely in Australia. Environments with climates similar to Japan's exist in various parts of Australia suggesting that <i>P. melonis</i> has the potential to establish and spread in Australia.</p> | <p>Yes. <i>Phytophthora melonis</i> is one of the most severe diseases of the Cucurbitaceae, significantly reducing crop yield worldwide (Erwin & Ribeiro 1996; Hashemi et al. 2020). It has been reported to cause root rot on melon resulting in significant yield loss (Mirtalebi & Banihashemi 2019). In cucumber, it causes damping-off or crown rot, resulting in severe economic losses (Hashemi et al. 2020; Ho, Gallegly & Hong 2007).</p> | Yes (EP) |
| <p><i>Phytophthora nicotianae</i> Breda de Haan</p> <p>[Peronosporales: Peronosporaceae]</p> <p>Black shank</p> | Yes (Rahman et al. 2015). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (Burgess et al. 2021). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <p><i>Pseudoperonospora cubensis</i> (Berk. & M.A. Curtis) Rostovzev</p> <p>[Peronosporales: Peronosporaceae]</p> <p>Downy mildew</p> | Yes (Inaba, Morinaka & Hamaya 1986). | Yes. NSW, NT, Qld, SA, WA (APPD 2025; Persley, Cooke & House 2010; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|--|--|-------------------------------|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| <i>Pythium aphanidermatum</i> (Edson) Fitzp. [Peronosporales: Pythiaceae] Root rot | Yes (Tojo, Yonemoto & Kawamura 2007). | Yes. NSW, NT, Qld, SA, Vic., WA (APPD 2025; Cook & Dubé 1989; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| <i>Pythium myriotylum</i> Drechsler [Peronosporales: Pythiaceae] Soft rot | Yes (NARO 2024b; Watanabe, Hashimoto & Sato 1977). | Yes. NSW, NT, Qld, SA, Vic., WA (APPD 2025; Cook & Dubé 1989; Shivas 1989). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| VIRUSES | | | | | | | |
| Bean yellow mosaic virus (BYMV) <i>Potyvirus phaseoluteum</i> [Patavirales: Potyviridae] | Yes (PSJ 2021). | Yes. NSW, Qld, SA, Tas., Vic., WA (EPPD 2025; Geering & Thomas 2022). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| Beet pseudoyellows virus (BPYV) <i>Crinivirus pseudobetae</i> [Martellivirales: Closteroviridae] | Yes (PSJ 2021). | Yes. Tas. (Constable et al. 2010; Duffus & Johnstone 1981). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| Clover yellow vein virus (CYVV) <i>Potyvirus trifolii</i> [Patavirales: Potyviridae] | Yes (PSJ 2021). | Yes. NSW, Qld, SA, Tas., Vic., WA (Geering & Thomas 2022; Helms, Müller & Waterhouse 1993; Norton & Johnstone 1998). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|------------------------------|---|---|---|---|---|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| Cucumber green mottle mosaic virus (CGMMV) <i>Tobamovirus viridimaculae</i> [<i>Martellivirales</i> : <i>Virgaviridae</i>] | Yes (PSJ 2021). | Yes. Under official control (National) (DAWR 2017b). Present with restricted distribution in NSW, NT, Qld, SA, WA (Kehoe et al. 2022; Mackie et al. 2023). | Yes. Melon is a natural host of CGMMV (Reingold et al. 2015; Sugiyama, Ohara & Sakata 2006; Tian et al. 2014). CGMMV can cause leaf mottling, mosaic symptoms on the leaves and fruit mottling or distortion (Reingold et al. 2015). Infected melon fruit may display mottled symptoms (AMA 2015). As part of Japan's export process, any melon fruit showing visible symptoms of viral infections at the packing house are discarded and are not considered suitable for export. However, asymptomatic fruits may be missed. | Yes. CGMMV can be mechanically transmitted or seed transmitted (Dombrovsky, Tran-Nguyen & Jones 2017). Melon fruit imported from Japan will likely be distributed throughout Australia for retail sale. Some asymptomatic infected fruit may be sold. Some melon fruit waste infected with CGMMV may be discarded into the environment near suitable host plants. | Yes. CGMMV has established in various regions in Australia (Mackie et al. 2023). Climatic conditions in Australia are favourable for the establishment of the pathogen. CGMMV is very stable and can be transmitted from infected plants mechanically, via infected tools and machinery which come in contact with the virus. Long distance dispersal of this virus could also occur through the movement of infected propagative material. | Yes. CGMMV is an economically important pathogen of cucumber, melon, squash and watermelon (Moradi & Jafarpour 2011). It is reported to cause yield losses of around 15% in cucurbitaceous crops (Nontajak et al. 2014). The damage it causes to the host plant and fruit can be extensive. Therefore, CGMMV is considered a threat to Australia's fresh vegetable market and the cucurbitaceous seed industry. | Yes (EP). |
| Cucumber mosaic virus (CMV) <i>Cucumovirus CMV</i> [<i>Martellivirales</i> : <i>Bromoviridae</i> :] | Yes (PSJ 2021). | Yes. NSW, Qld, SA, Tas., Vic., WA (APPD 2025; Geering & Thomas 2022). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| Cucurbit aphid-borne yellows virus (CABYV) <i>Polerovirus CABYV</i> [<i>Sobelivirales</i> : <i>Solemoviridae</i>] | Yes (Yoshida & Tamada 2019). | Yes. NT (National Management Group 2012). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | 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 | | | |
| Cucurbit chlorotic yellows virus (CCYV) [<i>Martellivirales</i> : <i>Closteroviridae</i>] | Yes (PSJ 2021). | No records found. | Yes. CCYV has been reported to naturally affect melon, causing yellowing and vein clearing symptoms (Cho et al. 2021). This virus is known to infect host plants systemically (Okuda et al. 2010), and it has been detected on symptomatic watermelon fruit (Luria et al. 2019). | No. As a crinivirus, CCYV is not mechanically transmissible or seed transmitted (Okuda et al. 2010; Orfanidou et al. 2017). CCYV is only known to be vectored by some members of the <i>Bemisia tabaci</i> complex (Orfanidou et al. 2017). While some of these vectors may be present in Australia, they are highly unlikely to feed on fresh fruit or fruit waste, as they are sap feeders that infest leaves, stems and buds of host plants (Alegbejo & Banwo 2005; CABI 2025; McAuslane 2009). | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|------------------|--------------------------|---|---|--|--|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| Kyuri green mottle mosaic virus (KGMMV) <i>Tobamovirus kyuri</i> [<i>Martellivirales</i> : <i>Virgaviridae</i>] | Yes (PSJ 2021). | No records found. | Yes. Melon is a natural host of KGMMV (Kim, Lee & Natsuaki 2009). Infection is systemic and infected fruit may be seriously deformed, with mottle mosaic symptoms (Daryono, Somowiyarjo & Natsuaki 2005a; Kim, Lee & Natsuaki 2009), rendering the fruits unmarketable. KGMMV is present in melon production areas but has not been reported on melon in Japan. As part of Japan's export process, any melon fruit showing visible symptoms of viral infections at the packing house are discarded as unsuitable for export. However, it is possible latent or early infection could result in infected asymptomatic fruits that may be missed. | Yes. KGMMV is seed transmitted (Balsak 2023) and may be mechanically transmitted through contact with infected material (Dombrovsky & Smith 2017). Melon fruit imported from Japan will likely be distributed throughout Australia for retail sale. Some asymptomatic infected fruit may be sold. Some melon fruit waste infected with KGMMV may be discarded into the environment near suitable host plants. | Yes. KGMMV naturally infects several species within the Cucurbitaceae family (Kim, Lee & Natsuaki 2009) which are widely planted throughout Australia. KGMMV has established in areas with a wide range of climatic conditions (Daryono, Somowiyarjo & Natsuaki 2005a). There are similar climatic regions in parts of Australia that would be suitable for the establishment and spread of this virus. Tobamoviruses, including KGMMV, are highly stable and persistent (Daryono, Somowiyarjo & Natsuaki 2005b; Lecoq & Katis 2014) and may remain viable in the environment for long periods | Yes. KGMMV causes serious diseases of cucurbit crops and is responsible for significant economic losses in several countries (Kim, Lee & Natsuaki 2009). In Japan, KGMMV is considered a major virus, causing severe yield reduction in cucumber (Fukuta et al. 2012). | Yes (EP). |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|---|--|--|--|---|---|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| Melon mild mottle virus (MMMoV) <i>Nepovirus cucumis</i> [Picornavirales: Secoviridae] | Yes (PSJ 2021; Tomitaka, Fujimoto & Nakata 2011). | No records found. | No. There is a single record of MMMoV on melon reported in 2010 (Tomitaka, Fujimoto & Nakata 2011). Since then, there have been no records of this species affecting melon or any other plant. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| Melon necrotic spot virus (MNSV) <i>Gammacarmovirus melonis</i> Synonym: Muskmelon necrotic spot virus [Tolivirales: Tombusviridae] | Yes (PSJ 2021). | Yes. Under official control (National) (IPPC 2016). Present with restricted distribution in NSW, Qld and Vic. (Business Queensland 2021; Mackie et al. 2020). | Yes. Melon is the natural host of MNSV (Choi, Kim & Kim 2003). MNSV affects melon systemically and is present in the fruit and seeds (Hibi & Furuki 1985). On the outside of infected melon fruit, indentations and brown spots can appear, whilst the flesh may become dark, hollow and rotten (Agriculture Victoria 2015). As part of Japan's export process any melon fruit showing visible symptoms of viral infections at the packing house are discarded and are not considered suitable for export. However, asymptomatic fruits may be missed. | Yes. MNSV is seed transmitted and soil and water-borne, and can be mechanically transmitted by contact between plants or by tools used for pruning (Lecoq & Desbiez 2012). Melon fruit imported from Japan will likely be distributed throughout Australia for retail sale. Some asymptomatic infected fruit may be sold. Some melon fruit waste infected with MNSV may be discarded into the environment near suitable host plants. | Yes. MNSV has been detected sporadically in Australia (Business Queensland 2021). MNSV naturally infects members of the Cucurbitaceae family, including melon (Ayo-John et al. 2014; Kishi 1966; Koç, Fidan & Baloğlu 2014; Lecoq & Desbiez 2012; Tomlinson & Thomas 1986). Host species are widely planted in Australia. Virus particles can remain viable in the soil for several years and can also persist for a long period in association with its soil-borne fungal vector <i>Olpidium bornovanus</i> , which is present in Australia (Mackie et al. 2020; Plant Health Australia 2016). | Yes. MNSV is a serious pathogen of greenhouse melons and cucumbers worldwide, but it also causes problems in fields (Herrera-Vásquez et al. 2009; Lecoq & Desbiez 2012). MNSV has been reported to cause up to 100% loss in other melon growing regions of the world (Kwak et al. 2015). In greenhouse grown watermelon plants, it has been reported to cause rates of plant death of 80% (Ruiz et al. 2016). | Yes (EP). |

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| Pest | Present in Japan | 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 | | | |
| Melon yellow spot virus (MYSV) <i>Orthotospovirus meloiflavi</i> [Elliovirales: Tospoviridae] | Yes (PSJ 2021). | No records found. | Yes. MYSV has been reported to naturally affect melon, causing severe yellowing and necrotic spots on leaves and fruits (Kato, Hanada & Kameya-Iwaki 2000; Okuda et al. 2002). This virus has been detected on symptomatic melon fruit (Peng et al. 2011). As part of Japan's export process any melon fruit showing visible symptoms of viral infections at the packing house are discarded and are not considered suitable for export. However, asymptomatic fruits may be missed. | No. This orthotospovirus is only known to be transmitted by thrips (<i>Thrips palmi</i>) (DAWR 2017a; Kato, Hanada & Kameya-Iwaki 1999; Takeuchi et al. 2001). As explained in the Thrips Group PRA (DAWR 2017a), there is a negligible/very low likelihood of orthotospovirus acquisition from infected produce for subsequent transmission, via a thrips, to a susceptible host. | Assessment not required. | Assessment not required. | No. |
| Papaya ringspot virus type W <i>Potyvirus papayanuli</i> Synonym: Watermelon mosaic virus 1 [Patatavirales: Potyviridae] | Yes (PSJ 2021). | Yes. NSW, NT, Qld, WA (Maina et al. 2017). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| Squash mosaic virus (SqMV) <i>Comovirus cucurbitae</i> [Picornavirales: Secoviridae] | Yes (PSJ 2021; Yoshida et al. 1980). | Yes. NSW, NT, Qld, Vic., WA (Büchen-Osmond et al. 1988; Coutts & Jones 2005). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|---|------------------|--|--|--|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| Tobacco ringspot virus <i>Nepovirus nicotianae</i> [Picornavirales: Secoviridae] | Yes (PSJ 2021). | Yes. Qld, SA, WA (MacNish 1963; Randles & Francki 1965; Reynolds & Teakle 1976). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| Tomato chlorosis virus (ToCV) <i>Crinivirus tomatichlorosis</i> [Martellivirales: Closteroviridae] | Yes (PSJ 2021). | No records found. | Yes. ToCV has been reported to naturally affect melon (Abdel-Salam, Rezk & Dawoud 2019). As this virus is known to infect host plants systemically (Fiallo-Olivé & Navas-Castillo 2019), it could be present in melon fruit (Luria et al. 2019). | No. As a crinivirus, ToCV is not mechanically transmissible or seed transmitted (Abdel-Salam, Rezk & Dawoud 2019). ToCV is only known to be vectored semi-persistently by whiteflies of the genera <i>Bemisia</i> and <i>Trialeurodes</i> . (Fiallo-Olivé & Navas-Castillo 2019; Fiallo-Olivé et al. 2020). While some of these vectors may be present in Australia, they are highly unlikely to feed on fresh fruit or fruit waste, as they are sap feeders that infest leaves, stems and buds of host plants (Alegbejo & Banwo 2005; CABI 2025; McAuslane 2009). | Assessment not required. | Assessment not required. | No. |

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| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|------------------|---|---|--|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| Tomato spotted wilt orthotospovirus (TSWV) <i>Orthotospovirus tomatomaculæ</i> [Elliovirales: Tospoviridae] | Yes (PSJ 2021). | Yes. NSW, NT, Qld, SA, Tas., Vic., WA (APPD 2025; CABI 2025). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| Watermelon mosaic virus (WMV) <i>Potyvirus citrulli</i> Synonym: Watermelon mosaic virus – 2 [Patatavirales: Potyviridae] | Yes (PSJ 2021). | Yes. NSW, Qld, Vic., WA (APPD 2025; Greber 1978). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |
| Watermelon silver mottle orthotospovirus (WSMoV) <i>Orthotospovirus citrullomaculosi</i> [Elliovirales: Tospoviridae] | Yes (PSJ 2021). | No records found. | Yes. WSMoV has been reported to naturally affect melon, causing chlorotic or necrotic spots on the leaves (Okuda et al. 2002). This virus was first reported infecting watermelon in Japan in 1982, and was initially described as a strain of TSWV (Iwaki et al. 1984), before being considered a new orthotospovirus (Yeh & Chang 1995; Yeh et al. 1997). Orthotospoviruses infect hosts systemically (OEPP/EPP 2020), and WSMoV has been reported causing mottle symptoms on watermelon fruit (Iwaki et al. 1984). | No. This orthotospovirus is only known to be transmitted by thrips (<i>Thrips palmi</i>) (Mou et al. 2021; Okuda et al. 2002). As explained in the Thrips Group PRA (DAWR 2017a), there is a negligible/very low likelihood of orthotospovirus acquisition from infected produce for subsequent transmission, via a thrips, to a susceptible host. | Assessment not required. | Assessment not required. | No. |

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Appendix B: Initiation and categorisation for pests of melon fruit from Japan

| Pest | Present in Japan | Present within Australia | Potential to enter on pathway | | | | Pest risk assessment required |
|--|------------------|---|-------------------------------|----------------------------|--|-------------------------------------|-------------------------------|
| | | | Potential for importation | Potential for distribution | Potential for establishment and spread | Potential for economic consequences | |
| Zucchini yellow mosaic virus (ZYMV) <i>Potyvirus cucurbitaflaviteselati</i> [Patatavirales: Potyviridae] | Yes (PSJ 2021). | Yes. NSW, NT, Qld, Tas., WA (Greber, Persley & Herrington 1988; Maina et al. 2019). | Assessment not required. | Assessment not required. | Assessment not required. | Assessment not required. | No. |

No soft scale species associated with commercially produced melon fruit were identified by Japan in their Technical Market Access Submission. Application of the *Final group pest risk analysis for soft and hard scale insects on fresh fruit, vegetable, cut-flower and foliage imports* (DAWE 2021) did not identify any soft scales that are associated with the melon fruit from Japan pathway. A further literature search found no soft scale species that are likely to be present on the melon fruit from Japan pathway.

Appendix C: Stakeholder comments

This section outlines key technical issues raised by stakeholders during consultation on the draft report, and the department's responses. Additional information on other issues raised by stakeholders, which are outside the scope of this technical report, is available on the department website.

Issue 1: Clarification was sought on why *Zeugodacus depressus* was assessed as requiring risk management measures in the import risk analysis for oriental melon and rockmelon from Korea but assessed as not being associated with the melons from Japan pathway.

The main host plants for *Zeugodacus depressus* are Chinese cucumber or 'snakegourd' (*Trichosanthes kirilowii*) and pumpkin (*Cucurbita moschata*) (Han, Choi & Ro 2017; Mun, Bohonak & Roderick 2003). Among melons (*Cucumis melo*) *Z. depressus* has only been reported in association with oriental melon (*Cucumis melo* var. *makuwa*) and oriental pickling melon (*C. melo* var. *utilissimus*). Japan have excluded these varieties from the scope of their market access request for melons for this reason.

Evidence of melons in general as a host of *Z. depressus* comes from a single primary report from Korea, where Han et al. (1994) surveyed damage to tomatoes and cucurbits by *Z. depressus*. The main text of Han et al. (1994) was published in Korean, with an English abstract, tables and figures; no scientific names of hosts are given in the paper. The department commissioned a professional translation of the full paper. The main text in Korean refers throughout to *chamoe* which specifically means oriental melon. 'Melon' is used only in the English parts of the publication, indicating that 'melon' was a translation error in the abstract and tables. Therefore, Han et al. (1994) only provided evidence that the oriental melon variety is a host of *Z. depressus*, not *C. melo* in general.

The oriental melon and rockmelon fruit from Korea IRA (DAFF 2023a) stated, "The risk scenario of biosecurity concern is that *Z. depressus* eggs or larvae may be present within oriental melon or rockmelon fruit imported from Korea." This is inaccurate and arose from the mistranslation of the original Korean text of Han et al. (1994). The mistranslation was not picked up during preparation of the melons from Korea report, therefore no distinction was made between the host status of oriental melon and rockmelon in that report. The department does not consider that there is a risk of *Z. depressus* eggs or larvae being associated with rockmelon from Korea; only with oriental melon.

As we have no evidence of *Z. depressus* in association with the commodity proposed for import from Japan, specific risk management measures for this fruit fly are not required for this pathway. However, consignments of fresh melon fruit will be inspected on arrival in Australia and the detection of any quarantine pest, including *Z. depressus*, will result in remedial action and may lead to a suspension of trade while the incident is investigated and/or a review of policy is undertaken to determine if additional measures may be required.

Issue 2: Clarification was sought on the current status of *Pantoea ananatis* Group II strains in Japan.

Pantoea ananatis has previously been assessed by the department, at species level, as present in Australia (DAFF 2012; DAWE 2020b; Department of Agriculture 2019). There are no formally described subspecies or pathovars of *P. ananatis* (EFSA Panel on Plant Health (PLH) et al. 2023a); however, three functional groups were described in Japan by Kido et al. (2010). Of the functional

groups, group II strains were isolated from melon fruit with internal fruit rot symptoms. *Pantoea ananatis* has also been associated with post-harvest melon rot in the USA (Bruton et al. 1991; Wells et al. 1987), where symptoms were on the fruit surface and the bacteria were not identified beyond species level. In the pest categorisation section of this report (Appendix B), *P. ananatis* is considered at strain level because the Group II strains were described from Japan in association with diseased melon fruit.

Pantoea ananatis group II strains have only been reported from Earl's type melon (*C. melo* var. *reticulatus*) grown in greenhouses in Kochi Prefecture, associated with internal water-soaked symptoms around the fruit placenta. It is unclear whether the internal fruit rot is related to the presence of a specific strain of *P. ananatis*, or to the varieties grown or greenhouse production methods used (Kido et al. 2008a). Infection of melon by Group II strains is thought to occur early in fruit development (Kido et al. 2008a) and wounding seems necessary for bacteria to establish within the fruit (Kido & Takikawa 2009). In some greenhouse production, after fruit has set, withering flowers and sepals may be removed by hand. This practice may possibly cause damage, allowing entry of bacteria into the fruit (Kido & Takikawa 2009).

The department has confirmed with MAFF that there have been no further reports of internal fruit rot caused by *P. ananatis* Group II strains outside of the reports from Kochi in greenhouse Earl's melons. In 2005 disease incidence was 0.2% in affected crops, there are no further updates to the prevalence of disease since then. The department has advised MAFF that these strains are considered a quarantine pest for Australia, and that while we consider it very unlikely that they would be present on melons imported to Australia any detection would result in remedial action for the shipment and may trigger a review of the import requirements. MAFF will be required to keep the department informed of any change in the status of this disease in Japan.

Issue 3: Questions were raised about the process of assurance that quarantine pests assessed as not requiring specific risk management measures will not enter Australia on melon fruit from Japan.

Thirty-four pests were assessed in the pest categorisation process (Appendix B) as not having the potential to enter Australia on commercially produced melon fruit from Japan. In addition, 8 pests were categorised as having potential to enter on the pathway but the unrestricted risks for these species were assessed as achieving the ALOP for Australia. Therefore, specific risk management measures are not required for these 42 species. However, these pests are still quarantine pests for Australia and they will be actioned if they are detected during verification inspection on arrival in Australia. MAFF must ensure these pests are not present in melon fruit exported to Australia.

Before trade can commence, the department will work with MAFF to set out the requirements for the export of melons to Australia. The requirements will specify an operational system for the assurance, maintenance and verification of phytosanitary status of melon fruit from Japan (as outlined in section 4.2 of the report). This includes a system of traceability, registration of greenhouses and packing houses, auditing of procedures, and pre-export phytosanitary inspection by MAFF.

In addition, the department will provide MAFF with a list of the quarantine pests potentially associated with melon plants in Japan, including pests assessed in the pest categorisation process as

not associated with the fruit pathway. MAFF must inspect for these pests as part of the phytosanitary inspection to ensure that all consignments are free of pests of biosecurity concern to Australia.

The requirements for phytosanitary inspection and certification are explained in section 4.2.6 of the report. The department considers pre-export phytosanitary inspection an effective procedure to ensure import conditions are met and consignments are free of quarantine pests on a wide range of fresh horticultural commodities imported into Australia. Inspection methods must be suitable to detect pests that may be present on fresh melon fruit. International standards provide guidance when conducting inspections, these are *ISPM 23: Guidelines for inspection* (FAO 2019c) and *ISPM 31: Methodologies for sampling of consignments* (FAO 2016b). Japan is required to conduct pre-export visual inspection in accordance with these international standards.

In addition to pre-export phytosanitary inspection, consignments of fresh melon fruit will be inspected on arrival in Australia to ensure the goods comply with Australia's import requirements. The detection of any quarantine pests or disease symptoms on imported melon fruit will result in remedial action, as described in section 4.2.8 of the report.

Reassessment may be required if detected pests were categorised as not having potential to be on the import pathway, or as having potential to be on the pathway but assessed as having an unrestricted risk that achieves the ALOP for Australia.

Issue 4: Stakeholders queried the rating of the overall likelihood of entry, establishment and spread of *Zeugodacus tau* being 'very low', suggesting this would be better classified as a 'low' risk.

The pest risk analysis assesses the risk according to the current pest status of *Zeugodacus tau* (present in Okinawa, absent from the rest of Japan). A number of factors contributed to the assessment of the likelihood of importation for *Zeugodacus tau* as Very low:

- the fruit fly is not present in the main production areas for export melons.
- the implementation of control measures, with the intention of eradicating the fruit fly – this should reduce (and ultimately eliminate) the pest population, thereby reducing the potential for infestation. Restrictions on the movement of host fruits from the infested area to other areas are in place. These measures prevent spread of the fruit fly to other areas of Japan.
- the pest has been reported infesting melons, however, other cucurbits such as cucumber, ivy gourd, bitter melon and squash may be preferred if available.
- the modest volume of fruit likely to be imported from Japan each year.
- the small to negligible proportion of any imported fruit that is likely to be sourced from Okinawa, where the pest is present.

The ratings for establishment, spread and the consequences of the entry, establishment and spread of the pest were adopted from previous import policy where *Z. tau* was assessed, as these ratings are independent of how the pest arrived here and so should be consistent across assessments (unless new information becomes available to suggest a different rating is warranted). The likelihoods of establishment and spread were assessed as High in the policy for fresh mangoes from Taiwan (Biosecurity Australia 2006).

The key outcome from the pest risk assessment is that the unrestricted risk estimate on this pathway does not achieve the appropriate level of protection (ALOP), and so phytosanitary measures are required to reduce that risk to an acceptable level.

Glossary, acronyms and abbreviations

| Term or abbreviation | Definition |
|--|---|
| 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). |
| 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 bicon.agriculture.gov.au/BiconWeb4.0 |
| 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. |
| 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). |
| 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). |

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Glossary, acronyms and abbreviations

| Term or abbreviation | Definition |
|--|--|
| 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 (foodstandards.gov.au/Pages/default.aspx) and the Australia New Zealand Food Standards Code (foodstandards.gov.au/code/Pages/default.aspx) |
| 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 orthospoviruses 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 2019), 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 2021) 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). |
| 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). |
| Instar | An insect life stage in between moults. |
| 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 |

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| Term or abbreviation | Definition |
|--|---|
| | 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). |
| JA | Japan Agricultural Cooperatives. |
| Larva | A juvenile form of animal with indirect development, undergoing metamorphosis (for example, insects or amphibians). |
| Latent infection | 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. |
| 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. |
| MAFF | Japanese Ministry of Agriculture, Forestry and Fisheries, the NPPO of Japan. |
| Mycelia | The root-like structure of a fungus, made up of threads in and on soil or other substrates. |
| 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). |
| Oospore | A thick-walled fungal spore used by fungi for sexual reproduction. |
| 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). |
| 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). |
| 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). |

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Glossary, acronyms and abbreviations

| Term or abbreviation | Definition |
|---|---|
| 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). |
| 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 <i>Cucumis melo</i> 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. |
| 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, |

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| Term or abbreviation | Definition |
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| | 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. |
| Serological methods | Tests based on the reaction of an antibody with antigen. These may be used to detect viruses. |
| 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. |
| Stem collar | The junction between the root of a plant and its stem. |
| 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). |
| Systematic infection | An infection affecting the entire organism, rather than a single organ or part. |
| Systems approach(es) | The integration of different risk management measures, at least 2 of which act independently, and which cumulatively achieve the appropriate level of protection against regulated pests. |
| 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. |
| Viable | Alive, able to germinate or capable of growth and/or development. |

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| Term or abbreviation | Definition |
|-----------------------------|--|
| Vic. | The state of Victoria in Australia. |
| WA | The state of Western Australia. |
| WTO | World Trade Organization |
| Zoospore | A mobile spore produced by some fungi to spread and reproduce asexually. |

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