











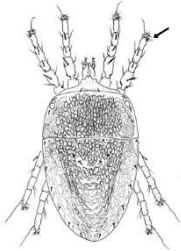



Kiwifruit risk organisms – April 2022





Insects				
Name	Current distribution	Damage	Industry impact	Image
Mediterranean Fruit Fly <i>(Ceratitis capitata)</i>	<p>Originated in tropical Africa and spread to Mediterranean area, central and South America, and South West Australia.</p> <p>Not present in New Zealand.</p>	<ul style="list-style-type: none"> • Significant damage to some crops. • Production impacts to kiwifruit in Europe, especially young vines. • Market access implications likely. 	High	
Queensland Fruit Fly (QFF) <i>(Bactrocera tryoni)</i>	<p>Present in Australia (large populations throughout Eastern Australia), New Caledonia and Austral Islands (French Polynesia).</p> <p>Not present in New Zealand.</p>	<ul style="list-style-type: none"> • Significant damage to some crops. • Kiwifruit is on the host list for QFF which means significant market access implications are likely. 	High	
Oriental Fruit Fly <i>(Bactrocera dorsalis)</i>	<p>Present mainly in Asia and South East Asia and it has been introduced to Palau, Hawaii, Nauru, and Tahiti.</p> <p>Not present in New Zealand.</p>	<ul style="list-style-type: none"> • Significant damage to some crops. • Kiwifruit is likely a poor host with little production impact but market access implications likely. 	High	




<p>Brown Marmorated Stink Bug (BMSB) (<i>Halyomorpha halys</i>)</p>	<p>Native to parts of Asia (China, Japan, Myanmar, Taiwan, Vietnam, and Korea). Invader in USA, Europe, and Chile.</p> <p>Not present in New Zealand but climate is suitable.</p>	<ul style="list-style-type: none"> • Damage to fruit causing rotting of ripening fruit. • Impacts to kiwifruit reported in Italy, up to 30% fruit loss on some orchards. • Hitchhiker species. • Highly mobile and invasive. • Shelter in houses and protected areas during autumn and winter. 	<p>High</p>	
<p>Other species of fruit flies</p>	<p>Worldwide</p>	<ul style="list-style-type: none"> • Potential damage to crop and market implications. 	<p>High</p>	<p>No image available</p>
<p>Asian Hornet (<i>Vespa velutina</i>)</p>	<p>Native to Asia and widespread. Invading Europe since 2006 (Belgium, France, Italy, Portugal, Spain).</p>	<ul style="list-style-type: none"> • Most significant impact is loss of honeybees. Single hornet can catch 25-50 bees per day and rob brood nests to feed their own larvae. • Thought to be causing significant impacts to pollination in France and Spain but extent of damage not well quantified. • Aggressive invader, in France it invaded 120,000 km² within three years. • Can survive long distance transport and enter as a hitch hiker on several pathways including containers, vehicles, and machinery. 	<p>High</p>	
<p>Spotted Lanternfly (<i>Lycorma delicatula</i>)</p>	<p>Native to China where it is listed as a kiwifruit pest.</p> <p>Present in Korea since 2004.</p> <p>Present in Pennsylvania since 2014 and has since spread to seven other US states in the North East.</p>	<ul style="list-style-type: none"> • Emerging biosecurity threat to many horticultural industries, including kiwifruit. • The potential impacts to kiwifruit are unclear but kiwifruit is a reported host. • Hard to control. • Capable of flying but long distance spread usually by hitchhiking on inanimate objects. • Causing economic impacts to the wine grape and other horticultural sectors in the US. 	<p>High</p>	





<p>South American Fruit Fly (<i>Anastrepha fraterculus</i>)</p>	<p>The most serious fruit fly pest in tropical Americas.</p> <p>Distribution ranges from Texas to Argentina. Was eradicated from Chile in 1964 so no longer present in any kiwifruit production regions.</p>	<ul style="list-style-type: none"> • Broad host range that includes both <i>A. chinensis</i>, <i>A. deliciosa</i> but not present in kiwifruit production regions so extent of these impacts unknown. • Serious pest of guavas, mangos, and citrus. • No effective lures available – would not be detected in the New Zealand surveillance system. • Not present in any major kiwifruit markets so high market access implications likely. 	<p>High</p>	
<p>Leafhoppers (<i>Empoasca vitis</i> and <i>E. flavescens</i>)</p>	<p>Widespread in Europe, Asia, and Northern Africa.</p>	<ul style="list-style-type: none"> • Attacks kiwifruit leaves by puncturing and feeding on them. • Causes leaf scorching. • Major pest of kiwifruit in China. 	<p>Moderate</p>	
<p>White Peach Scale (<i>Pseudaulacaspis pentagona</i>)</p>	<p>Originates from Eastern Asia and has global distribution including Australia and Pacific Islands.</p>	<ul style="list-style-type: none"> • Significant loss of crop. • Infests bark, fruit, and leaves. • Known pest of kiwifruit in Italy. • Possible market access implications. • Very widespread pest. 	<p>Moderate</p>	
<p>Yellow Peach Grub (<i>Conogethes punctiferalis</i>)</p>	<p>Widespread in Asia (including Japan, Korea, China and Taiwan) and in the western Pacific and Australia.</p>	<ul style="list-style-type: none"> • Considered a pest of serious concern to kiwifruit in China. • Highly polyphagous and considered by MPI to be a potential high impact species to New Zealand – of particular concern to pip fruit and stone fruit. 	<p>Moderate</p>	




<p>Giant Asian Hornet (<i>Vespa mandarinia</i>)</p>	<p>Native to Asia. Recently intercepted in the USA (2019) and occasionally intercepted in the UK.</p>	<ul style="list-style-type: none"> • Hitchhiker pest. Closely related to Asian Hornet which is causing known pollination issues in Europe by decimating bee colonies. • Can grow up to 4cm. • Thought to have hitchhiked into USA, so can withstand long distance hitchhiking. • Voracious pest that can take out a whole bee colony in number of hours so implications for pollination. 	<p>Moderate</p>	
<p><i>Otiorhynchus salicicola</i></p>	<p>Present in Europe</p>	<ul style="list-style-type: none"> • Impacts kiwifruit plants in Italy. • Damage to roots below the ground, causing deterioration and death in small plants. • Damage to foliage and to a lesser extent, stems, and flowers. 	<p>Moderate</p>	
<p><u>Yellow Spotted Stink Bug</u> (<i>Erthesina fullo</i>)</p>	<p>Japan, China, Taiwan and Vietnam</p>	<ul style="list-style-type: none"> • Reported to be a major kiwifruit pest in China, with some reports of similar level of impact to BMSB. • Risk of entry considered less than BMSB as present only in native range – but intercepted at New Zealand border and post-border on numerous occasions. • Overwinters on inanimate objects and can enter New Zealand as a hitchhiker species. • Difficult to eradicate (like BMSB). 	<p>Moderate</p>	

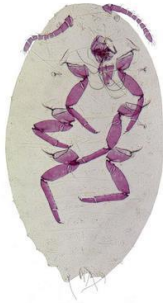



<p>False spider mite (<i>Brevipalpus chilensis</i>)</p>	<p>Present in Chile and Argentina.</p>	<ul style="list-style-type: none"> The most numerous mite found in Chilean kiwifruit orchards where they have caused significant damage to both fruit and vines. 	<p>Moderate</p>	
<p>Brown-winged green stinkbug (<i>Plautia stali</i>)</p>	<p>Japan, Taiwan, South China, and Korea.</p>	<ul style="list-style-type: none"> Attacks a wide range of fruit trees and vegetables. Kiwifruit pest in Japan and Korea. Fruit is attacked when ripe or near ripening causing blemishing and often internal damage. 	<p>Moderate</p>	
<p>Apple heliodinid (<i>Stathmopoda auriferella</i>)</p>	<p>Impacts on kiwifruit reported in Korea.</p> <p>Also found in Japan, Taiwan, China, Pakistan, India, South East Asia, some African countries, and Greece.</p>	<ul style="list-style-type: none"> One of the most serious pests in organic kiwifruit orchards in Korea. Causes fruit damage, especially in Hayward. 	<p>Moderate</p>	
<p>Grape berry moth (<i>Lobesia botrana</i>)</p>	<p>Native to Southern Italy, found throughout Europe, North and West Africa, Middle East, eastern Russia, Japan, and Chile.</p> <p>Pest of kiwifruit in Japan.</p>	<ul style="list-style-type: none"> Grapes are the preferred host but impacts on kiwifruit reported in Japan. First generation larvae feed on flowers, second generation feed on unripe fruit, and third generation cause the greatest damage feeding inside fruit and berries contaminating them with excrement and exposing them to secondary infection. 	<p>Moderate</p>	




<p>Omnivorous leaf roller (<i>Platynota stultana</i>)</p>	<p>Native to Mexico and southern USA. Present as an invasive in California, Florida and Hawaii and established in Spain (2005).</p> <p>Pest of kiwifruit in California.</p>	<ul style="list-style-type: none"> • Highly polyphagous but grapes and stone fruit preferred hosts. • Impacts on kiwifruit reported in California. • Leaf rolling is common symptom, but can also result in flower bud damage, and larval damage to fruit. • Yield losses in grapes are up to 50%. • Thought to only survive in glasshouses in cooler climates. 	<p>Moderate</p>	
<p>Grapevine leafroller (<i>Proeulia auraria</i>)</p>	<p>Chile</p>	<ul style="list-style-type: none"> • An emerging pest affecting grapes and kiwifruit in Chile. • Folded leaves are a symptom of feeding damage. • Larval control not easy with conventional insecticides and may require use of pyrethroids. 	<p>Moderate</p>	
<p>Grape vine leaf-rolling tortricid (<i>Proeulia chrysopteris</i>)</p>	<p>Chile</p>	<ul style="list-style-type: none"> • An emerging pest of fruit crops and vineyards. Infesting Chilean kiwifruit orchards. • Damage to fruit and flowers partially controlled with pesticides. 	<p>Moderate</p>	
<p>Bark Beetles (<i>Xyleborus dispar</i>, <i>X. xylogaphus</i>, <i>Xylosandrus germanus</i>, <i>Lymantor coryli</i>)</p>	<p>Worldwide, impacts to kiwifruit reported in Turkey.</p> <p>Full host range uncertain, but entry pathways (timber and nursery stock), considered to be well managed as a significant forestry pest.</p>	<ul style="list-style-type: none"> • Bark beetles eat the inner bark on twigs, branches, or trunks of kiwifruit vines. • <i>L. coryli</i> also attacks fruit causing fruit drop. • Known as a secondary pest, attacking vines and trees already weakened by disease, drought, or other factors. However, they can also attack healthy trees, especially when they are present as an exotic invader. • Highly invasive. 	<p>Moderate</p>	





<p>Fruit piercing moth (<i>Eudocima phalonia</i>)</p>	<p>Widespread through Asia, Africa. Also present in Hawaii, Australia (NT, NSW, Qld), Cook Islands, French Polynesia, Fiji, Samoa, Tonga, Vanuatu. This species as an occasional non-establishing migrant in New Zealand – thought NZ conditions may not be conducive to establishment.</p>	<ul style="list-style-type: none"> • Feeds on a wide range of fruit. • Kiwifruit (<i>A. chinensis</i>) is a reported host. • Prefers ripe fruit, early harvest limits impact. • Damage by piercing fruit, and secondary infections. • Results in fruit drop and post-harvest rot. • Not considered a market access pest. 	<p>Moderate</p>	
<p>Pumpkin beetles (<i>Aulacophora femoralis</i> & <i>A. indica</i>)</p>	<p>Widespread through most of Asia, Pacific Islands and Russia.</p>	<ul style="list-style-type: none"> • Reported to be a major kiwifruit pest in China. 	<p>Moderate</p>	
<p>Minute brown scavenger beetle (<i>Corticaria gibbosa</i>)</p>	<p>Widespread in Europe, and Asia and in parts of North America.</p>	<ul style="list-style-type: none"> • Reported as a major pest of kiwifruit in China. • Hides in gaps between fruit, or between leaves and fruit. • Host range includes many crops, including kiwifruit. • Can feed on fungi or bacteria, but also fruit skin and flesh (2-3mm deep) in early summer. • Feeding results in corky lesions in fruit. 	<p>Moderate</p>	




<p><i>Dolycoris baccarum</i></p>	<p>Most of Europe and central Asia, including China.</p>	<ul style="list-style-type: none"> • <i>D. baccarum</i>, along with BMSB, was reported as a pest and dominant species in kiwifruit orchards. • Reported as a pest of kiwifruit in China. 	<p>Moderate</p>	
<p><i>Cicadella viridis</i></p>	<p>Widespread in Europe and in Asia including China.</p>	<ul style="list-style-type: none"> • Reported pest on kiwifruit in China. • Potential vector. • Larvae are harmful to young orchards, laying eggs before overwintering and resulting in large numbers of wounds on trunk of young trees. 	<p>Low</p>	
<p>Spotted Wing Drosophila (<i>Drosophila suzukii</i>)</p>	<p>Widely distributed throughout Asia, France, Italy, and Spain. Also present in USA and Canada.</p>	<ul style="list-style-type: none"> • Can attack fruit close to harvest. • Very invasive. • Actinidia reported as host of EPPO/CABI. • Found in all kiwifruit growing regions globally and no recorded impacts to kiwifruit. • Impacts to softer skinned kiwifruit varieties unknown. • Market access implications possible. 	<p>Low</p>	
<p>Chafer beetle (<i>Melolontha melolontha</i>)</p>	<p>Kiwifruit pest in Europe, Northern Asia, and the Mediterranean Basin. Previously widespread in Europe in great numbers, almost eradicated with pesticide use, numbers are beginning to increase again.</p>	<ul style="list-style-type: none"> • Serious pest when present in large numbers. • Reported to impact kiwifruit in Europe. Extent of damage unknown. 	<p>Low</p>	





<p>Chafer beetle (<i>Holotrichia oblita</i>)</p>	<p>One of the main soil-dwelling pests reported to damage Kiwifruit in China.</p>	<ul style="list-style-type: none"> • Reported to damage Kiwifruit in China on leaves primarily • Have adapted to entomopathogens that are used as biocontrol agents, by forming an egg case structure around their eggs to protect their larvae from biocontrol agents such as <i>Beauveria bassiana</i> and the biological pesticide <i>Bacillus thuringiensis</i>. 	<p>Low</p>	
<p>Planthopper or frosted moth bug (<i>Metcalfa pruinosa</i>)</p>	<p>Mainly found in North America and Europe but also present in Cuba and Korea.</p>	<ul style="list-style-type: none"> • Kiwifruit is a reported host with damage reported in Italy, France, and Turkey. • Known invasive. • Large nymph populations can stunt shoot growth. • Adults can cause sooty mould to form. • Leaves markings on fruit. • May be a vector for virus transmission. 	<p>Low</p>	
<p>Chilli Thrips (<i>Scirtothrips dorsalis</i>)</p>	<p>Widespread in Pakistan, Japan, Solomon Islands and Australia, also established in Africa, Israel, USA and Asia including Korea.</p>	<ul style="list-style-type: none"> • Primarily foliage damage on kiwifruit. • Widespread pest with high numbers during the kiwifruit season. • Highly polyphagous (100 plant sp.). • Can transmit viruses. • Recently identified as a species complex (2015) of 9 species with some members more invasive and polyphagous and one more cold tolerant (MPI ERS). • Rapid population growth of <i>S. dorsalis</i> in the outdoors is unlikely in New Zealand due to the climatic conditions. 	<p>Low</p>	


<p>Latana mealybug (<i>Phenacoccus parvus</i>)</p>	<p>Native to south and central America. It has now spread to North America, Asia, Africa, and Australia.</p>	<ul style="list-style-type: none"> Listed as a pest of kiwifruit in Chile, no association with kiwifruit elsewhere. Has been recorded to stunt growth and prevent flower development in some hosts. Few reports of economic damage. 	<p>Low</p>	
<p>Boxelder bug (<i>Boisea trivittata</i>)</p>	<p>North America. Listed as a pest of kiwifruit in California.</p>	<ul style="list-style-type: none"> Not considered a significant horticultural pest but do cause some impacts to kiwifruit including bud and fruit drop as well as fruit malformation, especially noticeable when fruit is cut. Mainly found near coastal areas. Public nuisance when overwintering in houses- often when they are most noticeable. 	<p>Low</p>	
<p><i>Ricania japonica</i>/ <i>Ricania simulans</i></p>	<p>Thought to originate in China, Japan, and Korea.</p> <p>Present as an invasive in Georgia, Russia, Bulgaria, and Turkey.</p> <p><i>R. simulans</i> is a similar species recently reported in Italy, the two species can be confused.</p>	<ul style="list-style-type: none"> A plant hopper that is reported to be a serious pest of kiwifruit and tea in the eastern part of the Black Sea region. Adults and nymphs suck the plant sap and heavy infestations damage the vine. Also, a pest of apple, aubergine, citrus, wine grapes and pears. Large populations may be required for significant damage. 	<p>Low</p>	
<p>Leafhopper (<i>Edwardsiana salicicola</i>)</p>	<p>Turkey, UK and parts of Europe.</p>	<ul style="list-style-type: none"> Impacts on kiwifruit reported in Turkey, where extensive feeding caused severe leaf distortions such as leaf crinkling. 	<p>Low</p>	


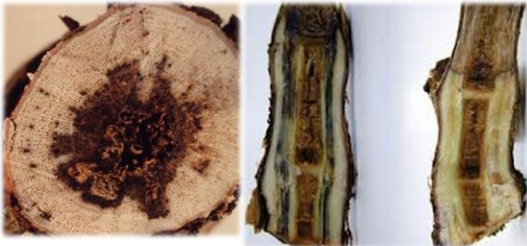
<p>Japanese Beetle (<i>Popillia japonica</i>)</p>	<p>Native to Japan and Russia. Present throughout USA as an invasive.</p> <p>First reported in Italy in 2014 in the regions of Piedmont and Lombardy.</p>	<ul style="list-style-type: none"> • Adults attack leaves and destroy flowers. • Has a wide host range that includes kiwifruit. 	<p>Low</p>	
<p>Mulberry moth / Fall web worm (<i>Hyphantria cunea</i>)</p>	<p>Native to North America where it is widespread. Present as an invasive in Europe and Eastern Asia.</p> <p>2003 incursion in Auckland, subsequently eradicated.</p>	<ul style="list-style-type: none"> • Highly polyphagous feeding on almost any deciduous tree, chewing leaves and in some cases defoliating leaves of entire branches. • Recorded on 636 plant species. • Reported to be feeding on kiwifruit leaves in France and stripping the skin off fruit. 	<p>Low</p>	<p>Male (above) and female (below)</p> 
<p>Black-tipped leaf hopper (<i>Bothrogonia ferruginea</i>)</p>	<p>Much of Asia, including China and Japan.</p>	<ul style="list-style-type: none"> • Reported pest of kiwifruit in China. • Sucks sap on the underside of leaves. 	<p>Low</p>	


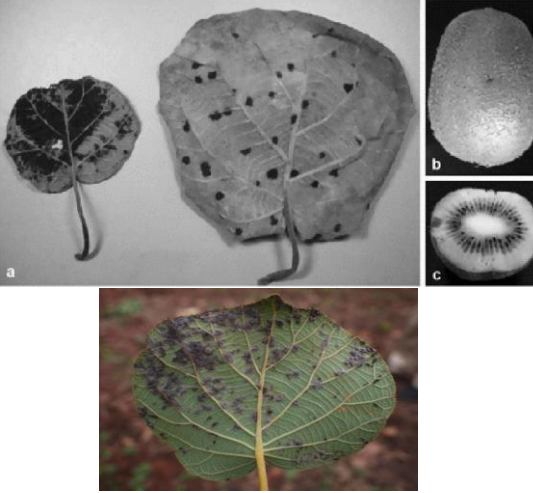

<p>Vine Hawk Moth (<i>Ampelophaga rubiginosa</i>)</p>	<p>Found throughout Asia and Russia.</p>	<ul style="list-style-type: none"> • Reported as a pest of kiwifruit in China. • Known as an occasional pest on grapevines - can defoliate whole vines. 	<p>Low</p>	
<p>Giant Looper (<i>Ascostis selenaria</i>)</p>	<p>Found Worldwide- Europe, Africa, Asia.</p>	<ul style="list-style-type: none"> • Known as a major pest in certain crops; citrus, tea, coffee, alfalfa, peanuts etc. • Reported as a minor pest a kiwifruit in China. 	<p>Low</p>	
<p>Painted Apple Moth (<i>Teia anartoides</i>)</p>	<p>Native to Australia. Not currently present in New Zealand, has previously been eradicated.</p>	<ul style="list-style-type: none"> • Attacks fruit and leaves of multiple horticultural crops. • Kiwifruit not a reported host. • Unknown if an incursion may still have market access implications. 	<p>unknown</p>	
<p>Asian Gypsy Moth (<i>Lymantria dispar</i>)</p>	<p>Present in Japan, China, Korea, Russia, Germany.</p> <p>Not currently present in New Zealand, has previously been eradicated.</p>	<ul style="list-style-type: none"> • Attacks fruit and leaves of many horticultural crops. • Kiwifruit is not a recorded host. • Unknown if an incursion may still result in market access restrictions. 	<p>unknown</p>	



<p>Glassy winged sharpshooter (<i>Homalodisca vitripennis</i>)</p>	<p>Present in USA, Mexico and the Pacific.</p>	<ul style="list-style-type: none"> • Known invasive and pathogen transmitter, especially in grape industry. • Known to transmit <i>Xylella fastidiosa</i> – a serious bacteria decimating olives in Italy. • Impacts to kiwifruit unknown. 	<p>unknown</p>	
<p>Fall Army Worm (<i>Spodoptera frugiperda</i>)</p>	<p>Native to the Americas. Invasive to Africa, Asia, and more recently invader to Australia (2019).</p>	<ul style="list-style-type: none"> • Cultivated grasses (i.e., maize, rice) are primary hosts although wide host range of over 350 hosts. • Kiwifruit not a reported host. However close relative, tropical army worm can cause significant impacts to orchards. • Significant defoliator. Feeds on leaves and stems. • Known to disperse large distances and spread rapidly once introduced. 	<p>unknown</p>	
<p>Bean bug (<i>Riptortus clavatus</i>)</p>	<p>China, Korea, Taiwan, Japan.</p>	<ul style="list-style-type: none"> • Present in kiwifruit orchards. • Attracted by stink bug lures. • Found in association with damaged fruit with other stink bugs but unknown if causes impact. 	<p>unknown</p>	



<p>Mango scale, Magnolia white scale (<i>Pseudaulacaspis cockerelli</i>)</p>	<p>Native to Asia. Invasive in Hawaii, Puerto Rico and southern USA.</p>	<ul style="list-style-type: none"> • Serious pest of many agricultural and ornamental plants (mainly palms). • Reported as pest on kiwifruit in China. 	<p>unknown</p>	
<p>Coconut scale (<i>Aspidiotus destructor</i>)</p>	<p>Tropical/sub-tropical distribution globally.</p>	<ul style="list-style-type: none"> • Serious pest of many fruit trees including avocado, breadfruit and mango. • Known pest of kiwifruit in China. • May not establish into New Zealand due to climatic unsuitability. 	<p>unknown</p>	
<p>Red wax scale (<i>Ceroplastens rubens</i>)</p>	<p>Found throughout Asia, some parts of Africa and Oceania.</p>	<ul style="list-style-type: none"> • Significant pest of Citrus in Australia, Hawaii, Korea, Japan and China. • Reported as pest on kiwifruit in China. 	<p>unknown</p>	
<p>Apple Maggot Fly (<i>Rhagoletis pomonella</i>)</p>	<p>North America (USA, Canada and Mexico).</p>	<ul style="list-style-type: none"> • Larval feeding on fruit, one of the most serious insect pests for the apple industry. • Impacts to kiwifruit unknown. • Difficult to eradicate. 	<p>unknown</p>	
<p><i>Leipothrix argutae</i> sp. nov. (Mite species)</p>	<p>China</p>	<ul style="list-style-type: none"> • Reported on <i>Actinidia arguta</i> in China. • Affected plants exhibited rusty leaf and fruit discoloration. 	<p>unknown</p>	<p>No image available</p>


<p>Mexican Fruit Fly (<i>Anastrepha ludens</i>)</p>	<p>USA, Mexico and much of Central America.</p>	<ul style="list-style-type: none"> • Larval feeding on fruit, especially citrus. • Unknown if kiwifruit is a host. • High dispersal potential and difficult to eradicate. • May result in market access implications. 	<p>unknown</p>	
---	---	---	----------------	---

Fungi				
Name	Current distribution	Damage	Industry impact	Image
<p>Ceratocystis fimbriata</p>	<p>Worldwide on a wide range of hosts, including NZ on kumara (but this strain non-pathogenic to kiwifruit). Impacts to kiwifruit only reported in Brazil. Strains in mango, eucalyptus, coffee and pomegranate in India, Pakistan, Indonesia, South China and Oman may also be pathogenic to kiwifruit and are of particular concern.</p>	<ul style="list-style-type: none"> • Significant damage to Brazilian kiwifruit industry. • Can result in vine death extremely rapidly. • Some orchards have lost 50% of vines. • No effective fungicides available. • Spread through movement of contaminated soil, tools and infected plant material. 	<p>High</p>	
<p>Esca disease <i>Fomitiporia mediterranea</i></p>	<p>Widespread in wine grapes, found throughout Europe and also in Algeria and Iran. First reported in kiwifruit in Italy, 1995 and has subsequently spread through multiple growing regions in Italy.</p>	<ul style="list-style-type: none"> • Vine rot referred to as Esca disease in wine grapes and kiwifruit. • Causes leaf spotting leading to wilting and drop. • Fruit become stunted and do not reach maturity reducing productivity. • Trunk decay may be bleached spongy decay or brown areas of necrosis. 	<p>High</p>	

<p><u>Verticillium wilt</u> (<i>Verticillium nonalfalfae</i>)</p>	<p>Strain pathogenic to kiwifruit only reported in Chile.</p> <p>Strains pathogenic to other hosts widely distributed including presence in New Zealand.</p>	<ul style="list-style-type: none"> • Impacts to kiwifruit reported in Chile. • Sudden collapse of apparently healthy plants. • Brown discolouration of vascular tissue. • Damage to foliage and vine death, especially in Hort16A. • Some infected orchards in Chile have had up to 80% vine mortality within 3 years. 	<p>High</p>	
<p>Sooty spot (<i>Pseudocercospora actinidiae</i>)</p>	<p>Present in Japan and Korea and China.</p>	<ul style="list-style-type: none"> • Impacts to kiwifruit foliage and fruit. • Causes 'sooty spot' – a black sooty spot on the leaf. • Affected fruit have lesion with an oval cave of 2-4 cm diameter. 	<p>Moderate</p>	
<p>Side rot (<i>Pseudocercospora hangzhouensis</i>)</p>	<p>Japan and Korea.</p>	<ul style="list-style-type: none"> • Affects Hort 16A. • Amorphous large brown spots on both side of leaf. • Affected fruit is soft, with lesion of 1-2cm in diameter that may be white or light brown. 	<p>Moderate</p>	



<i>Calonectria ilicicola</i>	Present in Asia, Australia, UK, USA and New Zealand (not on kiwifruit).	<ul style="list-style-type: none"> • Wide host range. • Causes root rot in other hosts, including avocados in New Zealand. • Pathogenicity testing indicates could cause root rot in kiwifruit. 	Moderate	No image available
Brown leaf spot (<i>Corynespora cassiicola</i>)	First report of brown leaf spot on kiwifruit in Sichuan, China.	<ul style="list-style-type: none"> • Observed on <i>A. chinensis</i> in 2012. • Caused reddish brown lesions that developed into brown lesions surrounded by purple margins. • Resulted in extensive necrosis and premature defoliation, affecting photosynthesis and nutrient transport. 	Moderate	
<i>Diaporthe actinidiae</i> (aka <i>Phomopsis actinidiae</i> , <i>Cytospora actinidiae</i>)	Reported in China and Korea.	<ul style="list-style-type: none"> • Causes internal rot of kiwifruit fruit and vines. • Known to cause stem rot in kiwifruit since the 1970s. • Thought to prefer climates with high humidity so low risk to New Zealand except possibly under covered orchards. 	Moderate	
<i>Diaporthe tulliensis</i>	China – Hubei and Anhui provinces, reported in kiwifruit 2017.	<ul style="list-style-type: none"> • Pathogenicity testing indicated high virulence to kiwifruit. • Associated with cankers and fruit rot but unclear which symptoms associated with <i>D. tulliensis</i> vs. <i>D. actinidiae</i> which was also present. 	Moderate	No image available



<i>Armillaria mellea</i>	Worldwide although this strain is not present in New Zealand.	<ul style="list-style-type: none"> • Causes root rot and die back. • Not likely to have economic impact unless the strain is much more aggressive than the strain of <i>Armillaria</i> currently present. 	Low	
Rust disease (<i>Pucciniastrum actinidiae</i>)	Reported in China, Japan and Taiwan.	<ul style="list-style-type: none"> • Rust fungus causes symptoms on kiwifruit leaves in Japan. Extent of impacts unknown. 	Low	
<i>Pestalotiopsis neglecta</i>	Present in Asia, Poland, Cameroon and Australia.	<ul style="list-style-type: none"> • Angular leaf spotting on kiwifruit in Japan. • Other <i>Pestalotiopsis</i> are present in New Zealand but have minimal impacts on kiwifruit to date. 	Low	No image available
<i>Lecythophora luteoviridis</i>	Present in Italy and Germany.	<ul style="list-style-type: none"> • Abnormal increase in trunk diameter with longitudinal dark cracks. • Fruit is abnormal on affected vines. • Inoculation trials show an intermediate ability to colonise kiwifruit. 	Low	No image available
Brown leaf spot (<i>Phyllosticta actinidiae</i>)	Present in China.	<ul style="list-style-type: none"> • Reported to cause brown spot in kiwifruit leaves in China. • <i>Phyllosticta</i> genus contains many other plant pathogen species infecting other hosts worldwide. 	Low	No image available
<i>Botryosphaeria kuwatsukai</i> (syn:	Present in China.	<ul style="list-style-type: none"> • Reported as a disease in China. • Causes fruit rot on affected plants. 	Unknown	No image available


<i>Phyalospora piricola)</i>		<ul style="list-style-type: none"> • Full impacts somewhat unknown. 		
<i>Cercospora iteodaphnes</i> Or <i>Spiropes scopiformis</i>	Present in China	<ul style="list-style-type: none"> • Reported as a disease in China. • Causes leaf mould on affected plants. • Full impacts somewhat unknown. 	Unknown	No image available
<i>Phyllactinia imperialis</i>	Present in China.	<ul style="list-style-type: none"> • Reported as a disease in China. • Causes powdery mildew on kiwifruit. • Full impacts somewhat unknown. 	Unknown	No image available
Oomycetes				
Name	Current distribution	Damage	Industry impact	Image
<i>Phytophthora drechsleri</i>	Reported in kiwifruit in Korea (1997). Now found in California, USA. Organism widely distributed but no other reports in kiwifruit.	<ul style="list-style-type: none"> • Causes severe root rot in 1-5-year-old vines. • Infected vines display leaf chlorosis, scorch, defoliation and eventually death. • Severe in poorly drained lowlands and can infect over 80% of vines and over 80% of orchards in these regions. 	High	
<i>Pythium helicoides</i> (syn. <i>Phytopythium helicoides</i>)	Japan, China, USA and Italy	<ul style="list-style-type: none"> • Infects both green and gold kiwifruit varieties. • Incidence of infection in China was 38% in some orchards. • Necrosis of leaf margins and leaf curl followed by decline and then vine death. • Causes root and collar rot, infected tissue red/brown. • Isolated from vines presenting death in Italy - still work to determine if causal agent. 	Moderate	No image available


<i>Phytophthora palmivora</i>	Worldwide distribution. Reported on as new host on kiwifruit in Turkey.	<ul style="list-style-type: none"> • Crown rot symptoms observed in approx. 10% of vines in an experimental orchard in Turkey ultimately resulting in 100% death of all vines. 	Low	<i>No image available</i>
<i>Phytophthora pistaciae</i>	Thought to be native to Iran. Has not been reported outside Iran.	<ul style="list-style-type: none"> • Recently isolated from pistachio in Iran – an important crop to the region where Phytophthora cause yield losses of about 10%. • Pathogenicity testing indicates this species is pathogenic to a range of hosts, including Actinidia. 	Low	<i>No image available</i>

Bacteria

Name	Current distribution	Damage	Industry impact	Image
Psa (non-NZ biovars) <i>Pseudomonas syringae actinidiae</i>	Present in Japan, South Korea. These strains not present in New Zealand.	<ul style="list-style-type: none"> • There are at least four biovars of Psa infecting kiwifruit around the world, of which NZ has one (Psa-3). • Japanese and Korean strains are more virulent towards Hayward cultivars which would be devastating to the NZ industry should they establish here. • Symptoms similar to Psa-V, severe infection causes death to vines. 	High	
Summer Canker <i>Pectobacterium carotovorum subsp. Actinidiae</i>	This subspecies and its impacts to kiwifruit have only been reported in Jeju province, Korea. More recently found in Sichuan Province, China. Other <i>P. carotovorum</i> subspecies widely distributed including presence in New Zealand.	<ul style="list-style-type: none"> • Symptoms similar to Psa-V, severe infection causes vine death. • Gold kiwifruit varieties, especially Hort16A are most susceptible. • In Korea it is associated with warmer summer (30-32 °C). • High level of incidence in Korean orchards. 	High	

				
<i>Acidovorax valerianellae</i>	Reported in kiwifruit in Korea. Also reported in other hosts in Belgium, Germany, Austria France.	<ul style="list-style-type: none"> • Bacterial leaf spot disease on Hayward and Hort16A in Korea. • Spots without halos. • Found during the rainy season. • Found in other host species such as hydrangea, tea, watermelon and salad greens where it causes severe economic losses. 	Low	<i>No image available</i>
Phytoplasma	Worldwide. Reported in Italy on kiwifruit.	<ul style="list-style-type: none"> • Phytoplasma are known to cause serious diseases in many species of fruit trees. • A survey of fruit crops in central and southern Italy using DNA testing, found phytoplasma in kiwifruit. • Impacts to kiwifruit are unknown. 	Unknown	<i>No image available</i>
<i>Xylella fastidiosa</i>	California, Italy, mainly infection grapes and olives. Kiwifruit not a known host but because there are multiple strains which are host specific the risk remains somewhat unknown but impact warrants watching brief.	<ul style="list-style-type: none"> • No impact to kiwifruit reported despite being present in kiwifruit growing regions in California. • Serious horticultural pathogen causing significant impacts to European olive and wine grape industries. • Extensive host range but different strains impact different hosts so unknown where risk lies. • Insect vectored. • GWSS primary vector offshore and not present in New Zealand. • Spittlebugs also know to vector offshore. Spittlebugs are present 	Unknown	

		in NZ but their presence in kiwifruit orchards is somewhat unknown.		
<i>Enterobacter mori</i>	China, Japan, and Taiwan	<ul style="list-style-type: none"> Reported to cause bacterial wilt on kiwifruit in China. Unknown impact as newly reported- more research needed to determine actual impacts. 	Unknown	No image available
Viruses				
Name	Current distribution	Damage	Industry impact	Image
Pelargonium zonate spot virus (PZSV)	Present in Italy in kiwifruit. Found in other hosts in Australia, France, Italy, Israel, Spain and the USA.	<ul style="list-style-type: none"> Seed borne in other host species. Symptoms include leaf spotting and fruit distortion. 	Moderate	
<i>Actinidia chlorotic ringspot-associated virus</i> (AcCRaV)	New to science, recently found in kiwifruit in five provinces of central and western China. Detected in recent surveys.	<ul style="list-style-type: none"> Associated with symptoms including leaf chlorotic ring spots and vein yellowing. Impacts unknown but potential to reduce kiwifruit yield and vine survival with significant economic implications. Found in four species; <i>Actinidia chinensis</i>, <i>A. deliciosa</i>, <i>A. kolomikta</i>, <i>A. eriantha</i>. Thought to be transmissible through grafting and mites. 	Moderate	No image available
<i>Tomato zonate spot virus</i>	China	<ul style="list-style-type: none"> Recently isolated from kiwifruit, first host record. Potential impact unknown. 	Unknown	No image available

Apple stem grooving virus (kiwifruit strain)	Present in China. Not present in New Zealand but has been found in imports from China held in quarantine	<ul style="list-style-type: none"> • Damage to leaves. • Not transmitted by a vector, mechanically transmitted during vine management. 	Not thought to be detrimental to commercial kiwifruit production	
Actinidia emaravirus 2 (AcEV-2)	Present in China in kiwifruit. New novel emaravirus.	<ul style="list-style-type: none"> • Isolation to leaf chlorosis and leaf mottling. • New to science so not enough evidence to make a conclusion about association with disease symptoms. 	Unknown	<i>No image available</i>
Other viruses isolated from kiwifruit include; <i>Emaravirus</i> , Citrus Blotch virus, <i>Closterovirus</i> , <i>Tospovirus</i>	Isolated by deep sequencing in China. Study indicates virus infections in kiwifruit are common.	<ul style="list-style-type: none"> • Plants were symptomatic. • Nature of symptoms and virus responsible unknown. 	Unknown	<i>No image available</i>

Kiwifruit Vine Health Incorporated (KVH) makes no warranty or representation as to the accuracy or completeness of the information, photographs or other published material in this publication. KVH shall not be liable to any person for loss, injury or damages arising from a person's reliance on the published material. Published material authored by a person other than KVH reflects the view of the author and not necessarily the view of KVH. The published material may be subject to copyright and shall not be reproduced in any manner without first obtaining the permission of KVH.