



Netherlands Truss Tomatoes

Draft Import Policy



May 2003

Foreword

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GLOSSARY OF TERMS AND ABBREVIATIONS

AFFA	Agriculture, Fisheries and Forestry - Australia
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
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
Entry potential	likelihood of the entry of a pest
Establishment	the perpetuation, for the foreseeable future, of a pest within an area after entry
Establishment potential	likelihood of the establishment of a pest
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

Introduction potential.....	likelihood of the introduction of a pest
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

Pest risk assessment	determination of whether a pest is a quarantine pest and evaluation of its introduction potential
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	the decision-making process of reducing the risk of introduction of a quarantine pest
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
Spread potential	likelihood of the spread of a pest
SPS	Sanitary and Phytosanitary
SPS Agreement	WTO Agreement on the Application of Sanitary and Phytosanitary Measures
WTO	World Trade Organization

EXECUTIVE SUMMARY

The Commonwealth Department of Agriculture, Fisheries and Forestry - Australia (AFFA) is considering 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 has determined that, rather than proceeding by way of an IRA, the market access request for truss tomatoes from the Netherlands can 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 are under official control 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 or spread within Australia as well as associated potential biological and economic 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 are under official control 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 or spread within Australia as well as associated potential biological and economic consequences. These arthropods were therefore categorised as potential quarantine pests.

A detailed PRA was conducted for those pests and biological control agents that were categorised as potential 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 proposed.

The document recommends that the importation of truss tomatoes from the Netherlands into Australia be permitted subject to the application of phytosanitary measures as outlined.

There are four categories of measures proposed to mitigate the risks identified in the pest risk assessment:

- pest free areas for *Ceratitis capitata* (Mediterranean fruit fly),
- pest free areas for Pepino mosaic potexvirus,
- freedom of consignments from other identified quarantine pests and
- operational maintenance and verification of phytosanitary status

Biosecurity Australia invites comments on the technical and economic feasibility of the proposed risk management measures, in particular, comments on their appropriateness and any other measures that stakeholders consider would provide equivalent risk management. Comments on the draft review for Netherlands truss tomatoes should be received by Biosecurity Australia no later than 30 June 2003.

INTRODUCTION

Biosecurity Australia is responsible inter alia for developing quarantine policy for imports of plants, plant products and other regulated articles and for liaising 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 AQIS) initiated an IRA on the importation of fresh tomato fruit from the Netherlands in 1998. At the request of the Netherlands Plant Protection Service (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, 2001), the PRA comprises three interrelated stages:

- Stage 1: initiation of the PRA
- Stage 2: risk assessment
- Stage 3: risk management

An outline of the methodology used for this review is provided in the Biosecurity Australia publication *Draft Guidelines for Import Risk Analysis* – September 2001.

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 truss tomatoes,
- Brief descriptions of the fresh tomato fruit industry in Australia and the Netherlands,
- A description of the PRA methodology used,
- Results of stages 1-3 of the PRA, and
- Recommended quarantine 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.

SCOPE

TOMATO FRUIT AND ASSOCIATED PESTS

In this PRA Biosecurity Australia has considered the pests associated with truss tomatoes (*Lycopersicon esculentum*) in the Netherlands. These pests have been categorised to determine whether the criteria for a quarantine pest are met. In the cases where quarantine pests have been identified, detailed assessments of risk have been conducted. Each risk assessment is specific to the importation, into Australia, of fresh, commercially produced individual and truss tomato fruit from the Netherlands for human consumption. Where necessary, risk management measures have been proposed.

The PRA forms the basis for development of importation policy with respect to the entry of 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 stalk of a single fruit or stalks of the fruit cluster) of *Lycopersicon esculentum* of the family Solanacea.

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, a phytosanitary certificate from the New Zealand Ministry of Agriculture and Forestry (NZ MAF), freedom from soil and other debris and inspection on arrival in Australia.

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 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

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. 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 and under official control, presence on the pathway (truss tomatoes), potential for entry, establishment or spread and potential economic 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 (or present but not widely distributed and being under official control). 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 limited distribution and 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 and under official control, 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	Associated with truss tomatoes in the Netherlands and either absent from Australia or present but 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 the pests identified in the preliminary pest categorisation (appendix 2) have feasible potential for entry, establishment or spread in the PRA area as well as an associated potential for economic consequences. All of the organisms are therefore considered quarantine pests and required detailed risk assessment.

PROBABILITY OF ENTRY, ESTABLISHMENT AND SPREAD AND ECONOMIC CONSEQUENCES

The next stage of pest risk assessment consists of determination of the probability for entry, establishment or spread of the quarantine pests and determination of the economic consequences (including environmental 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 polyphagous 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.

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
<i>Direct consequences</i>	
Animal or plant health or welfare	C – minor at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
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* (Gennadius) Takahashi; *Bemisia vayssierei* Frappa.

Common name(s): silverleaf whitefly; sweet potato whitefly and tobacco whitefly.

Hosts: It has become a pest of glasshouse 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.

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 glasshouses); 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
<i>Direct consequences</i>	
Animal or plant health or welfare	D – minor at the national level

Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
Eradication, control etc	D – programs to control/eradicate this pest at the national level are not likely to be costly
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 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.

***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 capitata* 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 (*Ceratitidis 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 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 during on arrival inspections 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
<i>Direct consequences</i>	
Animal or plant health or welfare	D – significant at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
Eradication, control etc	E – programs to control/eradicate this pest at the national level are 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: 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); Fabaceae (legumes); *Flaviera australasica*; *Geranium* spp.; *Glycine max* (soybeans); *Gossypium* sp. (cotton); *Ipomoea batatas* (sweet potato); *Lycopersicon esculentum*; *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 processing or inspection (Harakly and Farang, 1975).

Probability of distribution: Low

Any late instar larvae escaping detection during on arrival inspection 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 Gutierrez, 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
<i>Direct consequences</i>	
Animal or plant health or welfare	C – minor at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	

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.

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 not detected during on arrival inspection 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
<i>Direct consequences</i>	
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 at the national level

Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
Eradication, control etc	B – programs to control/eradicate this pest at the national level are not likely to be costly
Domestic trade	B – 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.; *Dendrathera indicum* (chrysanthemum, in glasshouse); *D. morifolium* (chrysanthemum, in glasshouse); *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 (Burgess and Jamet, 1976). Detection of internally feeding larvae or pupae within plant canes 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
<i>Direct consequences</i>	
Animal or plant health or welfare	C – minor at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	

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
<i>Direct consequences</i>	
Animal or plant health or welfare	C – unlikely to be discernible at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
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 parviflora* (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
<i>Direct consequences</i>	
Animal or plant health or welfare	C – unlikely to be discernible at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
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*

***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 (Burgess and Jarrett, 1976). Entrance holes into fruit are likely to be detected during visual inspection.

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
<i>Direct consequences</i>	
Animal or plant health or welfare	C – minor significance at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
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 remain undetected during on arrival inspection, 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
<i>Direct consequences</i>	
Animal or plant health or welfare	A – unlikely to be discernible at national level
Human life	A – unlikely to be discernible at national level
Environment	C – unlikely to be discernible at national level
<i>Indirect consequences</i>	
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: Negligible

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: *Acyrtosiphon*

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 likely 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. Visual inspection is likely to detect host and predator presence.

Probability of distribution: Low

If larvae or parasitised aphids remain undetected on the fruit surface 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
<i>Direct consequences</i>	
Animal or plant health or welfare	A – unlikely to be discernible at the national level
Human life	A – unlikely to be discernible at national level
Environment	C – may have an effect on aphid fauna at the national level
<i>Indirect consequences</i>	
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 devector*; *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 cocoon upon stems of the plant, this would be the most likely means of importation. Visual inspection is likely to detect larval or cocoon presence upon the fruit or truss.

Probability of distribution: Moderate

If larvae or cocoons remain undetected 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

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
<i>Direct consequences</i>	
Animal or plant health or welfare	A – unlikely to be discernible at the national level
Human life	A – unlikely to be discernible at national level
Environment	C – may have an effect on arthropod fauna at the national level
<i>Indirect consequences</i>	
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 tetranychii* 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 glasshouse tomatoes in the Netherlands.

Plant Parts Affected: This insect is 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 cocoons remain undetected 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: 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
<i>Direct consequences</i>	
Animal or plant health or welfare	A – unlikely to be discernible at the national level
Human life	A – unlikely to be discernible at national level
Environment	C – may have an effect on arthropod fauna at the national level
<i>Indirect consequences</i>	
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-Ménéville, 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 remain undetected 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: 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* (Schränk), 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
<i>Direct consequences</i>	
Animal or plant health or welfare	A – unlikely to be discernible at the national level
Human life	A – unlikely to be discernible at national level

Environment	D – may have an effect on arthropod fauna at the national level
<i>Indirect consequences</i>	
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 by visual inspection.

Probability of distribution: Moderate

If larvae or adults remain undetected 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: 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
<i>Direct consequences</i>	
Animal or plant health or welfare	A – unlikely to be discernible at the national level
Human life	A – unlikely to be discernible at national level
Environment	D – may have an effect on arthropod fauna at the national level
<i>Indirect consequences</i>	
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*; *Tetranychopsis 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 Friesse, 1985). Mites may be detected upon fruit or trusses during inspection.

Probability of distribution: Moderate

If adults or immature stages remain undetected 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

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 Friesse, 1985).

Probability of spread: Moderate

Adults and juvenile 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
<i>Direct consequences</i>	
Animal or plant health or welfare	A – unlikely to be discernible at the national level
Human life	A – unlikely to be discernible at national level
Environment	D – may have an effect on arthropod fauna at the national level
<i>Indirect consequences</i>	
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 (Voegelé, 1982) but now being distributed widely as a biological control agent for caterpillars in glasshouse 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 remain undetected during inspection, 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
<i>Direct consequences</i>	
Animal or plant health or welfare	A – unlikely to be discernible at national level
Human life	A – unlikely to be discernible at national level
Environment	C – unlikely to be discernible at national level
<i>Indirect consequences</i>	
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: Negligible

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, French 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 during standard management practices and on arrival inspection. 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 undetected 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: Low

Host species would be present within the PRA area, however, specific environmental conditions are required for successful establishment. 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: Negligible

Criteria	Estimate
<i>Direct consequences</i>	
Animal or plant health or welfare	A – unlikely to be discernible at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
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	A – unlikely to be discernible at national level

Unrestricted risk estimate: Negligible

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); 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; Kazakhstan; 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.

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 glasshouse 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), 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.

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
<i>Direct consequences</i>	
Animal or plant health or welfare	C – consequences likely to be minor at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
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 (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 tetragonoides* (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).

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 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 be mechanically transmitted from infected imported material to appropriate hosts, on a relatively large scale for the virus to establish.

Probability of spread: Moderate

Pepino mosaic virus (PepMV) did spread rapidly throughout several glasshouse areas within the Netherlands 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
<i>Direct consequences</i>	
Animal or plant health or welfare	D – consequences not likely to be significant at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
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 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

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
<i>Direct consequences</i>	
Animal or plant health or welfare	D – consequences likely to be minor at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
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. Affected fruit is likely to be detected during inspection.

Probability of distribution: Low

If infected fruit were imported the virus may be distributed.

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: 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
<i>Direct consequences</i>	
Animal or plant health or welfare	C – consequences likely to be minor at the regional level
Human life	A – unlikely to be discernible at regional level
Environment	A – unlikely to be discernible at regional level
<i>Indirect consequences</i>	

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. Tomato fruit displaying visual symptoms are likely to be detected. Murat (1983) has reported seed infectivity of the virus in tomato to be 20%.

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). 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 range. Seed transmission is an important aspect of disease epidemiology as the virus life is shortlived within 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
<i>Direct consequences</i>	
Animal or plant health or welfare	D – consequences likely to be minor at the national level
Human life	A – unlikely to be discernible at national level
Environment	A – unlikely to be discernible at national level
<i>Indirect consequences</i>	
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.

Three quarantine pests (*Aphidoletes aphidimyza*, *Trichogramma brassicae* and *Phoma lycopersici*) were assessed to have an unrestricted risk of negligible, 10 quarantine pests (*Aphelinus abdominalis*, *Chrysodeixis chalcites*, *Feltiella acarisuga*, *Hippodamia convergens*, *Liriomyza huidobrensis*, *Lygocoris pabulinus*, *Macrolophus caliginosus*, 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 argentifolii*, *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 assessment 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							
<i>Aphis fabae</i> Scoloopi	Black bean aphid	Low	Moderate	High	Low	Moderate	Low
<i>Bemisia argentifolii</i> (Bellows, Perring, Gill & Hendrick)	Silverleaf whitefly	Low	High	High	Low	Moderate	Low
<i>Ceratitis capitata</i> (Wiedemann, 1824)	Mediterranean fruit fly	Low	High	Moderate	Low	High	Moderate
<i>Chrysodeixis chalcites</i> (Esper, 1789)	Golden twin spot	Very low	Moderate	High	Very low	Moderate	Very low
<i>Frankliniella occidentalis</i> (Pergande)	Western flower thrips	Low	High	High	Low	Moderate	Low
<i>Lacanobia oleracea</i> (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			
<i>Liriomyza huidobrensis</i> (Blanchard) [Diptera: Agromyzidae]	Serpentine leafminer	Very low	Moderate	Low	Very low	Moderate	Very low
<i>Lygocoris pabulinus</i> (Linnaeus, 1761)	Green capsid bug	Very low	Moderate	Moderate	Very low	Moderate	Very low
<i>Mamestra brassicae</i> (Linnaeus, 1758)	Cabbage moth	Low	Moderate	Moderate	Low	Moderate	Low
Arthropod biocontrol agents							
<i>Aphelinus abdominalis</i> (Dalmer)	Parasitic wasp	Very low	Moderate	Moderate	Very low	Low	Very low
<i>Aphidoletes aphidimyza</i> (Rondani, 1847)	Predatory midge	Very low	Moderate	Moderate	Extremely low	Moderate	Negligible
<i>Chrysoperla carnea</i> (Stephens, 1836)	Green lacewing	Low	Moderate	Moderate	Low	Moderate	Low
<i>Feltiella acarisuga</i> (Vallot, 1827)	Predatory midge	Low	Low	Low	Very low	Moderate	Very low
<i>Hippodamia convergens</i> Guerin-Meneville, 1842	Convergent ladybird	Low	Low	Moderate	Very low	Moderate	Very low
<i>Macrolophus caliginosus</i> Wagner, 1950	Predatory mirid bug	Low	Low	Moderate	Very low	Moderate	Very low
<i>Neoseiulus californicus</i> (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			
<i>Trichogramma brassicae</i> Bezdenko	Parasitic wasp	Very low	Moderate	Moderate	Low	Low	Negligible
Pathogens							
Fungi							
<i>Phoma lycopersici</i> (Plowr.) Jaczewski, 1898	Fruit rot	Low	Low	Low	Very low	Negligible	Negligible
<i>Phytophthora infestans</i> (Mont.) de Bary	Late blight	Low	Moderate	Moderate	Low	Moderate	Low
Virus							
Pepino mosaic <i>potexvirus</i>	PepMV	Low	Moderate	Moderate	Low	Moderate	Low
Raspberry ringspot virus	RpRSV	Low	Low	Moderate	Very low	Moderate	Very low
Tomato aspermy cucumovirus	TAC	Very low	Low	Low	Very low	Moderate	Very low
Tomato black ring virus	TBRV	Low	Low	Moderate	Very low	Moderate	Very low

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

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

RISK MANAGEMENT

Pest risk management evaluates and selects options for measures to reduce the risk of entry, establishment or spread of quarantine pests assessed to pose an unacceptable level of risk to Australia via the importation of commercially produced truss tomatoes from the Netherlands (ie have come from standard cultivation, harvesting and packing activities).

Biosecurity Australia considers that the risk management measures proposed below are commensurate with the identified risks and invites comments on their technical and economic feasibility. In particular, comments are welcome on the appropriateness of the measures and any alternative measures that stakeholders consider would achieve the identified objectives. Note that Biosecurity Australia regards the measures proposed below to be consistent with the measures that are currently in place for the importation of truss tomatoes from New Zealand.

The measures described below will form the basis of proposed import condition for truss tomatoes from the Netherlands.

There are four categories of measures proposed to mitigate the risks identified in the pest risk assessment:

- pest free areas for *Ceratitidis capitata* (Mediterranean fruit fly),
- pest free areas for Pepino mosaic potexvirus,
- freedom of consignments from other identified quarantine pests and
- operational maintenance and verification of phytosanitary status

[1] PEST FREE AREAS FOR MEDITERRANEAN FRUIT FLY

Ceratitidis 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. Other identified options to mitigate risks associated with Medfly are either the use of disinfestation treatments or by sourcing fruit from pest free areas.

The Netherlands authorities have proposed that product for prospective export to Australia would be from Medfly pest free areas. Truss tomato production areas in the Netherlands

have been established and maintained as pest free areas for Medfly. Sourcing truss tomatoes from Medfly pest free areas is considered to be more technically and economically feasible than applying post harvest disinfestation treatments on a consignment basis.

To verify the maintenance of Medfly pest free status for truss tomato production areas, the Netherlands authorities must undertake on-going crop monitoring/ surveillance trapping. AFFA must be notified by the Netherlands authorities of any detections or related developments in the status of Medfly in the Netherlands.

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 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. An identified option to mitigate risks associated with pepino mosaic potexvirus is pest free areas.

Truss tomatoes from the Netherlands for export to Australia must be sourced from registered greenhouses that have been established, maintained and verified as free from Pepino mosaic potexvirus throughout the growth period of the plants by the NPPS. This growing period verification will result in greenhouses that are considered as pest free production sites with respect to Pepino mosaic potexvirus.

The detailed technical requirements to verify for freedom from pepino mosaic potexvirus will be determined by NPPS in consultation with AFFA. This is to ensure that requirements are appropriate to the circumstances of Netherlands truss tomato production. AFFA must continue to be notified of the status of Pepino mosaic potexvirus 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 considered to be an appropriate risk management option for these pests in view of the level of risk identified and because these pests are considered to be easily detected at visual inspection.

[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. Biosecurity Australia propose a system for that purpose which is equivalent to is the one currently in place for the importation of truss tomatoes from New Zealand.

Details of this system, or of an equivalent one, will be determined by agreement with NPPS. This is to ensure that requirements are appropriate to the circumstances of Netherlands truss tomato production and export.

The proposed system of operational procedures for the production and export of truss tomatoes to Australia from the Netherlands consist of :-

- Registration of growers and greenhouses,
- Registration of packhouses,
- Packaging and labelling compliance,
- Specific conditions for storage and movement of produce,
- Phytosanitary inspection by NPPS,
- Phytosanitary certification by NPPS,
- Phytosanitary inspection by AQIS.

[4A] REGISTRATION OF GROWERS AND GLASSHOUSES

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 by AQIS if requested.

[4B] REGISTRATION OF PACKHOUSES

All packhouses that handle fresh truss tomato fruit for export to Australia must be registered with NPPS. Registration of packhouses will enable NPPS to ensure compliance with packaging, labelling and storage requirements as specified by AFFA and facilitate traceback along the import pathway should non-compliance occur. Records of audits conducted by NPPS on packhouses should be available for review by AQIS as required.

[4C] 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.

[4D] SPECIFIC CONDITIONS FOR STORAGE AND MOVEMENT OF PRODUCE

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

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

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

Arrangements for secure storage and movement of produce to be developed by NPPS in consultation with AFFA.

[4E] 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. This equates to a level of zero unit infested by quarantine pests in a random sample size of 600 units from the homogenous lots in the consignment. The 600-unit sample must be selected randomly from every lot in the consignment. Detection of live quarantine pests, or trash will result in failure of the consignment. If a consignment fails inspection by NPPS the producer 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 AFFA 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.

[4F] 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).

[4G] ON-ARRIVAL PHYTOSANITARY INSPECTION

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 AFFA is satisfied that appropriate corrective action has been taken.

UNCATEGORISED PESTS

If an organism that 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 the existing measures continue to provide the appropriate level of phytosanitary protection for 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 risk management measures proposed in this review will provide an appropriate level of protection against the pests identified in the risk assessment. Various risk management measures may be suitable to manage the risks associated with truss tomatoes from the Netherlands and Biosecurity Australia will consider any other measures suggested by stakeholders that provide an equivalent level of phytosanitary protection.

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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]				
<i>Aculops lycopersici</i> Masee synonym : <i>Vasates lycopersici</i> (Masee) [Acarina: Eriophyidae]	Tomato russet mite	Yes NPPS (1997)	Yes AQIS (1997)	No
<i>Polyphagotarsonemus latus</i> (Banks) [Acarina: Tarsonemidae]	Broad mite, tropical mite	Yes Woets (1976)	Yes AQIS (1997)	No
<i>Tetranychus cinnabarinus</i> (Boisduval) [Acarina: Tetranychidae]	Carmine spider mite	Yes Saba (1975)	Yes AQIS (1997); AICN (2003)	No
<i>Tetranychus urticae</i> Koch [Acarina: Tetranychidae]	Two spotted spider mite	Yes Janssen <i>et al.</i> (1999)	Yes AQIS (1997)	No

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

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

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

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

Scientific Name	Common name	Present in the Netherlands	Present in Australia	Consider further
Coleoptera: Coccinellidae: Scymninae]	mealybug, ladybird mealy bug	Hennekam <i>et al.</i> (1987)	Bartlett (1974)	
<i>Hippodamia convergens</i> (Guérin-Méneville) [Coleoptera: Coccinellidae]	Convergent ladybird	Yes NPPS (1997)	No	Yes
Diptera [flies]				
<i>Aphidoletes aphidimyza</i> (Rondani) [Diptera: Cecidomyiidae]	Predatory midge	Yes NPPS (1997)	No	Yes
<i>Feltiella acarisuga</i> (Vallot) [Diptera: Cecidomyiidae]	Predatory midge	Yes Bolckmans pers. comm. (1999)	No	Yes
Hemiptera [aphids, leafhoppers, mealybugs, psyllids, scales, whiteflies]				
<i>Macrolophus caliginosus</i> Wagner Hemiptera: Miridae]	Predatory mirid bug	Yes NPPS (1997)	No	Yes
<i>Orius laevigatus</i> Fieber [Hemiptera: Anthocoridae]	Flowerbug	Yes NPPS (1997)	No	Yes
<i>Orius majusculus</i> (Reuter) [Hemiptera: Anthocoridae]	Flowerbug	Yes NPPS (1997)	No	Yes
Hymenoptera [ants, wasps]				

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

Scientific Name	Common name	Present in the Netherlands	Present in Australia	Consider further
<i>Opius pallipes</i> Wesmael [Hymenoptera: Braconidae]	Flowerbug	Yes NPPS (1997)	No	Yes
<i>Trichogramma brassicae</i> Bezdenko [Hymenoptera: Trichogrammatidae]	Parasitic wasp	Yes NPPS (1997)	No	Yes
Neuroptera [lacewings]				
<i>Chrysoperla carnea</i> (Stephens) sp. group [Neuroptera: Chrysopidae]	Green lacewing	Yes NPPS (1997)	No	Yes
BACTERIA				
<i>Pseudomonas corrugata</i> (ex Scarlett <i>et al.</i>) Roberts & Scarlett [Pseudomonadales: Pseudomonadaceae]	Tomato pith necrosis	Yes NPPS (1997)	Yes Agriculture WA (2000)	No
<i>Pseudomonas syringae</i> pv. <i>syringae</i> van Hall [Pseudomonadales: Pseudomonadaceae]	Bacterial blight, bacterial canker, bacterial leaf spot	Yes Bradbury (1986)	Yes Shivas (1989)	No
FUNGI				
<i>Alternaria solani</i> Sorauer ['mycosporic fungi': Hyphomycetes]	Target spot, early blight	Yes Turkenstein & Lablans (1988)	Yes AQIS (1997)	No

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

Scientific Name	Common name	Present in the Netherlands	Present in Australia	Consider further
			(1991)	
<i>Phytophthora nicotianae</i> Breda de Haan [Pythiales: Pythiaceae]	Black shank	Yes NPPS (1997)	Yes Shivas (1989)	No
<i>Pyrenochaeta lycopersici</i> Schneider & Gerlach ['mytosporic fungi': Coelomycetes]	Brown rot, corky rot	Yes NPPS (1997)	Yes AQIS (1997)	No
<i>Pythium</i> spp. [Pythiales: Pythiaceae]		Yes NPPS (1997)	Yes Agriculture WA (2000)	No
<i>Thanatephorus cucumeris</i> (A.B. Frank) Donk anamorph : <i>Rhizoctonia solani</i> Kühn [Tulagnellales : Ceratobasidiaceae]	Black scurf, stem canker	Yes NPPS (1997)	Yes AQIS (1997)	No
<i>Sclerotinia sclerotiorum</i> (Lib.) de Bary [Helotiales: Sclerotiniaceae]	Root rot, stem blight	Yes NPPS (1997)	Yes AQIS (1997)	No
<i>Verticillium albo-atrum</i> Reinke & Berthold ['mytosporic fungi': Hyphomycetes]	Verticillium blight, verticillium wilt	Yes NPPS (1997)	Yes – on potato only Agriculture WA (2000)	No
<i>Verticillium dahliae</i> Kleb. ['mytosporic fungi': Hyphomycetes]	Verticillium wilt	Yes NPPS (1997)	Yes AQIS (1997)	No
<i>Verticillium lecanii</i> (H. Zimmerman) Viégas ['mytosporic fungi': Hyphomycetes]		Yes Foschi & Deseo (1987)	Yes Shivas (1989)	No

Scientific Name	Common name	Present in the Netherlands	Present in Australia	Consider further
NEMATODA (nematodes)				
<i>Globodera pallida</i> (Stone) Behrens [Tylenchida: Heteroderinae]	White potato cyst nematode	Yes NPPS (1997)	No	Yes
<i>Globodera rostochiensis</i> (Woll.) Behrens [Tylenchida: Heteroderidae]	Yellow potato cyst nematode	Yes NPPS (1997)	Yes (under official control in Vic and WA). Agriculture WA (2000)	Yes
<i>Meloidogyne</i> spp. [Tylenchida: Heteroderidae]	Root knot nematode	Yes NPPS (1997)	Yes AQIS (1997)	No
<i>Pratylenchus penetrans</i> (Cobb, 1917) Filipjev & S. Stekhoven [Tylenchida: Pratylenchidae]	Root lesion nematode	Yes NPPS (1997)	Yes McLeod <i>et al.</i> (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	Yes	No
		NPPS (1997)	Wright (1993)	
VIRUSES				
Alfalfa mosaic alfamovirus [Bromoviridae]	AMV	Yes	Yes	No
		EPPO (1999)	AQIS (1997)	
Cucumber mosaic cucumovirus [Bromoviridae]	CMV	Yes	Yes	No
		NPPS (1997)	AQIS (1997)	
Pepino mosaic potexvirus	PepMV	Yes	No	Yes
		EPPO (2000)		
Potato X potexvirus	PVX	Yes	Yes	No
		NPPS (1997)	AQIS (1997)	
Potato Y potyvirus [Potyviridae]	PVY	Yes	Yes	No
		NPPS (1997)	AQIS (1997)	
Raspberry ringspot nepovirus [Comoviridae]	RpRSV	Yes	No	Yes
		Brunt et. al., (1996)		

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

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315-316.

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]				
<i>Ceratitis capitata</i> (Wiedemann) [Diptera: Tephritidae]	Mediterranean fruit fly	Yes	Smith <i>et al.</i> , (1992); De Lima <i>et al.</i> , (1993); CAB International, (2001)	Yes
<i>Liriomyza bryoniae</i> (Kaltenbach) [Diptera: Agromyzidae]	Tomato leafminer	No	CAB International, (2001)	No
<i>Liriomyza huidobrensis</i> (Blanchard) [Diptera: Agromyzidae]	Serpentine leafminer	Yes	CAB International, (2001)	Yes
<i>Liriomyza trifolii</i> (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
<i>Aphis fabae</i> Scopoli [Hemiptera: Aphididae]	Black bean aphid	Yes	Blackman & Eastop (1984); CAB International, (2001)	Yes
<i>Bemisia argentifolii</i> (Bellows, Perring, Gill & Hendrick) synonym : <i>Bemisia tabaci</i> B biotype (Gennadius) [Hemiptera: Aleyrodidae]	Silverleaf whitefly	Yes	AQIS (1997); CAB International, (2001)	Yes
<i>Lygocoris pabulinus</i> (Linnaeus) [Hemiptera: Miridae]	Common green capsid	Yes	CAB International, (2001)	Yes
Hymenoptera [ants, wasps]				
<i>Bombus terrestris</i> (Linnaeus) [Hymenoptera: Apidae]	Bumble bee	No		No
Lepidoptera [butterflies, moths]				
<i>Chrysodeixis chalcites</i> Esper [Lepidoptera: Noctuidae]	Golden twin spot	Yes	Harakly & Farag (1975); CAB International, (2001)	Yes
<i>Clepsia spectrana</i> (Treitschke) [Lepidoptera: Tortricidae]	Cabbage leaf roller, cyclamen tortrix	No		No
<i>Lacanobia oleracea</i> (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]				
<i>Mamestra brassicae</i> (Linnaeus)	Cabbage moth	Yes	Dochklova (1975)	Yes
[Lepidoptera: Noctuidae]				
Thysanoptera [thrips]				
<i>Frankliniella occidentalis</i> (Pergande) [Thysanoptera: Thripidae]	Western flower thrips	Yes	CAB International, (2001)	Yes
ARTHROPODS – BIOLOGICAL CONTROL AGENTS				
Acari [mites]				
<i>Neoseiulus californicus</i> (McGregor) [Acarina: Phytoseiidae]	Predatory mite	Yes	CAB International, (2001)	Yes
<i>Polyphagotarsonemus latus</i>				
Coleoptera [beetles]				
<i>Hippodamia convergens</i> (Guérin-Méneville) [Coleoptera: Coccinellidae]	Convergent ladybird	Yes	CAB International, (2001)	Yes
<i>Aphis gossypii</i> & <i>Phytoseiulus persimilis</i>				
Diptera [flies]				

Scientific name	Common name	Associated with fresh individual or truss tomato fruit ⁴	Reference	Consider further ⁵
<i>Aphidoletes aphidimyza</i> (Rondani) [Diptera: Cecidomyiidae]	Predatory midge	Yes <i>Aphis fabae</i>	CAB International, (2001); Blackman & Eastop (1984)	Yes
<i>Feltiella acarisuga</i> (Vallot) [Diptera: Cecidomyiidae]	Predatory midge	Yes <i>Tetranychus urticae</i>	Jeppson <i>et al.</i> (1975)	Yes
Hemiptera [aphids, leafhoppers, mealybugs, psyllids, scales, whiteflies]				
<i>Macrolophus caliginosus</i> Wagner [Hemiptera: Miridae]	Predatory mirid bug	Yes <i>Aphis gossypii</i> & <i>Myzus persicae</i>	CAB International, (2001)	Yes
<i>Orius laevigatus</i> Fieber [Hemiptera: Anthocoridae]	Flowerbug	Yes <i>Liriomyza bryoniae</i> & <i>Liriomyza trifolii</i>	CAB International, (2001)	No
<i>Orius majusculus</i> (Reuter) [Hemiptera: Anthocoridae]	Flowerbug	Yes <i>Liriomyza bryoniae</i> & <i>Liriomyza trifolii</i>	CAB International, (2001)	No
Hymenoptera [ants, wasps]				
<i>Aphelinus abdominalis</i> (Dalmer) [Hymenoptera: Aphelinidae]	Parasitic wasp	Yes Parasitic on aphids	Waterhouse (1998)	Yes
<i>Dacnusa sibirica</i> 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]				
		<i>Liriomyza bryoniae</i> & <i>Liriomyza trifolii</i>		
<i>Diglyphus isaea</i> (Walker)	Parasitic wasp	Yes	CAB International, (2001)	No
[Hymenoptera: Eulophidae]				
		<i>Liriomyza bryoniae</i> & <i>Liriomyza trifolii</i>		
<i>Trichogramma brassicae</i>	Parasitic wasp	Yes	Dochklova (1975)	Yes
Bezdenko [Hymenoptera: Trichogrammatidae]		<i>Mamestra brassicae</i>		
<i>Opius pallipes</i> Wesmael	Flowerbug	Yes	CAB International, (2001)	No
[Hymenoptera: Braconidae]				
		<i>Liriomyza bryoniae</i> & <i>Liriomyza trifolii</i>		
Neuroptera [lacewings]				
<i>Chrysoperla carnea</i> (Stephens)	Green lacewing	Yes	CAB International, (2001)	Yes
sp. group [Neuroptera: Chrysopidae]		<i>Myzus persicae</i> , <i>Bemisia argentifolii</i>		
FUNGI				
<i>Phoma lycopersici</i> Cooke	Fruit rot	Yes	Fagg and Fletcher, (1987)	Yes
(teleomorph : <i>Didymella lycopersici</i> Kleb.) ['mycosporic fungi' : Coelomycetes]				

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

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