Australian Government

Department of Agriculture, Fisheries and Forestry

Persimmon fruit (*Diospyros kaki* L.) from Japan, Korea and Israel

Final Import Policy

June 2004

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GLOSSARY OF TERMS AND ABBREVIATIONS

ALOP	appropriate level of protection
AQIS	Australian Quarantine and Inspection Service
Area	an officially defined country, part of a country or all or parts of several countries
Biosecurity Australia	an agency within the Australian Government Department of Agriculture, Fisheries and Forestry. Biosecurity Australia protects consumers and animal and plant health, and facilitates trade, by providing sound scientifically based and cost effective quarantine policy
Control (of a pest)	suppression, containment or eradication of a pest population
Endangered area	an area where ecological factors favour the establishment of a pest whose presence in the area will result in economically important loss
Entry	movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled
Establishment	the perpetuation, for the foreseeable future, of a pest within an area after entry
FAO	Food and Agriculture Organization of the United Nations
Fresh	not dried, deep-frozen or otherwise conserved
ICON	AQIS Import Conditions database
Introduction	entry of a pest resulting in its establishment
IPPC	International Plant Protection Convention, as deposited in 1951 with FAO in Rome and as subsequently amended
IRA	import risk analysis
ISPM	International Standard for Phytosanitary Measures
National Plant Protection Organisation	official service established by a government to discharge the functions specified by the IPPC
NPPO	National Plant Protection Organisation
Non-quarantine pest	pest that is not a quarantine pest for an area
Official	established, authorised or performed by a National Plant Protection Organisation
Official control (of a regulated pest)	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

Pathway	any means that allows the entry of spread of a pest
PBPM	Plant Biosecurity Policy Memorandum
Pest	any species, strain or biotype of plant, animal, or pathogenic agent, injurious to plants or plant products
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
Pest free area	an area in which a specific pest does not occur as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained
Pest risk assessment (for quarantine pests)	evaluation of the probability of the introduction or spread of a pest and of the associated potential economic consequences
Pest risk management (for quarantine pests)	evaluation and selection of options to reduce the risk of introduction or spread of a pest
PFA	Pest Free Area
Phytosanitary measure	any legislation, regulation or official procedure having the purpose to prevent the introduction and/or spread of quarantine pests
Phytosanitary regulation	official rule to prevent the introduction and/or spread of quarantine pests, by regulating the production, movement or existence of commodities or other articles, or the normal activity of persons, and by establishing schemes for phytosanitary certification.
PRA area	area in relation to which a pest risk analysis is conducted
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
Spread	expansion of the geographical distribution of a pest within an area

EXECUTIVE SUMMARY

The Australian Government Department of Agriculture, Fisheries and Forestry has considered the importation of fresh persimmon fruit from Japan, The Republic of Korea (herein after referred to as Korea) and Israel. In 2002, Biosecurity Australia officially advised stakeholders of the commencement of the generic Import Risk Analysis (IRA) on the importation of persimmons. In 2003, Biosecurity Australia conducted a preliminary risk assessment and determined that the potential quarantine pests associated with persimmons in Japan, Korea and Israel were not significantly different to those for which policy already exists. Therefore, Biosecurity Australia advised stakeholders of the cessation of the IRA and assessment of the import access request as an extension of existing policy. Biosecurity Australia has existing policy for the importation of fresh persimmons from the USA (California, Arizona and Texas only) and New Zealand. Biosecurity Australia circulated the Draft Import Policy Report in December 2003.

This document presents final import policy for fresh persimmon fruit imports into Australia from Japan, Korea and Israel.

Of the pests associated with fresh persimmon fruit in Japan, Korea and Israel, 26 pests (24 arthropods and two pathogens) were determined to be quarantine pests for Australia.

Of these pests, 20 arthropods and one pathogen were assessed to have unrestricted risk estimates above Australia's appropriate level of protection (ALOP) and risk management measures have been developed.

This import policy concludes that the risks associated with the importation of fresh persimmons from Japan, Korea and Israel can be managed by applying a combination of risk management measures and operational maintenance systems, specifically:

- registration of export orchards and packinghouses;
- option of pest free areas or cold disinfestation for the management of *Ceratitis capitata* (Mediterranean fruit fly) for persimmons from Israel;
- option of:
  - pest free area/pest free places of production, or
  - orchard control, visual inspection and remedial action, or
  - methyl bromide fumigation for the management of *Stathmopoda masinissa* (persimmon fruit moth) for persimmons from Korea and Japan.;
- export orchard surveillance and sanitation for freedom from *Monilinia fructigena* (brown rot) for persimmons from Japan, Korea and Israel;
- cleaning for the removal of mealybugs;
- targeted pre-export inspection by the National Plant Protection Organisation (NPPO);
- packing, labelling and storage procedures;
- phytosanitary certification by NPPO; and
- targeted on-arrival quarantine inspection and clearance by AQIS.

INTRODUCTION

Biosecurity Australia is responsible for developing quarantine policy for imports of plants, plant products and other regulated articles and for liasing with overseas National Plant Protection Organisations (NPPOs) to determine their requirements for exports of Australian plants and plant products.

Biosecurity Australia has existing policy for the importation of fresh persimmons from the USA (California, Arizona and Texas only) and New Zealand.

Biosecurity Australia has now conducted a pest risk analysis (PRA) on fresh persimmons from Japan, Korea and Israel into Australia.

This document includes the following sections:

- Background to this risk analysis;
- A description of the scope of this risk analysis;
- An outline of current quarantine policy for the importation of fresh persimmons;
- The methodology and results of pest categorisation, risk assessment and risk management; and
- Import conditions for the importation of fresh persimmons from Japan, Korea and Israel into Australia.

METHOD FOR PEST RISK ANALYSIS

An outline of the pest risk analysis (PRA) methodology used for this import policy is provided in the Biosecurity Australia publication *Draft Guidelines for Import Risk Analysis* – September 2001. In accordance with ISPM No. 11 Rev. 1 - *Pest Risk Analysis for Quarantine Pests Including Analysis of Environmental Risks*, this PRA comprises three interrelated stages:

- Stage 1: initiation.
- Stage 2: risk assessment.
- Stage 3: risk management.

STAGE 1: INITIATION

The aim of the initiation stage is to identify the pest(s) and pathways (e.g. commodity imports) that are of quarantine concern and should be considered for risk analysis in relation to the identified PRA area. This PRA was initiated by requests from Japan, Korea and Israel to export commercially produced fresh persimmon fruit to Australia for human consumption. Further details are provided in the "Proposal to import persimmons from Japan, Korea and Israel" section of this document.

STAGE 2: RISK ASSESSMENT

The process for pest risk assessment can be broadly divided into three steps:

- Pest categorisation;
- Assessment of probability of entry, establishment or spread;
- Consequences of entry, establishment or spread (including environmental consequences); and
- Unrestricted risk.

Pest categorisation

Pest categorisation is a process to examine whether each of the pests identified in Stage 1 meet the definition of a quarantine pest i.e. *" 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, 1996).

The categorisation of a pest as a quarantine pest includes the following primary elements:

- Identity of the pest
- Presence or absence in the endangered area
- Regulatory status
- Potential for establishment or spread in the PRA area
- Potential for consequences in the endangered area

Pest categorisation was carried out in two stages in this PRA.

In the first stage, a list of pests of persimmons in Japan, Korea and Israel was categorised according to the presence or absence of each pest in Australia, and the association of each pest with persimmon fruit. This step represents an assessment of the potential for entry of the identified pests.

In the second stage, each pest absent from Australia (or part(s) of Australia) and with potential for entry, was categorised according to (a) its potential to establish or spread in Australia, and (b) its potential for consequences. Categorisation of potential for establishment or spread and potential for consequences was expressed using the terms 'feasible'/'not feasible' and 'significant'/'not significant', respectively. A summary of the results of pest categorisation is given in the "Pest Categorisation" section of this document.

Pests found to have potential for entry, establishment or spread and potential for consequences satisfy the criteria for a quarantine pest. Further background and methodology for the detailed assessments conducted on the quarantine pests is provided below.

Assessment of the probability of entry, establishment or spread

Details on assessing the 'probability of entry', 'probability of establishment' and 'probability of spread after establishment' of a pest are given in ISPM 11 Rev. 1. Assessing the probability of entry requires an analysis of each of the pathways with which a pest may be associated, from its origin to its establishment in the PRA area. The assessment of the probability of establishment or spread is based primarily on biological considerations similar to those for entry.

Assessment of potential consequences

The basic requirements for the assessment of consequences are described in the SPS Agreement under Article 5.3 and Annex A. Further detail on assessing consequences is given in the "potential economic consequences" section of ISPM 11 Rev. 1. This ISPM separates the consequences into "direct" and "indirect" and provides examples of factors to consider within each. In this PRA, the term "consequence" is used to reflect the "relevant economic factors"/"associated potential biological and economic consequences" and "potential economic consequences" terms as used in the SPS Agreement and ISPM 11 Rev. 1, respectively.

The results of the assessments of the probability for entry, establishment or spread and potential consequences for quarantine pests is given in the "Risk Assessment" section of this document.

Unrestricted risk

The unrestricted risk estimate for each pest is determined by combining the overall estimate for "entry, establishment and spread potential" with the overall expected consequence using a risk estimation matrix, as described in the *Draft Guidelines for Import Risk Analysis* – September 2001. The requirement for risk management is then determined by comparing the unrestricted risk estimate with Australia's Appropriate Level of Protection (ALOP) i.e. "very low".

STAGE 3: PEST RISK MANAGEMENT

Where the estimate of unrestricted risk does not exceed Australia's ALOP, risk management is not required. Where the unrestricted estimate exceeds Australia's ALOP, risk management measures are required to reduce this risk to an acceptable level. ISPM 11 Rev. 1 provides details on the identification and selection of appropriate risk management options.

Risk management measures are identified for each quarantine pest as required and are presented in the "Risk Management" section of this document. The phytosanitary regulations based on these measures are presented in the "Import Conditions" section of this document.

PROPOSAL TO IMPORT PERSIMMONS FROM JAPAN, KOREA AND ISRAEL

BACKGROUND

On 16 March 2001, Biosecurity Australia advised stakeholders through Plant Biosecurity Policy Memorandum (PBPM) 2001/05 that Japan, Korea and Israel had requested access for fresh persimmon fruit into Australia. PBPM 2002/02 of 29 January 2002 informed stakeholders that Biosecurity Australia had commenced a generic IRA on the importation of persimmons.

The existing conditions for persimmons cover importation from the USA (California, Texas and Arizona only) and New Zealand. Following a preliminary assessment, Biosecurity Australia considered that the potential quarantine pests associated with persimmons from Japan, Korea and Israel do not pose significantly different risks or require significantly different management measures than those for which policy already exists. Therefore, Biosecurity Australia determined that the access request would be progressed as an extension of existing policy, rather than an IRA.

Biosecurity Australia advised the State Departments of Agriculture and stakeholders in May and June 2003, respectively, that access request for the importation of fresh persimmons from Japan, Korea and Israel would be considered as an extension of existing policy for persimmons from the USA (California, Arizona and Texas only) and New Zealand.

SCOPE

In this import policy, Biosecurity Australia has considered the pests associated with fresh persimmon fruit in Japan, Korea and Israel in accordance with ISPM No. 11 Rev. 1 *Pest Risk Analysis for Quarantine Pests Including Analysis of Environmental Risks*.

Persimmon fruit is defined as fresh fruit (including the calyx) of *Diospyros kaki* L. of the family Ebenaceae that has been cultivated, harvested, packed and transported to Australia under commercial conditions from Japan, Korea or Israel.

AUSTRALIA’S CURRENT QUARANTINE POLICY FOR THE IMPORT OF FRESH PERSIMMON FRUIT

International quarantine policy

The existing conditions for fresh persimmons currently cover importation from the USA (California, Arizona and Texas only) and New Zealand. All imported consignments of persimmons are subject to existing condition C6000 ‘General Import requirements for all fruits and vegetables’. In addition to general requirements, each country has specific import conditions. Details of the importation requirements for fresh persimmon fruit are available on AQIS Import Condition database (ICON) at http://www.aqis.gov.au/icon The specific import conditions for each exporting country are summarised as follows:

New Zealand

- Persimmon fruit from New Zealand must be pre-cleared to confirm freedom from identified actionable quarantine pests. Preclearance is a quarantine inspection conducted by AQIS before consignments are exported.
- Pre-cleared fruit from New Zealand will be identified by detailing the shipping container numbers and the MAF Tyden seal numbers or the aircraft flight numbers on the Phytosanitary Certificate.
- The Phytosanitary Certificate will be endorsed with the following statement:

  "Produce as identified by the attached Declaration of Intention to Export, reference number has been pre-cleared in New Zealand"

- Pre-cleared fruit with the correct documentation shall not be subjected to inspection in Australia. Should any discrepancy be found, the produce must be detained and appropriate corrective action will be determined. Corrective action in Australia may include further inspection, treatment or re-shipping of the product.
- Non pre-cleared consignments from New Zealand shall be subject to inspection on arrival in Australia and subject to AQIS approved treatment if insects and other contaminants are found.

United States of America

- Entry is permitted from Arizona, California and Texas in the USA.
- Each consignment must be accompanied by a Phytosanitary Certificate endorsed:

  "The fruit in this consignment was sourced and packed in (name of State) which is free of all economically significant fruit flies."

  OR

  "The fruit in this consignment was sourced and packed in (name of county) which is an area free of all economically significant fruit flies."

  OR

  "The fruit in this consignment was sourced and packed in (name of county) which is an area located in excess of 15 kilometres from any fruit fly declared areas."

- This area freedom certification must include the nominated county or state name.
- Insects and contaminants must be treated, removed or destroyed using an AQIS approved method.

THE FRESH PERSIMMON INDUSTRY

THE PERSIMMON INDUSTRY IN AUSTRALIA

Persimmons have been grown non-commercially in Australia since the 1850s. The first commercial planting of non-astringent persimmons, including the variety Fuyu, was in 1982/83 and the number of trees increased from that date to 100 000 by 1990 (Paulin and Collins, 2000). By 1993 the total plantings of astringent and non-astringent varieties were 107 574 trees (Nissen *et al*., 2000).

Non-astringent varieties currently dominate production and the main varieties grown are Fuyu, Izu, Jiro, Suruga and Gailey. Fuyu is the dominant variety and accounts for approximately 75% of production (Horticulture Australia, 2003). Total persimmon production by the industry is estimated to be greater than 2100 tons per year with an average yield of 15.8 tons per hectare of orchard (Nissen *et al*. 2000).

Persimmon production areas in Australia

Persimmon production occurs in five mainland states from the semi-tropical far north of Queensland through New South Wales to the cooler temperate zones of Victoria, South Australia and Western Australia (Nissen *et al*., 2000). Queensland produces all four of the varieties produced in Australia, which are Izu, Fuyu, Jiro and Suruga. New South Wales produces Fuyu and Jiro; South Australia produces Izu, Fuyu and Suruga, as does Victoria and Western Australia produces the Fuyu variety only (Nissen *et al*., 2000).

Harvesting periods for Australian persimmons

Persimmons are harvested from late February to early May in Queensland; from late April to mid June in New South Wales; from late March to early June in South Australia; from late April to early June in Victoria and in Western Australia persimmons are harvested from May to June (Nissen *et al*., 2000).

Export of persimmons from Australia

The main export markets are Singapore, Thailand, Malaysia and Hong Kong. Singapore is the largest importer of Australian persimmons, accounting for approximately 70% of total exports (Anon, 2002).

THE PERSIMMON INDUSTRY IN JAPAN

Principal cultivars are Fuyu, Matsumotowase Fuyu, Jiro and Maekawa Jiro for the non-astringent types and Hiratanenashi, Tonewase and Hachiya for astringent types. Nishimurawase is the most popular among pollination-variant and non-astringent types (Yonemori, 1997). According to FAO (2002), persimmon fruit production in Japan in 2002 was 269, 300 tons.

Persimmon production areas in Japan

The primary production areas are Wakayama, Fukuoka, Nara and Gifu Prefectures, followed by Aichi, Ehime, Niigata and Yamagata Prefectures (Yonemori, 1997).

Harvesting periods for Japanese persimmons

The harvest season is from mid September to mid December and stored fruit is available for consumption and export until March (Collins *et al*., 1993).

Exports of persimmons from Japan

In the past, most of the fruit produced in Japan was sold locally and small quantities were exported to South East Asia (Collins *et al*., 1993). During 2001 Japan exported 535 tons of persimmon fruit (FAO, 2002).

THE PERSIMMON INDUSTRY IN KOREA

Korea is a major producer of persimmons and the non-astringent varieties account for 85% of total production (Collins *et al*., 1993). Total production of persimmon fruit in 2002 was 270, 000 tons (FAO, 2002).

Persimmon production areas in Korea

Sweet persimmon is commercially grown in the southern part of Korea, especially in Gyungsangnam-do Province, which produces almost 58% of total persimmon crop. Chanwon is the centre of persimmon production within Gyungsangnam-do Province, occupying 9% of total sweet persimmon production area and producing 11% of the persimmon crop in Korea. Other major persimmon production areas are Gyungsangbuk-do and Jeollanam-do (NPQS, 2003). Astringent persimmon production areas extend to the central part of the Korean peninsula (GARES, 2003).

Harvesting periods for Korean persimmons

In Korea, fresh persimmons are available fresh from October to November and stored persimmons are available from December until February (Mowat, 2003).

Exports of persimmons from Korea

Korea exports fresh persimmon fruit to South East Asian countries (GARES, 2003) and the USA (USDA, 1997). According to FAO (2002), 6, 257 tons of persimmon fruit were exported during 2001.

THE PERSIMMON INDUSTRY IN ISRAEL

The current dominant cultivar grown in Israel is the astringent “Triumph” which is marketed under the common name of Sharon fruit. Total production of persimmons in the year 2001/2002 was 20, 000 tons of which 7, 000 tons were exported (PPIS, 2002).

Persimmon production areas in Israel

Israel has an expanding persimmon industry with production areas throughout the country, but mostly centred in Northern and Western Galilee, Hula Valley, Coastal Plain, the Northern Negev and the Sharon region north of Tel Aviv (PPIS, 2002).

Harvesting periods for Israeli persimmons

The harvesting period for persimmons in Israel is from November to January (Collins *et al*. 1993).

Exports of persimmons from Israel

The export season for the persimmons is from November to mid-March (Collins et al. 1993). Israel exports persimmons to the Far East (Singapore, Hong Kong, Thailand, Malaysia), Western Europe (United Kingdom, Scandinavia, Netherlands, Belgium, France, Germany, Switzerland, Austria), Brazil, USA, Canada and South Africa. Israel has also requested access for persimmons to Chile and Japan (PPIS, 2002).

Most export markets do not require specific disinfestation treatments other than routine brushing in running water, with no chemical additives. In transit cold treatment is required for current exports to USA against Mediterranean fruit fly (PPIS, 2002).

PEST CATEGORISATION

Details of the first stage of pest categorisation for persimmon fruit from Japan, Korea and Israel are presented in Appendices 1 and 2. Appendix 1 lists all known pests (arthropods, nematodes and diseases) associated with persimmons in Japan, Korea and Israel, and categorises them based on their presence or absence in Australia. A number of pests listed in Appendix 1 are considered to be present in Australia but absent from Western Australia (based on the evidence provided to Biosecurity Australia by the Department of Agriculture Western Australia). Appendix 2 contains information on whether the potential quarantine pests occur on the pathway under consideration in this import policy (i.e. in association with fresh persimmon fruit).

Three sooty mould causing fungi (*Capnophaeum fuliginodes, Scorias communis* and *Tripospermum juglandis*) were identified as being on the pathway but are not considered further for risk assessment as they are weak pathogens or secondary invaders and are normally considered to be a cosmetic or aesthetic problem (Nameth *et al*, 2003). For further comments refer to Appendix 2.

Twenty-six pests have been identified as quarantine pests of persimmon fruit from Japan, Korea and Israel and are listed below in Table 1.

Table 1. Quarantine pests for persimmons from Japan, Korea and Israel

Pest	Common Name	Distribution (within Japan, Korea and Israel)
ARTHROPODS		
Aceria diospyri Keifer[1] [Acarina: Eriophydae]	Persimmon bud mite	Japan
Adris tyrannus amurensis Staudinger[2, 3] [Lepidoptera: Noctuidae]	Akebia leaf-like moth	Japan and Korea
Ceratitis capitata Wiedemann[5] [Diptera: Tephritidae]	Mediterranean fruit fly; medfly	Israel
Ceroplastes floridensis Comstock[5] [Hemiptera: Coccidae]	Florida wax scale	Japan, Korea and Israel
Cryptoblabes gnidiella (Millière)[4] [Lepidoptera: Pyralidae]	Pyralid moth, Honeydew moth	Israel
Grapholita molesta (Busck)[5] Syn = *Cydia molesta* (Busck) [Lepidoptera: Tortricidae]	Oriental fruit moth	Japan, Korea
Halyomorpha halys Stål [Hemiptera: Pentatomidae]	Brown marmorated stink bug	Japan, Korea

Homona magnanima Diakonoff[2] [Lepidoptera: Tortricidae]	Oriental tea tortrix	Japan
Lagoptera juno (Dalman)[2, 3] [Lepidoptera: Noctuidae]	Rose of Sharon leaf-like moth; Fruit-piercing moth	Japan and Korea
Lepidosaphes conchiformis (Gmelin)[5] [Hemiptera: Diaspididae]	Pear oystershell scale	Japan, Korea
Lobesia botrana (Denis and Schiffermuller) [Lepidoptera: Tortricidae]	Grapevine moth	Japan and Israel
Lopholeucaspis japonica (Cockerell)[2, 3] [Hemiptera: Diasididae]	Japanese baton-shaped scale	Japan and Korea
Nezara antennata Scott[6] [Hemiptera: Pentatomidae]	Green stink bug	Japan, Korea
Parlatoria pergandii Comstock[5] [Hemiptera: Diaspididae]	Black parlatoria scale	Korea and Israel
Phenacoccus pergandei Cockerell[2] [Hemiptera: Pseudococcidae]	Persimmon long wooly scale	Japan and Korea
Planococcus kraunhiae (Kuwana)[3] [Hemiptera: Coccidae]	Japanese mealybug	Japan and Korea
Ponticulothrips diospyrosi Haga & Okajima[2] [Thysanoptera: Phlaeothripidae]	Japanese gall forming thrips	Japan, Korea
Pseudaonidia duplex (Cockerell)[2, 3] [Hemiptera: Diaspididae]	Camphor scale	Japan and Korea
Pseudaulacaspis pentagona (Targioni-Tozzetti)[1] [Hemiptera: Diaspididae]	Peach white scale	Japan, Korea and Israel
Pseudococcus cryptus Hempel [Hemiptera: Pseudococcidae]	Citriculus mealybug, cryptic mealybug	Japan, Israel
Retithrips syriacus (Mayet) [Thysanoptera: Thripidae]	Black vine thrips; castor thrips; grape thrips	Israel
Sesamia nonagrioides (Lefebvre) [Lepidopetera: Noctuidae]	Pink maize stalk borer	Israel
Stathmopoda masinissa Meyrick [Lepidoptera: Oecophoridae]	Persimmon fruit moth	Japan and Korea
Tenuipalpus zhizhilashviliae (Reck) [Acarina: Tenuipalpidae]	Persimmon false spider mite	Japan and Korea
PATHOGENS		
Monilinia fructigena Honey[3] [Leotiales: Sclerotiniaceae]	Brown rot	Japan, Korea and Israel

Phoma kakivora (Hara) ['mitosporic fungi': Coelomycetes]	Black spot	Japan

1. Covered under existing policy for persimmons from New Zealand.
2. Covered under existing policy for Fuji apple from Japan.
3. Covered under existing policy for Korean pear from Korea.
4. Covered under existing policy for citrus from Egypt.
5. Covered under existing policy for persimmons from the USA.
6. Covered under import risk analysis for longan and lychee from China and Thailand.

Nineteen of the 26 quarantine pests listed in Table 1 have been assessed in previous import policies and IRAs, as indicated in the footnote. The eight additional pests (seven arthropods and one fungus) that have not been previously assessed have been categorised in this import policy according to their potential for entry, establishment or spread in the PRA area and potential for consequences. The results of this second stage of pest categorisation are provided below in Table 2. The pests assessed as having 'feasible' potential for establishment or spread in the PRA area and 'significant' potential for consequences were determined to be quarantine pests for Australia. Detailed risk assessments for these seven quarantine pests are provided in the next section of this document. Information on these pests is provided in the technical data sheets in Appendix 3.

Table 2. Potential for establishment and economic consequences for pests not assessed in previous policies or IRAs

Scientific name	Common name	Potential for establishment or spread in the PRA area		Potential for economic consequences		Consider further? (yes/no)
ARTHROPODS						
Glaucias subpunctatus (Walker) [Hemiptera: Pentatomidae]	Polished green stink bug	Feasible	Adults feed on fruit including persimmons causing blemishes (Anonymous, 2004a).	Not significant	Adults most commonly seen in the forest and surrounds, feeding on *Paulownia*, mulberry, cedar tree and the like (Anonymous, 2004b). Light trap data shows that *G. subpunctatus* only accounts for less than 1% of the catch (Moriya *et al.,* 1987).	No
Halyomorpha halys Stål [Hemiptera: Pentatomidae]	Brown marmorated stink bug	Feasible	Wide host range. Adapted to tropical and subtropical climates. Adults and nymphs are mobile (Hamilton, 2003).	Significant	Pierces fruit and sucks juice. Severe feeding symptoms include physical changes of the fruit, such as concaving of the surface or its becoming dark blue-black in a "bull's-eye" configuration and the flesh becoming soft and spongy (Hoebeke, 2002).	Yes
Lobesia botrana (Denis and Schiffermuller) [Lepidoptera: Tortricidae]	Grapevine moth	Feasible	Polyphagous and adults are highly mobile (CAB International, 2002)	Significant	Causes significant yield losses in grapevine (CAB International, 2002)	Yes
Pseudococcus cryptus Hempel [Hemiptera: Pseudococcidae]	Citriculus mealybug, cryptic mealybug	Feasible	Polyphagous (Ben-Dov, 1994) and young mealybugs usually settle under the calyx (Smith *et al*, 1997)	Significant	Mealy bugs can directly damage fruit and also produce honeydew resulting in heavy growth of sooty mould (Smith *et al*, 1997)	Yes

Scientific name	Common name	Potential for establishment or spread in the PRA area		Potential for economic consequences		Consider further? (yes/no)
Retithrips syriacus (Mayet) [Thysanoptera: Thripidae]	Black vine thrips; castor thrips; grape thrips	Feasible	Highly polyphagous (Rosales, 2000) Adults capable of flight.	Significant	Feeds on and blemishes leaves and fruit skin of persimmons (Morton, 1987)	Yes
Sesamia nonagrioides (Lefebvre) [Lepidoptera: Noctuidae]	Pink maize stalk borer	Feasible	Moderate host range (CAB International, 2002). Adapted to tropical and subtropical climates.	Significant	Considered as a serious pest of maize (CAB International, 2002)	Yes
Stathmopoda masinissa Meyrick [Lepidoptera: Oecophoridae]	Persimmon fruit moth	Feasible	Larvae are internal feeders on persimmon (MAFF, 1987).	Significant	Considered to be a serious pest of persimmon (AQIS, 1997).	Yes
Tenuipalpus zhizhilashviliae (Reck) [Acarina: Tenuipalpidae]	Persimmon false spider mite	Feasible	*Tenuipalpus* spp. are widespread in Australia.	Significant	Feeds directly on fruit, which causes superficial damage and may result in commercial losses.	Yes
PATHOGENS						
Botrytis diospyri Brizi [Helotiales: Sclerotiniaceae]	Grey mould	Feasible	Causes fruit rot, leaf spot and dieback of twigs. (Dzhalagoniya, 1990).	Not significant	Reported only once from Japan (Watson, 1971). Although reported once in Russia in (Dzhalagoniya, 1990) as causing significant damage on persimmon fruit, no further research has been undertaken on this pathogen.	No
Myxosporium kaki Hara [Ascomycetes: Incertae sedis]		Feasible	Associated with lesions on fruit, stems and branches in Japan (Watson, 1971).	Not significant	Reported only once from Japan (Watson, 1971). No further research has been undertaken on this pathogen.	No

Scientific name	Common name	Potential for establishment or spread in the PRA area		Potential for economic consequences		Consider further? (yes/no)
Phoma kakivora (Hara) [Mitosporic fungi: Coelomycetes]	Black spot	Feasible	*Phoma* spp. are widespread in Australia.	Significant	Known to cause direct damage to persimmon fruit (Yamada, 1966).	Yes

RISK ASSESSMENTS FOR QUARANTINE PESTS

Detailed risk assessments were conducted for the seven quarantine pests identified in the pest categorisation stage that have not been assessed under previous policies or IRAs. Each risk assessment includes a summary of supporting evidence with each likelihood estimate. An unrestricted risk estimate has been determined for each of these quarantine pests and those with a risk estimate above Australia's ALOP have been identified. More detailed technical information used in the risk assessments is provided in the pest data sheets in Appendix 3.

Further risk assessments for the 19 pests that have been previously assessed are not required in this import policy, as the existing policies are applicable to persimmons.

Of those pests that have previously been assessed, on-arrival inspection is required under existing policies for 14 pests (*Adris tyrannus amurensis, Ceroplastes floridensis, Cryptoblabes gnidiella, Grapholita molesta, Homona magnanima*, *Lagoptera juno, Lepidosaphes conchiformis, Lopholeucaspis japonica*, *Parlatoria pergandii, , Phenacoccus pergandei, Planococcus kraunhiae*, *Ponticulothrips diospyrosi, Pseudaonidia duplex* and *Pseudaulacaspis pentagon*). No risk management measures are required for *Nezara antennata*, or *Aceria diospyri* as their unrestricted risk estimates were determined to be below Australia's ALOP in the import risk analysis for longan and lychee from China and Thailand and the import policy for persimmons from New Zealand, respectively. The risk potential for *Ceratitis capitata* and *Monilinia fructigena* was assessed to be above Australia's ALOP. Therefore, additional phytosanitary measures are required for these potential quarantine pests. An expanded description of these two pests is provided below:

Ceratitis capitata (Medfly)

Mediterranean fruit fly is widely recognised as an economically important pest, which is present on almost every continent and causes damage to a wide range of hosts. Australia is free of *C. capitata* except in the state of Western Australia, where in certain areas it is under official control (De Lima, 1993). Adults lay eggs under the skin of host fruit and larvae are internal feeders. These eggs and larvae would be difficult to detect during routine inspection (Fimiani, 1989). Therefore, it is likely that Medfly would arrive in Australia in infested persimmon fruit. Furthermore, adults are strong fliers and are capable of independent dispersal to new host plants. Adults and larvae may also be distributed via transport of fruit and discarded waste. As described in earlier risk assessments (e.g. Netherlands truss tomatoes) this pest would likely be distributed if infested fruit were imported. *C. capitata* is likely to establish in Australia as it has a wide range of hosts, many of which are available within Australia. If introduced, Medfly may have significant implications for trade in a number of economically important crops to overseas markets. The unrestricted risk estimate for Medfly was determined to be moderate in the policy for imports of truss tomatoes from Netherlands. Risk mitigation measures for Medfly are in place under existing policy for the import of persimmons from the USA (California, Arizona and Texas only).

Monilinia fructigena (Brown rot)

Monilinia fructigena infects a wide range of economically important crops, including apple, pear, persimmon, plum, quince and sweet cherry. On susceptible hosts, brown rot occurs on ripening or mature fruit, typically developing as a rapidly spreading firm lesion that is brown in colour. However, infection of fruits can take place at any stage during fruit development and produce visible symptoms (CAB International, 2002). Conidia of *M. fructigena* are transported to young fruit via wind, water and insects. Initial infection is always via wounds or sites of insect damage, but subsequent spread by contact between adjacent fruit is possible (Rekhviashvili, 1975). As described in earlier risk assessments (e.g. Discussion paper and phytosanitary requirements on pest risk analysis of the importation of Korean pear fruit from the Republic of Korea) this fungus has the ability to cause latent infection in fruit, and also to develop during storage and transport. Furthermore, *M. fructigena* is likely to establish in Australia due to its wide host range and the favourable environmental conditions in Australia. The highly infectious nature of *M. fructigena* means that it is likely to enter Australia as a result of trade in fresh persimmon fruit, be distributed in a viable state to suitable hosts, establish in that area and subsequently spread within Australia. The disease caused by *M. fructigena* is known to cause significant losses in commercial fruit crops both before and after harvest (Batra, 1991), and if introduced, may have significant impacts on international trade for a number of economically important commodities to countries where this pathogen is not present. The unrestricted risk estimate for *M. fructigena* was determined to be high in the policy for imports of Korean pears from the Republic of Korea (AQIS, 1999).

RISK ASSESSMENTS FOR ADDITIONAL QUARANTINE PESTS

Arthropods

Halyomorpha halys Stål (Brown marmorated stink bug)

Probability of importation

The likelihood that *Halyomorpha halys* will arrive in Australia with the importation of fresh persimmon fruit: **Very Low.**

- Female stink bugs lay eggs on underside of leaves in a cluster of 20 to 30 eggs (Hamilton, 2003). *H. halys* is a sucking insect that uses its proboscis to pierce the host plant in order to feed. This feeding results, in part, in the formation of small, necrotic areas on the ourter surface of developing fruits and leaves of its hosts (Hamilton, 2003).
- The adults will fly away when disturbed and nymphs are mobile. Like other stink bugs, when disturbed, the nymphs may exhibit a defensive response, emitting a foul smelling fuid and then falling to the ground. This means that this pest is unlikely to be included in consignments of fruit packed for export.
- Both nymphs (2.4 to 12 mm) and adults (12-17 mm) are easily visible.

Probability of distribution

The likelihood that *H. halys* will be distributed to the endangered area as a result of the processing, sale or disposal of fresh persimmon fruit: **High.**

- Stink bugs are likely to survive storage and transportation and be associated with infested waste. Stink bugs are likely to enter the orchard environment in one or two ways: nymphs may be discarded with persimmon fruit skin, mature into adults and fly to a suitable host plant, or adults can fly directly to suitable hosts.

Probability of entry

The likelihood that *H. halys* will arrive in Australia as a result of trade in fresh persimmon fruit and be distributed to the endangered area: **Very Low.**

The overall probability of entry is determined by combining the likelihoods of importation and distribution using the matrix of 'rules' for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Probability of establishment

The likelihood that *H. halys* will establish based on a comparative assessment of factors in the source and destination areas considered pertinent to the ability of the pest to survive and propagate: **High.**

- *H. halys* is a polyphagous pest and can infest a wide range of host plants (Hamilton, 2003). This pest is likely to survive and find suitable hosts, especially in the warmer subtropical and tropical regions of Australia.
- *H. halys* has a moderate reproductive rate. In the field, females oviposit eggs from early June to late August (Kawada and Kitamura, 1983) in cluster of 20-30 eggs on the underside of leaves (Hamilton, 2003).

Probability of spread

The likelihood that *H. halys* will spread based on a comparative assessment of those factors in the area of origin and in Australia considered pertinent to the expansion of the geographical distribution of the pest: **Moderate.**

- Tropical or subtropical environments of Australia would be suitable for the spread of these stink bugs because they are recorded from such environments.
- Eggs are laid on the underside of leaves (Hamilton, 2003) and may be moved long distances on planting material.
- Adults and nymphs are mobile and can spread short distances (Hoebeke, 2000).
- The relevance of natural enemies is not known.

Probability of entry, establishment and spread

The overall likelihood that *H. halys* will enter Australia as a result of trade in fresh persimmon fruit, be distributed in a viable state to suitable hosts, establish in that area and subsequently spread within Australia: **Very Low.**

The probability of entry, establishment and spread is determined by combining the likelihoods of entry, establishment and spread using the matrix of 'rules' for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Consequences

Consequences (direct and indirect) of *H. halys*: **Low.**

Criterion	Estimate
Direct consequences	
Plant life, health or welfare	C — *H. halys* is recorded as capable of causing direct damage to persimmon fruit (Chung *et al*., 1992) and has been reported as a vector for Paulownia witches' broom disease (Nakamura *et al*, 1996).
Any other aspects of the environment	A — There are no known consequences of this pest on other aspects of the environment.
Indirect consequences	
Eradication, control etc.	B — Programs to minimise the impact of this pest on host plants are likely to be costly and include chemical and cultural control.
Domestic trade	B — The presence of this pest in commercial production areas may have a significant effect at the local level due to any resulting interstate trade restrictions on a wide range of commodities. Such restrictions may lead to a loss of markets.
International trade	B — The presence of this pest in commercial production areas of a wide range of commodities may have a significant effect at the local level due to any limitations to access to overseas markets where this pest is absent.
Environment	A — Although additional pesticides may be required to control vine moths on susceptible crops, this is not considered to have significant consequences for the environment.

Unrestricted risk estimate

The unrestricted risk estimate as determined by combining the overall probability of entry, establishment and spread with the 'consequences' using the risk estimation matrix as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001: **Negligible.**

Lobesia botrana (Denis and Schiffermüller) (Grapevine moth)

Probability of importation

The likelihood that *Lobesia botrana* will arrive in Australia with the importation of fresh persimmon fruit: **Moderate**.

- *L. botrana* is most commonly associated with grapevines. Persimmons are listed as a secondary host (CAB International, 2002).

- The larvae feed externally on fruit. Mature larvae grow to a length of 10-15 mm (CAB International, 2002), and therefore are likely to be detected on the surface of the fruit during standard packing and sorting procedures. However, it is possible that early developmental stages of the larvae may hide under the calyx and may not be detected.
- Other species of moths from the Tortricidae family have been intercepted on persimmon fruit imported from the USA and New Zealand.

Probability of distribution

The likelihood that *Lobesia botrana* will be distributed to the endangered area as a result of the processing, sale or disposal of fresh persimmon fruit: **High**.

- The pest is likely to survive storage and transportation. Temperature induced dormancy has been reported in egg and larval stages (Tzanakakis *et al*., 1988) and the diapausing pupae are protected inside a cocoon and are more rigid (Torres-Vila *et al*., 1996). Larvae have a considerable dispersal capacity and are able to reach reproductive organs of hosts (Torres-Vila *et al*., 1997).
- Larvae may hide underneath the calyx and remain with the commodity during distribution via wholesale or retail trade.
- *L. botrana* has a wide host range so may readily disperse to suitable host plants in Australia.
- All stages of the vine moth survive in the environment for long periods.

Probability of entry

The likelihood that *Lobesia botrana* will arrive in Australia as a result of trade in fresh persimmon fruit and be distributed to the endangered area: **Moderate.**

The overall probability of entry is determined by combining the likelihoods of importation and distribution using the matrix of 'rules' for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Probability of establishment

The likelihood that *L. botrana* will establish based on a comparative assessment of factors in the source and destination areas considered pertinent to the ability of the pest to survive and propagate: **High**.

- *L. botrana* is highly polyphagous (CAB International, 2002) and has a high reproductive rate with two to four generations per year. Females lay 300 or more eggs at a rate of more than 35 per day during their lifetime (Exosect, 2003).
- This pest has a wide host range, including many species that are common in Australia, such as berries, olives, grapes and a number of ornamental plants.
- Environmental conditions in Australia are likely to be suitable for the establishment of this pest.

Probability of spread

The likelihood that *L. botrana* will spread based on a comparative assessment of those factors in the area of origin and in Australia considered pertinent to the expansion of the geographical distribution of the pest: **High**.

- Adult moths are highly mobile and able to rapidly move between host plants, which are widely present in Australia.
- Temperate regions of Australia would be suitable for the spread of this moth.
- The relevance of natural enemies in Australia is not known.

Probability of entry, establishment and spread

The overall likelihood that *L. botrana* will enter Australia as a result of trade in fresh persimmon fruit, be distributed in a viable state to suitable hosts, establish in that area and subsequently spread within Australia: **Moderate**.

The probability of entry, establishment and spread is determined by combining the likelihoods of entry, establishment and spread using the matrix of 'rules' for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Consequences

Consequences (direct and indirect) of *L. botrana*: **Low.**

Criterion	Estimate
Direct consequences	
Plant life, health or welfare	C — Vine moth can cause direct and indirect harm to a wide range of plant hosts. Larvae feeding on fruit directly reduce yield and contaminate the crop. Indirect loss is by feeding larvae that creates infection sites for fruit rots and feeding by fruit flies.
Any other aspects of the environment	A — There are no known consequences of vine moths on other aspects of the environment.
Indirect consequences	
Eradication, control etc.	B — Programs to minimise the impact of this pest on host plants are likely to be costly and include chemical and cultural control.
Domestic trade	B — The presence of this pest in commercial production areas may have a significant effect at the local level due to any resulting interstate trade restrictions on a wide range of commodities. Such restrictions may lead to a loss of markets, which in turn would be likely to require industry adjustment.
International trade	C — The presence of this pest in commercial production areas of a wide range of commodities (e.g. stone fruit and grapes) may have a significant effect at the regional level due to any limitations to access to overseas markets where this pest is absent.
Environment	A — Although additional pesticides may be required to control vine moths on susceptible crops, this is not considered to have significant consequences for the environment.

Unrestricted risk estimate

The unrestricted risk estimate as determined by combining the overall probability of entry, establishment and spread with the 'consequences' using the risk estimation matrix as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001: **Low.**

Pseudococcus cryptus Hempel (Cryptic mealybug)

Probability of importation

The likelihood that mealybugs will arrive in Australia with the importation of fresh persimmon fruit: **High**.

- Mealybugs are known to be associated with the persimmon fruit pathway. For example, mealybugs have been intercepted on persimmon fruit imports from the USA and New Zealand.
- Mealybugs are sessile, small (1.5-4 mm) and are often inconspicuous (Lim *et al*., 1998). Persimmon fruit packed for export are likely to be infested by mealybugs, as they can remain hidden and anchored beneath the calyx.

Probability of distribution

The likelihood that mealybugs will be distributed to the endangered area as a result of the processing, sale or disposal of fresh persimmon fruit: **Moderate**.

- *P. cryptus* is likely to survive storage and transportation because mealybugs generally tolerate cold temperature and over-winter at various stages of growth. It takes 42 days storage at 0°C for complete mortality of *Pseudococcus affinis* (Hoy and Whiting, 1997).
- Mealybugs may enter the environment in two ways: adults may be discarded with persimmon skin, or crawlers may be blown by wind, or carried by other vectors, from persimmons up to the point of sale or after purchase by consumers. Long-range dispersal of these pests would require movement of adults and nymphs with vegetative material. Shorter-range dispersal would occur readily through the random movement of crawlers with wind currents or biological or mechanical vectors. Although mealybugs imported with fruit are likely to be at non-mobile stages, ants can transport them to suitable hosts.
- Mealybugs hidden under the calyx may remain with the commodity during distribution via wholesale or retail trade and with waste material. Mealybugs are protected underneath the calyx, so may survive longer in the environment and are likely to be transferred to a suitable host.

Probability of entry

The likelihood that mealybugs will enter Australia as a result of trade in fresh persimmon fruit, and be distributed to the endangered area: **Moderate**.

The overall probability of entry is determined by combining the likelihoods of importation and distribution using the matrix of 'rules' for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Probability of establishment

The likelihood that mealybugs will establish based on a comparative assessment of factors in the source and destination areas considered pertinent to the ability if the pest to survive and propagate: **High.**

- Mealybugs are highly polyphagous and host plants are common in Australia e.g. citrus, pineapple and mango. The skin of infested fruit is likely to be discarded, therefore this pest may survive and find suitable hosts especially in the warmer subtropical and tropical regions of Australia.
- Mealybugs have a high reproductive rate. Reproduction is bisexual (production of fertilised eggs) with two to eight generations per year. Females lay between 90-600 eggs during their lifetime. The eggs hatch in 6-14 days and the first instars or 'crawlers' disperse to suitable feeding sites on their hosts or new plants. Nymphs are active during the first instar stage and may travel some distance to a new plant where they become sessile for the remaining nymphal (larval) instars. Adult females can live for several months and produce up to several hundred offspring. Adult males are short-lived.

Probability of spread

The likelihood that mealybugs will spread based on a comparative assessment of those factors in the area of origin and in Australia considered pertinent to the expansion of the geographical distribution of the pest: **High.**

- Tropical or subtropical environments of Australia would be suitable for the spread of this mealybug because they are recorded from such environments.
- Adults and nymphs can be moved within and between plantations by the movement of equipment and personnel. Crawlers can be dispersed onto other plants up to several hundred yards by wind (Rohrbach *et al*., 1988).
- The relevance of natural enemies is not known.

Probability of entry, establishment and spread

The overall likelihood that mealybugs will enter Australia as a result of trade in fresh persimmon fruit, be distributed in a viable state to suitable hosts, establish in that area and subsequently spread within Australia: **Moderate**.

The probability of entry, establishment and spread is determined by combining the likelihoods of entry, establishment and spread using the matrix of rules for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Consequences

Consequences (direct and indirect) of mealybugs: **Low.**

Criterion	**Estimate**
Direct consequences	
Plant life, health or welfare	C — Mealybugs can cause direct harm to a wide range of host plants and have also been reported as disease vectors (Rohrbach *et al*., 1988). Fruit quality can be reduced by the presence of secondary sooty mould. Mealybugs are estimated to have consequences that are unlikely to be discernible at the

	national level and of minor significance at the regional level.
Any other aspects of the environment	A — There are no known consequences of mealybugs on other aspects of the environment.
Indirect consequences	
Eradication, control etc.	B — Programs to minimise the impact of this pest on host plants is likely to be costly and include pesticide applications and crop monitoring. Existing control programs can be effective for some hosts (e.g. broad spectrum pesticide applications) but not all hosts (e.g. where specific integrated pest management programs are used).
Domestic trade	B — The presence of this pest in commercial production areas can have a significant effect at the local level due to any resulting interstate trade restrictions on a wide range of commodities. These restrictions can lead to a loss of markets, which in turn would be likely to require industry adjustment.
International trade	C — The presence of this pest in commercial production areas of a wide range of commodities (e.g. citrus, mango) can have a significant effect at the local level due to any limitations to access to overseas markets where these pests are absent. This species is regarded as a significant quarantine threat to United States agriculture e.g. citrus (Miller *et al*., 2002), and measures are required to manage the risk of introduction of this species into the United States.
Environment	A — Although additional pesticides may be required to control mealybugs on susceptible crops, this is not considered to have significant consequences for the environment.

Unrestricted risk estimate

The unrestricted risk estimate as determined by combining the overall 'probability of entry, establishment and spread' with the 'consequences' using the risk estimation matrix as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001: **Low.**

Retithrips syriacus (Mayet) (Black vine thrips)

Probability of importation

The likelihood that *R. syriacus* will arrive in Australia with the importation of fresh persimmon fruit: **High.**

- *R. syriacus* is known to be associated with persimmon production in Israel (PPIS, 2002).
- Adults are black in colour and nymphs are red, with a yellow head and legs. Therefore, all stages of this pest would be visible on the surface of fruit. However, thrips are relatively small and may remain hidden under the calyx, making them difficult to remove or detect during routine packing and sorting procedures, especially at low population levels. Therefore, it is likely that this pest will be associated with fruit packed for export.
- Other thrips species have been intercepted on persimmon fruit imports from the USA and New Zealand.

Probability of distribution

The likelihood that *R. syriacus* will be distributed to the endangered area as a result of the processing, sale or disposal of fresh persimmons: **High**.

- The pest is likely to survive storage and transportation.

- Thrips hidden under the calyx may remain with the commodity during distribution via wholesale or retail trade and with waste material.
- All stages of grape thrips survive in the environment for some time and could be transferred to a susceptible host.

Probability of entry

The likelihood that *R. syriacus* will arrive in Australia as a result of trade in fresh persimmon fruit, and be distributed to the endangered area: **High.**

The overall probability of entry is determined by combining the likelihoods of importation and distribution using the matrix of ‘rules’ for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Probability of establishment

The likelihood that *R. syriacus* will establish based on a comparative assessment of factors in the source and destination areas considered pertinent to the ability of the pest to survive and propagate: **High.**

- *R. syriacus* is polyphagous (Rosales, 2000) and host plants are common in Australia e.g. mangoes, grapevines and a number of ornamental plant species. The skin of infested fruit is likely to be discarded; therefore this pest may survive and find suitable hosts in Australia.
- *R. syriacus* has a high reproductive rate. On average, females lay around 50 to 80 eggs. Reproduction is mainly bisexual (production of fertilised eggs), but is sometimes parthenogenic. This thrips produces about seven generations a year.
- Existing control programs may not be effective for some hosts.

Probability of spread

The likelihood that *R. syriacus* will spread based on a comparative assessment of factors in those factors in the area of origin and in Australia considered pertinent to the expansion of the geographical distribution of the pest: **High.**

- Adults are capable of flight, and adults and immature forms may spread undetected via the movement of fruit or infested vegetative host material.
- Temperate regions of Australia would be suitable for the spread of this pest.
- The relevance of natural enemies in Australia is not known.

Probability of entry, establishment and spread

The overall likelihood that *R. syriacus* will enter Australia as a result of trade in fresh persimmon fruit, be distributed in a viable state to suitable hosts, establish in that area and subsequently spread within Australia: **High**.

The probability of entry, establishment and spread is determined by combining the likelihoods of entry, establishment and spread using the matrix of ‘rules’ for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Consequences

Consequences (direct and indirect) of *R. syriacus*: **Low**.

Criterion	Estimate
Direct consequences	
Plant life, health or welfare	C — This pest is capable of causing direct harm to a wide range of hosts and can vector diseases.
Any other aspects of the environment	A — There are no known consequences of black vine thrips on other aspects of the environment.
Indirect consequences	
Eradication, control etc.	B — Programs to minimise the impact of this pest on host plants may be necessary. Existing control programs may be effective for some hosts (e.g. broad spectrum pesticide applications) but not all hosts (e.g. where specific integrated pest management programs are used).
Domestic trade	B — The presence of this pest in commercial production areas may have a significant effect at the local level due to any resulting interstate trade restrictions on a wide range of commodities. These restrictions may lead to a loss of markets, which in turn would be likely to require industry adjustment.
International trade	C — The presence of this pest in commercial production areas of a wide range of commodities (e.g. stone fruit and grapes) may have a significant effect at the district level due to any limitations to access to overseas markets where this pest is absent.
Environment	C — Although additional pesticides may be required to control black vine thrips on susceptible crops, this is considered to have minor consequences for the environment.

Unrestricted risk estimate

The unrestricted risk estimate as determined by combining the overall ‘probability of entry, establishment and spread’ with the ‘consequences’ using the risk estimation matrix as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001: **Low.**

Sesamia nonagrioides (Lefebvre) (Pink maize stalk borer)

Probability of importation

The likelihood that *S. nonagrioides* will arrive in Australia with the importation of fresh persimmon fruit: **Very low**.

- Persimmon orchards in Israel are rarely infested by *S. nonagrioides* (PPIS, 2002) and it has only been recorded once on persimmons in Israel (Wysoki and Madjar, 1986).
- On some non-Poaceous crops the larvae feed on flower buds, flowers and fruits as well as tunnelling in leaf and stem tissues (CAB International, 2002). It is very unlikely that fruit sent to be packed for export contain this pest; however there is a very low chance that larvae may hide beneath the calyx of persimmon fruit.
- Noctuidae moths are rarely intercepted on persimmon fruit imports from the USA and New Zealand.

Probability of distribution

The likelihood that *S. nonagrioides* will be distributed to the endangered area as a result of the processing, sale or disposal of fresh persimmon fruit: **Low**.

- Stalk borers may enter the environment directly from fruit at the point of sale or after hatching from pupae attached to the discarded persimmon fruit skin or calyx.
- On maize crops, eggs require a constant temperature of 25-26^{o}C for 5-6 days to hatch. The newly hatched larvae often move by crawling over the soil. Fully grown larvae over winter in the stem bases of maize plants (CAB International, 2002).

Probability of entry

The likelihood that *S. nonagrioides* will enter Australia as a result of trade in fresh persimmon fruit, and be distributed to the endangered area: **Very low.**

The overall probability of entry is determined by combining the likelihoods of importation and distribution using the matrix of 'rules' for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Probability of establishment

The likelihood that *S. nonagrioides* will establish based on a comparative assessment of factors in the source and destination areas considered pertinent to the ability of the pest to survive and propagate: **Moderate.**

- The host range of *S. nonagrioides* is mainly restricted to Poacea cereal crops.
- On maize plants, females may lay several hundred eggs. During the growing season, development is continuous, without diapause, and the number of adult generations is determined by climatic factors and the availability of sufficient food (Anglade, 1972). In Greece, Kavut (1987) reported that adults emerge over a period of 30-40 days and there were three generations a year on maize crop. The likelihood of sufficient numbers of insects reaching maturity to establish a population would be low.

Probability of spread:

The likelihood that *S. nonagrioides* will spread based on a comparative assessment of those factors in the area of origin and in Australia considered pertinent to the expansion of the geographical distribution of the pest: **Moderate.**

- Tropical or subtropical environments of Australia would be suitable for the spread of this stalk borer, because it is recorded mainly from these environments. This species has a medium host range and environmental conditions play an important role in the survival of this species.
- The movement of newly hatched larvae is often slow as they crawl over the soil.
- The relevance of natural enemies in Australia is not known.

Probability of entry, establishment and spread

The overall likelihood that *S. nonagrioides* will enter Australia as a result of trade in fresh persimmon fruit, be distributed in a viable state to suitable hosts, establish in that area and subsequently spread within Australia: **Very low.**

The probability of entry, establishment and spread is determined by combining the likelihoods of entry, establishment and spread using the matrix of rules for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Consequences

Consequences (direct and indirect) of *S. nonagrioides*: **Very low.**

Criteria	Estimate
Direct consequences	
Plant health or welfare	B —*S. nonagrioides* mainly feeds on stems of maize but may occur on leaves and fruits of host plants. Persimmon has been recorded as a host only once in Israel. Fruit quality may be reduced by the damage caused by larval feeding.
Any other aspects of the environment	A — There are no known consequences of this pest on other aspects of the environment.
Indirect consequences	
Eradication, control etc	B — Programs to minimise the impact of this pest on host plants are likely to be costly and include pesticide applications, biological control and crop sanitation.
Domestic trade	A – Domestic trade restrictions are not anticipated. The presence of stalk borers on persimmon fruit or seeds of susceptible crops is not common.
International trade	A — Presence of this pest on persimmon fruit is not common. The presence of stalk borers on other crops would be unlikely to have a significant effect on trade.
Environment	A— Although additional pesticide applications would be required to control this pest on susceptible crops, this is unlikely to affect the environment.

Unrestricted risk estimate

The unrestricted risk estimate as determined by combining the overall 'probability of entry, establishment and spread' with the 'consequences' using the risk estimation matrix as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001: **Negligible.**

Stathmopoda masinissa (Meyrick) (Persimmon fruit moth)

Probability of importation

The likelihood that persimmon fruit moth will arrive in Australia with the importation of fresh persimmon fruit: **High**.

- The larvae of *S. masinissa* are internal borers that enter fruit through the stalk or calyx (MAFF, 1987).

- In Korea, larval infestations of *S. masinissa* on persimmon are commonly recorded under the pedicel, in the pedicel and in the fruit (Bae, 1997). Mature larvae can also overwinter at the calyx basin of persimmon fruit (Li, 1999).
- As the larvae are present inside the fruit, it is unlikely that *S. masinissa* will be detected during sorting and packing procedures.

Probability of distribution

The likelihood that persimmon fruit moth will be distributed to the endangered area as a result of the processing, sale or disposal of fresh persimmon fruit: **High**.

- Persimmon fruit moth can enter the environment through the larvae that are associated with infested fruit, pedicel and calyx.
- The commodity may be distributed throughout Australia for retail sale. Long-range dispersal of these pests would require movement of larvae on infested fruit, pedicel, calyx or vegetative waste. Short-range dispersal would occur readily through the movement of larvae or adult moths.
- The intended use of the commodity is human consumption but waste material would be generated.

Probability of entry

The likelihood that persimmon fruit moth will arrive in Australia as a result of trade in fresh persimmon fruit, and be distributed to the endangered area: **High.**

The overall probability of entry is determined by combining the likelihoods of importation and distribution using the matrix of rules for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Probability of establishment

The likelihood that persimmon fruit moth will establish based on a comparative assessment of factors in the source and destination areas considered pertinent to the ability of the pest to survive and propagate: **Moderate.**

- The host range of *S. masinissa* is restricted to *Diospyros* spp and *Amaranthus* spp. Neither of these species is widely grown in Australia on a large scale.
- *S. masinissa* has a high reproductive rate and has two generations per year. Females lay between 20-150 eggs, with an average of 70 eggs per female.

Probability of spread

The likelihood that persimmon fruit moth will spread based on a comparative assessment of those factors in the area of origin and in Australia considered pertinent to the expansion of the geographical distribution of the pest: **High.**

- Adult moths are highly mobile and are capable of independent dispersal. The main distribution method would be through infested fruit, pedicel and calyx.
- Temperate regions of Australia would be suitable for the spread of this moth.

- The relevance of natural enemies in Australia is not known.

Probability of entry, establishment and spread

The overall likelihood that persimmon fruit moth will enter Australia as a result of trade in fresh persimmon fruit, be distributed in a viable state to suitable hosts, establish in that area and subsequently spread within Australia: **Moderate.**

The probability of entry, establishment and spread is determined by combining the likelihoods of entry, establishment and spread using the matrix of rules for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Consequences

Consequences (direct and indirect) of persimmon fruit moth: **Low.**

Criteria	**Estimate**
Direct consequences	
Plant life, health or welfare	C – *S. masinissa* is recorded as capable of causing direct damage to persimmon fruit. The young larvae bore into fruit from fruit stalk or calyx (MAFF, 1987) and infestation rate of up to 22% was recorded in the fruit (Bae, 1997).
Any other aspects of the environment	A – There are no known consequences of this pest on other aspects of the environment.
Indirect consequences	
Eradication, control etc	B – Additional programs to minimise the impact of this pest on host plants may be necessary.
Domestic trade	C – The presence of this pest in commercial production areas is likely to have a significant effect at the district level due to any resulting interstate trade restrictions on persimmons. These restrictions may lead to a loss of markets, which in turn would be likely to require industry adjustment.
International trade	C – Persimmon fruit moth is considered to be a serious pest of persimmons. The presence of this pest in commercial production areas may have a significant effect at the district level due to any limitations to access to overseas markets where this pest is absent e.g. the USA and New Zealand.
Environment	A — Although additional pesticide applications would be required to control these pests on susceptible crops, this is unlikely to affect the environment.

Unrestricted risk estimate

The unrestricted risk estimate as determined by combining the overall 'probability of entry, establishment and spread' with the 'consequences' using the risk estimation matrix as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001: **Low.**

Tenuipalpus zhizhilashviliae (Reck) (Persimmon false spider mite)

Probability of importation

The likelihood that false spider mite will arrive in Australia with the importation of fresh persimmon fruit: **Moderate.**

- In general, false spider mites tend to colonise lower stems and leaves first, moving up through the plant and eventually to the fruit, if present in large populations (USDA, 1997). Therefore, these mites are not commonly associated with the fruit of persimmon.
- If mites were present beneath the calyx, they would be difficult to detect or remove.
- Mites have been intercepted on imports of fresh persimmon fruit from the USA and New Zealand.

Probability of distribution

The likelihood that false spider mite will be distributed to the endangered area as a result of the processing, sale or disposal of fresh persimmon fruit: **Low.**

- Immature stages and adults may survive the storage and transport and be associated with infested waste.
- Mites are not mobile and are unable to enter the environment unaided and disperse to suitable hosts. Mites may only enter the environment in two ways: adults or immature stages may be blown by wind, or carried by other vectors, such as transport of persimmons and discarded waste.

Probability of entry

The likelihood that false spider mite will arrive in Australia as a result of trade in fresh persimmon fruit, and be distributed to the endangered area: **Low.**

The overall probability of entry is determined by combining the likelihoods of importation and distribution using the matrix of rules for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Probability of establishment

The likelihood that false spider mite will establish based on a comparative assessment of factors in the source and destination areas considered pertinent to the ability of the pest to survive and propagate: **Low**.

- The host range of *T. zhizhilashviliae* is extremely limited as this mite is only known to attack persimmons and grapes (Ghai and Shenhmar, 1984). Persimmons trees are not widely present in Australia on a large scale, so it is unlikely that this mite would find suitable hosts and establish in Australia.
- The reproductive rate of false spider mites is low compared to other mite species, with 4-6 generations per year (Baker and Bambara, 1997).

Probability of spread

The likelihood that false spider mite will spread based on a comparative assessment of those factors in the area of origin and in Australia considered pertinent to the expansion of the geographical distribution of the pest: **Low**.

- Mites are unable to spread unaided and long-range dispersal of this pest would require movement of immature stages or adults with vegetative material.
- At a local level, mites are mainly spread by wind. However, the narrow host range of these mites means that they are unlikely to be spread by wind to other suitable hosts.
- If established, suitable environmental conditions are available in Australia for the spread of this pest.
- The relevance of natural enemies in Australia is not known.

Probability of entry, establishment and spread

The overall likelihood that false spider mite will enter Australia as a result of trade in fresh persimmon fruit, be distributed in a viable state to suitable hosts, establish in that area and subsequently spread within Australia: **Very low.**

The probability of entry, establishment and spread is determined by combining the likelihoods of entry, establishment and spread using the matrix of rules for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Consequences

Consequences (direct and indirect) of false spider mite: **Very low**.

Criterion	Estimate
Direct consequences	
Plant life, health or welfare	B — Persimmon false spider mites can cause direct harm to a narrow range of plant hosts. The genus *Tenuipalpus* has been reported as disease vectors. The extent of damage caused by *T. zhizhilashviliae* on persimmons is not known.
Any other aspects of the environment	A — There are no known consequences of this pest on other aspects of the environment.
Indirect consequences	
Eradication, control etc.	B — Programs to minimise the impact of this pest on host plants are likely to be costly and include pesticide applications and cultural control.
Domestic trade	B – Domestic trade restrictions are not anticipated.
International trade	B –The presence of false spider mites on susceptible hosts can have a significant effect at the local level due to any limitations to access to overseas markets where *T. zhizhilashviliae* is absent. This pest has been classified as a quarantine pest on persimmon fruit from Korea into United States (USDA, 1997).
Environment	A — Although additional pesticide applications would be required to control this pest on susceptible crops, this is unlikely to affect the environment.

Unrestricted risk estimate

The unrestricted risk estimate as determined by combining the overall ‘probability of entry, establishment and spread’ with the ‘consequences’ using the risk estimation matrix as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001: **Negligible.**

PATHOGENS

Phoma kakivora (Hara) (Black spot)

Probability of importation

The likelihood that black spot will arrive in Australia with the importation of fresh persimmon fruit: **Low.**

- Black spot disease typically occurs on the surface of the fruit, but may also be observed on the calyx and petiole, or on the leaf blade (Yamada, 1966). The disease is present as irregular black stains, approximately 10-15 mm in diameter. Therefore, it is likely that this pathogen would be detected during packing and sorting procedures.
- This pathogen is not commonly reported on persimmon.

Probability of distribution

The likelihood that black spot will be distributed to the endangered area as a result of the processing, sale or disposal of fresh persimmon fruit: **Moderate.**

- Pycnidia and spores of P. *kakivora* are likely to survive transportation and storage.
- The commodity may be distributed throughout Australia for retail sale. The intended use of the commodity is human consumption but waste material would be generated. *P. kakivora* may enter the environment in two ways: pycnidia and pycnidiospores may be associated with discarded persimmon skin or they may be spread by water from persimmons at the point of sale or after purchase by consumers.

Probability of entry

The likelihood that black spot will arrive in Australia as a result of trade in fresh persimmon fruit, and be distributed to the endangered area: **Low.**

The probability of entry is determined by combining the likelihoods of importation and distribution using the matrix of rules for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Probability of establishment

The likelihood that black spot will establish based on a comparative assessment of factors in the source and destination areas considered pertinent to the ability of the pest to survive and propagate: **Very low.**

- Persimmons are the only known hosts of *P. kakivora* and are not widely grown in Australia on a large scale. Therefore, it is unlikely that this pathogen will spread to a suitable host and establish in Australia.

Susceptibility of persimmons to black spot disease varies in different varieties. In Kouchi Prefecture, the disease is known to cause most damage in Jiro fruit (up to 35%), and extremely little in Fuyu fruit (Yamada, 1966).

- Specific information with regard to the suitable environmental conditions for *P. kakivora* is not available, however various *Phoma* spp. are recorded in Australia.

Probability of spread

The likelihood that black spot will spread based on a comparative assessment of those factors in the area of origin and in Australia considered pertinent to the expansion of the geographical distribution of the pest: **Low**.

- Long-range dispersal of *P. kakivora* would require movement of inoculum with fruit or leaves. Locally spores are mainly spread by water splashes. The likelihood of this pest reaching susceptible hosts is very low as *P. kakivora* has a very narrow host range and is known to infect only persimmons, which are not widely cultivated within Australia.

Probability of entry, establishment and spread

The overall likelihood that black spot will enter Australia as a result of trade in fresh persimmon fruit, be distributed in a viable state to suitable hosts, establish in that area and subsequently spread within Australia: **Very low.**

The probability of entry, establishment and spread is determined by combining the likelihoods of entry, establishment and spread using the matrix of rules for combining descriptive likelihoods as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Consequences

Consequences (direct and indirect) of black spot: **Very low**.

Criterion	Estimate
Direct consequences	
Plant life, health or welfare	A — *P. kakivora* can cause blackspot disease on the surface of the fruit. This pathogen is not commonly reported on persimmon and may cause only minor damage to persimmon production at local level.
Any other aspects of the environment	A — There are no known consequences of this disease on other aspects of the environment.
Indirect consequences	
Eradication, control etc.	A — Programs to minimise the impact of this disease on host plants are likely to be costly than existing pre and post harvest treatments.
Domestic trade	B – Domestic trade restrictions are not anticipated.
International trade	A –The presence of this disease in commercial production areas of persimmons is unlikely to be discernible.
Environment	A — Although additional pre and post-harvest fungicide applications might be required to control this disease on persimmons, this is unlikely to affect the environment.

Unrestricted risk estimate

The unrestricted risk estimate as determined by combining the overall 'probability of entry, establishment and spread' with the 'consequences' using the risk estimation matrix as outlined in the Biosecurity Australia publication Guidelines for Import Risk Analysis – September 2001: **Negligible.**

CONCLUSIONS: RISK ASSESSMENTS

Table 3 summarises the detailed risk assessments and provides unrestricted risk estimates for the quarantine pests considered to be associated with fresh persimmons from Japan, Korea and Israel.

Three arthropods (*Hlyomorpha halys, Sesamia nonagrioides* and *Tenuipalpus zhizhilashviliae*) and one pathogen (*Phoma kakivora*) were assessed to have an unrestricted risk below Australia's ALOP and do not require management measures.

Four arthropods (*Lobesia botrana*, *Retithrips syriacus*, *Pseudococcus cryptus* and *Stathmopoda masinissa*) were assessed to have an unrestricted risk estimate of low.

Table 4 provides the final list of quarantine pests (including those pests considered in earlier IRAs or AQIS pre IRA assessments) associated with fresh persimmons from Japan, Korea and Israel that have been assessed to have unrestricted risk assessment above Australia's ALOP, and therefore require risk management measures. The proposed risk management measures are described in the following section.

Table 3. Results of the risk assessments

Scientific Name	Common name	Probability of			Overall Probability of entry, establishment and spread	Consequences	Unrestricted Risk
		Entry	Establishment	Spread			
ARTHROPODS							
Halyomorpha halys *Stål* (Syn = *Halyomorpha mista (Uhler); Halyomorpha brevis ; Halyomorpha picus) [Hemiptera: Pentatomidae]*	Brown marmorated stink bug	Very Low	High	Moderate	Very Low	Low	Negligible
Lobesia botrana (Denis and Schiffermüller)	Grapevine moth	Moderate	High	High	Moderate	Low	Low
Pseudococcus cryptus Hempel	Cryptic mealy bug	Moderate	High	High	Moderate	Low	Low
Retithrips syriacus (Mayet)	Black vine thrips	High	High	High	High	Low	Low
Sesamia nonagrioides (Lefebvre)	Pink maize stalk borer	Very low	Moderate	Moderate	Very low	Very low	Negligible
Stathmopoda masinissa Meyrick	Persimmon fruit moth	High	Moderate	High	Moderate	Low	Low
Tenuipalpus zhizhilashviliae (Reck)	Persimmon false spider mite	Low	Low	Low	Very low	Very low	Negligible
PATHOGENS							
Phoma kakivora (Hara)	Black spot	Low	Very low	Low	Very low	Very low	Negligible

Table 4. Quarantine pests of fresh persimmon fruit from Japan, Korea and Israel assessed to have unrestricted risk estimates above Australia's ALOP and therefore require risk management measures

Pest	Common name
ARTHROPODS	
Adris tyrannus amurensis Staudinger[2, 3] [Lepidoptera: Noctuidae]	Akebia leaf-like moth
Ceratitis capitata Wiedemann[5] [Diptera: Tephritidae]	Mediterranean fruit fly; Medfly
Ceroplastes floridensis Comstock[5] [Hemiptera: Coccidae]	Florida wax scale
Cryptoblabes gnidiella (Millière)[4] [Lepidoptera: Pyralidae]	Pyralid moth, Honeydew moth
Grapholita molesta (Busck)[5] Syn = *Cydia molesta* (Busck) [Lepidoptera: Tortricidae]	Oriental fruit moth
Homona magnanima Diakonoff[2] [Lepidoptera: Tortricidae]	Oriental tea tortrix
Lagoptera juno (Dalman)[2, 3] [Lepidoptera : Noctuidae]	Rose of Sharon leaf-like moth; Fruit-piercing moth
Lepidosaphes conchiformis[5] (Gmelin) [Hemiptera: Diaspididae]	Pear oystershell scale
Lobesia botrana (Denis and Schiffermüller) [Lepidoptera: Tortricidae]	Grapevine moth
Lopholeucaspis japonica (Cockerell)[2, 3] [Hemiptera: Diaspididae]	Japanese baton-shaped scale
Parlatoria pergandii Comstock[5] [Hemiptera: Diasididae]	Black parlatoria scale
Phenacoccus pergandei Cockerell[2] [Hemiptera: Pseudococcidae]	Persimmon long wooly scale
Planococcus kraunhiae (Kuwana)[3] [Hemiptera: Pseudococcidae]	Japanese mealybug
Ponticulothrips diospyrosi Haga & Okajima[2] [Thysanoptera: Phlaeothripidae]	Japanese gall forming thrips

Pest	Common name
Pseudaonidia duplex (Cockerell)[2, 3] [Hemiptera: Diaspididae]	Camphor scale
Pseudaulacaspis pentagona (Targioni-Tozzetti)[1] [Hemiptera: Diaspididae]	Peach white scale
Pseudococcus cryptus Hempel [Hemiptera: Pseudococcidae]	Citriculus mealybug, cryptic mealybug
Retithrips syriacus (Mayet) [Thysanoptera: Thripidae]	Black vine thrips; castor thrips; grape thrips
Stathmopoda masinissa Meyrick [Lepidoptera: Oecophoridae]	Persimmon fruit moth
PATHOGENS	
Monilinia fructigena Honey[3] [Leotiales: Sclerotiniaceae]	Brown rot

1. Covered under existing policy for persimmons from New Zealand.
2. Covered under existing policy for Fuji apple from Japan.
3. Covered under existing policy for Korean pear from Korea.
4. Covered under existing policy for citrus from Egypt
5. Covered under existing policy for persimmons from the USA.

RISK MANAGEMENT

Pest risk management evaluates and selects options for measures to reduce the risk of entry, establishment or spread of quarantine pests assessed to pose an unacceptable level of risk to Australia via the importation of commercially produced fresh persimmon fruit from Japan, Korea or Israel (i.e. fruit sourced from commercial production sites subjected to standard cultivation, harvesting and packing activities).

Biosecurity Australia considers that the risk management measures listed below are commensurate with the identified risks. These measures are based on the measures that are currently in place for the importation of fresh persimmons from New Zealand and the USA (California, Texas and Arizona only) and other existing policies, where relevant. For those pests that are not covered under existing policy, Biosecurity Australia has proposed measures that are appropriate to reduce the level of risk to below Australia's ALOP.

It is important to note that it is only appropriate for the unrestricted risk assessments to take into account the minimum border procedures used by relevant government agencies and not those measures approved by such agencies that are intended to mitigate risks associated with the commodity itself. The minimum procedures include verifying that the commodity is as described in the shipping documents and identifying external and internal contaminations of containers and packaging. In order to have least trade restrictive measures, the starting point for evaluation of the restricted risk management options first considered the use of a 600-unit inspection in detecting quarantine pests requiring risk management, and the subsequent remedial actions or treatments that might be applied if a pest is intercepted.

The standard AQIS sampling protocol requires inspection of 600 units, for quarantine pests in systematically selected random samples per homogeneous consignment or lot. The unit for persimmon is defined as one detached persimmon fruit. Biometrically, if no pests are detected by the inspection, this size sample achieves a confidence level of 95% that not more than 0.5% of the units in the consignment are infested/infected. The level of confidence depends on each fruit in the consignment having about the same likelihood of being affected by a quarantine pest and the inspection technique being able to reliably detect all quarantine pests in the sample. If no live quarantine pests are detected in the sample, the consignment is considered to be free from quarantine pests and would be released from quarantine. Where a quarantine pest is intercepted in a sample, the remedial actions or treatments may (depending on the location of the inspection) include:

- withdrawing the consignment from export to Australia;
- re-export of the consignment from Australia;
- destruction of the consignment ; or
- treatment of the consignment to ensure that the pest is no longer viable.

It should be emphasised that inspection is not a measure that mitigates the risk of a pest. It is the remedial actions or treatment that can be taken based on the results of the inspection that would reduce a pest risk.

The measures described below will form the basis of the import conditions for fresh persimmon fruit from Japan, Korea and Israel, which are detailed in the next section entitled "Import Conditions".

RISK MANAGEMENT MEASURES

There are six categories of measures listed to manage the risks identified in the pest risk assessment:

1. Pest free areas or cold disinfestation for the management of *Ceratitis capitata* (Mediterranean fruit fly) for persimmons from Israel.
2. Pest free areas/pest free places of production or orchard control and visual inspection and remedial action or methyl bromide fumigation for the management of *Stathmopoda masinissa* (persimmon fruit moth) for persimmons from Korea and Japan.
3. Export orchard surveillance and sanitation for freedom from *Monilinia fructigena* (brown rot) for persimmons from Japan, Korea and Israel.
4. Cleaning for the removal of mealybugs.
5. Inspection and remedial action for the management of scales, thrips, leafrollers and moths.
6. Supporting operational maintenance systems and verification of phytosanitary status.

[1] Options for the management of Mediterranean fruit fly

Ceratitis capitata (Mediterranean fruit fly/Medfly) has been assessed to have an unrestricted risk of moderate, and therefore, measures are required to manage that risk for persimmons from Israel.

Visual inspection alone is not considered to be an appropriate risk management option in view of the level of risk identified and because clear visual signs of infestation (particularly in recently infested fruit) may not be present. If infested fruit was not detected at inspection, Medfly may enter, establish and spread. Biosecurity Australia has identified the following two options to manage risks associated with Medfly: Option 1a - to source fruit from pest free areas or Option 1b – cold disinfestation treatment. Biosecurity Australia considers that either of these two measures is appropriate to reduce the risk associated with Medfly to very low, which is below Australia's ALOP.

[1a] Pest free areas (PFA)

To verify the maintenance of Medfly pest free status for fresh persimmon production areas, Israeli authorities must undertake on-going crop monitoring/ surveillance trapping. The NPPO is responsible to define a set of conditions to be met by producers to establish and maintain pest free areas for Medfly. The verification of pest free status must be done by NPPO personnel or by persons duly authorized by the NPPO, as defined by the International Standards for Phytosanitary Measures, Food & Agriculture Organization, publication No. 4 *Requirements for the establishment of pest free areas*.

Under the PFA option, each consignment must be inspected by the NPPO before export and if any live or dead Medfly is detected in consignments of fresh persimmon fruit, that consignment will be deemed non-compliant with the pest free area status. Exports to Australia will be suspended until

Biosecurity Australia/AQIS and Israeli authorities are satisfied that appropriate corrective action has been taken to re-instate the pest free area status for Medfly, or an alternative risk management measure has been developed and approved.

Biosecurity Australia/AQIS must be notified by Israeli authorities of any Medfly detections or changes in the status of Medfly in persimmon orchards in Israel.

This measure is consistent with the existing policy for the import of fresh persimmon fruit from the USA, where pest free areas have been established for the States of California, Texas and Arizona.

[1b]: Cold disinfestation treatment

For persimmons, the USDA treatment schedule *T107-a Cold treatment* against Medfly (USDA, 2003) is as follows:

Temperature	Exposure Period
1.11°C (34°F) or below	14 days
1.67°C (35°F) or below	16 days
2.2°C (36°F) or below	18 days

This treatment schedule is approved by the USDA for disinfestation of *C. capitata* in persimmon fruit imported into the USA from Israel. The Israeli authorities have informed Biosecurity Australia that standard post-harvest storage for persimmon fruit is at –0.5 to 0°C, followed by approximately 14 days of intransit cold treatment at 0.5 to 1.5°C.

Biosecurity Australia recommends the option of pre-shipment/intransit cold treatment as specified by the USDA in treatment schedule T107a for persimmon fruit to manage the risk of Medfly.

[2] Options for the management of persimmon fruit moth

Stathmopoda masinissa (persimmon fruit moth) has been assessed to have an unrestricted risk of low, and therefore, measures are required to manage that risk for persimmons from Japan and Korea.

Larvae of persimmon fruit moth feed on flower pods, pedicels, calyces and within fruit of persimmon. Larvae bore into the fruit from the fruit stalk or calyx and excrement can be seen around entrance holes (MAFF, 1987).

From field studies carried out in Japan, a close relationship was found between the numbers of calyces remaining on persimmon twigs after larval hibernation and the number of hibernating larvae of *S.masinissa*. It is suggested that calyx numbers could be used to predict the occurrence of *S. masinissa* the following spring (Kiyonaga and Tanaka, 1987).

If infested fruit was not detected at inspection, persimmon fruit moth may enter, establish and spread. Identified options to manage risks associated with persimmon fruit moth are either by [2a] sourcing fruit from pest free areas/places of production or [2b] orchard control, visual inspection and remedial action or [2c] the use of methyl bromide fumigation. Biosecurity Australia considers that any one of these measures is appropriate to reduce the risk associated with persimmon fruit moth to very low, which is below Australia's ALOP.

[2a]: Pest free areas or pest free places of production

The NPPO is responsible to define a set of conditions to be met by producers to establish and maintain pest free areas or pest free places of production for *S. masinissa*. The verification of pest free status must be done by NPPO personnel or by persons duly authorized by the NPPO, as defined by the ISPM No. 4 *Requirements for the establishment of pest free areas*, or ISPM No. 10 *Requirements for the establishment of pest free places of production and pest free production sites*.

The NPPO should establish pest freedom by verification of pest free areas or pest free places of prodution by specific surveys conducted in form of field inspections done at least once during the growing season and another before harvest of persimmon production in which consignments are certified for export.

If evidence of *S. masinissa* is detected during inspection, the production area/places will be immediately rejected. Exports from that production area/places will be disallowed until Biosecurity Australia/AQIS and the NPPO have agreed that the pest eradication measures taken have been effective and the pest risk has been eliminated.

Under this option, each consignment must be inspected by the NPPO before export and if any live or dead persimmon fruit moth is detected in consignments of fresh persimmon fruit, that consignment will be deemed non-compliant with the pest free area/pest free palces of production status. Exports to Australia will be suspended until Biosecurity Australia/AQIS and the NPPO are satisfied that appropriate corrective action has been taken to re-instate the pest free area/places of production status for persimmon fruit moth, or an alternative risk management measure has been developed and approved.

[2b]: Orchard control, visual inspection and remedial action

Biosecurity Australia proposes an alternative option of implementing an NPPO approved orchard control program and inspection for freedom from *S. masinissa*. The orchard control program for *S. masinissa* may include an Integrated Pest Management (IPM) program using appropriate, effective and compatible measures at critical stages of development of the pest and crop. Measures should be based on pest monitoring through weekly orchard inspections and forecasts of infestations.

Orchard control for persimmon fruit moth must include an orchard survey before harvest, by the NPPO nominated representatives, to check for the absence of persimmon fruit moth in the orchard and to verify the effectiveness of the orchard control measure.

The objective of these measures is to maintain a low pest prevalence in the orchard.

Information on the NPPO approved orchard control program for *S. masinissa* must be made available to Biosecurity Australia/AQIS if requested.

Harvested fruit must be inspected specifically for evidence of *S. masinissa*. If *S. masinissa* is found during orchard surveys, pre-export or on-arrival clearance then remedial action or treatment must be taken.

The combination of orchard control, targeted visual inspection and remedial action for freedom from this pest during pre-export inspection (6d) and on-arrival clearance (6g) would reduce the risk of *S. masinissa* from Japan and Korea to an acceptable level.

Additional measures (6a, 6b and 6c) will ensure operational procedures are in place to maintain and verify the integrity of these measures.

[2c]: Pre-shipment methyl bromide fumigation

Japan has conducted large-scale trials and confirmed the efficacy of methyl bromide fumigation for the management of *S. masinissa* in persimmon fruit (Matsuoka *et al*, 2001) for export to the USA.

Based on the Japanese efficacy data, fumigation should be carried out for a duration of 2 hours according to the specifications below:

> 48g/m^3 for 2hrs at a fruit pulp temperature of 15^{o}C.
>
> The loading ratio should not exceed 50% of the chamber volume.

Further details of methyl bromide fumigation protocol are provided under Import Condition 7.

[3] Export orchard surveillance and sanitation for freedom from brown rot

Monilinia fructigena (brown rot) has been assessed to have an unrestricted risk of high, and measures are therefore required to manage that risk for fresh persimmons from Japan, Korea and Israel.

M. fructigena affects blossoms, shoots, branches and fruit. The fungus over winters on peduncles, mummified fruit and twigs. It usually gains entry to the fruit through wounds, causing soft decay of the flesh. The disease occurs primarily on fruit in orchards that have blossom or shoot infection, and more often on mature fruit that have some damage. The disease may continue to develop after the fruit is in storage or in the market (Biosecurity Australia, 2003).

Current management measures in place for brown rot of pome fruit from Japan, Korea and China (Biosecurity Australia, 2003) can be applied to persimmons. Biosecurity Australia considers that these measures are appropriate to reduce the risk associated with brown rot to very low, which is below Australia’s ALOP. These measures are:

- Fruit must be sourced only from registered orchards in designated export area.
- Fruit must be packed in registered packing houses.
- Detection/monitoring surveys for brown rot must be conducted by the NPPO in export orchards. The NPPO must submit the results to Biosecurity Australia, using an agreed reporting format.
- The NPPO must inspect all export orchards and a sample of non-export orchards, both inside and outside the designated export area during orchard inspection, and must monitor the levels of

pests of concern. If brown rot is detected in any designated export area, fruit from that export area will not be permitted entry into Australia.

- Field sanitation measures in export orchards to reduce the incidence of brown rot.
- Export fruit free from disease symptoms during pre-export inspection by the NPPO and on-arrival inspection by AQIS.
- The NPPO must notify Biosecurity Australia if disease status changes or unusual weather conditions that give rise to conducive conditions for disease development to occur.

[4] Cleaning for the removal of mealybugs

Mealybugs have been assessed to have an unrestricted risk estimate above Australia's ALOP, and measures are therefore required to manage that risk. As these pests can hide underneath the fruit calyx, visual inspection alone is not considered to be an appropriate risk management option. If infested fruit was not detected at inspection, these pests may enter, establish and spread. Cleaning is proposed as a phytosanitary risk management measure for mealybugs. Biosecurity Australia considers that this measure is appropriate to reduce the risk associated with mealybugs to very low, which is below Australia's ALOP.

All fruit is to be cleaned of mealybugs on the surface and underneath the calyx using any physical or mechanical means, such as high-pressure air/water blast or other equivalent measures. This must be completed in packinghouses that are registered and audited by the NPPO (refer to measure 6b).

[5] Inspection and remedial action for the management of scales, thrips, leafrollers and moths

Biosecurity Australia considers that targeted visual inspection for freedom from scales, thrips, leafrollers and moths (other than persimmon fruit moth) is considered to be an appropriate measure to reduce the risk associated with scales, thrips, leafrollers and moths to very low, which is below Australia's ALOP. If infested fruit was not inspected, these pests may enter, establish and spread.

Sheltered sites such as the calyx and any indented areas are to be inspected carefully during pre-export inspection (6d) and on-arrival inspection (6g). The produce is to be examined directly with a lens or binocular microscope, or any pests or debris may be brushed onto a white sheet of paper for inspection under a lens or microscope.

The objective of this measure is to ensure that the persimmon fruit exported to Australia do not contain actionable scales, thrips, leafrollers and moth quarantine pests. Additional measures 6a, 6b, 6c will ensure operational procedures are in place to maintain and verify the integrity of these measures. If actionable pests are found during these inspections, then remedial action must be taken.

Together these measures and phytosanitary procedures will mitigate the risk of scales, thrips, leafrollers and moths to an acceptable level.

This phytosanitary measure is based on the current risk management measures for persimmons from New Zealand and the USA.

[6] Supporting operational maintenance and verification of phytosanitary status

It is necessary to have a system of operational procedures in place to ensure that the phytosanitary status of fresh persimmons from Japan, Korea and Israel is maintained and verified during the process of production and export to Australia. This is to ensure that the objectives of the risk management measures previously identified have been met and are being maintained.

The proposed system of operational procedures for the production and export of fresh persimmons to Australia from Japan, Korea and Israel consist of:

6a. Registration of orchards in designated export areas;

6b. Registration of pack houses and auditing of procedures;

6c. Packaging and labelling compliance;

6d. Pre-export inspection and remedial action by NPPO;

6e. Phytosanitary certification by NPPO;

6f. Storage and movement; and

6g. On-arrival phytosanitary inspection by AQIS.

[6a] Registration of export orchards

All persimmons for export to Australia must be sourced from export orchards registered with Japan's, Korea's, or Israel's NPPO prior to the commencement of exports. Copies of the registration records must be made available to AQIS upon request. The NPPO is required to register export orchards prior to commencement of exports.

The objective of this procedure is to ensure that orchards from which persimmons are sourced can be identified. This is to allow trace back to individual orchards and growers in the event of non-compliance and for audit (of control measures). For example, if live pests are intercepted, the ability to identify a specific orchard allows the investigation and corrective action to be targeted rather than applying to all possible orchards.

[6b] Registration of packing houses and auditing of procedures

All packinghouses intending to export persimmon fruit to Australia must be registered with the NPPO.

The cleaning for removal of mealybugs is to be done within the registered packinghouses in Japan, Korea and Israel.

If cold treatment is used for disinfestation of fruit flies, it is to be done within the registered packinghouses in Israel. Copies of the registration records for cold treatment in Israel must be provided to AQIS.

Packinghouses would be required to identify the individual orchard with a numbering system and identify fruit from individual orchards by marking boxes or pallets (i.e. one orchard per pallet) with the unique orchard number. The list of registered packinghouses must be kept by the NPPO and provided to AQIS prior to exports commencing with updates provided if packinghouses are added or removed from the list.

If methyl bromide fumigation is used for the treatment of persimmon fruit moth, export fumigation facilities must be registered with the NPPO prior to commencement of exports. Facilities for methyl bromide fumigation in Japan and Korea are to comply with the relevant AQIS standards.

Registration of orchards, packinghouses and fumigation facilities is to include an audit program by the NPPO. An audit is to be conducted prior to registration and then done at least annually. Records of audits conducted by NPPO on pack houses should be available for review by AQIS as required.

The objective of this procedure is to ensure that packinghouses and fumigation facilities at which treatment procedures are carried out can be identified. This is to allow trace-back to individual orchards, packinghouses and fumigation facilities in the event of non-compliance and audit.

[6c] Packaging and labelling

All packages of persimmons for export would be free from contaminated plant material including trash and weed seeds and would meet Australia's general import conditions for fresh fruits and vegetables (C6000 General Requirements for All Fruit and Vegetables, available at http://www.aqis.gov.au/icon/). Trash refers to soil, splinters, twigs, leaves and other plant material but excludes the persimmon calyx.

Inspected and treated fruit would be required to be packed in new boxes. Packing material would be synthetic or be processed if of plant origin. No unprocessed packing material of plant origin, such as straw, will be allowed. All wood material used in packaging of persimmon fruit must comply with the AQIS conditions (e.g. those in "Cargo containers: Quarantine aspects and procedures" (AQIS, 2003)).

All boxes would be labelled with the orchard registration number and packinghouse registration number for the purposes of trace back in the event that this is necessary. The pallets should be securely strapped only after phytosanitary inspection has been carried out following mandatory postharvest treatments. Palletised product is to be identified by attaching a uniquely numbered pallet card to each pallet or part pallet to enable trace back to registered orchards.

The objectives of this procedure are to ensure that:

- The persimmon fruit exported to Australia are not contaminated by weeds or trash.
- Unprocessed packing material (which may vector pests identified as not on the pathway and pests not known to be associated with persimmon) is not imported with persimmons.
- The packaged persimmon fruit are labelled in such a way to identify the orchard and packinghouse (see measures 6a,b).

[6d] Pre-export inspection and remedial action by NPPO

The NPPO will inspect all consignments in accordance with official procedures for all visually detectable quarantine pests and trash using sampling rates developed by the NPPO in consultation with Biosecurity Australia/AQIS. Sheltered sites such as the calyx and any indented areas are to be inspected carefully.

If actionable pests are found during these inspections, then remedial action must be taken.

Records of the interceptions made during these inspections (live or dead quarantine pests and trash) are to be maintained by the NPPO and made available to Biosecurity Australia as requested. This information will assist in future reviews of this import pathway and consideration of the appropriateness of the phytosanitary measures that have been applied.

The objective of this procedure is to ensure that persimmon fruit exported to Australia do not contain quarantine pests or trash, are clean of any extraneous organic material on the surface of the fruit, and complies with packing and labelling requirements.

[6e] Phytosanitary certification by NPPO

The NPPO is required to issue a Phytosanitary Certificate for each consignment upon completion of pre-shipment phytosanitary inspection and treatment. The objective of this procedure is to provide formal documentation to AQIS verifying that the relevant measures have been done off-shore. Each Phytosanitary Certificate is to contain the following information:

Additional declarations

"*The persimmons in this consignment have been produced in <<Japan/Korea/Israel>> in accordance with the conditions governing entry of fresh persimmon fruit to Australia and inspected and found to be free of quarantine pests*".

Distinguishing marks

The orchard registration number, packinghouse registration number, number of boxes per consignment, and container and seal numbers (as appropriate); (to ensure trace back to the orchard in the event that this is necessary).

Treatments

Details of cleaning method, cold treatment (i.e. temperature, duration and packinghouse number) and methyl bromide fumigation (i.e. dosage, duration, fruit temperature, date and fumigation facility number), where relevant.

A consignment is the quantity of persimmon fruits covered by one Phytosanitary Certificate that arrives at one port in one shipment. All consignments would need to be shipped directly from one port or city in Japan, Korea or Israel to a designated port or city in Australia.

[6f] Storage and movement

Packed product and packaging is to be protected from pest contamination during and after packing, during storage and during movement between locations (e.g. packinghouse to cool storage/depot, to inspection point, to export point).

Product for export to Australia that has been inspected and certified by the NPPO must be maintained in secure conditions that will prevent mixing with fruit for export to other destinations.

Security of the consignment is to be maintained until release from quarantine in Australia.

The objective of this procedure is to ensure that the phytosanitary status of the product is maintained during storage and movement.

[6g] On-arrival phytosanitary inspection and remedial action, and clearance by AQIS

On arrival in Australia, each consignment will be inspected by AQIS. AQIS would undertake a documentation compliance examination for consignment verification purposes at the port of entry in Australia prior to release from quarantine. Fruit from each consignment would be randomly sampled for inspection. Such sampling methodology will provide 95% confidence that there is not more than 0.5% of infestation in the consignment.

The objective of this procedure is to verify that the required measures have been undertaken.

Where consignments are found to be non-compliant with requirements on-arrival, the importer will be given the option to treat (if suitable treatments for the pests detected can be applied), re-export or destroy the consignment. If product continually fails inspection, AQIS reserves the right to suspend the export program and conduct an audit of the Japanese, Korean or Israeli persimmon risk management systems. The program will continue only after Biosecurity Australia/AQIS is satisfied that appropriate corrective action has been taken.

Uncategorised pests

If an organism is detected on fresh persimmons from Japan, Korea or Israel that has not been categorised, it will require assessment to determine its quarantine status and if phytosanitary action is required. The detection of any significant pests of quarantine concern not already identified in the analysis may result in the suspension of the trade while a review is conducted to ensure that the existing measures continue to provide the appropriate level of phytosanitary protection for Australia.

IMPORT CONDITIONS

The components of the import conditions are summarised in dot point format below. The risk management measure that links with each component is given in brackets ( ).

- Import Condition 1. Registration of export orchards (links with risk management measures 1a, 2a, 2b, 3, 6a)
- Import Condition 2. Registration of packinghouses and auditing of procedures (2c, 6b)
- Import condition 3. Pest free area for Medfly (1a)
- Import Condition 4. Pre-shipment/intransit cold disinfestation treatment for Medfly (1b)
- Import condition 5. Pest free area or pest free places of production for persimmon fruit moth (2a)
- Import condition 6. Orchard control, visual inspection and remedial action for persimmon fruit moth (2b)
- Import Condition 7. Pre-shipment methyl bromide fumigation for persimmon fruit moth (2c)
- Import Condition 8. Export orchard surveillance and sanitation for brown rot (3)
- Import Condition 9. Cleaning for the removal of mealybugs. (4)
- Import Condition 10. Packing and labelling (6c)
- Import Condition 11. Targeted pre-export inspection by NPPO (2b, 5, 6d)
- Import Condition 12. Phytosanitary certification by NPPO (6e)
- Import Condition 13. Storage and movement (6f)
- Import Condition 14. Targeted on-arrival quarantine inspection and clearance by AQIS (6g)
- Import Condition 15. Audit and review of policy.

IMPORT CONDITION 1. REGISTRATION OF EXPORT ORCHARDS

All persimmon fruit for export to Australia must be sourced from export orchards registered with Japan, Korea or Israel's NPPO. Copies of the registration records must be made available to AQIS upon request. The NPPO is required to register all export orchards and growers prior to commencement of exports.

IMPORT CONDITION 2. REGISTRATION OF PACKINGHOUSES AND AUDITING OF PROCEDURES

All packinghouses intending to export persimmon fruit to Australia need to be registered with the NPPO.

The cleaning for removal of mealybugs is to be done within the registered packinghouses.

If cold treatment is used for disinfestation of fruit flies, it is to be done within the registered packinghouses in Israel. Copies of the registration records for cold treatment in Israel must be provided to AQIS.

Packinghouses would be required to identify the individual orchard with a numbering system and identify fruit from individual orchards by marking boxes or pallets (i.e. one orchard per pallet) with the unique orchard number. The list of registered packinghouses must be kept by the NPPO and provided to AQIS prior to exports commencing with updates provided if packinghouses are added or removed from the list.

If methyl bromide fumigation is used for the treatment of persimmon fruit moth, export fumigation facilities must be registered with the NPPO prior to commencement of exports. Facilities for methyl bromide fumigation in Japan and Korea are to comply with the relevant AQIS standards.

Registration of orchards, packinghouses and fumigation facilities is to include an audit program by the NPPO. An audit is to be conducted prior to registration and then done at least annually. Records of audits conducted by NPPO on packhouses should be available for review by AQIS as required.

IMPORT CONDITION 3. PEST FREE AREA FOR MEDFLY

If the option of establishing a pest free area for Medfly is adopted by Israel, technical information including trapping and monitoring data, and regulatory procedures to justify maintenance of Israel's Medfly pest free status for fresh persimmon production areas must be provided to Biosecurity Australia/AQIS prior to the commencement of exports for consideration.

IMPORT CONDITION 4. PRE-SHIPMENT/INTRANSIT COLD DISINFESTATION TREATMENT FOR MEDFLY

If the cold disinfestation treatment option is to be adopted for Medfly disinfestation by Israel, the following procedure must be followed:

Medfly disinfestation only:

Temperature	Exposure Period
1.11°C (34°F) or below	14 days
1.67°C (35°F) or below	16 days
2.2°C (36°F) or below	18 days

The pulp of the fruit must be at or below the indicated temperature at time of beginning treatment. Cold treatment may be conducted in Israel in cold disinfestation facilities that are registered with and audited by the NPPO, or intransit in containers designated by the NPPO for such purposes. Temperature values would need to be recorded to standards agreed between the NPPO and AQIS and monitored by the NPPO.

IMPORT CONDITION 5. PEST FREE AREA OR PEST FREE PLACES OF PRODUCTION FOR PERSIMMON FRUIT MOTH

If the option of establishing a pest free area/pest free places of production for persimmon fruit moth is adopted by Japan and/or Korea, information on specific surveys and field inspection conducted during growing season and before harvest, to justify maintenance of pest free status for fresh persimmon production areas/places must be provided to Biosecurity Australia/AQIS prior to the commencement of exports for consideration.

IMPORT CONDITION 6. ORCHARD CONTROL, VISUAL INSPECTION AND REMEDIAL ACTION FOR PERSIMMON FRUIT MOTH

If the orchard control, visual inspection and remedial action is to be adopted for freedom of persimmon fruit moth by the NPPO, the following procedures must be followed:

Registered export orchard growers must implement an orchard control program (i.e. good agricultural practice/integrated pest management (IPM) programs for export fruit) that has been approved by the NPPO, incorporating field sanitation and appropriate biocontrol and/or pesticide applications for the management of persimmon fruit moth. Registered export orchard growers must have an additional registration number and need to keep records of control measures for auditing purposes by NPPO. The program would include:

- Monitoring of the persimmon fruit moth throughout the year and inspection of fruit weekly from fruit set;
- Chemical control, using appropriate, effective and compatible insecticides for persimmon fruit moth. Recommended withholding periods must be enforced for export fruit.
- An orchard survey before harvest, by the NPPO nominated representatives, to check for the absence of persimmon fruit moth in the orchard and to verify the effectiveness of the orchard control measures; and
- NPPO to audit growers' compliance with the orchard control program. Orchards found not to be complying with the program must have their registration suspended.

Information on the NPPO approved orchard control program and audit records for persimmon fruit moth must be made available to AQIS if requested.

IMPORT CONDITION 7. PRE-SHIPMENT METHYL BROMIDE FUMIGATION FOR PERSIMMON FRUIT MOTH

If the methyl bromide fumigation option is to be adopted for disinfestation of *Stathmopoda masinissa* (persimmon fruit moth) by Japan or Korea, the following procedure must be followed:

All fumigation facilities for disinfestation of persimmon fruit moth must be registered with NPPO and would need to comply with NPPO standards for export grade facilities. These facilities must undergo fumigation testing to ensure that the chambers can deliver and maintain methyl bromide fumigation in accordance with the applicable NPPO standards. Records of chamber testing must be made available to AQIS if required.

Fumigation with methyl bromide must be carried out for 2hrs at $48g/m^3$ at a fruit pulp temperature of 15°C at Normal Atmospheric Pressure (NAP). Concentration of the fumigant must be monitored and maintained at $48g/m^3$ during the treatment period. Additional fumigant must be added if concentration of methyl bromide falls below $48g/m^3$ during fumigation. The loading ratio should not exceed 50% of the chamber volume. This must be completed under the supervision of the NPPO or an accredited certifying official at the facility that is registered with, and audited by the NPPO.

Fumigation establishments must ensure that records identify each fumigation treatment. All data pertaining to the fumigation treatment must be recorded: the number and identification of pallets treated, the time and date for the treatment, the temperature data from each pallet, the methyl bromide dose rate as calculated, the chamber capacity, and the volume of product treated.

Fumigation establishments must ensure their systems will assure that treated and untreated product is identified and segregated at all times while on the premises.

IMPORT CONDITION 8. EXPORT ORCHARD SURVEILLANCE AND SANITATION FOR BROWN ROT

The NPPO in Japan, Korea and Israel must ensure that registered export orchards are subject to orchard sanitation and control measures against *Monilinia fructigena* (brown rot). The following procedures must be undertaken by all export orchards:

- Fruit must be sourced only from registered orchards in designated export area.
- Fruit must be packed in registered packing houses.
- Detection/monitoring surveys for brown rot must be conducted by the NPPO in export orchards. The NPPO must submit the results to Biosecurity Australia, using an agreed reporting format.
- The NPPO must inspect all export orchards and a sample of non-export orchards, both inside and outside the designated export area during orchard inspection, and must monitor the levels of pests of concern. If brown rot is detected in any designated export area, fruit from that export area will not be permitted entry into Australia. NPPOs will be required to notify Biosecurity Australia of any detection of brown rot in export orchards and any measures taken to control the outbreaks.
- Field sanitation measures in export orchards to reduce the incidence of brown rot.
- Export fruit free from disease symptoms during pre-export inspection by the NPPO and on-arrival inspection by AQIS. If brown rot is detected, consignments will be rejected for export to Australia.
- The NPPO must notify Biosecurity Australia if disease status changes or unusual weather conditions that give rise to conducive conditions for disease development to occur.

IMPORT CONDITION 9. CLEANING FOR THE REMOVAL OF MEALYBUGS

All fruit is to be cleaned of mealybugs, scales and thrips on the surface and underneath the calyx using any physical or mechanical means, such as high pressure air/water blast or other equivalent measures. This must be completed in packinghouses that are registered and audited by the NPPO.

IMPORT CONDITION 10. PACKING AND LABELLING

All packages of persimmon fruit for export must be free from contaminated plant materials including trash and weed seeds and would meet Australia's general import conditions for fresh fruits and vegetables. (C6000 General Requirements for All Fruit and Vegetables, available at http://www.aqis.gov.au/icon/). Trash refers to soil, splinters, twigs, leaves and other plant materials but excludes the persimmon calyx.

Inspected and treated fruit must be packed in new cartons. Packing material would be synthetic or processed if of plant origin. No unprocessed packing material of plant origin, such as straw, will be allowed. All wood material used in packaging of persimmon fruit must comply with the AQIS conditions (e.g. those in "Cargo containers: Quarantine aspects and procedures" (AQIS, 2003)).

All boxes should be labelled with the orchard registration number and packinghouse registration number for the purposes of trace back in the event that this is necessary. The pallets should be securely strapped only after phytosanitary inspection has been carried out following mandatory post-harvest treatments. Palletised product is to be identified by attaching a uniquely numbered pallet card to each pallet or part pallet to enable trace back to registered orchards.

IMPORT CONDITION 11. TARGETED PRE-EXPORT INSPECTION BY NPPO

The NPPO will inspect all consignments in accordance with official procedures for all visually detectable quarantine pests, soil and trash using sampling procedures developed by the NPPO in consultation with Biosecurity Australia/AQIS. Sheltered sites such as the calyx and any indented areas are to be inspected carefully. During inspection, the produce is to be examined directly with a lens or binocular microscope, or any pests or debris may be brushed onto a white sheet of paper for inspection under a lens or microscope. Inspection must be completed in packinghouses that are registered with and audited by the NPPO.

The targeted inspection procedure would ensure that fresh persimmon fruit are free from all actionable scales, thrips, leafrollers and moths and, where relevant to the risk management option, persimmon fruit moth (in association with Import Condition 2b).

Consignments that do not comply with the above requirements will be rejected for export to Australia.

Records of the interceptions made during these inspections (live or dead quarantine pests, and trash) are to be maintained by NPPO and made available to Biosecurity Australia as requested. This information will assist in future reviews of this import pathway and consideration of the appropriateness of the phytosanitary measures that have been applied.

IMPORT CONDITION 12. PHYTOSANITARY CERTIFICATION BY NPPO

The NPPO is required to issue a Phytosanitary Certificate for each consignment upon completion of pre-export treatment and inspection. Each Phytosanitary Certificate must contain the following information:

Additional declarations

- For Japan, Korea and Israel

  “The persimmons in this consignment have been produced in <<Japan/Korea/Israel>> in accordance with the conditions governing entry of fresh persimmon fruit to Australia and inspected and found to be free of quarantine pests”.

- For Israel, if the option of area of freedom for *Ceratitis capitata* (Medfly) is adopted, following declaration is required:

  "The fruit in this consignment was sourced and packed in <<name of area>> which is an area free of Ceratitis capitata (Medfly)”.

  OR

- *"The fruit in this consignment was sourced and packed in <<name of area>> which is an area located in excess of 15 kilometres from any Ceratitis capitata (Medfly) declared areas."*

- For Japan and Korea, if the option of pest free area/place of production for *Stathmopoda masinissa* is adopted, following declaration is required:

  “The fruit in this consignment was sourced and packed in <<name of area>> which is a pest free area/pest free place of production for Stathmopoda masinissa (persimmon fruit moth)”.

Distinguishing marks

The orchard registration number, packinghouse registration number, number of cartons per consignment, and container and seal numbers (as appropriate); (to ensure trace back to orchard in the event that this is necessary).

A consignment is the quantity of persimmon fruit covered by one Phytosanitary Certificate that arrives at one port in one shipment. All consignments would need to be shipped directly from one port or city in Japan, Korea or Israel to a designated port or city in Australia.

Treatment

- For Israel, if the option of post harvest cold disinfestation treatment for *Ceratitis capitata* (Medfly) is adopted, the following declaration is required:

  "The fruit in this consignment has been cold treated for disinfestation of Ceratitis capitata (Medfly)."

- For Japan and Korea, if the option of disinfestation of harvested fruit by fumigation for *Stathmopoda masinissa* (persimmon fruit moth) is adopted, the following declaration is required:

  "The fruit in this consignment has been fumigated with methyl bromide for disinfestation of Stathmopoda masinissa (persimmon fruit moth)."

- For Japan, Korea and Israel, the following declaration is required:

  "The fruit in this consignment has been cleaned using <<specify procedure>>."

IMPORT CONDITION 13. STORAGE AND MOVEMENT

Packed product and packaging is to be protected from pest contamination during and after packing, during storage and during movement between locations (e.g., packing house to cool storage/depot, to inspection point, to export point).

Product for export to Australia that has been inspected and certified by the NPPO must be maintained in secure conditions that will prevent mixing with fruit for export to other destinations. This could be achieved through segregation of fruit for export to Australia in separate storage facilities, netting or shrink-wrapping pallets in plastic, or by placing sealed cartons in low temperature cold storage before loading into a shipping container. Alternatively, packed fruit must be directly transferred at the packinghouse into a shipping container, which would be sealed and not opened until the container reached Australia.

Security of the consignment is to be maintained until release from quarantine in Australia.

IMPORT CONDITION 14. TARGETED ON-ARRIVAL QUARANTINE INSPECTION AND CLEARANCE BY AQIS

On arrival, each consignment must be inspected by AQIS and documentation examined for consignment verification purposes at the port of entry in Australia prior to release from quarantine. Sampling methodology would provide 95% confidence that there is not more than 0.5% infestation in a consignment.

An example of a sampling size for inspection of persimmon is given below.

Consignment size (Units)	**Sample size (Units)**
For 'consignments' of fruit less than 1000 units	Either 450 units or 100% of consignment

	(whichever is smaller)
For ‘consignments’ of fruit greater than or equal to 1000 units	600 units

Unit = one individual persimmon fruit

Where consignments are found to be non-compliant with requirements on-arrival, the importer will be given the option to treat (if suitable treatments for the pests detected can be applied), re-export or destroy the consignment. If product continually fails inspection, AQIS reserves the right to suspend the export program and conduct an audit of the Japan or Korea or Israel persimmon risk management systems. The program will continue only after Biosecurity Australia/AQIS is satisfied that appropriate corrective action has been taken.

Uncategorised pests

If an organism that is detected on persimmons from Japan, Korea or Israel that has not been categorised, it will require assessment to determine its quarantine status and if phytosanitary action is required. The detection of any live pests of quarantine concern not already identified in the analysis may result in the suspension of the trade while a review is conducted to ensure that the existing measures continue to provide the appropriate level of phytosanitary protection for Australia.

IMPORT CONDITION 15. REVIEW OF POLICY

Biosecurity Australia reserves the right to review the adopted policy at any time after significant trade has occurred or where there is reason to believe that the phytosanitary status of the exporting country has changed.

CONCLUSIONS

The findings of this import policy are based on a comprehensive analysis of relevant scientific literature and existing import requirements for persimmons into Australia.

Biosecurity Australia considers that the import conditions specified will provide an appropriate level of protection against the pests identified in the risk assessment.

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APPENDICES

Appendix 1: Pest categorisation for persimmons (presence/absence)

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
ARTHROPODA				
Acanthosoma denticaudum Jakovlev Syn = *Acanthosoma denticauda* Kim *et al*.; *Acanthosoma denticauda* Kim. [Hemiptera: Acanthosomatidae]	Red-backed stink bug	Japan, Korea (Kulik, 1965)	No (CSIRO, 2002; DAWA, 2003)	Yes
Aceria diospyri Keifer [Acarina: Eriophyidae]	Persimmon bud mite	Japan (Hiehata, 1995), New Zealand (NZ MAF, 2003)	Yes (Halliday, 1998). Not in WA (DAWA, 2003)	Yes (For WA only)
Acrobasis tokiella (Ragonot) [Lepidoptera: Pyralidae]	Apple leaf case bearer	Korea (KSPP, 1986; NPQS, 1995), United States (USDA, 1997)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Acronicta intermedia (Warren) Syns = *Acronicta increta* Butler; *Acronicta incretata* Hampson; *Apatele intermedia* Warren; *Triaena intermedia* Warren [Lepidoptera: Noctuidae]	Apple dagger moth	Japan, Korea (JSAE, 1987; Zhang, 1994)	No (Nielsen *et al*., 1996)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Acronicta rumicis Linnaeus [Lepidoptera: Noctuidae]	Sorrel cutworm, Knotgrass moth	Korea (Lee *et al*., 1970.	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Adoretus tenuimaculatus Waterhouse [Coleoptera: Scarabaeidae]	Brown chafer	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (Cassis *et al*., 1992; DAWA, 2003)	Yes
Adris tyrannus amurensis Staudinger [Lepidoptera: Noctuidae]	Akebia leaf-like moth	Korea (KSPP, 1986), Japan (AQIS, 1998), New Zealand (NZ MAF, 1999)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Agrilus moerens Saunders [Coleoptera: Bupresidae]	Jewel beetle	Japan (Akiyama and Akiyama, 1996)	No (CSIRO, 2002; DAWA, 2003)	Yes
Aleurocanthus spiniferus Quaintance and Baker Syn = *Aleurocanthus citricolus* (Newstead) Quaintance and Baker; *Aleurocanthus rosae* Singh; *Aleurocanthus spiniferus* var. *intermedia* Silvestri; *Aleurodes citricola* Newstead; *Aleurodes spinifera* Quaintance). [Hemiptera: Aleyrodidae]	Citrus blackfly, Orange spiny whitefly, Citrus mealywing	Japan, Korea (CAB International, 2002), USA – Hawaii (USDA, 1997)	Yes (CAB International, 2002; Martin, 1999). Not in WA (DAWA, 2003)	Yes (For WA only)
Aleurothrixus floccosus (Maskell) [Hemiptera: Aleyrodidae]	Woolly whitefly	Israel, Japan (CAB International, 2003)	No (CAB International, 2003; Martin, 1999)	Yes
Aleurotrachelus camelliae (Kuwana) [Hemiptera: Aleyrodidae]	Camellia whitefly	Japan, Korea (JSAE, 1987; Anonymous, 2004)	No (Martin, 1999)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Ambrosiodmus apicalis (Blandford) *Syn = Xyleborus apicalis Blandford* [Coleoptera: Curculionidae, Scolytinae]	Apple ambrosia beetle	Japan, Korea (JSAE, 1987; Wood and Bright, 1992)	No (Wood and Bright, 1992)	Yes
Anacanthocoris striicornis (Scott) [Hemiptera: Coreidae]	Larger squash bug	Japan, Korea (JSAE 1987; Wildsky, 2004)	No (Cassis and Gross, 2002)	Yes
Anomala albopilosa Hope [Coleoptera: Scarabaeidae]	Green chafer	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (Cassis *et al*., 1992; DAWA, 2003)	Yes
Anomala cuprea (Hope) Syn = *Euchlora cuprea.* [Coleoptera: Scarabaeidae]	Cupreous chafer	Japan (JSAE, 1987), Korea (KSPP, 1986; Cho *et al*., 1989)	No (Cassis *et al*., 1992; DAWA, 2003)	Yes
Anomala daimiana Harold [Coleoptera: Scarabaeidae]	Cherry chafer	Korea (KSPP, 1986; Lee *et al*., 1992)	No (Cassis *et al*., 1992; DAWA, 2003)	Yes
Anomala octiescostata Burmeister [Coleoptera: Scarabaeidae]	Chafer	Japan (JSAE, 1987)	No (Cassis and Gross, 2002; Cassis, 2002)	Yes
Anomala puncticollis Harold [Coleoptera: Scarabaeidae]	Chafer	Japan (JSAE, 1987)	No (Cassis and Gross, 2002; Cassis, 2002)	Yes
Anomala rufocuprea (Motschulsky) [Coleoptera: Scarabaeidae]	Soyabean beetle	Korea (Cho *et al*., 1989)	No (Cassis *et al*., 1992; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Apate monachus (Fabricius) Syn = *Apate monacha* Fabricius; *Apate carmelita* Fabricius; *Apate francisca* Fabricius; *Apate gibba* Fabricius; *Apate mendica* Olivier; *Apate monachus* var. *rufiventris* Lucas; *Apate semicostata* Thomson; *Apate senii* Stefani. [Coleoptera: Bostrichidae]	Date palm bostrichid, Black borer, Twig borer	Israel (PPIS, 2002), USA – intercepted in Florida (CAB International, 2002)	No (CSIRO, 2002; DAWA, 2003)	Yes
Aphis gossypii Glover Syn = *Cerosipha gossypii* Glover; *Doralina frangulae* Kaltenbach; *Doralina gossypii* Glover; *Doralis frangulae* Kaltenbach; *Doralis gossypii* Glover; *Toxoptera leonuri* Takahashi; *Aphis bauhiniae* Theobald; *Aphis circezandis* Fitch. *Aphis citri* Ashmead of Essig; *Aphis citrulli* Ashmead. [Hemiptera: Aphididae]	Betelvine aphid, Cotton aphid, Cucurbits aphid, Green aphis, Melon aphid	Israel (PPIS, 2002), USA – California, Arizona and Texas, New Zealand (CAB International, 2002)	Yes (Naumann, 1993; CSIRO, 2002). Present in WA (DAWA, 2003)	No

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Aphis spiraecola Patch Syn = *Anuraphis erratica* del Guercio, *Aphis bidentis* Theobald, *Aphis citricola* van der Goot, *Aphis croomiae* Shinji, *Aphis deutziae* Shinji, *Aphis malvoides* van der Goot, *Aphis mitsubae* Shinji, *Aphis nigricauda* van der Goot, *Aphis pseudopomi* Blanchard, *Aphis virburnicolens* Swain, [Hemiptera: Aphididae]	Green citrus aphid, Spiraea aphid	Japan (CAB International, 2002), Korea (Cho *et al*., 1997), Israel (PPIS, 2002), USA (including California, Arizona and Texas), New Zealand (CAB International, 2002)	Yes (Naumann, 1993; CSIRO, 2002). Present in WA (DAWA, 2003)	No
Aphrophora rugosa Matsumura [Hemiptera: Aphrophoridae]	Froghopper	Japan (JSAE, 1987)	No (Fletcher and Larivière, 2001 and updates)	Yes
Apriona japonica Thomson [Coleoptera: Cerambycidae]	Mulberry borer	Japan (JSAE , 1987)	No (McKeown, 1947)	Yes
Archips audax Razowski [Lepidoptera: Tortricidae]		Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes
Archips fuscocupreanus Walsingham Syn = *Cacoecia fuscocupreana* Walsingham; *Ptycholoma fuscocupreana* Walsingham. [Lepidoptera: Tortricidae]	Apple tortrix	Japan (JSAE, 1987), Korea (Zhang, 1994; NPQS, 1995), USA (Maier and Mastro 1998)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Archips ingentanus Christoph Syn=*Archippus ingentanus* Christoph). [Lepidoptera: Tortricidae]	Larger apple tortrix	Japan (JSAE, 1987), Korea (KSPP, 1986; Zhang, 1994)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Artena dotata Fabricius [Lepidoptera: Noctuidae]	Noctuid	Japan (Watanabe, 1984), Korea (Yoon and Lee, 1974; Zhang, 1994; KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Ascotis selenaria (Denis and Schiffermüller) Syn =*Boarmia selenaria* Schiffermuller [Lepidoptera: Geometridae]	Geometrid moth	Israel (PPIS, 2002)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Aspidiotus destructor Signoret [Hemiptera: Diaspididae]	Coconut scale	Korea (KSPP, 1986), USA (USDA, 1997)	Yes (CSIRO, 2002), Not in WA (DAWA, 2003)	Yes (For WA only)
Bambalina sp. [Lepidoptera: Psychidae]	Mulberry bagworm	Japan (JSAE, 1987)	Uncertain Uncertain in WA	Yes
Basilepta fulvipes (Motschulsky) [Coleoptera: Chrysomelidae]	Golden-green minute leaf beetle	Japan (JSAE, 1987), Korea (AQIS, 1999)	No (CSIRO, 2002; DAWA, 2003)	Yes.

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Bemisia argentifolii Bellows and Perring Syn = *Bemisia tabaci* biotype B. [Hemiptera: Aleyrodidae]	Tobacco whitefly, cotton whitefly, silverleaf whitefly, Poinsettia whitefly	Japan (Ota and Ozawa, 1997), Israel (PPIS, 2002), Korea, USA (including California, Texas and Arizona), New Zealand (CAB International, 2002)	Yes (Carver and Reid, 1996; Martin, 1999) Under official control, Restricted distribution in WA (Poole *et al*., 2003; DAWA, 2003)	Yes
Blenina senex (Butler) [Lepidoptera: Noctuidae]	Bark-like moth	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003).	Yes
Blitopertha orientalis (Waterhouse) Syn = Anomala orientalis (Waterhouse) [Coleoptera: Scarabaeidae: Rutelinae]	Oriental beetle	Japan, Korea (JSAE, 1987; CAB International and EPPO, 1997)	No (Cassis and Gross, 2002; Cassis, 2002)	Yes
Bothrogonia japonica Ishihara [Hemiptera: Cicadellidae]	Black-tipped leafhopper	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (Day and Fletcher, 1994; DAWA, 2003)	Yes
Cagosima sanguinolenta Thomson [Coleoptera: Cerambycidae]	Alder longicorn beetle	Japan (JSAE , 1987)	No (McKeown, 1947)	Yes
Calguia defiguralis Walker [Lepidoptera: Pyralidae]		Japan (JSAE, 1987; Zhang, 1994)	Yes (Nielsen *et al*., 1996) Not in WA (DAWA, 2004)	Yes (For WA only)

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Caligula japonica Moore Syn =*Dictyoploca japonica* (Moore) [Lepidoptera: Saturniidae]	Wild silk moth, camphor silk moth, Japanese giant silk moth	Japan (Zhang, 1994), Korea (KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Caliroa cerasi (Linnaeus) [Hymenoptera: Tenthredinidae]	Pear sawfly; pear and cherry slug	Japan (JSAE, 1987)	Yes (APPD, 2004; AICN, 2004) Present in WA (AICN, 2004)	No
Canephora asiatica Staudinger [Lepidoptera: Psychidae]	Mulberry bagworm	Japan (Kitagawa and Glucina, 1984; Zhang, 1994)	No (Nielsen *et al*., 1996)	Yes
Ceratitis capitata (Wiedemann) [Diptera: Tephritidae]	Mediterranean fruit fly, Medfly	Israel (PPIS, 2002), USA - including California (CAB International, 2002)	Yes. Present in WA (De Lima *et al*., 1993; DAWA, 2003) and under official control (De Lima *et al*., 1993)	Yes (For WA only)
Ceroplastes ceriferus (Fabricius) [Hemiptera: Coccidae]	Indian white wax scale	Japan, USA – including Texas (CAB International, 2002)	Yes (CAB International, 2002; USDA, 2003). Present in WA (DAWA, 2003).	No
Ceroplastes floridensis Comstock [Hemiptera: Coccidae]	Florida wax scale	Japan, Korea, USA (including Texas), New Zealand (CAB International, 2002), Israel (PPIS, 2002)	Yes (Naumann, 1993). Not in WA (DAWA, 2003)	Yes (For WA only)

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Ceroplastes japonicus Green [Hemiptera: Coccidae]	Japanese wax scale	Japan (CAB International, 2002), Korea (Park *et al*., 1992; KSPP, 1986)	No (CAB International, 2002; Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Ceroplastes pseudoceriferus Green [Hemiptera: Coccidae]	Wax scale	Japan (Kamei and Asano, 1976), Korea (NPQS, 1993; APPC, 1987; KSPP, 1986)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Ceroplastes rubens Maskell [Hemiptera: Coccidae]	Pink wax scale	Japan (JSAE, 1987), Korea (KSPP, 1986), USA – Hawaii and Florida (USDA, 1997)	Yes (CSIRO, 2002; CAB International, 2002). Present in WA (DAWA, 2003)	No
Chalioides kondonis Kondo [Lepidoptera: Psychidae]		Japan (JSAE, 1987; Zhang, 1994)	No (Nielsen *et al*., 1996)	Yes
Chlorophorus japonicus (Chevrolat) [Coleoptera: Cerambycidae]	Spined-winged tiger longicorn beetle	Japan (JSAE , 1987)	No (McKeown, 1947)	Yes
Chrysobothris succedanea Saunders [Coleoptera: Buprestidae]	Metallic wood borer	Japan, Korea (JSAE, 1987)	No (Bellamy, 2002)	Yes
Chrysochroa fulgidissima (Schonherr) [Coleoptera: Buprestidae]	Two-striped green buprestid, Jewel beetle	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (CSIRO, 2002; DAWA, 2003)	Yes
Chrysomela populi Linnaeus Syn=*Melasoma populi* [Coleoptera: Chrysomelidae]	Poplar leaf beetle	Japan (Matsuda and Sugawara, 1980), Korea (KSPP, 1986)	No (CAB International, 2002; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Chrysomphalus bifasciculatus Ferris [Hemiptera: Diaspididae]	Diaspid scale	Japan (JSAE, 1987)	No (Donaldson and Tsang, 2002)	Yes
Cicadella viridis (Linnaeus) [Hemiptera: Cicadellidae]	Green leafhopper	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (CSIRO, 2002; DAWA, 2003)	Yes
Cletus punctiger (Dallas) [Hemiptera: Coreidae]		Japan, Korea (JSAE, 1987; Josifov and Kerzhner, 1978)	No (Cassis and Gross, 2002)	Yes
Coccura suwakoensis (Kuwana and Toyoda) [Hemiptera: Coccidae]	Quince cottony scale	Japan (JSAE, 1987), Korea (Ben-Dov *et al*., 2002)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Coccus hesperidum Linnaeus [Hemiptera: Coccidae]	Common shield scale, Soft brown scale	Japan, Korea, USA (including California, Texas and Arizona), New Zealand (CAB International, 2002), Israel (PPIS, 2002)	Yes (Naumann, 1993; CSIRO, 2002). Present in WA (DAWA, 2003)	No
Colomerus vitis (Pagenstecher) [Acarina: Eriophyidae]	Grape erineum mite	Israel (CAB International, 2003)	Yes (Hely *et al.*, 1982) Present in WA (Anonymous, 1988)	No
Comstockaspis perniciosa (Comstock) [Hemiptera: Diaspididae]	San Jose Scale	Japan (JSAE, 1987)	Yes (Hely *et al.*, 1982) Present in WA (Sutton *et al.*, 2003)	No

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Conogethes punctiferalis (Guenée) Syn = *Dichocrosis punctiferalis* (Guenée) [Lepidoptera: Pyralidae]	Yellow peach moth	Japan (MAFF, 1985), Korea, (KSPP, 1986)	Yes (CSIRO, 2002; Nielsen *et al*., 1996; CAB International, 2002). Recorded in WA (ICDb, 2003; DAWA, 2003) NT, QLD, NSW, VIC, SA (CSIRO, 2002; CAB International, 2002)	No
Cossus jezoensis Matsumura [Lepidoptera: Cossidae]	Oriental carpenter moth	Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes
Crisicoccus azaleae (Tinsley) [Hemiptera: Pseudococcidae]		Japan (JSAE, 1987; Kawai, 1980)	No (Williams, 1985)	Yes
Crisicoccus matsumotoi (Shiraiwa) [Hemiptera: Pseudococcidae]	Matsumoto mealybug	Japan, South Korea (JSAE , 1987; Ben-Dov, 1994)	No (Williams, 1985)	Yes
Cryptoblabes gnidiella (Millière) [Lepidoptera: Pyralidae]	Pyralid moth, honeydew	Israel (PPIS, 2002), USA, New Zealand (CAB International, 2002)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Cryptothelea formosicola (Strand) Syn = *Clania formosicola* (Strand) [Lepidoptera: Psychidae]	Giant bagworm	Japan (Kitagawa and Glucina, 1984)	No (Nielsen *et al*., 1996)	Yes
Cuphodes diospyrosella Issiki [Lepidoptera: Gracillariidae]	Persimmon leafminer	Japan (Kitagawa and Glucina, 1984)	No (Nielsen *et al*., 1996)	Yes
Cyrtoclytus caproides Bates Syn = *Cyrtoclytus capra* (Germar) [Coleoptera: Cerambycidae]	Long horn beetle	Korea (KSPP, 1986)	No (CSIRO, 2002; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Dendrothrips minowai Priesner [Thysanoptera: Thripidae]		Japan (JSAE, 1987)	No (Mound, 2001)	Yes
Dialeurodes citri (Ashmead) [Hemiptera: Aleyrodidae]	Citrus whitefly	Israel, Japan, Korea (CAB International, 2003)	No (Martin, 1999)	Yes
Drosicha corpulenta (Kuwana) [Hemiptera: Margaroididae]	Giant mealybug	Japan (Hashimoto and Ueda, 1985), Korea (KSPP, 1986)	No (CSIRO, 2002; DAWA, 2003)	Yes.
Dysmicoccus wistariae (Green) [Hemiptera: Pseudococcidae]	Pear mealybug	Japan, Korea (JSAE, 1987; Ben-Dov, 1994)	No (Williams, 1985)	Yes
Ectinus sericeus Candeze [Coleoptera: Elateridae]	Wheat wireworm	Japan (Kishii, 1983), Korea (KSPP, 1986)	No (Calder, 1998; DAWA, 2003)	Yes.
Edwardsiana flavescens (Fabricius) [Hemiptera: Cicadellidae]	Small green leafhopper	Japan (JSAE, 1987)	No (Fletcher and Larivière, 2001and updates)	Yes
Empoasca vitis (Göthe) [Hemiptera : Cicadellidae]	Small green leafhopper	Japan, Israel (CAB International, 2002), Korea (KSPP, 1986)	No (CAB International, 2002; DAWA, 2003)	Yes
Endoclita excrescens (Butler) [Lepidoptera: Hepialidae]	Japanese swift moth	Japan (JSAE, 1987), Korea (KSPP, 1986; Zhang, 1994)	No (Nielsen *et al*., 1996; CSIRO, 2002; DAWA, 2003)	Yes
Endoclyta sinensis (Moore) [Lepidoptera: Hepialidae]	Grape tree-borer	Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Eoscarta assimilis (Uhler) Syns = *Eoscartopsis assimilis* (Uhler); *Paracercopis assimilis* (Uhler) [Hemiptera: Cercopidae]	Spittlebug	Japan, Korea (Kitagawa and Glucina, 1984; Kwon and Lee, 1978; JSAE, 1987)	No (Fletcher and Larivière, 2001and updates)	Yes
Eotetranychus sexmaculatus (Riley) [Acarina: Tetranychidae]	Six-spotted mite	Japan, Korea (JSAE, 1987; Bolland *et al.*, 1998)	Yes (AICN, 2004) Not in WA (AICN, 2004)	Yes (For WA only)
Eriococcus lagerstroemiae Kuwana [Homoptera: Eriococcidae]	Crapemyrtle scale	Japan (Ben-Dov *et al*., 2002), Korea (NPQS, 1993; Kwon *et al.*, 1995; KSPP, 1986).	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Eudocima fullonia (Clerck) Syn = *Noctua dioscoreae* Fabricius; *Ophideres fullonica* Linnaeus; *Ophideres obliteraus* Walker; *Othreis fullonia* Clerck; *Othreis fullonica* Linnaeus; *Othreis pomona* Hübner; *Phalaena (Attacus) fullonica* Linnaeus; *Phalaena (Noctua) phalonia* Linnaeus; *Phalaena pomona* Cramer; *Ophideres fullonia* Clerck. [Lepidoptera: Noctuidae]	Fruit piercing moth, Orange piercing moth	Japan, Korea, USA (CAB International, 2002)	Yes Recorded in NT, NSW, QLD (CAB International, 2002) and WA (ICDb, 2003; DAWA, 2003)	No

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Eumeta japonica (Heylaerts) [Lepidoptera: Psychidae]	Giant bagworm	Japan (JSAE, 1987; Zhang, 1994)	No (Nielsen *et al*., 1996)	Yes
Eumeta minuscula (Butler) Syn=*Clania minuscula* (Butler) [Lepidoptera: Pyschidae]	Tea bagworm	Korea (KSPP, 1986; Zhang, 1994)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Euproctis pseudoconspersa (Strand) Syn = *Euproctis conspersa* Butler [Lepidoptera: Lymantriidae]	Tea tussock moth	Japan (JSAE, 1987; Zhang, 1994)	No (Nielsen *et al*., 1996)	Yes
Euproctis similis Fuessly [Lepidoptera: Lymantriidae]	Browntail moth	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Euproctis subflava (Bremer) [Lepidoptera: Lymantriidae]	Oriental tussock moth	Japan (Kawamoto, 1978), Korea (KSPP, 1986; NPQS, 1995)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Eutetranychus orientalis (Klein) [Acarina: Tetranychidae]	Oriental red spider mite	Japan (CAB International, 2002), Israel (PPIS, 2002)	Yes, in WA (DAWA, 2003) and QLD (CAB International, 2002)	No
Euwallacea validus (Eichhoff) Syn = *Xyleborus validus* Eichhoff [Coleoptera: Curculionidae, Scolytinae]	Bark beetle	Japan, Korea (JSAE, 1987; Wood and Bright , 1992)	No (Wood and Bright, 1992)	Yes
Euzophera batangensis Caradja [Lepidoptera: Pyralidae]	Persimmon bark borer	Japan (Kitagawa and Glucina, 1984), Korea (Choi et al., 1998)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Euzopherodes vapidella Mann Syn = *Ephestia vapidella* [Lepidoptera: Pyralidae]	Citrus stub moth	Israel (PPIS, 2002)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Eysarcoris ventralis (Westwood) Syn = *Eysarcoris inconspicuous (H. Sch.)* [Hemiptera: Pentatomidae]	White spotted bug	Japan, Korea (JSAE, 1987; CAB International, 2003)	No (Cassis and Gross, 2002)	Yes
Frankliniella intonsa (Trybom) [Thysanoptera: Thripidae]	Flower thrips	Israel, Japan, Korea (JSAE, 1987; CAB International, 2003)	No (Mound, 2001)	Yes
Frankliniella occidentalis (Pergande) Syn = *F. californica* (Moulton) [Thysanoptera: Thripidae]	Western flower thrips	Japan, Korea, USA (including California, Arizona and Texas), New Zealand (CAB International, 2002), Israel (PPIS, 2002; CAB International, 2002)	Yes (AFD, 2001) Under offical control in Tasmania.	Yes
Gametis jucunda Faldermann [Coleoptera: Scarabaeidae]	Scarab beetle	Japan, Korea, Taiwan (Lee *et al.*, 2002)	No (Cassis and Gross, 2002)	Yes
Gastropacha orientalis Sheljuzhko [Lepidoptera: Lasiocampidae]	Oriental lappet	Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes
Geisha distinctissima (Walker) [Hemiptera: Flatidae]	Green broad-winged planthopper	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (CSIRO, 2002; DAWA, 2003)	Yes
Glaucias subpunctatus (Walker) [Hemiptera: Pentatomidae]	Stink bug	Japan (Kitagawa and Glucina, 1984; JSAE, 1987)	No (Cassis and Gross, 2002)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Grapholita molesta (Busck) Syn = *Cydia molesta* (Busck) [Lepidoptera: Tortricidae]	Oriental fruit moth	Japan (JSAE, 1987), Korea (KSPP, 1986), USA (USDA, 1997), New Zealand (CAB International, 2002)	Yes, under official control (CSIRO, 2002) Not in WA (DAWA, 2003)	Yes (For WA only)
Graptopsaltria nigrofuscata (Motschulsky) [Hemiptera: Cicadidae]	Large brown cicada	Japan (Shiozawa and Tsuchizaki, 1992), Korea (KSPP, 1986)	No (CSIRO, 2002; DAWA, 2003)	Yes
Gymnoscelis rufifasciata (Haworth) [Lepidoptera: Geometridae]	Geometrid moth	Israel (PPIS, 2002)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Halyomorpha halys Stål Syn = *Halyomorpha mista* (Uhler); *Halyomorpha brevis ; Halyomorpha picus* [Hemiptera: Pentatomidae]	Brown marmorated stink bug	Japan, Korea (JSAE, 1987; Son *et al.*, 2000)	No (Cassis and Gross, 2002; DAWA, 2003)	Yes
Haplothrips chinensis Priesner [Thysanoptera: Phlaeothripidae]	Thrips	Japan (JSAE, 1987), Korea (Woo, 1988)	No (Mound, 1996; DAWA, 2003)	Yes
Heliothrips haemorrhoidalis (Bouche) [Thysanoptera: Thripidae]	Greenhouse thrips	Japan (JSAE, 1987), Israel (PPIS, 2002), USA (including California and Texas) (CAB International, 2002), New Zealand (NZ MAF, 2003)	Yes (AFD, 2001; Mound, 1996) Present in WA (DAWA, 2003)	No

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Hemiberlesia lataniae (Signoret) Syn = *Diaspidiotus lataniae* [Hemiptera: Diaspididae]	Latania scale	Japan, USA – Including California (CAB International, 2002), Israel (PPIS, 2002), New Zealand (NZ MAF, 2003)	Yes Recorded in QLD (CAB International, 2002) and WA (ICDb, 2003; DAWA, 2003)	No
Holochlora japonica Brunner von Wattenwyl [Orthoptera: Tettigoniidae]	Japanese broad-winged katydid; Fruit-tree katydid	Korea (KSPP, 1986)	No (CSIRO, 2002; DAWA, 2003)	Yes
Holotrichia morose Walker [Coleoptera: Scarabaeidae]	Scarab beetle	Korea (Lee *et al.*, 2002)	No (Cassis and Gross, 2002; Cassis, 2002)	Yes
Homalogonia obtusa (Walker) [Hemiptera: Pentatomidae]		Japan (JSAE, 1987)	No (Cassis and Gross, 2002)	Yes
Homoeocerus dilatus Horváth [Hemiptera: Coreidae]	Squash bug	Japan (JSAE, 1987)	No (Cassis and Gross, 2002)	Yes
Homoeocerus unipunctatus (Thunberg) [Hemiptera: Coreidae]	Squash bug	Japan (JSAE, 1987)	No (Cassis and Gross, 2002)	Yes
Homona magnanima Diakonoff [Lepidoptera: Tortricidae]	Oriental tea tortrix	Japan (MAFF, 1985)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Hoshinoa longicellana Walsingham Syn = *Archips longicellana* Walsingham [Lepidoptera: Tortricidae]	Common apple leafroller	Japan (JSAE, 1987), Korea (Kim et al., 1997)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Howardia biclavis (Comstock) [Hemiptera: Diaspididae]	Mining scale	Japan (JSAE, 1987)	Yes (Donaldson and Tsang, 2002; AICN, 2004) Not in WA (Donaldson and Tsang, 2002)	Yes (For WA only)
Hyphantria cunea (Drury) [Lepidoptera: Arctiidae]	Fall webworm, Mulberry moth	Japan (JSAE, 1987), Korea (KSPP, 1986), USA – including California and Texas (CAB International, 2002)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Hypocala deflorata (Fabricius) Syn = *Hypocala moorei* Butler [Lepidoptera: Noctuidae]	Noctuid moth	Japan (JSAE, 1987)	Yes (Nielsen *et al*., 1996) Not in WA (DAWA, 2004)	Yes (For WA only)
Hypocala subsatura Guenée [Lepidoptera: Noctuidae]	Noctuid moth	Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes
Hypothenemus amakusanus (Murayama) [Coleoptera: Curculionidae, Scolytinae]		Japan, Korea (JSAE, 1987; Choo *et al*., 1983; Wood and Bright, 1992)	No (Wood and Bright, 1992)	Yes
Hypothenemus eruditus Westwood [Coleoptera: Scolytidae]	Bark beetle	Korea (KSPP, 1986; Choo et al., 1983), USA (USDA, 1997)	No (CSIRO, 2002; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Icerya purchasi Maskell [Hemiptera: Mararodidae]	Cottony cushion scale	Japan, Israel, New Zealand (CAB International, 2002), Korea (KSPP, 1986; CAB International, 2002), USA (USDA, 1997)	Yes (CSIRO, 2002; CAB International, 2002) Prresent in WA (DAWA, 2003)	No
Lagoptera juno (Dalman) [Lepidoptera : Noctuidae]	Rose of sharon leaf-like moth, Fruit-piercing moth	Japan (unconfirmed record) (CAB International, 2002), Korea (Lee *et al*., 1970; AQIS, 1999)	No (CSIRO, 2002; DAWA, 2003)	Yes
Lelia decempunctata (Motschulsky) [Hemiptera: Pentatomidae]		Japan (JSAE, 1987)	No (Cassis and Gross, 2002)	Yes
Lemyra imparilis (Butler) Syns = *Diacrisia imparilis* Butler; *Spilarctia imparilis* Butler; *Spilosoma imparilis* Butler; *Thanatarctia imparilis* Butler [Lepidoptera: Arctiidae]	Mulberry tiger moth	Japan (JSAE, 1987; Zhang, 1994)	No (Nielsen *et al*., 1996)	Yes
Lepidosaphes conchiformis (Gmelin) [Hemiptera: Diaspididae]	Pear oystershell scale	Japan (JSAE, 1987), Korea (KSPP, 1986), USA (USDA, 1997)	Yes (CSIRO, 2002) Not in WA (DAWA, 2003)	Yes (For WA only)

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Lepidosaphes cupressi Borchsenius Syns = *Lepidosaphes foliicola* Borchsenius; *Cornuaspis cupressi* Borchsenius. [Homoptera: Diaspididae]		Japan (Ben-Dov *et al*., 2002)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Lepidosaphes tubulorum Ferris [Hemiptera: Diaspididae]	Dark oystershell scale	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (CSIRO, 2002; DAWA, 2003)	Yes
Leptocorisa chinensis (Dallas) [Hemiptera: Alydidae]	Rice bug	Japan (JSAE, 1987)	No (Cassis and Gross, 2002)	Yes
Lixus ornatus Reiche [Coleoptera: Curculionidae]	Weevil	Israel (PPIS, 2002)	No (CSIRO, 2002; DAWA, 2003)	Yes
Lobesia botrana Denis and Schiffermüller Syn = *Polychrosis botrana* Schiff. [Lepidoptera: Tortricidae]	European/Mediterranean grape berry/vine moth	Japan (CAB International, 2002), Israel (PPIS, 2002)	No (all Australian material misidentified as *L. botrana*) (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Lopholeucaspis japonica (Cockerell) [Hemiptera: Diaspididae]	Japanese baton-shaped scale	Korea, Japan (CAB International, 2002; NPQS, 1995; KSPP, 1986), USA (not in California, Texas and Arizona) (USDA, 1997)	Yes (Donaldson and Tsang, 2002) Not in WA (Donaldson and Tsang, 2002)	Yes (For WA only)

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Lygocoris spinolai (Meyer-Dür) Syn = *Apolygus spinolai* (Meyer-Dür) [Hemiptera: Miridae]		Japan (JSAE,1987)	No (Cassis and Gross, 1995)	Yes
Lymantria dispar japonica Motschulsky [Lepidoptera: Lymantriidae]	Gypsy moth	Japan (JSAE, 1987), Korea (NPQS, 1995; Zhang, 1994; KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes *Lymantria dispar* is in a WA list of pests that are not in WA
Lymantria mathura Moore [Lepidoptera: Lymantriidae]	Pink gypsy moth, oak tussock moth	Japan (Zlotina *et al*., 1998), Korea (NPQS, 1995; Zhang, 1994)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes.
Machaerotypus sibiricus (Lethierry) [Hemiptera: Membracidae]	Brown treehopper	Japan (JSAE, 1987)	No (Fletcher and Larivière, 2001and updates)	Yes
Maconellicoccus hirsutus [Hemiptera: Pseudococcidae]	Pink hibiscus mealybug	Japan, USA – including California (CAB International, 2002)	Yes In NT, QLD, SA (CAB International, 2002) Present in WA (DAWA, 2003)	No
Maladera castanea (Arrow) [Coleoptera: Scarabaeidae]	Asiatic garden beetle	Japan (JSAE, 1987), Korea (KSPP, 1986), USA (USDA, 1997)	No (Cassis *et al*., 1992; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Maladera matrida Argaman [Coleoptera: Scarabaeidae]	Khomeini beetle	Israel (PPIS, 2002)	No (Cassis *et al*., 1992; DAWA, 2003)	Yes
Maladera orientalis Motschulsky [Coleoptera: Scaraaeidae]	Smaller velvety chafer	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (Cassis *et al*., 1992; DAWA, 2003)	Yes
Mamestra brassicae (Linnaeus) [Lepidoptera: Noctuidae]	CAB Internationalbage armyworm	Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes
Megacopta punctatissimum (Montandon) [Hemiptera: Plataspidae]		Japan (JSAE, 1987)	No (Cassis and Gross, 2002)	Yes
Megalurothrips distalis (Karny) [Thysanoptera: Thripidae]		Japan, Korea (JSAE, 1987; CAB International, 2003)	No (Mound, 2001)	Yes
Melanotus legatus Candeze [Coleoptera: Elateridae]	Pectinate-horned click beetle	Japan (Unconfirmed record – CAB International, 2002), Korea (KSPP, 1986)	No (Calder, 1998; DAWA, 2003)	Yes
Melolontha frater Arrow [Coleoptera: Scarabaeidae]	Larger frosted chafer	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (Cassis *et al*., 1992; DAWA, 2003)	Yes
Melolontha japonica Burmeister [Coleoptera: Scarabaeidae]	Japanese cockchafer	Japan (JSAE, 1987)	No (Cassis, 2002)	Yes
Menida violacea Motschulsky [Hemiptera: Pentatomidae]		Japan (JSAE, 1987)	No (Cassis and Gross, 2002)	Yes
Menophra senilis (Butler) [Lepidoptera: Geometridae]		Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Microleon longipalpis Butlerlong [Lepidoptera: Limacodidae]	Palpi cochlid	Japan (JSAE, 1987), Korea (KSPP, 1986; Zhang, 1994)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Milviscutulus mangiferae (Green) Syn = *Protopulvinaria mangiferae*, *Coccus mangiferae* [Hemiptera: Coccidae]	Mango shield scale, Mango scale	Israel (PPIS, 2002)	No (Brown, 1989; DAWA, 2003)	Yes
Mimadoretus mutans (Newman) Syn = *Popillia mutans* Newman [Coleoptera: Scarabaeidae]	Scarab beetle	Japan, Korea (Lee *et al.*, 2002; Jianqing *et al.*, 2000)	No (Cassis, 2002)	Yes
Mimela splendens (Gyllenhal) [Coleoptera: Scarabaeidae]	Scarab beetle	Japan (JSAE, 1987), Korea (Kim, 1996)	No (Cassis *et al*., 1992; DAWA, 2003)	Yes
Monema flavescens Walker [Lepidoptera: Limicodidae]	Oriental moth	Japan (Togashi and Ishikawa, 1996), Korea (NPQS, 1993; NPQS, 1995; KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Myzus persicae (Sulzer) [Hemiptera: Aphididae]	Green peach aphid	Japan (JSAE, 1987), Korea (KSPP, 1986), Israel, New Zealand (CAB International, 2002), USA (USDA, 1997)	Yes (CSIRO, 2002) Present in WA (DAWA, 2003)	No
Narosoideus flavidorsalis (Staudinger) [Lepidoptera: Limacodidae]	Pear stinging caterpillar	Korea (KSPP, 1986; Zhang, 1994)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Neocoenorrhinus interruptus (Voss) Syn = *Rhodocyrtus interruptus* (Voss) [Coleoptera: Rhynchitidae]	Weevil	Japan (JSAE, 1987)	No (Zimmerman, 1994)	Yes
Nezara antennata Scott [Hemiptera: Pentatomidae]	Green stink bug	Japan (JSAE, 1987), Korea (Jang and Choe, 1992)	No (CSIRO, 2002; DAWA, 2003)	Yes
Nymphalis xanthomela Denis and Schiffermüller [Lepidoptera: Nymphalidae]	Willow nymphalid	Korea (KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Odites leucostola (Meyrick) [Lepidoptera: Lecithoceridae]	Lecithocerid moth	Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes
Odites lividula Meyrick [Lepidoptera: Lecithoceridae]	Lecithocerid moth	Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes
Oraesia emarginata (Fabricius) Syns = *Calpe emarginata* (Fabricius); *Calyptra emarginata* (Fabricius); *Noctua emaraginata* Fabricius [Lepidoptera: Noctuidae]	Small oraesia, Fruit-piercing moth	Japan, Korea (Kitagawa and Glucina, 1984; JSAE, 1987; Zhang, 1994)	Yes (Nielsen *et al*., 1996) Not in WA (DAWA, 2004)	Yes (For WA only)
Oraesia excavata (Butler) Syns = *Calpe excavata* Butler; *Calyptra excavata* Butler [Lepidoptera: Noctuidae]	Reddish oraesia, Fruit-piercing moth	Japan, Korea (Kitagawa and Glucina, 1984; JSAE, 1987; Zhang, 1994)	No (Nielsen *et al*., 1996)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Orgyia thyellina Butler [Lepidoptera: Lymantriidae]	Japanese tussock moth	Japan (JSAE, 1987), Korea (NPQS, 1995; Zhang, 1994)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Orosanga japonicus (Melichar) [Hemiptera: Ricaniidae]	Ricaniid	Japan (JSAE, 1987)	No (Fletcher and Larivière, 2001and updates)	Yes
Pachazia fuscata albomaculata (Uhler) [Hemiptera: Ricaniidae]		Japan (JSAE, 1987)	No (Fletcher and Larivière, 2001and updates)	Yes
Pagaronia guttigera (Uhler) [Hemiptera: Cicadellidae]	Yellow mulberry leafhopper	Japan (JSAE, 1987)	No (Fletcher and Larivière, 2001and updates)	Yes
Pandemis heparana (Denis and Schiffermüller) [Lepidoptera: Tortricidae]	Fruit-tree tortrix	Japan (JSAE, 1987), Korea (NPQS, 1995; Zhang, 1994)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Panonychus citri (McGregor) [Acarina: Tetranychidae]	Citrus red mite	Israel, Japan, Korea (JSAE, 1987; CAB International, 2003)	Yes (AICN, 2004) Not in WA (AICN, 2004)	Yes (For WA only)
Panonychus ulmi (Koch) [Acarina: Tetranychidae]	European red mite	Japan, Israel, New Zealand (CAB International, 2002), Korea (KSPP, 1986; CAB International, 2002), USA (USDA, 1997)	Yes under official control in WA (Halliday, 1998)	Yes (For WA only)

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Pantomorus cervinus (Boheman) [Coleoptera: Curculionidae]	Fuller's rose beetle	Japan, USA (including California, Arizona and Texas), New Zealand (CAB International, 2002)	Yes (CAB International, 2002) Present in WA (DAWA, 2003)	No
Parabemisia myricae (Kuwana) [Hemiptera: Aleyrodidae]	Japanese bayberry whitefly	Japan, USA – including California (CAB International, 2002), Israel (PPIS, 2002)	Yes (DPI, 2001) Not in WA (DAWA, 2003)	Yes (For WA only)
Parasa consocia Walker Syn =*Latoia consocia* (Walker) [Lepidoptera: Limacodidae]	Green cochlid	Japan (JSAE, 1987), Korea (Zhang, 1994; KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Parasa sinica Moore Syn =*Latoia sinica* (Moore) [Lepidoptera: Limacodidae]	Chinese green cochlid	Japan (Togashi and Ishikawa, 1996), Korea (Zhang, 1994; CAB International, 2002)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Parlatoria pergandii Comstock [Hemiptera: Diasididae]	Black parlatoria scale	Japan (JSAE, 1987), Korea (KSPP, 1986), Israel (CAB International, 2002), USA -including California and Texas) (USDA, 1997)	Yes (CSIRO, 2002) Not in WA (DAWA, 2003)	Yes (For WA only)

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Parthenolecanium corni (Bouché) Syn = *Lecanium corni* Bouché) [Hemiptera: Coccidae]	European fruit lecanium	Japan (CAB International, 2003), Korea (Ben-Dov *et al*., 2002), USA (including California and Texas), New Zealand (CAB International, 2002)	Yes (CAB International, 2002; CSIRO, 2002) Not in WA (DAWA, 2003)	Yes (For WA only)
Parthenolecanium persicae (Fabricius) [Hemiptera: Coccidae]	Grapevine scale	Japan, Korea (Ben-Dov *et al*., 2002), Israel (PPIS, 2002), New Zealand, (NZ MAF, 2003)	Yes (Naumann, 1993) Present in WA (DAWA, 2003)	No
Penthimia nitida Lethierry [Hemiptera: Cicadellidae]		Japan, Korea (JSAE, 1987; McKamey, 2004)	No (Fletcher and Larivière, 2001 and updates)	Yes
Percnia albinigrata Warren [Lepidoptera: Geometridae]	Looper	Korea (KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Percnia giraffata (Guenée) [Lepidoptera: Geometridae]	Spotted persimmon looper	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Phenacoccus aceris (Signoret) [Hemiptera: Pseudococcidae]	Apple mealybug	Korea (NPQS, 1993; NPQS, 1995; KSPP, 1986), USA (USDA, 1997)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Phenacoccus pergandei Cockerell [Hemiptera: Pseudococcidae]	Persimmon long wooly scale (in China)	Japan (Ueno, 1971), Korea (NPQS, 1995)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Phrixolepia sericea Butler [Lepidoptera: Limacodidae]	Tea cochlid	Japan, Korea (JSAE, 1987; NFIS, 2000)	No (Nielsen *et al*., 1996)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Piezodorus hybneri (Gmelin) [Hemiptera: Pentatomidae]	Redbanded shield bug	Japan (JSAE, 1987), Korea (Son *et al*., 2000)	Yes (CSIRO, 2002) Present in WA (DAWA, 2003)	No
Pinnaspis strachani (Cooley) [Hemiptera: Diaspididae]	Lesser snow scale	Korea - Restricted distribution, USA (CAB International, 2002)	No (CAB International, 2002) Present in WA (DAWA, 2003)	No
Planococcus citri (Risso) [Hemiptera: Pseudoccidae]	Citrus mealybug	Japan (JSAE, 1987), Korea (KSPP, 1986), Israel (PPIS, 2002), USA (USDA, 1997), New Zealand (CAB International, 2002)	Yes (Ben-Dov *et al*., 2002; CSIRO, 2002) Present in WA (DAWA, 2003)	No
Planococcus kraunhiae (Kuwana) [Hemiptera: Coccidae]	Japanese mealybug	Japan (MAFF, 1985), Korea (KSPP, 1986)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Platypleura kaempferi (Fabricius) [Hemiptera: Cicididae]	Kaempfer cicada	Japan (JSAE, 1987), Korea (AQIS, 1999)	No (CSIRO, 2002; DAWA, 2003)	Yes
Plautia stali Scott [Hemiptera: Pentatomidae]	Brown-winged stink bug	Japan (JSAE, 1987), Korea (KSPP, 1986; NPQS, 1995)	No (CSIRO, 2002; DAWA, 2003)	Yes
Pleuroptya chlorophanta Butler [Lepidoptera: Pyralidae]	Three striped pyralid?	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Polyphagotarsonemus latus (Banks) [Acarina: Tarsonemidae]	Broad mite, Potato broad mite	Japan, Korea, USA, New Zealand (CAB International, 2002), Israel (PPIS, 2002)	Yes (AFD, 2001; CAB International, 2002) Present in WA (DAWA, 2003)	No
Ponticulothrips diospyrosi Haga and Okajima [Thysanoptera: Phlaeothripidae]	Japanese gall forming thrips	Japan (Haga and Okajima, 1983; MAFF, 1987), Korea (Lee *et al*., 2002)	No (CSIRO, 2002; DAWA, 2003)	Yes
Popillia japonica Newman Syn = *Maladera japonica* (Motschulsky) [Coleoptera: Scarabaeidae]	Japanese beetle	Japan (JSAE, 1987), Korea (KSPP, 1986), USA (USDA, 1997)	No (Cassis *et al*., 1992; DAWA, 2003)	Yes
Protaetia brevitarsis Lewis [Coleoptera: Scarabaeidae]	Scarab beetle	Korea (Lee and Yoo 1999)	No (CSIRO, 2002; DAWA, 2003)	Yes
Pseudaonidia duplex (Cockerell) [Hemiptera: Diaspididae]	Camphor scale	Japan (MAFF, 1992), Korea (KSPP, 1986), USA (USDA, 1997)	No (CSIRO, 2002; DAWA, 2003)	Yes
Pseudaulacaspis cockerelli (Cooley) [Hemiptera: Diaspididae]	Diaspid scale	Japan (JSAE, 1987)	Yes (Donaldson and Tsang, 2002; AICN, 2004) Present in WA (Johnson and Parr, 1999)	No

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Pseudaulacaspis pentagona (Targioni-Tozzetti) [Hemiptera: Diaspididae]	Peach white scale	Japan (JSAE, 1987), Korea (KSPP, 1986), Israel, New Zealand (CAB International, 2002), USA - including California and Texas (USDA, 1997)	Yes (CSIRO, 2002; CAB International, 2002) Not in WA (DAWA, 2003)	Yes (For WA only)
Pseudocneorhinus obesus Roelofs [Coleoptera: Curculionidae]		Japan (JSAE, 1987)	No (Marshall, 1931)	Yes
Pseudococcus comstocki (Kuwana) [Hemiptera: Pseudococcidae]	Comstock mealybug	Japan (MAFF, 1985), Korea (KSPP, 1986; Ben-Dov *et al*., 2002), USA (USDA, 1997)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Pseudococcus cryptus Hempel [Hemiptera: Pseudococcidae]	Citriculus mealybug, Cryptic mealybug	Japan (Ben-Dov, 1994), Israel (PPIS, 2002)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Pseudococcus longispinus (Targioni Tozzetti) Syn = *Pseudococcus adonidum* [Hemiptera: Pseudococcidae]	Long tailed mealy bug	Japan, USA – including California and Texas (CAB International, 2002), Israel (PPIS, 2002), New Zealand (NZ MAF, 2003)	Yes (CAB International, 2002) Present in WA (DAWA, 2003)	No
Pseudococcus viburni (Signoret,) Syn = *Pseudococcus affinis* Maskell [Hemiptera: Pseudococcidae]	Obscure mealybug	Israel (PPIS, 2002), Korea (Ben-Dov *et al*., 2002), New Zealand (NZ MAF, 2003)	Yes (Williams, 1985) Present in WA (DAWA, 2003)	No
Psyche niphonica (Hori) Syn = *Fumea niphonica* Hori [Lepidoptera: Psychidae]	Persimmon bagworm	Japan (JSAE, 1987; Zhang, 1994)	No (Nielsen *et al*., 1996)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Ptycholoma lecheana circumclusana (Christoph) [Lepidoptera: Tortricidae]	Persimmon leafroller	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Pulvinaria aurantii Cockerell Syns = *Lecanium notatum* Maskell; *Coccus notatus* Fernald; *Chloropulvinaria aurantii* Borchsenius; *Pulvinaria notatum* Takahashi; *Pulvinaria aurantii* Ben-Dov. [Homoptera: Coccidae]	Citrus cottony scale	Japan (Ben-Dov *et al*., 2002)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Pulvinaria citricola Kuwana Syns = *Pulvinaria nipponica* Lindinger; *Eupulvinaria citricola* Borchsenius; [Homoptera: Coccidae]	Cottony citrus scale	Japan (Ben-Dov *et al*., 2002)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Pulvinaria idesiae Kuwana Syns = *Eupulvinaria idesiae* Borchsenius [Homoptera: Coccidae]		Japan (Ben-Dov *et al*., 2002)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Pulvinaria kuwacola Kuwana [Hemiptera: Coccidae]	Cottony mulberry scale	Japan (JSAE, 1987)	No (Ben-Dov, 2002)	Yes
Quadraspidiotus perniciosus (Comstock) Syn =*Comstockaspis perniciosa* (Comstock) [Hemiptera: Diaspididae]	San José scale	Korea (KSPP, 1986; Ben-Dov *et al*., 2002), USA (USDA, 1997), Japan, New Zealand (CAB International, 2003)	Yes (CSIRO, 2002; CAB International, 2002) Present in WA (DAWA, 2003)	No
Retithrips syriacus (Mayet) [Thysanoptera: Thripidae]	Black black vine trips, Castor thrips, Grape thrips	Israel (PPIS, 2002), USA - Florida (Hamon and Edwards, 1994)	No (CSIRO, 2002; DAWA, 2003)	Yes
Rhyzopertha dominica (Fabricius) [Coleoptera: Bostrichidae]	Lesser grain borer, American wheat weevil	Japan, Korea, Israel, USA (CAB International, 2003)	Yes (CSIRO, 2002; CAB International, 2002) Present in WA (DAWA, 2003)	No
Ricania japonica Melichar [Hemiptera: Ricaniidae]	Japanese leafhopper	Korea (KSPP, 1986)	No (CSIRO, 2002; DAWA, 2003)	Yes
Riptortus clavatus (Thunberg) [Hemiptera: Alydidae]	Bean bug	Japan (JSAE, 1987), Korea (Chung *et al*., 1995)	No (CAB International, 2002; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Saissetia citricola Kuwana Syns = *Takahashia citricola* Kuwana; *Saissetia citricola* Takahashi and Tachikawa; *Parasaissetia citricola* Yang. [Hemiptera: Coccidae]		Japan (Ben-Dov *et al*., 2002)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Saissetia coffeae (Walker) [Hemiptera: Coccidae]	Hemispherical scale	Korea (KSPP, 1986), Israel, New Zealand (CAB International, 2002), USA (USDA, 1997)	Yes (CSIRO, 2002) Present in WA (DAWA, 2003)	No
Saissetia oleae Syns = *Saissetia oleae cherimoliae* Gómez-Menor Ortega; *Coccus* (*Saissetia*) *oleae cherimoliae* Gómez-Menor Ortega; *Saissetia oleae cherimoliae* Gómez-Menor Ortega. [Homoptera: Coccidae]	Black scale	Japan, Israel (Ben-Dov *et al*., 2002)	Yes (Ben-Dov *et al*., 2002) Present in WA (DAWA, 2003)	No
Samaria ardentella Ragonot [Lepidoptera: Pyralidae]	Camellia webworm	Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Scirtothrips dorsalis Hood [Thysanoptera: Thripidae]	Yellow tea thrips	Japan (Kitagawa and Glucina, 1984; JSAE, 1987)	Yes (Mound, 2001) Present in WA (Norwood and Moulden, 2003)	No
Scolytoplatypus mikado Blandford [Coleoptera: Scolytinae]	Mikado ambrosia beetle	Japan (JSAE, 1987), Korea (Choo and Woo, 1985)	No (CSIRO, 2002; DAWA, 2003)	Yes
Scolytus japonicus Chapuis [Coleoptera: Curculionidae, Scolytinae]	Japanese bark beetle	Japan, Korea (JSAE, 1987; Wood and Bright, 1992; Anonymous, 2004)	No (Wood and Bright, 1992)	Yes
Scopelodes contracta Walker [Lepidoptera: Limacodidae]	Persimmon cochlid	Japan (Zhang, 1994)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Selenothrips rubrocinctus (Giard) [Thysanoptera: Thripidae]	Red-banded thrips	Japan (JSAE, 1987)	Yes (Mound, 2001) Present in WA (Norwood and Moulden, 2003)	No
Sesamia nonagrioides (Lefevbre) [Lepidoptera: Noctuidae]	Mediterranean corn stalk borer, Pink maize stalk borer	Israel (PPIS, 2002)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Sinoxylon japonicum Lesne [Coleptera: Bostrichidae]	Two-horned stem-boring beetle	Japan (Ono, 1937), Korea (KSPP, 1986)	No (CSIRO, 2002; DAWA, 2003)	Yes
Sparganothis matsudai Yasuda [Lepidoptera: Tortricidae]		Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Sparganothis pilleriana (Denis and Schiffermüller) [Lepidoptera: Tortricidae]	Grape berry moth	Japan (JSAE, 1987), Korea (KSPP, 1986; Zhang, 1994)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Spilarctia subcarnea (Walker) Syn =*Spilosoma subcarnea* Walker [Lepidoptera: Arctidae]	Tiger moth	Japan (JSAE, 1987), Korea (Zhang, 1994; APPC, 1987; KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Spilosoma flammeolum (Moore) [Lepidoptera: Arctiidae]		Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes
Spilosoma lubricipeda (Linnaeus) [Lepidoptera: Arctidae]	White ermine moth	Japan (JSAE, 1987), Korea (NPQS, 1993; KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Spilosoma punctaria (Stoll) [Lepidoptera: Arctidae]	Red belly black-dotted arctiid	Japan (Akutsu, 1971), Korea (KSPP, 1986)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Spodoptera litura (Fabricius) [Lepidoptera: Noctuidae]	Cluster caterpillar	Japan (JSAE, 1987), Korea, USA, New Zealand (CAB International, 2002)	Yes (Nielsen *et al*., 1996) Present in WA (DAWA, 2003)	No
Stathmopoda masinissa Meyrick [Lepidoptera: Oecophoridae]	Persimmon fruit moth	Japan (MAFF, 1985; Zhang, 1994), Korea (KSPP, 1986; Kim *et al*. 1997; NPQS, 1995)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Stephanitis takeyai Drake and Maa Syn = *Tingis globulifera* Matsumura [Hemiptera: Tingidae]	Andromeda lacebug	Japan (Kitagawa and Glucina, 1984; JSAE, 1987)	No (Cassis and Gross, 1995)	Yes
Synanthedon tenuis (Butler) Syn =*Conopia tenuis* Butler [Lepidoptera: Sessiidae]	Smaller clearwing moth	Japan (MAFF, 1987), Korea (KSPP, 1986; NPQS, 1995)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Takahashia japonica (Cockerell) [Hemiptera: Coccidae]	String cottony scale	Japan (JSAE, 1987), Korea (KSPP, 1986)	No (Ben-Dov *et al*., 2002; DAWA, 2003)	Yes
Tenuipalpus japonicus Nishio [Acarina: Tenuipalpidae]	Tenuipalpid mite	Korea (Han, 1970)	No (Halliday, 2000)	Yes
Tenuipalpus zhizhilashvilliae Rekk [Acarina: Tenipalpidae]	Persimmon false spider mite	Korea (KSPP, 1986), Japan (Ghai and Shenhmar, 1984)	No (Halliday, 1998; CSIRO, 2002; DAWA, 2003)	Yes
Tetranychus kanzawai Kishida [Acarina: Tetranychidae]	Kanzawai spider mite	Japan , Korea (CAB International, 2003)	Yes (Halliday, 1998) Not in WA (DAWA, 2003)	Yes (For WA only)

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Tetranychus urticae Koch Syn=*Tetranychus cinnabarinus* (Boisduval) [Acarina: Tetranychidae]	Carmine spider mite	Japan, Korea, USA -including California and Texas (CAB International, 2002), Israel (PPIS, 2002)	Yes (CSIRO, 2002; DAWA, 2003)	No
Thrips coloratus Schmutz Syn = *Thrips aligherini* Girault [Thysanoptera: Thripidae]	Thrips	Japan (JSAE, 1987)	Yes (Mound, 2001) Not in WA (Mound, 2001)	Yes (For WA only)
Thrips hawaiiensis (Morgan) [Thysanoptera: Thripidae]	Flower thrips	Japan (JSAE, 1987)	Yes (Mound, 2001) Present in WA (Norwood and Moulden, 2003)	No
Trialeurodes vaporariorum (Westwood) [Hemiptera: Aleyrodidae]	Greenhouse whitefly	Japan, Korea, USA, New Zealand (CAB International, 2002), Israel (PPIS, 2002)	Yes (Carver and Reid, 1996; CSIRO, 2002) Present in WA (DAWA, 2003)	No
Tropidothorax beloglowi Jakovlev [Hemiptera: Lygaeidae]	Lygaeid bug	Japan (JSAE, 1987), Korea (Lee *et al*., 1994)	No (CSIRO, 2002; DAWA, 2003)	Yes
Tropidothorax cruciger Motschulsky [Hemiptera: Lygaeidae]	Lygaeid bug	Japan (JSAE, 1987), Korea (Kim *et al*., 2000)	No (CSIRO, 2002; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Vespa crabro (Linnaeus) [Hymenoptera: Vespidae]	Spotted giant hornet	Japan (Ono and Sasaki, 1987), Korea (KSPP, 1986; Kim *et al*., 1994), USA (USDA, 1997)	No (CSIRO, 2002; DAWA, 2003)	Yes
Vespa mandarinia Smith [Hymenoptera: Vespidae]	Yellow jacket	Japan (Ono *et al*., 1986), Korea (KSPP, 1986; Kim *et al*., 1994)	No (CSIRO, 2002; DAWA, 2003)	Yes
Vespa simillima xanthoptera Cameron [Hymenoptera: Vespidae]	Yellow hornet	Japan (CAB International, 2002), Korea (KSPP, 1986; Kim *et al*., 1994)	No (CSIRO, 2002; DAWA, 2003)	Yes
Xyleborus rubricollis Eichhoff. Syn = *Ambrosiodmus rubricollis* (Eichhoff) [Coleoptera: Curculionidae]	Ambrosia beetle, Red-necked bark beetle.	Japan (JSAE, 1987), Korea (Choo and Woo, 1983; KSPP, 1986), USA - South Carolina (Kovach and Gorsuch, 1985).	No (CSIRO, 2002; DAWA, 2003).	Yes.
Xyleborus saxeseni (Ratzeburg) [Coleoptera: Scolytinae]	Fruit-tree pinhole borer	Japan (JSAE, 1987), Korea (KSPP, 1986), USA (USDA, 1997)	Yes (CSIRO, 2002) Present in WA (Abbott, 1985; DAWA, 2003)	No
Xylena fumosa (Butler) [Lepidoptera: Noctuidae]	Rape caterpillar	Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes
Xylosandrus brevis (Eichhoff) [Coleoptera: Curculionidae]	Short-winged bark beetle	Japan (Kajimura and Hijii, 1994), Korea (KSPP, 1986)	No (CSIRO, 2002; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Xylosandrus germanus (Blandford) [Coleoptera: Scolytinae]	Alnus ambrosia beetle	Japan (JSAE, 1987), Korea (Yoon *et al*., 1982)	No (CSIRO, 2002; DAWA, 2003)	Yes
Zeuzera leuconotum Butler [Lepidoptera: Coccidae]	Wood leopard moth	Japan (Kitagawa and Glucina, 1984), Israel (CAB International, 2002)	No (Nielsen *et al*., 1996; DAWA, 2003)	Yes
Zeuzera multistrigata Moore [Lepidoptera: Cossidae]	Oriental leopard moth	Japan (JSAE, 1987)	No (Nielsen *et al*., 1996)	Yes
NEMATODA				
Aphelenchoides ritzmebosi (Schwarz) Steiner and Buhrer [Tylenchida: Aphelenchoididae]	Leaf nematode	Japan – restricted, Korea (CAB International, 2002)	Yes (McLeod *et al*., 1994) Present in WA (DAWA, 2003)	No
Basiria graminophila Siddiqi [Tylenchina: Tylenchidae]	Nematode	Korea (KSPP, 1986)	Yes (McLeod *et al*., 1994) – Qld Not in WA (DAWA, 2003)	Yes (For WA only)
Coslenchus costatus (de Man) Siddiqi Syn =*Aglenchus costatus* (de Man) Meyl [Tylenchina: Tylenchidae]	Nematode	Japan (Mizukubo and Minagawa, 1984), Korea (KSPP, 1986)	Yes (McLeod *et al*., 1994) Present in WA (DAWA, 2003)	No

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Helicotylenchus dihystera (Cobb) Sher [Tylenchida: Hoplolaimidae]	Spiral nematode	Japan, Israel, USA, New Zealand (CAB International, 2002)	Yes (McLeod *et al*., 1994) Present in WA (DAWA, 2003)	No
Helicotylenchus pseudorobustus (Steiner) Golden [Tylenchida: Haploloimidae]	Spiral nematode	Korea (CAB International, 2002; KSPP, 1986), USA (including California and Texas), New Zealand (CAB International, 2002)	Yes (McLeod *et al*., 1994) Present in WA (DAWA, 2003)	No
Meloidogyne incognita (Kofoid and White) Chitwood Syn =*Meloidogyne acrita* Chitwood) [Tylenchida: Heteroderidae]	Southern root knot nematode	Japan, Korea, Israel, USA – including Arizona, California and Texas (CAB International, 2002)	Yes (McLeod *et al*., 1994) Present in WA (DAWA, 2003)	No
Meloidogyne javanica (Treub) Chitwood [Tylenchida: Heteroderidae]	Javanese root knot nematode	Japan, Korea, USA – including Arizona, California and Texas (CAB International, 2002), Israel (PPIS, 2002)	Yes (McLeod *et al*., 1994) Present in WA (DAWA, 2003)	No
Pratylenchus loosi Loof [Tylenchida: Pratylenchidae]	Root lesion nematode	Japan (CAB International, 2002)	Yes (McLeod *et al*., 1994) Not in WA (DAWA, 2003)	Yes (For WA only)

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Pratylenchus scribneri Steiner [Tylenchida: Pratylenchidae]	Scribner’s lesion nematode	Korea (Park *et al*., 1999)	No (McLeod *et al*., 1994) Present in WA (DAWA, 2003)	No
Pratylenchus thornei Sher and Allen [Tylenchida: Pratylenchidae]	Thorn's root lesion nematode	Japan, Israel, USA – Including California (CAB International, 2002), Korea (KSPP, 1986)	Yes (McLeod *et al*., 1994; (CAB International, 2002) Present in WA (DAWA, 2003)	No
Pratylenchus vulnus Allen and Jensen [Tylenchida: Pratylenchidae]	Walnut root lesion nematode	Japan, Korea, USA (including California), New Zealand (CAB International, 2002)	Yes (McLeod *et al*., 1994) Present in WA (DAWA, 2003)	No
Tylenchulus semipenetrans Cobb [Tylenchina: Tylenchulidae]	Citrus root nematode, slow decline nematode	Japan, Korea, Israel, USA - including Arizona, California and Texas (CAB International, 2002)	Yes (McLeod *et al*., 1994) Present in WA (DAWA, 2003)	No
Xiphinema americanum sensu lato Cobb [Dorylaimida: Longidoridae]	American dagger nematode	Japan, Korea, USA – including California and Texas (CAB International, 2002)	Yes (McLeod *et al*., 1994) Present in WA (DAWA, 2003)	No

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
BACTERIA				
Pseudomonas syringae pv. *syringae* van Hall [Pseudomonadales: Pseudomonadaceae]	Bacterial canker or blast	Japan, Korea, Israel, USA, New Zealand (CAB International, 2002)	Yes (APDD, 2002; CAB International, 2002) Present in WA (DAWA, 2003)	No
Rhizobium radiobacter (Beijerinck and van Delden) Young et al. [Rhizobiales: Rhizobiaceae]	Crown gall	Japan, Korea, Israel – restricted, USA, New Zealand (CAB International, 2002)	Yes (CAB International, 2002) Present in WA (Shivas, 1989)	No
Rhizobium rhizogenes [Rhizobiales: Rhizobiaceae]	Bacterial gall	Japan, USA – including California and Texas (CAB International, 2002)	Yes (CAB International, 2002) Present in WA (Shivas, 1989)	No
FUNGI				
Alternaria alternata (Fr.:Fr.) Keissler Syn = *A. tenuis* Nees ['mitosporic fungi': Hyphomycetes] possibly *A. alternata* pv. *Citri*	Persimmon black spot, Fruit rot	Japan (Qadir and Hashinaga, 2001), Korea (Park *et al.*, 1999), Israel (PPIS, 2002), New Zealand (NZ MAF 2003)	Yes (APDD, 2002) Present in WA (DAWA, 2003)	No

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Aureobasidium pullulans (de Bary) Arnaud [‘mitosporic fungi’: Hyphomycetes] Syn =*Dematium pullulans* (de Bary); *Aureobasidium oleae* (Castagne) Subram; *Aureobasidium vitis* Viala & G. Boyer; *Azymocandida malicola* (D.S. Clark & R.H. Wallace) E.K. Novak & Zsolt; *Candida malicola* D.S. Clark & R.H. Wllace; *Dematium pullulans* de Bary & Lowenthal; *Pullularia pullulans* (de Bary & Lowenthal) Berkhout; *Torula oleae* Castagne	Root rot, Blue stain, Core rot	Japan (Kitagawa and Glucina, 1984), Korea (Yun *et al*.,, 1997)	Yes (APDD, 2002) Present in WA (DAWA, 2003)	No
Botryosphaeria dothidea (Moug.: Fr.) Ces. and De Not. [Dothideales: Botryosphaeriaceae]	Canker	Japan (Kitagawa and Glucina, 1984)	Yes (Letham, 1995; APPD, 2004) Not in WA (APPD, 2004)	Yes (For WA only)
Botrytis cinerea Persoon (anamorph) Syn = *Botryotinia fuckeliana* (de Bary) Whetzel (teleomorph) [Helotiales: Sclerotiniaceae]	Grey mould	Japan (Kitagawa and Glucina, 1984), Korea (CAB International, 2002), Israel (PPIS, 2002), USA (USDA, 1997), New Zealand (NZ MAF, 2003)	Yes (APDD, 2002) Present in WA (DAWA, 2003)	No

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Botrytis diospyri Brizi [Helotiales: Sclerotiniaceae]	Grey mould	Japan (Watson, 1971)	No (Farr *et al*, 2003; DAWA, 2003; APPD, 2004)	Yes
Capnophaeum fuliginodes (Rehm) Yamamoto [Loculoascomycetes: Dothideales]	Sooty mould	Japan (MAFF, 1985; MAFF, 1987), Korea (KSPP, 1986)	No (Farr *et al*, 2003; DAWA, 2003)	Yes
Cercospora fuliginosa Ellis S and Kellerman ['mitosporic fungi': Hyphomycetes]	Anthracnose	Japan (MAFF, 2001)	No (Farr *et al*, 2003; DAWA, 2003)	Yes
Cercospora kaki Ellis and Everhart ['mitosporic fungi': Hyphomycetes]	Angular leaf spot on leaves	Japan (MAFF, 1987), USA (USDA, 1997)	Yes (Qld) (Simmonds, 1966; Farr *et al*, 2003) Not in WA (DAWA, 2003)	Yes (For WA only)
Cercospora kakivora Hara ['mitosporic fungi': Hyphomycetes]	Cercospora leaf spot	Japan (Pollack, 1987; MAFF, 2001)	No (Farr *et al*, 2003; DAWA, 2003)	Yes
Cladosporium herbarum (Persoon) Link ['mitosporic fungi': Hyphomycetes]	Sooty mould	Japan (MAFF, 1985; Saito *et al*., 1997)	Yes (APDD, 2002; Sharma and Heather, 1981) Present in WA (DAWA, 2003)	No

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Colletotrichum coccodes (Wallr.) Hughes Syn = *Gloeosporium kaki* S. Ito [Helotiales: Dermateaceae]	Fruit rot	Japan (ICMP, 2003; Kitagawa and Glucina, 1984)	Yes (APPD, 2003) Present in WA (APPD, 2003)	No
Fusarium oxysporum Schlechtendahl:Fr. ['mitosporic fungi': Hyphomycetes]	Fusarium rot, Fruit rot, Branch canker	Japan, Korea (CAB International, 2002), Israel (PPIS, 2002)	Yes (Sampson and Walker, 1982; Cook and Dube, 1989; Shivas, 1989; CAB International, 2002) Present in WA (DAWA, 2003)	No
Fusicladium levieri Magnus Syn = *Fusicladium diospyrae* Hori and Yoshida [Anamorphic Acantharia]	Black spot	Japan (MAFF, 1987)	No (Farr *et al*, 2003; DAWA, 2003)	Yes
Glomerella cingulata (Stonem.) Spauld. & H. Schrenk [teleomorph] *Colletotrichum gloeosporioides* (Penz.) Sacc. [anamorph] [Sordariomycetidae: Glomerellaceae]	Anthracnose	Japan, Korea, Israel (CAB International, 2002), USA (USDA, 1997), New Zealand (NZ MAF, 2003)	Yes (CAB International, 2002) Present in WA (DAWA, 2003)	No
Helicobasidium mompa Tanaka [Auriculariales: Auriculariaceae]	Violet root rot	Japan, Korea (Farr *et al*, 2003)	No (Farr *et al*, 2003; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Lasiodiplodia theobromae (Pat.) Griffon and Maubl. (anamorph) Syn = *Diplodia theobroma; Botryodiplodia theobromae* [Xylariales: Hyponectriaceae]	Fruit rot, Floral shoot dieback disease, Stem rot, Stem–end rot, Stem canker	Japan, USA – including California (CAB International, 2002), Israel (PPIS, 2002)	Yes (APDD, 2002; CAB International, 2002) Present in WA (DAWA, 2003)	No
Macrophoma kaki Hara [‘mitosporic fungi’: Coelomycetes]		Japan (Watson, 1971; MAFF, 2001)	No (Farr *et al*, 2003; DAWA, 2003)	Yes
Macrophomina phaseolina (Tassi) Goid [‘Mitosporic fungi’: Coelomycetes} Syn = *Sclerotium bataticola* Taubenh.	Charcoal rot	Japan, Korea, USA(including Arizona, California and Texas), New Zealand (CAB International, 2002), Israel (PPIS, 2002)	Yes (APDD, 2002; CAB International, 2002) Present in WA (DAWA, 2003)	No
Monilinia fructigena Honey [Leotiales: Sclerotiniaceeae]	Brown rot	Japan, Korea, Israel (CAB International, 2002)	No (APDD, 2002; CAB Inernational, 2002; DAWA, 2003)	Yes
Monochaetia diospyri Yoshii [Ascomycetes: Incertae sedis]	Large leaf spot	Japan (Nag Raj, 1993)	No (APPD, 2003)	Yes
Mycosphaerella nawae (Sydow) Hiura and Ikata [Dothideales: Mycosphaerellaceae]	Circular leaf spot of persimmon	Japan (MAFF, 1987), Korea (NPQS, 1993)	Yes (APDD, 2002) Not in WA (DAWA, 2003)	Yes (For WA only)
Myxosporium kaki Hara [Ascomycetes: Incertae sedis]		Japan (Watson, 1971)	No (APPD, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Nectria haematococca (Wollenw.) Gerlach (teleomorph) [Hypocreales: Nectriaceae] *Fusarium solani* (Martius) Sacc. [anamorph]	Dry rot of potato, Tuber rot	Japan, Korea (CAB International, 2002), Israel (PPIS, 2002; CAB International, 2002)	Yes (CAB International, 2002) Present in WA (DAWA, 2003)	No
Penicillium expansum Link and Gray [‘Mitosporic fungi’: Hyphomycetes]	Fruit rot, blue mould	Israel (PPIS, 2002)	Yes (APDD, 2002) Present in WA (DAWA, 2003)	No
Pestalotia diospyri Sydow [‘mitosporic fungi’: Coelomycetes]	Leaf spot	Japan (MAFF, 1985)	No (Farr *et al,* 2003; DAWA, 2003)	Yes
Pestalotia kaki Ellis and Everhart see *Pestalotiopsis kaki* (Ellis and Everhart) Steyaert	Leaf spot	Japan, Korea (Nag Raj, 1993; Kim *et al.,* 1997)	No (APPD, 2003	Yes
Pestalotia theae Sawada Syn = *Pestalotiopsis theae* (Saw.) Steyeart [‘mitosporic fungi’: Coelomycetes]	Ringspot, tea grey blight	Korea (Chang *et al.* 1996; Chang *et al.*, 1997)	Yes (APDD, 2002) Not in WA (DAWA, 2003)	Yes (For WA only)
Pestalotiopsis breviseta (Sacc.) Steyaert (1949). (Syn = *Pestalotia breviseta*) [Xylariales: Amphisphaeriaceae]		Japan (Farr *et al.,*2003 n. d; Sun and Cao, 1990)	Yes (Simmonds, 1966) Not in WA (APPD, 2003)	Yes (For WA only)

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Pestalotiopsis kaki (Ellis and Everhart) Steyaert Steyaert (1949) restricted *Pestalotia* to a single species and reassigned most of the remaining species to *Pestalotiopsis*.	Leaf spot	Japan, Korea (Nag Raj, 1993; Kim *et al.*, 1997)	No (APPD, 2003)	Yes
Pestalotiopsis longiaristata Maubl. [Xylariales: Amphisphaeriaceae]		Japan (Farr *et al.*, 2003 n. d.)	No (APPD, 2003)	Yes
Pestalotiopsis longiseta (Speg.) K. Dai and Ts. Kobay. (1990) [Xylariales: Amphisphaeriaceae]	Leaf spot	Korea (Kim *et al.*, 1997)	No (APPD, 2003)	Yes
Phoma kakivora Hara ['mitosporic fungi': Coelomycetes]	Phoma spot	Japan (Sugawara and Yamada, 1971; MAFF, 1985)	No (Farr *et al*, 2003; DAWA, 2003)	Yes
Phoma loti Cooke ['mitosporic fungi': Coelomycetes]		Japan (MAFF, 2001)	No (Farr *et al*, 2003; DAWA, 2003)	Yes
Phomopsis rojana Linnaeus ['mitosporic fungi': Coelomycetes]		Japan (MAFF, 2001)	No (Farr *et al*, 2003; DAWA, 2003)	Yes

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Phyllactinia guttata (Wallr. : Fries) Leveille Syn =*Phyllactinia kakicola* Sawada; *Phyllactinia corylea* (Persoon) Karsten [Erysiphales: Erysiphaceae]	Powdery mildew	Japan (Spaulding, 1961), Korea (NPQS, 1993), USA (USDA, 1997)	No (Farr *et al*, 2003; DAWA, 2003)	Yes
Physalospora kaki Hara [Amphisphisphaeriales: Hyponectriaceae]		Japan (MAFF, 2001)	No (Farr *et al*, 2003; DAWA, 2003)	Yes
Pseudocercospora diospyri-morrisianae Sawada ex Goh and W.H. Hsieh (Syn = *Cylindrosporium kaki*) [Mycosphaerellales: Mycosphaerellaceae]	Angular leaf spot	Japan, Korea (Farr *et al.,* 2003 n. d; Watson, 1971; Shin, 2001)	No (APPD, 2003)	Yes
Rosellinia necatrix (Hartig) Berlese (teleomorph) Syn = *Dematophora necatrix* R. Hartig) [Xylariales: Xylariaceae]	White root rot	Japan, Korea, USA (including California), New Zealand (CAB International, 2002), Israel (PPIS, 2002; CAB International, 2002)	Yes, but under official control (South Australia) (APDD, 2002) Present in WA (DAWA, 2003)	Yes
Schizothyrium pomi (Mont. and Fr.) [Microthyriales: Schizothyriaceae]	Flyspeck	Japan (Kitagawa and Glucina, 1984) (as *Leptothyrium pomi*)	Yes (APPD, 2003) Present in WA (APPD, 2003)	No

Scientific name of the pest[1]	Common name (s)	Present in exporting country[2]	Present in Australia[3]	Consider further[4]
Sclerotinia sclerotiorum (Lib.) de Bary [Discomycetes: Heliotiales]	Twig blight	Japan, Korea, USA (including Texas, Arizona and California), New Zealand (CAB International, 2002), Israel (PPIS, 2002; CAB International, 2002)	Yes (APDD, 2002; CAB International, 2002) Present in WA (DAWA, 2003)	No
Scorias communis Yamamoto [Dothidiales: Capnodiaceae]	Sooty mould	Japan (MAFF, 1985)	No (APDD, 2002; Farr *et al*, 2003; DAWA, 2003)	Yes
Septogloeum kaki (Sydow) Hara [Dothideales: Mycosphaerellaceae]	Leaf spot	Japan (MAFF, 2001)	No (APDD, 2002; Farr *et al*, 2003; DAWA, 2003)	Yes
Thanatephorus cucumeris (Frank) Donk (teleomorph) [Ceratobasidiales: Ceratobasidiaceae] *Rhizoctonia solani* [anamorph]	Damping off, rice sheath blight, root rot	Japan, Korea, USA (CAB International, 2002), Israel (PPIS, 2002; CAB International, 2002)	Yes (CAB International, 2002) Present in WA (DAWA, 2003)	No
Tripospermum juglandis (Trumen) Spgazzini ['mitosporic fungi': Hyphomycetes]	Sooty mould	Japan (MAFF, 1985)	No (APDD, 2002; Farr *et al*, 2003; DAWA, 2003)	Yes

1 The initial list contains all pests known to be associated with persimmons in Japan, Korea and Israel.

2 Comparision of pests of persimmons in Japan, Korea and Israel with the USA (California, Arizona and Texas) and New Zealand

3 As described in Pest Categorisation (see *Method for Stage 2: Risk assessment*).

4 Pest present in Japan, Korea and Israel, but not in Australia or present but officially controlled, are considered further in the 'present on pathway' stage of pest categorisation.

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Appendix 2: Pest categorisation for persimmons (pathway association)

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
ARTHROPODA					
Acanthosoma denticaudum Jakovlev Syn = *Acanthosoma denticauda* Kim [Hemiptera: Acanthosomatidae]	Red-backed stink bug	No (AQIS, 1998)	Not applicable	Not applicable	No
Aceria diospyri Keifer [Acarina: Eriophyidae]	Persimmon bud mite	Yes (Hiehata, 1995)	Yes (AQIS, 1995)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Acrobasis tokiella (Ragonot) [Lepidoptera: Pyralidae]	Apple leaf case bearer	No (USDA, 1997)	Not applicable	Not applicable	No
Acronicta intermedia (Warren) Syns = *Acronicta increta* Butler; *Acronicta incretata* Hampson; *Apatele intermedia* Warren; *Triaena intermedia* Warren [Lepidoptera: Noctuidae]	Apple dagger moth	No (NIAST Entomology, 2004)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Acronicta rumicis Linnaeus Syn = *Acronicta alnoides* Geest, *Acronicta grisea* Warren, *Acronicta marginata* Lambillion, *Acronicta striata* Meves, *Acronicta suhrianna* Gillmer, *Acronicta tugubris* Schultc, *Acronycta bercei* Saunders, *Acronycta diffusa* Walker. [Lepidoptera: Noctuidae]	Sorrel cutworm, Knotgrass moth	No (CAB International, 2002)	Not applicable	Not applicable	No
Adoretus tenuimaculatus Waterhouse [Coleoptera: Scarabaeidae]	Brown chafer	No (Lee *et al.*, 2002a)	Not applicable	Not applicable	No
Adris tyrannus amurensis Staudinger [Lepidoptera: Noctuidae]	Akebia leaf-like moth	Yes (NZ MAF, 1999)	Yes (AQIS, 1998 & 1999)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Agrilus moerens Saunders [Coleoptera: Bupresidae]	Jewel beetle	No (Booth *et al.* 1990)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Aleurocanthus spiniferus Quaintance & Baker Syn = *Aleurocanthus citricolus* (Newstead) Quaintance & Baker; *Aleurocanthus rosae* Singh; *Aleurocanthus spiniferus* var. *intermedia* Silvestri; *Aleurodes citricola* Newstead; *Aleurodes spinifera* Quaintance) [Hemiptera: Aleyrodidae]	Citrus blackfly, Orange spiny whitefly, Citrus mealywing	No (USDA, 1997)	Not applicable	Not applicable	No
Aleurothrixus floccosus (Maskell) [Hemiptera: Aleyrodidae]	Woolly whitefly	No (CAB International, 2003)	Not applicable	Not applicable	No
Aleurotrachelus camelliae (Kuwana) [Hemiptera: Aleyrodidae]	Camellia whitefly	No (Anonymous, 2004c)	Not applicable	Not applicable	No
Ambrosiodmus apicalis (Blandford) Syn = *Xyleborus apicalis* Blandford [Coleoptera: Scolytinae]	Apple ambrosia beetle	No (Anonymous, 2004a)	Not applicable	Not applicable	No
Ambrosiodmus rubricollis (Eichhoff) Syn = *Xyleborus rubricollis* Eichhoff [Coleoptera: Scolytidae]	Ambrosia beetle; Red-necked bark beetle	No (Booth *et al.* 1990)	Not applicable	Not applicable	No
Anacanthocoris striicornis (Scott) [Hemiptera: Coreidae]	Larger squash bug	No (Anonymous, 2004d)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Anomala albopilosa Hope [Coleoptera: Scarabaeidae]	Green chafer	No (USDA, 1997)	Not applicable	Not applicable	No
Anomala cuprea (Hope) Syn = *Euchlora cuprea* [Coleoptera: Scarabaeidae]	Cupreous chafer	No (USDA, 1997)	Not applicable	Not applicable	No
Anomala daimiana Harold [Coleoptera: Scarabaeidae]	Cherry chafer	No (USDA, 1997)	Not applicable	Not applicable	No
Anomala octiescostata Burmeister [Coleoptera: Scarabaeidae: Rutelinae]	Chafer	No (Booth *et al*., 1990)	Not applicable	Not applicable	No
Anomala puncticollis Harold [Coleoptera: Scarabaeidae: Rutelinae]	Chafer	No (Booth *et al*., 1990)	Not applicable	Not applicable	No
Anomala rufocuprea (Motschulsky) [Coleoptera: Scarabaeidae]	Soyabean beetle	No (Lee *et al*. 2002)	Not applicable	Not applicable	No
Apate monachus (Fabricius) Syn = *Apate monachal* Fabricius; *Apate carmelita* Fabricius; *Apate francisca* Fabricius; *Apate gibba* Fabricius; *Apate mendica* Olivier; *Apate monachus* var. *rufiventris* Lucas; *Apate semicostata* Thomson; *Apate senii* Stefani [Coleoptera: Bostrichidae]	Date palm bostrichid, Black borer, Twig borer	No (PPIS, 2002)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Aphrophora rugosa Matsumura [Hemiptera: Aphrophoridae]	Froghopper	No (NIML, 2004; Liang and Fletcher, 2003)	Not applicable	Not applicable	No
Apriona japonica Thomson [Coleoptera: Cerambycidae]	Mulberry borer	No (Duffy, 1968; Esaki, 1995)	Not applicable	Not applicable	No
Archips audax Razowski [Lepidoptera: Tortricidae]		No (Horak and Brown, 1991)	Not applicable	Not applicable	No
Archips fuscocupreanus Walsingham Syn = *Cacoecia fuscocupreana* Walsingham; *Ptycholoma fuscocupreana* Walsingham [Lepidoptera: Tortricidae]	Apple tortrix	No (USDA, 1997). Genus is not associated with fruit.	Not applicable	Not applicable	No
Archips ingentanus Christoph Syn = *Archippus ingentanus* Christoph [Lepidoptera: Tortricidae]	Larger apple tortrix	No (USDA, 1997)	Not applicable	Not applicable	No
Artena dotata Fabricius [Lepidoptera: Noctuidae]	Noctuid	No (USDA, 1997)	Not applicable	Not applicable	No
*Ascotis selenaria (*Denis & Schiffermüller) Syn =*Boarmia selenaria* Schiffermuller [Lepidoptera: Geometridae]	Geometrid moth	No (USDA, 2002) (not on pathway for citrus from Korea)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Aspidiotus destructor Signoret [Hemiptera: Diaspididae]	Coconut scale	No (USDA, 1997)	Not applicable	Not applicable	No
Bambalina sp. [Lepidoptera: Psychidae]	Mulberry bagworm	No (Holloway *et al*., 1987)	Not applicable	Not applicable	No
Basilepta fulvipes (Motschulsky) [Coleoptera: Chrysomelidae]	Golden-green minute leaf beetle	No (CAB International, 2002). Genus known to feed on leaves and roots.	Not applicable	Not applicable	No
Bemisia argentifolii Bellows and Perring Syn = *Bemisia tabaci* biotype B. [Hemiptera: Aleyrodidae]	Tobacco whitefly, cotton whitefly, silverleaf whitefly, Poinsettia whitefly	No (Hoddle, 1999; Van Lenteren & Noldus, 1990; McAuslane, 2002)	Not applicable	Not applicable	No
Blenina senex (Butler) [Lepidoptera: Noctuidae]	Bark-like moth	No (USDA, 1997)	Not applicable	Not applicable	No
Blitopertha orientalis (Waterhouse) Syn = *Anomala orientalis* (Waterhouse) [Coleoptera: Scarabaeidae: Rutelinae]	Oriental beetle	No (CAB International and EPPO, 1997)	Not applicable	Not applicable	No
Bothrogonia japonica Ishihara [Hemiptera: Cicadellidae]	Black-tipped leafhopper	No (USDA, 1997)	Not applicable	Not applicable	No
Cagosima sanguinolenta Thomson [Coleoptera: Cerambycidae]	Alder longicorn beetle	No (Kryvolutskaya, 1997; Booth *et al*., 1990)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Calguia defiguralis Walker [Lepidoptera: Pyralidae]		No (Anonymous, 2004i)	Not applicable	Not applicable	No
Caligula japonica Moore Syn =*Dictyoploca japonica* Moore [Lepidoptera: Saturniidae]	Wild silk moth	No (USDA, 1997)	Not applicable	Not applicable	No
Canephora asiatica Staudinger [Lepidoptera: Psychidae]	Mulberry bagworm	No (Holloway *et al*., 1987)	Not applicable	Not applicable	No
Ceratitis capitata Wiedemann [Diptera: Tephritidae]	Mediterranean fruit fly; medfly	Yes (PPIS, 2002)	Yes (persimmons from the USA)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Ceroplastes floridensis Comstock [Hemiptera: Coccidae]	Florida wax scale	Yes (PPIS, 2002)	Yes (persimmons from the USA)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Ceroplastes japonicus Green [Hemiptera: Coccidae]	Japanese wax scale	No (USDA, 1997)	Not applicable	Not applicable	No
Ceroplastes pseudoceriferus Green [Hemiptera: Coccidae]	Wax scale	No (USDA, 1997)	Not applicable	Not applicable	No
Chalioides kondonis Kondo [Lepidoptera: Psychidae]		No (Holloway *et al*., 1987)	Not applicable	Not applicable	No
Chlorophorus japonicus (Chevrolat) [Coleoptera: Cerambycidae]	Spined-winged tiger longicorn beetle	No (Booth *et al*., 1990)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Chrysobothris succedanea Saunders [Coleoptera: Buprestidae]	Metallic wood borer	No (Coder, 1999)	Not applicable	Not applicable	No
Chrysochroa fulgidissima Schonherr [Coleoptera: Buprestidae]	Two-striped green buprestid, jewel beetle	No (USDA, 1997)	Not applicable	Not applicable	No
Chrysomela populi Linnaeus Syn= *Melasoma populi* [Coleoptera: Chrysomelidae]	Poplar leaf beetle	No (USDA, 1997)	Not applicable	Not applicable	No
Chrysomphalus bifasciculatus Ferris [Hemiptera: Diaspididae]	Diaspid scale	No (Gill, 1997)	Not applicable	Not applicable	No
Cicadella viridis (Linnaeus) [Hemiptera: Cicadellidae]	Green leafhopper	No (USDA, 1997)	Not applicable	Not applicable	No
Cletus punctiger (Dallas) [Hemiptera: Coreidae]		No (Ito, 1986; Mitchell, 2000)	Not applicable	Not applicable	No
Coccura suwakoensis (Kuwana & Toyoda) [Hemiptera: Pseudococcidae]	Quince cottony scale	No (Ben-Dov *et al*., 2002)	Not applicable	Not applicable	No
Cossus jezoensis Matsumura [Lepidoptera: Cossidae]	Oriental carpenter moth	No (Holloway *et al*., 1987)	Not applicable	Not applicable	No
Crisicoccus azaleae (Tinsley) [Hemiptera: Pseudococcidae]		No (Ben-Dov *et al*., 2002)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Crisicoccus matsumotoi (Shiraiwa) [Hemiptera: Pseudococcidae]	Matsumoto mealybug	No (Ben-Dov, 1994)	Not applicable	Not applicable	No
Cryptoblabes gnidiella (Millière) [Lepidoptera: Pyralidae]	Pyralid moth, Honeydew moth	Yes (PPIS, 2002)	Yes (BA, 2002)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Cryptothelea formosicola (Strand) Syn = *Clania formosicola* (Strand) [Lepidoptera: Psychidae]	Giant bagworm	No (Holloway *et al*., 1987)	Not applicable	Not applicable	No
Cuphodes diospyrosella Issiki [Lepidoptera: Gracillariidae]	Persimmon leafminer	No (Aoki, 2003b)	Not applicable	Not applicable	No
Cyrtoclytus caproides Bates Syn = *Cyrtoclytus capra* (Germar)] [Coleoptera: Cerambycidae]	Long horn beetle	No (Booth *et al*. 1990)	Not applicable	Not applicable	No
Dendrothrips minowai Priesner [Thysanoptera: Thripidae]		No (Anonymous, 2004f)	Not applicable	Not applicable	No
Dialeurodes citri (Ashmead) [Hemiptera: Aleyrodidae]	Citrus whitefly	No (Crocker and Hamon, 1983)	Not applicable	Not applicable	No
Drosicha corpulenta (Kuwana) [Hemiptera: Margaroididae]	Giant mealybug	No (USDA, 1997)	Not applicable	Not applicable	No
Dysmicoccus wistariae (Green) [Hemiptera: Pseudococcidae]	Pear mealybug	No (Ben-Dov, 1994; Hokkaido, 2004)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Ectinus sericeus Candeze [Coleoptera: Elateridae]	Wheat wireworm	No (USDA, 1997)	Not applicable	Not applicable	No
Edwardsiana flavescens (Fabricius) [Hemiptera: Cicadellidae]	Small green leafhopper	No (Chang and Chen, 1993; Lodos and Kalkandelen, 1984)	Not applicable	Not applicable	No
Empoasca vitis (Göthe) [Hemiptera : Cicadellidae]	Small green leaf hopper	No (USDA, 1997)	Not applicable	Not applicable	No
Endoclita excrescens (Butler) [Lepidoptera: Hepialidae]	Japanese swift moth	No (USDA, 1997)	Not applicable	Not applicable	No
Endoclyta sinensis (Moore) [Lepidoptera: Hepialidae]	Grape tree-borer	No (Holloway *et al*., 1987)	Not applicable	Not applicable	No
Eoscarta assimilis (Uhler) Syns = *Eoscartopsis assimilis* (Uhler); *Paracercopis assimilis* (Uhler) [Hemiptera: Cercopidae]	Spittlebug	No (Takabe, 2002; Morishita, 2001)	Not applicable	Not applicable	No
Eotetranychus sexmaculatus (Riley) [Acarina: Tetranychidae]	Six-spotted mite	No (Childers and Fasulo, 1995)	Not applicable	Not applicable	No
Eriococcus lagerstroemiae Kuwana [Homoptera: Eriococcidae]	Crapemyrtle scale	No (USDA, 1997)	Not applicable	Not applicable	No
Eumeta japonica (Heylaerts) [Lepidoptera: Psychidae]	Giant bagworm	No (Holloway *et al*., 1987)	Not applicable	Not applicable	No

Scientific name	**Common name(s)**	**Associated with fruit**[5]	**Considered under existing policies**	**Quarantine status**	**Consider pest further for risk assessment / risk management**[6]
Eumeta minuscula (Butler) Syn = *Clania minuscula* Butler [Lepidoptera: Pyschidae]	Tea bagworm	No (USDA, 1997)	Not applicable	Not applicable	No
Euproctis pseudoconspersa (Strand) Syn = *Euproctis conspersa* Butler [Lepidoptera: Lymantriidae]	Tea tussock moth	No (Mizuta, 1981; Robinson *et al.*, 2001)	Not applicable	Not applicable	No
Euproctis similis Fuessly [Lepidoptera: Lymantriidae]	Browntail moth	No (USDA, 1997)	Not applicable	Not applicable	No
Euproctis subflava (Bremer) [Lepidoptera: Lymantriidae]	Oriental tussock moth	No (USDA, 1997)	Not applicable	Not applicable	No
Euwallacea validus (Eichhoff) Syn = *Xyleborus validus* Eichhoff [Coleoptera: Scolytinae]	Bark beetle	No (Anonymous, 2004b)	Not applicable	Not applicable	No
Euzophera batangensis Caradja [Lepidoptera: Pyralidae]	Persimmon bark borer	No (Wang and Wang, 1988)	Not applicable	Not applicable	No
Euzopherodes vapidella Mann Syn = *Ephestia vapidella* [Lepidoptera: Pyralidae]	Citrus stub moth	No (PPIS, 2002)	Not applicable	Not applicable	No
Eysarcoris ventralis (Westwood) Syn = *Eysarcoris inconspicuus* (H. Sch.) [Hemiptera: Pentatomidae]	White spotted bug	No (Ito, 1986; Sharma, 1994; CAB International, 2003)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Frankliniella intonsa (Trybom) [Thysanoptera: Thripidae]	Flower thrips	No (CAB International, 2003)	Not applicable	Not applicable	No
Frankliniella occidentalis (Pergande) Syn = *F. californica* (Moulton) [Thysanoptera: Thripidae]	Western flower thrips	No (CAB International, 2002)	Not applicable	Not applicable	No
Gametis jucunda Faldermann [Coleoptera: Scarabaeidae: Cetoniinae]	Scarab beetle	No (Booth *et al*., 1990)	Not applicable	Not applicable	No
Gastropacha orientalis Sheljuzhko [Lepidoptera: Lasiocampidae]	Oriental lappet	No (Anonymous, 2004e; Aoki, 2004)	Not applicable	Not applicable	No
Geisha distinctissima (Walker) [Hemiptera: Flatidae]	Green broad-winged planthopper	No (USDA, 1997; MAFF 2001)	Not applicable	Not applicable	No
Glaucias subpunctatus (Walker) [Hemiptera: Pentatomidae]	Polished green stink bug	Yes (Anonymous, 2004m)	No	Quarantine pest	Yes
Grapholita molesta (Busck) Syn = *Cydia molesta* (Busck) [Lepidoptera: Tortricidae]	Oriental fruit moth	Yes (CAB International, 2002)	Yes (persimmons from the USA)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Graptopsaltria nigrofuscata (Motschulsky)	Large brown cicada	No (USDA, 1997)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Gymnoscelis rufifasciata Haworth [Lepidoptera: Geometridae]	Geometrid moth, Double-striped pug	No (PPIS, 2002)	Not applicable	Not applicable	No
Halyomorpha halys Stål Syn = *Halyomorpha mista* (Uhler); *Halyomorpha brevis ; Halyomorpha picus* [Hemiptera: Pentatomidae]	Brown marmorated stink bug	Yes (Kawada and Kitamura, 1983; Hoebeke, 2002; CAB International, 2003)	No	Quarantine pest	Yes
Haplothrips chinensis Priesner [Thysanoptera: Phlaeothripidae]	Thrips	No (Broughton and De Lima, 2002)	Not applicable	Not applicable	No
Holochlora japonica Brunner von Wattenwyl	Japanese broad-winged katydid; fruit-tree katydid	No (USDA, 1997)	Not applicable	Not applicable	No
Holotrichia morosa Walker [Coleoptera: Scarabaeidae: Melolonthinae]	Scarab beetle	No (Booth *et al*., 1990)	Not applicable	Not applicable	No
Homalogonia obtusa (Walker) [Hemiptera: Pentatomidae]		No (Funayama, 2002)	Not applicable	Not applicable	No
Homoeocerus dilatus Horváth [Hemiptera: Coreidae]	Squash bug	No (Schuh and Slater, 1995)	Not applicable	Not applicable	No
Homoeocerus unipunctatus (Thunberg) [Hemiptera: Coreidae]	Squash bug	No (Mitchell, 2000)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Homona magnanima Diakonoff [Lepidoptera: Tortricidae]	Oriental tea tortrix	Yes (MAFF, 1992)	Yes (AQIS, 1998)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Hoshinoa longicellana Walsingham Syn = *Archips longicellana* Walsingham [Lepidoptera: Tortricidae]	Common apple leafroller	No (USDA, 1997)	Not applicable	Not applicable	No
Howardia biclavis (Comstock) [Hemiptera: Diaspididae]	Mining scale	No (CAB International, 2003; Miller and Gimpel, 2001)	Not applicable	Not applicable	No
Hyphantria cunea (Drury) [Lepidoptera: Arctiidae]	Fall webworm, Mulberry moth	No (CAB International, 2003; AQIS, 1998)	Not applicable	Not applicable	No
Hypocala deflorata (Fabricius) Syn = *Hypocala moorei* Butler [Lepidoptera: Noctuidae]	Noctuid moth	No (Beeson, 1941; Robinson *et al.*, 2001)	Not applicable	Not applicable	No
Hypocala subsatura Guenée [Lepidoptera: Noctuidae]	Noctuid moth	No (Beeson, 1941)	Not applicable	Not applicable	No
Hypothenemus amakusanus Murayama [Coleoptera: Curculionidae, Scolytinae]		No (Booth *et al*., 1990)	Not applicable	Not applicable	No
Hypothenemus eruditus Westwood [Coleoptera: Scolytidae]	Bark beetle	No (USDA, 1997)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Lagoptera juno (Dalman) [Lepidoptera : Noctuidae]	Rose of sharon leaf-like moth; Fruit-piercing moth	Yes (USDA, 1997)	Yes (AQIS, 1998 &1999)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Lelia decempunctata (Motschulsky) [Hemiptera: Pentatomidae]		No (MAFF, 1989)	Not applicable	Not applicable	No
Lemyra imparilis (Butler) Syns = *Diacrisia imparilis* (Butler); *Spilarctia imparilis* Butler; *Spilosoma imparilis* (Butler); *Thanatarctia imparilis* (Butler); *Lemyra jezoensis* (Matsumura) [Lepidoptera: Arctiidae]	Mulberry tiger moth	No (Holloway *et al.*, 1987)	Not applicable	Not applicable	No
Lepidosaphes conchiformis (Gmelin) Syn = *Lepidosaphes conchiformioides* Borchsenius [Hemiptera: Diaspididae]	Pear oystershell scale	Yes (USDA, 1997)	Yes (persimmons from the USA)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Lepidosaphes cupressi Borchsenius Syns = *Lepidosaphes foliicola* Borchsenius; *Cornuaspis cupressi* Borchsenius. [Hemiptera: Diaspididae]		No (Xu *et al.,* 1995)	Not applicable	Not applicable	No
Lepidosaphes tubulorum Ferris [Hemiptera: Diaspididae]	Dark oystershell scale	No (USDA, 1997)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Leptocorisa chinensis (Dallas) [Hemiptera: Alydidae]	Rice bug	No (Ito, 1986; Panizzi *et al.*, 2000)	Not applicable	Not applicable	No
Lixus ornatus Reiche [Coleoptera: Curculionidae]	Weevil	No (PPIS, 2002)	Not applicable	Not applicable	No
Lobesia botrana Denis & Schiffermüller Syn = *Polychrosis botrana* Schiff. [Lepidoptera: Tortricidae]	European/Mediterranean grape berry/vine moth	Yes (PPIS, 2002)	No	Quarantine pest	Yes
Lopholeucaspis japonica (Cockerell) [Hemiptera: Diaspididae]	Japanese baton-shaped scale	Yes (CAB International, 2003; Murakami, 1970)	Yes (AQIS, 1998 & 1999)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Lygocoris spinolai (Meyer-Dür) Syn = *Apolygus spinolai* (Meyer-Dür) [Hemiptera: Miridae]		No (Wrzesinska *et al.*, 2001)	Not applicable	Not applicable	No
Lymantria dispar japonica Motschulsky [Lepidoptera: Lymantriidae]	Asian gypsy moth	No (USDA, 1997)	Not applicable	Not applicable	No
Lymantria mathura Moore [Lepidoptera: Lymantriidae]	Pink gypsy moth	No (USDA, 1997)	Not applicable	Not applicable	No
Machaerotypus sibiricus (Lethierry) [Hemiptera: Membracidae]	Brown treehopper	No (Metcalf and Flint, 1962)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Maladera castanea (Arrow) [Coleoptera: Scarabaeidae]	Asiatic garden beetle	No (USDA, 1997)	Not applicable	Not applicable	No
Maladera matrida Argaman [Coleoptera: Scarabaeidae]	Khomeini beetle	No (PPIS, 2002)	Not applicable	Not applicable	No
Maladera orientalis Motschulsky [Coleoptera: Scaraaeidae]	Smaller velvety chafer	No (USDA, 1997)	Not applicable	Not applicable	No
Mamestra brassicae (Linnaeus) [Lepidoptera: Noctuidae]	Cabbage armyworm	No (Sannino and Espinosa, 1999; Mazzei *et al.*, 2004)	Not applicable	Not applicable	No
Megacopta punctatissimum (Montandon) [Hemiptera: Plataspidae]		No (CAB International, 2003; Tayutivutikul and Yano, 1990; Takagi and Murakami, 1997)	Not applicable	Not applicable	No
Megalurothrips distalis (Karny) [Thysanoptera: Thripidae]		No (CAB International, 2003)	Not applicable	Not applicable	No
Melanotus legatus Candeze [Coleoptera: Elateridae]	Pectinate-horned click beetle	No (USDA, 1997)	Not applicable	Not applicable	No
Melolontha frater Arrow [Coleoptera: Scarabaeidae]	Larger frosted chafer	No (USDA, 1997)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Melolontha japonica Burmeister [Coleoptera: Scarabaeidae: Melolonthinae]	Japanese cockchafer	No (Booth *et al*., 1990)	Not applicable	Not applicable	No
Menida violacea Motschulsky [Hemiptera: Pentatomidae]		No (Yanagisawa and Hara, 1994; Tada *et al*., 2001)	Not applicable	Not applicable	No
Menophra senilis (Butler) [Lepidoptera: Geometridae]		No (Common, 1990; Holloway *et al.* 1987)	Not applicable	Not applicable	No
Microleon longipalpis Butlerlong [Lepidoptera: Limacodidae]]	Palpi cochlid	No (USDA, 1997)	Not applicable	Not applicable	No
Milviscutulus mangiferae Green Syn = *Protopulvinaria mangiferae; Coccus mangiferae* [Hemiptera: Coccidae]	Mango shield scale, Mango scale	No (PPIS, 2002)	Not applicable	Not applicable	No
Mimadoretus mutans (Newman) Syn = *Popillia mutans* Newman [Coleoptera: Scarabaeidae: Rutelinae]	Scarab beetle	No (Booth *et al*., 1990)	Not applicable	Not applicable	No
Mimela splendens Gyllenhal [Coleoptera: Scarabaeidae]	Scarab beetle	No (Booth *et al.* 1990)	Not applicable	Not applicable	No
Monema flavescens Walker [Lepidoptera: Limicodidae]	Oriental moth	No (NPQS, 1993)	Not applicable	Not applicable	No

Scientific name	**Common name(s)**	**Associated with fruit**[5]	**Considered under existing policies**	**Quarantine status**	**Consider pest further for risk assessment / risk management**[6]
Narosoideus flavidorsalis (Staudinger) [Lepidoptera: Limacodidae]	Pear stinging caterpillar	No (USDA, 1997)	Not applicable	Not applicable	No
Neocoenorrhinus interruptus (Voss) Syn = *Rhodocyrtus interruptus* (Voss) [Coleoptera: Rhynchitidae]	Weevil	No (Anonymous, 2004g; Zimmerman, 1994)	Not applicable	Not applicable	No
Nezara antennata Scott [Hemiptera: Pentatomidae]	Green stink bug	Yes (MAFF, 1992)	Yes (BA, 2004)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Nymphalis xanthomela Denis & Schiffermüller [Lepidoptera: Nymphalidae]	Willow nymphalid	No (USDA, 1997)	Not applicable	Not applicable	No
Odites leucostola (Meyrick) [Lepidoptera: Lecithoceridae]	Lecithocerid moth	No (Common, 1990)	Not applicable	Not applicable	No
Odites lividula Meyrick [Lepidoptera: Lecithoceridae]	Lecithocerid moth	No (Common, 1990)	Not applicable	Not applicable	No
Oraesia emarginata (Fabricius) Syns = *Calpe emarginata* (Fabricius); *Calyptra emarginata* (Fabricius); *Noctua emaraginata* Fabricius [Lepidoptera: Noctuidae]	Small oraesia, Fruit-piercing moth	No (Ogihara *et al.* 1992; Ogihara *et al.* 1996)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Oraesia excavata (Butler) Syns = *Calpe excavata* Butler; *Calyptra excavata* Butler [Lepidoptera: Noctuidae]	Reddish oraesia, Fruit-piercing moth	No (Zhang, 1994; Robinson *et al.*, 2001)	Not applicable	Not applicable	No
Orgyia thyellina Butler [Lepidoptera: Lymantriidae]	Japanese tussock moth	No (MAFF, 1992)	Not applicable	Not applicable	No
Orosanga japonicus (Melichar) [Hemiptera: Ricaniidae]	Ricaniid	No (Anonymous, 2004k)	Not applicable	Not applicable	No
Pachazia fuscata albomaculata (Uhler) [Hemiptera: Ricaniidae]		No (Anonymous, 2004k)	Not applicable	Not applicable	No
Pagaronia guttigera (Uhler) [Hemiptera: Cicadellidae]	Yellow mulberry leafhopper	No (MAFF, 1989)	Not applicable	Not applicable	No
Pandemis heparana (Denis & Schiffermüller) [Lepidoptera: Tortricidae]	Fruit-tree tortrix	No (MAFF, 1992)	Not applicable	Not applicable	No
Panonychus citri (McGregor) [Acarina: Tetranychidae]	Citrus red mite	Not likely (CAB International, 2003; Smith *et al*., 1997)	Not applicable	Not applicable	No
Panonychus ulmi (Koch) [Acarina: Tetranychidae]	European red mite	No (CAB International, 2002)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Parabemisia myricae (Kuwana) [Hemiptera: Aleyrodidae]	Japanese bayberry whitefly	No (PPIS, 2002; CAB International, 2003)	Not applicable	Not applicable	No
Parasa consocia Walker Syn =*Latoia consocia* (Walker) [Lepidoptera: Limacodidae]	Green cochlid	No (AQIS, 1998)	Not applicable	Not applicable	No
Parasa sinica Moore Syn = *Latoia sinica* (Moore)) [Lepidoptera: Limacodidae]	Chinese cochlid	No (AQIS, 1998)	Not applicable	Not applicable	No
Parlatoria pergandii Comstock [Hemiptera: Diasididae]	Black parlatoria scale	Yes (CAB International, 2002)	Yes (persimmons from the USA)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Parthenolecanium corni (Bouché) Syn = *Lecanium corni* (Bouché) [Hemiptera: Coccidae]	Peach scale	No (CAB International, 2003)	Not applicable	Not applicable	No
Penthimia nitida Lethierry [Hemiptera: Cicadellidae]		No (MAFF, 1989)	Not applicable	Not applicable	No
Percnia albinigrata Warren [Lepidoptera: Geometridae]	Looper	No (USDA, 1997)	Not applicable	Not applicable	No
Percnia giraffata (Guenée) [Lepidoptera: Geometridae]	Spotted persimmon looper	No (USDA, 1997)	Not applicable	Not applicable	No

Scientific name	**Common name(s)**	**Associated with fruit**[5]	**Considered under existing policies**	**Quarantine status**	**Consider pest further for risk assessment / risk management**[6]
Phenacoccus aceris (Signoret) [Hemiptera: Pseudococcidae]	Apple mealybug	No (Kosztarab, 1996)	Not applicable	Not applicable	No
Phenacoccus pergandei Cockerell [Hemiptera: Pseudococcidae]	Persimmon long wooly scale (in China)	Yes (Ueno, 1971)	Yes (AQIS, 1998)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Phrixolepia sericea Butler [Lepidoptera: Limacodidae]	Tea cochlid	No (Aoki, 2003a; NFIS, 2000)	Not applicable	Not applicable	No
Planococcus kraunhiae (Kuwana) [Hemiptera: Pseudococcidae]	Japanese mealybug	Yes (USDA, 1997)	Yes (AQIS, 1999)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Platypleura kaempferi (Fabricius) [Hemiptera: Cicididae]	Kaempfer cicada	No (AQIS, 1998)	Not applicable	Not applicable	No
Plautia stali Scott [Hemiptera: Pentatomidae]	Brown-winged stink bug	No (USDA, 1997)	Not applicable	Not applicable	No
Pleuroptya chlorophanta Butler [Lepidoptera: Pyralidae]	Three striped pyralid?	No (USDA, 1997)	Not applicable	Not applicable	No
Ponticulothrips diospyrosi Haga & Okajima [Thysanoptera: Phlaeothripidae]	Japanese gall forming thrips	Yes (Lee *et al*., 2002b)	Yes (AQIS, 1998)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)

Scientific name	**Common name(s)**	**Associated with fruit[5]**	**Considered under existing policies**	**Quarantine status**	**Consider pest further for risk assessment / risk management[6]**
Popillia japonica Newman Syn = *Maladera japonica* (Motschulsky) [Coleoptera: Scarabaeidae]	Chafer	No (Fleming, 1972; CAB International, 2003; USDA, 1997)	Not applicable	Not applicable	No
Protaetia brevitarsis Lewis [Coleoptera: Scarabaeidae]	Scarab beetle	No (Booth *et al*. 1990)	Not applicable	Not applicable	No
Pseudaonidia duplex (Cockerell) [Hemiptera: Diaspididae]	Camphor scale	Yes (MAFF, 1992)	Yes (AQIS, 1998 & 1999)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Pseudaulacaspis pentagona (Targioni-Tozzetti) [Hemiptera: Diaspididae]	Peach white scale	Yes (CAB International, 2002)	Yes (AQIS, 1995)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Pseudocneorhinus obesus Roelofs [Coleoptera: Curculionidae]		No (Baker *et al*., 1996)	Not applicable	Not applicable	No
Pseudococcus comstocki (Kuwana) [Hemiptera: Pseudococcidae]	Comstock mealybug	No (MAFF, 2001)	Not applicable	Not applicable	No
Pseudococcus cryptus Hempel [Hemiptera: Pseudococcidae]	Citriculus mealybug, cryptic mealybug	Yes (PPIS, 2002)	No	Quarantine pest	Yes
Psyche niphonica (Hori) Syn = *Fumea niphonica* Hori [Lepidoptera: Psychidae]	Persimmon bagworm	No (Holloway *et al*., 1987)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Ptycholoma lecheana circumclusana (Christoph) [Lepidoptera: Tortricidae]	Persimmon leafroller	No (USDA, 1997)	Not applicable	Not applicable	No
Pulvinaria aurantii Cockerell Syns = *Lecanium notatum* Maskell; *Coccus notatus* Fernald; *Chloropulvinaria aurantii* Borchsenius; *Pulvinaria notatum* Takahashi [Homoptera: Coccidae]	Cottony citrus scale	No (APHIS, 1997)	No	Not applicable	No
Pulvinaria citricola Kuwana Syns = *Pulvinaria nipponica* Lindinger; *Eupulvinaria citricola* Borchsenius [Hemiptera: Coccidae]	Cottony citrus scale	No (Vranjic, 1997)	No	Not applicable	No
Pulvinaria idesiae Kuwana Syns = *Eupulvinaria idesiae* Borchsenius [Hemiptera: Coccidae]		No (Kawai, 1980)	No	Not applicable	No
Pulvinaria kuwacola Kuwana [Hemiptera: Coccidae]	Cottony mulberry scale	No (Ben-Dov, 1993)	Not applicable	Not applicable	No
Retithrips syriacus (Mayet) [Thysanoptera: Thripidae]	Black black vine trips; castor thrips; grape thrips	Yes (PPIS, 2002)	No	Quarantine pest	Yes
Ricania japonica Melichar [Hemiptera: Ricaniidae]	Japanese leafhopper	No (USDA, 1997)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Riptortus clavatus (Thunberg) [Hemiptera: Alydidae]	Bean bug	No (USDA, 1997)	Not applicable	Not applicable	No
Saissetia citricola Kuwana Syns = *Takahashia citricola* Kuwana; *Saissetia citricola* Takahashi and Tachikawa; *Parasaissetia citricola* Yang. [Hemiptera: Coccidae]		No (Kawai, 1980)	No	Not applicable	No
Samaria ardentella Ragonot [Lepidoptera: Pyralidae]	Camellia webworm	No (Anonymous, 2004j; Holloway *et al.* 1987)	Not applicable	Not applicable	No
Scolytoplatypus mikado Blandford [Coleoptera: Scolytinae]	Mikado ambrosia beetle	No (Booth *et al*, 1990)	Not applicable	Not applicable	No
Scolytus japonicus Chapuis [Coleoptera: Scolytinae]	Japanese bark beetle	No (Anonymous, 2004a)	Not applicable	Not applicable	No
Scopelodes contracta Walker [Lepidoptera: Limacodidae]	Small blackish cochlid	No (Common, 1990)	Not applicable	Not applicable	No
Sesamia nonagrioides (Lefevbre) [Lepidoptera: Noctuidae]	Mediterranean corn stalk borer, pink maize stalk borer	Yes (PPIS, 2002)	No	Quarantine pest	Yes
Sinoxylon japonicum Lesne [Coleptera: Bostrichidae]	Two-horned stem-boring beetle	No (Booth *et al*, 1990)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Sparganothis matsudai Yasuda [Lepidoptera: Tortricidae]		No (Wyniger, 1962)	Not applicable	Not applicable	No
Sparganothis pilleriana (Denis & Schiffermüller) [Lepidoptera: Tortricidae]	Grape berry moth	No (Carter, 1984)	Not applicable	Not applicable	No
Spilarctia subcarnea (Walker) Syn = *Spilosoma subcarnea* Walker [Lepidoptera: Arctidae]	Tiger moth	No (USDA, 1997)	Not applicable	Not applicable	No
Spilosoma flammeolum (Moore) [Lepidoptera: Arctiidae]		No (Wyniger, 1962)	Not applicable	Not applicable	No
Spilosoma lubricipeda (Linnaeus) [Lepidoptera: Arctidae]	White ermine moth	No (USDA, 1997)	Not applicable	Not applicable	No
Spilosoma punctaria (Stoll) [Lepidoptera: Arctidae]	Red belly black-dotted arctiid	No (USDA, 1997)	Not applicable	Not applicable	No
Stathmopoda masinissa Meyrick [Lepidoptera: Oecophoridae]	Persimmon fruit moth	Yes (USDA, 1997)	Yes (AQIS, 1998 & 1999)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Stephanitis takeyai (Drake & Maa) (Syn. = *Tingis globulifera* Matsumura) [Hemiptera: Tingidae]	Andromeda lacebug	No (Nielsen, 1997; Hommes *et al*., 2003)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Synanthedon tenuis Butler Syn =*Conopia tenuis* Butler [Lepidoptera: Sessiidae]	Smaller clearwing moth	No (USDA, 1997)	Not applicable	Not applicable	No
Takahashia japonica (Cockerell) [Hemiptera: Coccidae]	String cottony scale	No (USDA, 1997)	Not applicable	Not applicable	No
Tenuipalpus japonicus Nishio [Acarina: Tenuipalpidae]	Tenuipalpid mite	No (Jeppson *et al*., 1975)	Not applicable	Not applicable	No
Tenuipalpus zhizhilashvilliae Rekk [Acarina: Tenipalpidae]	Persimmon false spider mite	Yes (USDA, 1997)	No	Quarantine pest	Yes
Tetranychus kanzawai Kishida [Acarina: Tetranychidae]	Kanzawai spider mite	No (USDA, 1997; CAB International, 2002)	Not applicable	Not applicable	No
Thrips coloratus Schmutz Syn = *Thrips aligherini* Girault [Thysanoptera: Thripidae]	Thrips	No (Palmer *et al*., 1989)	Not applicable	Not applicable	No
Tropidothorax beloglowi Jakovlev [Hemiptera: Lygaeidae]	Lygaeid bug	No (Lee *et al*., 1994)	Not applicable	Not applicable	No
Tropidothorax cruciger Motschulsky [Hemiptera: Lygaeidae]	Lygaeid bug	No (Lee *et al*., 1994)	Not applicable	Not applicable	No
Vespa crabro (Linneaus) [Hymenoptera: Vespidae]	Spotted giant hornet	No (AQIS, 1998)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Vespa mandarinia Smith [Hymenoptera: Vespidae]	Yellow jacket	No (USDA, 1997)	Not applicable	Not applicable	No
Vespa simillima xanthoptera Cameron [Hymenoptera: Vespidae]	Yellow hornet	No (USDA, 1997)	Not applicable	Not applicable	No
Xylena fumosa (Butler) [Lepidoptera: Noctuidae]	Rape caterpillar	No (Aoki, 2003c)	Not applicable	Not applicable	No
Xylosandrus brevis (Eichhoff) [Coleoptera: Cuculionidae]	Short-winged bark beetle	No (USDA, 1997)	Not applicable	Not applicable	No
Xylosandrus germanus (Blandford) [Coleoptera: Curculionidae]	Alnus ambrosia beetle	No (Booth *et al.* 1990)	Not applicable	Not applicable	No
Zeuzera leuconotum Butler [Lepidoptera: Coccidae]	Wood leopard moth	No (Common, 1990)	Not applicable	Not applicable	No
Zeuzera multistrigata Moore [Lepidoptera: Cossidae]	Oriental leopard moth	No (Holloway *et al.*, 1987)	Not applicable	Not applicable	No
NEMATODA					
Basiria graminophila Siddiqi [Tylenchida: Tylenchidae]	Nematode	No (no information found)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Pratylenchus loosi Loof [Tylenchida: Pratylenchidae]	Root lesion nematode	No (CAB International, 2002)	Not applicable	Not applicable	No
FUNGI					
Botryosphaeria dothidea (Moug.: Fr.) Ces. & De Not. [Dothideales: Botryosphaeriaceae]	Canker	No (CAB International, 2003; Brown-Rytlewski and McManus, 1999; Michailides and Morgan, 2004; Anderson *et al.*, 2000)	Not applicable	Quarantine pest	No
Botrytis diospyri Brizi [Helotiales: Sclerotiniaceae]	Fruit rot; Leaf spot	Yes (Dzhalagoniya, 1990)	No	Quarantine pest	Yes
Capnophaeum fuliginodes (Rehm) Yamamoto[#] [Loculoascomycetes: Dothideales]	Sooty mould	Yes (MAFF, 1985)	No	Non-Quarantine pest.	No
Cercospora fuliginosa Ellis S & Kellerman ['mitosporic fungi': Hyphomycetes]	Anthracnose	No (MAFF, 2001)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Cercospora kaki Ellis and Everhart ['mitosporic fungi': Hyphomycetes]	Angular leaf spot on leaves	No (USDA, 1997)	Not applicable	Not applicable	No
Cercospora kakivora Hara ['mitosporic fungi': Hyphomycetes]	Leaf spot	No (MAFF, 2001)	Not applicable	Not applicable	No
Fusicladium levieri Magnus Syn = *Fusicladium diospyrae* Hori & Yoshida [Dothideales: Venturiaceae]	Black spot	No (only infects leaves, twigs or immature fruit (MAFF, 1987))	Not applicable	Not applicable	No
Helicobasidium mompa Tanaka [Auriculariales: Auriculariaceae]	Violet root rot	No (Sayama *et al.*, 1994)	Not applicable	Not applicable	No
Macrophoma kaki Hara ['mitosporic fungi': Coelomycetes]		No (USDA, 1997; MAFF, 2001)	Not applicable	Not applicable	No
Monilinia fructigena Honey [Leotiales: Sclerotiniaceae]	Brown rot	Yes (CAB International, 2002)	Yes (AQIS, 1999)	Quarantine pest	Yes (current risk management measures for this pest will be adopted)
Monochaetia diospyri Yoshii [Ascomycetes: Incertae sedis]	Large leaf spot	No (Guba, 1961)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Mycosphaerella nawae (Sydow) Hiura and Ikata [Dothideales: Mycosphaerellaceae]	Circular leaf spot of persimmon	No (USDA, 1997)	Not applicable	Not applicable	No
Myxosporium kaki Hara [Ascomycetes: Incertae sedis]		Yes (Watson, 1971)	No	Quarantine pest	Yes
Pestalotiopsis longiaristata (Maubl.) Kausar Syn = *Pestalotia longi-aristata* Maubl. [Xylariales: Amphisphaeriaceae]		No (Nag Raj, 1993)	Not applicable	Not applicable	No
Pestalotia diospyri Sydow ['mitosporic fungi': Coelomycetes]	Leaf spot	No (USDA, 1997)	Not applicable	Not applicable	No
Pestalotia theae Sawada Syn = *Pestalotiopsis theae* (Saw.) Steyeart ['mitosporic fungi': Coelomycetes]	Ringspot, tea grey blight	No (USDA, 1997)	Not applicable	Not applicable	No
Pestalotiopsis breviseta (Sacc.) Steyaert Syn. = *Pestalotia breviseta* [Xylariales: Amphisphaeriaceae]		No (Nag Raj, 1993; Schuster, 2004)	Not applicable	Not applicable	No
Pestalotiopsis kaki Ellis & Everhart	Leaf spot	No (Kim *et al.* 1997)	Not applicable	Not applicable	No

Scientific name	**Common name(s)**	**Associated with fruit**[5]	**Considered under existing policies**	**Quarantine status**	**Consider pest further for risk assessment / risk management**[6]
Pestalotiopsis longiseta (Speg.) K. Dai & Ts. Kobay. [Xylariales: Amphisphaeriaceae]	Leaf spot	No (Chang *et al.* 1997; Kim *et al.* 1997)	Not applicable	Not applicable	No
Phoma kakivora Hara ['mitosporic fungi': Coelomycetes]	Phoma spot	Yes (Yamada, 1966)	No	Quarantine pest	Yes
Phoma loti Cooke ['mitosporic fungi': Coelomycetes]		No (MAFF, 2001)	Not applicable	Not applicable	No
Phomopsis rojana Linnaeus ['mitosporic fungi': Coelomycetes]		No (MAFF, 2001)	Not applicable	Not applicable	No
Phyllactinia guttata (Wallr. : Fries) Leveille Syn =*Phyllactinia kakicola* Sawada; *Phyllactinia corylea* (Persoon) Karsten [Erysiphales: Erysiphaceae]	Powdery mildew	No (NPQS, 1993)	Not applicable	Not applicable	No
Physalospora kaki Hara [Amphisphisphaeriales: Hyponectriaceae]	Leaf curl	No (MAFF, 2001)	Not applicable	Not applicable	No
Pseudocercospora diospyri-morrisianae Sawada ex Goh & W.H. Hsieh Syn. = *Cylindrosporium kaki* [Mycosphaerellales: Mycosphaerellaceae]	Angular leaf spot	No (Shin and Shin, 1995; Sawada, 1943)	Not applicable	Not applicable	No

Scientific name	Common name(s)	Associated with fruit[5]	Considered under existing policies	Quarantine status	Consider pest further for risk assessment / risk management[6]
Rosellinia necatrix Prill (teleomorph) Syn = *Dematophora necatrix* R. Hartig (anamorph) [Xylariales: Xylariaceae]	White root rot	No (CAB International, 2002)	Not applicable	Not applicable	No
Scorias communis Yamamoto[#] [Dothidiales: Capnodiaceae]	Sooty mould	Yes (MAFF, 1985)	No	Non-Quarantine pest	No
*Septogloeum kak*i (Sydow) Hara [Dothideales: Mycosphaerellaceae]	Leaf spot	No (MAFF, 2001)	Not applicable	Not applicable	No
Tripospermum juglandis (Trumen) Spgazzini[#] ['mitosporic fungi': Hyphomycetes]	Sooty mould	Yes (MAFF, 2001)	No	Non-Quarantine pest	No

[5] Describes whether the pest is associated with the pathway.

[6] Pests that are known to be associated with fresh persimmon fruit and either not present in Australia or present but not widely distributed and under offical control, are to be considered further in the risk analysis

Sooty mould is the common name applied to several species of fungi that grow on honeydew secretions on plant parts and other surfaces (Laemmlen, 2003). Sucking insects are the primary cause of sooty mould growth. Sooty moulds are normally considered to be a cosmetic or aesthetic problem (Nameth *et al*, 2003). They do not infect plants but grow on surfaces where honeydew deposits accumulate and can indirectly damage the plant by coating the leaves. In extremely severe cases, it is possible for the black sooty growth to block enough sunlight to interfere with photosynthesis (Nameth *et al*, 2003). Fruits or vegetables covered with sooty moulds are edible and can be removed with a solution of mild soap and warm water wash (Laemmlen, 2003).

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APPENDIX 3: PEST DATA SHEETS

3.1 Arthropods

3.1.1 *Halyomorpha halys* Stål (Brown marmorated stink bug) [Hemiptera: Pentatomidae]

Synonyms and change in combination: *Halyomorpha mista* Uhler; *Halyomorpha mysta* Uhler; *Halyomorpha brevis*; *Halyomorpha picus*.

Common name(s): brown marmorated stinkbug, East Asian stink bug, yellow-brown stinkbug.

Hosts: *Halyomorpha halys* has a large host range that includes ornamental plants and trees, shade and fruit trees, vegetables, pulses and leguminous crops (Hamilton, 2003; Hoebeke, 2002; Kawada and Kitamura, 1983a, b).

Hosts include: *Acer platanoides* (Norway maple) (Hamilton, 2003), *Arctium* spp. (burdock) (Hoebeke, 2002), *Asparagus officinalis* (asparagus) (Hamilton, 2003), *Basella alba* (Indian spinach) (Hoebeke, 2002), *Buddleia* sp. (butterfly bush) (Hamilton, 2003), *Celosia argentea* (quailgrass) (Hoebeke, 2002), *Citrus* sp. (Shiraki, 1952), *Diospyros kaki* (persimmon) (Chung *et al*., 1992), *Ficus* sp. (fig) (Shiraki, 1952), *Glycine max* (soybean) (Son *et al*., 2000), *Hibiscus rosa-sinensis* (rose-of-China) (Hoebeke, 2002), *Ilex opaca* (American holly) (Hamilton, 2003), *Malus domestica* (apple) (Funayama, 1996), *Malus sylvestris* (crab apple) (Hamilton, 2003), *Morus* spp. (mulberry) (Yoshii and Yokoi, 1984), *Paulownia catalpifolia* (Yuan, 1984), *Paulownia elongata* (Yuan, 1984), *Paulownia fortunei* (Yuan, 1984), *Paulownia kawakamii* (Yuan, 1984), *Paulownia* spp. (Yuan, 1984), *Phaseolus vulgaris* var. *vulgaris* (string bean) (Hamilton, 2003), *Prunus avium* (cherry) (Watanabe, 1996), *Prunus mume* (Japanese apricot) (Shiraki, 1952), *Prunus persica* (peach) (Shiraki, 1952), *Pyracantha* sp. (firethorn) (Hamilton, 2003), *Pyrus pyrifolia* (pear) (Shiraki, 1952), *Rubus idaeus* (raspberry) (Hamilton, 2003), *Solanum nigrum* (black nightshade) (Hoebeke, 2002), *Ziziphus jujuba* (jujube) (Anon., 2001).

Plant part affected: Flowers, stems and pods of various beans (Hoebeke, 2002); fruit (Anon., 2001; Hoebeke, 2002), leaves (Hamilton, 2003), stems (Hoebeke, 2002) and shoots (Yoshii and Yokoi, 1984).

Distribution: China (Yuan, 1984), Japan (Watanabe, 1996), Korea (Chung *et al*., 1992; Son *et al*., 2000), Taiwan (Hoebeke, 2002), USA (Hamilton, 2003).

Biology

Life History: Adults are shield shaped and approximately 12-17 mm long. They are dark “marbled” brown in colour with characteristic whitish antennal segments and darker bands on the membranous, overlapping part, at the rear of the wings. Adults also have patches of coppery or bluish metallic-coloured punctures (small rounded depressions) on the head and pronotum. Scent glands are located on the dorsal surface of the abdomen and the underside of the thorax and are responsible for producing the pungent odour that characterizes "stink bugs."

In Japan, overwintered adults emerge from their hibernation sites in early spring i.e. beginning of June (Jacobs, 2003). Mating and egg laying do not start until about two weeks after adults emerge from overwintering sites (Hoebeke, 2002). Under laboratory conditions, 14-15 days are needed from the time the stink bugs moult to the adult stage until they become sexually mature (Hoebeke, 2002). Sexually mature females usually mate on multiple occasions, as many as five times per day. Females oviposit eggs from early June to late August (Kawada and Kitamura, 1983b). The eggs are elliptical (1.6 × 1.3 mm) and light green to light yellow to yellow-red in colour. Eggs are laid, attached and side-by-side, in clusters of 20 to 30 on the underside of leaves (Hamilton, 2003). They hatch in 4-5 days after deposition.

There are five nymphal instars (immature stages) before reaching adulthood. Immatures (or nymphs) are characterised by dark red eyes. First instar nymphs are 2.4 mm long and have a yellowish-red abdomen. In later instars, the abdomen gradually turns to an off-white colour with reddish spots. The fifth instar is approximately 12 mm in length. In the laboratory with light and dark periods set at 16 and 8 hours, respectively, and the temperature at 25°C, the nymphal stage ranged from 29 to 54 days on soybean (Kodosawa and Santa, 1981). In May, young nymphs are collected at weedy sites (Chinzoumou, undated). For many hemipterans, the total time required for the development of a complete generation varies from a minimum of 62 days to a maximum of 190 days; the average time is 112 days, or just under four months (Ball, 1920).

In Korea and Japan, emerging adults of the first generation are generally observed from early to mid-August to early or mid-September, respectively. Generally, only one generation is produced annually in most of Asia (Hoebeke, 2002). However, in parts of sub-tropical China, there are four to possibly six generations per year (Jacobs, 2003). In Asia, *H. halys* overwinters as adults and aggregates, sometimes in large numbers, on the outside of buildings when it is seeking hibernation sites in the fall (Hoebeke, 2002). The flight of *H. halys* to overwintering sites such as wall surfaces of buildings starts at the end of September and peaks around the third week in October (Hoebeke, 2002). Similar aggregation and flight behavior have been observed in Pennsylvania in the United States for *H. halys* in residential areas. This stinkbug is frequently captured by light-traps with a mercury lamp (Kawada and Kitamura, 1983b).

H. halys is a sucking insect that uses its proboscis to pierce the host plant in order to feed. Adults generally feed on fruit, while nymphs feed on leaves, stems and fruit (Hoebeke, 2002). Feeding by this insect causes the formation of small, necrotic areas on the outer surface of fruits and leaves of its hosts causing characteristic cat-facing injury in fruits such as apples and peaches (Hamilton, 2003). In Japan, adults and nymphs can cause serious yield loss by sucking sap from soybean seeds, and most adult feeding damage to 'Fuji' apples is from early to mid-August, with the fruit most susceptible to stylet injury during the thickening period; the actual feeding injury appears as pitting and discoloration of the flesh (Funayama, 1996; Hoebeke, 2002).

In persimmon orchards in Korea, severe feeding symptoms include physical changes of the fruit, such as concaving of the surface or its becoming dark blue-black in a "bull's-eye" configuration and the flesh becoming soft and spongy (Chung *et al*., 1992; Hoebeke, 2002). When attack is severe, the fruit becomes soft and red like ripe fruit (Chung *et al*., 1992). The most serious damage was observed from late August to late October. In 1992 in the most commercially successful orchard, the damage rate was 10.8% (Chung *et al*., 1992). Peak occurrence of *H. halys* occurred in early August (Chung *et al*., 1992).

Paulownia witches' broom, one of the phytoplasma diseases, is also vectored or disseminated primarily by *H. halys*, and this malady can greatly reduce the growth and vigour of trees, with their severe decline causing premature death (Hoebeke, 2002). The wood of infected trees is of poor quality and is often unfit for commercial use (Nakamura *et al*., 1996). Paulownia witches'-broom causes severe damage in plantations in central and southern sections of in Japan (Anon., 2001). Axillary buds and shoots grow from May or June into late fall on part or all of the tree. Twigs and branches become weak and brittle. Leaves on diseased branches become abnormally thin, narrow, rough, and chlorotic. One- and two-year-old trees usually die within two years; older trees may survive for several years (Wilson and Seliskar, 1976).

In soybean in Korea, chemical control using fenitrothion, triazophos and carbaryl controlled stinkbugs by 83.4%, 69.5%, and 87.0%, respectively (Son *et al*., 2000). Seven insecticides have been tested against adult house-invading bugs: three pyrethroids (cyphenothrin, phenothrin, permethrin), three organophosphates (fenthion, fenitrothion, diazinon) and one carbamate (propoxur). The pyrethroids were effective against this stinkbug. Cyphenothrin was superior to other chemicals both in being fast-acting and having residual activity and propoxur was also fast-acting and had good residual activity. The organophosphates had little insecticidal activity under the experimental conditions (Watanabe *et al*., 1994).

The tachinid fly, *Bogosia* sp., is a parasitoid of the adult stinkbug. After the eggs are oviposited on the pronotum of the stinkbug, the larvae penetrate into the body to feed on the reproductive organs. The percent of parasitisation was 6.78% of 1,268 females and 6.15% of 1,090 males (Kawada and Kitamura, 1983b). The *Plautia stali* intestine virus (PSIV), a picorna-like virus isolated from the brown-winged stinkbug *Plautia stali*, also infects this stinkbug (Nakashima *et al*., 1998). The use of cultural control methods such as elimination of weed hosts and deep cultivation of the soil has been used to control stinkbugs in rice in Columbia (Perez *et al*., 1995).

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3.1.2 *Lobesia botrana* (Denis and Schiffermüller) [Lepidoptera: Tortricidae]

Synonyms and change in combination: *Coccyx botrana* Praun; *Cochylis botrana* Herrich-Schaffer; *Cochylis vitisana* Audouin; *Eudemis botrana* Frey; *Eudemis rosmarinana* Millière; *Grapholita botrana* Heinemann; *Lobesia rosmariana*; *Noctua romani* O. Costa; *Paralobesia botrana*; *Penthina vitivorana* Packard; *Polychrosis botrana* Ragonot; *Tinea premixtana* Hübner; *Tinea reliquana* Hübner; *Tortrix botrana* Denis and Schiffermüller; *Tortrix reliquana* Treitschke; *Tortrix romaniana* O. Costa; *Tortrix vitisana* Jacquin.

Common name(s): European grape vine moth, grape berry moth, grape fruit moth, grape leaf-roller, grape moth, grape vine moth, vine moth.

Hosts: *Actinidia chinensis* (Chinese gooseberry), *Arbutus unedo* (arbutus), *Berberis vulgaris* (European barberry), *Clematis vitalba* (traveller's-joy), *Cornus mas* (cornelian cherry), *Cornus sanguinea* (dogwood), *Daphne gnidium* (spurge flax), *Dianthus* spp. (carnation), *Diospyros kaki* (oriental persimmon),*Hedera helix* (ivy), *Ligustrum vulgare* (privet), *Lonicera tatarica* (Tatarian honeysuckle), *Menispermum canadense* (common moonseed), *Olea europaea* subsp. *europaea* (olive), *Parthenocissus quinquefolia* (Virginia creeper), *Prunus amygdalus* (hall's hardy almond), *Prunus avium* (gean), *Prunus domestica* (damson), *Prunus spinosa* (blackthorn), *Punica granatum* (pomegranate), *Ribes nigrum* (blackcurrant), *Ribes rubrum* (red currant), *Ribes uva-crispa* (gooseberry), *Rosmarinus officinalis* (rosemary), *Rubus caesius* (dewberry), *Rubus fruticosa* (blackberry), *Syringa vulgaris* (lilac), *Viburnum lantana* (wayfaring tree), *Vitis vinifera* (grapevine), *Ziziphus jujuba* (common jujube) (CAB International, 2002).

Plant part affected: On persimmons in Israel, *Lobesia botrana* causes external damage on fruit and infests flowers, buds, leaves, bark and vine (PPIS, 2002).

Distribution: Algeria, Armenia, Austria, Azerbaijan, Bulgaria, Cyprus, Czech Republic, Egypt, England, Eritrea, France, Georgia, Germany, Greece, Hungary, Iran, Iraq, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya, Lebanon, Libya, Luxembourg, Macedonia, Malta, Moldova, Morocco, Portugal, Romania, Slovakia, Slovenia, Spain, Switzerland, Syria, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia, not present in Korea (CAB International, 2002).

Biology

Life History:

L. botrana is a polyphagous pest, but grapevine is the main host. Persimmon is reported as a secondary host (CAB International, 2002). Pucat and Wallace (1995) reported that hosts other than stone fruit and grapevine have not been recently confirmed. Specific information on the damage caused on persimmon fruit is not available. The following description of damage symptoms refers to grapevine, on which symptoms largely depend on the phenological stage of the reproductive organs.

In Israel, *L. botrana* causes external damage on fruit and infests flowers, buds, leaves, bark and vine (PPIS, 2002). On inflorescences, neonate larvae penetrate single flower buds. Symptoms are not evident initially, because larvae remain protected by the top bud. Later, when larval size increases, each larva binds several flower buds together with silk forming glomerules that are visible to the naked eye. The larvae continue feeding whilst protected inside. Larvae usually make one to three glomerules during their development. Despite the hygienic behaviour of larvae, frass may remain adhering to the glomerules. On grapes, larvae feed externally and when the berries are a little desiccated, they penetrate them, bore into the pulp and remain protected by the berry peel. Larvae secure the pierced berries to surrounding ones with silk in order to avoid falling. Frass may also be visible. Each larva directly damages several berries, but if the conditions are suitable for fungal or acid rot development, a large number of berries placed around may be also affected. Damage is variety-dependent: generally it is more severe on grapevine varieties with dense grapes, because this increases both larval installation and rot development. On both inflorescences and grapes, several larvae may co-exist in a single reproductive organ. Larval damage on growing points, shoots or leaves is unusual.

The eggs of *L. botrana* are flat and measure 0.65-0.90 x 0.45-0.75 mm. Freshly laid eggs are pale cream in colour and later they become light grey and translucent with iridescent glints (Feytaud, 1924). Eggs are laid singly, and more rarely in small clusters of two or three. There are usually five larval instars. Neonate larvae are 0.95-1.00 mm long with a light yellow body. The head and prothoracic shield are deep brown/black in colour. Mature larvae reach a length of 10-15 mm and vary from light green to light brown in colour. The head and prothoracic shield of mature larvae are lighter than those of neonate larvae. Newly formed pupae are usually cream or light brown in colour but can also be light green or blue. A few hours later they become brown. Female pupae are larger (5-9 mm) than males (4-7 mm). Adults are 6-8 mm long with a wingspan of 10-13 mm. Adult size is greatly affected by larval food quality (Torres-Vila, 1995). The head and abdomen are cream coloured; the thorax is also cream with black markings and a brown ferruginous dorsal crest. The legs have alternate pale cream and brown bands. Forewings have a mosaic-shaped pattern with black, brown, cream, red and blue ornamentation. Hind wings are light brownish grey and darker towards the apex (CAB International, 2002).

There is no clear sexual dimorphism, but the sexes may be easily separated by their general morphology and behaviour. Males are smaller than females as they have a narrower abdomen with a fine anal comb of modified scales. When disturbed, males move more quickly than females (CAB International, 2002).

Moth activity including flight, feeding, calling, mating and egg-laying, is principally displayed at dusk, although some activity can also occur at daybreak or at any time on cloudy days. Water availability is necessary for adults to reach their potential reproductive output (Torres-Vila *et al.,* 1996b). One to three days after mating, females initiate oviposition on host reproductive organs. Females lay 300 or more eggs at a rate of more than 35 per day eggs during their lifetime. The eggs hatch in 7-11 days in spring, and in summer in 3-5 days (Exosect, 2003). Larvae have a considerable dispersal capacity and are able to reach reproductive organs placed around those selected for egg-laying by females (Torres-Vila *et al.,* 1997). Many young larvae die, but mortality among older larvae is very low (CFIA, 2003). Thus available food for larvae changes throughout the season according to the phenology of the host reproductive organs, and this may also affect to a great extent both survival (Torres-Vila *et al.,* 1992; Gabel and Roehrich, 1995) and reproductive output (Torres-Vila, 1995). Pest development ceases at temperatures below 10.5^{o}C (CFIA, 2003). After larval development, pupation occurs principally on leaves in non-diapausing individuals (1st and 2nd generations). Larval development averages 20-28 days whereas pupal development averages 12-14 days in non-diapaused individuals. Individuals from the last generation overwinter as diapausing pupae from autumn to the next spring, located under vine bark or stake crevices, and protected inside a cocoon more rigid than that of non-diapausing pupae. The cocoon reduces dehydration and weight loss in overwintering pupae, maintaining female potential fecundity (Torres-Vila *et al.,* 1996a). Abiotic factors may have a major effect on population dynamics of *L. botrana* at all insect stages. In particular, temperature acting on adult and larval stages regulates female fecundity (Bergougnoux, 1988; Torres-Vila, 1996); adult activity and longevity (Bovey, 1966); egg mortality (Coscollá *et al.,* 1986); and pupal mortality (Torres-Vila *et al.,* 1993). Temperature-induced dormancy has been reported in egg and larval stages (Tzanakakis *et al.,* 1988).

The moth has two generations per year in northern cold areas, and more usually three in southern temperate ones, although this general latitudinal pattern is often modified by the altitude-derived gradient and/or microclimatic conditions in a given area (CAB International, 2002).

Yield loss quantification on grape vines with larval damage to their inflorescences has been carried out using several approaches, including comparing naturally damaged and undamaged grapes (as inflorescences) by weighing or counting formed berries; artificial infestations with larvae; and damage simulation by direct ablation of flowers and berries (Roehrich, 1978; Coscollá, 1980; Gabel, 1989). Most studies show a high compensation capacity of grapevine, variable between vine varieties, supporting the presence of 1-4 glomerules, or the ablation of 30 flowers per inflorescence, without significant yield losses (Roehrich and Schmid, 1979). Larvae feeding on fruit directly reduces yield and contaminates the crop. More importantly, feeding by larvae creates infection sites for fruit rots and feeding by fruit flies (Exosect, 2003). Larval boring in grapes may promote a number of fungal rots including *Aspergillus*, *Alternaria*, *Rhizopus*, *Cladosporium*, *Penicillium* and especially the grey rot caused by *Botrytis cinerea* (Fermaud and Le Menn, 1989; Fermaud, 1990).

Lobesia botrana should be regarded as a potentially serious pest on a worldwide scale for all the vine-growing areas that are presently unaffected (CAB International, 2002).

Control: The abnormal distribution patterns of *Lobesia botrana* emphasize the inherent risk of new, undesired introductions when infested grapes and/or plant material are transported around the world. Phytosanitary control in commercialization channels should be enforced to limit further pest spread, especially in importer countries with favourable climatic conditions for pest development (CAB International, 2002).

Several cultural methods may reduce pest incidence to a highly variable degree. Voukassovitch (1924) listed some direct (pest-killing) and indirect (microclimate-modifying) practices to reduce *L. botrana* infestation levels, including pruning the vine canopy, leaf stripping, irrigation, earthing-up, weeding and especially harvesting date. However, cultural methods have limited efficacy by themselves, and are often inapplicable in major vineyards where possibilities of changing cultural schedules are restricted. Chemical control of eggs and larvae is the most widely used control method, due to high efficiency and low cost. Chemical control, by itself or included in Integrated Pest Management programmes, is at present necessary to keep *L. botrana* populations below the economic damage threshold.

Several broad-spectrum insecticides (organochlorines, carbamates, organophosphates and pyrethroids) are currently used to control *L. botrana*, but insect growth regulators and biological insecticides are also used. See Coscollá (1997) for a recent review of chemical control of *L. botrana*. In most situations Integrated Pest Management procedures are recommended against *L. botrana*, integrating all the available control methods in varying proportions, but with chemical control being, as far as possible, a minor component. Improvement of detection and inspection methods and accurate damage threshold establishment are used to enhance Integrated Pest Management programmes, which are being developed in most vine-growing countries

Parasitoids of *L. botrana* include: *Ascogaster quadridentata* attacking larvae in Austria, Germany, Italy and Russia; *Campoplex difformis* attacking larvae in Austria, Bulgaria, France, Germany, Italy, Russia and Spain; *Dibrachys affinis* attacking larvae and pupae in Algeria, Austria, France, Italy, Spain and Switzerland; *Dibrachys cavus* attacking larvae and pupae in Algeria, Austria, Bulgaria, France, Germany, Italy, Spain and Switzerland; *Hemiteles areator* attacking pupae in Austria, France, Germany, Italy, Russia and Algeria; *Pimpla turionellae* attacking larvae and pupae in Austria, France, Germany, Italy, Russia and Spain; *Trichogramma evanescens* attacking eggs in Austria, France, Germany, Italy, Russia, Spain and the Ukraine (CAB International, 2002).

Predators of *L. botrana* include:

Chrysopa carnea attacking eggs and larvae in Bulgaria, France, Russia, Spain and Italy (CAB International, 2002).

Pathogens of *L. botrana* include: *Beauveria bassiana* attacking larvae and pupae in France, Italy and Spain (CAB International, 2002).

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3.1.3 *Pseudococcus cryptus* (Hempel) [Hemiptera: Pseudococcidae]

Synonyms and changes in combination: *Dysmicoccus cryptus* Hempel; *Pseudococcus citriculus* Green.

Common name(s): cryptic mealybug, citriculus mealybug.

Host(s): *Artocarpus altilis* (breadfruit); *Artocarpus incisa* (breadfruit) (Ben-Dov, 1994); *Artocarpus odoratissimus* (tarap) (Lit, 1997); *Calophyllum inophyllum* (Alexandrian laurel); *Citrus aurantifolia* (lime); *Citrus aurantium* (bitter orange); *Citrus* × *paradisi* (grapefruit) (Ben-Dov, 1994); *Citrus reticulata* (mandarin) (CAB International, 2002); *Citrus reticulata* (mandarin); *Citrus sinensis* (sweet orange) (Ben-Dov, 1994); *Citrus unshiu* (Satsuma) (CAB International, 2002); *Citrus* sp. (Lit, 1997); *Cocos nucifera* (coconut); *Coffea arabica* (Arabian coffee) (Ben-Dov, 1994); *Coffea liberica* (Liberian coffee) (Williams and Watson, 1988); *Crinum asiaticum* (Asiatic poison lily) (Ben-Dov, 1994); *Dahlia* sp. (Williams and Granara de Willink, 1992); *Diospyros kaki* (PPIS, 2002), *Dillenia indica* (elephant-apple) (Ben-Dov, 1994); *Elaeis guineensis* (African oil palm) (Williams and Watson, 1988); *Erythrina* sp. (coral tree) (Ben-Dov, 1994); *Garcinia mangostana* (mangosteen) (Anon., 2000); *Gardenia* sp. (Ben-Dov, 1994); *Heliconia* sp. (Lit, 1997); *Hevea brasiliensis* (rubbertree) (Williams and Watson, 1988); *Ixora* sp. (Lit, 1997); *Mangifera indica* (mango) (Ben-Dov, 1994); *Ocotea pedalifolia* (Stout, 1979); *Osbornia ocdonta* (Lit, 1997); *Pandanus* sp. (screwpine); *Pandanus upoluensis* (palm) (Ben-Dov, 1994); *Passiflora foetida* (wild passionfruit) (Williams and Watson, 1988); *Persea americana* (avocado); *Piper methysticum* (kava); *Plumeria* sp. (frangipani) (Ben-Dov, 1994); *Psidium guajava* (guava) (Williams and Watson, 1988); *Selaginella* sp. (spike moss) (Ben-Dov, 1994).

Plant part(s) affected: Roots of coffee (Cecilia *et al.,* 2002). Most mealybug species feed on foliage, flowers, fruits and stems, but some species e.g. *Rhizoecus* feed on roots (Drees and Jackman, 1999).

Distribution: *Pseudococcus cryptus* is widely distributed in South East Asia, tropical Africa, mideastern Mediterranean and South America. However, it is particularly a pest of citrus in Israel, into which it was inadvertently introduced in 1937 (Blumberg *et al.,* 1999). Following importation of the encyrtid *Clausenia purpurea* Ishii, the pest was successfully controlled.

Distribution includes: Afghanistan (Ben-Dov, 1994); American Samoa (Ben-Dov, 1994); Argentina (Williams and Granara de Willink, 1992); Bangladesh (Varshney, 1992); Brazil (Ben-Dov, 1994); British Indian Ocean Territories (Chagos Archipelago) (Ben-Dov, 1994); China (Hu *et al.,* 1992); Costa Rica (Ben-Dov, 1994); El Salvador (Ben-Dov, 1994); India (West Bengal) (Nath, 1972); Iran (Kozár *et al.,* 1996); Israel (Ben-Dov, 1994); Japan (Ben-Dov, 1994); Kenya (Ben-Dov, 1994); Mauritius (Ben-Dov, 1994); Micronesia, Federated States of (Ponape Island) (Ben-Dov, 1994); Paraguay (Williams and Granara de Willink, 1992); Philippines (Lit, 1997); Palau (Beardsley, 1966); Sri Lanka (Ben-Dov, 1994); Taiwan (Ben-Dov, 1994); United States (Hawaii) (Ben-Dov, 1994); United States Virgin Islands (Ben-Dov, 1994); Vietnam (Ben-Dov, 1994); Western Samoa (Williams and Watson, 1988); Zanzibar (Ben-Dov, 1994).

Biology

Natural History: No specific details on the biology of *Pseudococcus cryptus* are available. However, the life history of a similar species of mealybug, *Planococcus citri* (Risso), is outlined below.

During winter, citrus mealybugs shelter in cracks in the branches or trunk, or in leaf axils of host plants. Young mealybugs move onto citrus fruit in late spring and usually settle under the calyx or between touching fruit (Smith *et al.,* 1997). Mealybugs produce honeydew, resulting in heavy growths of sooty mould (Smith *et al.,* 1997). This species is regarded as a significant quarantine threat to United States agriculture e.g. citrus (Miller *et al.,* 2002).

Adult female *Planococcus citri* are white, about 3 mm long, and covered with a white, fluffy wax. White wax filaments surround the body margin, with the last pair up to ¼ the length of the female body. Males are tiny, gnat-like insects with one pair of fragile wings and non-functional mouthparts. They are short-lived (Smith *et al.,* 1997).

Pale yellow eggs are laid in an elongated, loose, cottony egg sac extending beneath and behind the female. About 300-600 eggs are laid over 1-2 weeks, and these eggs hatch in about a week (Smith *et al.,* 1997). Very young nymphs (crawlers) are flat, oval and yellow. They develop through several stages (instars) over several weeks before reaching sexual maturity.

There are three moults for females and four for males. Winged males emerge from a tiny fluffy cocoon and fly to the female mealybug to mate (Drees and Jackman, 1999). The complete life cycle takes about 6 weeks during the summer and there are 3-6 generations per year (Smith *et al.,* 1997).

Control: Following the introduction of *P. cryptus* into Israel in 1937, it was biologically controlled with the encyrtid *Clausenia purpurea* Ishii, prior to its recurrence in newer varieties of citrus (Blumberg *et al.,* 1999). Other natural enemies which attack nymphs and adults include the following parasitoids: *Anagyrus pseudococci*; *Cryptanusia luzonica*; *Paraplatycerus citriculus* and *Promuscidea unfasciativentris*; and following predators: *Amblyseius swirskii*; *Brumoides suturalis*; *Chilocorus nigrita*; *Diadiplosis hirticornis*; and *Pseudoscymnus dwipakalpa* (CAB International, 2002).

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3.1.4 R*etithrips syriacus* (Mayet) [Thysanoptera: Thripidae]

Synonyms and change in combination: None.

Common name(s): black vine trips, castor thrips, grape thrips.

Hosts: *Cercis siliquastrum* (Judas tree) (Wysoki, 1999), Cotton varieties Suvin and LRA 5166 (Gopichandran *et al.,* 1992), *Diospyros kaki* (persimmon) (Rubin, 1995; Wysoki, 1999; PPIS, 2002), *Eucalyptus globulus* (blue gum tree) (Ananthakrishnan *et al.,* 1992), *Eucalyptus* spp. (eucalypt) (Rosales, 2000), *Feijoa sellowiana* (guava) (Wysoki, 1999), *Feijoa* spp. (pineapple guava) (Wysoki, 1999), *Jatropha curcas* (purging nut) (Hamon and Edwards, 1994), *Leucaena* spp. (lead tree) (Ghosh *et al.,* 1986), *Mangifera indica* (mango) (Wysoki, 1999), *Manihot esculenta* (cassava) (Ananthakrishnan, 1978; Lal, 1982; Ananthakrishnan *et al.,* 1992), *Manihot glaziovii* (ceara rubbertree) (Bastos and Alves, 1981), *Melaleuca quinquenervia* (melaleuca tree) (Medina and Franqui, 2001), Orchidaceae (orchids) (Oda *et al.,* 1997), *Persea americana* (avocado) (Izhar *et al.,* 1992; Wysoki, 1999), *Platanus* spp. (plane trees) (Halperin, 1990), *Pyrus cydonia* (quince) (Wysoki, 1999), *Ricinis communis* (castor bean) (Suresh and Ananthakrishnan, 1988; Ananthakrishnan *et al.,* 1992), *Rosa* spp. (rose) (Dash and Naik, 1998; Wysoki, 1999), *Terminalia catappa* (tropical almond) (Hamon and Edwards, 1994), *Vitis* spp. (grapevines) (Wysoki, 1999).

Plant part affected: Leaves (grapevines, eucalypt, cassava, persimmon) (Monteiro, 2001) and fruit skin (persimmon) (Morton, 1987; PPIS, 2002).

Distribution: Brazil (Bastos and Alves, 1981), India (Ananthakrishnan, 1978; Lal, 1982; Kumar *et al.,* 1985; Ghosh *et al.,* 1986; Dash and Naik, 1998), Israel (Halperin, 1990; Izhar *et al.,* 1992; Rubin, 1995; PPIS, 2002), Palestine (Morton, 1987), Puerto Rico (Medina and Franqui, 2001), Sri Lanka (Oda *et al.,* 1997), USA (Florida) (Hamon and Edwards, 1994), Venezuela (Rosales, 2000).

Biology

Life History: *R. syriacus* feeds on and blemishes leaves and fruit skin of persimmons in Palestine (Morton, 1987), fruit damage is also reported in Israel (PPIS, 2002). The leaves of grapevines, eucalypt and cassava plants in Brazil are damaged by this pest (Monteiro, 2001).

R. syriacus is a polyphagous pest and infests more than 50 plant species (Rosales, 2000). No specific details on the biology of *R. syriacus* on persimmons is available.

In Venezuela, on *Eucalyptus* spp., *R. syriacus* forms colonies on the leaves and tears epidermis by absorbing the sap. When the colonies are abundant, they cover the whole leaves altering the leaf colour to a silverplated tone with numerous black points. When the damage is very intense, *R. syriacus* causes defoliation. Rain reduces the populations drastically and the plants recover their natural colour (Rosales, 2000).

Larvae are reddish in colour with a yellowish head and legs whilst pupae are reddish in colour. The adults are very small, females are approximately 1.5 mm in length and males are slightly smaller. Adults are of dark colour (almost black) with clear appendices (Lewis, 1997).

Female *R. syriacus* lay their eggs on the upper and lower surfaces of leaf tissue. The area around the egg protrudes above the leaf surface. On average, one female will lay approximately 50 eggs and under optimal conditions as many as 80 eggs may be laid. Eggs incubate from 10 to 30 days, according to temperature. The most rapid development occurs between 27 and 30°C; above this temperature, egg development is delayed. Egg mortality is still low at 30°C, but increases rapidly with rising temperature. At 37°C larvae fail to hatch. If leaves on which eggs are laid become desiccated, the eggs die rapidly (Avidoz and Harpazi, 1969).

Upon hatching, the larvae immediately start to feed and during development they hardly ever move away from the egg. There are two larval instars and development takes from 6 to 35 days with the most rapid development at 28-30°C. Larvae are less sensitive than the eggs to extremes in climatic conditions, though mortality increases when the temperature rises above 33°C. Above 37°C, no larva attain pupation. The majority of larvae also die when the temperature drops below 14°C. Larvae are resistant to low air humidities as long as the host leaf is water-saturated (Avidoz and Harpazi, 1969). In hot weather, the prepupal phase takes about one day, and the pupal stage 2 days. Development at lower temperatures takes longer, and may last, for example, 21 days at 15°C. Pupae are resistant to low humidities, but are also extremely sensitive to high air humidities approaching 100% RH. Cold air (15°C and less) and also high temperatures (37°C) are lethal to most of the pupae (Avidoz and Harpazi, 1969).

Adults generally mate on the day of emergence. In autumn the numbers of the sexes are equal, whereas in other seasons, females far out-number males. At times the females even comprise 70-80% of the total adult population. Under favourable climatic conditions the adults live from 10 to 20 days, whereas at lower temperatures longevity may reach 40 days. In summer the female starts to lay about 3 days after emergence, though in colder seasons there is a pre-oviposition period of 8-18 days. When the temperature drops below 17°C or rises above 37°C, oviposition is arrested. Only males emerge from unfertilised eggs. The black vine trips produces about seven generations a year. These thrips are sometimes parthenogenic (Avidoz and Harpazi, 1969).

Studies on this pest in the municipality of Maranguape, Brazil showed that there are 4 population peaks (in February, March, April and July), and that the population increases linearly with time (Bastos and Alves, 1981).

Control: *R. syriacus* has been controlled on persimmon by spraying with nicotine sulfate in Palestine (Morton, 1987). On roses, carbofuran applied as 0.15 or 0.18 g a.i./plant has significantly reduced the population of this pest (Nair *et al.*, 1990). On cassava, 99 - 100% mortality of last-instar nymphs was obtained within 48 h when plants were sprayed with an emulsifiable concentrate containing 40% monocrotophos used at 1.05 ml/litre, a solution containing 50% dicrotophos used at 0.75 ml/litre, an emulsifiable concentrate containing 2.5% deltamethrin (decamethrin) used at 0.6 ml/litre, an emulsifiable concentrate containing 30% fenvalerate used at 0.43 ml/litre, dichlorvos (DDVP) at 0.6 ml a.i./litre, an emulsifiable concentrate containing 40% triazophos used at 2 ml/litre or an emulsifiable concentrate containing 35% endosulfan used at 1.5 ml/litre (Bastos and Figueiredo, 1980).

Predators of *Retithrips syriacus* include: *Cryptolaemus montrouzieri* (Rubin, 1995); *Franklinothrips megalops* (Trybom) (Wysoki, 1999); *Geocoris ochropterus* (Kumar *et al.,* 1985); *Nephus reunioni* (Rubin, 1995); *Symphaerobius sanctus* (Rubin, 1995).

Megaphragma priesneri (Kryger) is an egg parasitoid of this pest (Wysoki, 1999).

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3.1.5 *Sesamia nonagrioides* (Lefebvre) [Lepidoptera: Noctuidae]

Synonyms and change in combination: *Sesamia botanephaga* Tams and Bowden; and *Sesamia vuteria* Stoll.

Common name(s): Mediterranean corn stalk borer, pink maize stalk borer.

Hosts: Cared (sedges), *Diospyros kaki* (oriental persimmon), *Gladiolus* spp. (sword lily), *Musa* spp. (banana), *Oryza sativa* (rice), Poacea (cereals), *Saccharum officinarum* (sugarcane), *Solanum melongena* (aubergine), Sorghum, *Strelitzia reginae* (bird of paradise), wild and cultivated grasses, *Zea mays* (maize) (CAB International, 2002).

Plant part affected: Whole plant, stems, roots, growing points, inflorescence, fruits/pods, and seeds (CAB International, 2002).

Distribution: Burundi, Cape Verde, Congo, Cote d'lvoire, Cyprus, France, Ghana, Greece, Iran, Israel, Italy, Kenya, Mali, Morocco, Nigeria, Portugal, Spain, Sudan, Tanzania, Togo, Turkey, Twanda, Uganda. Not recorded in Japan and Korea (CAB International, 2002).

Biology

Life History:

Sesamia nonagrioides has been recorded on persimmons only once in Israel, in 1986 (Wysoki and Madjar, 1986). Persimmon orchards in Israel are rarely infested by this pest (PPIS, 2002). *S. nonagrioides* is a serious pest of maize in southern Europe and North Africa but is also of local importance as a pest of sorghum, rice, wheat and barley. The larvae feed in stems, eating out frass-filled galleries. They do not usually feed on the young terminal leaves, so are less likely to cause the holing and scarification that is typical of attack by *Busseola fusca* and *Chilo* spp. Stem tunnelling may kill growing points, resulting in 'deadheart' symptoms as terminal leaves die, and may also cause stem breakages. Larvae may also feed in maize cobs and in inflorescence stalks of other cereals. On some non-poaceous crops the larvae feed on flower buds, flowers and fruits as well as tunnelling in leaf and stem tissues (CAB International, 2002).

A general account of the biology and ecology of this species was published by Anglade (1972). Adult behaviour has been little studied. They are nocturnal but are seldom caught in light traps and may often move by crawling over the soil. They mate and the females lay eggs on the two nights following emergence. Eggs are inserted under the leaf sheaths at the base of young maize plants and several hundred may be laid in a single batch, arranged in up to five parallel lines. The newly hatched larvae feed on the leaf sheath, penetrate the base of the stem and then eat galleries upwards in the stem and, at a later stage of plant development, tunnel into the base of the inflorescence. Extensive frass-filled galleries are eaten out and the larvae pupate within them. At a constant temperature of 25-26°C eggs hatch after 5-6 days, larvae feed for 25-30 days and the pupal period lasts 12-15 days. During the winter, larvae remain within stems and stubble but mortality is high when freezing temperatures of -5°C persist for a few days. During the growing season development is continuous, without diapause, and the number of adult generations is determined by climatic factors and the availability of sufficient food. In Spain and Sicily, where breeding is continuous, all stages may be present at the same time (Anglade, 1972).

In Greece, Kavut (1987) reported that mature larvae overwintered in stems of maize and also in those of *Typha latifolia* and *Arundo donax* growing along the banks of streams; 60-75% of the overwintering larvae resumed activity at 10 and 14°C, respectively, but activity declined when the temperature fell to 3°C. Adults emerged over a period of 30-40 days and there were three generations a year in the study area.

In Iran, Gemsi and Kamali (1992) reported that fully grown larvae overwintered in the stem bases of maize plants and that adult moths emerged in late March. Four generations were produced during the growing season with a partial fifth generation on second plantings of maize.

In Turkey, where this species is a major pest of rice, larvae overwintered in the bases of rice plants and the first generation developed on Typha in some areas (Fazeli, 1992).

Mating behaviour was studied in Greece by Babilis and Mazomenos (1992) who recorded that in laboratory conditions, at about 25°C, 5% RH and LD 16:8, females began calling during the first scotophase following emergence, with peak calling in the second scotophase. Maximum calling was observed between the fourth and fifth hours of scotophase and the calling pattern varied with age. Matings began during the first scotophase following emergence. Mated females did not remate and few males mated more than once.

Final instar larvae under short photoperiods enter a facultative diapause but may moult up to seven times before pupation, with some growth occurring so that diapause larvae produce heavier pupae than non-diapause larvae (Gadenne *et al.,* 1997).

Cold hardiness and the overwintering strategy of this species have been studied in France by Gillyboeuf *et al*. (1994) who concluded that the survival of overwintering larvae is related only to the microclimate of the overwintering site and that the freezing tolerance capacity of the larvae seemed to be irrelevant. Hilal (1992) studied the effect of extreme temperatures in laboratory experiments and reported 85% mortality after 4 hours at -5°C.

Brief descriptions of all stages of *S. nonagrioides*, with references to earlier publications, are given by Carter (1984).

Eggs are hemispherical, about 1 mm in diameter, slightly flattened and with radial striations. They are creamy-white when laid, but become pink as they develop. Larvae grow to a length of about 40 mm and are smooth, shiny and almost uniformly pinkish-yellow, except for greyish median and lateral lines. The head capsule and the thoracic plate are a shining dark brown. Badolato (1976) gives a detailed description and lists characters that distinguish larvae of this species from those of *S. cretica.* Meijerman and Ulenberg (1996) have also published a detailed description, based on African material, and reported that they found no reliable characters to distinguish *S. nonagrioides* larvae from those of *S. calamistis* and other African species of *Sesamia*.

Female pupae are up to about 18 mm long and males are slightly shorter, up to about 16 mm. They are chestnut brown and the terminal cremaster is bluntly conical with four robust, pointed, terminal projections. Badolato (1976) published an illustrated description and listed characters distinguishing pupae of *S. nonagrioides* from those of *S. cretica*. *S. nonagrioides* belongs in the family Noctuidae, which is characterized by the presence in adults of a tympanal organ (an opaque membrane) on each side of the metathorax facing posteriorly towards the abdomen. The hind-wing venation is also distinctive with only three, not four, veins associated with the posterior part of the hind-wing cell and only two anal veins. Adult wingspan is up to about 40 mm, with males generally smaller than females. The forewings are pale cartridge buff, suffused with light ochraceous colour and with variable darker markings. The hind wings are white with a pale buff suffusion at the apex (CAB International, 2002).

Field inspection is the main method of detecting infestations. Positive diagnosis is based on microscope examination of the male genitalia and, to some extent, of the female reproductive system and larval chaetotaxy (CAB International, 2002).

Control: Anglade (1972) summarized methods of control used up to that date and Naibo *et al.* (1996) have reviewed integrated control methods that are currently in use in France. The most effective combination involves reduction of the population of overwintering larvae by destruction of crop residues in the autumn and exposure to cold during the winter, followed by chemical treatments against first-generation larvae in the new crops. This limits the initial populations in the crop and chemical treatments against subsequent generations are then only necessary in localities where high populations persist.

In north-west Spain, early sowing could be a useful measure of control as early-maturing plants escape borer attack (Cartea *et al.,* 1994). Plant breeding for resistance has been in progress for some time and a meridic diet has been developed for laboratory rearing (Giacometti, 1995). Evaluation of sources of resistance to this species and the European corn borer (*Ostrinia nubilalis*) in Spain indicated that landraces of maize from the Ebro valley could be a good resource of resistance or tolerance to stem borers and that EPS7(S)C2 could be used as base material for a breeding program (Malvar *et al.,* 1993). In Portugal, the tachinid *Lydella thompsoni* has been recorded as an important parasitoid with biocontrol activity effective throughout the 2nd and 3rd generations but parasitoids were generally less effective than entomopathogens (Figueiredo and Araujo, 1996). Successful biological control has been reported from the Cape Verde Islands (van Harten *et al.,* 1990). According to Anglade (1972) this species is rarely parasitized, probably because it is protected within stems.

Parasitoids of *Sesamia nonagrioides* include: *Descampsina sesamiae* attacking larvae in West Africa; *Diadegma terebrans*; *Exorista segregata* attacking larvae; *Lydella thompsoni* attacking larvae in Spain, Portugal and France; *Masicera sphingivora* attacking larvae; *Pediobius furvus* attacking pupae in West Africa and the Cape Verde Islands; *Pediobius imbreus*; *Pseudogonia rufifrons* attacking larvae; *Telenomus busseolae* attacking eggs in the Cape Verde Islands, Greece and Turkey (CAB International, 2002).

Pathogens of *Sesamia nonagrioides* include: *Paecilomyces farinosus*; *Paecilomyces fumosoroseus* (CAB International, 2002).

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3.1.6 *Stathmopoda masinissa* (Meyrick) [Lepidoptera: Oecophoridae]

Synonyms and change in combination: *Kakivoria flavofasciata* Nagano

Common name(s): persimmon fruit moth.

Hosts: *Amaranthus* spp. (magic fountain amaranthus) (Moriuti and Yasuda, 1983); *Diospyros kaki* (persimmon) (USDA, 1997); *Diospyros kaki* var. *domestica* (wild persimmon) (Bae, 1997); *Diospyros lotus* (dateplum persimmon) (Xu *et al.,* 1996).

Plant part affected: Persimmon fruit (USDA, 1997).

Distribution: Japan (MAFF, 1985), Korea (KSPP, 1986; Kim *et al.* 1997; NPQS, 1995), Thailand (Moriuti and Yasuda, 1983). Not present in Australia (Nielsen *et al.,* 1996; DAWA, 2003).

Biology

Life History: *Stathmopoda masinissa* has two generations a year, the first generation adults emerge from late May to early June and second generation moths emerge from late July to early August. The moths rest on underside of leaves during daytime and emerge around sunset and mating occurs during dawn. They lay eggs after sunset. The moths lay one egg per shoot, mostly on the first five shoots from the top of fruit bearing branch. The number of eggs laid by one female range from 20 to 150 with an average of 70 eggs per female. The first generation eggs hatch in 10 days and second ones in 6 days after egg laying. The young larvae bore into the shoots and feed until second instar and attack fruit afterwards. In early to mid July after feeding several fruit, the first generation larvae spins its cocoon in early to mid September under the bark. Excrement of the pest can be seen around the hole of the infested shoot. The infested shoots soon die and the leaves fall if larvae feed on their petioles. Larvae bore into the fruit from the fruit stalk or calyx and excrement can be seen around entrance holes (MAFF, 1987).

Larval infestation of *S. masinissa* in wild persimmon fruit, *Diospyros kaki* var. *domestica* was investigated during autumn 1991 in Korea. Infestation rates were 41, 37 and 22% under the pedicel, in the pedicel and in the fruit, respectively. Infestation rates varied from 88% on 30 August, to 2.5% on 10 October and 0% on 15 October (Bae, 1997).

From field studies carried out in Japan, a close relationship was found between the numbers of calyces remaining on persimmon twigs after larval hibernation and the number of hibernating larvae of *S.masinissa.* It is suggested that calyx numbers could be used to predict the occurrence of *S. masinissa* the following spring (Kiyonaga and Tanaka, 1987).

Control: In Japan, forecasting of *S. masinissa* is carried out based on the number of insects collected by 100W light traps. Optimum timing for control is 7-10 days after the peak day of moth emergence. Cartap is used as an effective insecticide (MAFF, 1987). Since mature *Stathmopoda masinissa* larvae usually over winter in the gaps of split trunk bark and the calyx basin of persimmon fruit; scraping of bark to kill the over wintered larvae has been a key method for its control in China (Li, 1999). In the vegetative period, spraying 3 times with an 800-1500x solution of 40% omethoate, 50% dichlorvos or 50% phoxim between 2-8 June and 20-25 July also gave good control (Li, 1999).

A methyl bromide fumigation schedule with 48 g/m for 2 hours at 15°C with 50% loading resulted in complete mortality of *S. masinissa* larvae in persimmon fruits from Japanese orchards that had not been sprayed with pesticide. A total of 31739 larvae in fresh persimmons were killed completely in 16 replicated tests conducted from 1992 to 1999. This methyl bromide standard would provide for sufficient quarantine security for exporting Japanese persimmons. (Matsuoka *et al.,* 2001)

DBI-3204 (Bistrifluron, ISO proposed) is a new IGR insecticide of benzoylphenyl urea class. It is a highly active insecticide that shows a good controlling effect against whiteflies and lepidopterous insect pests such as *S. masinissa* (Kim *et al.,* 2000).

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3.1.7 *Tenuipalpus zhizhilashviliae* (Reck) [Acarina: Tenuipalpidae]

Synonyms and change in combination: None.

Common name(s): persimmon false spider mite.

Hosts: *Diospyros kaki* (persimmon), *Vitis vinifera* (grape vines) (Ghai and Shenhmar, 1984).

Plant part affected: Fruit and other plant parts (USDA, 1997).

Distribution: Japan (Ghai and Shenhmar, 1984), Korea (KSPP, 1986), Russia (Ghai and Shenhmar, 1984), Taiwan (Tseng *et al.* 1974). No record of this pest in Israel.

Biology

Life History:

No specific details on the biology of *Tenuipalpus zhizhilashviliae* or its damage on persimmons is available. However, life history of a closely related species from the same genus, *Tenuipalpus granati*, which attacks pistachio (Mehrnejad and Ueckermann, 2002; Mehrnejad, 2003), pomegranate and grapevine plants (Mehrnejad, 2003) is outlined below.

On pistachio, in Iran, *T. granati* overwinters in the adult stage, near the base of buds and under the bud scales, but it can also be found in crevices on the plant branches and twigs. It has several generations per year, and does not weave a silken web on the leaf or fruit. The eggs are reddish and are laid around the mid and sub-veins of pistachio leaves. The larvae and nymphs are red to orange colour but the adults turn to pale orange with numerous tiny black spots. In heavy infestations, fruit buds may drop and kernel development can be stopped. Severe damage may occur by defoliation in the late summer. *T. granati* is heavily attacked by predatory mites belonging to the Phytoseiidae and Ascidae, as well as by the coccinellid beetles (Mehrnejad, 2003). On grapevines, in Greece, *T. granati* did not cause extensive damage in vineyards (Papaioannou –Souliotis *et al*, 1999)

Control: According to U.S. Department of Agriculture, Federal Register (7 CFR Sec. 319.56-2kk), inspection, phytosanitary certificate stating that fruit has been inspected and is free of quarantine pests, and labelling requirements are adequate to prevent the introduction of quarantine pests into the United States. Also orchards where persimmons are grown must be inspected for quarantine pests by the Korean national plant quarantine service (NPQS) at least once during the growing season and before harvest (USDA, 2002).

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3.2 Pathogens

3.2.1 *Phoma kakivora* (Hara) [‘mitosporic fungi’: Coelomycetes]

Synonyms and change in combination: None.

Common name(s): black spot, fruit stain.

Hosts: *Diospyros kaki* (persimmon) (Yamada, 1966).

Plant part affected: Fruit and leaves (Yamada, 1966).

Distribution: Japan (Yamada, 1966).

Biology

Life History: Since 1930, reports of black spot disease have been limited to the listing of its name in the Common Names of Economic Plant Diseases in Japan in 1965 and Yamada’s work in 1966, indicating that it is not a common disease (Yamada, 1966).

Phoma kakivora causes fruit stains are mostly circular or somewhat irregular shape with about 10-15mm in diameter consisting of many small black spots, which began to appear on the young fruits just after petal fall in the field in early May. These black spots start as small, blackish-brown spots on the surface and beneath the epidermis of persimmon fruit. Once the spots reach a size of approximately 0.1 mm to 0.5 mm, they turn black, gradually increase in number, and protrude slightly. Often, the black spots appear in clusters, forming circular, or irregular-shaped stains some 10 mm to 15 mm in diameter. Otherwise, they may adopt a wave-like shape, or the clusters will merge and cover almost the entire surface of the fruit, or the black spots will disperse across the fruit. Black spots typically occur on the surface of the fruit, but on close examination they may also be observed on the calyx and petiole, or on the leaf blade (Yamada, 1966).

The disease is most commonly seen in fruit from the lower branches, and on a single piece of fruit and is most frequent on parts that are in shade, or where rainwater pools (Yamada, 1966).

Pycnidia of the *Phoma kakivora* appear first under the epidermis as black spots, but subsequently break through the epidermis and protrude. They are of slightly eccentric spheroid or ellipsoid shape, with diameter from 100 to 250µm and height of 80 to 150µm, with an ostiole at the apex. The pycnospore are either oval or a truncated egg shape, and are granular, ranging in size from 4.3 to 7.5µm x 5 to 10µm. The size of the spermatium ranged from 0.8 to 2.3µm x 2.5 to 7.5µm, and both edges were slightly swollen.

Information with regard to the suitable environmental conditions, mode of spread, establishment and control of *P. kakivora* is not available. In general, short range dispersal of *Phoma* spp. would be through water splashes and long distance spread would be by the movement of infected fruit and leaves. Results of the experiments conducted during September 1963 and July 1964 suggest that the period of infection of the pathogen reaches its end around late June, and does not occur thereafter (Yamada, 1966).

In Kouchi Prefecture, the disease is known to cause most damage in Jiro fruit (up to 35%), and extremely little in Fuyuu fruit (Yamada, 1966).

Control: Specific information with regard to the control of *Phoma kakivora* on persimmons is not available. Details of the control of citrus black spot disease caused by *Phoma citricarpa* (*Guignardia citricarpa*) are outlined below.

The removal of infected off-season citrus fruit to reduce conidial inoculum has been successful as a control method in South Africa (Koltze, 1981).

Citrus black spot was effectively controlled on Valencia orange trees by cupric hydroxide applied at petal fall, alone or followed by a second application 6 weeks later, or by Bordeaux mixture applied at petal fall (Bertus, 1981a, b). Benomyl was also applied alone or as supplemental treatments 16 weeks after petal fall. Significant control of black spot was obtained with all treatments, except benomyl alone. However, there were no differences in yield or fruit quality (Bertus, 1982).

Combining oil with fungicides, mancozeb followed by benomyl, thiophanate-methyl, carbendazim, thiabendazole or propineb plus oil, increased control of black spot on sweet orange (Tsai *et al.,* 1977; Tsai, 1982; Kellerman and Kotze, 1979). In other studies, these fungicides were not as effective as benomyl (Tsai, 1978). Single applications of benomyl alone or with oil have been effective for the control of black spot on Valencia orange but two applications are generally recommended (Kellerman and Kotze, 1973; Kiely, 1976).

Pre-harvest sprays on satsuma fruit with benomyl, thiophanate, thiophanate-methyl, thiabendazole, furidazole and Bayer 6233 provided significant control of *G. citricarpa* (Yamada *et al.,* 1972).

The leaves of the mango were sprayed with contact sprays, copper and mancozeb and the systemic fungicide benomyl; benomyl provided the most significant control of *G. citricarpa* (McMillan, 1986).

Hall (1973) described the post-harvest disease of black spot in citrus and subsequent control measures. Fruit produced for fresh market should be maintained at temperatures below 20°C after harvest to inhibit post-harvest development of the disease (Timmer, 1988). A preharvest thiophanate-methyl spray was more effective than a post-harvest thiohanate-methyl dip in reducing the incidence of storage rot by *Penicillium italicum, P. digitatum, Alternaria citri, Geotrichum candidum, Diaporthe citri* and *Phoma citricarpa* (*G. citricarpa*) (Nam *et al.,* 1993).

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