Extension of Existing Policy for Cherry Fruit (*Prunus avium*) Exported from New Zealand into Western Australia

January 2003

AGRICULTURE, FISHERIES AND FORESTRY - AUSTRALIA

Table of Contents

Executive summary

The importation of stone fruit (*Prunus* spp.) into Western Australia from any source had been prohibited due to the absence of brown rot caused by *Monilinia fructicola* and *M. laxa*. Brown rot of stone fruit was discovered in Western Australia in 1997. In 1999, the presence of both *M. fructicola* and *M. laxa* was confirmed in Western Australia and determined to be widespread. Following confirmation of brown rot in Western Australia, eastern Australian states and New Zealand requested access for stone fruit into Western Australia.

In September 2001, the Department of Agriculture Western Australia completed a State Import Risk Analysis (SIRA) on cherry fruit (*Prunus avium*) from South Australia. The SIRA on cherry fruit from South Australia recommended that the Plant Diseases Regulations 1989 be amended to allow the entry of cherry fruit from South Australia under a specific importation protocol.

This document reports on the findings of a review of import policy for fresh cherry fruit from New Zealand into Western Australia. The review recommends that the Plant Diseases Regulations 1989 be similarly amended to also allow the entry of fresh cherry fruit from New Zealand into Western Australia.

In completing the review for fresh cherry fruit from New Zealand the initial pest list, provided by New Zealand Ministry of Agriculture and Forestry (NZ MAF), was evaluated and records verified. Twenty-seven arthropods and 38 pathogens were identified as being possibly associated with cherry production in New Zealand. Of these pests, 19 arthropods and 21 pathogens were considered further. These 40 pests were evaluated further and 8 insects, 1 mite and 1 pathogen are considered to be associated with the fresh fruit pathway and hence regarded as potential quarantine pests for further consideration.

The SIRA conducted by the Department of Agriculture on fresh cherry fruit from South Australia established quarantine policy for fresh cherry fruit into Western Australia. Furthermore, all of the pests and diseases of quarantine concern associated with fresh cherry fruit from New Zealand are dealt with under existing state import quarantine policy for current imports of either interstate and or international horticultural commodities. For this reason Biosecurity Australia in consultation with the Department of Agriculture, determined that a review of existing policy was appropriate for the extension of these measures to cherry fruit of New Zealand origin.

In the review of the 10 pests of quarantine concern to Western Australia, factors such as: the history of trade with eastern states; biology; host range; distribution; presence on the pathway (fruit); entry, establishment and spread potential; and economic consequences were taken into account. In the assessment of risk, the probability of entry was based on the risk following either pre-clearance or on arrival inspection, resulting in a restricted risk estimate for the 10 pests that was below the appropriate level of protection for Australia.

This review proposes that the import conditions for fresh cherry fruit from New Zealand into eastern Australian states (pre-clearance or on arrival inspection) will effectively manage the quarantine pests associated with fresh cherry fruit from orchards in New Zealand into Western Australia for consumption and provide an appropriate level of protection for Australia.

Glossary of terms and abbreviations

AFFA	Commonwealth Department of Agriculture, Fisheries and Forestry - Australia
The Department of Agriculture	The Department of Agriculture Western Australia
ALOP	Appropriate Level of Protection; the level of protection deemed appropriate for establishing sanitary or phytosanitary measures to protect human, animal or plant life or health
AQIS	Australian Quarantine and Inspection Service, a section within AFFA
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
Eastern Australia or Eastern States	New South Wales, Victoria, Queensland, South Australia, Tasmania and the Northern Territory
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
Harmonisation	The establishment, recognition and application by different countries of phytosanitary measures based on common standards
Introduction (of a pest)	Entry of a pest resulting in its establishment
Introduction Potential	The likelihood that a given pest species will remain viable and undetected on or associated with the commodity as it moves from the exporting area to the endangered area where it may establish
IRA	Import Risk Analysis, an administrative process through which quarantine policy is developed or reviewed, incorporating risk assessment, risk management and risk communication
ISPM	International Standards for Phytosanitary Measures

MOU	Memorandum of Understanding on Animal and Plant Quarantine Measures (MOU) between the Commonwealth and States/Territories signed in December 1995
National Plant Protection Organisation (NPPO)	Official service established by a government of a country to discharge the functions specified by the IPPC (AFFA is Australia's NPPO)
Official	Established, authorised or performed by a National Plant Protection Organisation
Official control (of a regulated pest)	the active enforcement of mandatory phytosanitary regulations and the application of mandatory phytosanitary procedures with the objective of eradication or containment of quarantine pests or for the management of regulated non-quarantine pests
Pathway	Any means that allows the entry or spread of a pest
Pest	Any species, strain or biotype of plant or animal, or any pathogenic agent, injurious to plants or plant products
Pest of quarantine concern	Any species, strain or biotype of plant or animal, or any other biological agent that will or could cause significant damage to human beings, animals, plants, other aspects of the environment or economic activities
Phytosanitary measure	Any legislation, regulation or official procedure having the purpose to prevent the introduction and/or spread of quarantine pests
PIRSA	Primary Industries and Resources South Australia
Polyphagous	Feeding on a relatively large number of host plants from different plant families
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
Restricted risk	'Restricted' risk estimates are those derived when risk management measures are used
SIRA	State Import Risk Analysis; a process for assessing the risk and determining measures needed for the movement of plants and animals and their products between the States and Territories of Australia
Unrestricted risk	'Unrestricted' risk estimates are those derived in the complete absence of risk management measures

Introduction

Fresh cherry fruit from New Zealand has been imported into the eastern states of Australia for several years. Stone fruit imports from eastern Australia and New Zealand into Western Australia have not been permitted due to the absence of suitable phytosanitary measures to mitigate the risk of the introduction of the stone fruit disease brown rot, caused by *Monilinia fructicola* and *M. laxa*, into Western Australia.

Brown rot of stone fruit was discovered in Western Australia in 1997. In 1999, the presence of both *M. fructicola* and *M. laxa* in Western Australia were confirmed and determined to be widespread. Following confirmation of brown rot in Western Australia, eastern Australian states and New Zealand requested access for stone fruit into Western Australia.

In September 2001, Department of Agriculture Western Australia completed a SIRA on cherry fruit (*Prunus avium*) from South Australia. The SIRA on cherry fruit from South Australia recommended that the Plant Diseases Regulations 1989 be amended to allow the entry of cherry fruit from South Australia under a specific import protocol.

Biosecurity Australia is the agency within Agriculture Fisheries and Forestry – Australia responsible for developing international quarantine policy for imports and for liasing with overseas National Plant Protection Organisations (NPPO's) to determine their requirements for exports of Australian plants and plant products. Quarantine policy for the importation of fresh cherry fruit into Australia from New Zealand and certain other sources has been in place for some time, except for importation into Western Australia. If an extension of existing quarantine policy is sought by our international trading partners, Biosecurity Australia may conduct a policy review rather than an IRA for the relevant commodity and PRA area.

The decision to use an extension of existing quarantine policy is dependent upon the conditions of commodity importation and the similarities between the phytosanitary status of the PRA area under consideration and the area to which imports are already approved or accepted. In consultation with the Department of Agriculture, Biosecurity Australia has determined that such a review is appropriate for the consideration of importation of fresh cherry fruit from New Zealand into Western Australia.

In co-operation with NZ MAF and the Department of Agriculture, Biosecurity Australia has conducted a review on fresh cherry fruit from New Zealand into Western Australia. In accordance with ISPM Pub. No. 11 *Pest Risk Analysis for Quarantine Pests* (FAO, 2001), the review comprises three discrete stages:

- Stage 1: initiation of the review
- Stage 2: risk assessment

- Stage 3: risk management

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

This document includes the following sections:

- Background to this review
- Current quarantine policy for the importation of fresh cherry fruit from New Zealand
- A reference to the review methodology used
- Results of stages 1-3 of the review
- Recommendations for the importation of fresh cherry fruit from New Zealand into Western Australia

Background

Brown rot of stone fruit was discovered in Western Australia in 1997. At the time of detection, the disease was found to be established and widespread in the State. In 1999, the Department of Agriculture and Central Science Laboratories, United Kingdom, confirmed the presence in Western Australia of both *Monilinia fructicola* and *M. laxa*, the pathogens that cause brown rot of stone fruit. Following the establishment of brown rot in Western Australia, a number of requests were received to import stone fruit into the State from eastern Australia and New Zealand.

Western Australia's previous freedom from brown rot had enabled a prohibition on the importation of stone fruit into the State, as there was no effective phytosanitary measure for the disease. This prohibition has been in place for many years and as a result there has been no formal analysis of other exotic pests that could be introduced into Western Australia with imported stone fruit.

Following the requests to import stone fruit into the State, the Department of Agriculture embarked on a formal assessment of stone fruit from eastern Australia using the State Import Risk Analysis process. The first step in the analysis was to determine the pest status of Western Australia and the other Australian states and to conduct a pest risk assessment. In September 2001, the Department of Agriculture released a SIRA on fresh cherry fruit from South Australia recommending the import of fresh cherry fruit commence under an agreed import protocol.

This review has been conducted as an adjunct to the SIRA released by the Department of Agriculture on fresh cherry fruit from South Australia. Factors such as the: history of trade with eastern states; biology; host range; distribution; presence on the pathway (fruit); entry, establishment and spread potential; and economic consequences were taken into account. The review identified pests of cherry fruit of quarantine concern to Western Australia and considered to have a significant likelihood of introduction, establishment or spread.

Scope

In this review, conducted utilising existing Western Australian policy for importation of fresh cherry fruit from South Australia, Biosecurity Australia has considered the pests associated with cherry (*Prunus avium*) in New Zealand. These pests have been categorised and assessed to determine whether the international criteria for a quarantine pest are met. This pest list and categorisation will form the basis of future policy in respect to the entry of cherry fruit into Western Australia from New Zealand. Cherry fruit is defined as fresh, mature fruit (including the pedicel or stalk of a single fruit and the peduncle or stalks of the fruit cluster) of *Prunus avium* of the family Rosaceae imported for the purpose of consumption from export orchards in New Zealand.

Current quarantine policy on cherry fruit

National

The Quarantine Act 1908, including Quarantine Proclamation 1998 as amended, prohibits except by permit the entry of all fresh fruit, including cherry, into Australia. Permits are issued by AQIS for the entry of cherry fruit into Australia from New Zealand and parts of the United States of America, subject to certain conditions. Current AQIS import conditions allow entry of New Zealand cherry fruit to Australia but restrict the entry of cherry fruit from the United States to the eastern states. (AQIS, 2002a; AQIS, 2002b).

New Zealand cherry fruit can enter eastern Australia either under an AQIS pre-clearance program or require inspection upon arrival. If cherry fruit is exported under the AQIS pre-clearance program, no inspection is required on arrival in Australia. Inspection on arrival and treatment for quarantine pests, if detected, is required for New Zealand cherry fruit if they are not exported under the AQIS pre-clearance program.

Interstate

Under the Plant Diseases Act 1914 and Regulations 1989 the importation of cherry fruit is permitted from South Australia but is not permitted from the eastern states, New Zealand or the United States of America.

Outline of the cherry industry in New Zealand

New Zealand cherry production is primarily restricted to the South Island around the Blenheim and Otago regions. The orchard area currently covers approximately 335 hectares. Harvest of fruit commences during late November and concludes mid to late February. New Zealand producers export ten to thirty tonnes of fresh cherry fruit to the eastern states annually, with precise volumes dependent upon seasonal variation. Other export markets include Japan and Taiwan. Total export production may reach 2000 tonnes in 2003, as new orchard plantings begin to yield export quality fruit.

Outline of the cherry industry in Western Australia

The value of cherry production in Western Australia is approximately $1.5m per annum. The cherry industry is in a strong growth phase and appears set to double in size over the next few years. In 1995/96, there were over 37,000 cherry trees in Western Australia.

Pest Risk Analysis

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

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

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

Stage 1: Initiation

Initiation of this analysis followed the confirmation in 1999 that brown rot of stone fruit, caused by *Monilinia fructicola* and *M. laxa*, had established in Western Australia and the subsequent requests to import stone fruit into the State.

During 2000, NZ MAF and PIRSA sought access for fresh stone fruit for consumption. NZ MAF later indicated access for fresh cherries was a priority. In September 2001, the Department of Agriculture completed a SIRA on cherry fruit (*Prunus avium*) from South Australia. The SIRA on cherry fruit from South Australia recommended that the Plant Diseases Regulations 1989 be amended to allow the entry of cherry fruit from South Australia under a specific importation protocol. After the release of the South Australian import recommendations, the Department of Agriculture commenced work on a review for fresh cherry fruit from orchards within New Zealand.

The “PRA area” is defined in this review as the State of Western Australia. The ‘endangered area’ is defined as any area within Western Australia, where susceptible hosts are present, and in which ecological factors favour the establishment of a pest that might be introduced in association with cherry fruit from New Zealand. The pathway is considered to be fresh cherry fruit for consumption from export orchards in New Zealand.

Stage 2: Risk Assessment

The first step in the process is to determine which of the plant pests associated with cherry fruit in New Zealand 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 pests of quarantine significance have been determined through the lack of records of presence

in Western Australia, presence on the pathway (cherry fruit), potential for establishment and economic consequences. These factors are used in the following tables to categorise and subsequently identify the quarantine pests of cherry fruit for Western Australia. If pests are identified as being present in Western Australia and not under official control, or the pests do not have the potential for establishment or economic consequences, then further consideration is not required as they do not meet the definition of a quarantine pest.

Of the 27 arthropods and 38 pathogens possibly associated with the production of cherry fruit in New Zealand, 19 arthropods and 21 pathogens were considered further (Appendix 1). These 40 species not known to occur in Western Australia were then assessed for their presence on the cherry fruit pathway (Appendix 2). Of the 40 species, 8 insects, 1 mite and 1 pathogen were considered to be present on the pathway and retained as pests for further consideration (Table 1).

Datasheets were prepared for these 10 pests. Restricted risk estimates, where the risk of entry was reduced by either pre-clearance or on arrival inspection, were determined using the methodology as outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001 and presented in Table 2.

Table 1. Quarantine Pests associated with fresh cherry fruit from New Zealand to Western Australia requiring further consideration

Scientific name	Common name
Arthropods	
Ctenopseustis herana (Feld. & Rogen.) [Lepidoptera: Tortricidae]	Brownheaded leafroller
Ctenopseustis obliquana (Walker) [Lepidoptera: Tortricidae]	Brownheaded leafroller
Eucolaspis brunnea (F.) [Coleoptera: Chrysomelidae]	Bronze beetle
Grapholita molesta (Busk) [Lepidoptera:Tortricidae]	Oriental fruit moth
Myzus cerasi (F.) [Hemiptera: Aphididae]	Black cherry aphid
Panonychus ulmi (Koch) [Acarina: Tetranychidae]	European red mite
Planotortrix excessana (Walker) [Lepidoptera: Tortricidae]	Green headed leafroller
Planotortrix octo (Dugdale) [Lepidoptera: Tortricidae]	Green headed leafroller
Thrips obscuratus (Crawford) [Thysanoptera:Thripidae]	NZ flower thrips
Pathogens	
Venturia cerasi Aderhold [Loculoascomycetes: Dothideales]	Cherry scab

Risk Assessment for Pests of Quarantine Concern

The next step in the pest risk assessment is to assess the risk posed by the pests that have been identified. This is undertaken by assessing the probability of entry, establishment and spread for the pests. The probability of entry was obtained by considering the importation and distribution pathway(s) for the commodity and the likelihood that a given pest will remain viable and

undetected after each of the component steps in the pathway. The probability of establishment and the probability of spread were obtained by examining biological and other factors in the endangered area that may influence a pest's ability to become established and subsequently spread to other areas.

Pest data sheets have been compiled for the 10 pests of cherry fruit from New Zealand. The data sheets provide a summary of the biology of the pest and the rationale for determining the probabilities for entry, establishment and spread of the pest in Western Australia.

Brown-Headed Leafroller
Scientific name: *Ctenopseustis herana* (Felder & Rogenhofer, 1875) [Lepidoptera: Tortricidae]

Synonyms: *Tortrix herana* Felder & Rogenhofer, 1875; *Cacoecia inana* Butler, 1877; *Ctenopseustis herana* Felder & Rogenhofer; *Ctenopseustis obliquana* Type II of Foster *et al.* (1986), Foster and Dugdale (1988) (Dugdale, 1990; MAFNZ, 1999).

Other common names: None known.

Probability of importation: Low
A highly polyphagous species, larvae may be present on cherry fruit. Egg masses of this leafroller are laid on the leaves. The larvae feed mainly on leaves by spinning them together with silk and developing a protective shelter. Thomas (1979) indicated that "larvae eject frass (droppings) outside the fruit or protective shelter". They may also feed on shoots, buds, stems and externally or internally on fruit. The externally feeding larvae are likely to be eliminated by packinghouse procedures (including washing, sorting and grading). Most fruit with internally feeding larvae would show external damage or the presence of droppings and are therefore likely to be rejected during sorting. Internally infested fruit is susceptible to fungal attack and would be likely to be detected during visual inspection.

Probability of distribution: Low
Any early instar larvae escaping detection would be very unlikely to develop through to pupation from any disposed cherry fruit before the fruit desiccates or decays. The larvae would also be very unlikely to find a suitable alternate host to complete its development. Any late instar larvae escaping detection may be able to pupate and emerge as adults but would be very unlikely to find a suitable mate and establish an incursion population.

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: High

This species has been reported on numerous host plants (MAFNZ, 1999), many of which occur in Australia, such as apple, cherry, kiwifruit, peach, plum and wattle. The moths are likely to adapt to Australian conditions, as they have a wide climatic tolerance in New Zealand (MAFNZ, 1999). Development from egg to adult can be completed in 4-6 weeks in summer (MAFNZ, 1999).

Probability of spread: High

This species is common and widespread in New Zealand and they have a wide range of host plants (MAFNZ, 1999). This suggests that they would be able to spread widely in a similar environment such as some parts of Australia. Human activity can help the spread of these pests, as the larvae associated with fruit may be moved around with the commodity.

Probability of entry, establishment and spread: Very low

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

Consequences: Moderate

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

Restricted risk estimate: Very low

The restricted 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.

Brown-Headed Leafroller

Scientific name: *Ctenopseustis obliquana* (Walker, 1863) [Lepidoptera: Tortricidae]

Synonyms: *Teras obliquana* Walker, 1863; *Sciaphila transtrigana* Walker, 1863; *Sciaphila turbulentana* Walker, 1863; *Teras spurcatana* Walker, 1863; *Tortrix ropeana* Felder & Rogenhofer, 1875; *Cacoecia charactana* Meyrick, 1881; *Ctenopseustis obliquana* Types I and III of Foster *et al.* (1986); *Ctenopseustis obliquana* Types I of Foster and Dugdale (1988) (Dugdale, 1990; MAFNZ, 1999).

Other common names: None known.

Probability of importation: Low
A highly polyphagous species, larvae may be present on cherry fruit. Egg masses of this leafroller are laid on the leaves. The larvae feed mainly on leaves by spinning them together with silk and developing a protective shelter. Thomas (1979) indicated that "larvae eject frass (droppings) outside the fruit or protective shelter". They may also feed on shoots, buds, stems and externally or internally on fruit. The externally feeding larvae are likely to be eliminated by packinghouse procedures (including washing, sorting and grading). Most fruit with internally feeding larvae would show external damage or the presence of droppings and are therefore likely to be rejected during sorting. Internally infested fruit is susceptible to fungal attack and would be likely to be detected during visual inspection.

Probability of distribution: Low
Any early instar larvae escaping detection would be very unlikely to develop through to pupation from any disposed cherry fruit before the fruit desiccates or decays. The larvae would also be very unlikely to find a suitable alternate host to complete its development. Any late instar larvae escaping detection may be able to pupate and emerge as adults but would be very unlikely to find a suitable mate and establish an incursion population.

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: High
This species has been reported on numerous host plants (MAFNZ, 1999), many of which occur in Australia, such as apple, cherry, kiwifruit, peach, plum and wattle. The moths are likely to adapt to Australian conditions, as they have a wide climatic tolerance in New Zealand (MAFNZ, 1999). Development from egg to adult can be completed in 4-6 weeks in summer (MAFNZ, 1999).

Probability of spread: High
This species is common and widespread in New Zealand and they have a wide range of host plants (MAFNZ, 1999). This suggests that they would be able to spread widely in a similar environment such as some parts of Australia. Human activity can help the spread of these pests, as the larvae

associated with fruit may be moved around with the commodity.

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

Consequences: Moderate

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

Restricted risk estimate: Very low
The restricted 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.

Bronze Beetle
Scientific name: *Eucolaspis brunnea* (Fabricius) [Coleoptera: Chrysomelidae]

Synonyms: *Colaspis brunnea* Fabricius

Other common names: None known.

Probability of importation: Very low
Bronze beetles have an activity period coinciding with the harvest of early and mid season stone fruit varieties and may be present on harvested fruit as a contaminant. Post harvest grading, washing and packing procedures are likely to remove this pest from the fruit. Pre-clearance or on arrival inspection is likely to detect this pest.

Probability of distribution: High

Developmental stages of the beetle include egg, larvae, pupae and adult. The adult beetle is the destructive stage of the bronze beetle through defoliation of the host plant. Adults are capable of dispersal through flight. The larvae feed on roots, and may be dispersed via contaminated nursery stock.

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

Bronze beetle's host range extends to several horticultural crops and ornamental species. The distribution of bronze beetle in New Zealand indicates the species would be restricted to the lower south west of Western Australia.

Probability of spread: High

This species is common and widespread in New Zealand and has a wide range of host plants. Larvae attack clovers and grasses. Adults have been recorded on *Chenopodium quinoa* (Quinoa goosefoot), *Cynodon dactylon* (couch grass), stone fruit, pome fruit, berry fruits (Penman, 1984), pine (Kay, 1980), eucalypts, acacia, hawthorn, elm, clover, geranium, rose (Lysaght, 1930). This suggests that this species may be able to spread widely in some parts of 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: Low

Criteria	**Estimate**
Direct consequences	
Animal or plant health or welfare	C – host damage by larvae and adults is likely to be of minor significance at regional level
Human life	A – unlikely to be discernible at regional level
Environment	B – whilst recorded on many hosts damage is minor at the regional level
Indirect consequences	
Eradication, control etc	C – programs to control/eradicate this pest at the regional level may be costly

Domestic trade	C – may be initial significant domestic trade restrictions until mitigation strategies in place
International trade	B – international trade not significantly affected due to mitigation strategies
Environment	B – whilst recorded on many hosts damage is minor at the regional level

Restricted risk estimate: Negligible
The restricted 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.

Oriental fruit moth
Scientific name: *Grapholita molesta* (Busck) [Lepidoptera: Tortricidae]

Synonyms: *Cydia molesta* Busck; *Laspeyresia molesta* Busck;
Carpocapsa molesta Busck.

Other common names: Oriental peach moth; Peach tip moth.

Probability of importation: Very low
Oriental fruit moth is not considered a major pest of cherry fruit. When fruit is infested a gummy exudates may protrude from the entry hole (particularly in association with the later instars) and any infested fruit exhibiting gum or superficial feeding areas should be rejected during routine quality inspection. Early instar larvae may escape detection during quality control, due to the lack of gum or surface feeding scars and/or their small size.

Probability of distribution: Very low
Early instar larvae escaping detection are likely to survive storage and distribution to the area endangered. However, any early instar larvae escaping detection would be very unlikely to develop through to pupation from any disposed cherry fruit before the fruit desiccates or decays. The larvae would also be very unlikely to find a suitable alternate host to complete its development. Dispersal between hosts is normally achieved by the adult. Any late instar larvae escaping detection may be able to pupate and emerge as adults but would be very unlikely to find a suitable mate and establish an incursion population.

Probability of entry: Extremely 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

Although the host range of Oriental fruit moth cannot be considered polyphagous, it does include several major commercial crops and common home grown fruit trees. Peaches and nectarine are considered the major host species for the pest with other recorded host species including, cherry (Bailey, 1985), apricot, plum (Yokoyama and Miller, 1988a), hawthorn, quince, almond, pear, cotoneaster, loquat and grapevine (Hely *et al*., 1982). The pest does not solely rely on fruit for establishment, as larvae emerging in spring will attack new vegetative shoots. The previously eradicated incursion of Oriental fruit moth indicates that Western Australia has an environment suitable for establishment.

Probability of spread: High

Oriental fruit moth can disperse both independently and in association with host material. Spread, independent of host material, is by adult flight and in association with farm equipment and packaging. Oriental fruit moth can also disperse with host material and as such, long distance dispersal is facilitated by the commercial distribution of the host fruit and nursery stock.

Probability of entry, establishment and spread: Extremely low

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

Consequences: Low

Criteria	**Estimate**
Direct consequences	
Animal or plant health or welfare	C – significant at the district level
Human life	A – unlikely to be discernible at any level
Environment	A – unlikely to be discernible at any level
Indirect consequences	
Eradication, control etc	C – programs to control/eradicate this pest at the district level are likely to be costly
Domestic trade	B – significant domestic (intrastate) trade restrictions at the local level
International trade	B – international trade may be significantly affected at the local level
Environment	A – unlikely to be discernible at any level

Restricted risk estimate: Negligible

The restricted 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.

Cherry Aphid
Scientific name: *Myzus cerasi* Fabricius [Hemiptera: Aphididae]
Synonyms: *Aphis cerasi,* Fabricius; *Myzoides cerasi,* Fabricius; *Myzus asperulae,* Walker; *Myzus alectorolophi,* Heinze; *Aphis asperulae,* Walker; *Myzus callange,* Essig; *Aphis cerasi,* Müller; *Myzoides cerasi,* van der Goot; *Aphis euphrasiae,* Walker; *Myzus quasipyrinus,* Theobald; *Aphis veronicae,* Walker.
Other common names: Cherry black aphid, Black cherry aphid, Cherry black fly.

Probability of importation: Very low
This species primarily colonises new growth but can be present on the fruit (McLaren *et al*., 1999). The presence of high numbers of cherry aphid will be in association with highly visible honeydew production and associated sooty mould. Fruit harvested in this condition is likely to be detected during pack-house quality control inspection and by standard on-arrival inspection. Standard post-harvest practices for export cherry fruit in New Zealand should also help minimise the occurrence of adult cherry aphid on the fruit.

Probability of distribution: Low
Cherry aphids can disperse independently but are more likely to disperse in association with host material such as fruit and nursery stock. Adults are weak fliers and cherry aphid's limited host range would further restrict independent dispersal.

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
Cherry aphid has the ability to establish a colony from one viviparous adult, but has a limited host range with cherry considered the primary host and other *Prunus* species considered secondary host species.

Probability of spread: Low
Cherry aphids can disperse independently but are more likely to disperse in association with host material such as fruit and nursery stock. Adults are weak fliers and cherry aphid's limited host range would further restrict independent dispersal.

Probability of entry, establishment and spread: Very low
The probability of entry, establishment and spread is determined by combining the likelihoods of entry, establishment and spread using the matrix of rules for combining descriptive likelihoods as

outlined in the Biosecurity Australia publication *Guidelines for Import Risk Analysis* – September 2001.

Consequences : Low

Criteria	Estimate
Direct consequences	
Animal or plant health or welfare	C – host damage is likely to be of minor significance at regional level
Human life	A – unlikely to be discernible at regional level
Environment	A – unlikely to be discernible at regional level
Indirect consequences	
Eradication, control etc	C – programs to control/eradicate this pest at the regional level are likely to be costly
Domestic trade	A – unlikely to be discernible as pest widespread in areas other than WA
International trade	A – unlikely to be discernible as pest widespread in areas other than WA
Environment	A – unlikely to be discernible at regional level

Restricted risk estimate: Negligible

The restricted 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.

European Red Mite

Scientific name: *Panonychus ulmi* Koch [Acarina: Tetranychidae]

Synonyms: *Metatetranychus pilosus* (Canestrini & Fanzago), *Metatetranychus mali, Oligonychus ulmi, Paratetranychus pilosus occidentalis, Paratetranychus ulm, Tetranychus pilosus, Tetranychus ulmi, Paratetranychus pilosus* (Canestrini & Fanzago), *Metatetranychus ulmi* Koch

Other common names: Fruit tree red spider mite, European red spider mite, European fruit tree red spider mite.

Probability of importation: Low

European red mites are principally foliage feeding mites. They may become associated with the host fruit under high population pressures. Standard post-harvest practices for export cherry fruit in New Zealand will minimise the occurrence of adult European red mites on the fruit.

Probability of distribution: Low

European red mites rely on wind currents, animals and orchard workers for dispersal.

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
Female European red mites produce two types of eggs, namely winter and summer eggs. Resilient winter eggs enable the mite to 'overwinter' and are produced from late summer to late autumn. Winter eggs can be laid on leaves (Beament, 1951) and on late season fruit (Hely *et al.*, 1982) if population pressures are high enough. Summer eggs are usually produced from adults hatched from winter eggs and hatch within 12 days depending on weather conditions. Lifecycle development from eggs to adult usually takes 28 days depending on weather conditions and successive generations can occur over a season. Climatic conditions in Western Australia may be marginal for the establishment of the pest.

Probability of spread: Low
European red mites rely on wind currents, animals and orchard workers for dispersal. These dispersal strategies would not be effective in enabling European red mite to be transferred from a discarded fruit to a suitable host species.

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

Consequences: Low

Criteria	**Estimate**
Direct consequences	
Animal or plant health or welfare	C – host damage is likely to be of minor significance at regional level
Human life	A – unlikely to be discernible at regional level
Environment	A – unlikely to be discernible at regional level
Indirect consequences	
Eradication, control etc	C – programs to control/eradicate this pest at the regional level are likely to be costly
Domestic trade	A – unlikely to be discernible as pest widespread in areas other than WA
International trade	A – unlikely to be discernible as pest widespread in areas other than WA
Environment	A – unlikely to be discernible at regional level

Restricted risk estimate: Negligible
The restricted 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.

Green-Headed Leafroller
Scientific name: *Planotortrix excessana* (Walker, 1863) [Lepidoptera: Tortricidae]

Synonyms: *Teras excessana* Walker, 1863; *Teras biguttana* Walker, 1863; *Cacoecia excessana* (Walker, 1863); *Tortrix excessana* (Walker, 1863); *Planotortrix excessana* Type B of Foster *et al.* (1986); *Planotortrix excessana* Types B and C of Foster and Dugdale (1988) (Dugdale, 1990).

Other common names: Orchard leafroller.

Probability of importation: Low
A highly polyphagous species, larvae may be present on cherry fruit. Egg masses of this leafroller are laid on the leaves. The larvae feed mainly on leaves by spinning them together with silk and developing a protective shelter. Thomas (1979) indicated that "larvae eject frass (droppings) outside the fruit or protective shelter". They may also feed on shoots, buds, stems and externally or internally on fruit. The externally feeding larvae are likely to be eliminated by packinghouse procedures (including washing, sorting and grading). Most fruit with internally feeding larvae would show external damage or the presence of droppings and are therefore likely to be rejected during sorting. Internally infested fruit is susceptible to fungal attack and would be likely to be detected during visual inspection.

Probability of distribution: Low
Any early instar larvae escaping detection would be very unlikely to develop through to pupation from any disposed cherry fruit before the fruit desiccates or decays. The larvae would also be very unlikely to find a suitable alternate host to complete its development. Any late instar larvae escaping detection may be able to pupate and emerge as adults but would be very unlikely to find a suitable mate and establish an incursion population.

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: High
This species has been reported on numerous host plants (MAFNZ, 1999), many of which occur in Australia, such as apple, cherry, kiwifruit, peach, plum and wattle. The moths are likely to adapt to

Australian conditions, as they have a wide climatic tolerance in New Zealand (MAFNZ, 1999b). Development from egg to adult can be completed in 4-6 weeks in summer (MAFNZ, 1999b).

Probability of spread: High
This species is common and widespread in New Zealand and they have a wide range of host plants (MAFNZ, 1999). This suggests that they would be able to spread widely in a similar environment such as some parts of Australia. Human activity can help the spread of these pests, as the larvae associated with fruit can be readily moved around with the commodity.

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

Consequences: Moderate

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

Restricted risk estimate: Very low
The restricted 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.

Green-Headed Leafroller
Scientific name: *Planotortrix octo* Dugdale, 1990 [Lepidoptera: Tortricidae]

Synonyms: *Planotortrix excessana* Type A of Foster *et al.* (1986), Foster and Dugdale (1988) (Dugdale, 1990).

Other common names: None known.

Probability of importation: Low
A highly polyphagous species, larvae may be present on cherry fruit. Egg masses of this leafroller are laid on the leaves. The larvae feed mainly on leaves by spinning them together with silk and developing a protective shelter. Thomas (1979) indicated that "larvae eject frass (droppings) outside the fruit or protective shelter". They may also feed on shoots, buds, stems and externally or internally on fruit. The externally feeding larvae are likely to be eliminated by packinghouse procedures (including washing, sorting and grading). Most fruit with internally feeding larvae would show external damage or the presence of droppings and are therefore likely to be rejected during sorting. Internally infested fruit is susceptible to fungal attack and would be likely to be detected during visual inspection.

Probability of distribution: Low
Any early instar larvae escaping detection would be very unlikely to develop through to pupation from any disposed cherry fruit before the fruit desiccates or decays. The larvae would also be very unlikely to find a suitable alternate host to complete its development. Any late instar larvae escaping detection may be able to pupate and emerge as adults but would be very unlikely to find a suitable mate and establish an incursion population.

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: High
This species has been reported on numerous host plants (MAFNZ, 1999), many of which occur in Australia, such as apple, cherry, kiwifruit, peach, plum and wattle. The moths are likely to adapt to Australian conditions, as they have a wide climatic tolerance in New Zealand (MAFNZ, 1999). Development from egg to adult can be completed in 4-6 weeks in summer (MAFNZ, 1999).

Probability of spread: High
This species is common and widespread in New Zealand and they have a wide range of host plants (MAFNZ, 1999). This suggests that they would be able to spread widely in a similar environment such as some parts of Australia. Human activity can help the spread of these pests, as the larvae associated with fruit may be moved around with the commodity.

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

2001.

Consequences: Moderate

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

Restricted risk estimate: Very low
The restricted 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.

New Zealand flower thrips
Scientific name: *Thrips obscuratus* (Crawford) [Thysanoptera: Thripidae]

Synonyms: *Isoneurothrips obscuratus* Crawford, 1941; *Isothrips (Isoneurothrips) obscuratus* (Crawford, 1941); *Thrips (Isothrips) obscuratus* (Crawford, 1941) (MAFNZ, 1999)

Other common names: None known

Probability of importation: Moderate
A highly polyphagous species that has been detected on imported cherry fruit from New Zealand.

Probability of distribution: Moderate
May disperse on infested fruit or nursery stock. Historical dispersal of other introduced thrips species would suggest moderate probability of spread for this species.

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 species is polyphagous, and is noted for its ecological and physiological plasticity.

Probability of spread: Moderate
May disperse on infested fruit or nursery stock. Historical dispersal of other introduced thrips species would suggest moderate probability of spread for this species.

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: Low

Criteria	**Estimate**
Direct consequences	
Animal or plant health or welfare	C – of minor significance at regional level
Human life	A – unlikely to be discernible at regional level
Environment	C – minor significance at the regional level
Indirect consequences	
Eradication, control etc	C – programs to control/eradicate this pest at the regional level are likely to be costly
Domestic trade	C – initial significant domestic trade restrictions until mitigation strategies in place
International trade	B – international trade not significantly affected
Environment	C – possibly significant effects at the regional level

Restricted risk estimate: Very low
The restricted 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.

Cherry Scab
Scientific name: *Venturia cerasi*, Aderhold, 1900 [Loculoascomycetes: Dothideales]
Synonym/s: *Fusicladium cerasi* (Rabenh.) Sacc., 1886; *Acrosporium cerasi* (Rabenh. in Braun), 1854; *Cladosporium cerasi* (Rabenh,) Aderhold, 1901; *Megacladosporium cerasi* (Rabenh.) Vienn-Bourg., 1949.

Probability of importation: Very low
The fungus can be introduced on fruit, which record low levels of infection. Cherry fruit with disease symptoms usually do not ripen and fall off prematurely. Fruit showing symptoms are likely to be discarded following the stringent pack-house procedures used for export cherries.

Probability of distribution: Moderate
Infection and survival in leaf debris provide a dispersal mechanism. The proximity of cherry orchards in the south west of Western Australia may favour the spread of this fungus.

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
If the fungus is introduced, its inoculum can survive the dry summer on discarded infected fruit and sporulate to produce conidia during winter and spring rain. The conidia are dispersed by wind and rain-splash.

Probability of spread: Moderate
Infection and survival in leaf debris provide a dispersal mechanism. The proximity of cherry orchards in the south west of Western Australia may favour the spread of this fungus

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

Consequences: Low

Criteria	**Estimate**
Direct consequences	
Animal or plant health or welfare	C – of minor significance at regional level
Human life	A – unlikely to be discernible at national level
Environment	C – minor significance at the regional level
Indirect consequences	
Eradication, control etc	C – programs to control/eradicate this pest at the regional level are likely to be costly
Domestic trade	C – initial significant domestic trade restrictions until mitigation strategies in place

International trade	B – international trade not significantly affected
Environment	A – unlikely to be discernible at the regional level

Restricted risk estimate: Negligible
The restricted 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.

Risk assessment conclusion

Five pests, the four species of leafroller and New Zealand flower thrips, have a restricted risk estimate of very low (Table 2). Five pests, the Oriental fruit moth, the black cherry aphid, the European red mite, the bronze beetle and cherry scab have a restricted risk estimate of negligible (Table 2). The restricted risk estimates for these 10 pests are below Australia's appropriate level of protection. These pests do not require the use of risk management measures over and above the standard practices used in the production of export quality cherry fruit in New Zealand and either pre-clearance or on arrival inspection.

Acknowledgement

Biosecurity Australia wishes to thank the Plant Policy and Pest Risk Analysis Section of the Department of Agriculture Western Australia for its technical input into this paper, both for the provision of pest and disease information and for its comments on the draft review paper.

Table 2: Restricted risk summary

Scientific Name	Common name	Probability of			Overall Probability of introduction establishment and spread[1]	Economic Consequences	Restricted Risk[2]
		Entry	Establishment	Spread			
Arthropods							
Ctenopseustis herana (Feld. & Rogen.) [Lepidoptera: Tortricidae]	Brownheaded leafroller	Very low	High	High	Very low	Moderate	Very low
Ctenopseustis obliquana (Walker) [Lepidoptera: Tortricidae]	Brownheaded leafroller	Very low	High	High	Very low	Moderate	Very low
Eucolaspis brunnea (F.) [Coleoptera: Chrysomelidae]	Bronze beetle	Very low	Moderate	High	Very low	Low	Negligible
Grapholita molesta (Busk) [Lepioptera:Tortricidae]	Oriental fruit moth	Extremely low	High	High	Extremely low	Low	Negligible
Myzus cerasi (F.) [Hemiptera: Aphididae]	Cherry aphid	Very low	Low	Low	Very low	Low	Negligible
Panonychus ulmi (Koch) [Acarina: Tetranychidae]	European red mite	Very low	Low	Low	Very low	Low	Negligible
Planotortrix excessana (Walker) [Lepidoptera: Tortricidae]	Green headed leafroller	Very low	High	High	Very low	Moderate	Very low
Plantortrix octo (Dugdale) [Lepidoptera: Tortricidae]	Green headed leafroller	Very low	High	High	Very low	Moderate	Very low
Thrips obscuratus (Crawford) [Thysanoptera: Thripidae]	NZ Flower thrips	Low	Moderate	Moderate	Low	Low	Very low

[1] The 'introduction, establishment and spread potential' is the product of the probabilities of introduction, establishment and spread. This product is achieved by using the matrix of rules shown in Table 2 to cumulatively combine; (a) the probability of introduction and the probability of establishment, and, (b) the result of this with the probability of spread.

[2] Restricted risk is the product of; (a) probability of introduction (with risk management measures), establishment and spread; and, (b) the consequence of introduction (with risk management measures), establishment and spread, using the rules set out in Table 24 in Biosecurity Australia's publication *Guidelines for Import Risk Analysis* – September 2001, to give a measure of 'risk', or expected loss.

Extension of Existing Policy for Cherry Fruit Exported from New Zealand into Western Australia

Scientific Name	Common name	Probability of			Overall Probability of introduction establishment and spread[1]	Economic Consequences	Restricted Risk[2]
		Entry	Establishment	Spread			
Pathogens							
Venturia cerasi Aderhold [Loculoascomycetes: Dothideales]	Cherry Scab	Very low	Moderate	Moderate	Very low	Low	Negligible

Conditions for importation of cherry fruit from New Zealand into Western Australia

Conditions for import of fresh cherry fruit from New Zealand into Western Australia shall be as specified on ICON for fresh cherry fruit (*Prunus avium*) from New Zealand to eastern Australian states.

An organism that is detected on cherries from New Zealand that is not listed on ICON for fresh cherry fruit will be treated as a pest of quarantine concern. 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 measures continue to provide the appropriate level of protection for Australia.

Appendix 1 - Categorisation of pests associated with cherry fruit in New Zealand (distribution)

Scientific Name	Common Name	Presence in NZ	Presence in WA	Presence in SA	Eligible for further consideration
ARTHROPODA (arthropods)					
Acarina (mites)					
Aculus fockeui (Nalepa & Troussart) syn. *Aculus cornutus* (Banks) [Acarina: Eriophyidae]	plum rust mite	Yes; Manson, 1984; McLaren *et al*., 1999	Yes; AGWEST, 2001	Yes; AQIS, 1998	NO
Bdellodes sp. [Acarina: Bdellidae]	snout mite	Yes; McDaniel, 1979	Yes; Halliday *et al.*, 1998	Yes; SARDI, 2002	NO
Orthotydeus californicus (Banks) [Acarina: Tydeidae]	tydeid mite	Yes; Charles, 1984; McLaren, 1991	No records found	No records found	YES
Panonychus ulmi (Koch) [Acarina: Tetranychidae]	European red mite	Yes; Scott, 1984; McLaren *et al*., 1999	No records found	Yes; Thwaite, 1991	YES
Typhlodromus occidentalis Nesbitt syn. *Metaseiulus occidentalis* (Nesbitt) [Acarina: Phytoseiidae]	predatory mite	Yes; Scott, 1984; McLaren *et al*., 1999	Yes; AGWEST, 2002	No records found	NO
Coleoptera (beetles, weevils)					
Eucolaspis brunnea (F.) [Coleoptera: Chrysomelidae]	bronze beetle	Yes; Scott, 1984; McLaren *et al.,* 1999	No records found	No records found	YES
Diptera (flies)					
Drosophila spp.	vinegar fly	Yes; Mclaren *et al.,*	Yes; Evenhuis,	Yes; Evenhuis,	NO

Scientific Name	Common Name	Presence in NZ	Presence in WA	Presence in SA	Eligible for further consideration
[Diptera: Drosophilidae]		1999	1989	1989	
Hemiptera (aphids, leafhoppers, mealybugs, scales, true bugs)					
Brachycaudus persicae (Passerini) [Hemiptera: Aphididae]	black peach aphid	Yes; Cottier, 1953	Yes; Berlandier, 1997	Yes; Baker, 1998	NO
Lygus sp. [Hemiptera: Miridae]	native mirids	Yes; Helson, 1952	No records found	No records found	YES
Myzus cerasi (F.) [Hemiptera: Aphididae]	black cherry aphid	Yes; Cottier, 1953; McLaren *et al.,* 1999	No records found	Yes; Baker, 1998	YES
Parthenolecanium corni (Bouché) [Hemiptera:Coccidae]	European fruit lecanium	Yes; McLaren *et al.,* 1999	No records found	No records found	YES
Philaenus spumarius (L) [Hemiptera: Cercophidae]	meadow spittlebug	Yes; Scott, 1984	No records found	No records found	YES
Pulvinaria hydrangeae Steinwarden [Hemiptera: Coccidae]	hydrangea scale	Yes; Scott, 1984	No records found	No records found	YES
Quadraspidiotus ostreaeformis Curtis [Hemiptera: Diaspididae]	oystershell scale	Yes; McLaren *et al.,* 1999	No records found	No records found	YES
Quadraspidiotus perniciosus (Comstock) [Hemiptera: Diaspididae]	San Jose scale	Yes; Scott, 1984; McLaren *et al.,* 1999	Yes; Woods *et al.,* 1996	Yes; Baker, 1998	NO
Lepidoptera (moths and butterflies)					
Carposina adreptella [Lepidoptera:Tortricidae]	leafroller	Yes; McLaren *et al*., 1999	No records found	No records found	YES

Scientific Name	Common Name	Presence in NZ	Presence in WA	Presence in SA	Eligible for further consideration
Ctenopseustis herana (Feld. & Rogen.) [Lepidoptera: Tortricidae]	brownheaded leafroller	Yes; Dugdale, 1990	No records found	No records found	YES
Ctenopseustis obliquana (Walker) [Lepidoptera: Tortricidae]	brownheaded leafroller	Yes; Green, 1979; McLaren *et al*., 1999	No records found	No records found	YES
Epiphyas postvittana (Walker) [Lepidoptera: Tortricidae]	lightbrown apple moth	Yes; Thomas, 1984	Yes; Geier & Springett, 1976	Yes; Baker, 1998	NO
Eutorna phaulocosma [Lepidoptera: Tortricidae]	leafroller	Yes; McLaren *et al.*, 1999	No records found	No records found	YES
Grapholita molesta (Busck) [Lepidoptera: Tortricidae]	Oriental fruit moth	Yes; McLaren *et al*., 1999	No	Yes; Baker, 1998	YES
Planotortrix excessana (Walker) [Lepidoptera: Tortricidae]	green headed leafroller	Yes; Thomas, 1979; McLaren *et al.,* 1999	No records found	No records found	YES
Planotortrix octo Dugdale [Lepidoptera: Tortricidae]	green headed leafroller	Yes; Dugdale, 1990; McLaren *et al.,* 1999	No records found	No records found	YES
Planotortrix notophaea [Lepidoptera: Tortricidae]	leafroller	Yes; McLaren *et al*., 1999	No records found	No records found	YES
Pyrogotis plagiatana [Lepidoptera: Tortricidae]	leafroller	Yes; McLaren *et al*., 1999	No records found	No records found	YES
Thysanoptera (thrips)					
Thrips tabaci Lindeman [Thysanoptera: Thripidae]	onion thrips	Yes; Scott, 1984	Yes; Mound & Gillespie, 1997	Yes; CIE, 1969	NO
Thrips obscuratus (Crawford) [Thysanoptera: Thripidae]	NZ flower thrips	Yes; McLaren *et al.,* 1999	No records found	No records found	YES

Scientific Name	Common Name	Presence in NZ	Presence in WA	Presence in SA	Eligible for further consideration
BACTERIA					
Pseudomonas syringae pv. *syringae* van Hall [Pseudomonadaceae]	bacterial canker, blast, blister spot	Yes; Persley, 1993	Yes; Shivas, 1989	Yes; Cook & Dube, 1989	NO
Xanthomonas campestris pv. *pruni* (Smith) Dye [Pseudomonadaceae]	bacterial spot	Yes; Persley, 1993	Yes; Shivas, 1989	Yes; Cook & Dube, 1989	NO
FUNGI					
Alternaria alternata (Fr.) Keissl. [Hyphomycetes]	black mould, fruit rot, mould	Yes; Snowdon, 1990	Yes; APDD, 2002	Yes; APDD, 2002	NO
Apiosporina morbosa (Schwein.:Fr.)Arx (syn. *Dibotryon morbosum* (Schwein.:Fr.) Theiss. & Syd. [Loculoascomycetes: Dothideales]	black knot	Yes; Partridge, 1997	No records found	No records found	YES
Botrytis cinerea Pers.:Fr. (teleomorph: *Botryotinia fuckeliana* (de Bary) Whetzel) [Hyphomycetes]	dry eye rot, ghost spot, grey mould	Yes; Wilson & Ogawa, 1979	Yes; Shivas, 1989	Yes; Cook & Dube, 1989	NO
Chondrostereum purpureum (Pers.) Pouzar [Basidiomycetes: Aphyllophorales]	silver leaf disease	Yes; McLaren *et al*. 1999	Yes; Pearce *et al*., 1995	Yes; Cook & Dube, 1989	YES
Cladosporium cladosporioides (Fresen.) G.A. De Vries [Hyphomycetes]	mould	Yes; PPIN Ref: PHA 1916 PHO1	Yes; APDD, 2002	Yes; APDD, 2002	NO

Scientific Name	Common Name	Presence in NZ	Presence in WA	Presence in SA	Eligible for further consideration
Colletotrichum gloeosporioides (Penz.) Penz. & Sacc. in Penz. (teleomorph: *Glomerella cingulata* (Ston.) Spauld. & H. Schrenk) [Coelomycetes]	anthracnose, bitter rot	Yes; Snowdon, 1990	Yes; APDD, 2002; Shivas, 1989	Yes; Cook & Dube, 1989	NO
Collybia drucei (G. Stev.) E. Horak [Basidiomycetes: Agaricales]		Yes; Pennycook, 1989	No records found	No records found	YES
Erysiphe polyphaga Hammarl. [Pyrenomycetes: Erysiphales]	powdery mildew	Yes; Boesewinkel, 1981	No records found	No records found	YES
Fusarium culmorum (W.G. Sm.) Sacc. [Hyphomycetes]	fusarium mould, fusarium rot	Yes; Snowdon, 1990	Yes; CABI, 2002	Yes; APDD, 2002	NO
Leucostoma persoonii Hohn. (syn *Valsa leucostoma* (Pers.:Fr.) Fr.) [Pyrenomycetes: Diaporthales]		Yes; Pennycook, 1989	No records found	No records found	YES
Monilinia fructicola (G.Wint.) Honey [Discomycetes: Helotiales]	brown rot	Yes; Wilson & Ogawa, 1979	Yes; AGWEST, 2000	Yes; Cook & Dube, 1989	NO
Monilinia laxa (Aderhold & Ruhland) Honey [Discomycetes: Helotiales]	brown rot	Yes; Wilson & Ogawa, 1979	Yes; AGWEST, 2000	Yes; Cook & Dube, 1989	NO
Nectria cinnabarina (Tode:Fr.)Fr. [Pyrenomycetes: Hypocreales]	nectria canker	Yes; Pennycook, 1989	No records found	No records found	YES
Nectria ochroleuca (Schwein.) Berk. [Pyrenomycetes: Hypocreales]	mould	Yes; PPIN Ref: PHA 10588 PHO 1	Yes; Shivas, 1989	Yes; APDD, 2002	NO
Penicillium sp. [Hyphomycetes]	blue mould, penicillium mould	Yes; Snowdon, 1990	Yes; Shivas, 1989	Yes; APDD, 2002	NO

Scientific Name	Common Name	Presence in NZ	Presence in WA	Presence in SA	Eligible for further consideration
Peniophora sacrata G. Cunn. (syn *Amylostereum sacratum* (G. Cunn.) Burds.) [Basidiomycetes: Aphyllophorales]	wood rot	Yes; Pennycook , 1989	No records found	No records found	YES
Phytophthora megasperma Drechs. var. *sojae* A.A. Hildebrand [Oomycetes: Peronosporales]	root rot	Yes; Falloon & Tate, 1986	No records found	Yes; Cook & Dube, 1989	YES
Podosphaera tridactyla (Wallr.)de Bary [Pyrenomycetes: Ersiphales]	almond powdery mildew	Yes; Pennycook, 1989	No records found	No records found	YES
Rhizopus stolonifer (Ehr.:Fr.) Vuill. [Zygomycetes: Mucorales]	rhizopus rot	Yes; Snowdon, 1990	Yes; Shivas, 1989	Yes; Cook & Dube, 1989	NO
Taphrina wiesneri (Rathay) Mix [Discomycetes: Helotiales]	cherry leaf curl	Yes; Pennycook, 1989; McLaren *et al.,* 1999	No records found	No records found	YES
Tranzschelia discolor (Fuckel) Tranzschel & Litv. [Basidiomycetes: Uredinales]	rust	Yes; Wilson & Ogawa, 1979	Yes; Shivas, 1989	Yes; Cook & Dube, 1989	NO
Venturia carpophila E.E Fisher [Loculoascomycetes: Dothideales]	peach scab	Yes; Atkinson, 1971	Yes; Shivas, 1989	Yes; Cook & Dube, 1989	NO
Venturia cerasi Aderhold [Loculoascomycetes: Dothideales]	cherry scab	Yes; Ogawa, 1995	No; not recorded	Yes; Cartwright, 2000	YES
Wilsonomyces carpophilus (Lev.) Adaskaveg, Ogawa, and Butler [Hyphomycetes]	shothole	Yes; Wilson & Ogawa, 1979	Yes; Shivas, 1989	Yes; Cook & Dube, 1989	NO
VIRUSES					
Apple stem grooving *capillovirus*		Yes; CABI, 2002;	No records found	No records found	YES

Scientific Name	Common Name	Presence in NZ	Presence in WA	Presence in SA	Eligible for further consideration
		ICTV, 2002			
Carnation ringspot *dianthovirus*		Yes; CABI, 2002	No records found	No records found	YES
Cherry leaf roll nepovirus		Yes; CABI, 2002	No records found	No records found	YES
Cherry necrotic rusty mottle virus		Yes; CABI, 2002	No records found	No records found	YES
Cherry rasp leaf *nepovirus*		Yes; VIDE 2002	No records found WA survey data	No records found	YES
Cherry rusty mottle disease		Yes; CABI, 2002	No records found	No records found	YES
Green ring mottle virus		Yes; Wood, 1979	No records found	No records found	YES
Little cherry virus		Yes; Wood, 1979	No records found	No records found	YES
Prune dwarf *ilarvirus* [Ilarvirus: Bromoviridae]		Yes; Wood, 1979; Nemeth, 1986	Yes; McLean & Price, 1984	Yes; Cook & Dube, 1989	NO
Prunus necrotic ringspot *ilarvirus* [Ilarvirus: Bromoviridae]		Yes; Wood, 1979	Yes; McLean & Price, 1984	Yes; Cook & Dube, 1989	NO
Tomato ringspot nepovirus		Yes; Fry & Wood, 1978	No records found	Yes; Chu *et al.,* 1983	YES
DISEASES OF UNKNOWN AETIOLOGY					
Apple rubbery wood		Yes; CABI, 2002	No records found	Yes; EPPO, 2002	YES

Appendix 2: Categorisation of pests associated with cherry fruit in New Zealand (pathway association)

Scientific name	Common name	Associated with fresh cherries	Reference	Consider further
ARTHROPODA (arthropods)				
Acarina (mites)				
Orthotydeus californicus (Banks) [Acarina: Tydeidae]	Tydeid mite	Secondary pest of cherry, scavengers (on foliage, fruit), associated with sooty mould and fungi.	Charles, 1984; McLaren, 1991	NO
Panonychus ulmi (Koch) [Acarina: Tetranychidae]	European red mite	Primary pest of cherry (fruit & foliage)	McLaren *et al.*, 1999; Scott, 1984	YES
Coleoptera (beetles, weevils)				
Eucolaspis brunnea (F.) [Coleoptera: Chrysomelidae]	Bronze beetle	Yes; Larvae attack roots, adults attack cherry foliage and fruit. Primary pest of cherry (adults defoliate), Huntley, 1869, does not actually identify the "little brown beetles" as *E. brunneus*. Huntley states, "a small brown beetle, which makes its appearance in the apple trees, when the apples are about the size of cherries. .....the beetle also attacks cherries and to a small extent peaches". Huntley does not specifically state that peach fruit is attacked. Mclaren, 1999, states "feed on fruit as well as foliage..could be present on trees at time of harvest", therefore possible on fruit/in box.	McLaren *et al.*, 1999; Penman, 1984; Scott, 1984	YES
Hemiptera (aphids, leafhoppers, mealybugs, scales, true bugs)				
Lygus sp. [Hemiptera: Miridae]	Native mirids	No; Endemic to NZ (3 native spp), no details : potentially	Cherry pest list NZ	NO

Scientific name	Common name	Associated with fresh cherries	Reference	Consider further
		a primary pest of cherry buds, fruitlets but no information available. Note one of these 3 native species (Lygus buchanani) has been deleted from the NZ fauna (Eyles, 1999). The "Lygus complex" in New Zealand is being revised by Eyles (in press).	notes	
Myzus cerasi (F.) [Hemiptera: Aphididae]	Black cherry aphid	Primary pest of cherry, on foliage, (on fruit and leaves at time of harvest); possibly on fruit.	Cottier, 1953; McLaren *et al*., 1999	YES
Parthenolecanium corni (Bouché) [Hemiptera:Coccidae]	European fruit lecanium	No; adults infest twigs & branches	Ben-Dov & Hodgson, 1997	NO
Philaenus spumarius (L.) [Hemiptera: Cercophidae]	Meadow spittlebug	Not a pest of cherry.	Scott, 1984	NO
Pulvinaria hydrangeae (Steinwarden) [Hemiptera:Coccidae]	Hydrangea scale	Primary pest on hydrangeas. 83/6763 (on stems, foliage, fruit) is an unusual host record, however Lincoln also has a record from flowering cherry (plant part affected not recorded). No Rosaceae recorded as hosts in Ben-Dov (1993).		NO
Quadraspidiotus ostreaeformis Curtis [Hemiptera: Diaspididae]	oystershell scale	No; adults infest branches and twigs not fruit.	Scott, 1984	NO
Lepidoptera (butterflies, moths)				
Carposina adreptella [Lepidoptera:Tortricidae]	leafroller	No	McLaren *et al.*, 1999	NO
Ctenopseustis herana (Feld. & Rogen.) [Lepidoptera: Tortricidae]	Brownheaded leafroller	Yes; Cherry fruit and foliage are attacked. Formerly a synonym for *C. obliquana* (sp. nr), not separated until 1990 and then only separated as adults (Dugdale, 1990).	Dugdale, 1990; Poole *et al*., 1999	YES

Scientific name	Common name	Associated with fresh cherries	Reference	Consider further
		C. obliquana is present in both North and South Islands. *C. herana* is only in the South Island. A tortricid larval key in preparation will allow differentiation of species in larval stage. Primary pest of cherry (on foliage and fruit) of all the same hosts as *C. obliquana*.		
Ctenopseustis obliquana (Walker) [Lepidoptera: Tortricidae]	Brownheaded leafroller	Yes; Leaves, also sometimes buds, stems and fruits. Post-harvest. endemic, primary (on foliage and fruit).	Green, 1979; McLaren *et al.*, 1999; Poole *et al.*, 1999	YES
Eutorna phaulocosma [Lepidoptera:Tortricidae]	leafroller	No	McLaren *et al.,* 1999	NO
Grapholita molesta (Busck) [Lepidoptera: Tortricidae]	Oriental fruit moth	Yes; larvae may infest fruit	McLaren *et al.*, 1999	YES
Planotortrix excessana (Walker) [Lepidoptera: Tortricidae]	Green headed leafroller	Yes; Leaves and fruit, post-harvest. Primary pest of cherry (fruit & foliage)	CABI, 2002; McLaren *et al.*, 1999; Thomas, 1979	YES
Plantortrix octo (Dugdale) [Lepidoptera: Tortricidae]	Green headed leafroller	Yes; Leaves and fruit. Primary pest of cherry (on foliage, fruit). Recommend retention of this record.	Dugdale, 1990; McLaren *et al.*, 1999; Poole *et al.*, 1999	YES
Pyrogotis plagiatana [Lepidoptera:Tortricidae]	leafroller	No	McLaren et al., 1999	NO
Thysanoptera (thrips)				
Thrips obscuratus (Crawford) [Thysanoptera: Thripidae]	NZ flower thrips	Yes	AQIS interception records	YES

Scientific name	Common name	Associated with fresh cherries	Reference	Consider further
FUNGI				
Amylostereum sacratum [Basidiomycetes: Aphyllophorales]	wood rot	No	Farr *et. al*., 2002	NO
Apiosporina morbosa (Schwein.:Fr.)Arx (syn. *Dibotryon morbosum* (Schwein.:Fr.) Theiss. & Syd. [Loculoascomycetes: Dothideales]	black knot	No	Sutton & Waterson, 1970	NO
Chondrostereum purpureum (Pers.) Pouzar [Basidiomycetes: Aphyllophorales]	silver leaf disease	No	CABI 2002; Farr *et. al*., 2002	NO
Collybia drucei (G. Stev.) E. Horak [Basidiomycetes: Agaricales]		No	SMBL, 2002	NO
Erysiphe polyphaga Hammarl. [Pyrenomycetes: Erysiphales]	powdery mildew	No	CABI, 2002	NO
Leucostoma persoonii Hohn. (syn *Valsa leucostoma* (Pers.:Fr.) Fr.) [Pyrenomycetes: Diaporthales]		No	Hayova & Minter, 1998	NO
Nectria cinnabarina (Tode:Fr.)Fr. [Pyrenomycetes: Hypocreales]	nectria canker	No records found		NO
Phytophthora megasperma Drechs. var. *sojae* A.A. Hildebrand [Oomycetes: Peronosporales]	root rot	No	CABI, 2002	NO
Podosphaera tridactyla (Wallr.)de Bary	almond powdery	No records found		NO

Scientific name	Common name	Associated with fresh cherries	Reference	Consider further
[Pyrenomycetes: Ersiphales]	mildew			
Taphrina wiesneri (Rathay) Mix [Discomycetes: Helotiales]	cherry leaf curl	No	McLaren *et.al.,* 1999	NO
Venturia cerasi Aderhold [Loculoascomycetes: Dothideales]	cherry scab	Yes; Primary, infects fruit but rare. Small, round, olive black spots appear on infected cherries about 6 weeks after petals have fallen. Cracking may follow.	Horst, 1990; Ogawa, 1995	YES
VIRUSES				
Apple stem grooving *capillovirus*		No	VIDE, 2002	NO
Carnation ringspot *dianthovirus*		No	CABI, 2002	NO
Cherry leaf roll *nepovirus*		No	CABI, 2002	NO
Cherry necrotic rusty mottle virus		No	CABI, 2002	NO
Cherry rasp leaf *nepovirus*		No	CABI, 2002	NO
Cherry rusty mottle disease		No	CABI, 2002	NO
Green ring mottle virus		No	Ogawa *et. al.*, 1995,	NO
Little cherry virus		No	CABI, 2002	NO
Tomato ringspot *nepovirus*		No	VIDE, 2002	NO

References

AGWEST (2000). Disease Records Database. Agriculture Western Australia.

AGWEST (2001). Insect Reference Collection. Agriculture Western Australia.

AGWEST (2002). Understanding the Two-Spotted mite (*Tetranychus urticae*) on Cut flowers in Glasshouse – Floriculture. Agriculture Western Australia website, http://www.agric.wa.gov.au/programs/hort/floriculture

APDD (2002). Australian Plant Disease Database. http://npdd.nre.vic.gov.au/ihd/nre/research.htm

AQIS (1998). Pests and Diseases of All Stone Fruits in Australia. Australian Quarantine and Inspection Service. Canberra.

AQIS (2002a). Import Conditions Database (ICON). Australian Quarantine and Inspection Service. Agriculture, Fisheries and Forestry - Australia, Canberra. http://www.aqis.gov.au/icon/asp/ex_QueryResults.asp?Commodity=cherry&Area=&EndUse=All&QueryType=Pattern+Match

AQIS (2002b). Import Conditions Database (ICON). http://www.aqis.gov.au/icon/asp/ex_casecontent.asp?intNodeId=179888&intCommodityId=6267&Types=none&WhichQuery=Go+to+full+text

Atkinson, J. D. (1971). Diseases of tree fruits in New Zealand. A. R. Shearer, Government Printer, Wellington. 406 pp.

Bailey, P. (1985). Oriental fruit moth. Fact sheet FS 26/55. Department of Agriculture, South Australia.

Baker, G.J. (1998). Records of insects associated with South Australian stone fruit. Personal communication, SARDI Entomology Unit 5/5/98.

Beament, J.W.L. (1951). The structure and formation of the egg of the fruit tree red spider mite, *Metatetranychus ulmi* Koch. *Annals of Applied Biology* **38**: 1-24.

Ben-Dov, Y. (1993). A Systemic Catalogue of the Soft Scale Insects of the World. Sandhill Crane Press, Gainsville.

Ben-Dov, Y. and Hodgson, C.J. (eds). (1997). Soft Scale Insects. Their Biology, Natural Enemies and Control. Volume 7A. Elsevier, Amsterdam.

Berlandier, F.A. (1997). "The distribution of Black peach aphid *Brachycaudus persicae* (Passerini) in Western Australia". Personal Communication.

Boesewinkel, H.J. (1981). A first recording of rose mildew, *Sphaerotheca pannosa*, on three species of *Eucalyptus*. *Nova Hedwigia* **34**(3-4): 721-730.

CABI. (2002). Crop Protection Compendium, Global edition. CAB International, Wallingford, UK.

Cartwright, D. (2000). Cherry Export Proposal - South Australia. Primary Industries and Resources, South Australia. 13th July 2000.

Charles, J.G. (1984). Mites in fruit crops - The good, the bad and the ugly. *Orchardist of New Zealand* **57**(9): 387-394.

Chu, P.W.G.; Francki, R.I.B. and Hatta, T. (1983). Some properties of tomato ringspot virus isolated from *Pentas lanceolata* in South Australia *Plant pathology* 32(3):353-356.

CIE. (1969). Distribution Maps of Plant Pests, No. 20. CAB International, Wallingford, UK.

Cook, R.P. and Dube, A.J. (1989). Host-Pathogen Index of Plant Diseases in South Australia. South Australian Department of Agriculture, Adelaide.

Cottier, W. (1953). Aphids of New Zealand. New Zealand DSIR, Bulletin 106. 382 pp.

Dugdale, J.T. (1990). Reassessment of *Ctenpseustis meyrick* and *Planotortrix dugdale* with descriptions of two new general (Lepidoptera: Torticidae). *New Zealand Journal of Zoology*. **17**: 437-465.

Evenhuis, N. L. (1989). Catalogue of the Diptera of the Australasian and Oceanian Regions. Bishop Museum Special Publication 86. Bishop Museum Press, Honolulu.

EPPO, 2002. PQR database (version 4.1). European and Mediterranean Plant Protection Organization, Paris, France.

Falloon, P.G. and Tate, K.G. (1986). Major diseases of asparagus in New Zealand. *Proceedings, Annual Conference, Agronomy Society of New Zealand* **16**: 17-28.

FAO (1996). International Standards for Phytosanitary Measures - Guidelines for Pest Risk Analysis, Publication. No. 2. Secretariat of the International Plant Protection Convention, Food and Agriculture Organisation of the United Nations, Rome.

FAO (2001). International Standards for Phytosanitary Measures – Pest Risk Analysis for Quarantine Pests. Publication No. 11. Secretariat of the International Plant Protection Convention, Food and Agriculture Organization of the United Nations, Rome.

Farr, D.F., Rossman, A.Y., Palm, M.E. and McCray, E.B. (2002.). Fungal Databases, Systematic Botany & Mycology Laboratory, ARS, USDA. http://nt.ars-grin.gov/fungaldatabases/

Fry, P.R. and Wood, G.A. (1978). Two berry fruit virus diseases newly recorded in New Zealand. *New Zealand Journal of Agricultural Research* **21**(3): 543-547.

Geier, P.W. and Springett, B.P. (1976). "Population characteristics of Australian leafrollers (*Epiphyas* spp., Lepidoptera) infesting orchards". *Australian Journal of Ecology* **1**: 129-144.

Green, C. J. (1979). Brownheaded leafroller, *Ctenopseustis obliquana* (Walker), life cycle. DSIR Information Series 105/27. New Zealand Department of Scientific and Industrial Research.

Halliday, R.B., Walter, D.E., Proctor, H.C., Norton, R.A and Colloff, M.J. (Editors) (1998). Acarology – Proceedings of the 10th International Congress. CSIRO Publishing, Collingwood, VIC.

Hayova, V.P. and Minter D.W. (1998). *Leucostoma persoonii*. IMI Descriptions of Plant Pathogenic Fungi and Bacteria 1363.

Helson, G. A. H. (1952). Insect pests affecting horticultural crops and plants in New Zealand. Plant Quarantine Service, circular No. 2: 1-32.

Hely, P. C., Pasfield, G. and Gellatley, G. J. (1982). Insect pests of fruit and vegetables in New South Wales. Inkata Press, Melbourne.

Horst, R.K. (1990). Westcott's Plant Disease Handbook. Fifth Edition. Van Nostrand Reinhold, NY.

ICTV (2002). Buchen-Osmond, C. The Universal Virus Database of the International Committee on Taxonomy of Viruses

Kay, M.K. (1980). "*Eucolaspsis brunnea* (Frabricius) (Coleoptera:Chrysomelidae). Bronze beetle". Forest and timber insects in New Zealand. 49 - 4.

Lysaght, A.M. (1930). "Bronze beetle research" New Zealand Department of science and industrial research.

MAFNZ (1999). Data sheets compiled by MAFNZ on AQIS request (received in May 1999).

Manson, D.C.M. (1984). Eriophyinae (Arachnida: Acari). Fauna of New Zealand No 5.

McDaniel, B. (1979). How to know the mites and ticks. Wm. C. Brown Company Publishers, Dubeque, Iowa.

McLaren, G.F. (1991). *Tydeus californicus* food sources. Department of Scientific and Industrial Research report to the Ministry of Agriculture.

McLaren, G.F., Grandison, G., Wood, G.A. Tate, G. and Horner, I. (1999). Summerfruit in New Zealand Management of Pest and Diseases.

McLean, G.D. and Price, L.K. (1984). Virus, Viroid, Mycoplasma and Rickettsial Diseases of Plants in Western Australia. Technical Bulletin number 68, Western Australian Department of Agriculture.

Mound, L.A. and Gillespie, P. (1997). "Identification guide to thrips associated with crops in Australia". NSW Agriculture, Orange, NSW.

Nemeth, M. (1986). Virus, Mycoplasma and Ricketssia Diseases of Fruit Trees. M. Nijhoff & W. Junk Publishers. 840 pp.

Ogawa,J. M. (1995). Miscellaneous Postharvest Fruit Decay. IN: Compendium of Stone Fruit Diseases. Ogawa, J. M. ed. pp.26. The American Phytopathology Society, St Paul, Minnesota.

Ogawa, J.M., Dehr, E.I., Bird, G.W., Ritchie, D.F., Kiyoto, V. and Uyemoto, J.K. (eds). (1995). Compendium of Stonefruit Diseases. APS Press, USA.

Partridge, J.E. (1997). Black Knot of Plum, Department of Plant Pathology, University of Nebraska-Lincoln http://plantpath.unl.edu/peartree/homer/disease.skp/hort/Trees/PlmBlkKnt.html

Pearce, M.H., Nelson, E.E. and Malajczuk, N (1995). Effects of the cord-forming saprotrophs *Hypholoma australe* and *Phanerochaete filamentosa* and of ammonia sulphate on establishment of *Armillaria luteobubalina* on stumps of *Eucalyptus diversicolor*. *Mycological Research* **99**(8): 951-956.

Penman, D.R. (1984) "Deciduous tree fruit pests". IN: Scott, R.R. (editor) "New Zealand pests and beneficial insects" Lincoln University College of Agriculture.

Persley, D. [Ed] (1993). Diseases of fruit crops. Queensland Government. 114 pp.

Pennycook, S.R. (1989). Plant diseases recorded in New Zealand. 3 Vol. Pl. Dis. Div., D.S.I.R., Auckland.

Poole, M.C., McKirdy S. and Stuart, M. J. (1999). "Draft biological threat assessment of insect, mites and pathogens associated with the importation of stonefruit from New Zealand and of concern to Western Australia". Internal report, Plant Industry Protection, Agriculture Western Australia. 105 pp.

PPIN. Plant Pest Information Network, New Zealand. (Information provided by NZ MAF)

SARDI. (2002). Photographic insect collection. http://www.sardi.sa.gov.au/foto

Scott, R.R. (editor). (1984). New Zealand pest and beneficial insects. Lincoln University College of Agriculture, Lincoln, New Zealand.

Shivas, R.G. (1989). Fungal and bacterial diseases of plants in Western Australia. *Journal of the Royal Society of Western Australia* **72**(1 & 2): 1-62.

Snowdon, A. (1990). A colour atlas of post-harvest diseases and disorders of fruit and vegetables. Volume 1: General introduction and fruits. Wolfe Scientific Ltd, Spain.

SMBL (2002) Systematic Botany and Mycology Fungal Databases http://nt.ars-grin.gov/fungaldatabases/databaseframe.cfm

Sutton, B.C. and Waterson, J.M. (1970). *Dibotryon morbosum*. CMI Descriptions of Pathogenic Fungi and Bacteria 224.

Thomas, W.P. (1979). Greenheaded leafroller, *Planotortrix excessana* (Walker), life cycle. DSIR Information Series No. 105/26. New Zealand Department of Scientific and Industrial Research.

Thomas, W.P. (1984). Lightbrown apple moth, *Epiphyas postvittana* (Walker) life cycle. DSIR Information Series No. 105/3; 1st revision. New Zealand Department of Scientific and Industrial Research.

Thwaite, W.G. (1991). Acaricide resistance in Australian deciduous fruit crops. *Resistant Pest Management* **3**: 22-23.

VIDE (2002). Plant Viruses Online: Descriptions and Lists from the VIDE Database http://image.fs.uidaho.edu/vide/refs.htm

Wilson, E. E. and Ogawa, J. M. (1979). Bacterial, fungal, and certain non parasitic diseases of fruit and nut crops in California. Agricultural Science Publications, University of California, 190 pp.

Wood, G. A. (1979). Virus and virus-like diseases of pome fruits and stone fruits in New Zealand. DSIR Bulletin 226, New Zealand Department of Scientific and Industrial Research. 87 pp.

Woods, W., Dick, J. and Learmonth, S. (1996). "Orchard and Vineyard pest and disease management guide, March 1996". Agriculture Western Australia Bulletin 4313.

Yokoyama, V.Y and Miller, G.T. (1998). Laboratory evaluations of oriental fruit moth (Lepidoptera:Tortricidae) oviposition and larval survival on five species of stone fruits. *Journal of Economic Entomology* **3**: 867-872.