Australian Government

Department of Agriculture, Fisheries and Forestry

# Netherlands Truss Tomatoes

## *Import Policy*

October 2003

## Foreword

# Contents

# TABLES

# 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 Commonwealth Department of Agriculture, Fisheries and Forestry - Australia. Biosecurity Australia protects consumers and animal and plant health, and facilitates trade, by providing sound scientifically based and cost effective quarantine policy |
| Contaminating pest | a pest that is carried by a commodity and, in the case of plants and plant products, does not infest those plants or plant products |
| Control (of a pest) | suppression, containment or eradication of a pest population |
| DAFF | Department of Agriculture, Fisheries and Forestry |
| 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 (of a pest) | movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled |
| 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 |
| Hitchhiker pest | see contaminating pest |
| ICA | Interstate Certification Assurance |
| ICON | AQIS Import Conditions database |
| Introduction | entry of a pest resulting in its establishment |

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| 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 |
| Organisation | official service established by a government to discharge the functions specified by the IPPC |
| NPPS | Netherlands Plant Protection Service |
| 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 |
| OIE | International Office of Epizootics |
| 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 analysis | the process of evaluating biological or other scientific evidence to determine whether a pest should be regulated and the strength of any phytosanitary measures to be taken against it |

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| Pest risk assessment (for quarantine pests) | evaluation of the probability of the introduction and 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 and spread of a pest |
| 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 | pest risk analysis |
| 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 |
| Regulated non-quarantine pest | a non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party |
| Spread | expansion of the geographical distribution of a pest within an area |
| SPS Agreement | WTO Agreement on the Application of Sanitary and Phytosanitary Measures |
| WTO | World Trade Organization |

## EXECUTIVE SUMMARY

The Department of Agriculture, Fisheries and Forestry (DAFF) has considered the importation of fresh individual and truss tomato fruit from the Netherlands. An import risk analysis (IRA) was initiated in 1998. At that time there was no existing policy for the importation of truss tomatoes into Australia. Biosecurity Australia has since conducted a risk assessment for truss tomatoes from New Zealand and recommended that truss tomatoes be imported from New Zealand subject to the implementation of phytosanitary measures. This represented an extension to the existing policy that has allowed the importation of fresh individual tomatoes from New Zealand since 1978.

An assessment of pests potentially associated with truss tomatoes from the Netherlands has indicated that the pests do not pose significantly different quarantine risks or require significantly different management measures than those for which policy exists. In view of this, Biosecurity Australia determined that, rather than proceeding by way of an IRA, the market access request for truss tomatoes from the Netherlands could be addressed as an extension of existing policy.

This document reports on the findings of the pest risk analysis (PRA) for truss tomato fruit from the Netherlands into Australia. Pests comprising 26 arthropods and 32 pathogens were identified as being possibly associated with truss tomato production in the Netherlands. Additionally 21 arthropods and 1 nematode were identified as biocontrol agents and possibly associated with truss tomato production in the Netherlands.

Of the 58 pests considered, 13 arthropods and 8 pathogens were either not present in Australia, or if present have restricted/limited distribution and hence considered further. Of these 21 pests that were considered further, 9 insects and 6 pathogens were considered to be associated with the truss tomato pathway and to have potential for entry, establishment and spread within Australia as well as associated potential consequences. These 15 pests were therefore categorised as potential quarantine pests.

Of the 22 biological control agents considered, 14 arthropods were either not present in Australia, or if present have restricted/limited distribution and hence considered further. Of these 14 arthropods, 8 were considered to be associated with the truss tomato pathway and to have potential for entry, establishment and spread within Australia as well as associated consequences. These arthropods were therefore categorised as quarantine pests.

A detailed pest risk assessment (PRA) was conducted for those pests and biological control agents that were categorised as quarantine pests to determine an unrestricted risk estimate for each organism. For those pests and biological control agents for which the risk was considered to be above Australia's appropriate level of protection (ALOP), risk management measures have been developed. Consultation with the Netherlands Plant Protection Service (NPPS) and input from stakeholders on the draft import conditions has resulted in the finalisation of import conditions for truss tomatoes from the Netherlands that are considered to maintain Australia's ALOP.

This document provides the finalised PRA including import conditions for truss tomatoes from the Netherlands into Australia. The policy may be reviewed at any time if phytosanitary conditions for Netherlands truss tomatoes should change and or after sufficient history of trade justifies reassessment of the phytosanitary risks associated with imports of Netherlands truss tomatoes.

# INTRODUCTION

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

Biosecurity Australia has recently finalised a PRA on the importation of truss tomatoes from New Zealand and recommended that imports of truss tomatoes from New Zealand be allowed to commence subject to the application of specific phytosanitary measures. Prior to the PRA on New Zealand truss tomatoes, only individual tomatoes from New Zealand were permitted into Australia.

Biosecurity Australia (previously a business unit within AQIS) initiated an IRA on the importation of fresh tomato fruit from the Netherlands in 1998. At the request of the NPPS the scope of the IRA was extended to include truss tomatoes in 1999.

Biosecurity Australia has now conducted a PRA on truss tomatoes from the Netherlands into Australia. In accordance with ISPM 11 *Pest Risk Analysis for Quarantine Pests* (FAO, 2003), the PRA comprises three interrelated stages:

Stage 1: initiation of the PRA

Stage 2: risk assessment

Stage 3: risk management

This document includes the following sections:

- Background to this PRA,
- A description of the scope of this PRA,
- An outline of current quarantine policy for the importation of fresh tomatoes,
- Brief descriptions of the fresh tomato fruit industry in Australia and the Netherlands,
- Results of stages 1-3 of the PRA, and
- Conditions for the importation of truss tomatoes from the Netherlands into Australia.

# PROPOSAL TO IMPORT FRESH TOMATOES FROM THE NETHERLANDS

## Background

On 20 January 1998, Biosecurity Australia informed registered stakeholders that it had received an application from the NPPS seeking market access to Australia for fresh greenhouse tomatoes. This was the first step in the IRA process as outlined in the Handbook. Accompanying the application was a list of arthropod pests and diseases associated with greenhouse tomato crops in the Netherlands, including arthropods used as biological control agents during the production process. Further information was subsequently provided by the NPPS relating to the production system used for tomatoes in the Netherlands.

In March 1998, Biosecurity Australia informed stakeholders of its proposal to undertake the IRA following the routine process, as outlined in the Handbook. In July 1998, a routine approach was adopted following consultation with stakeholders.

In July, September and November 1998, Biosecurity Australia requested additional information from the NPPS on Mediterranean fruit fly (*Ceratitis capitata*) and late blight (*Phytophthora infestans*). The requested information was received in December 1998.

In July 1999, an AQIS officer visited the tomato greenhouse production areas in the Netherlands and was advised that the Netherlands was mainly interested in exporting truss tomatoes. This delayed the progress of the IRA as additional pests and diseases associated with the green vegetative plant parts needed to be assessed.

In November 1999, AQIS received news of an outbreak of a new virus that affected tomatoes in greenhouses in the Netherlands. Biosecurity Australia requested information on this new disease (pepino mosaic *potexvirus*) and received technical information from NPPS on the outbreak in December 1999.

Stakeholders were advised of the status of the IRA in Plant Biosecurity Policy Memoranda (PBPM) 2000/01, 2001/05 and 2002/24 dated 13 March 2000, 16 March 2001, 21 May 2002 and 23 March 2003, respectively. The PBPM of 23 March 2003 advised stakeholders that the risk assessment for Netherlands truss tomatoes would no longer be handled by way of an IRA, and that the access request would be considered as an extension of existing policy based upon recently established import policy for truss tomato fruit from New Zealand.

A Draft Import Policy was released in May 2003, stakeholders were requested to provide comments on the draft policy within 30 days of release. Biosecurity Australia received comments from 5 stakeholders. Stakeholder comments were considered and incorporated into this policy document where appropriate. Individual responses were sent to all stakeholders regarding their submissions.

# SCOPE

## TOMATO FRUIT AND ASSOCIATED PESTS

In this PRA Biosecurity Australia has considered the pests associated with truss tomatoes (*Lycopersicon esculentum*) in the Netherlands. The PRA forms the basis for development of import policy with respect to the entry of truss tomato fruit into Australia from the Netherlands that have been cultivated, harvested, packed and transported to Australia under commercial conditions. Truss tomato fruit is defined as fresh, mature fruit (including the calyx and stalks of a fruit cluster) of *Lycopersicon esculentum* of the family Solanaceae.

## BIOCONTROL AGENTS

A range of biological control agents are commonly used in the production of tomatoes in the Netherlands. They form part of integrated pest management programs and are available commercially to control target pests. Species not present in Australia are potentially beneficial to various production systems but they could also pose a risk to the environment. In addition, tomato imports represent a possible pathway for entry of biocontrol agents which have not met the standard requirements for the import and/or release of biocontrol agents in Australia (eg. host specificity testing and rearing through one generation to ensure freedom from diseases and parasites).

Biosecurity Australia has included assessments of biocontrol agents known to be used in tomato production in the Netherlands as part of this PRA.

# AUSTRALIA'S CURRENT QUARANTINE POLICY FOR IMPORTS OF FRESH TOMATOES

## FRESH TOMATO FRUIT (NON TRUSS)

Imports of fresh tomato fruit into Australia for consumption are currently permitted from New Zealand under specific import conditions. The current import conditions for fresh tomato (non truss) include requirements for an AQIS import permit, phytosanitary inspection and issue of a phytosanitary certificate from the New Zealand Ministry of Agriculture and Forestry (NZ MAF), specific requirements for packaging and labelling of produce, freedom from soil and other debris and inspection on arrival in Australia by AQIS.

## FRESH TOMATO FRUIT (TRUSS)

The current import conditions for truss tomatoes from New Zealand include existing import conditions established for individual tomatoes plus an additional condition to manage the risk of Potato Spindle Tuber Viroid (PSTVd). In summary, truss tomatoes from New Zealand may be imported under existing condition C6000 Import Requirements for All Fruit and Vegetables. An additional declaration on the phytosanitary certificate that the "The truss tomatoes in this consignment have been produced in New Zealand in accordance with the AFFA-MAF Agreed Conditions Governing the Entry of Truss Tomatoes from New Zealand to Australia" must also be supplied by NZ MAF.

The "AFFA-MAF Agreed Conditions Governing the Entry of Truss Tomatoes from New Zealand to Australia" include that:

- All truss tomatoes for export to Australia from New Zealand are to be produced in accordance with the "Code of Practice for the management of Potato Spindle Tuber Viroid (PSTVd) in greenhouse tomato and capsicum crops". The Code of Practice has been produced by the Vegfed (New Zealand industry body) PSTVd Technical Advisory group in consultation with the NZ MAF;
- All growers who wish to export truss tomatoes to Australia are to be registered with MAF Biosecurity;
- Only registered growers will be eligible for MAF phytosanitary certification;
- Registered growers are to be audited annually before export by MAF or an accredited Independent Verification Agency (IVA) for compliance with the Code of Practice;
- Audit reports are to be made available to AFFA on request; and
- MAF phytosanitary certification is to be withheld while cases of non-compliance are investigated and resolved. Resolution of on-going non-compliance is to be negotiated with

AFFA.

Details of the importation requirements for tomatoes are available in the AQIS Import Conditions database (ICON)[1].

# THE FRESH TOMATO INDUSTRY

## PRODUCTION OF FRESH TOMATOES IN AUSTRALIA

In Australia, tomatoes are grown as a major commercial field crop in five states:

- Bowen, Bundaberg, Stanthorpe and the Lockyer Valley (Queensland);
- the Sunraysia district and the Goulburn Valley (Victoria);
- the north coast, central coast, around Sydney, the Murrumbidgee Irrigation Areas and Narromine (New South Wales);
- the Murray Bridge, Waikerie and the Adelaide Plains (South Australia); and
- Carnarvon, Geraldton and around Perth (Western Australia).

Australian tomato production details by State for 2000-2001 are given in Table 1. During the months from May to December, Queensland is the highest producer of tomatoes. In this period, fresh tomatoes are distributed from Queensland through central wholesale markets in each capital city but primarily to Sydney, Melbourne and Brisbane.

**Table 1 Australian production and area of tomatoes by State for 2000-2001**

| State | NSW | Vic | Qld | SA | WA | Tas | NT | ACT | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Production (tonnes)** | 103 200 | 329 200 | 107 000 | 2 100 | 13 300 | 1 500 | 5 | 0 | 556 305 |
| **Area (ha)** | 1 700 | 4 600 | 2 850 | 130 | 360 | 15 | 5 | 0 | 9 645 |
| **Yield (t/ha)** | 64 | 72 | 38 | 16 | 37 | 100 | 1 | 0 | 328 |

Source: Australian Bureau of Statistics 2001 Agriculture Australia.

[1] Available at http://www.aqis.gov.au/icon/

## THE FRESH TOMATO INDUSTRY IN THE NETHERLANDS

Commercial tomatoes in the Netherlands are produced in heated greenhouses. Over 95% of production uses the artificial growing media Rockwool®. The growing medium is contained within plastic and tomato plants are transplanted into holes cut in the plastic. Water and nutrients are supplied by a closed, recycling irrigation system. Over 90% of crops are produced using beneficial arthropods to control arthropod pests.

Tomato production occurs from February/March to September/October. Tomatoes are largely produced as clusters of five to eight fruit on the vine (truss tomatoes) but fruits with calyces attached or fruits alone without calyces (individual fruit) are also produced. Tomatoes are generally exported from the Netherlands by air (Schipol airport) and imported into the Netherlands by sea (Rotterdam).

# PEST RISK ANALYSIS

In accordance with ISPM No. 11 *Pest Risk Analysis for Quarantine Pests*, this PRA comprises three interrelated stages:

Stage 1: initiation

Stage 2: risk assessment

Stage 3: risk management

A qualitative detailed pest risk asessment was conducted for the quarantine pests associated with truss tomatoes from the Netherlands. An outline of the methodology used for this review is provided in the Biosecurity Australia publication *Draft Guidelines for Import Risk Analysis* – September 2001.

# STAGE 1: INITIATION

Initiation of this PRA followed the request in 1998 for access for individual fresh tomato fruit (not including truss) from the Netherlands into Australia. The request was amended in 1999, after advice from the NPPS, to include truss tomatoes.

The “PRA area” is defined in this PRA as Australia or in the case of regional quarantine pests the “PRA area” is defined by the state of Australia that has regional freedom from the pest. The ‘endangered area’ is defined as any area within Australia, where susceptible hosts are present, and in which ecological factors favour the establishment of a pest that might be introduced in association with tomato fruit from the Netherlands. The pathway is considered to be fresh tomato fruit, including the truss, produced under commercial greenhouse production methods within the Netherlands.

# STAGE 2: RISK ASSESSMENT

## PEST CATEGORISATION

The pest categorisation process is to determine which of the pests associated with truss tomatoes in the Netherlands 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 quarantine pests have been determined through the lack of records of presence in Australia, present in Australia but of restricted/limited distribution, under official control, presence on the pathway (truss tomatoes), potential for entry, establishment and spread and potential consequences. These criteria are used in the following tables to categorise and subsequently identify the quarantine pests of truss tomato fruit from the Netherlands to Australia. Pests that do not meet the definition of a quarantine pest, and are not considered further.

Appendix 1 lists the pests and biocontrol agents associated with individual and truss tomatoes in the Netherlands and their presence or absence in Australia. Appendix 2 indicates whether the potential pest or biocontrol agent occurs on the pathway under consideration in this risk analysis.

Tables 2 and 3 provide, for each type of organism (arthropods, nematodes, bacteria, fungi and viruses), a summary of the number known to be associated with individual and truss tomatoes in the Netherlands, the number present in Australia and the number associated with the import pathway (i.e. that occur on individual and/or truss tomatoes). Many of the pests associated with individual and truss tomatoes in the Netherlands occur in Australia or are not present on the import pathway. These pests were not considered further in the risk analysis.

**Table 2 Numbers of pests and biocontrol agents possibly associated with tomatoes in the Netherlands and in Australia**

| Organism type | Possibly associated with tomato | Present in Australia | Present in Australia but of restricted distribution, under official control | Not present in Australia |
|---|---|---|---|---|
| Arthropod - pest | 26 | 13 | 4 | 9 |
| Arthropod - biocontrol agent | 21 | 7 | 1 | 13 |
| Nematode - pest | 4 | 2 | 1 | 1 |
| Nematode - biocontrol agent | 1 | 1 | 0 | 0 |
| Bacteria | 2 | 2 | 0 | 0 |
| Fungi | 16 | 14 | 2 | 0 |
| Viruses | 10 | 6 | 1 | 3 |
| **Total** | **80** | **45** | **9** | **26** |

## SUMMARY OF PEST CATEGORISATION

Biosecurity Australia has identified a total of 23 pests and biocontrol agents that are likely to be associated with individual and/or truss tomatoes from the Netherlands and either absent from Australia, or present but have restricted or limited distribution, and considered to be on the import pathway for individual and /or truss tomatoes (table 3).

**Table 3 Numbers of potential pests and biocontrol agents on the import pathway (individual and/or truss tomatoes) for further consideration**

| Organism type | Absent from Australia or present of restricted distribution, under official control | On the import pathway for individual and/or truss tomatoes - consider further |
|---|---|---|
| Arthropod - pest | 13 | 9 |
| Arthropod - biocontrol agent | 14 | 8 |
| Nematode - pest | 2 | 0 |
| Nematode - biocontrol agent | 0 | 0 |
| Bacteria | 0 | 0 |
| Fungi | 2 | 2 |
| Viruses | 4 | 4 |
| **Total** | **35** | **23** |

Biosecurity Australia considers that all of the pests identified in the preliminary pest categorisation (appendix 2) have feasible potential for entry, establishment and spread in the PRA area as well as associated consequences. All of the organisms are therefore considered quarantine pests and required detailed risk assessment.

## PROBABILITY OF ENTRY, ESTABLISHMENT AND SPREAD AND CONSEQUENCES

The next stage of pest risk assessment consists of determination of the probability for entry, establishment and spread of the quarantine pests and determination of the consequences in the PRA area. This stage is presented in the next section of the document. The supporting biological information is presented in combination with the assigned likelihoods and consequences. An unrestricted risk estimate has been determined for each of the quarantine pests and those quarantine pests with a risk estimate above Australia's ALOP identified.

# DETAILED RISK ASSESSMENT FOR QUARANTINE PESTS AND BIOCONTROL AGENTS

## ARTHROPOD PESTS

### *Aphis fabae* Scopoli, 1763 [Hemiptera: Aphididae]

**Synonyms and changes in combination:** *Anuraphis cynariella* Theobald; *Aphis abientaria* Walker; *Aphis addita* Walker; *Aphis adducta* Walker; *Aphis advena* Walker; *Aphis aparines* Fabricius; *Aphis aparinis* E. Blanchard; *Aphis apii* Theobald; *Aphis apocyni* Koch; *Aphis atriplicis* nec Linnaeus; *Aphis brevisiphona* Theobald; *Aphis carpathica* Tshumak; *Aphis citricola* van der Goot; *Aphis dahliae* Mosley; *Aphis erecta* del Guercio; *Aphis fabae* E. Blanchard; *Aphis fumariae* E Blanchard; *Aphis hortensis* Fabricius; *Aphis indistincta* Walker; *Aphis inducta* Walker; *Aphis insularis* E.E. Blanchard; *Aphis ligustici* Fabricius; *Aphis neri*; *Aphis papaveris* auct.; *Aphis phlomoidea* del Guercio; *Aphis polyanthis* Passerini; *Aphis rumicis* auctt; *Aphis silybi* Passerini; *Aphis thlaspeos* Schrank; *Aphis translata* Walker; *Aphis tuberosae* Boyer de Fonscolombe; *Aphis valerianina* del Guercio; *Aphis watsoni* Theobald; *Doralis fabae* Scopoli; *Myzus roseum* Macchiati; *Myzus rubra* Macchiati; *Myzus rubrum* del Guercio.

**Common name(s):** Bean aphid, black bean aphid, black dolphin, blackfly.

**Hosts:** The primary host is usually *Euonymus europaeus* but *A. fabae* is highly polyphagus on secondary hosts including crop plants. **Distribution:** Widespread in the temperate regions of the Northern Hemisphere (including the Netherlands), South America and Africa. Not in Australia.

**Plant Parts Affected:** buds, shoots, and other aerial parts of plants. This pest is a known vector of several plant viruses.

**Probability of importation: Low**

This species has a complex life cycle involving both primary and secondary host plants, tomatoes are a known host (Blackman and Eastop, 1985). Young colonies develop on young shoots and older colonies spread all over the aerial parts of the plant (Blackman and Eastop 1985). Individuals may occur on calyxes and stems. This external feeder is likely to be eliminated by standard management and post harvest treatments.

**Probability of distribution: Moderate**

The probability of distribution would be moderate if alate and or parthenogenetic viviparous females were introduced on fruit (Dixon, 1987). Migrant adults disperse readily and colonize a wide range of secondary hosts.

**Probability of entry: 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: Moderate**

The probability of establishment would be moderate if alate and or parthenogenetic viviparous females were introduced. Rapid rates of population growth occur, resulting in dense colonies. One female may produce up to 100 young, at a rate of 10 per day (Dixon, 1987).

**Probability of spread: High**

This species has a wide host range and could spread readily within Australia. This species has spread widely throughout the world. Migrant adults disperse readily and colonize a wide range of secondary hosts on which apterous females are produced which reproduce parthenogenetically. Alates are produced on secondary hosts throughout the summer and these continuously colonize fresh herbaceous secondary host plants.

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | C – minor at the national level |
| Environment | A – unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | D – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | D – initial domestic trade restrictions anticipated until mitigation strategies in place |
| International trade | B – international trade not significantly affected |
| Environment | A – unlikely to be discernible at the national level |

**Unrestricted risk estimate: Low**

The unrestricted risk estimate is 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.

***Bemisia argentifolii* (Gennadius, 1889) B biotype [Hemiptera: Aleyrodidae]**

**Synonyms and Changes in Combination:** *Aleurodes tabaci* Gennadius; *Aleurodes inconspicua* Quintance; *Bemisia achyranthes* Singh; *Bemisia bahiana* Bondar; *Bemisia costa-limai* Bondar; *Bemisia emiliae* Corbett; *Bemisia goldfingi* Corbett; *Bemisia gossyperda* Misra & Lamba; *Bemisia gossyperda* var. *mosaicivectura* Ghesquière; *Bemisia* (*Neobemisia*) *hibisci* Takahashi; *Bemisia inconspicua*; *Bemisia longispina* Priesner & Hornsy; *Bemisia lonicerae* Takahashi; *Bemisia manihotis* Frappa; *Bemisia minima* Danzig; *Bemisia miniscula* Danzig; *Bemisia nigeriensis* Corbett; *Bemisia rhodesiaensis* Corbett; *Bemisia* (*Neobemisia*) *rhodesiaensis* Corbett, *Bemisia signata* Bondar; *Bemisia tabaci* (Gennaddius) Takahashi; *Bemisia vayssierei* Frappa.
**Common name(s):** silverleaf whitefly; sweet potato whitefly and tobacco whitefly.
**Hosts:** It has become a pest of greenhouse crops in many parts of the world, especially *Capsicum* sp., *Gerbera* sp., *Gloxinia* sp*., Hibiscus* sp. and *Lycopersicon esculentum* (tomato). *B. argentifolii* has a very wide host range within a number of plant families (Compositae, Convolvulaceae, Cruciferae, Cucurbitaceae, Euphorbiaceae, Leguminosae, Malvaceae, Solanaceae including *Lycopersicon esculentum* (tomato).
**Plant Part Affected:** leaf and stems. This pest is a known vector of several plant viruses.
**Distribution:** Afghanistan; Angola; Antigua & Barbuda; Argentina; Australia (NT; Qld; but not Tasmania or WA where it is under official control); Azerbaijan; Barbados; Belize; Brazil; Cameroon; Canada; Chad; China (Chekiang, Fukien, Kwangtung, Shensi, Szechwan, Taiwan); Colombia; Congo; Costa Rica; Côte d'Ivoire; Cyprus; Dominican Republic; Egypt; El Salvador; Ethiopia; Fiji; Gambia; Germany; Ghana; Greece; Grenada; Guadeloupe; Guatemala; Honduras; India (Andhra Pradesh, Bangalore, Buhar, Delhi, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Mysore, Orissa, Punjab, Rajasthan, Uttar Pradesh, West Bengal); Indonesia (Java, Sumatra); Iran; Iraq; Israel; Italy (Sicily); Jamaica; Japan (Honshu, Shikoku); Jordan; Kenya; Lebanon; Libya; Madagascar; Malawi; Malaysia; Mauritius; Mexico; Micronesia (Caroline Islands); Morocco; Mozambique; Netherlands (in greenhouses); Nicaragua; Nigeria; Northern Mariana Islands (Mariana Islands); Pakistan; Panama; Papua New Guinea; Philippines; Portugal; Puerto Rico; Saint Kitts & Nevis; Saudi Arabia; Sierra Leone; Somalia; Spain (Canary Islands); Sri Lanka; Sudan; Syrian Arab Republic; Tanzania; Thailand; Trinidad & Tobago; Turkey; Uganda;

United Kingdom; United States (Arizona, California, Florida, Georgia, Hawaii, Tennessee, Texas); USSR; Venezuela; Yemen; Zaire; Zimbabwe. Near cosmopolitan.

**Probability of importation: Low**

Adults are highly mobile and likely to leave fruit and trusses if disturbed. Eggs are laid on the underside of leaves, nymphs feed on leaves (De Barro, 1995). Eggs or nymphs may be found on trusses.

**Probability of distribution: Moderate**

If eggs or nymphs remain undetected distribution may occur.

**Probability of entry: 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: High**

This species has a wide host range and is present (under official control) within some areas of Australia.

**Probability of spread: High**

This species has a wide host range and environmental tolerances and has would spread readily within some states in Australia, if official control measures were not in place. This species has spread widely throughout the world (Mound and Halsey, 1978). Adults disperse readily on the wind and eggs and nymphs may also be transported with infested plant material.

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | C – minor at the regional level |
| Environment | A – unlikely to be discernible at the regional level |
| *Indirect consequences* | |

| | |
|---|---|
| Eradication, control etc | C – programs to control/eradicate this pest at the national level are not likely to be costly at the regional level |
| Domestic trade | D – domestic quarantine measures currently in place |
| International trade | B – international trade not significantly affected |
| Environment | A – unlikely to be discernible at the regional level |

**Unrestricted risk estimate: Low**

The unrestricted risk estimate is 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.

***Ceratitis capitata* (Wiedemann, 1824) [Diptera: Tephritidae]**

**Synonyms and Changes in Combination:** *Ceratitis citriperda* Macleay, 1829; *Ceratitis hispanica* De Brême, 1842; *Pardalaspis asparagi* Bezzi, 1991; *Tephritis capitate* Wiedemann, 1824.
**Common Names:** medfly; Mediterranean fruit fly.
**Hosts:** *Lycopersicon esculentum* (tomato); Over 200 species from the families Anacardiaceae, Chrysobalanaceae, Cucurbitaceae, Ebenaceae, Loganiaceae, Malpighiaceae, Meliaceae, Oleaceae, Podocarpaceae, Rosaceae, Rubiaceae, Rutaceae, Sapotaceae, and Solanaceae.
**Plant Parts Affected:** fruit.
**Distribution:** Albania, Algeria, Angola - restricted distribution (rd), Argentina (rd), Australia (rd), Benin, Bolivia, Botswana, Brazil, Burkina Faso, Burundi (rd), Cameroon, Cape Verde, Colombia, Congo (rd), Congo Democratic Republic, Corsica, Costa Rica, Côte d'Ivoire, Croatia (rd), Cyprus, Ecuador (rd), Egypt, El Salvador (rd), Ethiopia, France (rd), Gabon, Ghana, Greece, Guatemala (rd), Guinea (rd), Honduras (rd), Israel, Italy, Jamaica, Jordan, Kenya, Lebanon, Liberia, Libya (rd), Madagascar (rd), Malawi, Mali, Malta, Mauritius, Mexico, Morocco, Mozambique (rd), Netherlands (interceptions only), Netherlands Antilles, Nicaragua, Niger, Nigeria (rd), Panama, Paraguay, Peru, Portugal, Réunion (rd), Russian Federation, Saint Helena (rd), Sao Tome and Principe (rd), Saudi Arabia, Senegal, Seychelles (rd), Sierra Leone, Slovenia (rd), South Africa, Spain, Sudan, Switzerland (rd), Syria, Tanzania, Togo, Tunisia, Turkey, Uganda, Uruguay, USA (rd), Venezuela, Yemen, Yugoslavia (rd), Zimbabwe.

Mediterranean fruit fly (*Ceratitis capitata;* medfly) is not considered a pest of tomato crops in the Netherlands as it is not established there but it has been detected in trapping grids in Rotterdam. Presumably these individuals derive from fresh produce imported from areas where the pest occurs.

Biosecurity Australia considers there may be a risk medfly infesting export fruit and escaping detection for a short period of time. Consequently medfly is considered to be a pest of concern to Australia in view of the relatively free movement of people and goods throughout the European Union, and the limited distribution of this pest within Australia where it is limited in distribution and under official control.

**Probability of importation: Low**

Eggs are laid by mature females under the skin of host fruit. Larvae of this species are internal feeders and may not be readily detected by on arrival inspection (Fimmiani, 1989). Medfly is known not to infest the Netherlands tomato production areas.

**Probability of distribution: Moderate**

The probability of distribution would be moderate if infested fruits were not detected and distributed to various markets.

**Probability of entry: 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: High**

The probability of establishment is high as *C. capitata* has a wide range of host fruits, many of which are available within the PRA area. *C. capitata* is under official control within areas of Western Australia (De Lima, 1993).

**Probability of spread: Moderate**

This species has a wide host range and environmental tolerances and would spread readily within Australia if official control measures had not been implemented. This species has spread widely throughout the world. Adults do not disperse widely. The main distribution method would be through infested fruit, however, current official control measures would reduce the likelihood of spread via infested fruit.

**Probability of entry, establishment and spread: 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: High**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |

| | |
|---|---|
| Animal or plant health or welfare | D – significant at the national level |
| Environment | A – unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | E – extensive domestic quarantine measures currently in place |
| Domestic trade | D – initial domestic trade restrictions anticipated until mitigation strategies in place |
| International trade | B – international trade not significantly affected |
| Environment | A – unlikely to be discernible at the national level |

**Unrestricted risk estimate: Moderate**

The unrestricted risk estimate is 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.

***Chrysodeixis chalcites* (Esper, 1789) [Lepidoptera: Noctuidae]**

**Synonyms and Changes in Combination:** *Autographa chalcites* (Esper); *Noctua chalcites* Esper; *Phytometra chalcites* (Esper); *Plusia chalcites* (Esper).

**Common Names:** golden twin spot; green garden looper; tomato looper.

**Hosts:** *Lycopersicon esculentum* (tomato); *Abelmoschus esculentus (okra); Brassica*; *Brassica oleracea* var. *capitata* (cabbages); Cruciferae; Cucurbits (Cucurbitae); *Cynara scolymus* (globe artichokes); *Dioscorea (yams)*; Fabacae (legumes); *Flavera australasica*; *Geranium* spp.; *Glycine max* (soybeans); *Gossypium* sp. (cotton); *Ipomoea batatas* (sweet potato); *Lycopersicon airsutum*; *L. pennellii*; *Nicotiana tabacum* (tobacco); *Phaseolus* (beans); *Phaseolus vulgaris* (kidney bean); *Solanum melongena* (eggplant); *Solanum tuberosum* (potato); *Triticum aestivum* (wheat); *Zea mays* (maize).

**Distribution:** Africa; Canary Islands; Cape Verde Islands; Comoros; Mauritius; Italy; Netherlands; New Zealand and Southern Europe.

**Plant Parts Affected:** leaves and young fruit

**Probability of importation: Low**

Eggs are laid on the leaves of the host plant. Larvae of this species primarily feed on leaves and to a lesser extent on the fruit of tomato plants. Damage to fruit is external and would be readily detected during growth or processing (Harakly and Farang, 1975).

**Probability of distribution: Low**

Any late instar larvae surviving importation may be distributed with infested fruit.

**Probability of entry: 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: Moderate**

The likelihood of sufficient numbers of insects reaching maturity to establish a population would be low, however, *Chrysodeixis chalcites* has a wide host range of commercial crops readily available within the PRA area.

**Probability of spread: High**

This species has a wide host range and environmental tolerances. It is well known as a migratory species (Delobel and Gutirrrez, 1981) and would spread readily within Australia.

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | C – minor at the national level |
| Environment | A – unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | C – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | D – initial domestic trade restrictions anticipated until mitigation strategies in place |
| International trade | B – international trade not significantly affected |
| Environment | A – unlikely to be discernible at the national level |

**Unrestricted risk estimate: Very low**

The unrestricted risk estimate is 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.

***Frankliniella occidentalis* (Pergande) [Thysanoptera: Thripidae]**

**Hosts:** *Lycopersicon esculentum* (tomato); *Allium cepa* (onion); *Amaranthus palmeri* (Palmer amaranth); *Arachis hypogaea* (groundnut); *Begonia; Beta vulgaris* (beetroot); *Beta vulgaris var. saccharifera* (sugarbeet); *Brassica oleracea var. capitata* (cabbages); *Capsicum* annuum (bell pepper); *Capsicum sp.; Carthamus tinctorius* (safflower); *Chrysanthemum x morifolium* (chrysanthemum (florists')); *Citrus paradisi* (grapefruit); *Cucumis melo* (melon); *Cucumis sativus* (cucumber); *Cucurbita maxima* (giant pumpkin); *Cucurbita pepo* (ornamental gourd); Cucurbitaceae (cucurbits); *Cyclamen; Dahlia; Daucus carota* (carrot); *Dianthus caryophyllus* (carnation); *Euphorbia pulcherrima* (poinsettia); *Ficus carica* (fig); *Fragaria ananassa* (strawberry); *Fuchsia; Geranium* (cranesbill); *Gerbera jamesonii* (African daisy); *Gladiolus* hybrids (sword lily); *Gladiolus* sp.; *Gossypium* sp. (cotton); *Gypsophila* sp. (chalkplant); *Hibiscus* sp. (rosemallows); *Impatiens* sp. (balsam); *Kalanchoe* sp.; *Lactuca sativa* (lettuce); *Lathyrus odoratus* (sweet pea); *Leucaena leucocephala* (leucaena); *Limonium sinuatum* (sea pink); *Lisianthus* sp.; *Malus domestica* (apple); *Medicago sativa* (lucerne); Orchidaceae (orchids); *Petroselinum crispum* (parsley); *Phaseolus* sp. (bean); *Phaseolus* vulgaris (kidney bean); *Pisum sativum* (pea); *Pisum sativum* (pea); *Prunus armeniaca* (apricot); *Prunus cerasifera* (cherry plum); *Prunus domestica* (plum); *Prunus persica* (peach and nectarine); *Prunus persica* var. *nucipersica* (nectarine); *Prunus mume* (Japanese apricot); *Purshia tridentata* (bitterbrush); *Raphanus raphanistrum* (wild radish); *Rhododendron* sp.(rhododendron); *Rosa* sp. (rose); *Saintpaulia ionantha* (African violet); *Salvia* sp.; *Secale cereale* (rye); *Sinapis arvensis* (wild mustard); *Sinningia speciosa* (gloxinia); *Solanum melongena* (aubergine); *Sonchus* sp.(sowthistle); *Syzygium jambos* (rose apple); *Trifolium* spp. (clovers); *Triticum aestivum* (wheat); *Vitis vinifera* (grape); *Zinnia* sp..

**Plant Parts Affected:** flowers, fruit and foliage. This pest is a known vector of several plant viruses.

**Distribution:** Argentina; Australia (rd.); Austria; Belgium; Brazil; Bulgaria; Canada; Central Russia; Chile; Colombia; Costa Rica; Crete; Croatia; Cyprus; Czech Republic; Denmark; Dominican Republic; Ecuador; Estonia; Finland; France; French Guiana; Germany; Greece; Guatemala; Hungary; Ireland; Israel; Italy; Japan; Kenya; Korea, Republic of; Lithuania; Malaysia; Malta; Martinique; Mexico; Netherlands; New Zealand; Norway; Peru; Poland; Portugal; Puerto Rico; Reunion; Romania; Sardinia; Sicily; Singapore; Slovakia; Slovenia; South Africa; Southern Russia; Spain; Sri Lanka; Swaziland; Sweden; Switzerland; Tunisia; Turkey; United Kingdom; USA; Venezuela; Zimbabwe.

**Common name:** Western flower thrips

**Probability of importation: Moderate**

Adults are highly mobile and likely to leave the fruit if disturbed. Eggs may be present on the fruit or trusses, however, they are subject to high mortality due to desiccation.

**Probability of distribution: High**

If live stages suvive importation and are not detected by commercial operators distribution may occur.

**Probability of entry: 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: High**

A range of plants commonly found in Australia can act as hosts for these pests (this species is under official control within areas of Australia). Species can have a high reproductive potential even in the absence of males.

**Probability of spread: High**

Adults are capable of flight and adults and immature forms could be spread via fruit or vegetative host material.

**Probability of entry, establishment and spread: 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: Low**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | C — These pests are capable of causing direct harm to a wide range of hosts and can vector diseases |
| Environment | A – unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | C – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | C – interstate quarantine measures currently in place |
| International trade | C – unlikely to be discernible at national level |
| Environment | A – unlikely to be discernible at national level |

**Unrestricted risk estimate: Low**

The unrestricted risk estimate is 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.

***Lacanobia oleracea* (Linnaeus, 1758) [Lepidoptera: Noctuidae]**

**Synonyms and Changes in Combination:** *Barathra oleracea* (Linnaeus); *Diataraxia oleracea* (Linnaeus); *Hadena oleracea* (Linnaeus); *Mamestra oleracea* (Linnaeus); *Polia oleracea* (Linnaeus).
**Common Names:** bright-line brown-eye, tomato moth.
**Hosts:** *Lycopersicon esculentum* (tomato); *Allium cepa* (onion); *Asparagus officinalis* (asparagus); *Asparagus* sp.; *Beta vulgaris* (beetroot); *Beta vulgaris* var. *saccharifera* (sugarbeet); *Brassica napus* (rape); *Brassica oleracea* var. *botrytis* (cauliflower); *Brassica oleracea* var. *capitata* (cabbage); *Brassica oleracea* var. *gemmifera* (Brussels sprouts); *Brassica* spp.; *Capsicum* (peppers); *Chenopodium* (goosefoot); *Chrysanthemum* sp. (chrysanthemum); *Cucumis sativus* (cucumber); *Cyclamen* sp.; *Dendrathema indicum* (chrysanthemum, in greenhouse); *D. morifolium* (chrysanthemum, in greenhouse); *Dianthus caryophyllus* (carnation); *Fragaria* sp.; *Lactuca sativa* (lettuce); *Malus domestica* (apple); *Malus pumila* (apple); *Medicago sativa* (lucerne); *Nicotiana tabacum* (tobacco); *Pisum sativum* (pea); *Prunus persica* (peach); *Quercus* sp.(oak); *Rubus idaeus* (raspberry); *R. strigosus* (raspberry); *Salix* sp. (willow); *Solanum tuberosum* (potato); *Sonchus arvensis*; *Ulmus* sp. (elm); *Urtica* spp.

**Distribution:** Belgium; Bulgaria; Czechoslovakia; Denmark; Italy; Netherlands; North Africa; Romania; Turkey; United Kingdom; USSR (Former); Yugoslavia (Former).
**Plant Parts Affected:** flowers; fruit; leaves; stems.
**Probability of importation: High**
Eggs are laid on the underside of leaves of the host plant. Larvae of this species primarily feed on leaves, late instar larvae may also feed internally on fruit. Larvae will pupate in silken cocoons in crevices or hollow plant canes (Burges and Jamet, 1976). Detection of internally feeding larvae or pupae within plant canes during growth and processing would be difficult.
**Probability of distribution: Moderate**
Late instar larvae or pupae escaping detection may be able to pupate and emerge as an adult.
**Probability of entry: 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: Moderate**

*Lacanobia oleracea* has a wide host range and preferred hosts are present within the PRA area. This species may overwinter in the pupal stage. Fecundity data suggests population numbers can increase rapidly under suitable conditions. The incubation period for eggs is 3 to 8.4 days, larval stage from 23.5-39.2 days, pupal stage from 13.6-21.4 and the adults lived from 8.1-20.7 days (Jarret, 1985).

**Probability of spread: Moderate**

This species has a wide host range and environmental tolerances. Adults are good flyers and would spread readily within Australia. Spread for this species has also been recorded through the movement of infested plant material.

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | C – minor at the national level |
| Environment | A – unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | D – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | D – initial domestic trade restrictions anticipated until mitigation strategies in place |
| International trade | B – international trade not significantly affected |
| Environment | A – unlikely to be discernible at the national level |

**Unrestricted risk estimate: Low**

The unrestricted risk estimate is 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.

***Lygocoris pabulinus* (Linnaeus, 1761) [Hemiptera: Miridae]**

**Synonyms and Changes in Combination:** *Cimex aerugineus* Geoffery; *Cimex hortorum* Tigny;

*Cimex nigrophthalmus* Retzius; *Cimex pabulinus* Linnaeus; *Deraeocoris viridanus* Motschulsky; *Lygus chagnoni* Stevenson; *Lygus chloris* Feiber; *Lygus flavovirens* Fieber; *Lygus gemellus* Distant; *Lygus solani* Curtis.

**Common Names:** common green capsid; green capsid bug.

**Hosts:** *Lycopersicon esculentum* (tomato); *Aegopodium podagraria* (elder); *Capsicum annuum* (sweet pepper); *Citrus limone* (lime); *Dendranthema indicum*; *D. morifolium* (chrysanthemum); *Fragaria* sp. (strawberry); *Malus pumila* (apple); *Prunus avium* (wild cherry); *P. cerasus* (cherry); *Prunus cerasifera*; *P. domestica* (plum); *Crataegus monogyna* (hawthorn); *Ribes* spp. (currant); *Rosa* sp. (rose); *Rubus idaeus*; *R. strigosus* (raspberry); *Solanum melongena* (aubergine); *Solanum tuberosum* (potato).

**Distribution:** Canada; China; Europe (including the Netherlands); India; Japan; Korea; North America; Philippines; Russian Federation; Sri Lanka; USA.

**Plant Parts Affected:** young leaves; shoots; small, developing fruit.

**Probability of importation: Low**

Highly active insect likely to leave fruit if disturbed. Only young fruit is attacked. No lifestages completed within fruit or stems (Bloomers, *et al.,* 1997).

**Probability of distribution: Low**

Adults and nymphs not likely to remain on fruit if disturbed.

**Probability of entry: 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: Moderate**

*Lygocoris pabulinus* has a wide host range and most hosts are present within the PRA area. This species may overwinter as eggs underneath the bark of host plants (Bloomers, *et al.,* 1997).

**Probability of spread: Moderate**

This species has a wide host range and environmental tolerances. Adults are good flyers and nymph dispersal is assisted by prevailing wind patterns.

**Probability of entry, establishment and spread: 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: Moderate**

| Criteria | Estimate |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | C – unlikely to be discernible at the national level |
| Environment | A – unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | C – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | D – initial domestic trade restrictions anticipated until mitigation strategies in place |
| International trade | B – international trade not significantly affected |
| Environment | A – unlikely to be discernible at the national level |

**Unrestricted risk estimate: Very low**

The unrestricted risk estimate is 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.

***Liriomyza huidobrensis* (Blanchard, 1926) [Diptera: Agromyzidae]**

**Synonyms and Changes in Combination:** *Agromyza huidobrensis* Blanchard; *Liriomyza cucumerifoliae* Blanchard; *Liriomyza langei* Frick; *Liriomyza dianthi* Frick.
**Common Names:** pea leafminer; serpentine leafminer; South American leafminer.
**Hosts:** *Lycopersicon esculentum* (tomato); *Allium cepa* (onion); *Allium sativum* (garlic); *Amaranthus* (grain amaranth); *Amaranthus retroflexus* (redroot); *Apium graveolens* (celery); *Aster* sp.; *Beta vulgaris* (beetroot); *Bidens pilosa* (spanish needle); *Calendula* (marigolds); *Capsicum annuum* (bell pepper); *Chrysanthemum x morifolium* (chrysanthemum (florists); *Cucumis melo* (melon); *Cucumis sativus* (cucumber); *Cucurbita pepo* (ornamental gourd); *Datura* sp.; *Emilia sonchifolia* (consumption weed); *Galinsoga* sp.; *Galinsoga parviflor*a (gallant soldier); *Gerbera* sp.; *Gypsophila paniculata* (babysbreath); *Lactuca sativa* (lettuce); *Lathyrus* sp. (Vetchling); *Linum* sp.; *Medicago sativa* (lucerne); *Melilotus* spp. (melilots); *Oxalis* spp. (wood sorrels); *Petunia* sp.; *Phaseolus vulgaris* (kidney bean); *Pisum sativum* var. *arvense* (Austrian winter pea); *Portulaca oleracea* (pussley); *Solanum melongena* (aubergine); *Solanum tuberosum* (potato); *Sonchus* sp. (sowthistle); *Spinacia oleracea* (spinach); *Tagetes* sp.; *Tropaeolum* sp.; *Vicia faba* (broad bean).

**Distribution:** Argentina; Austria; Belgium; Belize; Brazil; Chile; Colombia; Costa Rica; Cyprus; Czech Republic; Denmark; Dominican Republic; Ecuador; El Salvador; Finland; France; French Guiana; Germany; Greece; Guadeloupe; Guatemala; Honduras; India; India; Indonesia; Ireland; Israel; Italy; Jordan; Kenya; Lebanon; Malaysia; Malta; Mauritius; Netherlands; Nicaragua; Norway; Panama; Peru:; Portugal; Reunion; Seychelles; Singapore; Spain; Sri Lanka; Sweden; Switzerland; Syria; Thailand; Turkey; United Kingdom; United States of America; Venezuela. Not in Australia.

**Plant Parts Affected:** Larvae feed on cotyledons, leaves and petioles.

**Probability of importation: Low**

Eggs are inserted just below the leaf surface (not within fruit). Larvae may pupate internally within the leaf tissue (Lange *et al.,* 1957). Leaf tissue is not to be associated with tomato fruit or trusses. Adults are likely to leave fruit or trusses if disturbed.

**Probability of distribution: Low**

If larvae or pupae remain undetected within the truss distribution may occur.

**Probability of entry: 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: Moderate**

Suitable host species are present throughout the PRA area. The number of eggs laid varies according to temperature and host plant. Eggs hatch in 2-5 days according to the temperature. The duration of larval development is generally 4-7 days at mean temperatures above 24°C.

**Probability of spread: Low**

Adults are poor fliers, dispersal is likely to occur through infested plant material.

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | C – unlikely to be discernible at the national level |
| Environment | A – unlikely to be discernible at national level |

| *Indirect consequences* | |
|---|---|
| Eradication, control etc | D – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | A – unlikely to be discernible at national level |
| International trade | A – unlikely to be discernible at national level |
| Environment | A – unlikely to be discernible at national level |

**Unrestricted risk estimate: Very low**

The unrestricted risk estimate is 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.

***Mamestra brassicae* (Linnaeus, 1758) [Lepidoptera: Noctuidae]**

**Synonyms and Changes in Combination:** *Barathra brassicae* (Linnaeus*); Hypobarathra unicolor* Marumo; *Noctua albidilinea* Haworth; *Phalaena brassicae* Linnaeus; *Phalaena omicron* Geoffray.
**Common Names:** cabbage armyworm; cabbage moth.
**Hosts:** *Lycopersicon esculentum* (tomato); *Allium cepa* (onion); *Allium sativum* (garlic); *Beta vulgaris* (beetroot); *Beta vulgaris var. saccharifera* (sugarbeet); *Brassica oleracea* (kale); *Brassica oleracea* var. *botrytis* (cauliflower); *Brassica oleracea* var. *capitata* (cabbage); *Brassica oleracea* var. *gemmifera* (Brussels sprouts); *Brassica rapa* subsp. *pekinensis* (Chinese cabbage); *Callistephus chinensis* (China aster); *Capsicum annuum* (bell pepper); *Chrysanthemum* sp. (chrysanthemum); Cruciferae; *Dendranthema* sp. (chrysanthemum); *Dianthus caryophyllus* (carnation); *Fagus* sp.; *Fragaria* sp. (strawberry); *Glycine max* (soyabean); *Lactuca sativa* (lettuce) ); *Larix* sp; leek (*Allium*); *Linum usitatissimum* (flax); *Malus domestica* (apple).; *Malus pumila* (apple); *Medicago sativa* (lucerne); *Nicotiana tabacum* (tobacco); *Capsicum* spp. (peppers); *Phaseolus vulgaris* (kidney bean); *Pisum sativum* (peas); *Prunus persica* (peach); *Quercus* sp. (oak); *Rheum rhaponticum* (rhubarb); *Rosa* sp. (rose); *Salix* sp. (willow); *Solanum tuberosum* (potato); *Trifolium repens* (white clover); *Vicia faba* (broad bean); *Vitis vinifera* (grapevine); *Zea mays* (maize).
**Distribution:** Armenia; Austria; Azerbaijan; Belarus; Belgium; Bulgaria; Canary Islands; China; Czechoslovakia (former -); Denmark; Finland; France; Georgia (Republic); Germany; Hungary; India; Iran; Ireland; Italy; Japan; Kazakstan; Kirgizia; Korea, Democratic People's Republic; Korea, Republic of; Latvia; Lebanon; Libya; Lithuania; Malta; Moldova; Mongolia; Netherlands; Norway; Pakistan; Poland; Portugal; Romania; Russian Federation; Spain; Sweden; Switzerland; Syria; Turkey;

Ukraine; United Kingdom; Uzbekistan; Yugoslavia

**Plant Parts Affected:** whole plant, leaves, stems, roots, growing points, inflorescence, and fruits/pods.

**Probability of importation: Low**

Eggs are laid on the underside of leaves. Larvae generally feed on leaves but may occasionally be found on fruit. Large larvae may occasionally burrow into fruit (Burges and Jarret, 1976). Entrance holes into fruit are likely to be detected.

**Probability of distribution: Moderate**

If larvae within fruit remain undetected distribution may occur.

**Probability of entry: 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: Moderate**

*Mamestra brassicae* has a wide host range and most hosts are present within the PRA area. Field mortality for larvae can be very high. This species may enter diapause to overwinter (Dochova, 1975).

**Probability of spread: Moderate**

This species has a wide host range and environmental tolerances. Adults are good flyers and their largely nocturnal (Dochova, 1975) behaviour may mean they remain unnoticed for some time.

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | C – minor significance at the national level |
| Environment | A – unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | D – programs to control/eradicate this pest at the national level are not likely to be costly |

| | |
|---|---|
| Domestic trade | D – initial domestic trade restrictions anticipated until mitigation strategies in place |
| International trade | B – international trade not significantly affected |
| Environment | A – unlikely to be discernible at the national level |

**Unrestricted risk estimate: Low**

The unrestricted risk estimate is 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.

## BIOCONTROL AGENTS

***Aphelinus abdominalis* (Dalmer) [Hymenoptera: Aspelinidae: Aspelinini]**

**Synonyms and Changes in Combination:** *Aphelinus basalis, Aphelinus* sp. nr *flavipes*

**Common Names:** parasitic wasp.

**Hosts:** Internal parasites of aphids including *Macrosiphum euphorbiae*; *Aphis gossypii*; *Ericaphis latifrons* (Born.); *Metopolophium dirhodum (Walker)*. Biocontrol agent, not a plant pest.

**Part of Plant Affected:** This species is an aphid biological control agent.

**Distribution:** Australia (not present within WA); China, France; Guam; India; Israel, Pakistan; Switzerland; Netherlands; United Kingdom of Great Britain, USSR.

**Probability of importation: Low**

This species is a highly mobile parasitic wasp. Adults are likely to leave fruit if disturbed. Parasitic larvae may be present within aphids if aphids are present on tomatoes or trusses.

**Probability of distribution: Low**

Adults are not likely to be present upon tomatoes, if larvae are present within aphids and aphids survive importation distribution may occur.

**Probability of entry: 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: Moderate**

This species tends to parasitise larger species of aphids that will be readily available within the PRA area. Adults are strong fliers and are likely to be successful in finding hosts.

**Probability of spread: Moderate**

Adults are strong fliers, dispersal may also occur within parasitised aphids upon plant material.

**Probability of entry, establishment and spread: 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: Low**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | A – unlikely to be discernible at the regional level |
| Environment | C – unlikely to be discernible at the regional level |
| *Indirect consequences* | |
| Eradication, control etc | A – unlikely to be discernible at the regional level |
| Domestic trade | A – unlikely to be discernible at the regional level |
| International trade | A – unlikely to be discernible at the regional level |
| Environment | C – unlikely to be discernible at the regional level level |

**Unrestricted risk estimate: Neglible**

The unrestricted risk estimate is 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.

***Aphidoletes aphidimyza* (Rondani, 1847) [Diptera: Cecidomyiidae]**

**Synonyms and Changes in Combination:** *Aphidoletes aphidisuga; Aphidoletes aphidivora; Aphidoletes cardui; Aphidoletes carnifex; Aphidoletes cucullata; Aphidoletes cucumeris; Aphidoletes fulva; Aphidoletes helichrysis; Aphidoletes kiefferi; Aphidoletes kiefferiana; Aphidoletes macrosiphoniellae; Aphidoletes macrosiphonis; Aphidoletes meridionalis; Aphidoletes ornata; Aphidoletes phorodontis; Cecidomyia aphidimyza* (Rondani); *Guerciobremia cucullata; Isobremia*

*kiefferi; Phaenobremia aphidimyza* (Rondani); *Phaenobremia aphidisuga* (Rübsaamen); *Phaenobremia aphidivora* (Rübsaamen); *Phaenobremia cardui; Phaenobremia carnifex; Phaenobremia fulva; Phaenobremia helichrysis* Barnes; *Phaenobremia kiefferiana; Phaenobremia meridionalis* (Felt); *Rondaniella cucullata; Rondaniella macrosiphoniellae; Rondaniella macrosiphonis; Rondaniella ornata; Rondaniella phorodontis;* Details of systematics are given in Harris (1973) and Kulp *et al*., (1989).

**Common name:** aphid midge; predatory gall midge; predatory midge.

**Hosts:** This insect is not a plant pest but a biological control agent. Its hosts include: *Acyrthosiphon pisum; Aphis craccivora; Aphis fabae; Aphis gossypii; Aphis pomi; Aulacorthum circumflexum; Brachycaudus cardui; Brachycaudus helichrysi; Brevicoryne brassicae; Chaetosiphon fragaefolii; Cryptomyzus ribis; Diuraphis noxia; Dysaphis plantaginea; Hyalopterus pruni; Macrosiphoniella sanborni; Macrosiphum euphorbiae; Macrosiphum rosae; Megoura viciae; Myzus cerasi* in Europe; *Myzus persicae; Phorodon humuli; Rhopalosiphum padi; Schizaphis graminum; Sitobion avenae; Uroleucon sonchi.* Altogether approximately 60 species of aphids serve as host for this predator.

**Plant Parts Affected:** *Aphidoletes aphidimyza* is not a plant pest. It is a free-living predator of many aphid species.

**Distribution:** Austria; Canada; Chile; China; Cyprus; Czechoslovakia; Egypt; Finland; Former Yugoslavia; France; Germany; India; Israel; Italy; Japan; Netherlands; New Zealand; Poland; Russian Federation; Spain; Sudan; Sweden; Turkey; United Kingdom; USA.

**Probability of importation: Low**

Larvae of *Aphidoletes aphidimyza* are an active predator of aphids. Adults feed on honeydew secreted by aphids and lay eggs on or around aphid colonies (Harris, 1973). Adults are liklely to leave fruit if disturbed. Mature larvae pupate within the soil. The likelihood of importation is low as long as parasitised aphids are not present upon the fruit or trusses.

**Probability of distribution: Low**

If larvae or parasitised aphids survive importation distribution may occur.

**Probability of entry: 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: Moderate**

Suitable aphid hosts are abundant throughout the PRA area.

**Probability of spread: Moderate**

Adults are capable of flight and larvae may be dispersed on infested fruit, or within parasitised prey.

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | A – unlikely to be discernible at the national level |
| Environment | C – may have an effect on aphid fauna at the national level |
| *Indirect consequences* | |
| Eradication, control etc | D – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | A – unlikely to be discernible at national level |
| International trade | A – unlikely to be discernible at national level |
| Environment | D – may have an effect on aphid fauna at the national level |

**Unrestricted risk estimate: Very low**

The unrestricted risk estimate is 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.

***Chrysoperla carnea* (Stephens, 1836) complex [Neuroptera: Chrysopidae]**

**Synonyms and Changes in Combination:** *Chrysopa affinis* Stephens; *Chrysopa kolthoffi* Navas; *Chrysopa kurisakiana* Okamoto; *Chrysopa lamproptera* Stein; *Chrysopa lucasina* Lacroix; *Chrysopa microcephala* Brauer; *Chrysopa nipponensis* Okamoto; *Chrysopa vulgaris* Schneider. For a complete synonymy see Tsukaguchi (1995).

**Common Name:** common green lacewing; common lacewing; green lacewing; lion aphid lacewing.

**Hosts:** This insect is not a plant pest. Aphids and to a lesser extent whitefly, thrips and moth eggs serve as prey for this predator. Cannibalism of larvae has been documented.

**Parts of Plant Affected:** This insect is not a plant pest. It is a free-living, unselective predator that

searches freely over the host plant. Hosts include: *Acaphylla theae* (rust mite); *Aculus schlechtendali* (apple rust mite); *Aeolothrips intermedius* (thrips)*; Aleurolobus barodensis; Amrasca biguttula biguttula; Anapulvinaria pistaciae; Aphis craccivora; Aphis cytisorum; Aphis gossypii; Aphis punica*; *Bemisia tabaci* (cotton whitefly); *Brevicoryne brassicae* (cabbage aphid); *Cacopsylla notata* (psyllid); *Chrysomela populi; Chrysomela tremula* (leaf beetle); *Cinara pilicornis* (tree aphid); *Cnephasia pumicana; Coccinella septempunctata* (ladybird beetle); *Corythucha ciliata*; *Diuraphis noxia*; *Dysaphis devecta*; *Dysaphis plantaginea*; *Dysaphis pyri*; *Empoasca vitis* (leafhopper) in Italy; *Euphyllura olivina*; *Eupoecilia ambiguella*; *Galleria mellonella* (larger wax moth); *Gymnoscelis rufifasciata*; *Helicoverpa armigera* (corn earworm); *Helicoverpa zea* (corn earworm); *Heliothis virescens* (tobacco budworm); *Heliothrips haemorrhoidalis* (greenhouse thrips); *Illinoia liriodendri* (aphid); *Leptinotarsa decemlineata* (Colorado potato beetle); *Lipaphis erysimi; Lobesia botrana*; *Lygus hesperus* (Hemiptera); *Macrosiphum albifrons*; *Macrosiphum euphorbiae*; *Macrosiphum rosae*; *Mamestra configurata*; *Mycetaspis personata*; *Myzus obtusirostris*; *Myzus persicae* (green peach aphid); *Oxycarenus hyalinipennis* (bug); *Panonychus ulmi* (European red mite); *Pectinophora gossypiella* (pink bollworm ); *Phorodon humuli*; *Phthorimaea operculella* (potato moth); *Phylloxera quercus*; *Pieris brassicae* (cabbage white butterfly); *Prays oleae*; *Pseudococcus maritimus* (mealybug); *Rhopalosiphum maidis*; *Rhopalosiphum padi*; *Saissetia oleae*; *Schizaphis graminum*; *Sipha maydis*; *Sitobion avenae*; *Sitobion fragariae*; *Spodoptera littoralis* (armyworm); *Tetranychus cinnabarinus* (carmine spider mite)***;*** *Thrips angusticeps*; *Thrips tabaci* (onion thrips); *Toxoptera aurantii* (brown citrus aphid); *Trichogramma telengai*; *Trichoplusia ni* (cabbage looper); *Uroleucon cichorii*; *Zygina rhamni*; *Zyginidia pullula.*

**Distribution:** A holarctic (does not include Australia) species complex from a wide range of latitudes. There may be as many as sixteen different distinguishable “forms” in the complex, of which about six occur in Europe.

**Probability of importation: Low**

Larvae of *Chrysoperla carnea* are an active predator of aphids, moth and whitefly eggs. Adults feed on honeydew, nectar and pollen. Eggs are laid on the underside of leaves often on or around aphid colonies (Tauber and Tauber, 1983). Adults are likely to leave fruit if disturbed. Mature larvae pupate within a coccoon upon stems of the plant, this would be the most likely means of importation.

**Probability of distribution: Moderate**

If larvae or coccoons survive importation distribution may occur.

**Probability of entry: 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: Moderate**

Suitable arthropod hosts are abundant throughout the PRA area. A single female may lay 290-320 eggs. The full life cycle from oviposition to adult emergence takes about 25 days. Up to five generations occur per year (Tauber and Tauber, 1983). The larvae may survive up to a week without food and overwinters as diapausing adults (Bowden, 1979).

**Probability of spread: Moderate**

Adults are capable of flight and larvae may be dispersed on infested fruit or plants.

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | A – unlikely to be discernible at the national level |
| Environment | C – may have an effect on arthropod fauna at the national level |
| *Indirect consequences* | |
| Eradication, control etc | C – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | A – unlikely to be discernible at national level |
| International trade | A – unlikely to be discernible at national level |
| Environment | D – may have an effect on arthropod fauna at the national level |

**Unrestricted risk estimate: Low**

The unrestricted risk estimate is 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.

***Feltiella acarisuga* (Vallot, 1827) [Diptera: Cecidomyiidae]**

**Synonyms and Changes in Combination:** *Arthrocnodax rutherfordi* Felt; *Cecidomyia acarisuga* Vallot; *Mycodiplosis minuta,* Felt; *Feltiella tetranychi* Rübsaamen; *Feltiella acarisuga* (Vallot); *Feltiella davisia* Felt; *Feltiella americana* Felt; *Feltiella ithacae* Felt; *Feltiella quadrata* Kashyap; *Therodiplosis beglarovi* Mamaev; *Therodiplosis persicae* Kieffer.

**Common Name:** predatory midge.

**Hosts:** This insect is not a plant pest but it is a specialist predator of tetranychid (spider) mite species and is used to control *Tetranychus urticae* (two spotted spider mite) on greenhouse tomatoes in the Netherlands.

**Plant Parts Affected:** This insect in not a plant pest. It is a specific predator of tetranychid mites.

**Distribution:** Asia; Belgium; Canada; Italy; Netherlands; New Zealand; USA.

**Probability of importation: Moderate**

Eggs are laid singly on plant tissue infested with host mites. Larvae are slow moving and quiescent. Pupation may occur upon the leaf or within the ground (Gagné, 1995).

**Probability of distribution: Moderate**

If larvae or coccoons survive importation distribution may occur.

**Probability of entry: 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: Low**

Suitable prey species are abundant throughout the PRA area. Larvae develop singularly and are relatively quiescent. The likelihood of a mating pair surviving, developing and locating one another in order to establish a population is low.

**Probability of spread: Low**

Adults and larvae may be dispersed on infested fruit or trusses.

**Probability of entry, establishment and spread: 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: Moderate**

| Criteria | Estimate |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | A – unlikely to be discernible at the national level |
| Environment | C – may have an effect on arthropod fauna at the national level |
| *Indirect consequences* | |
| Eradication, control etc | D – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | A – unlikely to be discernible at national level |
| International trade | A – unlikely to be discernible at national level |
| Environment | D – may have an effect on arthropod fauna at the national level |

**Unrestricted risk estimate: Very low**

The unrestricted risk estimate is 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.

***Hippodamia convergens* Guérin-Méneville, 1842 [Coleoptera: Coccinellidae]**

**Synonyms and Changes in Combination:** *Hippodamia juncta* Casey; *Hippodamia modesta* Melsheimer; *Hippodamia convergens* var *obsoleta* Crotch; *Hippodamia praticola* Mulsant.
**Common Name:** convergent ladybird; convergent lady beetle.
**Hosts:** This insect is not a plant pest but a predator of a range of aphid species and other insects. Prey species include: Aphididae; *Aphis craccivora; Aphis gossypii* (cotton aphid); *Aphis nerii; Aphis varians; Battus philenor; Cerataphis variabilis; Chrysomela scripta; Cinara fresai; Diuraphis noxia; Epilachna varivestis* (ladybird beetle); *Helicoverpa zea* (corn earworm); *Heliothis virescens* (tobacco budworm); *Leptinotarsa decemlineata* (Colorado potato beetle); *Monellia caryella; Monelliopsis pecanis; Myzus persicae* (green peach aphid); *Nezara viridula* (green vegetable bug); *Oligonychus pratensis; Pectinophora gossypiella* (pink bollworm); *Phorodon humuli; Phytoseiulus persimilis* (Chilean predatory mite); *Rhopalosiphum maidis; Schizaphis graminum; Taeniothrips inconsequens;*

*Therioaphis trifolii; Trialeurodes abutiloneus* (whitefly); *Trichoplusia ni* (cabbage looper).

**Plant Parts Affected:** This insect is not a plant pest but will actively search all parts of the plant for aphid colonies.

**Distribution:** Argentina; Bermuda; Brazil; British Columbia; Canada; Chile; China; Colombia; Ecuador; France; Haiti; Italy; Kenya; Mexico; New Zealand; Pakistan; Paraguay; Peru; Philippines; Sao Paulo; South Africa; Turkey; USA; Venezuela.

**Probability of importation: Low**

Eggs are laid near appropriate arthropod prey species. Larvae and adults actively scour vegetation for prey species (Hodek, 1973). Adults are likely to leave fruit or trusses if disturbed. Larvae may be present on fruit or trusses if prey species are present.

**Probability of distribution: Moderate**

If eggs, larvae or adults survive importation distribution may occur.

**Probability of entry: 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: Low**

Suitable prey species are abundant throughout the PRA area. Life cycle development time is dependent on temperature and food supply there appears to be one generation a year. Adults of *Hippodamia convergens* can overwinter. *Hippodamia convergens* is subject to parasitism by *Perilitus coccinellae* (Schrank), a specialist coccinellid parasitoid which is present in Australia (Anderson, *et al.,* 1986).

**Probability of spread: Moderate**

Adults are active fliers and larvae may be dispersed on infested fruit or trusses.

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | A – unlikely to be discernible at the national level |
| Environment | D – may have an effect on arthropod fauna at the national |

| | |
|---|---|
| | level |
| *Indirect consequences* | |
| Eradication, control etc | C – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | A – unlikely to be discernible at national level |
| International trade | A – unlikely to be discernible at national level |
| Environment | D – may have an effect on arthropod fauna at the national level |

**Unrestricted risk estimate: Very low**

The unrestricted risk estimate is 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.

***Macrolophus caliginosus* Wagner, 1950 [Hemiptera: Miridae]**

**Synonyms and Changes in Combination:** not known.

**Common Name:** predatory mirid bug.

**Hosts:** This insect is not a plant pest. *M. caliginosus* is a predator on whiteflies (*Trialeurodes vaporariorum,* greenhouse whitefly), and on the aphids *Macrosiphum euphorbiae* (potato aphid), *Myzus persicae* (green peach aphid), *Aphis gossypii* (cotton aphid) and, to a lesser extent, the two spotted mite, *Tetranychus urticae*. Other aleyrodids and lepidopteran eggs are also included in the host range of this species.

**Plant Parts Affected:** This species is not a plant pest.

**Distribution:** France; Italy; Netherlands; Spain. *Macrolophus caliginosus* is being widely used as a biological control agent in Europe.

**Probability of importation: Low**

Eggs are deposited into the leaf tissue of the host plant (Ferran *et al.,* 1996). *Macrolophus caliginosus* is being widely used in Europe to control whitefly, thrips, mites, and caterpillars. It is a relatively large insect and would be easily detected.

**Probability of distribution: Moderate**

If larvae or adults survive importation distribution may occur.

**Probability of entry: 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: Low**

Suitable prey species are abundant throughout the PRA area, successful establishment would be dependent upon locating suitable prey species (Alvarado, *et al.,* 1997).

**Probability of spread: Moderate**

Adults are relatively strong fliers and eggs may be distributed within infested plant tissue.

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | A – unlikely to be discernible at the national level |
| Environment | D – may have an effect on arthropod fauna at the national level |
| *Indirect consequences* | |
| Eradication, control etc | C – programs to control/eradicate this pest at the national level are likely to be costly |
| Domestic trade | A – unlikely to be discernible at national level |
| International trade | A – unlikely to be discernible at national level |
| Environment | D – may have an effect on arthropod fauna at the national level |

**Unrestricted risk estimate: Very low**

The unrestricted risk estimate is 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.

***Neoseiulus californicus* (McGregor, 1954) [Acarina: Phytoseiidae]**

**Synonyms and Changes in Combination:** *Amblyseius californicus* (McGregor, 1954).

**Common Name:** predatory mite.

**Hosts:** This mite is not a plant pest. *N. californicus* is a predator of mites including the following: *Calepitrimerus vitis* (grapeleaf rust mite); *Eotetranychus carpini; Mononychellus progresivus; Oligonychus pratensis; Oligonychus punicae; Panonychus ulmi* (European red mite); *Polyphagotarsonemus latus* (broad mite) in Italy; *Tetranychus cinnabarinus* (carmine spider mite); *Tetranychus evansi; Tetranycopsis horridus.*

**Plant Parts Affected:** This predator is not a plant pest but is a biological control agent.

**Distribution:** Africa (as a whole); Argentina; China; Colombia; Cuba; Italy; Poland; Portugal; Spain; Switzerland; Taiwan; USA. It is commercially available in the Netherlands. Not in Australia.

**Probability of importation: Moderate**

Eggs are laid along the midvein of leaves. (Malais and Ravensberg, 1992). This mite is a highly mobile, generalist predator. Adults and immatures will search all parts of the plant for prey or alternative food, for example pollen, and are strongly attracted to chemicals given off either by plants damaged by the prey species or by the prey species itself (Gilstrap and Friese, 1985).

**Probability of distribution: Moderate**

If adults or immature stages survive importation distribution may occur.

**Probability of entry: 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: Moderate**

This mite is a highly mobile, generalist predator. If prey species are not available plant pollen and exudates may serve as food sources (Gilstrap and Friese, 1985).

**Probability of spread: Moderate**

Adults and juveille stages may be spread on contaminated plant material. The generalist diet would increase survival chances.

**Probability of entry, establishment and spread: 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: Moderate**

| Criteria | Estimate |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | A – unlikely to be discernible at the national level |
| Environment | D – may have an effect on arthropod fauna at the national level |
| *Indirect consequences* | |
| Eradication, control etc | C – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | A – unlikely to be discernible at national level |
| International trade | A – unlikely to be discernible at national level |
| Environment | D – may have some affect on arthropod fauna at the national level |

**Unrestricted risk estimate: Low**

The unrestricted risk estimate is 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.

***Trichogramma brassicae* Bezdenko [Hymenoptera: Trichogrammatidae]**

**Synonyms and Changes in Combination:** not known.

**Common names:** parasitic wasp

**Hosts:** Not a plant pest. It is a generalist parasitoid of eggs of a range of species of Lepidoptera in families Gelechiidae, Plutellidae, Noctuidae, Pyralidae and others (Bai *et al.,* 1995).

**Distribution:** Originally described from material collected in the French Republic (Voegele, 1982) but now being distributed widely as a biological control agent for caterpillars in greenhouse and field grown crops in Europe including the Netherlands, and the United States of America (Bai *et al.,* 1995). Not in Australia.

**Plant Parts Affected:** Not a plant pest. A parasitoid.

**Probability of importation: Low**

This species is a highly mobile parasitic wasp that parasitises lepidopteran eggs. Adults are likely to leave fruit if disturbed. Parasitised lepidopteran eggs may not be detected during visual inspection.

**Probability of distribution: Low**

Adults are not likely to be present upon tomatoes, if parasitised lepidopteran eggs survive importation distribution may occur.

**Probability of entry: 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: Moderate**

This species is a generalist parasite of lepidopteran eggs. Prey species are likely to be detected within the PRA area.

**Probability of spread: Moderate**

Adults are strong fliers, dispersal may also occur within parasitised eggs upon plant material.

**Probability of entry, establishment and spread: 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: Low**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | A – unlikely to be discernible at national level |
| Environment | C – unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | A – unlikely to be discernible at national level |
| Domestic trade | A – unlikely to be discernible at national level |
| International trade | A – unlikely to be discernible at national level |
| Environment | C – unlikely to be discernible at the national level |

**Unrestricted risk estimate: Neglible**

The unrestricted risk estimate is determined by combining the overall probability of entry, establishment and spread with the consequences using

## FUNGI

***Phoma lycopersici* (Plowr.) Jaczewski, 1898**

**Synonyms:** *Didymella lycopersici* Kleb., *Ascochyta lycopersici* (Plowr.) Brunaud [anamorph], *Diplodina lycopersici* Hollós [anamorph], *Sphaeronaema lycopersici* Plowr. [anamorph].
**Common names:** fruit rot, canker of tomato, leaf spot of tomato, ascochyta blight, stem canker of tomato.
**Host range:** *Lycopersicon esculentum* (tomato), *Solanum tuberosum* (potato), Capsicum (peppers), *Solanum melongena* (aubergine) and *Solanum nigrum* (black nightshade).
**Plant Parts Affected:** Whole plant
**Distribution:** Widespread: Europe, including Netherlands. Asia, India, Israel, Africa, Brazil, Canada, Haiti, Mexico, Panama, Puerto Rico, Trinidad and Tobago, USA, Fench Polynesia, New Caledonia, New Zealand, Australia (not WA), Papua New Guinea, and Tonga.

**Probability of importation: Moderate**

Infected plants develop lesions (including fruit) that would be detected. The pathogen can be found in tomato stems far from the visible lesion (Phillips, 1956) and may remain undetected.

**Probability of distribution: Moderate**

If the pathogen remains on the fruit surface or truss, distribution may occur.

**Probability of entry: 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: Moderate**

Host species would be present within the PRA area. Survival of the pathogen is increased by high moisture, high organic matter levels and low temperature (Williams *et al*., 1953). The optimum temperature for mycelial growth and conidial germination in vitro is 19-20°C and there is little or no growth above 31°C (Holliday and Punithalingam, 1970). Infection is most likely during cool, humid weather (>90% RH) (Fagg and Fletcher, 1987).

**Probability of spread: Low**

Dissemination occurs mainly as conidia. Water-splash, soil dispersal of conidia, and contaminated nutrient solutions and tools are the main means of dissemination; air dispersal and seed transmission are less important. Pycnidiospores of *D. lycopersici* do not survive on the surface of artificially infected seeds for more than 9 months and the fungus appears to die within a year on commercial seed (Phillips, 1956). Infection of mature plants from infected seed has not been demonstrated (Knight and Keyworth, 1960).

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | D – significant at the regional level |
| Environment | A – unlikely to be discernible at the regional level |
| *Indirect consequences* | |
| Eradication, control etc | D– significant at the regional level |
| Domestic trade | C – likely to be minor at the regional level |
| International trade | D – likely to be significant at the regional level |
| Environment | A – unlikely to be discernible at national level |

**Unrestricted risk estimate: Very low**

The unrestricted risk estimate is 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.

***Phytophthora infestans* (Mont.) de Bary. [Pythiales: Pythiaceae]**

**Synonyms and Changes in Combination: not known.**

**Common Names:** Irish blight; late blight; potato blight; potato downy mildew; tomato late blight,

**Hosts:** *Lycopersicon esculentum* (tomato); *Capsicum annuum* (bell pepper); *Datura metel* (Hindu datura); *Datura stramonium* (jamestown-weed); *Hyoscyamus niger* (black henbane); *Ipomoea nil* (Japanese morning glory); *Lycium halimifolium* (Matrimonyvine); *Lycopersicon pimpinellifolium* (currant tomato); *Nicotiana glauca* (tree tobacco); *Petunia* sp.; *Petunia hybrida*; *Pharbitis purpurea* (tall morning glory); *Physalis angulata* (cutleaf groundcherry); *Rumex acetosa* var. *hortensis* (garden sorrel); *Solanum* sp.(nightshade); *Solanum incanum*; *Solanum indicum*; *Solanum laciniatum* (kangaroo apple); *Solanum marginatum* (white-edged nightshade); *Solanum melongena* (aubergine); *Solanum nigrum* (blackberry nightshade)**;** *Solanum tuberosum* (potato).

**Plant Parts Affected:** leaf, petiole, stem, fruit, whole plant, pods, and vegetative organs

**Distribution:** Algeria; Angola; Antigua and Barbuda; Argentina; Australia (A1 mating type only, however not present in WA); Austria; Bahamas; Barbados; Belgium; Bermuda; Bolivia; Bosnia and Herzegovina; Brazil; Bulgaria; Cameroon; Canada; Chile; China; Colombia; Cook Islands; Costa Rica; Cuba; Cyprus; Czech Republic; Czechoslovakia (former -); Denmark; Dominica; Dominican Republic; Ecuador; Egypt; El Salvador; Estonia; Fiji; Finland; France; French West Indies; Germany; Ghana; Greece; Guadeloupe; Guatemala; Guyana; Haiti; Honduras; Hungary; Iceland; India; Indonesia; Iran; Iraq; Ireland; Israel; Italy; Jamaica; Japan; Jordan; Kazakstan; Kenya; Korea, Democratic Peoples' Republic; Korea, Republic of; Laos; Latvia; Lebanon; Lithuania; Luxembourg; Macedonia; Madagascar; Malawi; Malaysia; Malta; Martinique; Mauritius; Mexico; Montserrat; Morocco; Nepal; Netherlands; New Caledonia; New Zealand; Nicaragua; Nigeria; Norfolk Island; Norway; Pakistan; Panama; Papua New Guinea; Paraguay; Peru; Philippines; Portugal; Puerto Rico; Reunion; Romania; Rwanda; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; Samoa; Saudi Arabia; Slovakia; Slovenia; Somalia; South Africa; Spain; Sri Lanka; Sudan; Sweden; Switzerland; Taiwan; Tanzania; Thailand; Trinidad and Tobago; Turkey; Uganda; Ukraine; United Kingdom; Uruguay; USA; Venezuela; Vietnam; Western Hemisphere; Yugoslavia (former); Zambia; Zimbabwe.

The A1 mating type is not present within WA. The A1 and A2 mating types have been considered within the risk assessment for *P. infestans.*

**Probability of importation: Low**

*Phytophthora infestans* attacks all above ground parts of the tomato plant (Drenth, 1994). Leaf and fruit lesions enlarge rapidly to cover large areas of the leaf and fruit. Standard greenhouse management techniques would contain the disease at low levels, if present. Infected fruit is likely to be detected during visual inspection.

**Probability of distribution: Moderate**

Spores may be carried on fruit or trusses, if temperatures do not favour sporangia development infection may remain asymptomatic and be distributed.

**Probability of entry: 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: Moderate**

The A1 mating type of the fungus has a world wide distribution including Australia (CMI Distribution Map No. 109, 1982) except for WA, while distribution of the A2 type is more limited (CMI

Distribution Map No. 728, 1996). A1 distribution throughout Australia would suggest the A2 mating type could establish given favourable conditions.

**Probability of spread: Moderate**

Favourable hosts for this fungus are available within the PRA area. Dispersal over hundreds of kilometres is known to occur aerially (Fry and Goodwin, 1997). However, spores rapidly loose their viability when the relative humidity is below 95%. Additionally, spores require a continuous film of water for infection to establish (Sherf and MacNab, 1986).

**Probability of entry, establishment and spread: 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 for the A2 mating type were estimated at the national level. Consequences for the A1 mating type (regional quarantine pest for WA) were estimated at the regional level.

**Consequences: Moderate for A1 and A2 mating types**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | C – consequences likely to be minor at the national level<br>D* – consequences likely to be significant at the regional level |
| Environment | A – unlikely to be discernible at national level<br>A* - unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | D – programs to control/eradicate this pest at the national level are not likely to be costly<br>D* - programs to control/eradicate this pest at the regional level are likely to be significant |
| Domestic trade | D – consequences likely to be minor at the national level<br>A* - consequences unlikely to be discernible at the regional level |

| | |
|---|---|
| International trade | D – consequences likely to be minor at the international level<br>C* - consequences unlikely to be discernible at the regional level |
| Environment | A – unlikely to be discernible at national level<br>A* - consequences unlikely to be discernible at the regional level |

*** A1 mating type (WA regional quarantine pest)**

**Unrestricted risk estimate: Low**

The unrestricted risk estimate is determined by combining the overall probability of entry (with either pre-clearance or on arrival inspection), 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.

## VIRUS

**Pepino mosaic *potexvirus* (PepMV) [Potexvirus group]**

**Synonyms and changes in combination:** Pepino mosaic virus.
**Common name(s):** Pepino mosaic virus (PepMV).
**Hosts:** *Cucumis sativus* (cucumber); *Datura metel* (Hindu datura); *Datura stramonium* (jamestown-weed, jimsonweed, moonflower, thorn-apple); *Lycopersicon chilense*; *Lycopersicon esculentum* (tomato) cv. Kondine red and Rutgers; *Lycopersicon peruvianum*; *Lycopersicon pimpinellifolium* (currant tomato); *Nicandra physalodes* (apple-of-Peru, shoofly plant); *Nicotiana bigelovii*; *Nicotiana clevelandii*; *Nicotiana debneyi*; *Nicotiana glutinosa*; *Nicotiana occidentalis*; *Nicotiana rustica* (Aztec tobacco, wild tobacco); *Nicotiana tabacum* cv. Samsun (tobacco); *Physalis floridana*; *Physalis peruviana* (Cape gooseberry, ground cherry); *Solanum demissum*; *Solanum demissum* x *S. tuberosum*; *Solanum muricatum* (pepino, sweet cucumber, melon pear, melon shrub); *Solanum tuberosum* (potato); *Tetragonia tetragonioides* (New Zealand spinach); white burley.
**Plant part affected:** Fruit, leaf, stem.

**Distribution:** Netherlands, Peru.

**Probability of importation: Moderate**

Pepino mosaic virus (PepMV) is transmitted mechanically through contact such as contaminated tools, hands, clothing, direct plant-to-plant contact, and propagation (grafting, cuttings) (Lacasa, *et al.,* 2001). Asympotmatic fruit may be present. The Netherlands has a domestic PepMV management protocol inplace to ensure a low incidence of PepMV within tomato production areas.

**Probability of distribution: Moderate**

PepMV may occasionally be symptomless on fruit. If symptomless fruit and trusses were imported the virus would not be detected during on arrival inspection and may be distributed.

**Probability of entry: 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: Moderate**

Pepino mosaic virus (PepMV) has been shown to be transmitted through mechanical contact (Lacasa, 2001). No arthropod vectors have been identified. Hosts are limited to some plants in the Solenaceous family, alternate solanaceous hosts exist within the PRA area, but the extent of the host range is still to be determined. Jones *et al.,* (1980) suggested that the virus could infect potatoes. The virus would have to mechanically transmitted from infected imported material to appropriate hosts, on a relatively large scale for the virus to establish. Establishement has occurred within greenhouses in Europe and the US on several occasions.

**Probability of spread: Moderate**

Pepino mosaic virus (PepMV) did spread throughout several greenhouse areas within Europe and the US prior to identification and management (EPPO, 2000).

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | D – consequences not likely to be significant at the national level |
| Environment | A – unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | D – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | D – consequences likely to be minor at the national level |

| | |
|---|---|
| International trade | D – consequences likely to be minor at the international level |
| Environment | A – unlikely to be discernible at national level |

**Unrestricted risk estimate: Low**

The unrestricted risk estimate is 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.

**Raspberry ringspot virus (RpRSV) [Nepovirus (Comoviridae)]**

**Common names:** raspberry Scottish leaf curl virus; red currant ringspot virus; raspberry leaf curl; Lloyd George yellow blotch.
**Hosts:** Families containing susceptible hosts: Amaryllidaceae; Chenopodiaceae; Cucurbitaceae; Leguminosae-Papilionoideae; Rosaceae; Solanaceae.
**Distribution:** Spread in the Eurasian region and the Mediterranean region. Not in Australia. Present in Austria; Belgium; Bulgaria; Czech Republic; Finland; France; Germany; Greece; Hungary; Ireland; Luxembourg; the Netherlands; Norway; Poland; Spain; Switzerland; Turkey; United Kingdom; United States of America; Russian Federation; the former Yugoslavia. Found, but with no evidence of spread, in Denmark (Brunt *et al.,* 1996).
**Plant Parts Affected:** leaves, pollen, fruit and seed.
**Probability of importation: Low**
The most likely means of entry for truss tomatoes is via vegetative material or seed. Tomato plants and fruit displaying visual symptoms are likely to be detected during propagation.
**Probability of distribution: Moderate**
If infected fruit and trusses were imported distribution may occur.
**Probability of entry: 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: Low**
Raspberry ringspot virus has a wide host range but seed transmission is not verified in tomato. Nematode vectors are present within Australia.
**Probability of spread: Moderate**
Raspberry ringspot virus has a wide host range. Nematode vectors are present within Australia.

**Probability of entry, establishment and spread: 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: Moderate**

| Criteria | Estimate |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | D – consequences likely to be minor at the national level |
| Environment | A – unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | D – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | D – consequences likely to be minor at the national level |
| International trade | D – consequences likely to be minor at the international level |
| Environment | A – unlikely to be discernible at national level |

**Unrestricted risk estimate: Very low**

The unrestricted risk estimate is 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.

**Tomato aspermy cucumovirus [Virus: Bromoviridae]**

**Synonyms and Changes in Combination:** Chrysanthemum aspermy virus; Chrysanthemum mild mottle virus; Chrysanthemum mosaic virus; cucumis virus 1; lycopersicon virus 7 strain chrysanthemum; Tomato aspermy virus.

**Hosts:** *Lycopersicon esculentum* (tomato); Aster; *Canna* spp.; *Capsicum* sp.; *Chenopodium amaranticolor*; *Chenopodium quinoa*; *Chrysanthemum morifolium*; *Cucumis sativus; Lilium* spp.; *Mentha spicata* (spear mint); *Nicotiana clevelandii*; *Nicotiana glutinosa*; *Nicotiana tabacum*; *Petunia hybrida*; *Phaseolus vulgaris*; *Stellaria media*; *Vigna unguiculata*; *Zinnia elegans* (zinnia).

**Distribution:** Australia (not WA); Canada; China; Estonia; Eurasia; India; Japan; New Zealand;

Netherlands; Poland; Romania; USA; USSR (former -); Yugoslavia.

**Probability of importation: Low**

In tomato the disease causes leaf mottling, malformation, dwarfing of plants. Fruits are dwarfed, malformed and seedless (Brunt *et al.,* 1996). The symptoms are likely to be detected during the growth phase and plants culled prior to harvest.

**Probability of distribution: Moderate**

If infected fruit were imported the virus may be distributed.

**Probability of entry: 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: Low**

Host plants may be available within the PRA area. Transmission to host plants would be dependent upon a suitable aphid vector (virus transmission is non persistent), by mechanical inoculation and grafting. Infected tomato fruit does not have seeds (Brunt *et al.,* 1996).

**Probability of spread: Low**

The virus may be transmitted by aphid vectors in a non persistent manner, by mechanical inoculation and grafting. Infected tomato fruit does not have seeds (Brunt *et al.,* 1996).

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | C – consequences likely to be minor at the regional level |
| Environment | A – unlikely to be discernible at regional level |
| *Indirect consequences* | |
| Eradication, control etc | D – programs to control/eradicate this disease at the regional level are not likely to be costly |
| Domestic trade | C – consequences likely to be minor at the regional level |

| | |
|---|---|
| International trade | C – consequences likely to be minor at the regional level |
| Environment | A – unlikely to be discernible at regional level |

**Unrestricted risk estimate: Very low**

The unrestricted risk estimate is 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.

**Tomato black ring virus (TBRV) [Nepovirus (Comoviridae)]**

**Common names:** bean ringspot; beet ringspot; celery yellow vein; lettuce ringspot; potato bouquet; tomato black ring (English).
**Hosts:** *Lycopersicon esculentum* (tomato); *Allium porrum*; *Beta vulgaris*; *Lactuca sativa*; *Phaseolus vulgaris*; *Robinia pseudoacacia*; *Fraxinus* sp.; *Rubus* sp.; *Solanum tuberosum* (potato); *Apium graveolens; Narcissus pseudo-narcissus*; *Tulipa* sp.; *Vitis* sp.; and many weed and endemic species.
**Distribution:** Brazil; Canada; Czech Republic; Denmark; Finland; France; Germany; Greece; Hungary; India; Ireland; Italy; Japan (no evidence of spread ); Kenya; Netherlands; Norway; Poland; Romania; Slovak Republic; Sweden; Turkey; United Kingdom; United States of America; Russian Federation; Yugoslavia (the former) (Brunt *et al.,* 1996).
**Plant Parts Affected:** leaves, pollen and seed.
**Probability of importation: Low**
The most likely means of entry for truss tomatoes is via vegetative material or seed. The probability of importation within infected seed has not been considered as tomato seed entrance into Australia is currently unregulated. Tomato fruit displaying visual symptoms are likely to be detected.
**Probability of distribution: Moderate**
If infected fruit and trusses were imported and the virus not detected during on arrival inspection, distribution may occur.
**Probability of entry: 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: Low**
Tomato black ring virus has a wide host range. Seed infectivity has been reported to be 20% (Murat, 1983). Seed movement into Australia is unregulated and the disease has not established to date. Nematode vectors are present within Australia, although virus life is shortlived within these vectors

(Murat, 1983).

**Probability of spread: Moderate**

Tomato black ring virus has a wide host rangeand may spread via nematode vectors (Murat, 1983).

**Probability of entry, establishment and spread: 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: Moderate**

| **Criteria** | **Estimate** |
|---|---|
| *Direct consequences* | |
| Animal or plant health or welfare | D – consequences likely to be minor at the national level |
| Environment | A – unlikely to be discernible at national level |
| *Indirect consequences* | |
| Eradication, control etc | D – programs to control/eradicate this pest at the national level are not likely to be costly |
| Domestic trade | D – consequences likely to be minor at the national level |
| International trade | D – consequences likely to be minor at the international level |
| Environment | A – unlikely to be discernible at national level |

**Unrestricted risk estimate: Very low**

The unrestricted risk estimate is 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.

## RISK ASSESSMENT CONCLUSION

Table 4 summarises the detailed risk assessments and provides unrestricted risk estimates for the quarantine pests considered to be associated with truss tomatoes from the Netherlands.

Two quarantine pests (*Aphelinus abdominalis* and *Trichogramma brassicae*) were assessed to have an unrestricted risk of negligible, 11 quarantine pests (*Aphidoletes aphidimyza, Chrysodeixis chalcites, Feltiella acarisuga, Hippodamia convergens, Liriomyza huidobrensis, Lygocoris pabulinus, Macrolophus caliginosus*, *Phoma lycospersici,* raspberry ringspot virus, tomato aspermy cucumovirus and tomato black ring virus) were assessed to have an unrestricted risk of very low.

Nine quarantine pests (*Aphis fabae, Bemisia argentifollii, Chrysoperla carnea, Frankliniella occidentalis, Lacanobia oleracea, Mamestra brassicae, Neoseiulus californicus,* Pepino mosaic potexvirus and *Phytophthora infestans*) were assessed to have an unrestricted risk estimate of low.

*Ceratitis capitata* (Mediterranean fruit fly, Medfly) was assessed to have an unrestricted risk of moderate. As indicated in the risk assessment, Medfly is not considered a pest of tomato crops in the Netherlands, as it is not established within the Netherlands but it has been detected in trapping grids in Rotterdam. Biosecurity Australia considers there is potential for Medfly infesting export fruit and escaping detection for a short period of time.

Table 5 provides the final list of quarantine pests of truss tomatoes from the Netherlands that have been assessed to have unrestricted risk estimates above Australia's ALOP. These pests do require the use of risk management measures over and above the standard practice used in the production of commercial truss tomatoes in the Netherlands.

**Table 4 Unrestricted risk summary**

| Scientific Name | Common name | Probability of | | | Overall Probability of entry, establishment and spread[2] | Consequences | Unrestricted Risk[3] |
|---|---|---|---|---|---|---|---|
| | | Entry | Establishment | Spread | | | |
| Arthropods | | | | | | | |
| *Aphis fabae* Scoloopi | Black bean aphid | Low | Moderate | High | Low | Moderate | Low |
| *Bemisia argentifolii* (Bellows, Perring, Gill & Hendrick) | Silverleaf whitefly | Low | High | High | Low | Moderate | Low |
| *Ceratitis capitata* (Wiedemann, 1824) | Mediterranean fruit fly | Low | High | Moderate | Low | High | Moderate |
| *Chrysodeixis chalcites* (Esper, 1789) | Golden twin spot | Very low | Moderate | High | Very low | Moderate | Very low |
| *Frankliniella occidentalis* (Pergande) | Western flower thrips | Moderate | High | High | Moderate | Low | Low |
| *Lacanobia oleracea* (Linnaeus, 1758) | Tomato moth | Moderate | Moderate | Moderate | Low | Moderate | Low |

[2] The entry, establishment and spread potential' is the product of the probabilities of entry, establishment and spread. This product is achieved by using the matrix of rules shown in Table 16 of the Guidelines for IRA 2001.

[3] Unrestricted risk is the product of; (a) probability of entry, establishment and spread; and, (b) the consequences, using the rules set out in Table 24 of the Guidelines for IRA 2001.

| Scientific Name | Common name | Probability of | | | Overall Probability of entry, establishment and spread[2] | Consequences | Unrestricted Risk[3] |
|---|---|---|---|---|---|---|---|
| | | Entry | Establishment | Spread | | | |
| *Liriomyza huidobrensis* (Blanchard) [Diptera: Agromyzidae] | Serpentine leafminer | Very low | Moderate | Low | Very low | Moderate | Very low |
| *Lygocoris pabulinus* (Linnaeus, 1761) | Green capsid bug | Very low | Moderate | Moderate | Very low | Moderate | Very low |
| *Mamestra brassicae* (Linnaeus, 1758) | Cabbage moth | Low | Moderate | Moderate | Low | Moderate | Low |
| **Arthropod biocontrol agents** | | | | | | | |
| *Aphelinus abdominalis* (Dalmer) | Parasitic wasp | Very low | Moderate | Moderate | Very low | Low | Negligible |
| *Aphidoletes aphidimyza* (Rondani, 1847) | Predatory midge | Very low | Moderate | Moderate | Very low | Moderate | Very low |
| *Chrysoperla carnea* (Stephens, 1836) | Green lacewing | Low | Moderate | Moderate | Low | Moderate | Low |
| *Feltiella acarisuga* (Vallot, 1827) | Predatory midge | Low | Low | Low | Very low | Moderate | Very low |
| *Hippodamia convergens* Guerin-Meneville, 1842 | Convergent ladybird | Low | Low | Moderate | Very low | Moderate | Very low |
| *Macrolophus caliginosus* Wagner, 1950 | Predatory mirid bug | Low | Low | Moderate | Very low | Moderate | Very low |
| *Neoseiulus californicus* (McGregor, 1954) | Predatory mite | Low | Moderate | Moderate | Low | Moderate | Low |

| Scientific Name | Common name | Probability of | | | Overall Probability of entry, establishment and spread[2] | Consequences | Unrestricted Risk[3] |
|---|---|---|---|---|---|---|---|
| | | Entry | Establishment | Spread | | | |
| *Trichogramma brassicae* Bezdenko | Parasitic wasp | Very low | Moderate | Moderate | Very low | Low | Negligible |
| **Pathogens** | | | | | | | |
| **Fungi** | | | | | | | |
| *Phoma lycopersici* (Plowr.) Jaczewski, 1898 | Fruit rot | Low | Moderate | Low | Very low | Moderate | Very low |
| *Phytophthora infestans** (Mont.) de Bary | Late blight | Low | Moderate | Moderate | Low | Moderate | Low |
| **Virus** | | | | | | | |
| Pepino mosaic *potexvirus* | PepMV | Low | Moderate | Moderate | Low | Moderate | Low |
| Raspberry ringspot virus | RpRSV | Low | Low | Moderate | Very low | Moderate | Very low |
| Tomato aspermy cucumovirus | TAC | Low | Low | Low | Very low | Moderate | Very low |
| Tomato black ring virus | TBRV | Low | Low | Moderate | Very low | Moderate | Very low |

* A1 (regional pest for WA) & A2 mating types

**Table 5 Quarantine pests of Netherlands truss tomatoes assessed to have unrestricted risk estimates above Australia's ALOP**

| Pest | Common name |
|---|---|
| *Aphis fabae* [Hemiptera: Aphididae] | Black bean aphid |
| *Bemisia* argentifollii [Hemiptera: Alerrodidae] | Siverleaf whitefly |
| *Ceratitis capitata* [Diptera: Tephritidae] | Mediterranean fruit fly |
| *Chrysoperla carnea* [Neuroptera: Chrysopidae] | Green lacewing |
| *Frankliniella occidentalis* [Thysanoptera: Thripidae] | Western flower thrips |
| *Lacanobia oleracea* [Lepidoptera: Noctuidae] | Golden twin spot |
| *Mamestra brasicae* [Lepidoptera: Noctuidae] | Cabbage moth |
| *Neoseiulus californicus* [Acarina: Phytoseiidae] | Predatory mite |
| *Phytophthora infestans* [Pythiales: Pythiaceae] | Late blight |
| Pepino mosaic *potexvirus* | PepMV |

## STAGE 3: RISK MANAGEMENT

Biosecurity Australia requested submissions from stakeholders regarding the Netherlands truss tomatoes draft import policy report. Biosecurity Australia received comments from several stakeholders and following consideration of these comments, has developed import conditions. The proposed risk management measures and the rationale for retaining or discarding the risk management measures as import policy are outlined below. The final import conditions for Netherlands truss tomatoes are presented after the risk management section.

## [1] PEST FREE PRODUCTION AREAS FOR MEDITERRANEAN FRUIT FLY

*Ceratitis capitata* (Mediterranean fruit fly, Medfly) has been assessed to have an unrestricted risk estimate of moderate and measures are therefore required to mitigate that risk.

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 therefore requires that Netherlands truss tomatoes for export to Australia be sourced from areas of production that are maintained free of Medfly (consistent with ISPM No. 10). Biosecurity Australia recognises pest free certification as an appropriate measure supported by a trapping network for Medfly.

Biosecurity Australia requires truss tomato production areas producing tomatoes for export to Australia be monitored using a commercially available Medfly trap and lure. Traps are to be positioned at a density of 1 trap per hectare within each greenhouse. Greenhouses to use Medfly proof screening of ventilation windows. Traps are to be maintained and serviced as per Biosecurity Australia-NPPS agreement. Records of trap maintenance and service history are to be maintained and available for audit. Biosecurity Australia is to be notified of any detections of Medfly within truss tomato production areas for export to Australia within 48 hours of NPPS becoming aware of a detection.

The finding of any live or dead Medfly associated with truss tomato consignments would indicate non-compliance with the pest free area status. Therefore, if any live or dead Medfly are detected at inspections, the export program to Australia will be suspended until

Biosecurity Australia and the Netherlands 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 as an alternative.

## [2] PEST FREE PRODUCTION AREAS FOR PEPINO MOSAIC POTEXVIRUS

Pepino mosaic potexvirus has been assessed to have an unrestricted risk estimate of low and measures are therefore required to mitigate that risk.

Visual inspection is not considered to be an appropriate risk management option for pepino mosaic potexvirus because the fruit may show no visual symptoms of infection with the virus. If infected symptomless fruit and trusses were not detected at inspection, the virus may enter, establish and spread. Biosecurity Australia will require establishment and maintenance of pest free production areas.

Verification of freedom from PepMV is to be achieved by sampling (200 leaves) for each registered production site two weeks prior commencement of picking of truss tomatoes for export to Australia and laboratory testing by a certified agency to confirm production site freedom from PepMV. Testing results are to be maintained by the NPPS and be made available for audit upon request. Production areas testing positive for PepMV to be excluded for export to Australia for 12 months.

The Netherlands must continue to notify Biosecurity Australia of the status of PepMV and any detections and related activities in the Netherlands.

## [3] FREEDOM OF CONSIGNMENTS FROM OTHER IDENTIFIED QUARANTINE PESTS

A list of eight other quarantine pests (six insects, one mite and one fungus, see Table 5) have been identified to have an unrestricted risk of low and measures are therefore required to mitigate that risk.

Visual inspection is the risk management measure for these pests in view of the level of risk identified. The requirement for phytosanitary inspection is encompassed within import condition C6000.

## [4] 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 Netherlands truss tomatoes is maintained and verified during the process of production and export to Australia. The system of operational procedures for the production and export of truss tomatoes to Australia from the Netherlands will consist of :-

- Registration of growers and greenhouses,
- Packaging and labelling compliance,
- Phytosanitary inspection by NPPS,
- Phytosanitary certification by NPPS,
- Phytosanitary inspection by AQIS.

With the exception of the requirement for registration of growers and greenhouses, the requirements under the heading of operational maintenance and verification of phytosanitary status are encompassed by import condition C6000.

## [4A] REGISTRATION OF GROWERS AND GREENHOUSES

All truss tomatoes for export must be sourced only from registered growers. NPPS will be required to register all growers and greenhouses involved in the export of truss tomatoes to Australia prior to commencement of exports. This will enable traceback in the event of non-compliance with import conditions. Copies of the registration records for growers and greenhouses in the Netherlands must be available for audit as required.

## REGISTRATION OF PACKHOUSES

The requirement for the registration of packhouses processing truss tomatoes for export to Australia has been removed after consideration of submissions from stakeholders. Biosecurity Australia considers that the current commercial practices for the operation of packhouses within the Netherlands will maintain quarantine integrity of the commodity, provide for traceability of consignments should non-compliance with import conditions

occur and provide an acceptable alternative measure to the requirement for the registration of packhouses.

## [4B] PACKAGING AND LABELLING

All truss tomatoes for export must be free from trash and pests of quarantine concern to Australia. Trash refers to soil, splinters, twigs, leaves and other plant material (other than the tomato truss). No unprocessed packing material of plant origin will be allowed. Packaging material includes export cartons/boxes, bags within which truss tomatoes are contained within the export carton/box, any material used to line export cartons/boxes, any pallets upon which the cartons/boxes are stacked, and any strapping or other materials associated with the export pallet. All packaging (except pallets) must be new.

All boxes must be labelled with the grower registration number. Box stamping requirements will only be necessary for consignments consisting of individual boxes and not complete pallets. 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 greenhouses and growers.

## SPECIFIC CONDITIONS FOR STORAGE AND MOVEMENT OF PRODUCE

The requirement for specific conditions for storage and movement of produce has been removed after consideration of submissions from stakeholders. Current commercial practices including the transport and storage of truss tomatoes for export in closed containers or covered by medfly-proof mesh prior to and after packing will maintain quarantine integrity of the commodity, provide for traceback of consignments and provide an acceptable alternative measure to the requirement for specific conditions for the storage and movement of produce.

## [4C] PHYTOSANITARY INSPECTION BY NPPS

NPPS is to inspect all consignments in accordance with official procedures for all visually detectable quarantine pests and trash. Sample rates must achieve a 95% confidence level that not more than 0.5% of the units (truss and associated tomatoes) in the consignment are infested. Detection of live quarantine pests, or trash will result in failure of the

consignment. If a consignment fails inspection by NPPS the exporter will be given the option of treatment and re-inspection of the consignment or removal of the consignment from the export pathway.

Records of the interceptions made during these inspections (live or dead quarantine pests, and trash) are to be maintained by NPPS and made available to DAFF 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.

Note: A consignment is the number of boxes of truss tomatoes covered by one phytosanitary certificate shipped via one port in the Netherlands to a designated port in Australia for one consignee on the same vessel on the same day. A lot is defined as a number of units of a single commodity, identifiable by its homogeneity of composition, for example, forming part of a consignment.

## [4D] PHYTOSANITARY CERTIFICATION BY NPPS

NPPS is to issue a phytosanitary certificate for each consignment after completion of the pre export phytosanitary inspection. Each phytosanitary certificate is to contain the following information:

### ADDITIONAL DECLARATIONS:

"*The truss tomatoes in this consignment have been produced in the Netherlands in accordance with the conditions governing the entry of fresh truss tomatoes from the Netherlands to Australia*"

consistent with International Standards For Phytosanitary Measures No. 7 Export Certification Systems (FAO, Rome, 1997).

### DISTINGUISHING MARKS

The pallet card numbers, container numbers, aircraft flight number (where known) and seal numbers (for sea freight).

## [4E] ON-ARRIVAL PHYTOSANITARY INSPECTION BY AQIS

AQIS will inspect the consignment at the first port of call using standard 600 unit AQIS sampling procedures (to provide 95% confidence of detecting a 0.5% defect level or greater). No land bridging of consignments will be permitted unless the goods have cleared quarantine.

Inspection will require that each truss and associated tomato fruits be individually examined. The full 600 trusses and associated tomato fruit selected for inspection will be completed regardless of whether any detections are found earlier in the inspection.

All fruit will be removed from each selected carton/box examined trash and live quarantine pests. Each empty carton/box will be similarly examined.

### ACTION FOR NON-COMPLYING LOTS

Where consignments are found to be non-compliant with requirements at AQIS on-arrival inspection due to the presence of live quarantine pests or trash, 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 truss tomato risk management systems that are in place. The program will continue only once DAFF is satisfied that appropriate corrective action has been taken.

### UNCATEGORISED PESTS

If an organism is detected on truss tomatoes from the Netherlands 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 measures are implemented that continue to provide the appropriate level of phytosanitary protection for Australia.

## IMPORT CONDITIONS

The import conditions will consist of condition C6000 (Import requirements for all Fruits and Vegetables), establishment and maintenance of pest free production areas for Mediterranean fruit fly and pepino mosaic virus, registration of growers and greenhouses for production of truss tomatoes for export to Australia and provision of an additional declaration with the phytosanitary certificate stating, "*The truss tomatoes in this consignment have been produced in the Netherlands in accordance with the conditions governing the entry of fresh truss tomatoes from the Netherlands to Australia*". Table 6 provides details of the import conditions and associated permit conditions for Netherlands truss tomatoes.

Biosecurity Australia considers that the import conditions below are commensurate with the identified risks. Note that Biosecurity Australia regards the measures described below to be consistent with and equivalent to the measures that are currently in place for the importation of truss tomatoes from New Zealand.

### Table 6 Table of Import Conditions for Truss Tomatoes from the Netherlands

| Condition C6000 (General Requirements for All Fruits And Vegetables) |
|---|
| The following conditions of entry are common to all commercial importations of fresh fruits and vegetables:<br><br>i) A Permit approved by the States is required;<br><br>ii) An original Phytosanitary Certificate must accompany each consignment;<br><br>iii) A Quarantine Entry form should be lodged for produce from sea and air freight by an importer or their agent for clearance of the consignment by AQIS;<br><br>iv) Shipments must be free of soil and other debris and packed in clean new packages;<br><br>v) All consignments (other than those pre-cleared in the country of origin under an arrangement approved by AQIS), are subject to inspection on arrival and any treatment necessary before release;<br><br>vi) Inspection must occur at the first port of call. No land-bridging of consignments will be permitted unless the goods have cleared quarantine; |

vii) All consignments treated prior to export must have a commercial treatment certificate or a valid endorsement on the Phytosanitary Certificate or as otherwise stated in the specific conditions;

viii) Open (door ajar) dry boxes that are used to ship produce that requires airing during transport are acceptable provided the containers are secured by replacing or closing the doors prior to movement from the wharf to the site of inspection. Alternative security can be provided by securely meshing, screening, covering with a heavy plastic sheet or tarping over the open containers;

ix) Timber packaging, pallets or dunnage in FCL containers will be subject to inspection and treatment on arrival, unless certified as having been treated by an approved method.

**Condition C 1569**

**Pest free production areas for Mediterranean fruit fly**

Production areas to be monitored for Mediterranean fruit fly using appropriate trapping regimes. Trapping records to be available for audit.

**Pest free production areas for pepino mosaic virus (PepMV)**

Leaf testing to be conducted on tomato plants 2 weeks prior to the commencement of harvest of fruit for export to Australia. Production areas testing positive for PepMV to be excluded for export to Australia for 12 months.

**Requirement for the registration of growers and greenhouses for export to Australia**

NPPS will be required to register all growers and greenhouses involved in the export of truss tomatoes to Australia prior to commencement of exports.

**Requirement for an additional declaration to accompany the phytosanitary certicate stating…**

"*The truss tomatoes in this consignment have been produced in the Netherlands in accordance with the conditions governing the entry of fresh truss tomatoes from the Netherlands to Australia*"

## CONCLUSION

The findings of this PRA are based on a comprehensive analysis of relevant scientific literature and existing import requirements for truss tomatoes 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 TOMATOES (PRESENCE/ABSENCE)

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| **ARTHROPODA** | | | | |
| **Acari [mites]** | | | | |
| *Aculops lycopersici* Massee synonym : *Vasates lycopersici* (Massee) [Acarina: Eriophyidae] | Tomato russet mite | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Polyphagotarsonemus latus* (Banks) [Acarina: Tarsonemidae] | Broad mite, tropical mite | Yes<br>Woets (1976) | Yes<br>AQIS (1997) | No |
| *Tetranychus cinnabarinus* (Boisduval) [Acarina: Tetranychidae] | Carmine spider mite | Yes<br>Saba (1975) | Yes<br>AQIS (1997); AICN (2003) | No |
| *Tetranychus urticae* Koch [Acarina: Tetranychidae] | Two spotted spider mite | Yes<br>Janssen *et al*. (1999) | Yes<br>AQIS (1997) | No |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| **Diptera [flies]** | | | | |
| *Ceratitis capitata* (Wiedemann) [Diptera: Tephritidae] | Mediterranean fruit fly | Detected occasionally on imported fruit<br>NPPS (2001) | Yes<br>Present in WA (under official control) | Yes |
| *Chromatomyia syngenesiae* Hardy [Diptera: Agromyzidae] | Chrysanthemum leafminer | Yes<br>NPPS (1997) | Yes<br>Anon (1984) | No |
| *Liriomyza bryoniae* (Kaltenbach) [Diptera: Agromyzidae] | Tomato leafminer | Yes<br>NPPS (1997) | No | Yes |
| *Liriomyza huidobrensis* (Blanchard) [Diptera: Agromyzidae] | Serpentine leafminer | Yes<br>NPPS (1997) | No | Yes |
| *Liriomyza trifolii* (Burgess) [Diptera: Agromyzidae] | American serpentine leafminer | Yes<br>NPPS (1997) | No | Yes |
| **Hemiptera [ aphids, leafhoppers, mealybugs, psyllids, scales, whiteflies]** | | | | |
| *Aphis fabae* Scopoli [Hemiptera: Aphididae] | Black bean aphid | Yes<br>NPPS (1997) | No | Yes |
| *Aphis gossypii* Glover [Hemiptera: | Cotton aphid | Yes | Yes | No |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| Aphididae] | | NPPS (1997) | AQIS (1997) | |
| *Aulacorthum solani* (Kaltenbach) synonym : *Macrosiphum solani* Kaltenbach [Hemiptera: Aphididae] | Potato aphid | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Bemisia argentifolii* (Bellows, Perring, Gill & Hendrick) synonym : *Bemisia tabaci* B biotype (Gennadius) [Hemiptera: Aleyrodidae] | Silverleaf whitefly | Yes<br>NPPS (1997) | Yes<br>AQIS (1997)<br>(under official control in states where present) | Yes |
| *Lygocoris pabulinus* (Linnaeus) [Hemiptera: Miridae] | Common green capsid | Yes<br>Bus *et al*. (1985) | No | Yes |
| *Macrosiphum euphorbiae* (Thomas) [Hemiptera: Aphididae] | Potato aphid, tomato aphid | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Myzus persicae* (Sulzer) [Hemiptera: Aphididae] | Green peach aphid | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Planococcus citri* (Risso) [Hemiptera: Pseudococcidae] | Citrus mealybug | Yes | Yes<br>Gullan (2000) | No |
| *Pseudococcus affinis* (Maskell) [Hemiptera: Pseudococcidae] | Californian mealybug | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| | | | | |
| *Trialeurodes vaporariorum* (Westwood) [Hemiptera: Aleyrodidae] | Greenhouse whitefly | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| **Hymenoptera [ants, wasps]** | | | | |
| *Bombus terrestris* (Linnaeus) [Hymenoptera: Apidae] | Bumble bee | Yes<br>Van den Eijnde (1990) | Yes – Tasmania only (under official control)<br>Stout & Goulson (2000) | Yes |
| **Lepidoptera [butterflies, moths]** | | | | |
| *Chrysodeixis chalcites* Esper [Lepidoptera: Noctuidae] | Tomato looper | Yes<br>Lempke (1978) | No | Yes |
| *Clepsis spectrana* (Treitschke) [Lepidoptera:Tortricidae] | Cabbage leaf roller, cyclamen tortrix | Yes<br>NPPS (1997) | No | Yes |
| *Lacanobia oleracea* (Linnaeus) [Lepidoptera: Noctuidae] | Tomato moth | Yes<br>Woets (1976) | No | Yes |
| *Mamestra brassicae* (Linnaeus) [Lepidoptera: Noctuidae] | Cabbage moth | Yes<br>Theunissen *et. al.*, (1995) | No | Yes |
| **Thysanoptera [thrips]** | | | | |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| *Frankliniella occidentalis* (Pergande) [Thysanoptera: Thripidae] | Western flower thrips | Yes<br>NPPS (1997) | Yes<br>AQIS (1997)<br>(under official control in states where detected) | Yes |
| *Thrips tabaci* Lindemann [Thysanoptera: Thripidae] | Onion thrips, potato thrips | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| **ARTHROPODA – BIOLOGICAL CONTROL AGENTS** | | | | |
| **Acari [mites]** | | | | |
| *Neoseiulus californicus* (McGregor) [Acarina: Phytoseiidae] | Predatory mite | Yes<br>Bolckmans pers. comm. (1999) | No | Yes |
| *Phytoseiulus persimilis* Athias-Henriot [Acarina: Phytoseiidae] | Roofmijt (Dutch) | Yes<br>NPPS (1997) | Yes<br>Goodwin & Schicha (1980) | No |
| *Stratiolaelaps miles* (Berlese) [Acari: Laelapidae] synonym : Geolaelups *miles* (Berlese) | Predatory laelapid mite | Yes<br>Lesna *et al*., (1995) | Yes<br>ABRS (2001) | No |
| **Coleoptera [beetles]** | | | | |
| *Cryptolaemus montrouzieri* Mulsant Coleoptera: Coccinellidae: Scymninae] | Destroyer mealybug, ladybird | Yes<br>Hennekam *et al*. (1987) | Yes<br>Bartlett (1974) | No |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| | mealy bug | | | |
| *Hippodamia convergens* (Guérin-Méneville) [Coleoptera: Coccinellidae] | Convergent ladybird | Yes<br>NPPS (1997) | No | Yes |
| **Diptera [flies]** | | | | |
| *Aphidoletes aphidimyza* (Rondani) [Diptera: Cecidomyiidae] | Predatory midge | Yes<br>NPPS (1997) | No | Yes |
| *Feltiella acarisuga* (Vallot) [Diptera: Cecidomyiidae] | Predatory midge | Yes<br>Bolckmans pers. comm. (1999) | No | Yes |
| **Hemiptera [ aphids, leafhoppers, mealybugs, psyllids, scales, whiteflies]** | | | | |
| *Macrolophus caliginosus* Wagner Hemiptera: Miridae] | Predatory mirid bug | Yes<br>NPPS (1997) | No | Yes |
| *Orius laevigatus* Fieber [Hemiptera: Anthocoridae] | Flowerbug | Yes<br>NPPS (1997) | No | Yes |
| *Orius majusculus* (Reuter) [Hemiptera: Anthocoridae] | Flowerbug | Yes<br>NPPS (1997) | No | Yes |
| **Hymenoptera [ ants, wasps]** | | | | |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| *Aphelinus abdominalis* (Dalmer) [Hymenoptera:Aphelinidae] | | Yes<br>Sterk *et al*. (1996) | Yes – not present WA<br>Franzmann *et al.* (1990) | Yes |
| *Aphidius colemani* Viereck [Hymenoptera: Braconidae] | | Yes<br>NPPS (1997) | Yes<br>Milne (1995) | No |
| *Aphidius ervi* Haliday [Hymenoptera: Braconidae] | | Yes<br>NPPS (1997) | Yes<br>Milne (1986) | No |
| *Dacnusa sibirica* Telenga [Hymenoptera: Braconidae] | Parasitic wasp | Yes<br>NPPS (1997) | No | Yes |
| *Diglyphus isaea* (Walker) [Hymenoptera: Eulophidae] | Parasitic wasp | Yes<br>NPPS (1997) | No | Yes |
| *Encarsia formosa* Gahan [Hymenoptera: Aphelinidae: Coccophaginae] | Whitefly parasite | Yes<br>NPPS (1997) | Yes<br>De Barro *et al.* (2000) | No |
| *Eretmocerus californicus* Howard synonym : *Eretmocerus eremicus* Rose & Zolnerowich [Hymenoptera: Aphelinidae] | Parasitic wasp | Yes<br>NPPS (1997) | No | Yes |
| *Leptomastix dactylopii* Howard [Hymenoptera: Encyrtidae] | | Yes<br>Hennekam *et al*. (1987) | Yes<br>Smith *et al*. (1988) | No |
| *Opius pallipes* Wesmael [Hymenoptera: | Flowerbug | Yes | No | Yes |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| Braconidae] | | NPPS (1997) | | |
| *Trichogramma brassicae* Bezdenko [Hymenoptera: Trichogrammatidae] | Parasitic wasp | Yes<br>NPPS (1997) | No | Yes |
| **Neuoptera [lacewings]** | | | | |
| *Chrysoperla carnea* (Stephens) sp. group [Neuroptera: Chrysopidae] | Green lacewing | Yes<br>NPPS (1997) | No | Yes |
| **BACTERIA** | | | | |
| *Pseudomonas corrugata* (ex Scarlett *et al*.) Roberts & Scarlett [Pseudomonadales: Pseudomonadaceae] | Tomato pith necrosis | Yes<br>NPPS (1997) | Yes<br>Agriculture WA (2000) | No |
| *Pseudomonas syringae* pv. *syringae* van Hall [Pseudomonadales: Pseudomonadaceae] | Bacterial blight, bacterial canker, bacterial leaf spot | Yes<br>Bradbury (1986) | Yes<br>Shivas (1989) | No |
| **FUNGI** | | | | |
| *Alternaria solani* Sorauer ['mytosporic fungi': Hyphomycetes] | Target spot, early blight | Yes<br>Turkenstein & Lablans (1988) | Yes<br>AQIS (1997) | No |
| *Botryotinia fuckeliana* (de Bary) Whetzel (anamorph : *Botrytis cinerea* Pers.: Fr.) | Grey mould | Yes | Yes | No |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| [Helotiales: Sclerotiniaceae] | | NPPS (1997) | AQIS (1997) | |
| *Colletotrichum coccodes* (Wallr.) Hughes ['mytosporic fungi' : Coelomycetes] | Anthracnose | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Fusarium oxysporum* f.sp. *lycopersici* (Sacc.) Snyder & Hansen ['mytosporic fungi': Hyphomycetes] | Fusarium wilt | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Mycovellosiella fulva* (Cooke) Arx. synonym : *Fulvia fulva* (Cooke) Cif. ; *Cladosporium fulvum* Cooke ['mytosporic fungi': Hyphomycetes] | Leaf mould | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Phoma destructiva* Plowr. ['mytosporic fungi' : Coelomycetes] | Black spot | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Phoma lycopersici* Cooke (teleomorph : Didymella lycopersici Kleb.) ['mytosporic fungi' : Coelomycetes] | Canker, fruit rot, leaf spot | Yes<br>NPPS (1997) | Yes– not present WA<br>Agriculture WA (2000) | Yes |
| *Phytophthora infestans* (Mont.) de Bary [Pythiales: Pythiaceae] | Late blight | Yes<br>NPPS (1997); Drenth *et al*. (1993) | Yes<br>(A1 mating type only – not present in WA)<br>AQIS (1997); Speilman *et al*. (1991) | Yes |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| *Phytophthora nicotianae* Breda de Haan [Pythiales: Pythiaceae] | Black shank | Yes<br>NPPS (1997) | Yes<br>Shivas (1989) | No |
| *Pyrenochaeta lycopersici* Schneider & Gerlach ['mytosporic fungi': Coelomycetes] | Brown rot, corky rot | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Pythium* spp. [Pythiales: Pythiaceae] | | Yes<br>NPPS (1997) | Yes<br>Agriculture WA (2000) | No |
| *Thanatephorus cucumeris* (A.B. Frank) Donk anamorph : *Rhizoctonia solani* Kühn [Tulagnellales : Ceratobasidiaceae] | Black scurf, stem canker | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Sclerotinia sclerotiorum* (Lib.) de Bary [Helotiales: Sclerotiniaceae] | Root rot, stem blight | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Verticillium albo-atrum* Reinke & Berthold ['mytosporic fungi': Hyphomycetes] | Verticillium blight, veticillium wilt | Yes<br>NPPS (1997) | Yes – on potato only<br>Agriculture WA (2000) | No |
| *Verticillium dahliae* Kleb. ['mytosporic fungi': Hyphomycetes] | Verticillium wilt | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Verticillium lecanii* (H. Zimmerman) Viégas ['mytosporic fungi': Hyphomycetes] | | Yes<br>Foschi & Deseo (1987) | Yes<br>Shivas (1989) | No |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| **NEMATODA (nematodes)** | | | | |
| *Globodera pallida* (Stone) Behrens [Tylenchida: Heteroderinae] | White potato cyst nematode | Yes<br>NPPS (1997) | No | Yes |
| *Globodera rostochiensis* (Woll.) Behrens [Tylenchida: Heteroderidae] | Yellow potato cyst nematode | Yes<br>NPPS (1997) | Yes<br>(under official control in Vic and WA). Agriculture WA (2000) | Yes |
| *Meloidogyne* spp. [Tylenchida: Heteroderidae] | Root knot nematode | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| *Pratylenchus penetrans* (Cobb, 1917) Filipjev & S. Stekhoven [Tylenchida: Pratylenchidae] | Root lesion nematode | Yes<br>NPPS (1997) | Yes<br>McLeod *et al*. (1994) | No |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| **NEMATODA – BIOLOGICAL CONTROL AGENTS** | | | | |
| *Steinernema feltiae* (Filipjev, 1934) Wouts, Mracek, Gerdin & Bedding, 1982 | | Yes<br>NPPS (1997) | Yes<br>Wright (1993) | No |
| **VIRUSES** | | | | |
| Alfalfa mosaic *alfamovirus* [Bromoviridae] | AMV | Yes<br>EPPO (1999) | Yes<br>AQIS (1997) | No |
| Cucumber mosaic *cucumovirus* [Bromoviridae] | CMV | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| Pepino mosaic *potexvirus* | PepMV | Yes<br>EPPO (2000) | No | Yes |
| Potato X *potexvirus* | PVX | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| Potato Y *potyvirus* [Potyviridae] | PVY | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| Raspberry ringspot *nepovirus* [Comoviridae] | RpRSV | Yes<br>Brunt *et. al.,* (1996) | No | Yes |

| Scientific Name | Common name | Present in the Netherlands | Present in Australia | Consider further |
|---|---|---|---|---|
| Tomato aspermy *cucumovirus* [Bromoviridae] | TAV | Yes<br>Belgraver *et al*. (1969) | Yes– not present WA<br>AQIS (1997) | Yes |
| Tomato black ring *nepovirus* [Comoviridae] | TBRV | Yes<br>Brunt *et. al.*, (1996) | No | Yes |
| Tomato mosaic *tobamovirus* | ToMV | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |
| Tomato spotted wilt *tospovirus* [Bunyaviridae] | TSWV | Yes<br>NPPS (1997) | Yes<br>AQIS (1997) | No |

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## APPENDIX 2: PEST CATEGORISATION FOR TOMATOES (PATHWAY ASSOCIATION)

Note: Biosecurity Australia will review these tables during the course of the review

| Scientific name | Common name | Associated with fresh individual or truss tomato fruit[4] | Reference | Consider further[5] |
|---|---|---|---|---|
| **ARTHROPODA (arthropods)** | | | | |
| **Diptera [flies]** | | | | |
| *Ceratitis capitata* (Wiedemann) [Diptera: Tephritidae] | Mediterranean fruit fly | Yes | Smith *et al*., (1992); De Lima *et al*., (1993); CAB International, (2001) | Yes |
| *Liriomyza bryoniae* (Kaltenbach) [Diptera: Agromyzidae] | Tomato leafminer | No | CAB International, (2001) | No |
| *Liriomyza huidobrensis* (Blanchard) [Diptera: Agromyzidae] | Serpentine leafminer | Yes | CAB International, (2001) | Yes |
| *Liriomyza trifolii* (Burgess) [Diptera: Agromyzidae] | American serpentine leafminer | No | CAB International, (2001) | No |
| **Hemiptera [aphids, leafhoppers, mealybugs, psyllids, scales, whiteflies]** | | | | |

| Scientific name | Common name | Associated with fresh individual or truss tomato fruit[4] | Reference | Consider further[5] |
|---|---|---|---|---|
| *Aphis fabae* Scopoli [Hemiptera: Aphididae] | Black bean aphid | Yes | Blackman & Eastop (1984); CAB International, (2001) | Yes |
| *Bemisia argentifolii* (Bellows, Perring, Gill & Hendrick) synonym : *Bemisia tabaci* B biotype (Gennadius) [Hemiptera: Aleyrodidae] | Silverleaf whitefly | Yes | AQIS (1997); CAB International, (2001) | Yes |
| *Lygocoris pabulinus* (Linnaeus) [Hemiptera: Miridae] | Common green capsid | Yes | CAB International, (2001) | Yes |
| **Hymenoptera [ants, wasps]** | | | | |
| *Bombus terrestris* (Linnaeus) [Hymenoptera: Apidae] | Bumble bee | No | | No |
| **Lepidoptera [butterflies, moths]** | | | | |
| *Chrysodeixis chalcites* Esper [Lepidoptera: Noctuidae] | Golden twin spot | Yes | Harakly & Farag (1975); CAB International, (2001) | Yes |
| *Clepsis spectrana* (Treitschke) [Lepidoptera:Tortricidae] | Cabbage leaf roller, cyclamen tortrix | No | | No |
| *Lacanobia oleracea* (Linnaeus) | Tomato moth | Yes | CAB International, (2001) | Yes |

| Scientific name | Common name | Associated with fresh individual or truss tomato fruit[4] | Reference | Consider further[5] |
|---|---|---|---|---|
| [Lepidoptera: Noctuidae] | | | | |
| *Mamestra brassicae* (Linnaeus) [Lepidoptera: Noctuidae] | Cabbage moth | Yes | Dochklova (1975) | Yes |
| **Thysanoptera [thrips]** | | | | |
| *Frankliniella occidentalis* (Pergande) [Thysanoptera: Thripidae] | Western flower thrips | Yes | CAB International, (2001) | Yes |
| **ARTHROPODS – BIOLOGICAL CONTROL AGENTS** | | | | |
| **Acari [mites]** | | | | |
| *Neoseiulus californicus* (McGregor) [Acarina: Phytoseiidae] | Predatory mite | Yes<br>*Polyphagotarsonemus latus* | CAB International, (2001) | Yes |
| Coleoptera [beetles] | | | | |
| *Hippodamia convergens* (Guérin-Méneville) [Coleoptera: Coccinellidae] | Convergent ladybird | Yes<br>*Aphis* gossypii & *Phytoseiulus persimilis* | CAB International, (2001) | Yes |
| **Diptera [flies]** | | | | |

| Scientific name | Common name | Associated with fresh individual or truss tomato fruit[4] | Reference | Consider further[5] |
|---|---|---|---|---|
| *Aphidoletes aphidimyza* (Rondani) [Diptera: Cecidomyiidae] | Predatory midge | Yes<br>*Aphis fabae* | CAB International, (2001); Blackman & Eastop (1984) | Yes |
| *Feltiella acarisuga* (Vallot) [Diptera: Cecidomyiidae] | Predatory midge | Yes<br>*Tetranychus urticae* | Jeppson *et al*. (1975) | Yes |
| **Hemiptera [aphids, leafhoppers, mealybugs, psyllids, scales, whiteflies]** | | | | |
| *Macrolophus caliginosus* Wagner [Hemiptera: Miridae] | Predatory mirid bug | Yes<br>*Aphis gossypii* & *Myzus persicae* | CAB International, (2001) | Yes |
| *Orius laevigatus* Fieber [Hemiptera: Anthocoridae] | Flowerbug | Yes<br>*Liriomyza bryoniae* & *Liriomyza trifolii* | CAB International, (2001) | No |
| *Orius majusculus* (Reuter) [Hemiptera: Anthocoridae] | Flowerbug | Yes<br>*Liriomyza bryoniae* & *Liriomyza trifolii* | CAB International, (2001) | No |
| **Hymenoptera [ants, wasps]** | | | | |
| *Aphelinus abdominalis* (Dalmer) [Hymenoptera:Aphelinidae] | Parasitic wasp | Yes<br>Parasitic on aphids | Waterhouse (1998) | Yes |
| *Dacnusa sibirica* Telenga | Parasitic wasp | Yes | CAB International, (2001) | No |

| Scientific name | Common name | Associated with fresh individual or truss tomato fruit[4] | Reference | Consider further[5] |
|---|---|---|---|---|
| [Hymenoptera: Braconidae] | | *Liriomyza bryoniae* & *Liriomyza trifolii* | | |
| *Diglyphus isaea* (Walker) [Hymenoptera: Eulophidae] | Parasitic wasp | Yes<br>*Liriomyza bryoniae* & *Liriomyza trifolii* | CAB International, (2001) | No |
| *Trichogramma brassicae* Bezdenko [Hymenoptera: Trichogrammatidae] | Parasitic wasp | Yes<br>*Mamestra b*rassicae | Dochklova (1975) | Yes |
| *Opius pallipes* Wesmael [Hymenoptera: Braconidae] | Flowerbug | Yes<br>*Liriomyza bryoniae* & *Liriomyza trifolii* | CAB International, (2001) | No |
| **Neuroptera [lacewings]** | | | | |
| *Chrysoperla carnea* (Stephens) sp. group [Neuroptera: Chrysopidae] | Green lacewing | Yes<br>*Myzus persicae*, *Bemisia argentifolii* | CAB International, (2001) | Yes |
| FUNGI | | | | |
| *Phoma lycopersici* Cooke (teleomorph : Didymella lycopersici Kleb.) ['mytosporic fungi' : Coelomycetes] | Fruit rot | Yes | Fagg and Fletcher, (1987) | Yes |

| Scientific name | Common name | Associated with fresh individual or truss tomato fruit[4] | Reference | Consider further[5] |
|---|---|---|---|---|
| *Phytophthora infestans* (Mont.) de Bary [Pythiales: Pythiaceae] | Late blight | Yes | CAB International, (2001) | Yes |
| NEMATODA (nematodes) | | | | |
| *Globodera pallida* (Stone) Behrens [Tylenchida: Heteroderinae] | White potato cyst nematode | No | CAB International, (2001) | No |
| *Globodera rostochiensis* (Woll.) Behrens [Tylenchida: Heteroderidae] | Yellow potato cyst nematode | No | CAB International, (2001) | No |
| VIRUSES | | | | |
| Pepino mosaic *potexvirus* | PepMV | Yes | EPPO (2000) | Yes |
| Raspberry ringspot *nepovirus* [Comoviridae] | RpRSV | Yes | CAB International, (2001) | Yes |
| Tomato aspermy *cucumovirus* [Bromoviridae] | TAV | Yes | Brunt *et al.,* (1996) | Yes |
| Tomato black ring *nepovirus* [Comoviridae] | TBRV | Yes | CAB International, (2001) | Yes |

[4] Describes whether the pest is associated with the pathway. The host relevant arthropod is listed for the biological control agents.

[5] Pests that are known to be associated with individual or truss tomatoes and either not present in Australia or present but not widely distributed and under official control, are to be considered further in the risk analysis

## References for Appendix 2

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