



Australian Government

Biosecurity Australia

Issues paper for the import risk
analysis of fresh apple fruit from the
United States of America



July 2008

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Submissions

This issues paper has been released to give all interested parties an opportunity to provide comment on issues relevant to the import risk analysis (IRA). Any comments should be submitted to Biosecurity Australia within the comment period stated in the related Biosecurity Australia Advice on the Biosecurity Australia website. Submissions will be considered during the preparation of a draft IRA report, which will be issued for comment at a later date.

Comments on the issues paper should be submitted to:

Plant Biosecurity
Biosecurity Australia
GPO Box 858
CANBERRA ACT 2601
AUSTRALIA

Telephone +61 2 6272 5094
Facsimile: +61 2 6272 3307
Email: plant@biosecurity.gov.au

Internet: www.biosecurityaustralia.gov.au

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Summary

Biosecurity Australia announced the formal commencement of an import risk analysis (IRA), under the regulated IRA process, to consider a proposal to import fresh apple fruit from the United States of America (Idaho, Oregon and Washington) on 17 March 2008. The IRA will be conducted using the expanded process, requiring completion within 30 months from announcement in accordance with the Quarantine Regulations 2000.

Australia has existing quarantine policy for the importation of apples from Japan and New Zealand.

The issues paper provides information relevant to the import request and the import risk analysis that has been announced by Biosecurity Australia. It also includes a list of pests that are considered to be associated with apple production in the USA.

Biosecurity Australia has reviewed the initial pest list provided by the USA and has conducted additional research to establish a draft pest list for apple production in the Pacific Northwest. The USA has agreed to provide further pest information to Biosecurity Australia shortly. This more comprehensive information will be required by Biosecurity Australia to enable this IRA to be completed in the most timely fashion.

Fire blight, caused by the bacterium *Erwinia amylovora*, is an internationally recognised and significant disease affecting pome fruit. Fire blight will be an issue of concern for the IRA because Australia is free of fire blight. Information on the status of fire blight in the USA has been provided in this issues paper.

An expert panel has been formed to assist Biosecurity Australia's consideration of the scientific issues associated with the proposed importation.

Stakeholders are invited to provide comments and submissions on the issues paper within the consultation period.

1. Introduction

1.1. Australia's biosecurity policy framework

Australia's biosecurity policies aim to protect Australia against the risks that may arise from exotic pests¹ entering, establishing and spreading in Australia, thereby threatening Australia's unique flora and fauna, as well as those agricultural industries that are relatively free from serious pests.

The import risk analysis (IRA) process is an important part of Australia's biosecurity framework. It enables the Australian Government to formally consider the risks that could be associated with proposals to import new products into Australia. If the risks are found to be above Australia's appropriate level of protection (ALOP), risk management measures are proposed to reduce the risks to an acceptable level. But, if it is not possible to reduce the risks to an acceptable level, then no trade will be allowed.

Successive Australian Governments have maintained a conservative, but not a zero-risk, approach to the management of biosecurity risks. This approach is expressed in terms of Australia's ALOP, which reflects community expectations through government policy and is currently described as providing a high level of protection aimed at reducing risk to a very low level, but not to zero.

Australia's IRAs are undertaken by Biosecurity Australia using teams of technical and scientific experts in relevant fields, and involving consultation with stakeholders at various stages during the process. The recommendations from Biosecurity Australia are provided to the Director of Animal and Plant Quarantine (the Secretary of the Australian Department of Agriculture, Fisheries and Forestry), who is responsible for determining whether or not an importation can be permitted under the *Quarantine Act 1908*, and if so, under what conditions. The Australian Quarantine and Inspection Service (AQIS) is responsible for implementing the import protocol, including any risk management measures.

More information about Australia's biosecurity framework is provided in the *Import Risk Analysis Handbook 2007* located on the Biosecurity Australia website www.biosecurityaustralia.gov.au.

1.2. Purpose

The primary purpose of this issues paper is to provide information to stakeholders about the import risk analysis (IRA) for fresh apple fruit from the United States of America (Idaho, Oregon and Washington), hereafter referred to as the Pacific Northwest. The issues paper is the first step towards identifying the issues relevant to the IRA. The information in this document is intended to assist stakeholders to contribute to the IRA process.

1.3. Background of access request

This IRA was initiated following receipt of a technical submission from the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) requesting access for apples from the Pacific Northwest. The USA first sought access for fresh apple fruit from the Pacific Northwest states in 1999.

¹ A pest is any species, strain or biotype of plant, animal, or pathogenic agent injurious to plants or plant products (FAO 2007b)

1.4. Administration

1.4.1. Timetable

Biosecurity Australia (BA) formally announced the commencement of an IRA under the regulated IRA process to consider a proposal to import fresh apple fruit from the Pacific Northwest, on 17 March 2008 (BAA 2008/06). The risk analysis will be undertaken as an expanded IRA, requiring completion within 30 months from commencement.

1.4.2. Scope

The scope of this IRA is to consider quarantine risks that may be associated with the importation of commercially produced fresh apple fruit, free of trash, from the Pacific Northwest into Australia. This IRA pertains to all commercial apple-producing counties and all commercially produced apple cultivars from the Pacific Northwest.

1.4.3. Method

The method employed for preparing the draft IRA report for apples from the Pacific Northwest will be qualitative. The IRA methodology used by BA has been published in recent IRAs and is consistent with the International Standards for Phytosanitary Measures (ISPMs) including ISPM2: *Framework for pest risk analysis* (FAO 2007a) and ISPM 11 *Pest risk analysis for quarantine pests, including analysis for environmental risks and living modified organisms* (FAO 2004).

For pests relevant to this IRA that have been assessed in previous import policies, BA will assess whether the existing policies are appropriate to the quarantine risk for apples from the Pacific Northwest.

1.4.4. Consultation

Biosecurity Australia Policy Memorandum (BAPM) 2007/20 of 12 September 2007, advised stakeholders that changes to the IRA process had been implemented on 5 September 2007 when regulations made under the *Quarantine Act 1908* formally took effect. That advice also notified the transitional arrangements for Biosecurity Australia's import work program which included apples from the Pacific Northwest.

This issues paper is released for comment and consultation with stakeholders as part of the process for an expanded IRA. Under the Quarantine Regulations 2000, stakeholders will have up to 60 days to submit written comments. Biosecurity Australia may meet with stakeholders to discuss matters raised in their submissions.

There will also be a 60 day consultation period to comment on the draft IRA report.

1.5. Expert panel

An expert panel has been formed to assist BA in its consideration of the scientific issues associated with this IRA.

The task of the Expert Panel is to:

- assist BA to examine and review scientific issues relevant to the IRA
- provide advice regarding the provisional conclusions in risk analysis documents being drafted
- provide guidance to BA scientists in areas of particular scientific expertise.

This expert panel will be led by Dr Bill Roberts, BA's Principal Scientist, Plant Biosecurity, and comprises:

Professor David Guest	Plant Pathology, Faculty of Agriculture, Food and Natural Resources, University of Sydney
Professor John Irwin	Molecular Plant Sciences, Faculty of Biological and Chemical Sciences, University of Queensland
Mr Barry Philp	Former Director, Horticulture Industry Development, Primary Industries and Resources South Australia.

1.6. Existing policy

Import policy exists for Fuji apples from Japan (AQIS 1998) and apples from New Zealand (BA 2006). These policies will be taken into account, where relevant, as part of this import risk analysis.

2. Apple industry in the United States

2.1. Production

Apples are grown in every state in the continental United States of America (USA), with thirty two states growing apples commercially. Approximately fifty eight per cent of all apples grown in the USA are produced in Washington State, followed by the states of New York (11 per cent) and Michigan (8 per cent) (USDA/FAS 2006). Other important apple growing states include California, Pennsylvania and Virginia (USDA/FAS 2006).

Apples are regarded as the third most valuable horticultural crop in the USA, after grapes and oranges (Geisler 2007). Apple production in the USA is valued at approximately US\$2 billion dollars annually with more than 60 per cent of the apples produced marketed as fresh fruit (Geisler 2007). An estimated 12 per cent of the USA apple production is exported annually (FAS online 2001).

Almost one hundred apple varieties are grown commercially in the USA. Of these, fifteen varieties accounted for over 90 per cent of USA production for 2005. These varieties included Red Delicious, Gala, Golden Delicious, Granny Smith, Fuji, Macintosh, Rome, Empire, York, Jonathan, Idared, Cortland, Stayman, Newtown and Northern Spy (Geisler 2007). Four of these varieties (Red Delicious, Gold Delicious, Gala and Fuji) account for 60 per cent of all apples commercially grown in the USA (FAS Online 2001). Other varieties gaining popularity include Braeburn, Cameo, Ginger Gold, Honeycrisp and Pink Lady (Geisler 2007). Domestic and international demand and increased competition in world markets may influence the production of new apple varieties (FAS Online 2001).

2.2. Exports

The USA is the fourth largest apple exporting producer behind the European Union, China, and Chile (USDA/FAS 2008). Over the past decade, USA apple exports have increased but recently the market share of total world apple exports has dropped with China currently leading the world in apple production (Geisler 2007).

The USA exports apples to many countries, with Mexico ranked as the top export market in terms of value and volume. Other important export markets are Canada, Taiwan, the United Kingdom, Indonesia, India and Hong Kong (Geisler 2007). The largest USA apple exporting state is Washington, with approximately a third of its crop sold to international markets (FAS online 2001).

2.3. Overview of cultivation and processing practices

Orchard systems

Older apple orchards generally produce Red or Golden Delicious varieties which are planted at densities of 40 trees per hectare. Older trees average 5.5 metres wide and 4.3 metres high, which makes pruning, spraying, fruit thinning and picking difficult and labour intensive (Washington State University 2001). Newer orchards are more likely to contain varieties such as Fuji, Gala, Granny Smith, Braeburn or Cameo. These orchards are usually planted more intensively, at densities of approximately 240 to 400 or more trees per hectare. Trees in this intensive style of orchard are usually 1.8 metres wide and 3 metres high, which eases labour and improves spray coverage (Washington State University 2001).

Orchard renovation, pruning and fruit thinning

Orchards tend to be replaced every thirty to thirty five years, as they come to the end of their economic life or as a result of damage from disease or environmental factors (Washington State University 2001).

Trees are pruned throughout the winter, while they are dormant (Washington State University 2001). Pruning maintains fruit quality and production over the lifetime of the orchard.

Fruit is thinned every spring to manage production and fruit quality (Washington State University 2001). Most apple varieties will develop a biennial bearing habit (produce a heavy crop one year and almost no crop the next), in the absence of fruit thinning management. Chemical thinners can be used during and shortly after the bloom period to prevent fruit set, or to remove fruit that may have set in clusters (Washington State University 2001). Blossom thinners interfere with the pollination (by damaging the flower stigma tip or by inducing the evolution of ethylene in the fruitlet), which causes abscission (fruit drop). Fruit thinning can also be done by hand (during June and early July), removing poor quality or closely spaced fruit (Washington State University 2001).

Pollination, fruit development and tree nutrition

Apples are dependent upon pollination by honeybees for fruit set. Orchardists usually provide one to two hives per hectare and they are left in the orchard for four to five days depending on weather conditions. The bees are transported from California to Oregon then Washington, following the cycle of the bloom (Washington State University 2001).

Orchardists may also adopt management practices to enhance tree nutrition and fruit quality. Chemicals can be applied to manipulate the development rate and shape of the fruit (Washington State University 2001). A variety of fertilisers is usually applied to the soil (the rate of which is determined through soil and tissue analysis), to enhance tree nutrition (Washington State University 2001).

Irrigation

Orchard managers may use a variety of irrigation methods. These may include high pressure under tree irrigation, overhead, drip, trickle or surge irrigation systems. Overhead systems or high pressure under tree systems may complicate pest management by providing conditions suitable for disease infections or by removing protectant pesticides too quickly after application (Washington State University 2001).

Packing system

Apples are packed using either a 'direct pack' system or a 'presize system' (Kupferman 1996). Direct packing takes apples from the bin and in one operation sorts, sizes and packs the fruit into shipping boxes. The presize approach is done in two separate steps where apples are floated out of the bin, sorted, sized and then placed back into bins for packing at a later time (Kupferman 1996). This system allows a greater volume of fruit to be run at one time.

Cold storage

Washington packhouses store, sort, box and ship apples most months of the year. Storage is based on the internal condition of the fruit, and timing of harvest is critical to good storage results (Washington Apple Commission 2007). Early harvest apples store best, whereas apples harvested at peak ripeness have a short storage life of only a few weeks (Washington Apple Commission 2007).

Apples are brought in bins from the orchard to the storage facilities and kept in refrigerated or controlled atmosphere (CA) storage (Kupferman 1996). Controlled atmosphere storage depends on the balance between temperature, oxygen and carbon dioxide (Kupferman 2001). Apples are held in a sealed, refrigerated room at a constant temperature range of 0 to 2 °C (Washington Apple Commission 2007). The oxygen levels are reduced to 0.7 - 2.5 per cent (Kupferman 1996), the carbon dioxide levels increased to 0.03 – 4.0 per cent (Kupferman 1996) and the humidity is maintained at 95 per cent (Washington Apple Commission 2007). The specific atmosphere is set according to the variety and capability of the storage facility (Kupferman 2001).

Post harvest disease control

Once the fruit has been harvested, the bins are taken to the packinghouse to be cooled rapidly, as cold temperature is one of the best methods for reducing the growth rate of fungi. Rapid cooling is essential for quality maintenance as well as decay control (Kupferman 1999).

Harvest bins are usually made of either plywood or plastic and are cleaned prior to being sent to the orchard (Kupferman 1999). There are several methods of cleaning, the most common is hot water delivered through a pressure hose. Most packing lines are cleaned and sanitised daily. Storerooms are cleaned and sanitised annually, when empty of fruit (Kupferman 1999).

Prior to storage, most fruit is treated with a fungicide drench to reduce fruit rots, especially those caused by *Penicillium* and *Botrytis* species (Washington State University 2002). In addition an antioxidant may be applied with the fungicide drench to fruit that is susceptible to a disorder that causes the browning of the skin in storage (storage scald) that renders the fruit unsaleable (Washington State University 2002).

3. Pests associated with apple production in the Pacific Northwest

3.1. Pest list

Biosecurity Australia has reviewed the initial pest list provided by the USA and conducted additional research to establish a draft pest list for US apple production in the Pacific Northwest. The USA has agreed to provide further pest information shortly. Biosecurity Australia also welcomes any additional information that may be received from other stakeholders. As the pest list is not considered to be finalised, research will be ongoing to ensure that all pests of concern have been identified and addressed within the IRA. The final list will form the basis of the pest categorisation process within the risk analysis.

3.2. Fire blight status in the USA

Fire blight, caused by the bacterium *Erwinia amylovora* (Burrill) Winslow *et al.*, is an internationally recognised and significant plant disease affecting pome fruit (CAB International 2007). Fire blight is not present in Australia and it is a quarantine pest for Australia.

Fire blight is widespread in the USA and has continuously been observed in apple and pear orchards since the late 18th century (Bonn and van der Zwet 2000). Fire blight spread northward in the early 20th century, appearing first in California then moving into Washington and Oregon (Bonn and van der Zwet 2000).

Outbreaks in the Pacific Northwest tend to be sporadic in occurrence, but when they do occur, losses are significant (Douglas 2006). Fire blight outbreaks have occurred in apple orchards of Washington State every season since 1991 (Smith 2006). Washington's worst fire blight season occurred in 1997 with serious damage also occurring in 1998 (Smith 2006).

Australia has developed a policy for apple fruit imported from New Zealand where fire blight is known to occur. This policy will be taken into account, where relevant, as part of this import risk analysis.

4. Further steps in the import risk analysis process

Completion of this IRA will be in accordance with the IRA Handbook and will therefore involve the following key steps:

- consultation on issues paper (60 days)
- risk analysis and preparation of a draft IRA report
- consultation on draft IRA report (60 days)
- consideration of stakeholder submissions and preparation of a revised draft IRA report
- review of revised draft IRA report by the Eminent Scientists Group
- preparation and publication of provisional final IRA report (*end of regulated timeframe*)
- opportunity to appeal on the provisional final IRA report
- if there are no appeals, or at the conclusion of the appeal process, BA will provide the final IRA report and a recommendation for a policy determination to the Director of Animal and Plant Quarantine
- consideration of the final report and its recommendations by the Director of Animal and Plant Quarantine
- determination of the policy
- publication of the final IRA report.

Biosecurity Australia is committed to a thorough risk analysis of the proposal to import fresh apple fruit from the United States of America (Idaho, Oregon and Washington). This analysis requires that technical information be gathered from a wide range of sources. This paper is being issued to give all interested parties an opportunity to comment on issues relevant to the analysis. If you have relevant information you would like to have considered as part of this analysis, it should be submitted to Biosecurity Australia by 5 September 2008.

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Appendix A: Pest list - apples from the Pacific Northwest

Scientific name	Common name/s
ARTHROPODS	
ACARI	
<i>Aculus schlectendali</i> (Nalepa, 1890) [Acari: Eriophyidae]	Apple rust mite
<i>Bryobia rubrioculus</i> (Scheuten, 1857) [Acari: Tetranychidae]	Brown apple mite
<i>Eotetranychus carpini borealis</i> (Ewing, 1913) [Acari: Tetranychidae]	Yellow spider mite
<i>Eotetranychus pruni</i> (Oudemans, 1931) [Acari: Tetranychidae]	Spider mite
<i>Eotetranychus uncatus</i> [Acari: Tetranychidae]	Spider mite
<i>Panonychus ulmi</i> (Koch, 1835) [Acari: Tetranychidae]	European red mite, fruit tree red spider mite
<i>Tetranychus canadensis</i> (McGregor, 1950) [Acari: Tetranychidae]	Four spotted spider-mite, hawthorn spider mite
<i>Tetranychus mcdanieli</i> McGregor, 1931 [Acari: Tetranychidae]	McDaniel spider mite
<i>Tetranychus pacificus</i> McGregor, 1919 [Acari: Tetranychidae]	Pacific spider mite
<i>Tetranychus urticae</i> Koch, 1836 [Acari: Tetranychidae]	Two spotted spider mite
COLEOPTERA	
<i>Anoplophora chinensis</i> (Forster, 1771) [Coleoptera: Cerambycidae]	Black and white citrus longhorn
<i>Anthonomus quadrigibbus</i> Say, 1831 Synonym: <i>Tachypterellus quadrigibbus</i> Fall & Cockerell, 1907 [Coleoptera: Curculionidae]	Apple curculio
<i>Asynonychus cervinus</i> (Boheman, 1840) [Coleoptera: Curculionidae]	Fuller's rose weevil
<i>Chrysobothris femorata</i> (Olivier, 1790) [Coleoptera: Buprestidae]	Flatheaded apple-tree borer
<i>Conotrachelus nenuphar</i> Harris, 1841 [Coleoptera: Curculionidae]	Plum curculio
<i>Harmonia axyridis</i> (Pallas, 1773) [Coleoptera: Coccinellidae]	Harlequin ladybird
<i>Otiorhynchus cribricollis</i> Gyllenhal, 1834 [Coleoptera: Curculionidae]	Apple weevil
<i>Popillia japonica</i> Newman, 1838 [Coleoptera: Scarabaeidae]	Japanese beetle
<i>Scolytus rugulosus</i> (Müller, 1818) [Coleoptera: Curculionidae, Scolytinae]	Shothole borer
<i>Xyleborinus saxesenii</i> (Ratzeburg, 1837) [Coleoptera: Curculionidae, Scolytinae]	Lesser shothole borer

Scientific name	Common name/s
<i>Xyleborus dispar</i> (Fabricius, 1792) [Coleoptera: Curculionidae, Scolytinae]	Pear blight beetle
<i>Xylosandrus germanus</i> (Blandford, 1894) [Coleoptera: Curculionidae, Scolytinae]	Black timber bark beetle
DIPTERA	
<i>Dasineura mali</i> Keiffer, 1904 [Diptera: Cecidomyiidae]	Apple leaf curling midge, apple leaf midge
<i>Rhagoletis pomonella</i> (Walsh, 1867) [Diptera: Tephritidae]	Apple maggot
<i>Anastrepha ludens</i> (Loew, 1873) [Diptera: Tephritidae]	Mexican fruit fly
<i>Bactrocera dorsalis</i> (Hendel, 1912) [Diptera: Tephritidae]	Oriental fruit fly
<i>Ceratitis capitata</i> (Wiedemann, 1824) [Diptera: Tephritidae]	Mediterranean fruit fly
HEMIPTERA	
<i>Acrosternum hilare</i> (Say, 1832) [Hemiptera: Pentatomidae]	Green stink bug
<i>Aphis gossypii</i> Glover, 1877 [Hemiptera: Aphididae]	Cotton aphid
<i>Aphis pomi</i> DeGeer, 1773 [Hemiptera: Aphididae]	Apple aphid, green apple aphid
<i>Aphis spiraecola</i> Patch, 1914 [Hemiptera: Aphididae]	Apple aphid, spirea aphid
<i>Boisea rubrolineata</i> (Barber, 1956) Synonym: <i>Leptocoris rubrolineatus</i> Barber, 1956 [Hemiptera: Rhopalidae]	Western boxelder bug
<i>Campylomma verbasci</i> (Meyer-Dür, 1843) [Hemiptera: Miridae]	Campylomma bug
<i>Ceresa alta</i> Walker, 1851 Synonym: <i>Stictocephala bisonia</i> Kopp & Yonke, 1977 Cited as <i>Stictocephala bubalus</i> (Caldwell, 1949) in APHIS (2007) [Hemiptera: Membracidae]	Buffalo treehopper
<i>Chrysomphalus aonidum</i> (Linnaeus, 1758) [Hemiptera: Diaspididae]	Circular scale
<i>Diaspidiotus ancyclus</i> (Putnam, 1878) [Hemiptera: Diaspididae]	Putnam scale
<i>Diaspidiotus perniciosus</i> (Comstock, 1881) Cited as <i>Quadraspidiotus perniciosus</i> in APHIS (2007) [Hemiptera: Diaspididae]	San Jose scale, Californian scale
<i>Dysaphis plantaginea</i> Passerini, 1860 [Hemiptera: Aphididae]	Rosy apple aphid
<i>Dysmicoccus brevipes</i> (Cockerell, 1893) [Hemiptera: Pseudococcidae]	Pineapple mealybug
<i>Edwardsiana rosae</i> (Linnaeus, 1758) [Hemiptera: Cicadellidae]	Rose leafhopper

Scientific name	Common name/s
<i>Empoasca fabae</i> (Harris, 1841) [Hemiptera: Cicadellidae]	Potato leafhopper
<i>Empoasca maligna</i> (Walsh, 1862) [Hemiptera: Cicadellidae]	Apple leafhopper
<i>Epidiaspis leperii</i> (Signoret, 1869) [Hemiptera: Diaspididae]	European pear scale
<i>Eriosoma lanigerum</i> (Hausmann, 1802) [Hemiptera: Aphididae]	Woolly aphid
<i>Eulecanium tiliae</i> (Linnaeus, 1758) [Hemiptera: Coccidae]	Nut scale
<i>Euschistus conspersus</i> Uhler, 1897 [Hemiptera: Pentatomidae]	Stink bug
<i>Fieberiella florii</i> (Stål 1864) [Hemiptera: Cicadellidae]	North American leafhopper, privet leafhopper
<i>Halyomorpha halys</i> (Stål, 1855) [Hemiptera: Pentatomidae]	Brown marmorated stink bug
<i>Hyalopterus pruni</i> (Geoffroy, 1762) [Hemiptera: Aphididae]	Mealy plum aphid
<i>Lepidosaphes ulmi</i> (Linnaeus, 1758) [Hemiptera: Diaspididae]	Oystershell scale, mussel scale
<i>Lopholeucaspis japonica</i> (Cockerell, 1897) [Hemiptera: Diaspididae]	Japanese baton shaped scale
<i>Metcalfa pruinosa</i> (Say, 1830) [Hemiptera: Flatidae]	Frosted moth bug
<i>Myzus persicae</i> (Sulzer, 1776) [Hemiptera: Aphididae]	Peach green aphid
<i>Parlatoria oleae</i> (Colvée, 1880) [Hemiptera: Diaspididae]	Olive scale
<i>Parlatoria pergandii</i> (Comstock, 1881) [Hemiptera: Diaspididae]	Chaff scale
<i>Parthenolecanium corni</i> Bouché, 1844) [Hemiptera: Coccidae]	European fruit lecanium
<i>Pseudococcus calceolariae</i> (Maskell, 1879) [Hemiptera: Pseudococcidae]	Citrophilus mealybug, scarlet mealybug
<i>Pseudococcus comstocki</i> (Kuwana, 1902) [Hemiptera: Pseudococcidae]	Comstock's mealybug
<i>Pseudococcus longispinus</i> (Targioni Tozzetti, 1867) [Hemiptera: Pseudococcidae]	Long tailed mealy bug
<i>Pseudococcus maritimus</i> (Ehrhorn, 1900) [Hemiptera: Pseudococcidae]	Grape mealybug
<i>Pseudococcus viburni</i> (Signoret, 1875) [Hemiptera: Pseudococcidae]	Obscure mealybug, Californian mealybug
<i>Rhopalosiphum insertum</i> (Walker, 1849) Synonym: <i>Rhopalosiphum padi</i> (Linnaeus, 1758) Cited as <i>Rhopalosiphum fitchii</i> (Sanderson, 1920) in APHIS (2007) [Hemiptera: Aphididae]	Apple grain aphid

Scientific name	Common name/s
<i>Stictocephala basalis</i> (Walker, 1851) Synonym: <i>Ceresa basalis</i> Walker, 1851 [Hemiptera: Membracidae]	Dark coloured treehopper
<i>Typhlocyba pomaria</i> McAtee, 1926 [Hemiptera: Cicadellidae]	White apple leafhopper
HYMENOPTERA	
<i>Ametastegia glabrata</i> (Fallén, 1808) [Hymenoptera: Tenthredinidae]	Dock sawfly
<i>Caliroa cerasi</i> Linnaeus, 1758 [Hymenoptera: Tenthredinidae]	Pear and cherry slugworm
LEPIDOPTERA	
<i>Acleris minuta</i> (Robinson, 1869) [Lepidoptera: Tortricidae]	Yellow headed fireworm
<i>Agrotis ipsilon</i> (Hufnagel, 1766) [Lepidoptera: Noctuidae]	Black cutworm
<i>Archips argyrospila</i> (Walker, 1863) [Lepidoptera: Tortricidae]	Fruit tree leafroller
<i>Archips fuscocupreanus</i> (Walsingham, 1900) [Lepidoptera: Tortricidae]	Apple tortrix
<i>Archips podana</i> (Scopoli, 1763) [Lepidoptera: Tortricidae]	Large fruit tree tortrix
<i>Archips rosana</i> (Linnaeus, 1758) Cited as <i>Archips rosanus</i> Linnaeus, 1758 in APHIS (2007) [Lepidoptera: Tortricidae]	European leafroller
<i>Argyrotaenia citrana</i> (Fernald, 1889) [Lepidoptera: Tortricidae]	Orange tortrix
<i>Argyrotaenia velutinana</i> (Walker, 1863) [Lepidoptera: Tortricidae]	Redbanded leafroller
<i>Choreutis pariana</i> (Clerck, 1759) [Lepidoptera: Choreutiidae]	Apple and thorn skeletoniser
<i>Choristoneura rosaceana</i> (Harris, 1841) [Lepidoptera: Tortricidae]	Obliquebanded leafroller
<i>Cydia pomonella</i> (Linnaeus, 1758) [Lepidoptera: Tortricidae]	Codling moth
<i>Datana ministra</i> (Drury, 1773) [Lepidoptera: Notodontidae]	Yellow necked caterpillar
<i>Enarmonia formosana</i> (Scopoli, 1763) [Lepidoptera: Tortricidae]	Cherry bark tortrix
<i>Euproctis chrysorrhoea</i> (Linnaeus, 1758) [Lepidoptera: Lymantriidae]	Brown tail moth
<i>Graphiphora augur</i> (Fabricius, 1775) [Lepidoptera: Noctuidae]	Double dart moth
<i>Grapholita molesta</i> (Busck, 1916) [Lepidoptera: Tortricidae]	Oriental fruit moth
<i>Grapholita packardi</i> (Zeller, 1875) [Lepidoptera: Tortricidae]	Cherry fruitworm

Scientific name	Common name/s
<i>Grapholita prunivora</i> (Walsh, 1868) Synonym: <i>Cydia prunivora</i> (Walsh, 1868) [Lepidoptera: Tortricidae]	Lesser apple worm
<i>Hedya nubiferana</i> (Haworth, 1811) [Lepidoptera: Tortricidae]	Green budworm
<i>Hyalophora cecropia</i> (Linnaeus, 1758) [Lepidoptera: Saturniidae]	Cecropia silkmoth
<i>Hyphantria cunea</i> Drury, 1770 [Lepidoptera: Arctiidae]	Fall webworm
<i>Lacanobia subjuncta</i> (Grote & Robinson, 1868) [Lepidoptera: Noctuidae]	Lacanobia fruitworm, speckled cutworm moth
<i>Lithophane antennata</i> (Walker, 1858) [Lepidoptera: Noctuidae]	Green fruitworm
<i>Lymantria dispar</i> (Linnaeus, 1758) [Lepidoptera: Lymantriidae]	European gypsy moth
<i>Lymantria monacha</i> (Linnaeus, 1758) [Lepidoptera: Lymantriidae]	Nun moth
<i>Lyonetia prunifoliella</i> Hübner, 1796 Synonym: <i>Lyonetia speculella</i> Clemens, 1862 [Lepidoptera: Lyonetiidae]	Apple leaf miner
<i>Lyonetia speculella</i> (Clemens, 1862) [Lepidoptera: Lyonetiidae]	Lyonetia leafminer
<i>Malacosoma americanum</i> (Fabricus, 1793) [Lepidoptera: Lasiocampidae]	Eastern tent caterpillar
<i>Malacosoma disstria</i> Hübner, 1820 [Lepidoptera: Lasiocampidae]	Forest tent caterpillars
<i>Mamestra configurata</i> Walker, 1856 [Lepidoptera: Noctuidae]	Bertha armyworm
<i>Operophtera bruceata</i> (Hulst, 1886) [Lepidoptera: Geometridae]	Bruce spanworm
<i>Operophtera brumata</i> (Linnaeus, 1758) [Lepidoptera: Geometridae]	Winter moth
<i>Orgyia antiqua</i> (Linnaeus, 1758) [Lepidoptera: Lymantriidae]	Rusty (European) tussock moth
<i>Orgyia leucostigma</i> (J. E. Smith, 1797) [Lepidoptera: Lymantriidae]	White marked tussock moth
<i>Orthosia hibisci</i> (Guenée, 1852) [Lepidoptera: Noctuidae]	Speckled green fruitworm
<i>Ostrinia nubilalis</i> (Hübner, 1796) [Lepidoptera: Pyralidae]	European corn borer
<i>Pandemis cerasana</i> (Hübner, 1786) [Lepidoptera: Tortricidae]	Barred fruit tree tortrix
<i>Pandemis heparana</i> (Denis & Schiffermüller, 1775) [Lepidoptera: Tortricidae]	Dark fruit tree tortrix
<i>Pandemis pyrusana</i> Kearfott, 1907 [Lepidoptera: Tortricidae]	Pandemis leafroller
<i>Peridroma saucia</i> (Hübner, 1808) [Lepidoptera: Notodontidae]	Pearly underwing

Scientific name	Common name/s
<i>Phyllonorycter blancardella</i> (Fabricius, 1781) [Lepidoptera: Gracillariidae]	Spotted teniform leafminer
<i>Phyllonorycter crataegella</i> (Clemens, 1859) [Lepidoptera: Gracillariidae]	Apple spot leafminer
<i>Phyllonorycter elmaella</i> Doganlar & Mutuura, 1980 [Lepidoptera: Gracillariidae]	Western tentiform leafminer
<i>Phyllonorycter mespilella</i> (Hübner, 1805) [Lepidoptera: Gracillariidae]	Apple leafmining moth
<i>Platynota flavedana</i> (Clemens, 1860) [Lepidoptera: Tortricidae]	Rusty brown tortricid
<i>Platynota idaeusalis</i> (Walker, 1859) [Lepidoptera: Tortricidae]	Tufted apple bud worm
<i>Pseudexentera mali</i> (Freeman, 1942) [Lepidoptera: Tortricidae]	Pale apple leafroller
<i>Recurvaria nanella</i> (Hubner, 1827) [Lepidoptera: Gelechiidae]	Lesser bud moth
<i>Rhopobota unipunctana</i> (Haworth, 1811) [Lepidoptera: Tortricidae]	Blackheaded fireworm moth
<i>Saturnia pyri</i> (Denis & Schiffermüller, 1775) [Lepidoptera: Lasiocampidae]	Giant peacock moth
<i>Spilonota ocellana</i> (Denis & Schiffermüller, 1775) [Lepidoptera: Tortricidae]	Eyespotted bud moth
<i>Spodoptera frugiperda</i> (J.E. Smith, 1797) [Lepidoptera: Noctuidae]	Fall armyworm
<i>Synanthedon scitula</i> (Harris, 1839) [Lepidoptera: Sesiidae]	Dogwood borer
<i>Tischeria malifoliella</i> (Clemens, 1860) [Lepidoptera: Tischeriidae]	Apple leaf trumpet miner
<i>Xestia c-nigrum</i> (Linnaeus, 1758) [Lepidoptera: Notodontidae]	Setaceous Hebrew character
<i>Yponomeuta malinellus</i> (Zeller, 1838) [Lepidoptera: Yponomeutidae]	Apple ermine moth
<i>Zeuzera pyrina</i> (Linnaeus, 1761) [Lepidoptera: Cossidae]	Leopard moth
THYSANOPTERA	
<i>Frankliniella occidentalis</i> (Pergande, 1895) [Thysanoptera: Thripidae]	Western flower thrips
<i>Frankliniella tritici</i> (Fitch, 1855) [Thysanoptera: Thripidae]	Eastern flower thrips
<i>Retithrips syriacus</i> Mayet, 1890 [Thysanoptera: Thripidae]	Black vine thrips

PATHOGENS	
BACTERIA	
<i>Rhizobium radiobacter</i> (Beijerinck & van Delden 1902) Young <i>et al.</i> 2001 Synonym: <i>Agrobacterium tumefaciens</i> (E.F. Smith & Townsend 1907) Conn (1942) [Gracilicutes- Proteobacteria: Rhizobiaceae]	Hairy root, crown gall
<i>Erwinia amylovora</i> (Burr.) Winslow <i>et al.</i> [Gracilicutes- Proteobacteria: Enterobacteriaceae]	Fire blight
FUNGI	
<i>Abortiporus biennis</i> (Bull.:Fr.) Singer Synonym: <i>Polyporus biennis</i> (Bull.:Fr.) Fr. [Poriales: Meripilaceae]	Blushing rosette
<i>Alternaria alternata</i> (Fr.: Fr.) Keissl (1912) Synonyms: <i>Alternaria tenuis</i> Needs (1822); <i>Alternaria fasciculata</i> (Cooke & Ellis) L.R. Jones & Grout (1897). [Pleosporales: Pleosporaceae]	Apple core rot, apple storage rot, leaf spot
<i>Alternaria mali</i> Roberts [Pleosporales: Pleosporaceae]	Alternaria blotch of apple, apple spot
<i>Alternaria pomicola</i> A.S. Horne [Pleosporales: Pleosporaceae]	
<i>Alternaria</i> sp. [Pleosporales: Pleosporaceae]	
<i>Antrodia malicola</i> (Berk. & M.A. Curtis) Donk Synonym: <i>Trametes malicola</i> Berk. & M.A. Curtis [Poriales: Fomitopsidaceae]	
<i>Armillaria mellea</i> (Vahl:Fr.) P. Kumm. [Agaricales: Armillariaceae]	Shoestring root rot
<i>Armillaria tabescens</i> (Scop.) Dennis Synonym: <i>Clitocybe tabescens</i> (Scop.) Bres. [Agaricales: Armillariaceae]	Clitocybe root rot
<i>Aspergillus clavatus</i> Desm. [Anamorphic Trichocomaceae]	Storage fruit rot
<i>Aspergillus flavus</i> Link:Fr. [Anamorphic Trichocomaceae]	Aspergillus ear rot
<i>Aspergillus sclerotiorum</i> G.A. Huber [Anamorphic Trichocomaceae]	Fruit rot
<i>Asteromella mali</i> (Briard) Boerema Synonym: <i>Phyllosticta mali</i> Briard [Anamorphic Didymosphaeriaceae]	
<i>Athelia bombacina</i> Pers. [Poriales: Cystostereaceae]	
<i>Aureobasidium pullulans</i> (de Bary) G. Arnaud Synonym: <i>Pullularia pullulans</i> (de Bary) Berkhout [Anamorphic Dothioraceae]	
<i>Biscogniauxia marginata</i> (Fr.) Pouzar Synonyms: <i>Nummularia discreta</i> (Schwein.) Tul. & C. Tul.; <i>Nummularia discincola</i> (Schwein.) Cooke [Xylariales: Xylariaceae]	Blister canker

<i>Botryosphaeria dothidea</i> (Moug.:Fr.) Ces. & De Not. [Dothideales: Botryosphaeriaceae]	Ring rot, ripe spot, white rot
<i>Botrytis cinerea</i> Pers.:Fr Teleomorph: <i>Botryotinia fuckeliana</i> (de Bary) Whetzel [Anamorphic Sclerotiniaceae]	Grey mould, dry eye rot, blossom end rot
<i>Botrytis mali</i> Rühle [Anamorphic Sclerotiniaceae]	
<i>Botrytis</i> sp. [Anamorphic Sclerotiniaceae]	
<i>Butlerellia eustacei</i> Weresub & Illman Synonym: <i>Corticium centrifugum</i> (Lév.) Bres. [Poriales: Cystostereaceae]	Fish eye rot
<i>Cadophora malorum</i> (Kidd & Beaumont) W. Gams Synonym: <i>Phialophora malorum</i> (Kidd & Beaumont) McColloch [Anamorphic Dermateaceae]	Side rot
<i>Cephalosporium carpogenum</i> Rühle [Anamorphic Hypocreales]	
<i>Ceratobasidium stevensii</i> (Burt) Venkatar. Synonym: <i>Corticium stevensii</i> Burt [Tulasnellales: Ceratobasidiaceae]	Hypochnose, thread blight
<i>Chaetomella</i> sp. [Anamorphic Leotiomycetes]	
<i>Chondrostereum purpureum</i> (Pers.: Fr.) Pouzar Synonyms: <i>Stereum ardoisiacum</i> Lloyd; <i>Thelephora purpurea</i> (Pers.) Pers. Cited as <i>Chondrosterem purpureum</i> (Pers.: Fr.) Pouzar in APHIS (2007) [Russulales: Meruliaceae]	Silver leaf
<i>Cladosporium cladosporioides</i> (Fresen.) G.A. De Vries Synonym: <i>Hormodendrum cladosporioides</i> [Anamorphic Davidiellaceae]	
<i>Cladosporium herbarum</i> (Pers.:Fr.) Link [Anamorphic Davidiellaceae]	Cladosporium rot, mouldy core
<i>Cladosporium malorum</i> Rühle [Anamorphic Davidiellaceae]	
<i>Cladosporium</i> sp. [Anamorphic Davidiellaceae]	
<i>Colletotrichum acutatum</i> J.H. Simmonds [Anamorphic Glomerellaceae]	Anthracnose
<i>Colletotrichum gloeosporioides</i> (Penz.) Penz. & Sacc. Teleomorph: <i>Glomerella cingulata</i> (Stoneman) Spauld. & H. Schrenk [Anamorphic Glomerellaceae]	Anthracnose, bitter rot
<i>Collybia</i> sp. [Agaricales: Tricholomataceae]	
<i>Coniothecium</i> sp. [Incertae sedis]	
<i>Coniothyrium convolutum</i> A.S. Horne [Anamorphic Leptosphaeriaceae]	
<i>Coniothyrium cydoniae</i> Brunaud [Anamorphic Leptosphaeriaceae]	

<i>Corioloopsis gallica</i> (Bull.:Fr.) Ryvarden Synonym: <i>Trametes hispida</i> Bagl. [Poriales: Polyporaceae]	
<i>Cosmospora episphaeria</i> (Tode) Rossman & Samuels Teleomorph: <i>Nectria episphaeria</i> (Tode) Fr. Synonym: <i>Nectria sanguinea</i> sensu auct. brit. [Anamorphic Nectriaceae]	
<i>Cristulariella moricola</i> (Hino) Redhead Teleomorph: <i>Grovesinia pyramidalis</i> M.N. Cline, J.L. Crane & S.D. Cline Synonym: <i>Sclerotinum cinnamomi</i> Sawada [Anamorphic Sclerotiniaceae]	Zonate leaf spot
<i>Cryptosporiopsis corticola</i> (Edgerton) Nannf. Synonym: <i>Myxosporium corticola</i> Edgerton [Anamorphic Dermateaceae]	
<i>Cryptosporiopsis curvispora</i> (Peck) Gremmen Teleomorph: <i>Neofabraea malicorticis</i> H. Jacks. Synonyms: <i>Pezicula malicorticis</i> (H. Jacks.) Nannf.; until 1993: <i>Cryptosporiopsis perennans</i> (Zeller & Childs) Wollenw. [Anamorphic Dermateaceae]	Bull's eye rot, anthracnose canker
<i>Cylindrocarpon angustum</i> Wollenw. [Anamorphic Nectriaceae]	
<i>Cylindrocarpon candidum</i> (Link) Wollenw. Teleomorph: <i>Neonectria coccinea</i> (Pers.:Fr.) Rossman & Samuels [Anamorphic Nectriaceae]	
<i>Cylindrocarpon destructans</i> (Zinssm.) Scholten Teleomorph: <i>Neonectria radicularis</i> (Gerlach & L. Nilsson) Mantiri & Samuels Synonym: <i>Nectria radicularis</i> Gerlach & L. Nilsson [Anamorphic Nectriaceae]	Storage rot
<i>Cylindrocarpon didymum</i> (Harting) Wollenw. [Anamorphic Nectriaceae]	
<i>Cylindrocarpon heteronema</i> (Berk. & Broome) Wollenw. Teleomorph: <i>Neonectria galligena</i> (Bres.) Rossman & Samuels Synonym: <i>Nectria galligena</i> Bres.; [Anamorphic Nectriaceae]	European canker
<i>Cylindrocarpon</i> sp. [Anamorphic Nectriaceae]	
<i>Cylindrocarpon willkommii</i> (Lindau) Wollenw. Teleomorph: <i>Neonectria ditissima</i> (Tul. & C. Tul.) Samuels & Rossman [Anamorphic Nectriaceae]	European canker, Neonectria canker
<i>Cytospora ambiens</i> Sacc. Teleomorph: <i>Valsa ambiens</i> (Pers.:Fr.) Fr. [Anamorphic Valsaceae]	
<i>Cytospora leucostoma</i> Sacc. Teleomorph: <i>Leucostoma persoonii</i> (Nitschke) Höhn. Synonym: <i>Valsa leucostoma</i> (Pers.:Fr.) Fr. [Anamorphic Valsaceae]	Valsa canker
<i>Daldinia concentrica</i> (Bolton:Fr.) [Xylariales: Xylariaceae]	
<i>Daldinia occidentalis</i> Child [Xylariales: Xylariaceae]	

<i>Davidiella tassiana</i> (De Not.) Crous & U. Braun Anamorph: <i>Cladosporium graminum</i> Synonym: <i>Mycosphaerella tulasnei</i> (Jancz.) Lindau [Capnodiales: Davidiellaceae]	
<i>Dendrophoma</i> sp. [Anamorphic Xylariales]	
<i>Dendrophora erumpens</i> (Burt) Chamuris Synonym: <i>Stereum erumpens</i> Burt [Russulales: Peniophoraceae]	
<i>Diaporthe eres</i> Nitschke Synonym: <i>Diaporthe ambigua</i> Nitschke [Diaporthales: Valsaceae]	Phomopsis rot, stem-end rot
<i>Diplodia mutila</i> (Fr.:Fr.) Mont. Teleomorph: <i>Botryosphaeria stevensii</i> Shoemaker Synonym: <i>Physalospora malorum</i> [Anamorphic Botryosphaeriaceae]	Black rot, diplodia canker
<i>Diplodia sarmentorum</i> (Fr.:Fr.) [Anamorphic Botryosphaeriaceae]	
<i>Dothichiza</i> sp. [Anamorphic Dothioraceae]	
<i>Elsinoe piri</i> (Woron.) Jenk. [Myriangiales: Elsinoaceae]	
<i>Epicoccum granulatum</i> Penz. [Anamorphic Dothideales]	
<i>Eutypella prunastri</i> (Pers.:Fr.) Sacc. [Xylariales: Diatrypaceae]	
<i>Fomes fomentarius</i> (L.:Fr.) J. Kickx fil. [Poriales: Polyporaceae]	
<i>Fomitopsis pinicola</i> (Sw.:Fr.) P. Karst. [Poriales: Fomitopsidaceae]	Brown cubical rot
<i>Fusarium avenaceum</i> (Fr.:Fr.) Sacc. Teleomorph: <i>Gibberella avenacea</i> R.J. Cook [Hypocreales: Nectriaceae]	
<i>Fusarium heterosporum</i> Nees:Fr. Synonym: <i>Fusarium graminum</i> Corda, pro parte [Hypocreales: Nectriaceae]	
<i>Fusarium lateritium</i> Nees:Fr. Teleomorph: <i>Gibberella baccata</i> (Wallr.) Sacc. [Hypocreales: Nectriaceae]	
<i>Fusarium oxysporum</i> Schldl.:Fr. [Hypocreales: Nectriaceae]	Root rot
<i>Fusarium roseum</i> Link:Fr. Teleomorph: <i>Gibberella zeae</i> (Schwein.) Petch [Hypocreales: Nectriaceae]	
<i>Fusarium scirpi</i> Lambotte & Fautrey Teleomorph: <i>Gibberella acuminata</i> C. Booth Synonyms: <i>Fusarium equiseti</i> (Corda) Sacc.; <i>Fusarium acuminatum</i> Ellis & Everh. [Hypocreales: Nectriaceae]	

<i>Fusicoccum dimidiatum</i> (Penz.) D. F. Farr Synonym: <i>Nattrassia mangiferae</i> (Syd. & P. Syd.) B. Sutton & Dyko [Anamorphic Botryosphaeriaceae]	Branch wilt of apple
<i>Fusicoccum pyrorum</i> Chupp & Clapp [Anamorphic Botryosphaeriaceae]	
<i>Fusicoccum</i> sp. [Anamorphic Botryosphaeriaceae]	
<i>Ganoderma applanatum</i> (Pers.) Gill. [Poriales: Ganodermataceae]	
<i>Geotrichum candidum</i> Link Synonym: <i>Oospora mali</i> Kidd & Beaumont [Anamorphic Dipodascaceae]	
<i>Gloeophyllum sepiarium</i> (Wulfen:Fr.) P. Karst. Synonym: <i>Lenzites sepiaria</i> (Wulfen:Fr.) Fr. [Poriales: Gloeophyllaceae]	
<i>Gloeophyllum trabeum</i> (Pers.:Fr.) Murill Synonym: <i>Lenzites trabea</i> (Pers.:Fr.) [Poriales: Gloeophyllaceae]	
<i>Glyphium corrugatum</i> (Ellis) H. Goree [Hysteriales: Mytiliniaceae]	
<i>Gymnosporangium clavipes</i> (Cooke & Peck) Cooke & Peck [Uredinales: Pucciniaceae]	Quince rust
<i>Gymnosporangium globosum</i> (Farl.) Farl. [Uredinales: Pucciniaceae]	Hawthorn rust
<i>Gymnosporangium juniperi-virginianae</i> Schwein. [Uredinales: Pucciniaceae]	Cedar apple rust
<i>Gymnosporangium libocedri</i> (Henn.) F. Kern [Uredinales: Pucciniaceae]	Pacific coast pear rust
<i>Helminthosporium papulosum</i> A. Berg [Anamorphic Pleomassariaceae]	Black pox
<i>Heterosporium maculatum</i> Klotzsch [Anamorphic Mycosphaerellaceae]	
<i>Hyphoderma litschaueri</i> (Burt) J. Erikss. & Å. Strid Synonym: <i>Corticium litschaueri</i> [Hymenochaetales: Hyphodermataceae]	
<i>Hypoxyton serpens</i> (Pers.:Fr.) J. Kickx. Fil. [Xylariales: Xylariaceae]	Sapwood rot
<i>Hysteropatella</i> sp. [Hysteriales: Hysteriaceae]	
<i>Maireina marginata</i> (McAlpine) W.B. Cooke Synonym: <i>Cyphella marginata</i> [Agaricales: Tricholomataceae]	
<i>Marssonina coronaria</i> (Ellis & Davis) Davis Synonym: <i>Diplocarpon mali</i> Harada & Sawamura [Helotiales: Dermateaceae]	Marssonina blotch, leaf spot
<i>Microdiplodia</i> sp. [Anamorphic Ascomycetes]	

<i>Microsphaeropsis fuckelii</i> (Sacc.) Boerema Synonym: <i>Coniothyrium fuckelii</i> Sacc. Teleomorph: <i>Kalmusia coniothyrium</i> (Fuckel) Huhndorf Synonyms: <i>Diapleella coniothyrium</i> (Fuckel) M.E. Barr; <i>Leptosphaeria coniothyrium</i> (Fuckel) Sacc. [Anamorphic Leptosphaeriaceae]	Leptosphaeria canker, fruit rot
<i>Monilinia fructicola</i> (G. Winter) Honey Anamorph: <i>Monilia</i> sp. [Helotiales: Sclerotiniaceae]	Brown rot
<i>Monilinia laxa</i> (Aderhold & Ruhland) Honey Synonym: <i>Monilia cinerea</i> Bonord. [Helotiales: Sclerotiniaceae]	Blossom blight
<i>Mucor mucedo</i> P. Mitch. ex Saint-Amans [Mucorales: Mucoraceae]	
<i>Mucor piriformis</i> E. Fisch. [Mucorales: Mucoraceae]	Fruit rot
<i>Mucor racemosus</i> Fresen. [Mucorales: Mucoraceae]	
<i>Mucor</i> spp. [Mucorales: Mucoraceae]	Mucor rot
<i>Mycosphaerella pomi</i> (Pass.) Lindau [Capnodiales: Mycosphaerellaceae]	Brooks fruit spot
<i>Neofabraea perennans</i> Kienholz Synonym: <i>Pezicula perennans</i> (Kienholz) Dugan, R.G. Roberts & G.G. Grove Anamorph: <i>Cryptosporiopsis perennans</i> (Zeller & Childs) Wollenw. [Helotiales: Dermateaceae]	Perennial canker
<i>Neofusicoccum ribis</i> (Slippers, Crous & M.J. Wingf.) Crous, Slippers & A.J.L. Phillips Teleomorph: <i>Botryosphaeria ribis</i> Grossenb. & Duggar [Anamorphic Botryosphaeriaceae]	Stem canker, limb canker, black rot
<i>Nigrospora oryzae</i> (Berk. & Broome) Petch [Trichosphaeriales: Incertae sedis]	X-spot, Nigrospora spot
<i>Oospora otophila</i> Harz [Anamorphic Erysiphaceae]	
<i>Othia amica</i> Sacc., E. Bommer & M. Rousseau [Dothideales: Incertae sedis]	
<i>Panellus serotinus</i> (Pers.:Fr.) Kühner [Agaricales: Mycenaceae]	
<i>Pellicularia koleroga</i> Cooke Synonym: <i>Corticium koleroga</i> (Cooke) Höhn. [Tulasnellales: Ceratobasidiaceae]	Hypochnus leaf blight
<i>Peltaster fructicola</i> (E.M. Johnson, T.B. Sutton & Hodges) [Anamorphic Mycosphaerellaceae]	Sooty blotch complex
<i>Penicillium aurantiogriseum</i> Dierckx Synonyms: <i>Penicillium martensi</i> Biourge; <i>Penicillium puberulum</i> Bainier [Anamorphic Trichocomaceae]	
<i>Penicillium aurantiogriseum</i> var. <i>viridicatum</i> (Westling) Frisvad & Filt. Synonyms: <i>Penicillium olivinoviride</i> Biourge; <i>Penicillium viridicatum</i> Westling [Anamorphic Trichocomaceae]	

<i>Penicillium expansum</i> Link (1809) [Anamorphic Trichocomaceae]	Blue mould, soft rot, wet rot
<i>Penicillium</i> spp. [Anamorphic Trichocomaceae]	Mould
<i>Penicillium verrucosum</i> Dierckx [Anamorphic Trichocomaceae]	
<i>Pestalotia concentrica</i> Berk. & Broome [Anamorphic Amphisphaereaceae]	
<i>Pezicula pruinosa</i> Farl. [Helotiales: Dermateaceae]	
<i>Peziza repanda</i> Pers. [Pezizales: Pezizaceae]	
<i>Phellinus igniarius</i> (L.:Fr.) Quél. Synonym: <i>Fomes igniarius</i> [Hymenochaetales: Hymenochaetaceae]	
<i>Phlyctema vagabunda</i> Desm. Variant spelling <i>Phlyctaena vagabunda</i> Desm. Teleomorph: <i>Neofabraea alba</i> (E.J. Guthrie) Verkley Synonym: <i>Pezicula alba</i> E.J. Guthrie [Anamorphic Dermateaceae]	Ripe spot, ripe fruit rot
<i>Phoma bismarckii</i> Kidd & Beaumont [Anamorphic Leptosphaeriaceae]	
<i>Phoma fuliginea</i> Kidd & Beaumont [Anamorphic Leptosphaeriaceae]	
<i>Phoma pomorum</i> Thüm. Synonym: <i>Coniothyrium pyrinum</i> [Anamorphic Leptosphaeriaceae]	Scurfy bark, leaf spot, Phoma fruit spot, shot hole spot
<i>Phomopsis prunorum</i> (Cooke) Grove Synonym: <i>Phomopsis mali</i> Roberts non (Schulzer & Sacc.) Died., nom. Illeg. Teleomorph: <i>Diaporthe pernicioso</i> Marchal & E. J. Marchal [Anamorphic Valsaceae]	Phomopsis canker, Phomopsis fruit decay
<i>Phyllachora pomigena</i> (Schwein.) Sacc. Synonym: <i>Gloeodes pomigena</i> (Schwein.) Colby [Phyllachorales: Phyllachoraceae]	Sooty blotch
<i>Phyllactinia guttata</i> (Wallr.:Fr.) Lév. [Erysiphales: Erysiphaceae]	
<i>Phyllosticta clypeata</i> Ellis & Everh. [Anamorphic Botryosphaereaceae]	
<i>Phyllosticta solitaria</i> Ellis & Everh. [Anamorphic Botryosphaereaceae]	Blotch, leaf spot, twig canker
<i>Phymatotrichopsis omnivora</i> (Duggar) Hennebert Synonym: <i>Phymatotrichum omnivorum</i> Duggar [Incertae sedis]	Phymatotrichum root rot
<i>Pleospora herbarum</i> (Pers.:Fr.) Rabenh. [Pleosporales: Pleosporaceae]	Pleospora rot
<i>Podosphaera clandestina</i> (Wallr.:Fr.) Lév. Anamorph: <i>Oidium crataegi</i> Grognot [Erysiphales: Erysiphaceae]	Hawthorn powdery mildew

<i>Podosphaera leucotricha</i> (Ellis & Everh.) E.S. Salmon Anamorph: <i>Oidium mespili</i> Cooke [Erysiphales: Erysiphaceae]	Powdery mildew (apple strain)
<i>Ramularia magnusiana</i> (Sacc.) Lindau [Anamorphic Mycosphaerellaceae]	
<i>Rhizopus stolonifer</i> (Ehrenb.:Fr.) Vuill. Synonym: <i>Rhizopus nigricans</i> Ehrenb. [Mucorales: Mucoraceae]	Bulb rot, Rhizopus rot, post harvest decay of fruit, soft rot, Coryneum blight
<i>Rosellinia necatrix</i> Prill. Variant spelling: <i>Rosellinia necatrix</i> Prill. [Xylariales: Xylariaceae]	Rosellinia root rot, Dematophora root rot
<i>Schizophyllum commune</i> Fr.:Fr. [Agaricales: Schizophyllaceae]	
<i>Schizothyrium pomi</i> (Mont. & Fr.) Arx Anamorph: <i>Zygophiala jamaicensis</i> E. Mason Synonym: <i>Microthyriella rubi</i> Pter. [Dothideales: Schizothyriaceae]	Flyspeck
<i>Sclerotinia sclerotiorum</i> (Lib.) de Bary [Helotiales: Sclerotiniaceae]	Calyx end rot, Sclerotinia rot, white mould
<i>Sclerotium rolfsii</i> Sacc. Synonym: <i>Athelia rolfsii</i> (Curzi) C.C. Tu & Kimbr. [Anamorphic Cystostereaceae]	Southern blight
<i>Scytinostroma galactinum</i> (Fr.) Donk [Russulales: Lachnocladiaceae]	Eastern white root rot
<i>Seiridium unicorne</i> (Cooke & Ellis) B. Sutton Synonym: <i>Monochaetia mali</i> (Ellis & Everh.) Sacc. [Xylariales: Amphisphaeriaceae]	Monochaetia twig canker
<i>Sphaeropsis malorum</i> Berk. Teleomorph: <i>Botryosphaeria obtusa</i> (Schwein.) Shoemaker Synonyms: <i>Physalospora cydoniae</i> G. Arnaud; <i>Physalospora obtusa</i> (Schwein.) Cooke [Anamorphic Botryosphaereaceae]	Black rot, frog eye leaf spot
<i>Sphaeropsis pyripitrescens</i> C.L. Xiao & J.D. Rogers [Anamorphic Botryosphaereaceae]	Sphaeropsis rot
<i>Sporocadus lichenicola</i> Corda Teleomorph: <i>Discostroma corticola</i> (Fuckel) Brockmann Synonym: <i>Coryneum foliicola</i> Fuckel [Anamorphic Amphisphaeriaceae]	
<i>Sporormia</i> sp. [Pleosporales: Sporormiaceae]	
<i>Stachybotrys albipes</i> (Berk. & Broome) S.C. Jong & Davis Teleomorph: <i>Melanopsamma pomiformis</i> (Pers.:Fr.) Sacc. [Anamorphic Niessliaceae]	
<i>Stemphylium graminis</i> (Corda) Bonord. [Anamorphic Pleosporaceae]	
<i>Stereum hirsutum</i> (Willd.:Fr.) Gray Synonym: <i>Stereum complicatum</i> (Fr.:Fr.) Fr. [Russulales: Stereaceae]	
<i>Taphrina bullata</i> (Berk.) Tul. [Taphrinales: Taphrinaceae]	

<i>Trametes hirsuta</i> (Wulfen:Fr.) Quél. Synonyms: <i>Coriolus hirsutus</i> (Wulfen:Fr.) Quél.; <i>Polyporus hirsutus hirsuta</i> (Wulfen:Fr.) Fr. [Poriales: Polyporaceae]	
<i>Trametes versicolor</i> (L.:fr.) Pilát Synonyms: <i>Coriolus versicolor</i> (L.:Fr.) Quél.; <i>Polyporus versicolor</i> (L.:fr.) Fr. [Poriales: Polyporaceae]	
<i>Trichoderma</i> sp. [Anamorphic Hypocreaceae]	
<i>Trichosporum</i> sp. [Incertae sedis]	
<i>Trichothecium roseum</i> (Pers.:Fr.) Link Synonym: <i>Cephalothecium roseum</i> Corda [Anamorphic Bionectriaceae]	Pink mould rot, pink fruit rot
<i>Truncatella hartigii</i> (Tubef.) Steyaert Synonym: <i>Pestalotia hartigii</i> Tubeuf [Anamorphic Amphisphaeriaceae]	Leaf spot
<i>Tubercularia vulgaris</i> Tode:Fr. Teleomorph: <i>Nectria cinnabarina</i> (Tode: Fr.) Fr. [Anamorphic Nectriaceae]	Apple canker, nectria twig blight
<i>Tyromyces chioneus</i> (Fr.:Fr.) P. Karst. Synonym: <i>Polyporus albellus</i> Peck [Poriales: Polyporaceae]	
<i>Ulocladium consortiale</i> (Thüm.) E.G. Simmons [Anamorphic Pleosporaceae]	
<i>Valsa ceratosperma</i> (Tode:Fr.) Maire Anamorph: <i>Cytospora sacculus</i> (Schwein.:Fr.) Gvrit. Synonyms: <i>Valsa americana</i> Berk. & M.A. Curtis; <i>Valsa mali</i> Miyabe & Yamada [Diaporthales: Valsacea]	Valsa canker
<i>Valsa cincta</i> (Fr.:Fr.) Fr. Synonym: <i>Leucostoma cinctum</i> (Fr.:Fr.) Höhn. (variant spelling: <i>Leucostoma cincta</i> (Fr.:Fr.) Höhn.) Synonyms: <i>Cytospora cincta</i> , <i>Valsa auerswaldii</i> , <i>Leucostoma auerswaldii</i> , <i>Cytospora personata</i> [Diaporthales: Valsacea]	Leucostoma canker and dieback
<i>Valsa papyriferae</i> (Schwein.) Cooke Synonym: <i>Valsella papyriferae</i> (Schwein.) Berl. & Voglino [Diaporthales: Valsacea]	
<i>Valsa</i> sp. [Diaporthales: Valsacea]	
<i>Valsella melastoma</i> (Fr.) Fuckel Synonym: <i>Valsa melastoma</i> Fr. [Diaporthales: Valsaceae]	
<i>Venturia inaequalis</i> (Cooke) G. Winter [Pleosporales: Venturiaceae]	Apple scab, black spot
<i>Verticillium</i> sp. [Incertae sedis]	
<i>Xylaria mali</i> Fromme [Xylariales: Xylariaceae]	Black root rot

<i>Xylaria polymorpha</i> (Pers.:Fr.) Grev. [Xylariales: Xylariaceae]	
NEMATODES	
<i>Criconemella curvata</i> (Raski, 1952) Luc & Raski, 1981 Synonyms: <i>Mesocriconema curvata</i> , <i>Macroposthonia curvata</i> [Tylenchida: Criconematidae]	Ring nematode
<i>Criconemella xenoplax</i> (Raski, 1952) Luc & Raski, 1981 Synonyms: <i>Criconemoides xenoplax</i> , <i>Macroposthonia xenoplax</i> , <i>Mesocriconemoides xenoplax</i> [Tylenchida: Criconematidae]	Ring nematode
<i>Helicotylenchus dihystra</i> (Cobb 1893) Sher 1961. [Tylenchida: Hopolaimidae]	Spiral nematode
<i>Longidorus elongatus</i> (de Man) Micoltzky (1922) [Dorylaimida: Longidoridae]	Needle nematode
<i>Meloidogyne arenaria</i> (Neal 1889) Chitwood 1949 [Tylenchida: Meloidogynidae]	Peanut root knot nematode
<i>Meloidogyne incognita</i> (Kofoid & White 1919) Chitwood 1949 [Tylenchida: Meloidogynidae]	Root knot nematode
<i>Meloidogyne javanica</i> (Treub 1885) Chitwood 1949 [Tylenchida: Meloidogynidae]	Root knot nematode
<i>Paratrichodorus porosus</i> (Allen, 1957) Siddiqi, 1974 [Triplonchida: Trichodoridae]	Chrisite's stubby root nematode
<i>Pratylenchus neglectus</i> (Rensch, 1924) Filipjev & Schuurmans Stekhoven, 1941 [Tylenchida: Pratylenchidae]	Root lesion nematode
<i>Pratylenchus penetrans</i> (Cobb 1917) Filiojev & Schuurmans Stekhoven, 1941 [Tylenchida: Pratylenchidae]	Cobb's root lesion nematode
<i>Trichodorus viruliferus</i> Hooper 1963 [Triplonchida: Trichodoridae]	Stubby root nematode
<i>Xiphinema americanum</i> Cobb 1913 Synonym: <i>Xiphinema californicum</i> Lamberti & Blevé-Zaches 1979 [Dorylaimida: Longidoridae]	American dagger nematode
<i>Xiphinema index</i> Thorne and Allen, 1950 [Dorylaimida: Longidoridae]	California dagger nematode
<i>Xiphinema rivesi</i> Dalmasso, 1969 [Dorylaimida: Longidoridae]	Dagger nematode
STRAMINOPILA	
<i>Phytophthora cactorum</i> (Lebert & Cohn) J. Schröt. [Peronosporales: Pythiaceae]	Phytophthora fruit rot, crown and root rot
<i>Phytophthora cambivora</i> (Petri) Buisman [Peronosporales: Pythiaceae]	Phytophthora root rot
<i>Phytophthora cryptogea</i> Pethybr. & Laff. [Peronosporales: Pythiaceae]	Phytophthora root rot
<i>Phytophthora drechsleri</i> Tucker [Peronosporales: Pythiaceae]	Crown rot, collar and root rot
<i>Phytophthora megasperma</i> Drechsler [Peronosporales: Pythiaceae]	Phytophthora root rot
<i>Phytophthora</i> sp. [Peronosporales: Pythiaceae]	Collar and root rot

<i>Phytophthora syringae</i> (Berk.) Kleb. [Peronosporales: Pythiaceae]	Phytophthora root rot
<i>Pythium irregulare</i> Buisman [Peronosporales: Pythiaceae]	Pythium root rot, damping off
<i>Pythium</i> sp. [Peronosporales: Pythiaceae]	Pythium root rot
<i>Pythium splendens</i> H. Braun [Peronosporales: Pythiaceae]	Root rot
<i>Pythium ultimum</i> Trow [Peronosporales: Pythiaceae]	Pythium root rot
VIROIDS	
Apple scar skin viroid Koganezawa et al. (1983)	ASSVd, apple scar skin, dapple apple
VIRUSES	
<i>Apple chlorotic leaf spot virus</i> Cadman (1963); Copley (1963; 1964) and Lister et al. (1965) [Flexiviridae: Trichovirus] ICTV 76.0.1.0.001	ACLSV, apple chlorotic leaf spot
<i>Apple mosaic virus</i> Bradford & Joley (1933); Christoff (1934) and White (1928) [Bromoviridae: Ilavirus] ICTV 10.0.2.03.01	ApMV, apple mosaic
<i>Apple stem pitting virus</i> Smith (1954) [Flexiviridae: Foveavirus] ICTV 79.0.P.DE.02	ASPV, apple stem pitting
<i>Apple stem grooving virus</i> Lister et al. (1965) [Flexiviridae: Capillovirus] ICTV 13.0.1.0.001	ASGV, apple stem grooving
<i>Cherry rasp leaf virus</i> Bodine and Newton (1942) [Comoviridae: Cheravirus] ICTV 00.111.0.01.001	CRLV, cherry rasp leaf
<i>Tobacco necrosis virus</i> Smith and Bald (1935). [Tombusviridae: Necrovirus] ICTV 00.074.0.03.001	TNV-A, TNV-D, tobacco necrosis
<i>Tobacco ringspot virus</i> Fromme et al. (1927) [Comoviridae: Nepovirus] ICTV 00.018.0.03.027	TRSV, tobacco ringspot virus in apple
<i>Tulare apple mosaic virus</i> Yarwood (1955) [Bromoviridae: Ilavirus] ICTV 00.010.0.02.018	TAMV, tulare apple mosaic
UNKNOWN ETIOLOGY	
Apple chat fruit phytoplasma	Apple chat fruit, apple small fruit
Apple russet ring and associated disorders	Apple russet ring, leaf pucker and fruit russet, leaf fleck, bark blister and fruit distortion
Apple freckle scurf	
Apple green crinkle disease	
Apple green mottle virus	
Apple leaf pucker	Apple leaf pucker virus
Apple McIntosh depression	Apple McIntosh depression virus
Apple platycarpa scaly bark	Platycarpa dwarf virus

Apple pustule canker	
Apple ringspot	Apple Henderson spot virus
Apple rough skin virus	
Apple rubbery wood phytoplasma	Rubbery wood, flat limb
Apple star crack agent	Apple star crack virus
Blister Bark	
Dead spur of apple	
