Australian Government

Biosecurity Australia

DRAFT

Revised Draft Import Risk Analysis Report for Table Grapes from Chile

Part B

February 2005

This *Revised Draft Import Risk Analysis Report for Table Grapes from Chile* is produced for consultation and stakeholder comments.

Every effort has been made to ensure that the information provided in this document is true and accurate at the time of publication. A number of factors may affect the accuracy or completeness of this information. These factors include changes in pest and disease status, scientific information, and material continuing to be reviewed by Biosecurity Australia or otherwise provided that is relevant to the final import risk assessment.

This revised draft import risk analysis report for table grapes from Chile should not be relied upon for making any business decisions.

Table of Contents

APPENDIX – 1: PEST CATEGORISATION

1A Pest categorisation for table grapes from Chile (Presence/Absence)

1B Pest categorisation for table grapes from Chile (pathway association)

1C Potential for establishement or spread and consequences

Appendix 1A: Pest categorisation for table grapes from Chile – Presence and absence in Australia (arthropods and pathogens)

Pest	Common name	Presence in		Consider further (yes/no)
		Chile	Australia	
ARTHROPODS				
Acari (mites)				
Brevipalpus chilensis Baker [Acari: Tenuipalpidae]	False red mite	Klein Koch & Waterhouse, 2000		Yes
Brevipalpus obovatus Donnadieu [Acari: Tenuipalpidae]	Privet mite	Klein Koch & Waterhouse, 2000	Halliday, 1998	
Bryobia rubrioculus (Sheuten) [Acari: Tetranychidae]	Brown almond mite	Klein Koch & Waterhouse, 2000	Halliday, 1998	
Colomerus vitis (Pagenstecher) [Acari: Eriophyidae] strain a	Grape erineum mite; grape leaf blister mite	Gonzalez, 1983	James & Whitney, 1993	
Colomerus vitis (Pagenstecher) [Acari: Eriophyidae] strain b	Grape bud mite	Gonzalez, 1983	James & Whitney, 1993	
Eotetranychus lewisi (McGregor) [Acari: Tetranychidae]	Lewis spider mite	Klein Koch & Waterhouse, 2000		Yes
Oligonychus mangiferus (Rahman & Sapra) [Acari: Tetranychidae]	Mango spider mite	Bolland *et al*., 1998	AICN, 2004 (except WA)	Yes
Oligonychus punicae (Hirst) [Acari: Tetranychidae]	Avocado brown mite	Bolland *et al*., 1998	AICN, 2004 (except WA)	Yes
Oligonychus vitis Zaher & Shehata [Acari: Tetranychidae]	Table grape red mite	Klein Koch & Waterhouse, 2000		Yes
`*Oligonychus yothersi* McGregor [Acari: Tetranychidae]	Avocado red mite	Bolland *et al*., 1998		Yes
Panonychus citri McGregor [Acari: Tetranychidae]	Citrus red mite	Bolland *et al*., 1998	AICN, 2004 (except WA)	Yes
Panonychus ulmi (Koch) [Acari: Tetranychidae]	European red mite	Gonzalez, 1983	AICN, 2004 (except WA)	Yes
Tetranychus desertorum Banks [Acari: Tetranychidae]	Tetranychid mite	Prado, 1991	AICN, 2004 (except WA)	Yes
Tetranychus ludeni Zacher [Acari: Tetranychidae]	Red spider mite	Prado, 1991	Halliday, 1998	
Tetranychus urticae Koch [Acari: Tetranychidae]	Two spotted spider mite	Klein Koch & Waterhouse, 2000	Halliday, 1998	
Coleoptera (beetles, weevils)				
Athlia rustica (Erichson) [Coleoptera: Scarabaeidae]	Brown beetle	Klein Koch & Waterhouse, 2000		Yes
Callideriphus laetus Bl. [Coleoptera: Cerambycidae]	Peumo borer	Klein Koch & Waterhouse, 2000		Yes
Carpophilus hemipterus (Linnaeus) [Coleoptera: Nitidulidae]	Dried fruit beetle	Klein Koch & Waterhouse, 2000	James *et al*., 2000	

Pest	Common name	Presence in		Consider further (yes/no)
		Chile	Australia	
Dexicrates robustus (Blanchard) [Coleoptera: Bostrichidae]	Tree wood borer	Klein Koch & Waterhouse, 2000		Yes
Geniocremnus chilensis (Boheman) [Coleoptera: Curculionidae]	Tuberous pine weevil	Klein Koch & Waterhouse, 2000		Yes
Micrapate humeralis (Blanchard) [Coleoptera: Bostrichidae]	Mesquite borer	Klein Koch & Waterhouse, 2000		Yes
Micrapate scabrata (Erichson) [Coleoptera: Bostrichidae]	Vine borer	Klein Koch & Waterhouse, 2000		Yes
Naupactus xanthographus (Germar) [Coleoptera: Curculionidae]	Fruit tree weevil	Klein Koch & Waterhouse, 2000		Yes
Neoterius mystax (Blanchard) [Coleoptera: Bostrichidae]	Fence borer	Klein Koch & Waterhouse, 2000		Yes
Otiorhynchus rugosostriatus (Goeze) [Coleoptera: Curculionidae]	Rough strawberry root weevil	Wibmer & O'Brien, 1986; Devotto & Gerding, 2001	Restricted to Tasmania (Miller, 1979)	Yes
Otiorhynchus sulcatus (Fabricius) [Coleoptera: Curculionidae]	Vine weevil	Prado, 1988	AICN, 2004 (except WA)	Yes
Pantomorus ruizi (Brèthes) [Coleoptera: Curculionidae]	Alfalfa root weevil	Klein Koch & Waterhouse, 2000		Yes
Platyapistes venustus (Erichson) [Coleoptera: Curculionidae]	Green weevil	Gonzalez, 1983		Yes
Diptera (flies)				
Ceratitis capitata (Wiedemann) [Diptera: Tephritidae]	Mediterranean fruit fly; Medfly	Prado, 1991	WA only (Hancock *et al.*, 2000) - Under official control)	Yes
Drosophila melanogaster Sturtevant [Diptera: Drosophilidae]	Vinegar fly	Klein Koch & Waterhouse, 2000	Olsen *et al*., 2001	
Drosophila simulans Sturtevant [Diptera: Drosophilidae]	Vinegar fly	CABI, 2004	Hoffmann, 1991	
Hemiptera (aphids, leafhoppers, mealybugs, scales, true bugs, whiteflies)				
Aphis fabae Scopoli [Hemiptera: Aphididae]	Black aphid	Klein Koch & Waterhouse, 2000		Yes
Aphis gossypii Glover [Hemiptera: Aphididae]	Cotton aphid	Gonzalez, 1983	APPD, 2004	
Aphis illinoisensis Shimer [Hemiptera: Aphididae]	Grapevine aphid	Klein Koch & Waterhouse, 2000		Yes
Aphis spiraecola Patch [Hemiptera: Aphididae]	Brown citrus aphid	Klein Koch & Waterhouse, 2000	APPD, 2004	
Aspidiotus nerii Bouché [Hemiptera: Diaspididae]	Aucuba scale	Klein Koch & Waterhouse, 2000	AICN, 2004	
Balclutha aridula (Linnavuori) [Hemiptera: Cicadellidae]	Ballica leafhopper	Klein Koch & Waterhouse, 2000		Yes
Coccus hesperidum Linnaeus [Hemiptera: Coccidae]	Brown scale	Klein Koch & Waterhouse, 2000	APPD, 2004	

Pest	Common name	Presence in		Consider further (yes/no)
		Chile	Australia	
Diaspidiotus ancylus (Putnam) [Hemiptera: Diaspididae]	Putnam scale	Klein Koch & Waterhouse, 2000	APPD, 2004	
Diaspidiotus perniciosus (Comstock) [Hemiptera: Diaspididae]	San Jose scale	Klein Koch & Waterhouse, 2000	AICN, 2004	
Hemiberlesia lataniae (Signoret) [Hemiptera: Diaspididae]	Lataniae scale	Klein Koch & Waterhouse, 2000	AICN, 2004	
Hemiberlesia rapax (Comstock) Hemiptera: Diaspididae]	Greedy Scale	Klein Koch & Waterhouse, 2000	AICN, 2004	
Icerya palmeri Riley-How [Hemiptera: Margarodidae]	Margarodes scale	Prado, 1991		Yes
Leptoglossus chilensis Spinola [Hemiptera: Coreidae]	Brown Chilean leaf-footed bug	Klein Koch & Waterhouse, 2000		Yes
Macrosiphum euphorbiae (Thomas) [Hemiptera: Aphididae]	Potato aphid	CABI, 2004	Dillard *et al*., 1993	
Margarodes vitis (Philippi) [Hemiptera: Margarodidae]	Grape pearl	Klein Koch & Waterhouse, 2000		Yes
Nezara viridula (Linnaeus) [Hemiptera: Aphididae]	Green vegetable bug	Klein Koch & Waterhouse, 2000	APPD, 2004	
Parthenolecanium corni (Bouché) [Hemiptera: Coccidae]	European fruit scale	Klein Koch & Waterhouse, 2000	AICN, 2004 (except WA)	Yes
Parthenolecanium persicae (Fabricius) [Hemiptera: Coccidae]	Peach scale	Klein Koch & Waterhouse, 2000	APPD, 2004	
Planococcus citri (Risso) [Hemiptera: Pseudococccidae]	Citrus mealybug	Klein Koch & Waterhouse, 2000	Gullan, 2000	
Pseudococcus calceolariae (Maskell) [Hemiptera: Pseudococccidae]	Citrophilus mealybug	Prado, 1991	AICN, 2004 (except WA)	Yes
Pseudococcus longispinus Targioni-Tozzetti [Hemiptera: Pseudococccidae]	Long-tailed mealybug	Klein Koch & Waterhouse, 2000	APPD, 2004	
Pseudococcus maritimus (Ehrhorn) [Hemiptera: Pseudococcidae]	Grape mealybug	Klein Koch & Waterhouse, 2000	Williams, 1985	
Pseudococcus viburni Maskell [Hemiptera: Pseudococccidae]	Tuber mealybug	Klein Koch & Waterhouse, 2000	APPD, 2004	
Saissetia coffeae (Walker) [Hemiptera: Coccidae]	Brown coffee scale	Ben-Dov, 1993	APPD, 2004	
Saissetia oleae (Olivier) [Hemiptera: Coccidae]	Mediterranean black scale	Klein Koch & Waterhouse, 2000	APPD, 2004	
Tettigades chilensis Amyot & Serville [Hemiptera: Cicadidae]	Common cicada	Klein Koch & Waterhouse, 2000		Yes
Hymenoptera (ants, wasps)				
Ametastegia glabrata Fallen [Hymenoptera: Tenthredinidae]	Holoartic sawfly	Prado, 1991	AICN, 2004 (except WA)	Yes

Pest	Common name	Presence in		Consider further (yes/no)
		Chile	Australia	
Polistes buyssoni Brethes [Hymenoptera: Vespidae]	Paper wasp	Klein Koch & Waterhouse, 2000		Yes
Vespula germanica (Fabricius) [Hymenoptera: Vespidae]	European wasp	Klein Koch & Waterhouse, 2000	AICN, 2004 (except WA)	Yes
Isoptera (termites)				
Neotermes chilensis (Blanchard) [Isoptera: Kalotermitidae]	Chilean termite	Klein Koch & Waterhouse, 2000		Yes
Lepidoptera (moths, butterflies)				
Accuminulia buscki J. Brown [Lepidoptera: Tortricidae]	Tortricid leafroller	Brown, 1999		Yes
Accuminulia longiphallus J. Brown [Lepidoptera: Tortricidae]	Tortricid leafroller	Brown, 1999		Yes
Agrostis ipsilon (Hufnagel) [Lepidoptera: Noctuidae]	Black cutworm	Parra *et al*., 1986	AICN, 2004	
Chileulia stalactitis (Meyrick) [Lepidoptera: Tortricidae]	Grape berry moth	Klein Koch & Waterhouse, 2000		Yes
Copitarsia consueta (Walker) [Lepidoptera: Noctuidae]	Copitarsia cutworm	Gonzalez, 1983		Yes
Copitarsia turbata (Herrich-Schaffer) [Lepidoptera: Noctuidae]	Copitarsia cutworm	Klein Koch & Waterhouse, 2000		Yes
Hyles annei (Guérin-Méneville) ([Lepidoptera: Sphingidae]	Vine hornworm	Klein Koch & Waterhouse, 2000		Yes
Hyles euphorbiarum (Guérin-Méneville & Percheron) [Lepidoptera: Sphingidae]	Palqui hornworm	Klein Koch & Waterhouse, 2000		Yes
Hyles lineata Fabricius (*Celerio lineata* (Fabricius)) [Lepidoptera: Sphingidae]	White lined sphinx	Gonzalez, 1983	AICN, 2004	
Paracles rudis (Butler) [Lepidoptera: Arctiidae]	Red grape caterpillar	Klein Koch & Waterhouse, 2000		Yes
Peridroma saucia (Hübner) [Lepidoptera: Noctuidae]	Variegated cutworm	Klein Koch & Waterhouse, 2000		Yes
Proeulia auraria (Clarke) [Lepidoptera: Tortricidae]	Orange leaf roller	Klein Koch & Waterhouse, 2000		Yes
Proeulia chrysopteris (Butler) [Lepidoptera: Tortricidae]	Fruit leaf roller	Klein Koch & Waterhouse, 2000		Yes
Proeulia triquetra Obraztsov [Lepidoptera: Tortricidae]	Grape leaf roller	Klein Koch & Waterhouse, 2000		Yes
Spodoptera frugiperda J.E. Smith [Lepidoptera: Noctuidae]	Fall armyworm	CABI/EPPO, 1997		Yes
Orthoptera (crickets, grasshoppers, locusts)				
Achaeta fulvipennis Brown [Orthoptera: Gryllidae]	Cricket	Gonzalez, 1983		Yes
Dichroplus maculipennis (Blanchard) [Orthoptera: Acrididae]	Spotted wing grasshopper	Klein Koch & Waterhouse, 2000		Yes

Pest	Common name	Presence in		Consider further (yes/no)
		Chile	Australia	
Schistocerca cancellata (Serville) [Orthoptera: Acrididae]	South American locust	Gonzalez, 1983		Yes
Thysanoptera (thrips)				
Drepanothrips reuteri Uzel [Thysanoptera: Thripidae]	Grape thrips	Klein Koch & Waterhouse, 2000		Yes
Frankliniella australis Morgan [Thysanoptera: Thripidae]	Chilean flower thrips	Klein Koch & Waterhouse, 2000		Yes
Frankliniella occidentalis (Pergande) [Thysanoptera: Thripidae]	Western flower thrips	Klein Koch & Waterhouse, 2000	Restricted distribution (Mound & Gillespie, 1997)	Yes
Heliothrips haemorrhoidalis (Bouché) [Thysanoptera: Thripidae]	Greenhouse thrips	Klein Koch & Waterhouse, 2000	AICN, 2004	
Thrips australis (Bagnall) [Thysanoptera: Thripidae]	Eucalyptus thrips	Prado, 1991	AICN, 2004	
Thrips tabaci Lindeman [Thysanoptera: Thripidae]	Onion thrips	Klein Koch & Waterhouse, 2000	AICN, 2004	
CONTAMINATING PESTS				
Latrodectus mactans (Fabricius) [Araneae: Theridiidae]	Black widow spider	Schenone & Correa, 1985		Yes[1]
GASTROPODS (snails, slugs)				
Helix aspersa Muller [Gastropoda: Helicidae]	Brown garden snail	Gonzalez, 1983	Furness, 1977	
PATHOGENS				
Bacteria				
Agrobacterium vitis (Smith & Townsend) Conn	Crown gall of grapes	Burr *et al*., 1998	Gillings & Ophel-Keller, 1995	
Pseudomonas syringae van Hall pv. *syringae* van Hall	Bacterial blast	Bradbury, 1986	APPD, 2004	
Rhizobium radiobacter (Beijerinck & van Delden) Young *et al*.	Crown gall	Bradbury, 1986	Bradbury, 1986	
Fungi				
Alternaria alternata (Fr.: Fr.) Keissl.	Alternaria leaf blight	Pszczólkowski *et al*., 2003	APPD, 2004	
Alternaria vitis Cavara	Grapevine alternariosis	Mujica & Vergara, 1945		Yes

[1] The black widow spider, although a non-plant pest was identified to be a sanitary (public health) concern.

Pest	Common name	Presence in		Consider further (yes/no)
		Chile	Australia	
Armillaria mellea (Vahl) P. Kummer	Armillaria root rot	SAG, 2003		Yes
Aspergillus niger Tiegh.	Aspergillus rot	Pszczólkowski *et al*., 2003	APPD, 2004	
Athelia rolfsii (Curzi) C.C. Tu & Kimbrough	Seedling blight	CABI, 2004	APPD, 2004	
Botryosphaeria dothidea (Moug.) Ces. & de Not.	Macrophoma rot	SAG, 2003	APPD, 2004	
Botrytis cinerea Pers: Fr.	Grey mould	Pszczólkowski *et al*., 2003	APPD, 2004	
Cladosporium herbarum (Pers.: Fr.) Link	Cladosporium rot	Pszczólkowski *et al*., 2003	APPD, 2004	
Cylindrocarpon destructans (Zinssmeister) Scholten		SAG, 2003	APPD, 2004	
Elsinoe ampelina (de Bary) Shears	Anthracnose, bird's eye rot (black spot)	Mujica *et al*., 1980	Nicholas *et al*., 1994	
Epicoccum nigrum Link	Cereal leaf spot	Mujica *et al*., 1980	APPD, 2004	
Erysiphe necator (Schwein.)	Grapevine powdery mildew	Latorre *et al*., 1996	APPD, 2004	
Fusarium culmorum (W.G. Sm.) Sacc.	Damping off	CABI, 2004	APPD, 2004	
Mucor racemosus Fres.	Spongy storage rot	Mujica *et al*., 1980	APPD, 2004	
Nectria cinnabarina (Tode) Fr.	Twig blight	Mujica *et al*., 1980	APPD, 2004	
Phaeoacremonium inflatipes (Pin)	Grape vine decline fungus	Farr *et al*., 2005		Yes
Phaeomoniella chlamydospora (W. Gams, Crous. M.J. Wingfield & L. Mugnai) Crous & Gams	Grape vine decline fungus	Auger *et al*., 2004	Edwards & Pascoe, 2003	
Phoma sp.	Fruit rot	Pszczólkowski *et al*., 2003	Shivas, 1989; Barbetti & Wood, 1978[2]	
Phomopsis viticola (Sacc.) Sacc. Type 1	Phomopsis cane and leaf spot, black rot	Mujica *et al*., 1980	Merrin *et al*., 1995	
Phomopsis viticola (Sacc.) Sacc. Type 2	Phomopsis cane and leaf spot, black rot	Uncertain[3]	Merrin *et al*., 1995 (except WA)	Yes

[2] In Australia *Phoma vitis* Bonord has been recorded on *Vitis* species.

[3] Biosecurity Australia has been unable to determine the status of *Phomopsis viticola* type 2 in Chile. Biosecurity Australia will consider the fungus of quarantine concern for Western Australia until the status of this fungus has been clarified in Chile.

Pest	Common name	Presence in		Consider further (yes/no)
		Chile	Australia	
Phytophthora cinnamomi Rands	Crown and root rot	Latorre *et al*., 1997	Marks *et al*., 1975	
Phytophthora cryptogea Pethybridge & Lafferty	Damping off	SAG, 2003	APPD, 2004	
Phytophthora drechsleri Tucker	Fruit rot	Latorre *et al*., 1997	APPD, 2004	
Plasmopara viticola (Berkeley & Curtis) Berl. & de Toni	Downy mildew	Macenauer, 1993	Nicholas *et al*., 1994	
Pleospora herbarum (Fr.) Rabenh.	Bunch rot	Mujica *et al*., 1980	APPD, 2004	
Pythium debaryanum Hesse	Damping off	Mujica *et al*., 1980	Marks & Kassaby, 1974	
Rosellinia necatrix Prill	Rosellinia root rot	SAG, 2003	APPD, 2004	
Sclerotinia sclerotiorum (Lib.) De Bary	Collar rot	Farr *et al*., 1989	APPD, 2004	
Sphaeropsis malorum Berk.	Dead arm, canker	SAG, 2003	APPD, 2004	
Stereum hirsutum (Willd. Ex Fr.) S.F. Gray	Esca	SAG, 2003	APPD, 2004	
Talaromyces wortmannii (Klocker) C.R. Benjamin	Blue mould rot	Soto *et al*., 1973	APPD, 2004	
Trichothecium roseum (Pers.) Link.	Pink mould rot	Soto *et al*., 1973	APPD, 2004	
Ulocladium atrum Preuss	Ulocladium blight	Soto *et al*., 1973	APPD, 2004	
Verticillium dahliae Kleb.	Verticillium wilt	Latorre *et al*., 1996	APPD, 2004	
Nematodes				
Criconemoides xenoplax Raski	Ring nematode	Allen *et al*., 1971	Nyczepir & Halbrendt, 1993	
Helicotylenchus dihystera (Cobb) Sher.	Spiral nematode	Allen *et al*., 1971	McLeod *et al*., 1994	
Helicotylenchus pseudorobustus (Steiner)	Spiral nematode	CABI, 2004	EPPO, 2004	
Meloidogyne arenaria (Neal) Chitwood	Root knot nematode	SAG, 2003	McLeod *et al*., 1994	
Meloidogyne hapla Chitwood	Root knot nematode	SAG, 2003	McLeod *et al*., 1994	
Meloidogyne incognita (Kofoid & White) Chitwood	Root-knot nematode	Allen *et al*., 1971	McLeod *et al*., 1994	
Meloidogyne javanica (Treub) Chitwood	Root-knot nematode	Allen *et al*., 1971	McLeod *et al*., 1994	
Paratylenchus nanus Cobb	Pin nematode	Allen *et al*., 1971	McLeod *et al*., 1994	
Paratylenchus vandenbrandei de Grisse	Pin nematode	Allen *et al*., 1971	McLeod *et al*., 1994	
Pratylenchus neglectus (Rensch) Filipjev & S. Stekhoven	Root-lesion nematode	Allen *et al*., 1971	McLeod *et al*., 1994	
Pratylenchus thornei Sher & Allen	Root-lesion nematode	Allen *et al*., 1971	McLeod *et al*., 1994	
Pratylenchus vulnus Allen & Jensen	Root lesion nematode	SAG, 2003	McLeod *et al*., 1994	

Pest	Common name	Presence in		Consider further (yes/no)
		Chile	Australia	
Tylenchulus semipenetrans Cobb	Root nematode	Allen *et al*., 1971	McLeod *et al*., 1994	
Xiphinema americanum Cobb	Dagger nematode	Allen *et al*., 1971	McLeod *et al*., 1994	
Xiphinema index Thorne & Allen	Dagger nematode	Allen *et al*., 1971	Restricted distribution (McLeod *et al*., 1994)	Yes
Phytoplasma				
Amarillamiento de Elqui	Grapevine yellows phytoplasma	Pearson & Goheen, 1994		Yes
Viruses				
Alfalfa mosaic virus		CABI, 2004	EPPO, 2004	
Arabis mosaic *nepovirus*	Arabis mosaic	SAG, 2003	Sivapalan *et al*., 2001	
Cucumber Mosic virus		CABI, 2004	EPPO, 2004	
Cherry leaf roll virus	Ash mosaic virus, sambucus ringspot and yellow net virus	Herrera & Madariaga, 2001	Brunt *et al*., 1996	
Grapevine corky bark associated *closterovirus*	Stem pitting of grapevine	SAG, 2003		Yes
Grapevine fanleaf *nepovirus*	Grapevine court-noué virus	Herrera & Madariaga, 2001	Restricted distribution (Sivapalan *et al*., 2001)	Yes
Grapevine leaf roll associated *closterovirus*	Grapevine leafroll disease	Herrera & Madariaga, 2001	Habili *et al*., 1996	Yes[4]
Strawberry latent ringspot *nepovirus*	Strawberry latent ringspot	SAG, 2003	Sivapalan *et al*., 2001	
Tomato ringspot *nepovirus*	Grapevine yellow vein	Herrera & Madariaga, 2001	Sivapalan *et al*., 2001	Yes[5]
Tomato spotted wilt *tospovirus*		CABI, 2004	EPPO, 2004	

[4] Uncertain as to which viruses/strains are present in Chile.

[5] Uncertain as to which viruses/strains are present in Chile.

Appendix 1B: Pest categorisation for table grapes from Chile – association with table grape bunches

Pest	Common name	Associated with table grape cluster (yes/no)	Comment	Reference	Consider pest further? (yes/no)
ARTHROPODS					
Acari (mites)					
Brevipalpus chilensis Baker [Acari: Tenuipalpidae]	False red mite	Yes	Feeds on the lower surface of the leaves. It is expected that mites will be found on stems, during their transit from leaf to leaf. This species has been intercepted on the fruit pathway.	Jeppson *et al.,* 1975; SAG/USDA 2002	**Yes**
Eotetranychus lewisi (McGregor) [Acari: Tetranychidae]	Lewis spider mite	Yes	Mites are known to feed and lay eggs on both fruit and leaves of other species of hosts. It is expected that mites will be found on stems, during their transit from leaf to leaf.	Jeppson *et al.,* 1975	**Yes**
Oligonychus mangiferus (Rahman & Sapra) [Acari: Tetranychidae]	Mango spider mite	Yes	Feeds on the upper leaf surface. During heavy infestations, the entire leaf surface may be attacked. The same type of attack is expected on *Vitis vinifera* leaves, and it is also expected that mites will be found on stems, during their transit from leaf to leaf.	Sadana & Chandler, 1978	**Yes**
Oligonychus punicae (Hirst) [Acari: Tetranychidae]	Avocado brown mite	Yes	Feeds on the upper leaf surface. During heavy infestations, the entire leaf surface may be attacked. The same type of attack is expected on *Vitis vinifera* leaves, and it is also expected that mites will be found on stems, during their transit from leaf to leaf.	Bolland *et al*., 1998	**Yes**
Oligonychus vitis Zaher & Shehata [Acari: Tetranychidae]	Table grape red mite	Yes	Primarily feeds on foliage and lays eggs on the bases of buds or in scars in wood. Larvae move	Gonzalez, 1983	**Yes**

Pest	Common name	Associated with table grape cluster (yes/no)	Comment	Reference	Consider pest further? (yes/no)
			towards leaves and are found on upper and lower surfaces of leaves and shoots. The main damage to the plant consists of browning of the leaf laminae and a slight web production that favours dust deposition. The attack on the foliage can lead to early defoliation in certain grape varieties.		
Oligonychus yothersi McGreg. [Acari: Tetranychidae]	Avocado red mite	Yes	Feeds on the upper leaf surface. During heavy infestations, the entire leaf surface may be attacked. The same type of attack is expected on *Vitis vinifera* leaves, and it is also expected that mites will be found on stems, during their transit from leaf to leaf.	Jeppson *et al.,* 1975	**Yes**
Panonychus citri (Mc Gregor) [Acari: Tetranychidae]	Citirs red mite	Yes	Has been recorded as pest of grapevines.	Wu & Lo, 1990	**Yes**
Panonychus ulmi (Koch) [Acari: Tetranychidae]	European red mite	Yes	Feeding causes the leaves to turn brown. Eggs are laid on twigs and smaller branches. Tetranychid mites are known to move to other parts of the plant (such as fruit) when populations are high (Jeppson *et al*., 1975).	WVU, 2000, Jeppson *et al*., 1975	**Yes**
Tetranychus desertorum Banks [Acari: Tetranychidae]	Tetranychid mite	Yes	Mite is known to feed on both fruit and leaves of other host species. Adults are dispersed from one host to another by crawling and by wind. The same type of attack is expected on *Vitis vinifera*, and it is also expected that mites will be found on stems, during their transit from leaf to leaf.	Jeppson *et al.,* 1975	**Yes**
Coleoptera (beetles, weevils)					
Athlia rustica (Erichson) [Coleoptera: Scarabaeidae]	Brown beetle	No	Primarily feeds on leaves and buds.	Gonzalez, 1983	
Callideriphus laetus Bl.	Peumo borer	No	Primarily feeds on downed logs, stumps, dead or	EFPIS, 1998; Klein	

Pest	Common name	Associated with table grape cluster (yes/no)	Comment	Reference	Consider pest further? (yes/no)
[Coleoptera: Cerambycidae]			dying branches. It has been recorded as using grape vines as a host.	Koch & Waterhouse, 2000	
Dexicrates robustus (Blanchard) [Coleoptera: Bostrichidae]	Wood borer	No	An incidental pest of grape vines, associated with trunks and branches.	Gonzalez, 1983	
Geniocremnus chiliensis (Boheman) [Coleoptera: Curculionidae]	Tuberous pine weevil	Yes	Native Coleopteran that can be found rarely feeding on leaves in grapevines. Cannot fly, larvae are subterranean. May be associated with clusters as for *Naupactus xanthographus*.	SAG, 2002	**Yes**
Micrapate humeralis (Blanchard) [Coleoptera: Bostrichidae]	Mesquite borer	No	A borer of carob tree branches (*Prosopis chilensis*), occasionally found in grape vines.	SAG, 2002	
Micrapate scabrata (Erichson) [Coleoptera: Bostrichidae]	Vine borer	No	Adults bore holes into the bases of the buds and vine trunks where eggs are laid. The larvae penetrate into the wood and construct a gallery in which they live and feed. This species mainly affects buds, branches and shoots. Overwinters as larvae, pupae and adults.	Gonzalez, 1983	
Naupactus xanthographus (Germar) [Coleoptera: Curculionidae]	Fruit tree weevil	Yes	Larvae damage the roots of grape vines and adults are known to be found on foliage. Has been detected in table grapes exported to the USA from Chile.	Gonzalez, 1983; Ripa, 1994	**Yes**
Neoterius mystax (Blanchard) [Coleoptera: Bostrichidae]	Fence borer	No	An opportunistic borer pest of vines. Found in trunks and branches.	Gonzalez, 1983	
Otiorhynchus sulcatus (Fabricius) [Coleoptera: Curculionidae]	Vine weevil	No	Larvae feed on small roots in the soil. Adults feed on foliage, as well as any portion of the inflorescence. It can cause damage to grapes by feeding on the pedicels and cluster stems.	CABI, 2004; Phillips, 1992	
*Otiorhynchus rugosostriatus (*Goeze) [Coleoptera: Curculionidae]	Rough strawberry weevil	No	Larvae feed on roots and adults feed on leaves throughout the summer and are nocturnal. Overwintering occurs as fully-grown larvae, pupae or adults, in the topsoil or soil debris.	NRC, 2002; Antonelli *et al*., 1988	
Pantomorus ruizi (Brèthes)	Alfalfa root	No	Adult feeds on foliage, larvae are of a	SAG, 2002	

Pest	Common name	Associated with table grape cluster (yes/no)	Comment	Reference	Consider pest further? (yes/no)
[Coleoptera: Curculionidae]	weevil		subterranean habit.		
Platyapistes venustus (Erichson) [Coleoptera: Curculionidae]	Green weevil	No	Associated with leaves and buds.	Gonzalez, 1983	
Diptera (flies)					
Ceratitis capitata (Wiedemann) [Diptera: Tephritidae]	Mediterranean fruit fly	Yes	Chile is considered a pest free area for this pest but it could be associated with the pathway if it became established. Causes damage to a wide range of unrelated fruit, primarily through oviposition into the fruit where larvae feed internally.	Hancock *et al*., 2000	**Yes**
Hemiptera (aphids, leafhoppers, mealybugs, scales, true bugs)					
Aphis fabae Scopoli [Hemiptera: Aphididae]	Black bean aphid	No	Young colonies consist of matt black aphids on young shoots, older colonies spread over most of aerial parts of the plant.	Blackman & Eastop, 1984	
Aphis illinoisensis Shimer [Hemiptera: Aphididae]	Grapevine aphid	No	Damages young shoots, leaves. When populations are high, some may feed on fruit clusters, causing some berries to drop.	Pfeiffer & Schultz, 1986	
Balclutha aridula (Linnaeus) [Hemiptera: Cicadellidae]	Ballica leafhopper	No	Little is known about this species. Other species of leafhopper found on grapes feed on leaves. Heavily damaged leaves lose their green colour, dry up and may fall off the vine. Leafhopper production of honeydew can result in spotting of fruit. Overwinter as adults, and are found on newly emerged grape leaves. Adults and nymphs feed on leaves by puncturing leaf cells and sucking out nutrients.	USDA, 2002	
Diaspidiotus ancylus (Putnam) [Hemiptera: Diaspididae]	Putnam scale	No	Heavy infestations can kill twigs and branches.	Arancibia *et al*., 1990	
Icerya palmeri Riley-How [Hemiptera: Margarodidae]	Margarodes scale	Yes	Little information is available on this species. In general, Margarodidae live on a wide variety of hosts, especially woody plants. Damage to the	Morales, 1991; NZ MAF, 2002a	**Yes**

Pest	Common name	Associated with table grape cluster (yes/no)	Comment	Reference	Consider pest further? (yes/no)
			plant is caused by sap depletion, introduction of toxins and the production of honeydew hindering photosynthesis. Scales have been intercepted on table grapes imported from Chile into New Zealand.		
Leptoglossus chilensis (Spin.) [Hemiptera: Coreidae]	Brown Chilean leaf-footed bug	No	Little information is available on the biology of this pest. Other species of this genus feed on shoots and occasionally on fruits. Has been recorded as causing fruit damage on citrus. Punctures the fruit and sucks juice.	Fasulo & Stansly, 1999	
Margarodes vitis (Philippi) [Hemiptera: Margarodidae]	Grape ground pearl	No	This species is subterranean (except for adult males) and live on roots. Males live for up to 14 days and appear above ground for a short time.	CABI/EPPO, 1997	
Parthenolecanium corni (Bouché) [Hemiptera: Coccidae]	European fruit lecanium scale	Yes	*Vitis* spp. are host plants for this species. Males are winged. Crawlers settle and feed on leaf undersides, but later stages often migrate to stems and branches. Scales have been intercepted on table grapes imported from Chile into New Zealand.	CABI, 2004; WVU 2000; NZ MAF, 2002a	**Yes**
Pseudococcus calceolariae (Maskell) [Hemiptera: Pseudococcidae]	Citrophilus mealybug	Yes	When *P. calceolariae* shelter in fruit, for example, within the calyx, around the stalk, or under fruit sepals, they are often hidden from view. *Vitis vinifera* is a primary host for this species.	CABI, 2004	**Yes**
Pseudococcus maritimus (Ehrhorn) [Hemiptera: Pseudococcidae]	Grape mealybug	Yes	Overwintered first instar nymphs feed at bases of shoots or pedicels of grape clusters. This mealybug contaminates grapes with one or more of the following: the cottony ovisac, eggs, immature larvae, adults, and honeydew or black sooty mould growing on honeydew.	Flaherty *et al.,* 1982; Pfeiffer & Schultz, 1986	**Yes**
Tettigades chilensis Amyot & Serville [Hemiptera: Cicadidae]	Common cicada	No	Primarily feeds on roots and branches.	Gonzalez, 1983	

Pest	Common name	Associated with table grape cluster (yes/no)	Comment	Reference	Consider pest further? (yes/no)
Hymenoptera (ants, wasps)					
Ametastegia glabrata Fallen [Hymenoptera: Tenthredinidae]	Sawfly	No	Larvae bore into the woody stems of grape vines to pupate.	Carillo *et al*., 1990	
Polistes buyssoni Brethes [Hymenoptera: Vespidae]	Paper wasp	No	Feed on mature fruits, extracting pieces of pulp.	Gonzalez, 1983	
Vespula germanica (Fabricius) [Hymenoptera: Vespidae]	European wasp	No	Wasps may break open the skins of grape berries in order to lick out the sweet contents.	VTED, 2003	
Isoptera (termites)					
Neotermes chilensis (Blanchard) [Isoptera: Kalotermitidae]	Chilean termite	No	When attacking the vine, termites feed on the heartwood (dead tissue) and usually avoid the living sapwood.	Rust, 1992	
Lepidoptera (moths, butterflies)					
Accuminulia buscki Brown [Lepidoptera: Tortricidae]	Tortricid leafroller	Yes	Feeds on berries.	Brown, 1999	**Yes**
Accuminulia longiphallus Brown [Lepidoptera: Tortricidae]	Tortricid leafroller	Yes	Nothing is known of the biology of this species. As other *Accuminulia* species are known to bore into fruit, this species would potentially remain on the pathway.	Brown, 1999	**Yes**
Chileulia stalactitis (Meyrick) [Lepidoptera: Tortricidae]	Grape berry moth	Yes	Larvae spin silk webs for protection and feed in several green berries in the cluster before becoming fully grown. Larvae pupate in folded cutout portions of the leaves on the vine or ground.	WVU, 2000; Weigle *et al.,* 2000	**Yes**
Copitarsia consueta (Walker) [Lepidoptera: Noctuidae]	Copitarsia cutworm	No	Climbing cutworms is a general term applied to a number of moth larvae that feed on grape buds. Climbing cutworms are sporadic pest of grapes. Larvae hide during the day under the bark and in the soil litter under the vines and come out at night to feed.	URI, 2003; Weigle *et al*., 2000	
Copitarsia turbata (Herrich-	Copitarsia	No	Climbing cutworms is a general term applied to a	URI, 2003; Weigle	

Pest	Common name	Associated with table grape cluster (yes/no)	Comment	Reference	Consider pest further? (yes/no)
Schaffer) [Lepidoptera: Noctuidae]	cutworm		number of moth larvae that feed on grape buds. Climbing cutworms are sporadic pest of grapes. Larvae hide during the day under the bark and in the soil litter under the vines and come out at night to feed.	*et al*., 2000	
Hyles annei (Guérin-Méneville) [Lepidoptera: Sphingidae]	Vine hornworm	No	Larvae feed on foliage and pupation is subterranean.	SAG, 2002	
Hyles euphorbiarum (Guérin-Méneville & Percheron) [Lepidoptera: Sphingidae]	Palqui hornworm	No	Occasional pest of vines. Can cause serious defoliation of individual plants.	Gonzalez, 1983	
Paracles rudis (Butler) (Chilesia rudis Butler) [Lepidoptera: Arctiidae]	Red grape caterpillar	No	The larvae are phytophagous and consume leaves and buds. Eggs are laid among tufts of grass.	Angulo, 2003	
Peridroma saucia (Hübner) [Lepidoptera: Noctuidae]	Variegated cutworm	No	Primarily feed on leaves, stems, growing points, and inflorescences of agricultural crops and low growing fruit trees. Eggs are usually laid on twigs and stems rather than on leaves.	CABI, 2004	
Proeulia auraria (Clarke) [Lepidoptera: Tortricidae]	Chilean fruit tree leaf folder	Yes	Larvae of the genus *Proeulia* are leaf rollers, also reported as feeding on the surface and boring into the fruit of host plants.	Brown & Passoa, 1998; Brown, 1999	**Yes**
Proeulia chrysopteris (Butler) [Lepidoptera: Tortricidae]	Fruit leaf folder	Yes	Larvae of the genus *Proeulia* are leaf rollers, also reported as feeding on the surface and boring into the fruit of host plants.	Brown & Passoa, 1998; Brown, 1999	**Yes**
Proeulia triquetra Obraztsov [Lepidoptera: Tortricidae]	Grape leaf roller, fruit tree leaf roller	Yes	Larvae of the genus *Proeulia* are leaf rollers, also reported as feeding on the surface and boring into the fruit of host plants.	Brown & Passoa, 1998; Brown, 1999	**Yes**
Spodoptera frugiperda J.E. Smith [Lepidoptera: Noctuidae]	Fall armyworm	No	Larvae feed on leaves. Pupation occurs in an earthen cell or rarely between leaves on the host plant.	CABI/EPPO, 1997	
Orthoptera (crickets, grasshoppers, katydids)					
Achaeta fulvipennis Brown	Cricket	No	Feeds on foliage of several hosts and is found	Zanin, 1995	

Pest	Common name	Associated with table grape cluster (yes/no)	Comment	Reference	Consider pest further? (yes/no)
[Orthoptera: Gryllidae]			principally in ground cover.		
Dichroplus maculipennis (Blanchard) [Orthoptera: Acrididae]	Spotted wing grasshopper	No	This species is phytophagous, invading crops, fodder, gardens and orchards. Oviposits in dry, uncultivated land.	Uvarov, 1977	
Schistocerca cancellata (Serville) [Orthoptera: Acrididae]	South American locust	No	An opportunistic feeder on leaves and buds.	Gonzalez, 1983	
Thysanoptera (thrips)					
Drepanothrips reuteri Uzel [Thysanoptera: Thripidae]	Grape thrips	Yes	Table grapes are susceptible to thrips damage. *D. reuteri* causes severe damage to both foliage and grape bunches, scarring berries with their feeding.	Flaherty *et al.,* 1982; Ripa, 1994; UC, 2000	**Yes**
Frankliniella australis Morgan [Thysanoptera: Thripidae]	Chilean flower thrips	Yes	Feeds around the sepals and calyces of blossoms and may cause scarring of fruit. May also affect leaves and shoots. Found on grape vines mainly during period of inflorescence. The remainder of the time it inhabits any plant, which allows the development of nymphs and adults.	Gonzalez, 1983	**Yes**
Frankliniella occidentalis (Pergande) [Thysanoptera: Thripidae]	Western flower thrips	Yes	Cause serious shoot stunting and leaf distortion, followed by berry scarring.	Lewis, 1997	**Yes**
CONTAMINATING PESTS					
Latrodectus mactans (Fabricius) [Araneae: Theridiidae]	Black widow spider	Yes (contaminating pest)	Although this species feeds on fauna rather than on table grapes directly, it has been recorded as having been imported into Ireland, and more recently into New Zealand, with table grape shipments from California.	Ross, 1988; NZ MAF, 2002b	**Yes**
PATHOGENS					
Fungi					
Alternaria vitis Carva	Grapevine alternariosis	No	Infects leaves and produces lesions on leaves. Causes leaf spots and defoliation.	Suhag *et al*., 1983	
Armillaria mellea (Vahl.: Fr.)	Armillaria root	No	*Armillaria mellea* is a soilborne fungus that	Elkins *et al*., 1998	

Pest	Common name	Associated with table grape cluster (yes/no)	Comment	Reference	Consider pest further? (yes/no)
Kumm	rot, honey root rot		causes root rot of a wide variety of plants including table grapes.		
Phaeoacremonium inflatipes (Pin)	Grape vine decline fungus	No	*Phaeoacremonium inflatipes* is a soil-borne fungus that causes decline in young vines. Affected plants showed low vigour, undersized trunks, short internodes, uneven wood maturity, sparse foliage, and stunted chlorotic leaves with interveinal chlorosis and necrosis.	Scheck *et al*., 1998	
Phomopsis viticola type 2 (Sacc.) Sacc.	Phomopsis cane and leaf spot, black rot	Yes	Fungal disease common in cooler grape growing regions. Spread occurs during wet weather. Berry infection is favoured by long (20-30 hr) wet periods at flowering.	Nicholas *et al*., 1994	**Yes**
Nematodes					
Xiphinema index Thorne & Allen	Dagger nematode	No	All stages occur in the soil as migratory root ectoparasites. There is no association of any life stage with the fruit of grapevine.	CABI, 2004	
Phytoplasma					
Amarillamiento de Elqui	Grapevine yellows phytoplasma	No	Grapevine yellows disease shows the symptoms of *flavesence doree*. The leaves harden, roll slightly abaxially and tend to overlap. The brittle leaves first become golden yellow or red (depending on cultivars) on plant parts most exposed to sun. Later in summer, creamy spots appear along the main veins. These cream-coloured spots generally become necrotic. Sometimes, angular spots occur, which are yellow in white-fruited cultivars and red in black-fruited cultivars.	Pearson & Goheen, 1994	
Viruses					
Grapevine corky bark associated *closterovirus*	Corky bark of grapevine	No	Causes pits and grooves in the trunk and is transmitted by a vector. Transmitted by grafting.	Brunt *et al*., 1996	

Pest	Common name	Associated with table grape cluster (yes/no)	Comment	Reference	Consider pest further? (yes/no)
			Transmission by contact between plants, seed or pollen has not been reported.		
Grapevine fanleaf *nepovirus*	Grapevine court-noué virus	Yes	May be associated with the endosperm of grape seeds, but is not known to be transmissible by grape seeds. The virus is transmissible by nematode vectors and mechanical inoculation. No restrictions are placed on grapes being moved from the Rutherglen area because of this virus.	CABI, 2004; Habili *et al.,* 2001	
Grapevine leaf roll associated *closterovirus*	Grapevine leafroll disease	Yes	Grapevine leafroll associated viruses are phloem-restricted viruses. Once the grape bunch has been severed from the vine, collapse and dessication of the peduncles associated with the bunch will begin. It is not believed that insect vectors (mealybugs, soft scales) will feed on latex from the severed peduncles. It is also believed that, except under very exacting laboratory conditions, peduncles would not be propagatable.	CABI, 2004	
Tomato ringspot *nepovirus*	Grapevine yellow vein	No	No evidence to suggest this virus is seed borne in tablegrapes.	CABI, 2004	

Appendix 1C: Potential for establishment or spread and associated consequences for pests of table grapes from Chile

Scientific name	Common name	Potential for establishment or spread in the PRA area		Potential for consequences		Consider pest further? (yes/no)
		Feasible/ not feasible	Comments	Significant/ not significant	Comments	
ARTHROPODS						
Acari (mites)						
Brevipalpus chilensis Baker [Acari: Tenuipalpidae]	Chilean false red mite (CFRM)	Feasible	Wide host range (Ripa & Rodriguez, 1989) and multivoltine, with four to five generations per year (Gonzalez, 1968).	Significant	CFRM may potentially increase production costs by triggering specific controls as these are of quarantine concern to important trading partners.	Yes
Eotetranychus lewisi (McGregor) [Acar: Tetranychidae]	Lewis spider mite	Feasible	Wide host range (Bolland *et al*., 1998) and high reproductive rate (Jeppson *et al.,* 1975). Short distance dispersal is by crawling and long-distance dispersal by wind (Jeppson *et al.,* 1975).	Significant	Spider mites are capable of causing direct harm to a wide range of hosts (Jeppson *et al.,* 1975).	Yes
Oligonychus mangiferus (Rahman & Sapar) [Acar: Tetranychidae]	Mango spider mite	Feasible	Wide host range (Bolland *et al*., 1998) and high reproductive rate (Jeppson *et al.,* 1975). Already established in some parts of Australia except Western Australia (APPD, 2004).	Significant	Spider mites are capable of causing direct harm to a wide range of hosts (Jeppson *et al.,* 1975).	Yes

Scientific name	Common name	Potential for establishment or spread in the PRA area		Potential for consequences		Consider pest further? (yes/no)
		Feasible/ not feasible	Comments	Significant/ not significant	Comments	
Oligonychus punicae (Hirst) [Acari: Tetranychidae]	Avocado brown mite	Feasible	Narrow host range (Bolland *et al*., 1998) but high reproductive rate (Jeppson *et al.,* 1975). For long-distance dispersal this species utilises strands of webbing to 'balloon' with the prevailing wind (Lawson *et al*., 1996).	Significant	Spider mites are capable of causing direct harm to a wide range of hosts (Jeppson *et al.,* 1975).	Yes
Oligonychus vitis Zaher & Shehata [Acar: Tetranychidae]	Table grape red mite	Feasible	Narrow host range (Bolland *et al*., 1998) but high reproductive rate (Jeppson *et al.,* 1975). For long-distance dispersal this species utilises strands of webbing to 'balloon' with the prevailing wind (Lawson *et al*., 1996).	Significant	Spider mites are capable of causing direct harm to a wide range of hosts (Jeppson *et al.,* 1975).	Yes
Oligonychus yothersi McGregor [Acar: Tetranychidae]	Avocado red mite	Feasible	Wide host range (Bolland *et al*., 1998) and high reproductive rate (Jeppson *et al.,* 1975). For long-distance dispersal this species utilises strands of webbing to 'balloon' with the prevailing wind (Lawson *et al*., 1996).	Significant	Spider mites are capable of causing direct harm to a wide range of hosts (Jeppson *et al.,* 1975).	Yes
Panonychus citri McGregor [Acari: Tetranychidae]	Citrus red mite	Feasible	Wide host range (Bolland *et al*., 1998) and already established in restricted areas of New South Wales (Hely *et al*., 1982).	Significant	This mite is considered to be an economically important pest of citrus crops (Jeppson *et al*., 1975).	Yes

Scientific name	Common name	Potential for establishment or spread in the PRA area		Potential for consequences		Consider pest further? (yes/no)
		Feasible/ not feasible	Comments	Significant/ not significant	Comments	
Panonychus ulmi (Koch) [Acari: Tetranychidae]	European red mite	Feasible	Wide host range (Bolland *et al*., 1998) and high reproductive rate (Jeppson *et al.,* 1975). For long-distance dispersal this species utilises strands of webbing to 'balloon' with the prevailing wind (Lawson *et al*., 1996).	Significant	Spider mites are capable of causing direct harm to a wide range of hosts (Jeppson *et al.,* 1975).	Yes
Tetranychus desertorum Banks [Acari: Tetranychidae]	Stigmaeid mite	Feasible	Wide host range (Bolland *et al*., 1998) and high reproductive rate (Jeppson *et al.,* 1975). For long-distance dispersal this species utilises strands of webbing to 'balloon' with the prevailing wind (Lawson *et al*., 1996).	Significant	Spider mites are capable of causing direct harm to a wide range of hosts (Jeppson *et al.,* 1975).	Yes
Coleoptera (weevils)						
Geniocremnus chiliensis (Boheman) [Coleoptera: Curculionidae]	Tuberous pine weevil	Feasible	Restricted host range and native to Chile (SAG, 2002).	Significant	Weevils may potentially increase production costs by triggering specific controls as these are of quarantine concern to important trading partners.	Yes
Naupactus xanthographus (Germar) [Coleoptera: Curculionidae]	South American fruit tree weevil	Feasible	SAFTW has a wide host range including apple, avocado, citrus, custard apple, loquat, kiwifruit, olive, stone fruits and walnuts (Gonzalez, 1983; Ripa, 1986).	Significant	Weevils may potentially increase production costs by triggering specific controls as these are of quarantine concern to important trading partners.	Yes
Diptera (flies)						
Ceratitis capitata Wiedemann) [Diptera: Thripidae]	Mediterranean fruit fly; Medfly	Feasible	Polyphagous, with a wide host range. Strong flyer- adults can fly up to 20 km (Fletcher, 1989). Females pierce the skin of fruit and lay eggs. Larvae feed internally on fruit (Knapp, 1998).	Significant	Medfly increase production costs by domestic and international trading restrictions imposed on fruit from areas where fruit fly becomes established.	Yes

Scientific name	Common name	Potential for establishment or spread in the PRA area		Potential for consequences		Consider pest further? (yes/no)
		Feasible/ not feasible	Comments	Significant/ not significant	Comments	
Hemiptera (aphids, leafhoppers, mealybugs, psyllids, scales, true bugs and whiteflies)						
Icerya palmeri Riley-How [Hemiptera: Margarodidae]	Margarodes scale	Feasible	Other species of this genus have wide host range and already established in some parts of Australia.	Significant	Scales can cause direct harm to a wide range of plant hosts (Gill, 1988). In addition to the direct feeding damage, the honeydew excreted forms a substrate for the growth of black sooty moulds.	Yes
Parthenolecanium corni (Bouché) [Hemiptera: Coccidae]	European fruit lecanium	Feasible	EFLS is highly polyphagous, attacking some 350 plant species placed in 40 families (Ben-Dov, 1993). This species is already established in New South Wales, Tasmania, and Victoria (AICN, 2004).	Significant	EFLS is a pest of a range of fruit and nut trees and ornamentals. It seriously infested hazel trees in Greece (Santas, 1985).	
Pseudococcus calceolariae (Maskell) [Hemiptera: Pseudococcidae]	Citrophilus mealybug	Feasible	Wide host range (Ben-Dov, 1994), high reproductive rates (Rotundo *et al*., 1979) and already established in New South Wales, Queensland, South Australia, Tasmania and Victoria (AICN, 2004).	Significant	Infested fruit is downgraded for fresh markets (Howitt, 2001).	Yes
Pseudococcus maritimus (Ehrhorn) [Hemiptera: Pseudococcidae]	Grape mealybug	Feasible	Wide host range (Ben-Dov, 1994), high reproductive rates (Grimes & Cone, 1985).	Significant	Honeydew secreted by mealybug support the growth of dark sooty mold fungus. Table grapes with sooty mould are downgraded for fresh market (Pfeiffer & Schultz, 1986).	Yes

Scientific name	Common name	Potential for establishment or spread in the PRA area		Potential for consequences		Consider pest further? (yes/no)
		Feasible/ not feasible	Comments	Significant/ not significant	Comments	
Lepidoptera (butterflies, moths)						
Accuminulia buscki Brown [Lepidoptera: Tortricidae]	Tortricid leafroller	Feasible	Larvae of this pest are polyphagous and native to Chile (Brown & Passoa, 1998).	Significant	Larval feeding can result in cosmetic degradation of fruit (Brown, 1999).	Yes
Accuminulia longiphallus Brown [Lepidoptera: Tortricidae]	Tortricid leafroller	Feasible	Larvae of this pest are polyphagous and native to Chile (Brown & Passoa, 1998).	Significant	Larval feeding can result in cosmetic degradation of fruit (Brown, 1999).	Yes
Chileulia stalactitis (Meyrick) [Lepidoptera: Tortricidae]	Grape berry moth	Feasible	Larvae of this pest are polyphagous and native to Chile (Brown & Passoa, 1998).	Significant	Larval feeding can result in cosmetic degradation of fruit (Brown, 1999).	Yes
Proeulia auraria (Clarke) [Lepidoptera: Tortricidae]	Chilean fruit tree leafroller	Feasible	Widehost range (Brown, 1999; Artigas, 1994) and high reproductive rates (Campos *et al*., 1981). The genus *Proeulia* is capable of flight with some species known to fly throughout the year (Gonzalez, 1983).	Significant	*Proeulia* spp. may potentially increase production costs by triggering specific controls as these are of quarantine concern to important trading partners.	Yes
Proeulia chrysopteris (Butler) [Lepidoptera: Tortricidae]	Fruit leaf roller	Feasible	Widehost range (Brown, 1999; Artigas, 1994) and high reproductive rates (Campos *et al*., 1981). The genus *Proeulia* is capable of flight with some species known to fly throughout the year (Gonzalez, 1983).	Significant	*Proeulia* spp. may potentially increase production costs by triggering specific controls as these are of quarantine concern to important trading partners.	Yes

Scientific name	Common name	Potential for establishment or spread in the PRA area		Potential for consequences		Consider pest further? (yes/no)
		Feasible/ not feasible	Comments	Significant/ not significant	Comments	
Proeulia triquetra Obraztsov [Lepidoptera: Tortricidae]	Grape leaf roller	Feasible	Widehost range (Brown, 1999; Artigas, 1994) and high reproductive rates (Campos *et al*., 1981). The genus *Proeulia* is capable of flight with some species known to fly throughout the year (Gonzalez, 1983).	Significant	*Proeulia* spp. may potentially increase production costs by triggering specific controls as these are of quarantine concern to important trading partners.	Yes
Thysanopetra (thrips)						
Drepanothrips reuteri Uzel [Thysanoptera: Thripidae]	Grape thrips	Feasible	Polyphagous pests and high reproductive rates (Mound & Teulon, 1995).	Significant	Damage plants directly by feeding and laying eggs on the plant, and indirectly by acting as vectors for viruses.	YES
Frankliniella australis Morgan [Thysanoptera: Thripidae]	Chilean flower thrips	Feasible	Polyphagous pests and high reproductive rates (Mound & Teulon, 1995).	Significant	Damage plants directly by feeding and laying eggs on the plant, and indirectly by acting as vectors for viruses.	YES
Frankliniella occidentalis (Pergande) [Thysanoptera: Thripidae]	Western flower thrips (WFT)	Feasible	Polyphagous pests and high reproductive rates (Mound & Teulon, 1995).	Significant	WFT damage plants directly by feeding and laying eggs on the plant (Childers & Achor, 1995), and indirectly by acting as vectors for viruses.	Yes
CONTAMINATING PESTS						
Latrodectus mactans (Fabricius) [Araneae: Theridiidae]	Black widow spider	Feasible	Some species of *Latrodectus* are already established in Australia. It could spread into new areas as a contaminant.	Significant	Spiders are considered as having an impact on human health and potential impact on the environment.	Yes

Scientific name	Common name	Potential for establishment or spread in the PRA area		Potential for consequences		Consider pest further? (yes/no)
		Feasible/ not feasible	Comments	Significant/ not significant	Comments	
PATHOGENS						
Fungi						
Phomopsis viticola (Sacc.) Sacc. Type 2	Phomopsis cane and leaf spot, black rot	Feasible	Narrow host range (Erincik *et al*., 2001). Long distance dispersal to new areas occurs primarily through the transfer of infected or contaminated propagation materials (Hewitt & Pearson, 1990; Creecy & Emmett, 1990).	Significant	*Phomopsis viticola* type 2 is a serious pathogen of grapes in several viticultural regions of the world (Machowicz-Stefaniak *et al*., 1991; Nair *et al*., 1994).	Yes

References

AICN (2004). Australian Insect Common Names database. http://www.ento.csiro.au/aicn

Allen, M.W., Noffsinger, E.M. and Valenzuela, A. (1971). Nematodes in orchards and vineyards in Chile. Agricultura Tecnica 31: 115-119.

Angulo, A. (2003). Entomologia General Chilena – Libro de Entomologia – Proyecto de Docencia No. 01-38 – Chilesia rudis (Butler). http://www.udec.cl/entomologia/Ch-rudis.html

Antonelli, A.L., Shanks, C.H. Jr., and Fisher, G.C. (1988). Small fruit pests. Biology, diagnosis and management. Extension Bulletin, Cooperative Extension, College of Agriculture, Washington State University, No. 1388:20pp.

APPD (2004). Australian plant pest database. http://www.planthealthaustralia.com.au/our_projects/display_project.asp?category=4&ID=1

Arancibia, O.C., Charlin, C.R. and Sazo, R.L. (1990). Observaciones de la biologia de la escama del acacio *Diaspidiotus ancylus* (Putnam) en acacia blanca (Robinia pseudoacacia). Simiente 60: 106-108.

Artigas, J. (1994). Entomologia Economica Vol1. Ediciones Universidad de Concepcion. Chile, 1126 pp.

Auger, J., Esterio, M., Perez, I., Gubler, W.D. and Eskalen, A. (2004). First report of *Phaeomoniella chlamydospora* on *Vitis vinifera* and French American hybrids in Chile. Plant Disease 88:1285.

Barbetti, M.J. and Wood, McR. P. (1978). Decline of Cabernet grapevines. Australasian Plant Pathathology 7: 24-25.

Ben-Dov, Y. (1993). A systematic catalogue of the soft scale insects of the world (Homoptera: Coccoidea: Coccidae) with data on geographical distribution, host plants, biology and economic importance. Gainesville, USA: Sandhill Crane Press, Inc., 536 pp

Blackman, R.L. and Eastop, V.F. (1984). Aphids on the World's Crops. An Identification and Information Guide. John Wiley & Sons, Chichester, UK.

Bolland, H.R., Guiterrez, J. and Flechtmann, C.H.W. (1998). World Catalogue of the Spider Mite Family (Acari: Tetranychidae). Koninklijke Brill NV, Leiden, The Netherlands. 392 pp.

Bradbury, J.F. (1986). Guide to plant pathogenic bacteria. CAB International, Wallingford, UK. 332 pp.

Brown, J.W. (1999). A new genus of tortricid moths (Tortricidae: Euliini) injurious to grapes and stone fruits in Chile. Journal of the Lepidopterists' Society 53: 60-64.

Brown, J.W. and Passoa, S. (1998). Larval food plants of Euliini (Lepidoptera: Tortricidae): from Abies to Vitis. Pan Pacific Entomologist 74: 1-11.

Brunt, A.A., Crabtree, K., Dallwitz, M.J., Gibbs, A.J. and Watson, L. (1996). Viruses of plants - Descriptions and lists from the VIDE Database. CAB International, UK. 1484 pp.

Burr, T.J., Bazzi, C., Sule, S. and Otton, L. (1998). Crown gall of grapes: Biology of *Agrobacterium vitis* and development of disease control strategies. Plant Disease 82: 1288-1297.

CABI (2004). Crop Protection Compendium Global Module. CAB International, Wallingford, UK. http://www.cabicompendium.org/cpc/home.asp

CABI/EPPO (1997). Quarantine Pests for Europe, 2nd Edition. Data sheets on quarantine pests for the European Union and for the European and Mediterranean Plant Protection Organization. University Press, Cambridge. 1425 pp.

Campos, L.S.E., Faccin, M.M.A., Echeverria, L.N. and Sazo, R.L. (1981). Distribucion y aclo evolutivo del torticido enrollador de la vid *Proeulia auraria* (Clarke). Agricultura Tecnica 41: 249-256.

Carillo, R.L., Mundaca, N.B. and Cisternas, E.A. (1990). *Ametastegia glabrata* (Fallen) especie fitófaga introducida a Chile (Hymenoptera: Tenthredinidae). Revista Chilena Entomologia 18: 5-7.

Childers, C. C. and D. S. Achor. (1995). Thrips feeding and oviposition injuries to economic plants, subsequent damage, and host responses to infestation, pp 31 – 51. In: Parker, A.S, Skinner M. and Lewis, T. (eds) Thrips Biology and Management. Plenum, New York.

Creecy, H. and Emmett, R.W. (1990). Phomopsis of grapevines and its control. Australian Grapegrower and Winemaker 316: 91-94.

Devotto, L.M. and Gerding, M.P. (2001). Curculionids on Berries. Lima: Government of Chile, Agriculture Ministry, http://www.inia.cl/cobertuna/quilamapu/tattersall/tattersall6.htm.

Dillard, H.R., Wicks, T.J. and Philp, B. (1993). A grower survey of diseases, invertebrate pests, and pesticide use on potatoes grown in South Australia. Australian Journal of Experimental Agriculture 33: 5.

Edwards, J. and Pascoe, G. (2003). Occurrence of *Phaeomoniella chlamydospora* and *Phaeoacremonium aleophilum* associated with Petri disease and esca in Australian grapevines. Austalasian Plant Pathology 32: 273-279.

EFPIS (1998). The Exotic Forest Pest Information System for North America. *Callideriphus laetus* Blanch record. http://www.exoticforestpests.org/english/searchname.cfm

Elkins, R.B., Rizzo, D.M. and Whiting, E.C. (1998). Biology and management of *Armillaria* root disease in pear in California. Acta Horticulturae 475: 453-458.

EPPO (2004). PQR database (version 4.3). Paris, France: European and Mediterranean Plant Protection Organization.

Erincik, O., Madden, L.V., Ferree, D.C. and Ellis, M.A. (2001). Effect of growth stage on susceptibility of grape berry and rachis tissues to infection by *Phomopsis viticola*. Plant Disease 85: 517-520.

Farr, D.F., Rossman, A.Y., Palm, M.E., and McCray, E.D. (2005). Fungal Databases, Systematic Botany and Mycology Laboratory, ARS, USDA. http://nt.ars-grin.gov/fungaldatabases/

Fasulo, T.R. and Stansly, P.A. (1999). Plant bugs of citrus. Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. ENY-808.

Flaherty, D.L., Jensen, F.J., Kasimatis, A.N., Kido, H. and Moller, W.J. (1982). Grape Pest Management. University of California, Berkeley. Division of Agriculture and Natural Resources Publication No. 4105.

Fletcher, B.S. (1989). Ecology; movements of tephritid fruit flies, pp 209-219 In: Robinson, A.S., and Hooper, G, (eds) Fruit Flies; Their Biology, Natural Enemies and Control. World Crop Pests. Elsevier Science Publishers, Amsterdam, Netherlands.

Furness, G.O. (1977). Survey of snails on citrus in the Riverland of South Australia. Australian Journal of Experimental Agriculture and Animal Husbandry 17: 1036-1039.

Gill, R.J. (1988). The Scale Insects of California, Part I. The Soft Scales (Homoptera: Coccoidea: Coccidae). Sacramento, California, USA: California Department of Food, Agriculture.

Gillings, M. and Ophel-Keller, K. (1995). Comparison of strains of *Agrobacterium vitis* from grapevine source areas in Australia. Australasian Plant Pathology 24: 29-37.

Gonzalez, R.H. (1968). Biologia y control de la falsa aranita de la vid *Brevipalpus chilensis* Baker (Acaria: Phytoptipaplidae). Boletin Tecnico No 1 Experimental Agronomica, Universidad de Chile, Santiago, Chile, 31 pp.

Gonzalez, R.H. (1983). Manejo de plagas de la vid. Publicacions en Ciencias Agricolas No. 13. Facultad de Ciencias Agrarias, Veterinarias y Forestales, Universidad de Chile, Santiago, Chile. 115 pp.

Grimes, E.W. and Cone, W.W. (1985). Life history, sex attraction, mating and natural enemies of the grape mealybug, *Pseudococcus maritimus* (Homoptera: Pseudococcidae). Annals of the Entomological Society of America 78: 554-558.

Gullan, P.J. (2000). Identification of the immature instars of mealybugs (Hemiptera: Pseudococcidae) found on citrus in Australia. Australian Journal of Entomology 39: 160-166.

Habili, N., Ewart, A.J.W., Fazeli, C.F., Scott, N.S., Krake, L.R. and Rezaian, M.A. (1996). Virus types associated with grapevine leafroll disease in Australia. The Australian Grape Grower and Winemaker 33: 25-28.

Habili, N., Rowhani, A. and Symons, R.H. (2001). Grapevine fanleaf virus: a potential threat to the viticultural industry. The Australian Grape Grower and Winemaker 449a, Annual Technical Issue 141-145.

Halliday, R.B. (1998). Mites of Australia: Checklist and Bibliography. Monographs on invertebrate taxonomy Vol 5. CSIRO Publishing, Melbourne. 317 pp.

Hancock, D. L., Hamacek, E. L., Lloyd, A. C. and Elson-Harris, M. M. (2000). The distribution and host plants of fruit flies (Diptera: Tephritidae) in Australia. Department of Primary Industries Queensland, Brisbane, Australia. 75 pp.

Hely, P.C., Pasfield, G. and Gellatley, J.G. (1982). Insect pests of fruit and vegetables in NSW. Inkata Press, Melbourne. 312 pp.

Herrera, G.M. and Madariaga, M.V. (2001). Presence and incidence of grapevine viruses in the central zone of Chile. Agricultura Tecnica (Chile) 61(4): 393-400.

Hewitt, W.B. and Pearson, R.C. (1990). Phomopsis cane and leaf spot, pp 17 -18. In: Pearson, R.C. and Goheen, A.C. (edd). Compendium of Grape Diseases. 2nd Edition. St. Paul, Minnesota, USA: APS Press, 17-18.

Hoffmann, A.A. (1991). Acclimation for desiccation resistance in *Drosophila*: species and population comparisons. Journal of Insect Physiology 37: 757-762.

Howitt, A.H. (2001). Grape mealybug. Fruit IPM Fact sheet. Michigan State University Extension. http://www.msue.msu.edu/vanburen/fgmbug.htm

James, D.G. and Whitney, J. (1993). Mite populations on grapevines in south-eastern Australia: implications for biological control of grapevine mites (Acarina: Tenuipalpidae, Eriophyidae). Experimental and Applied Acarology 17: 259-270.

James, D.G., Faulder, R.J., Vogel, B. and Moore, C.J. (2000). Pheromone-trapping of *Carpophilus* spp. (Coleoptera: Nitidulidae): fauna, abundance and seasonality in some Australian horticultural regions. Plant Protection Quarterly 15: 57-61.

Jeppson, L.R., Keifer, H.H. and Baker, E.W. (1975). Mites injurous to economic plants. University of California Press.

Klein Koch, C. and Waterhouse, D.F. (2000). Distribution and importance of arthropods associated with agriculture and forestry in Chile (Distribucion e importancia de los artropodos asociados a la agricultura y silvicultura en Chile). ACIAR Monograph No. 68. Canberra. Australia. 231 pp.

Knapp, J.L. (1998). The Mediterranean fruit fly. Entomology and Nematology. Department Florida Cooperative Extension Services, Institute of Food and Agricultural Sciences, University of Florida. Fact Sheet ENY-809.

Latorre, B.A., Pszczolkowski, P., Torres, R. and Broome, J.C. (1996). Efectividad de los acidos grasos e inhibidores de esteroles contra el oidio de la vid y accion sobre la vinificacion en Chile. Fitopatologia 31: 52-58.

Latorre, B.A., Wilcox, W.F. and Banados, M.P. (1997). Crown and root rots of table grapes caused by *Phytophthora* spp. in Chile. Vitis 36: 195-197.

Lawson, D.S., Nyrop, J.P. and Dennehy, T.J. (1996). Aerial dispersal of European red mite (Acari: Tetranychidae) in commercial apple orchards. Experimental and Applied Acarology 20: 193-202.

Lewis, T. (1997). Thrips as crop pests. CAB International. Wallingford, UK. 740 pp.

Macenauer, I.S.G. (1993). Deteccion del mildiu (*Plasmopara viticola* (Berk. & Curtis ex de Bary) Berl. & de Toni) en vid (Vitis vinifera L.) en la decima region de Chile. Agro-Sur 21: 82-84.

Machowicz-Stefaniak, Z., Kuropatwa, E. and Hetman, B. (1991). Fungi dangerous for the grapevine grown under cover. Ochrona Rolins 35: 10-11.

Marks, G.C. and Kassaby, F.Y. (1974). Pathogenicity of *Pythium* spp. and *Phytophthora drechsleri* to *Eucalyptus* spp.. Australian Journal of Botany 22: 661-668.

Marks, G.C., Fagg, P.C. and Kassaby, F.Y. (1975). The distribution of *Phytophthora cinnamomi*. Australian Journal of Botany 23: 263-275.

McLeod, R., Reay, F. and Smyth, J. (1994). Plant nematodes of Australia: Listed by plant and genus. New South Wales Agriculture. 201 pp.

Merrin, S.J., Nair, N.G., and Tarran, J. (1995). Variation in *Phomopsis* recorded on grapevine in Australia and its taxonomic and biological implications. Australasian Plant Pathology 24: 44-56.

Miller, L.A. (1979). Weevil pests of horticultural crops. Journal of Agriculture, Tasmania, 50: 52-53.

Morales, C.F. (1991). Margarodidae (Insecta: Hemiptera). Fauna of New Zealand. 123 pp.

Mound, L. A., and Teulon, D. A. J. (1995). Thysanoptera as phytophagous opportunist, pp 3 –19. In: Parker, B.L., Skinner, M. and Lewis, T. (eds), Thrips Biology and Management. Plenum, New York.

Mound, L.A. and Gillespie, P. (1997). Identification Guide to Thrips Associated with Crops in Australia. NSW Agriculture. Orange, Australia

Mujica, F., and Vergara, C. (1945). Flora fungosa Chilena. Indice preliminar de los huespedes de los hongos chilenos y sus referencias bibliograficas. Imprenta Stanley. 199 pp.

Mujica, R., Vergara, C. and Oehrens, B. (1980). Flora fungosa Chilena. 2nd Edition. Universidad dr Chile Facultad de Agronomia Ciencias Agricolas 5. 308 pp.

Nair, N.G., Merrin, S.J., and Terran, J. (1994). Studies on *Phomopsis* causing cane and leaf blight of grapevines in Australia. Australian Grapegrower and Winemaker 366A: 35-42.

Nicholas, P., Magarey, P. and Wachtel, M. (1994). Diseases and pests. Grape Production Series No.1. Wine titles. Australia. 106 pp.

NRC (2002). Root Weevils. Natural Resources Canada, Pacific Forestry Center, http://www.pcf.forestry.ca/diseases/nursery/pests/rootweev_e.html.

Nyczepir, A.P. and Halbrendt, J.M. (1993). Nematode pests of deciduous fruit and nut trees, pp 381-425. In: Evans, K., Trudgill, D.L. and Webster, J.M. (eds), Plant parasitic nematodes in temperate agriculture. CAB International, Wallingford UK.

NZ MAF (2002a). Interception data for table grapes from Chile. Provided by the New Zealand Ministry of Agriculture and Forestry to Biosecurity Australia, email 29 November 2002.

NZ MAF (2002b). Pest Risk Assessment: Spiders associated with table grapes from United States of America (State of California), Australia, Mexico and Chile. MAF Biosecurity, Ministry of Agriculture and Forstry, Wellington, New Zealand.

Olsen, K., Reynolds, K.T. and Hoffmann, A.A. (2001). A field cage test of the effects of the endosymbiont *Wolbachia* on *Drosophila melanogaster*. Heredity 86: 731-737.

Parra, L. E., Angulo, A.O. and Jana-Saenz, C. (1986). Lepidoptera of agricultural importance: a practical key to its identification in Chile (Lepidoptera: Noctuidae). Gayana Zoology 50: 81-116.

Pearson, R.C. and Goheen, A. C. (1994). Compendium of grape diseases. American Phytopathological Society, St. Paul, Minnesota, USA. 93 pp.

Pfeiffer, D.G. and Schultz, P.B. (1986). Major insect and mite pests of grape in Virginia. Virginia Cooperative Extension Service Bulletin pp 444-567.

Phillips, P.A. (1992). Black vine weevil. In: Flaherty, D. L., Christensen, P. L., Lanini, T.W., Marois, J. J., Phillips, P.A, and. Wilson, L.T. (eds), Grape Pest Management. University of California, Division of Agriculture and Natural Resources Oakland, California. Publication No. 3343.

Prado, C.E. (1988). Notes on some insects of agricultural importance in Chile. Agricultura Técnica 48: 51-54.

Prado, E.C. (1991). Artopodos y su enemigos naturales asociados a plantas cultivadas en Chile. Instituto de Investigaciones Agropecuarias Serie Boletin Tecnico 169: 1-208.

Pszczólkowski, P., Latorre, B.A. and Ceppi de Lecco, C. (2003). Efectos de los mohos presentes en uvas cosechadas tardiamente sobre la calidad de los mostos y vinos cabernet sauvignon. http://www.enologo.cl/paper5.html. Departamento de Fruticultura Enología, Pontificia Universidad Católica de Chile, Santiago.

Ripa, R. (1994). Fruit trees in Chile. IPM Bulletin of Pest Management. Issue 4. http://www.nri.org/IPMEurope/ipmwd/issue4/iss4uk00/htm

Ripa, S.R. (1986). Study of the food-plants of the larva of the fruit-tree weevil *Naupactus xanthographus* (Germar) (Coleoptera: Curculionidae). Agricultura Tecnica, 46:15-19.

Ripa, S.R. and Rodríguez, A.F. (1989). Susceptibility of larvae of *Naupactus xanthographus* (Coleoptera: Curculionidae) to eight isolates of *Metarhizium anisopliae* (Deuteromycotina: Hyphomycetes). Agricultura Técnica 49: 336-340.

Ross, H. (1988) A record of the blackwidow spider *Latrodectus mactans* Frabricius (Araneae: Theridiidae) in Ireland. Irish Naturalists Journal 22: 12.

Rotundo, G., Tremblay, E. and Giacometti, R. (1979). Final results of mass captures of the citrophilus mealybug males (*Pseudococcus calceolariae* Mask.) (Homoptera Coccoidea) in a citrus grove. Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri", Portici 36: 266-274.

Rust, M.K. (1992). Termites. In: In: Flaherty, D. L., Christensen, P. L., Lanini, T.W., Marois, J. J., Phillips, P.A, and. Wilson, L.T. (eds), Grape Pest Management. University of California, Division of Agriculture and Natural Resources Oakland, California. Publication No. 3343.

Sadana, G.L. and Chander, S. (1978). Laboratory studies on the host range of the phytophagous mite, (*Oligonychus mangiferus*) (Rahman and Sapra). Science and Culture 44: 411 – 413.

SAG (2002). Response to the Technical Issues Paper by Chile.

SAG (2003). Phytosanitary situation of table grape in Chile. Servico Agrícola y Ganadero (faxed document).

SAG/USDA (2002). Importation of Fresh Commercial Citrus Fruit: Clementine (*Citrus reticulata* Blanco var. Clementine), Mandarin (*Citrus reticulata* Blanco) and Tangerine (*Citrus reticulata* Blanco) from Chile into the United States. A Pathway Initiated Plant Pest Risk Assessment. Draft March 2002. Departamento Protección Agrícola, Servicio Agrícola Ganadera (Santiago, Chile) and United States Department of Agriculture, Plant Protection and Quarantine (Riverdale, Maryland). http://www.aphis.usda.gov/ppq/pra/clclementine.pdf

Santas, L.A. (1985). *Parthenolecanium corni* (Bouche) an orchard scale pest producing honeydew foraged by bees in Greece. Entomologia Hellenica 3: 53-58.

Scheck, H.J., Vasquez, S.J., Gubler, W.D. and Fogle, D. (1998). First report of three *Phaeoacremonium* spp. causing young grapevine decline in California. Plant Disease 82: 590.

Schenone, H. and Correa, L.E. (1985). Algunos conocimientos practicos sobre la biologia de la arana Latrodectus mactans y el sindrome del latrodectismo en Chile. Boletin Chileno de Parasitologicia 40: 18-23.

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

Sivapalan, S., Whattam, M., Eichner, R. and Beulke, R. (2001). Draft review of post-entry quarantine protocols for the importation of grapevine (Vitis) into Australia. GWRDC and Agriculture, Fisheries and Forestry – Australia.

Soto, A.E.M., Pinto de Totter, A. and Cancino, E.L. (1973). Preventive control of post-harvest rots in the Emperor and Almeria grapes and identification of the fungi isolated. Agricultura Técnica 33: 176-182.

Suhag, L.S., Kaushik, J.C. and Duhan, J.C. (1983). Etiology and epidemiology of fungal foliar diseases on grapevine. Indian Journal of Mycology and Plant Pathology 12: 191-197.

UC (2000). University of California Integrated Pest Management: UC management guidelines for thrips on grapes. University of California. UC IPM State wide integrated pest management project. www.ipm.ucdavis.edu/PMG/r302300911.html

URI (2003). Insect and Mite Pests of Grapevines. GreenShare Factsheets. University of Rhode Island Landscape Horticulture Program. http://www.uri.edu/ce/factsheets/sheets/grapepest.html

USDA (2002). NSF Centre for integrated pest management, North Carolina University. Crop profile for grapes (table) in California. http://pestdata.ncsu.edu/cropprofiles/docs/cagrapes-table.html

Uvarov, B. (1977). Grasshoppers and Locusts, a handbook of general acridology, Volume 2 – Behaviour, Ecology, Biogeography and Population dynamics. The Centre for Overseas Pest Research.

VTED (2003). Grape IPM. Mid-Atlantic Vineyards. Virginia Vineyard Page. Virginia Tech Entomology Department. http://www.ento.vt.edu/Fruitfiles/grape-fruit-ipm.html

Weigle, T., English-Loeb, G., Wilcox, W., Dunst, R., Shaffer, B., Mitchell, T. and Collins, T. (2000). Crop profile for grapes (Vinefera and French hybrid) in New York. http://pestdata.ncsu.edu/cropprofiles/docs/nygrapes-vineferaandfrenchhybrid.html

Wibmer, G.J. and O'Brien, C.W. (1986). Checklist of Weevils of South America. Memoirs of the American Entomology Institute 39:73.

Williams, D.J. (1985). Australian mealybugs. British Museum (Natural History).

Wu, T.K. and Lo, K.C. (1990). Integrated control of citrus red mite, *Panonchynus citri* (Acari: Tetranychidae). Chinese Journal of Entomology. Special Publication No. 3: 133 – 143.

WVU (2000). Pesticide Certification Information #6. Important insect pests of fruit. Extension Service, West Virginia University, USA. http://www.wvu.edu/~exten/infores/pubs/pest/pcerti6.pdf

Zanin, I., Araya, Y. and Valdivieso, C. (1995). Comparaciones de la entomofauna epigea en cultivos asociados de maiz y frejol. Inverstigacion Agricola 15: http://www.uchile.cl/facultades/cs_agronomicas/publicaciones/iagricola/vol15/

APPENDIX – 2: PEST CATEGORISATION FOR TABLE GRAPES FROM CHILE (Pest Plants)

2A Methodology for pest plants assessment (pest categorisation)

2B Categorisation of pest plants for Table grapes from Chile – status in Australia

2C Categorisation of pest plants for Table grapes from Chile – pathway association

Appendix 2A: Methodology for pest plants assessment (pest categorisation)

Pest Plants (quarantine status in Australia)

Step 1: Presence in Chile

All plant species listed in Appendix 2A must be recorded as present in Chilean vineyards with reference provided.

Step 2: Schedule 5 of the Quarantine Proclamation 1998

The principal Commonwealth legislation regulating quarantine in Australia is the *Quarantine Act 1908.* Within the Act, the *Quarantine Proclamation 1998* addresses quarantine by including measures that act to prevent or control the introduction, establishment or spread of diseases or pests that will or could cause significant damage to humans, animal, plants, environment or economic activities.

Schedule 5 of the Quarantine Proclamation is a list of plant seeds that are permitted entry into Australia. These seeds are exempt from requiring an import permit or import conditions (eg treatments, additional declarations, etc.).

Is the plant species listed in Schedule 5? **Yes**, end IRA assessment. Plant <u>is not</u> considered further to the next table.
No, go to step 3

Step 3: Schedule 4 Part 2 of the Quarantine Proclamation 1998

Schedule 4 Part 2 of the Quarantine Proclamation is a list of plant species that are quarantinable pests. Seeds of these plants are <u>not</u> permitted entry into Australia. These seeds must be considered for further assessment in the IRA.

Plant species listed in Schedule 4 Part 2? **Yes**, plant <u>is</u> considered further to the next table.
No, go to step 4

Step 4: Previous assessments of weediness

Any previous weed assessments that have been conducted need to be considered.

For weed assessments that may have been conducted prior to the Weed Risk Anaysis (WRA) System and has identified that the weed has a high potential to be a weed within agricultural or environmental systems

Has the seed been assessed as a weed? **Yes**- is a weed. Where:

(i) WRA has been conducted and the plant species has been given a REJECT value, or

(ii) due to a previous weed assessment the plant species is listed as prohibited.
In the IRA, the plant is considered further to the next table.

Not- is not a weed. Where :
(i) WRA has been conducted and the plant species has been given an ACCEPT value.
In the IRA, assessment ends for this plant. The plant is not considered further to the next table.

Yes- is considered a weed until further information can be obtained where:
(i) Preliminary assessment of biology indicates weediness within agricultural and environmental systems.

Unassessed- plant has not yet been assessed. Go to step 5.

Step 5: Presence in Australia

Is the weed present in Australia? **No**, plant is considered further to the next table.
Yes, go to step 6.

Step 6:

- If the weed is listed on **Schedule 5**, it should be **permitted** and only have general import conditions.
- If weed is listed on **Schedule 4 Part 2**, it should be **prohibited.**

Step 7: Official control in Australian States/Territories

Each State/Territory has its own noxious weed legislation.

A summary of each State/Territory weed legislation can be found on the National Weed Strategy website [http://www.weeds.org.au/noxious.htm]. The Noxious Weed List (a list of each declared plant species in each State and Territory), is to be used at this step in the IRA weed assessment, and can be found at the above website.

Any plant species in the IRA that has not already been addressed by Commonwealth legislation needs to be assessed for its official control status in Australian States and Territories. If the plant is under official control in a State or Territory, the plant species is to be considered further to the next table.

For each declared plant species on the Noxious Weed List, the State/Territory gives it a classification that corresponds to a certain action (ie. management plan). However, not all management plans qualify as an action that will label the declared plant species as "under official control," as defined by ISPM 11.

Does the management plan for this weed, in at least one Australian State/Territory, meet the definition of "under official control," as defined by ISPM 11?

Yes, plant is considered further to the next table.
No, end IRA assessment. Plant is not considered further to the next table.

EXAMPLE OF THE FILTER PROCESS FOR TABLE 1 OF THE PEST PLANTS ASSESSMENT

PEST	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	ICON	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
PEST PLANTS										
		Reference	Yes							No
		Reference	No	Yes						Yes
		Reference	No	No	Yes					Yes
		Reference	No	No	Not					No
		Reference	No	No	Unassessed	No	Reference			Yes
		Reference	No	No	Unassessed	Yes	Reference	for	**Yes**	Yes
		Reference	No	No	Unassessed	Yes	Reference	Information	No	No

Appendix 2 B: Categorisation of pest plants for table grapes from Chile – status in Australia

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
*Achillea millef*olium L.	Yarrow; milfoil	Marticorena & Quezada, 1985	Yes						No
Agrostis stolonifera L.	Blown grass	Marticorena & Quezada, 1985	Yes						No
Aira caryophyllea L.	Silvery hairgrass	Marticorena & Quezada, 1985	No	No	Unassessed	Yes	Weiller *et al.*, 1995	No	No
Allium vineale L.	Crow garlic	Marticorena & Quezada, 1985	No	No	Yes				**Yes**
Amaranthus albus L.	Tumbleweed	Matthei, 1995	Yes						No
Amaranthus deflexus L.	Spreading amaranthus	Matthei, 1995	Yes						No
*Amaranthus r*etroflexus L.	Redroot amaranth	Matthei, 1995	Yes						No
Amaranthus viridis L.	Green amaranth	Matthei, 1995	Yes						No
Ambrosia artemisiifolia L.	Annual ragweed	Matthei, 1995	No	Yes					**Yes**
Amsinckia calycina (Moris) Chater	Yellow burrweed	Matthei, 1995	No	Yes					**Yes**
Anagallis arvensis L.	Scarlet pimpernel	Matthei, 1995	Yes						No
Apium nodiflorum Reichb.	Fool's Watercress	Matthei, 1995	Yes						No

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
Arctotheca calendula (L.) Levyns	Capeweed	Matthei, 1995	Yes						No
Artemisia absinthium L.	Wormwood	Matthei, 1995	Yes						No
Avena barbata Pott. Ex Link	Bearded oat	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Avena fatua L.	Wild oat	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Avena sterilis L.	Sterile oat	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Avena strigosa Schreb.	Sand oat	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Bidens aurea (Ait.) Sherff	Arizona beggarticks	Kogan, 1989	No	No	Yes				**Yes**
Bidens pilosa L.	Cobbler's pegs	Marticorena & Quezada, 1985	Yes						No
Boerhavia erecta L.	Erect spiderling	Marticorena & Quezada, 1985	No	No	Yes				**Yes**
Brassica napus L.	Winter rape	Matthei, 1995	Yes						No
Brassica rapa L.	Turnip	Matthei, 1995	Yes						No
Bromus catharticus Vahl.	Prairie grass	Matthei, 1995	Yes						No
Bromus diandrus Roth.	Great brome	Matthei, 1995	Yes						No
Bromus hordeaceus L.	Soft brome	Matthei, 1995	Yes						No
Bromus lanceolatus Roth.	Mediterranean brome	Matthei, 1995	Yes						No
Bromus madritensis L.	Madrid brome	Matthei, 1995	Yes						No

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
Bromus racemosus L	Brome grass	Matthei, 1995	Yes						No
Bromus secalinus L.	Brome grass	Matthei, 1995	Yes						No
Bromus sterilis L.	Brome grass	Matthei, 1995	Yes						No
Bromus tectorum L.	Drooping brome	Matthei, 1995	Yes						No
Calandrinia compressa DC.	Parakeelya	Matthei, 1995	Yes						No
Calendula arvensis L.	Field marigold	Matthei, 1995	Yes						No
Calystegia sepium (L.) R. Br.	Greater bineweed	Matthei, 1995	Yes						No
Capsella bursa-pastoris (L.) Medik.	Shepherd's purse	Marticorena & Quezada, 1985	Yes						No
Cardamine hirsuta L.	Common bittercress	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Cardaria draba (L.) Desv.	Hoary cress	Matthei, 1995	Yes						No
Carduus nutans L.	Nodding thistle	Matthei, 1995	No	Yes					**Yes**
Carduus pycnocephalus L.	Slender thistle	Matthei, 1995	Yes						No
Carthamus lanatus L.	Saffron thistle	Matthei, 1995	Yes						No
Cenchrus echinatus L.	Mossman river grass	Matthei, 1995	No	Yes					**Yes**
Cenchrus incertus Curt.	Spiny burrgrass	Matthei, 1995	No	Yes					**Yes**

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
Centaurea solstitialis L.	Pineapple weed	Matthei, 1995	Yes						No
Chamaesyce hirta (L.) Millsp. (	Spurge	Matthei, 1995	Yes						No
Chenopodium album L.	Fat hen	Marticorena & Quezada, 1985	No	No	Not				No
Chenopodium ambrosioides L.	Wormseed	Matthei, 1995	Yes						No
Chenopodium ficifolium Sm.	Figleaf goosefoot	Matthei, 1995	No	No	Yes				**Yes**
Chenopodium murale L.	Nettle-leaved goosefoot	Matthei, 1995	No	No	Yes				**Yes**
Chloris gayana Kunth.	Rhode grass	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Chloris virgata Sw.	Feathertop Rhode grass	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Chrysanthemoides moniliferum (L.) Norlindh	Boneseed	Matthei, 1995	No	No	Yes				**Yes**
Chrysanthemum segetum L.	Corn daisy	Matthei, 1995	Yes						No
Conium maculatum L.	Hemlock	Matthei, 1995	Yes						No
Convolvulus arvensis L.	Field bineweed	Matthei, 1995	Yes						No
Conyza bonariensis (L.) Cronq.	Flaxleaf fleabane	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Cuscuta suaveolens Ser.	Fringed dodder	Matthei, 1995	No	Yes					**Yes**

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
Cynodon dactylon (LC Rich) Pers.	Couch	Marticorena & Quezada, 1985	Yes						No
Cynosurus echinatus L.	Rough dogstail	Marticorena & Quezada, 1985	Yes						No
Cyperus rotundus L.	Nutgrass	Marticorena & Quezada, 1985	Yes						No
Dactylis glomerata L.	Cocksfoot	Matthei, 1995	Yes						No
Datura stramonium L.	Common thornapple	Matthei, 1995	No	Yes					**Yes**
Delairea odorata Lem. (Syn. *Senecio mikanioides* Otto)	Cape ivy, German ivy	Matthei, 1995	No	No	Unassessed	Yes	Lazarides *et al.,* 1997	No	No
Digitaria ischaemum (Schreb.) Schreb.	Smooth summer grass	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Digitaria sanguinalis (L.) Scop.	Crabgrass	Marticorena & Quezada, 1985	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Diplotaxis muralis (L.) Dc.	Wall rocket	Matthei, 1995	Yes						No
Echinochloa crusgalli (L.) Beauv.	Barnyard grass	Marticorena & Quezada, 1985	Yes						No
Echium plantagineum L.	Paterson's curse	Matthei, 1995	No	No	Yes				**Yes**
Echium vulgare L.	Viper's bugloss	Marticorena & Quezada, 1985	No	No	Yes				**Yes**
Equisetum bogotense Kunth	Horsetail	Matthei, 1995	Yes						No

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
Eragrostis virescens Presl.	Mexican lovegrass	Matthei, 1995	No	No	Yes				**Yes**
Erodium botrys (Cav.) Bertol.	Long storksbill	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Erodium cicutarium (L.) L'Herit. ex W. Ait.	Common storksbill	Marticorena & Quezada, 1985	Yes						No
Erodium moschatum (L.) L'Herit. ex W. Ait.	Musky storksbill	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Eruca vesicaria Cav.	Roquette	Matthei, 1995	Yes						No
Euphorbia cyathophora Murr.	Painted spurge	Matthei, 1995	Yes						No
Euphorbia falcata L.	Sickleleaf spurge	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Euphorbia helioscopia L.	Sun spurge	Marticorena & Quezada, 1985	Yes						No
Euphorbia lathyris L.	Caper spurge	Matthei, 1995	No	No	Yes				**Yes**
Euphorbia maculata L.	Eyebane	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Euphorbia peplus L.	Petty spurge	Matthei, 1995	No	No	Yes				**Yes**
Euphorbia platyphyllos L.	Broad-leaved spurge	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Festuca arundinacea Schreb.	Tall fescue	Matthei, 1995	Yes						No
Galega officinalis L.	Goat's rue	Marticorena & Quezada, 1985	Yes						No
Galinsoga parviflora Cav.	Potato weed	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
Galium aparine L.	Cleavers	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	**Yes - WA**	**Yes**
Geranium dissectum L.	Cutleaf cranesbill	Matthei, 1995	Yes						No
Geranium molle L.	Dove's foot cranesbill	Matthei, 1995	Yes						No
Geranium robertianum L.	Herb Robert	Matthei, 1995	Yes						No
Glechoma hederacea L.	Ground ivy	Matthei, 1995	Yes						No
Holcus lanatus L.	Yorkshire fog	Matthei, 1995	Yes						No
Hordeum jubatum L.	Foxtail barley	Matthei, 1995	No	No	Yes				**Yes**
Hordeum marinum Huds.	Sea barley grass	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Hordeum murinum L.	Wild barley	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Hordeum secalinum Schreb.	Meadow barley	Matthei, 1995	No	No	Unassessed	Yes	Lazarides *et al.,* 1997	No	No
Hypericum perforatum L.	St John's wort	Matthei, 1995	No	No	Yes				**Yes**
Hypochaeris glabra L.	Smooth cat's ear	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Juncus procerus E. Mey.	Rush	Matthei, 1995	No	No	Yes				**Yes**
Kickxia elatine (L.) Dum.	Twining toadflax	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Lactuca serriola L.	Prickly lettuce	Marticorena & Quezada, 1985	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
Lamium amplexicaule L.	Deadnettle	Matthei, 1995	Yes						No
Lolium multiflorum Lam.	Italian ryegrass	Matthei, 1995	Yes						No
Lolium perenne L.	Perennial ryegrass	Matthei, 1995	Yes						No
Lolium temulentum L.	Bearded rye grass	Matthei, 1995	Yes						No
Lotus uliginosus L. Schk.	Large bird's foot trefoil	Matthei, 1995	Yes						No
Malva nicaensis All.	Mallow of Nice	Marticorena & Quezada, 1985	Yes						No
Matricaria matricarioides (Less.) Porter	Chamomile	Matthei, 1995	Yes						No
Modiola caroliniana (L.) G. Don.	Red-flowered mallow	Marticorena & Quezada, 1985	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Orobanche ramosa L.	Branched broomrape	FAO, 2003	No	Yes					**Yes**
Oxalis corniculata L.	Yellow wood sorrel	Matthei, 1995	Yes						No
Oxalis pes-caprae L.	Soursob	Matthei, 1995	Yes						No
Panicum capillare L.	Witchgrass	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Panicum miliaceum L.	Millet panic	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Paspalum dilatatum Poir.	Paspalum, Watergrass	Marticorena & Quezada, 1985	Yes						No

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
Paspalum distichum L.	Buffalo quick paspalum	Matthei, 1995	Yes						No
Pastinaca sativa L.	Parsnip	Matthei, 1995	Yes						No
Pennisetum clandestinum Hochst. Ex Chiov.	Kikuyu grass	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Persicaria maculosa S.F.Gray	Red shank	Marticorena & Quezada, 1985	No	No	Not				No
Physalis pubescens L.	Downy groundcherry	Matthei, 1995	Yes						No
Picris echioides L.	Bristly oxtongue	Matthei, 1995	Yes						No
Plantago lanceolata L.	Ribwort	Marticorena & Quezada, 1985	Yes						No
Poa annua L.	Annual poa	Marticorena & Quezada, 1985	Yes						No
Poa pratensis L.	Kentucky bluegrass	Matthei, 1995	Yes						No
Polygonum aviculare L.	Knotweed	Marticorena & Quezada, 1985	No	No	No				No
Polygonum hydropiper L.	Water pepper	Matthei, 1995	No	No	Yes				**Yes**
Polygonum lapathifolium L.	Pale smartweed	Matthei, 1995	No	No	Not				No
Portulaca oleracea L.	Purselane	Marticorena & Quezada, 1985	Yes						No
Prunella vulgaris L.	Self-heal	Matthei, 1995	Yes						No

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
Ranunculus arvensis L.	Corn buttercup	Matthei, 1995	No	No	Yes				**Yes**
Ranunculus muricatus L.	Sharp fruited buttercup	Matthei, 1995	No	No	Yes				**Yes**
Ranunculus parviflorus L.	Small-flowered buttercup	Matthei, 1995	No	No	Yes				**Yes**
Ranunculus repens L.	Creeping buttercup	Matthei, 1995	No	No	No				No
Raphanus raphanistrum L.	Wild radish	Matthei, 1995	Yes						No
Raphanus sativus L.	Radish	Marticorena & Quezada, 1985	Yes						No
Rapistrum rugosum (L.) All.	Turnip weed	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Rubus ulmifolius Schott	Blackberry	Marticorena & Quezada, 1985	Yes						No
Rumex acetosella L.	Dock	Marticorena & Quezada, 1985	Yes						No
Rumex conglomeratus Murr.	Clustered dock	Matthei, 1995	No	No	Yes				**Yes**
Rumex crispus L.	Curled dock	Marticorena & Quezada, 1985	No	No	Yes				**Yes**
Rumex longifolius DC.	Long leaved dock	Matthei, 1995	No	No	Yes				**Yes**

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
Salsola kali L. (varieties other than *S. kali* L. var. *kali*)	Prickly saltwort	Matthei, 1995	No	No	Yes				**Yes**
Senecio sylvaticus L.	Wood groundsel, mountain groundsel	Matthei, 1995	No	No	Yes				**Yes**
Setaria pumila (Poir.) Roem. & Schult.	Queensland pigeon grass	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Setaria verticillata (L.) Beauv.	Whorled pigeon grass	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	**Yes- NSW**	**Yes**
Setaria viridis (L.) Beauv.	Green pigeon grass	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Silene gallica L.	French catchfly	Matthei, 1995	Yes						No
Silybum marianum (L.) Gaertn.	Variegated thistle	Matthei, 1995	Yes						No
Solanum nigrum L.	Black nightshade	Marticorena & Quezada, 1985	Yes						No
Sonchus arvensis L.	Corn sowthistle	Matthei, 1995	No	Yes					**Yes**
Sonchus asper (L.) Hill	Rough sowthistle	Marticorena & Quezada, 1985	Yes						No
Sonchus tenerrimus L.	Clammy sowthistle	Matthei, 1995	Yes						No
Sorghum halepense (L.) Pers.	Johnson grass	Marticorena & Quezada, 1985	No	No	Unassessed	Yes	Hnatiuk, 1990	**Yes- NSW, WA, NT**	**Yes**

Scientific name	Common name	Reference for presence in Chile	Listed on Schedule 5? (Yes/No)	Listed on Schedule 4 Part 2? (Yes/No)	Assessed as a weed via previous assessment? (Yes/Not/ Unassessed)	Occurrence in Australia	Reference	Under official control in Australia? (Yes/No)	Consider pest further? (Yes/No)
Spergula arvensis L.	Corn spurry	Matthei, 1995	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Stellaria media (L.) Cyr.	Chickweed	Marticorena & Quezada, 1985	Yes						No
Taeniatherum caput-medusae Boiss	Medusa-head	Matthei, 1995	No	Yes					**Yes**
Taraxacum officinale Weber	Dandelion	Marticorena & Quezada, 1985	Yes						No
Tribulus terrestris L.	Caltrop	Matthei, 1995	Yes						No
Urtica dioica var. *mollis* L.	Stinging nettle	Matthei, 1995	Yes						No
Urtica urens L.	Dwarf nettle	Marticorena & Quezada, 1985	Yes						No
Veronica anagallis-aquatica L.		Marticorena & Quezada, 1985	Yes						No
Veronica arvensis L.	Wall speedwell	Matthei, 1995	Yes						No
Veronica persica Poir.	Creeping speedwell	Matthei, 1995	Yes						No
Vicia sativa L.	Common vetch	Marticorena & Quezada, 1985	No	No	Unassessed	Yes	Hnatiuk, 1990	No	No
Xanthium spinosum L.	Bathurst burr	Marticorena & Quezada, 1985	No	No	Yes				**Yes**

Appendix 2C: Categorisation of pest plants for tablge grapes from Chile – pathway association (table grapes clusters)

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
Allium vineale L.	Crow garlic	Grows in open warm-temperate regions occurring on a range of soils but preferring heavy, fertile loams. Seeds are produced in summer. Black seed 3 to 4 mm long, flattened on one side, not common. Main reproduction via underground bulbs and aerial bulbils in the inflorescence. The main means of spread is through soil borne bulbils (approx. the size of wheat grains) rather than windblown seed. Weed of cereal crops, pastures and roadsides.	Auld & Medd, 1992; Lamp & Collet, 1989; Parsons & Cuthbertson, 1992	• Soil-borne bulbils, the main mode of reproduction, are not likely to enter Australia via grape bunches.	No
Ambrosia artemisiifolia L.	Annual ragweed	Growns in subhumid temperate to subtropical regions, thriving on a wide range of soils. Flowering begins in late summer-early autumn; the main flowering period extending from March to April in Australia. Spreads over long distances because beaked and spined seeds are adapted to dispersal by sheep, furred animals, woolpacks, bags	Parsons & Cuthbertson, 1992	• Spined seeds are present during the grape production period, however; no mechanism for dispersal to grape bunches is apparent, not considered to be on the pathway.	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		and clothing, and by water. Weed of cultivated lands, stubble fields, old pastures, wastelands, roadsides, railway reserves and vacant lots.			
Amsinckia calycina (Moris) Chater	Yellow burrweed	Grows in temperate regions on a wide range of soil in moderately warm, unshaded situations. In Australia, flowering commences in August, continuing for about 2 months. Fruit is a group of 4 nutlets surrounded by a bristled calyx. The main cause of dispersal has been through movement of contaminated farm equipment and through contaminated seed, fodder and stock. Weed of cereal crops, lucerne, vineyards, degraded pastures and roadsides, particularly in dry, sandy areas.	Parsons & Cuthbertson, 1992	• Seeds are present during the grape production period; however, there is no apparent mechanism for dispersal of seed to grape bunches. Not considered to be on the pathway.	No
Bidens aurea (Ait.) Sherff.	Arizona beggarticks	Other species of this genus like *B. pilosa* are produced in late autumn to summer. Fruit are achenes. Narrow fruits with barbed awns result in attachment to clothing and animals and wide dispersal. Spread is also via rhizomes.	Hussey *et al.,* 1997; Kogan, 1989; Lamp & Collet, 1989	• Spread is likely to occur via the fruits attaching to animal hair, fibre and machinery. No apparent mechanism for dispersal of seed to grape bunches. Not considered to be on pathway.	No
Boerhavia erecta L.	Erect	This species occurs from sea level	Bromilow, 1995; Holm	• This species has shown in other parts	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
	spiderling	to 1500 meters and behaves as either an annual or perennial. A widely distributed weed in tropical and subtropical regions of the world. Seed are 1.5 mm long, smooth and inseparable from the fruit. Although seeds are not normally sticky, when wetted while still attached to the plant, a slimy substance forms, allowing seeds to adhere to passing animals. Is a common weed in cultivated fields, perennial crops, roadsides, pastures, gardens and wasteland. Is a weed of vineyards in Mexico.	*et al.,* 1997	of the world to readily spread via its sticky seed. No apparent mechanism for dispersal of seed to grape bunches. Not considered to be on pathway.	
Carduus nutans L.	Nodding thistle	Prefers open situations in temperate regions, usually on soils of moderate to high fertility in areas with an annual rainfall of 500 to 900 mm. Flowers are produced in spring, summer and autumn. A prolific seed producer. The pappus of the seed has fine-toothed bristles which assist with adhering to clothing, wool, bags and fur. Has become a weed in well-drained annual pastures where there are disturbed sites at the end of summer.	Holm *et al.,* 1977; Parsons & Cuthbertson, 1992	• Seed is present during the grape producing period, maybe dispersed by wind and has the potential to attach to grape bunches. • This species is already present in Australia and its presence in annual pastures demonstrates its ability to establish from seed in Australia. • Further spread is likely to occur via the spined flowerheads attaching to animal hair, fibre and machinery.	**Yes**

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
Cenchrus echinatus L.	Mossman river grass	Occurs in humid and subhumid tropical lowlands. It prefers moderate moisture and light, sandy, well-drained soils at low elevations. In Australia, burrs are formed between January and May. Inflorescence forms a dense cylindrical spike, 3-10 cm long, 1-2 cm wide, with spikelets enclosed in spinous burrs. Dispersal by spiny burrs, which adhere to any fibrous material. Weed in cultivated fields, pastures, roadsides, lawns, town pathways, river sand and beach margins. Also a weed of 18 crops in 35 countries, mostly in cereals, pulses, vineyards, plantation crops and pastures.	CABI, 2004; Holm *et al.,* 1977; Parsons & Cuthbertson, 1992	• Seeds are present during the grape producing season, however; there is no apparent mechanism for dispersal of seed to grape bunches. Not considered to be on the pathway.	No
Cenchrus incertus Curt.	Spiny burrgrass	Prefers temperate subhumid and semi-arid regions where it grows well on low-fertility, sandy, well-drained soils. Readily establishes on disturbed sites in the 250 to 500 mm annual rainfall belt. In Australia, burrs are produced from December to April. Seeds are enclosed within a spiny burr. Dispersal is by spiny burrs, which	Lamp & Collet, 1989; Parsons & Cuthbertson, 1992	• Seed is present during the grape producing season, however; there is no apparent mechanism for dispersal of seed to grape bunches. Not considered to be on the pathway.	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		easily detach from the plant when mature and adhere to wool, fur, clothing, bags, and any other fibrous material. It is a weed of vineyards in the USA, and wasteland.			
Chenopodium ficifolium Sm.	Figleaf goosefoot	No information has been found on *C. ficifolium*. However, information has been collated on similar species in the *Chenopodium* genus. Seed production is usually in summer and autumn months. They commonly have no special seed dispersal systems. Are commonly weeds of wasteland.	Lamp & Collet, 1989	• Although seed may be present during the grape producing period, seeds do not appear to have adaptations for attachment or wind dispersal and are not likely to be found within grape bunches.	No
Chenopodium murale L.	Nettle-leaved goosefoot	Found in cropland and wastelands, especially those with fertile soils. Grows from sea level to over 2000 m and in open and shaded sites. In northern Europe, it flowers from July to September (mid-summer to early-autumn). Seeds are 1.5 mm long, with a keeled margin, which give the appearance of a “pie-plate” rim. Seeds are borne in utricles in axillary panicles and have no special adaptations for wind dispersal, although dispersal by	Auld & Medd, 1992; Holm *et al.,* 1977	• Although seed is present during the grape producing period, seed do not appear to have adaptations for attachment or wind dispersal and are not likely to be found within grape bunches.	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		animals eating fruits may occur. Seeds are also often harvested with the surrounding crop. Principal weed of wheat, vegetables, vineyards (in South Africa), and dryland crops. Weed of wasteland in NSW.			
Chrysanthemoides monilifera (L.) Norlindh	Bitou bush, boneseed	Grows in subtropical and subhumid scrublands. Not restricted by climate, but prefers sandy or medium-textured soils and disturbed situations, particularly near the sea where it tolerates saline conditions. Flowers are produced all year round, with a peak in flowering from April to June in Australia. One seed is produced in each flowerhead, and fruits are in the form of a berry. Spread is by bird dispersal of fruit. Rabbits, foxes and cattle may also eat the fruit. Fruit and seeds can also be carried by water. A weed of native coastal vegetation.	Lamp & Collet, 1989; Parsons & Cuthbertson, 1992; Stuart, 2002	• Although seed is present during the grape harvesting period, animal and water dispersal is not likely to result in seeds entering Australia within grape clusters.	No
Cuscuta suaveolens Ser.	Fringed dodder	Grows in a wide range of environmental conditions. In Australia, flowers appear from October to January. Globular seed with a roughened	Lamp & Collet, 1989; Parsons & Cuthbertson, 1992	• Reproductive stem fragments likely to become associated with a grape cluster via twisting around sections of the grape cluster • This species is already present in Australia, demonstrating that it is able	**Yes**

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		coat. Most dispersal is by seed, but stem fragments (which can re-establish on a new host) can be spread on farm equipment or by water. A parasitic weed which can affect a wide range of broad-leaved plants, including lucerne and several vegetables.		to establish from seed and parasitic stem fragments • Further spread is likely to occur via seed.	
Datura stramonium L.	Common thornapple	Prefers warm-temperate and subtropical regions. Principally found in open, warm situations and on fertile soils. Flowers may be produced 2-5 weeks after germination and germination can occur all year round. Fruit is a spiny globular capsule containing numerous seeds. Seed are commonly distributed as a contaminant of soybeans, in soil and in agricultural seed stock. Water dispersal and human dispersal is also important. Are poisonous weeds of river flats, stockyards, etc.	Parsons & Cuthbertson, 1992	• Although seed is present during the grape producing period, neither the large fruit capsule nor the seeds are likely to attach to grape bunches.	No
Echium plantagineum L.	Paterson's curse	Warm-temperate regions, principally in areas with a dominant winter rainfall, where it is found on a wide range of soils.	Parsons & Cuthbertson, 1992	• Seed is present during the start of the grape producing period, however; there is no apparent mechanism for dispersal of seeds to grape bunches. Not	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		In Australia, flowering commences in early spring and continues for several months. Fruit is a group of 4 nutlets surrounded by a persistent stiff bristled calyx. Seeds are strongly wrinkled and pitted. Spread by animals, although the most important means of dispersal has been as a contaminant of hay or grain. Weed of degraded pastures, roadsides and neglected areas in winter rainfall districts.		considered to be on the pathway.	
Echium vulgare L.	Viper's bugloss	Prefers temperate regions at elevations up to 2100 m where it occurs over a wide range of soils but prefers the drier lighter ones. Flower production occurs several weeks later than *E. plantagineum* and extends over a longer period. Fruit is a group of 4 nutlets surrounded by a persistent, stiff, bristled calyx. Seeds are strongly wrinkled and pitted. Spread by animals, although the most important means of dispersal has been as a contaminant of hay or grain. A weed of pastures, roadsides and neglected areas.	Parsons & Cuthbertson, 1992	• Seed is present during the start of the grape producing period, however; there is no apparent mechanism for the dispersal of seed to grape bunches. Not considered to be on the pathway.	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
Eragrostis virescens Presl.	Mexican lovegrass	In Southern Africa it occupies temperate (with summer rainfall) and subtropical regions. A similar species, *Eragrostis curvula*, is spread short-distances by wind dispersal. Seed contaminants and in mud adhering to animals and machinery.	Parsons & Cuthbertson, 1992; Wells *et al.,* 1986	• Based on the seed dispersal characteristics of the similar species *E. curvula*, *E. virescens* seed has the potential to enter Australia by falling into grape bunches after wind dispersal. • This species is already present in Australia, demonstrating that it is able to establish from seed in Australia. • Further spread is likely to occur via wind-dispersed seed.	**Yes**
Euphorbia lathyrus L.	Caper spurge	Mainly occurs on the lighter soils of disturbed areas of temperate regions. Flowering begins in summer and continues through to autumn, both flowers and mature fruit being found at the same time on the one plant. Fruit is a 3-lobed pod-like capsule, containing 3 seeds. Ripe fruit burst open explosively, throwing seeds for several meters. Further dispersal results from seed being caught up in mud on animals, machinery, etc. A weed of gardens, along roadsides and in waste lands, especially close to rivers and streams.	Parsons & Cuthberson, 1992	• Seed has the potential enter Australia by falling into grape bunches upon explosion of the fruit capsule, if the weed is in close proximity to a grape vine. • This species is already present in Australia and its presence in gardens and roadsides demonstrates its ability to establish from seed in Australia. • Further spread is likely to occur via the explosive fruit capsules and then via seed being caught in mud on animals and machinery.	**Yes**
Euphorbia peplus	Petty spurge	A widespread weed of cultivation.	Auld & Medd, 1992;	• Seed is present during the grape	**Yes**

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
L.		It is very adaptable to a wide range of habitats, but prefers warm, moist, shaded, fertile areas of high humidity throughout the tropics, subtropics and warm temperate world. Inflorescences are produced in spring in Australia. Seeds possess deep regular pits. Within Species within the Euphorbiaceae family commonly have capsules that are round, 3-chambered, with 1 seed per chamber. Seeds ovoid to oblong, round in cross-section, and 2-3 mm long. The specific dispersal mechanism of this weed is not known. However, it is known that mature capsules of many spurges rupture and forcefully eject seeds some distance from the parent plant. A common weed of gardens, nurseries and other highly disturbed areas.	CABI, 2004; CDFA, 2001; Lamp & Collet, 1989; Hussey *et al.,* 1997	producing period and has the potential to enter Australia by falling into grape bunches upon explosion of the fruit capsule, if the weed is in close proximity to a grape vine. • This species is already present in Australia and its presence in gardens demonstrates its ability to establish from seed in Australia. • Further spread is likely to occur via the explosive fruit capsules and then via seed being caught in mud on animals and machinery.	
Galium aparine L.	Cleavers	Grows in a wide range of situations but thrives in moist habitats. It prefers nutrient-rich soils, but has been reported on sandy, loam and heavy organic soils. In Canada, mature fruits are	CABI, 2004; Holm *et al.,* 1977; Lamp & Collet, 1989	• 1. Based on the seed dispersal characteristics seed has the potential to enter Australia by falling into grape bunches after wind dispersal.	**Yes**

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		produced from late June to mid-July (summer months). The surfaces of the fruit are covered with hooked bristles. Reproduces solely by seed. Seeds are dispersed by wind, water, animals and farm machinery or as contaminants of crop seed. Hooked bristles on fruits and seeds attach to animal fur, feathers or human clothes and bags. Fruits also have a hollow space near to the point of attachment between the two halves, which enables them to float on water. Found on a wide range of crops as well as in meadows, pastures, rich woodlands, thickets, hedgerows, seashores, waste ground and along fence rows.			
Hordeum jubatum L.	Foxtail barley, squirrel tail	Grows at all elevations except in the alpine zone. It is common along roadsides, in moist meadows, and along lakeshores. It tolerates alkaline soils, and favours disturbed sites in urban settings. Seeds are produced during cool seasons (ie. late-autumn, winter or early-spring). Seeds possess sharp awns.	Auld & Medd, 1992; Lazarides *et al*., 1997; Stewart & Hebda, 2000; Stubbendieck *et al*., 1994	• Awned seeds fall from the plant during the grape producing period, however; there is no apparent mechanism for the dispersal of seed to grape bunches. Not considered to be on the pathway.	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		Dispersal is likely to be by seed getting caught up in the fur of animals, clothing, etc. Weed of sheep areas and winter-growing crops.			
Hypericum perforatum L.	St John's wort	Prefers humid and subhumid temperate regions, growing on drier sites at elevations between 500 and 100 m. In Australia, flowers, and subsequently seed, are produced in November and continue well into summer. Fruit is a sticky, many-seeded capsule. Seeds are very small (1 mm long). A prolific seed producer. Dispersal is by water, mud, soil, and agricultural produce, particularly hay and chaff. A weed of poorly managed grazing land, sparse bushland, roadsides, and neglected areas.	Parsons & Cuthbertson, 1992	• Sticky fruit are present during the start of the grape harvesting period, however; there is no apparent mechanism for the dispersal of seed to grape bunches. Not considered to be on the pathway.	No
Juncus procerus E. Mey.	Rush	No information was found on this species. However, information on similar species in the *Juncus* genus has been collated. Often grow in coastal marsh situation and inland where silt has been deposited. Salt tolerant species occur.	Lamp & Collet, 1989; Sainty *et al.,* 1998	• Although seed is present during the grape producing period, it is not likely to attach to grape clusters. Not considered to be on the pathway.	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		Flowers are mostly produced from late-spring to autumn. Can usually produce both vegetatively and from seed. Seed are commonly spread by water. Common in wet healthland, watercourses and grassland.			
Orobanche ramosa L.	Branched broomrape	Annual root parasite. Prefers well-drained, low fertility soils. Likely to grow in a wide range of environments including crops, pastures, roadsides and native vegetation. Wide potential distribution in Australia. Broomrape extracts nutrients and water from host, forming a swollen tubercle. Fleshy flowering stem emerges above ground. Sets seed within 3-4 weeks, dries and shatters. Reproduces via seed. A single plant may produce more than 40 fruits and each fruit may have more than 1200 seeds. Strain present in SA appears to attach in mid-late winter and flowers in spring. The seed can survive in the soil for over 10 years. Long-distance seed dispersal mainly via soil movement (machinery, vehicles) and stock. Branched broomrape has been	DPI, 2001; FAO, 2003	• Minute seeds are present during the grape production; however, there is no mechanism for the dispersal of seed to grape bunches, not considered to be on the pathway.	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		observed parasitising on canola, carrots, annual medics, vetch, capeweed, long-fruited turnip, stemless thistle, *tolpis* and various native daisies.			
Polygonum hydropiper L.	Water pepper	Commonly found in moist soil or standing water (eg, in shallow water along the banks of streams and in wet depressions, on river flats and in swamps). Also occurs in crops and pastures with poorly drained soils. Grows in most temperate and subtropical climates. Flowers produced in early to mid-summer. Fruits are shed from late-summer until plant death (by frost or drought). Triangular seed, 2.0-3.5 mm long. Seed dispersal is via water and human activities (spread in poultry feed and small grass seed). Weed of lowland rice and wheat, vegetables and other irrigated crops.	Holm *et al.,* 1997; Lamp & Collet, 1989	• This weed is not likely to be in close proximity to Chilean grape vines (ie. it prefers pools of fresh water). Furthermore, seeds do not possess adaptations that would enable them to become associated with a grape bunch.	No
Ranunculus arvensis L.	Corn buttercup	*Ranunculus* spp. prefer moist areas and flower in spring. The fruit is a bristled achene that allows for dispersal by attachment to animals. This species is a common weed found in vineyards. Plants of this	Hussey *et al.,* 1977; CABI, 2004	• Is known to be associated with vineyards. Seed may be present during the grape harvesting period, however; there is no apparent mechanism for the dispersal of seed to grape bunches. Not considered to be on the pathway.	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		genus are often found in undisturbed bushland in Western Australia.			
Ranunculus muricatus L.	Sharp fruited buttercup	Native to Mediterranean region, prefers to grow in winter-wet areas. Flowers are produced in late spring. Seeds have spiny, wart-like structures and a beak half as long as the seed. Seeds have spines that assist in dispersal by animals. A common weed of gardens, lawns, wetlands and grounds/pastures.	Auld & Medd, 1992; Hussey *et al.,* 1997; Lamp & Collet, 1989	• Spined seeds are present during the grape harvesting period, however; there is no apparent mechanism for the dispersal of seed to grape bunches. Not considered to be on the pathway.	No
Ranunculus parviflorus L.	Small-flowered buttercup	Other *Ranunculus* spp. flower in spring. Seeds have spines that assist in dispersal by animals. A common weed of gardens, lawns, wetlands and pastures.	Lamp & Collet, 1989	• Spined seeds are present during the grape harvesting period, however; there is no apparent mechanism for the dispersal of seed to grape bunches. Not considered to be on the pathway.	No
Rumex conglomeratus Murr.	Clustered dock	Prefers moist, fertile loams, or clay soils in temperate regions. Flowering occurs in spring, and seeds mature 16-20 days later. Fruit possesses 3 blunt-topped oblong valves. Valves on the fruit play an important part in fruit dissemination by wind, water,	Parsons & Cuthbertson, 1992	• Valved fruit may be present during the grape harvesting period and has the potential to attach to grape bunches. • This species is already present in Australia and its presence along roadsides and in pastures demonstrates its ability to establish from seed in Australia. • Further spread is likely to occur via	**Yes**

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		animals and man. These valves are large wing-like and act as sails (wind dispersal), while the tubercles at their base act as floatation chambers (water dispersal). The short bristles on the broadleaf fruit help it attach to wool, fur, bags and clothing. Some fruit is also spread in mud adhering to hooves, machinery and other vehicles, and as contaminants of agricultural seeds. Weed of wetter areas along roadsides, pastures and disturbed areas.		valved fruit attaching to animal hair, fibre and machinery, or being dispersed by wind and/or water. May also be spread as a contaminant of agricultural seed stock.	
Rumex crispus L.	Curled dock	Grows on most soil types and favours humid conditions but can withstand periods of drought because of deep-growing roots. Flowering occurs in spring and seeds mature 16-20 days later. Seeds develop in achenes that are triangular in cross section, 2-3 mm long, with a shortly pointed base and a somewhat more long-pointed apex. The achenes are enclosed within three inner sepals (valves), which are heart-shaped with entire margins, brown at maturity. Primarily a weed in grasslands (pastures and meadows) and on	CABI, 2004; Parsons & Cuthbertson, 1992	• Is known to be associated with vineyards. Seed may be present during the grape producing period, may be wind dispersed and attach to grape bunches. • This species is already present in Australia and its presence along roadsides and in vineyards demonstrates its ability to establish from seed in Australia. • Further spread is likely to occur via valved seed attaching to animal hair, fibre and machinery or being wind dispersed.	**Yes**

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		arable land under perennial crops. But also a weed in orchards and vineyards and other fruit gardens. It otherwise occurs as a ruderal on shores, roadsides, ditch banks and courtyards.			
Rumex longifolius DC.	Long-leaved dock	Little information has been found on *R. longifolius*. However, information on similar species in the *Rumex* genus has been collated. Prefers most soil types. Seed production commonly occurs in spring. *R. longifolius* is morphologically similar to *R. crispus* (see above). Fruit possess 3 blunt-topped oblong valves. Dispersal is commonly via fruit attaching to moving objects, such as animals and machinery.	CABI, 2004; Lamp & Collet, 1989; Parsons & Cuthbertson, 1992	• Seed may be present during the grape producing period. It is thought to be wind dispersed and may attach to grape bunches. • Not currently present in Australia. However, it is expected that R. longifolius will be able to establish in Australia, since similar species in the Rumex genus have done so. • Further spread is likely to occur via valved seed attaching to animal hair, fibre and machinery.	**Yes**
Salsola kali L. (varieties other than *S. kali* L. var. *kali* (synonym *S. australis*))	Prickly saltwort	Grows at low- to mid-elevations along roadsides, railroad tracks, fields, and disturbed or unoccupied sites. Grows on well-drained, uncompacted soils with a sunny exposure. Seeds mature during August-November in Canada (late-summer to late-autumn). Small, 1-seeded fruits with winged tips. Seeds are round, black,	Auld & Medd, 1992; BCMAFF, 2002; Holm *et al.,* 1977	• Although seed is present during the grape producing period, it is not likely that seed will be become associated with a grape bunch via the tumbling plant.	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		smooth and shiny. Dispersed by plant breaking off at the root at maturity and plant tumbling in the wind. Main cause of spread internationally and nationally as a contaminant in wheat and grains, as well as in straw and hay. Weed of dryland agriculture, disturbed rangeland and disturbed habitats.			
Senecio sylvaticus L.	Wood groundsell, Mountain groundsell	Prefers course texture, well-drained soils of an alpine or subalpine climate in an open, sunny position,and is frost resistant but drought tender. Flowers produced in late summer. Dispersal is via seed, most likely facilitated by herbivore grazing and machinery. In Australia, other *Senecio* spp. are commonly found along roadsides, in paddocks, woodland and wasteland.	Bodkin, 1993; Hussey *et al.,* 1997	• Seed is present during the grape producing period; however, there is no mechanism for the dispersal of seed to grape bunches, not considered to be on the pathway.	No
Setaria verticillata (L.) Beauv.	Whorled pigeon grass	A plant of disturbed areas, especially in annual and perennial crops, but also along roadsides and in waste places over a wide ecological range from northern temperate, throughout the tropics, to southern temperate areas. It also occurs at high altitude in the	CABI, 2004; Holm *et al.,* 1977; Wheeler *et al.,* 1984	• Seed is present during the grape harvesting period; however, there is no mechanism for the dispersal of seed to grape bunches, not considered to be on the pathway.	No

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		tropics, for example, in East Africa. Flowering occurs from July to November in Iraq (warm temperatures). Inflorescence is a narrow, spike-like panicle, 5-15 cm long. Dispersal is assisted by complete inflorescences being carried on clothing or animal fur assisted by barbed bristles on the spikelets. Weed of a wide range of tropical and temperate crops. Weed of maize, sorghum, sugarcane, and wheat crops.			
Sonchus arvensis L.	Corn sowthistle	Mainly occurs in temperate and subtropical areas with humid climates. It does not thrive in warm tropical climates. Grows on most soil types, but prefers moist soils. Flowering occurs from high summer to autumn. Seeds are 2.5-3.5 mm long and ribbed with a parachute-like pappus. A prolific seed producer. Dispersal is mainly by water, and via the pappus attached to seeds, short distance wind dispersal. Weed of agricultural and horticultural crops. It occurs in fields with perennial crops,	CABI, 2004; BCMAFF, 2002; Holm *et al.,* 1977	• Is known to be associated with vineyards. Seed is present during the grape harvesting period and via wind dispersal, has the potential to enter Australia by falling into grape bunches. • This species is already present in Australia and its presence in vineyards and perennial crops demonstrates its ability to establish from seed in Australia. • Further spread is likely to occur via seed being dispersed by water and wind.	**Yes**

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		particularly in orchards and vineyards.			
Sorghum halepense (L.) Pers.	Johnson grass	Occurs in temperate, subtropical and tropical regions, where it commonly inhabits wet places. In Australia, flowering occurs about 7 weeks after seedling emergence (seeds germinate in spring and early summer) and continues until autumn. Inflorescences possess spikelets on the outer surface. Seeds dispersal is facilitated by the detached spikelets, which are blown in the wind, float on water, stick to wool and fur and pass relatively unharmed through animal and bird digestive tracts. Seed may also be spread as a contaminant in agricultural produce and in mud sticking to vehicles. Weed of cultivation in irrigated areas.	Lamp & Collet, 1989; Parsons & Cuthbertson, 1992	• Spikey seed is present during the grape harvesting period, it is wind dispersed and has the potential to enter Australia by attaching to grape bunches. • This species is already present in Australia and its presence in cultivated areas demonstrates its ability to establish from seed in Australia. • Further spread is likely to occur via the spikey seed attaching to animal hair, fibre and machinery, being dispersed by wind or water, contaminating agricultural seed and by being transported by herbivores.	**Yes**
Taeniatherum caput-medusae Boiss.	Medusa-head	Typically invades rangeland communities. It occurs in disturbed sites, grassland, oak woodlands and agronomic fields. Growth is best on clay soils or where deep soil moisture is available late in the growing season.	CDFA, 2001	• Barbed seed is present during the grape producing period. Seed may be dispersed by wind and has the potential to enter Australia by attaching to grape bunches. • This species is already present in Australia and its presence on pastoral land demonstrates its ability to	**Yes**

Scientific name	Common name	Available information (ie. habitat, reproduction, etc.)	References	Final assessment	Considered to be on export pathway? (yes/no)
		Flowers appear in the summer months. Seeds possess barbs. Spikes, consisting of the ascending glumes, remain intact for a long period. Some florets can remain attached to spikes long after plants turn brown. Prolific seed producer, dispersing seed via wind, soil movement, human activities and by adhering to animals. Weed of pastoral land.		establish from seed in Australia. • Further spread is likely to occur via the barbed seed attaching to animal hair, fibre and machinery.	
Xanthium spinosum L.	Bathurst burr	Prefers exposed, moderately warm situation in temperate regions on highly fertile, disturbed soils. Often associated with sheep camps, watercourses, dam banks and floodplains. In Australia, burrs are produced in February. The fruit is a burr with numerous hooked spines. Well adapted to dispersal by animals and by man through attachment to virtually any fibrous material.	Parsons & Cuthbertson, 1992	• Burred seed is present during the grape producing period, however, there is no mechanism for the dispersal of seed to grape bunches, not considered to be on the pathway.	No

References

Auld, B.A. and Medd, R.W. (1992). Weeds - An Illustrated Botanical Guide to the Weeds of Australia. Inkata press. Melbourne, Australia.

BCMAFF (2002). Guide to Weeds in British Columbia. British Columbia Ministry of Agriculture, Food and Fisheries, Burnaby, Canada.

Bodkin, F. (1993). The Encyclopaedia Botanica: the essential reference guide to native and exotic plants in Australia. Angus and Robertson, Australia.

Bromilow, C. (1995). Problem Plants of South Africa. Briza Publications cc, Arcadia, South Africa.

CABI (2004). Crop Protection Compendium Global Module. CAB International, Wallingford, UK. http://www.cabicompendium.org/cpc/home.asp

CDFA (2001). The Noxious Weed Data Sheets. Californian Department of Food and Agriculture. http://pi.cdfa.ca.gov/weedinfo/NWIcommonname.html

DPI (2001). Horsham Weed ID/Management website. Department of Primary Industries, Victoria. http://weedman.horsham.net.au/index.html

FAO (2003). Chilean Weed Database. Integrated Pest Management. Food and Agriculture Organisation. http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPP/IPM/Weeds/default.htm

Hnatiuk, R.J. (1990). Census of Australian Vascular Plants. Australian Flora and Fauna Series Number 11. Bureau of Flora and Fauna, Canberra. Australian Government Printing Service, Canberra.

Holm, L.G., Plucknett, D.L., Pancho, J.V. and Herberger, J.P. (1977). The World's Worst Weeds. Distribution and Biology. University Press of Hawaii, Honolulu, Hawaii, USA.

Hussey, B.M.J., Keightley, G.J., Cousens, R.D., Dodd, J. and Loyd, S.G. (1997). Western Weeds. A Guide to Weeds of Western Australia. Plant Protection Society of Western Australia, Victoria Park, Western Australia.

Kogan, M. (1989). Biology of *Bidens aurea* (Ait) Sherff, important perennial weed on Chilean Fruiticulture. 4th Symposium on Weed Problems in the Mediterranean Climates. European Weed Research Society, Valencia, Spain.

Lamp, C. and Collet, F. (1989). Field Guide to the Weeds of Australia. Inkata Press, Melbourne, Australia.

Lazarides, M., Cowley, K. and Hohnen, P. (1997). CSIRO Handbook of Australia Weeds. CSIRO, Australia.

Marticorena, C. and Quezada, M. (1985). Catálogo de la flora vascular de Chile. Botanica Gayana 42: 1-155.

Matthei, O.J. (1995). Manual De Las Maleaz Que Crecen En Chile. Santiago, Chile. pp 519-522.

Parsons, W. T. and Cuthbertson, E. G. (1992). Noxious Weeds of Australia. Inkata Press, Melbourne, Australia.

Sainty, G., Hosking, J. and Jacobs, S. (1998). Alps Invaders. Weeds of the Australian High Country. Australian Alps Liaison Committee, Australia.

Stewart, H. and Hebda, R.J. (2000). Grasses of the Columbia Basin of British Columbia. Ministry of Forest Research Program, British Columbia.

Stuart, R.M. (2002). A biological control model for *Chrysanthemoides monilifera* ssp. *rotundata* (Asteraceae) by *Mesoclanis polana* (Tephritidae). Honours thesis, Australian National University, Canberra, ACT.

Stubbendieck, J., Friisoe, G.Y. and Bolick, M.R. (1994). Weeds of Nebraska and the Great Plains. Nebraska Department of Agriculture, Nebraska, USA.

Wells, M.J., Balsinhas, A.A., Joffe, H., Engelbrecht, V.M., Harding, G. and Stirton, C.H. (1986). A Catalogue of Problem Plants in Southern Africa. Memoirs of the Botanical Survey of South Africa No 53. Botanical Research Institute. Pretoria, South Africa.

Wheeler, D. J. B., Jacobs, S. W. L. and Norton, B. E. (1984). Grasses of New South Wales. University of New England Monographs 3. University of New England, Australia.

Weiller, C.M., Henwood, M.J., Lenz, J. and Watson, L. (1995). Pooideae (Poaceae) in Australia – Descriptions and Illustrations. URL http://biodiversity.uno.edu/delta/pooid/www/

APPENDIX – 3: DATA SHEETS FOR QUARANTINE PESTS

3.1 Arthropods

3.1.1 Spider mites

Eotetranychus lewisi (McGregor) [Acari: Tetranychidae] – Lewis spider mite

Oligonychus mangiferus (Rahman and Sapra) [Acari: Tetranychidae] – Mango spider mite

Oligonychus punicae (Hirst) [Acari: Tetranychidae] – Avocado brown mite

Oligonychus vitis Zaher & Shehata [Acari: Tetranychidae] – Table grape red mite

Oligonychus yothersi McGreg. [Acari: Tetranychidae] – Avocado red mite

Panonychus ulmi (Koch) [Acari: Tetranychidae] – European red mite

Panonychus citri (Mc Gregor) [Acari: Tetranychidae] – Citrus red mite

Tetranychus desertorum Banks [Acari: Tetranychidae] – Tetranychid mite

Synonyms and changes in combination (where applicable):

Eotetranychus lewisi: *Eutetranychus lewisi* (McGregor); *Tetranychus lewisi* McGregor.

Oligonychus yothersi: *Epitetranychus altaeae* von Haust; *Oligonychus major* Ewing; *Paratetranychus major* (Ewing); *Paratetranychus yothersi* (McGregor); *Tetranychus major* (Ewing); *Tetranychus yothersi* McGregor.

Panonychus ulmi: *Metatetranychus canestrinii* Oudemans; *Metatetranychus mali* Oudemans; *Metatetranychus pilosus* (Canestrini and Fanzago); *Metatetranychus ulmi* (Koch); *Oligonychus alni* Oudemans; *Oligonychus muscorum* Oudemans; *Oligonychus potentillae* Oudemans; *Oligonychus ulmi* (Koch); *Paratetranychis pilosus* (Canestrini and Fanzago); *Paratetranychis pilosus alboguttatus* Zacher; *Paratetranychus pilosus occidentalis* McGregor and Newcomer; *Tetranychus alboguttatus* Zacher; *Tetranychus pilosus* Canestrini and Fanzago; *Tetranychus Metatetranychus canestrinii* Oudemans; *Metatetranychus mali* Oudemans; *Metatetranychus pilosus* (Canestrini and Fanzago); *Metatetranychus ulmi* (Koch); *Oligonychus alni* Oudemans; *Oligonychus muscorum* Oudemans; *Oligonychus potentillae* Oudemans; *Oligonychus ulmi* (Koch); *Paratetranychis pilosus* (Canestrini and Fanzago); *Paratetranychis pilosus alboguttatus* Zacher; *Paratetranychus pilosus occidentalis* McGregor and Newcomer; *Tetranychus alboguttatus* Zacher; *Tetranychus pilosus* Canestrini and Fanzago; *Tetranychus pilosus* (Canestrini and Fanzago); *Tetranychus ulmi* Koch (Canestrini and Fanzago); *Tetranychus ulmi* Koch.

Tetranychus desertorum: *Septanychus argentinus; Septanychus deserticola; Septanychus texazona; Tetranychus argentinus; Tetranychus deserticola; Tetranychus opuntiae; Tetranychus texazona; Tetranychus thermophilus.*

Hosts:

Eotetranychus lewisi: *Abutilon malacum*; *Acacia constricta*; *Acacia kamerunensis*; *Acacia pennatula*; *Ambrosia confertiflora*; *Antigonon leptopus*; *Bauhinia* sp. & *B. picta*; *Bebbia juncea*; *Bocconia arborea*; *Brickellia californica*; *Cardiospermum halicacabum*; *Carica papaya*; *Ceanothus* sp.; *Ceiba acuminata*; *Citrus limon* (lemon); *Citrus* sp.; *Cleome* sp.; *Cnidoscolus* sp.; *Coenothus* sp.; *Crotalaria* sp.; *Croton ciliato-glandulosus*; *Croton glabellus*; *Croton sonorae*; *Cucurbita* sp.; *Ditaxis lanceolata*; *Encelia frutescens*; Er*ythrina* edulis; *Euphorbia* sp. & *E. cyathophora* & *E. marginata* & *E. pulcherrima* (poinsettia); *Ficus carica*; *Haplopappus spinulosus*; *Heterotheca* sp.; *Hydrangea arborescens*; *Ipomoea* sp.; *Jatropha cardiophylla*; *Koelreuteria paniculata*; *Lycium* sp.; *Malpighia* sp.; *Mimosa biuncifera*, *Mimos laxiflora*; *Monarda* sp.; *Pinus cembroide*; *Pinus nelsonii*; *Pinus ponderosa* (ponderosa pine); *Populus*

deltoides & P. tremuloides; *Prunus persica* (peach); *Prunus* sp. *Pyrus* sp.(pear); *Quercus* sp.(oak); *Rincinus communis*; *Rosa* sp.; *Scirpus californicus*; *Solanum elaegnifolium*; *Sphaeralcea orcuttii*; *Vixa orellana*; *Vitis* sp. (grape) (CABI, 2004).

Oligonychus mangiferus: *Mangifera indica* L.; *Persea americana* Mill.; *Vitis vinifera* (grape) (CABI, 2004).

Oligonychus punicae: *Mangifera indica* L.; *Persea americana* Mill.; *Vitis vinifera* (grape) (CABI, 2004).

Oligonychus vitis: *Eucalyptus* sp.; *Heteropyxis natalensis*; *Pyracnatha* sp.; *Vitis vinifera* (grape) (CABI, 2004).

Oligonychus yothersi: *Ampelopsis* sp.; *Anacardium occidentale*; *Annona cherimolav* (cherimoya); *Arenga engleri*; *Averrhoa carambola*; *Bixa orellana*; *Buxus* sp.; *Calliandra* sp. (powderpuff); *Camellia* sp & *C. sinensis* (tea); *Crica papaya*; *Castanea sativa*; *Chrysalidocarpus lutescens*; *Chrysophyllum cainito*; *Cinnamomum camphora*; *Clidemia* sp.; *Coffea C. arabica* (Arabian coffee); *Copaifera lansdorfii*; *Cotoneaster micorphylla*; *Cydonia oblonga* (quince); *Elaeagnus parvifolia*; *Eriobotrya japonica* (loquat); *Erythrina* sp. & *E. edulis*; *Eucalyptus* sp; *Eugenia* sp. & *E. insipida*; *Euphorbia longana*; *Ficus elastica*; *Fuschsia* sp.; *Grevillea robusta* (silky oak); *Guarea francavillana*; *Ipomeoa* sp.; *Lagerstroemia speciosa*; *Litchi chinensis* (litchi); *Malus* sp. & *M. pumila* (apple); *Mangifera indica* (mango); *Manihot esculentia*; *Musa sapientum*; *Persea americana* (avocado); *Platanus* sp.; *Populus tremuloides* (poplar); *Prunus persica* (peach); *Psidium guajava* (guava); *Punica granatum* (pomegranate); *Pyracantha* sp.; *Pyrus communis* (pear); *Rhododendron* sp.; *Ricinus communis*; *Rosa* sp.; *Salix* sp. & *S. alba* & *S. chilensis* (willow); *Terminalia catappa*; *Theobroma cacao*; *Tibouchina lepidopta*; *Vitis* sp. (grape); *Xylopia fragans* (CABI, 2004).

Panonychus citri: *Averrhoa carambola* (carambola); *Carica papaya* (papaw); *Citrus deliciosa* (mediterranean mandarin); *Citrus limon* (lemon); *Citrus reticulata* (mandarin); *Citrus sinensis* (navel orange); *Citrus unshiu* (satsuma); *Citrus x paradisi* (grapefruit); *Eriobotrya japonica* (loquat); *Fragaria; Malus pumila* (apple); *Manihot esculenta* (cassava); *Osmanthus fragrans; Prunus laurocerasus* (cherry laurel); *Prunus persica* (peach); *Pyrus communis* (European pear); *Vitis vinifera* (grapevine); *Ziziphus mauritiana* (Chinese date) (CABI, 2004).

Panonychus ulmi: *Acacia longifolia, Aesculus hippocastanum*; *Alnus* sp.; *Amaranthus* sp.; *Amelanchier* sp.; *Artocarpus heterophyllus*; *Atropa belladonna*; *Avena sativa* (oat); *Betula* sp. (birch); *Calystegia sepium*; *Camellia sinensis* (tea); *Castanea sativa* (sweet chestnut); *Chenopodium* sp.; *Citrus* sp. & *C. aurantiifolia* & *C. aurantium* & *C. grandis*; *Convolvulus arvensis*; *Corylus avellana*; *Cotoneaster tomentosus*; *Crataegus* sp.; *Cucumis* sp.; *Cucurbita maxima* & *C. pepo*; *Cydonia oblonga* (quince); *Dalbergia sissoo*; *Daucus carota* (carrot); *Desmodium canescens*; *Diospyros* sp. (persimmon); *Eriobotrya japonica* (loquat); *Fagus sylvatica*; *Ficus carica*; *Fragaria* sp.(strawberry); *F. vesca* (alpine strawberry, woodland strawberry); *Frangula alnus*; *Fraxinus* sp.; *Gardenia jasminioides*; *Hibiscus* sp.; *Hydrangea macrophylla* (hydrangea); *Juglans regia* (walnut); *Juncus maritimus*; *Laburnum alpinum*; *Lonicera japonica* (honeysuckle); *Malus* sp.; *Malva* sp.; *Medicago sativa* (lucerne, alfalfa); *Morus* sp.; *Myrica pensylvanica*; *Petroselinum crispum*; *Phaseolus* sp.; *Phlox* sp.*; Polygonum aviculare*; *Populus* sp. (poplar); *Potentilla fruticosa*; *Prunus* sp.; *Pyracantha* sp.; *Pyrus* sp.; *Quercus* sp. (oak); *Rhamnus* sp.; *Ribes* sp.; *Robinia pseudoacacia*; *Rosa* sp.; *Rubus* sp.; *Rumex obtusifolius; Salix alba* & *S. caprea*; *Sapindus saponaria*; *Sasa kurilensis*; *Sphora japonica*; *Sorbus aria* & *S. aucuparia* & *S. chrysophylla* & *S. conradina* & *S. fennica* & *S. hostii* & *S. scandica*; *Sorghum halepense* (sorghum); *Symphoricarpos foetidus*; *Syzygium* sp.; *Tilia cordata*; *Trifolium* sp. (clover); *Triticum*

aestivum (wheat); *Ulmus* sp.; *Vicia sativa*; *Vitis* sp. (grape); *Wisteria sinensis*; *Zea mays* (maize) (CABI, 2004).

Tetranychus desertorum: *Gossypium* (cotton), *Manihot esculenta* (cassava), *Vitis* sp. (grape); status on *Phaseolus vulgaris* (common bean) and *Vigna unguiculata* (cowpea) unknown (CABI, 2004).

Distribution:

Eotetranychus lewisi: Bolivia, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Hawaii, Honduras, Libya, Madeira Island, Mexico, Nicaragua, Panama, Peru, South Africa, USA.

Oligonychus mangiferus: Brazil, Chile, Egypt, India, Israel, Myanmar; Reunion, Singapore; South Africa, Thailand.

Oligonychus punicae: Chile, (Bolland *et al*., 1998); Costa Rica; El-Salvador; Guatela; USA (California) and USSR.

Oligonychus vitis: Algeria, Chile, Egypt, India, South Africa.

Oligonychus yothersi: Argentina, Brazil, Chile, China, Colombia, Costa Rica, Cuba, Ecuador, Hawaii, Mexico, Nicaragua, Paraguay, Peru, USA.

Panonychus ulmi: Afghanistan, Algeria, Argentina, Australia (except Western Australia), Austria, Belgium, Bermuda, Brazil, Bulgaria, Canada, Chile, China, Costa Rica, Czechoslovakia, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, India, Iran, Ireland, Israel, Italy, Japan, Korea, Lebanon, Libya, Lithuania, Madeira Island, Morocco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, South Africa, Spain, Sweden, Switzerland, Syria, Taiwan, Tunisia, Turkey, United Kingdom, USA, Uruguay, Venezuela, Vietnam, Yugoslavia.

Panonychus citri : Argentina, Australia (except Western Australia), Brazil, Chile, China; Colombia, Costa Rica, Croatia, Cuba, France, Greece, Georgia (Republic), India; Iran; Israel; Italy, Japan; Korea; Lebanon; Malaysia; Morocco, Mozambique, New Zealand, Peru, Spain, South Africa, Sri Lanka; Tunisia, Turkey, Venezuela, Vietnam, and Yugoslavia.

Tetranychus desertorum: Argentina, Australia (except Western Australia), Bolivia, Brazil, Chile, Costa Rica, Japan, Mexico, Paraguay, Senegal, Venezuela.

Biology: Tetranychid mites develop through egg, larva, protonymph, deutonymph and adult stages and there is considerable variation in developmental rate between genera. Most species have a relatively narrow host range. Many species have a preferred location upon the host plant, generally on the foliage. However, when populations become high they will move to other parts of the plant. The mites feeding directly on the plant tissue cause damage to host plants. The level of damage can vary and is closely linked with weather and plant vitality.

Oligonychus vitis assumed pest status in Chile in 1969 following a serious drought during 1968. It was associated with defoliation of several varieties. Damage due to this species in its native North Africa is also associated with dry climates (Gonzalez, 1983).

The report of Gonzalez (1983) indicates that, to varying degrees, *Oligonychus vitis*, *Tetranychus urticae* and *Panonychus ulmi* are all pests of *Vitis* in Chile. In recent comments from SAG (2002) it was noted that: *Eotetranychus lewisi* was occasionally detected in table grape foliage but has not been detected in grape bunches; *Oligonychus vitis* was considered to be a pest of mature leaves post harvest and not a pest of bunches; and *Panonychus ulmi* was normally a pest of pome fruit and was not associated with table grapes in Chile.

References:

Bolland, H.R., Guiterrez, J. and Flechtmann, C.H.W. (1998). World Catalogue of the Spider Mite Family (Acari: Tetranychidae). Koninklijke Brill NV, Leiden, The Netherlands. 392 pp.

CABI (2004). Crop Protection Compendium. CAB International, Wallingford, UK.

Gonzalez, R.H. (1983). Manejo de plagas de la vid. Publicacions en Ciencids Agricolas No. 13. Facultad de Ciencias Agrarias, Veterinarias y Forestales, Universidad de Chile, Santiago, Chile.

SAG (2002). Response to the Technical Issues Paper from Chile.

3.1.2 Chilean False Red Mite

Brevipalpus chilensis Baker [Acari: Tenuipalpidae] – Chilean False red mite

Hosts: *Actinidia chinensis* (kiwi fruit); *Ampelopsis* sp.; *Annona cherimola* (cherimoya); *Antirrhinium* sp.; *Catalpa speciosa*; *Chrysanthemum* sp.; *Citrus limon* (lemon); *Citrus sinensis* (orange); *Cydonia oblonga* (quince); *Diospyros kaki* (persimmon); *Ficus carica* (fig); *Garcinia* sp.; *Jasminum angustifolium*; *Lugustrum sinensis*; *Malus pumila* (apple); *Pelagonium* sp.; *Prunus armeniaca* (apricot); *Prunus dulcis* (almond); *Pyrus communis* (pear); *Rubus ideeus* (raspberry); *Strongylodon macrobotrys*; *Viburnum* sp.; *Vinca* sp.; *Vitis vinifera* (grape) (CABI, 2004).

Distribution:

Brevipalpus chilensis: Argentina; Chile.

Interceptions: *B. chilensis* was detected in association with *Vitis* sp. imported from Chile into the USA 119 times during 1994-2002 (SAG/USDA, 2002). This pest was also detected in association with *Actinidia chinensis* (x26), *Actinidia* spp. (x2) and *Citrus limon* (x6) from Chile during this period (SAG/USDA, 2002). However, it was not been detected in association with table grapes imported from Chile to New Zealand in approximately 70 consignments during 3 seasons of trade (NZ MAF, 2002).

Biology: *B. chilensis* is recognised as a significant pest of table grapes in Chile and is known to be associated with this commodity. Specific quarantine measures are required for *B. chilensis* for the importation of table grapes from Chile into the USA (methyl bromide fumigation, CFR 319.56-2m), New Zealand (inspection using a maggi lamp, MAF Biosecurity Authority (Plants) Standard 152.02) and Peru (inspection and methyl bromide fumigation, Departmental Resolution No. 076-2003-AG-SENASA-DGSV).

B. chilensis is a small, reddish mite about 1 mm long. Females lay eggs on the underside of leaves and produce up to 140 eggs. Populations of 900-1400 adults per leaf are reported for Chile. This species initially feeds and causes damage to *Vitis* buds and can then be found distributed through the bunch and on the underside of the leaves (Gonzalez, 1983).

B. chilensis assumed pest status in Chile in the 1950s following the widespread application of organophosphorus insecticides. Production losses in vineyards of up to 30% have been reported. This species primarily affects the buds and leaves of *Vitis* (its main host in Chile) and is associated with the vegetative and flowering/fruiting structures of a range of horticultural, forestry, ornamental and weed hosts (e.g. those in vineyards) (Gonzalez, 1983).

The report of Gonzalez (1983) indicates that, to varying degrees, *B. chilensis, Oligonychus vitis, Tetranychus urticae* and *Panonychus ulmi* are all pests of *Vitis* in Chile.

References:

CABI (2004). Crop Protection Compendium. CAB International, Wallingford, UK.

Gonzalez, R.H. (1983). Manejo de plagas de la vid. Publicacions en Ciencids Agricolas No. 13. Facultad de Ciencias Agrarias, Veterinarias y Forestales, Universidad de Chile, Santiago, Chile.

NZ MAF (2002). Interception data for table grapes from Chile. Provided by the Ministry of Agriculture and Forestry (New Zealand) to Biosecurity Australia, email 29 November 2002.

SAG/USDA (2002). Importation of Fresh Commercial Citrus Fruit: Clementine (Citrus reticulata Blanco var. Clementine), Mandarin (Citrus reticulata Blanco) and Tangerine (Citrus reticulata Blanco) from Chile into the United States. A Pathway Initiated Plant Pest Risk Assessment. Draft March 2002. Departamento Protección Agrícola, Servicio Agrícola Ganadera (Santiago, Chile) and United States Department of Agriculture, Plant Protection and Quarantine (Riverdale, Maryland). http://www.aphis.usda.gov/ppq/pra/clclementine.pdf

3.1.3 Weevils

Geniocremnus chiliensis (Boheman) [Coleoptera: Curculionidae] – Tuberous pine weevil

Naupactus xanthographus (Germar) [Coleoptera: Curculionidae] – Fruit tree weevil

Synonyms and changes in combination (where applicable):

Naupactus xanthographus: *Leptocerus xanthographus* Germar; *Pantomorus xanthographus* (Germar).

Hosts:

Geniocremnus chiliensis: *Vitis vinifera* (grapevine).

Naupactus xanthographus: There are conflicting reports (marked with *, Gonzalez, 1983, Ripa, 1986) on the host range for this species but it is considered to include: *Actinidia chinensis* (kiwi fruit); *Annona cherimola* (cherimoya, custard apple); *Beta vulgaris*; *Citrus limon* (lemon); *Citrus sinensis* (orange); *Conium maculatum*; *Cydonia* (quince); *Diospyros kaki* (persimmon); *Eriobotrya japonica* (loquat); *Foeniculum vulgare* (fennel); *Juglans regia* (walnut); *Lucuma bifera**; *Malus domestica* (apple); *Medicago sativa* (alfalfa, lucerne); *Mespilus germanic*; *Olea europaea* (olive); *Persea americana* (avocado); *Phaseolus vulgaris* (bean); Plantago major; Prunus armeniaca* (apricot); *Prunus cerasus* (cherry); *Prunus domestica* (plum); *Prunus persica** (peach); *Prunus salicina** (Japanese plum); *Pyrus communis** (pear); *Raphanus sativus* (radish)*; *Rubus idaeus** (frambuesa, raspberry); *Rumex* sp.; *Solanum tuberosum* (papa, potato); *Sorgum halepense* (sorghum); *Taraxacum officinale* (dandelion); *Vitis vinifera** (grapevine).

Distribution:

Geniocremnus chiliensis: Chile.

Naupactus xanthographus: Argentina (Bentancourt & Scatoni, 1992), Chile (Caballero, 1972), and Uruguay (Bentancourt & Scatoni, 1992).

Interceptions: *Naupactus xanthographus* has been detected in association with grapes and melons exported from Chile to the USA since 1953. Prior to 1975 (when mandatory fumigation of Chilean table grapes destined for the USA was introduced) it was detected 26 times with grapes and 10 times with melons. It was subsequently (until 1982) detected 6 times with grapes and pears. (Gonzalez, 1983)

Biology: The life stage of weevils, such as *N. xanthographus* and *O. sulcatus*, considered likely to be associated with table grapes is the adult. Larvae and eggs are primarily found in soil, bark and vegetation but adults may be associated with bunches (as demonstrated by interceptions of *N. xanthographus* during phytosanitary inspections).

Phytosanitary measures are required for *N. xanthographus* for the export of table grapes from Chile to the USA and Peru (inspection and methyl bromide fumigation, Departmental Resolution No. 076-2003-AG-SENASA-DGSV).

Naupactus xanthographus was first regarded as a pest of commercial crops in Chile in the 1930's but was not recognised as a pest of *Vitis* until the 1950's. By the 1960's was considered a serious pest of *Vitis* in Chile and also a primary pest of citrus, avocado and loquat. It is considered a secondary pest of alfalfa in Argentina. Damage due to adults is considered to be variable whereas damage due to larvae is considered to occur every year. The level of damage is proportional to the size of the population (Gonzalez, 1983).

Adult female *N. xanthographus* are 14-18mm long and the male is smaller (12-14mm) and narrower. Eggs are oval, approximately 1mm long, yellow/orangish and are laid under the bark in several clusters of 20-50 with up to 25 locations per plant. There are 6 larval stages with first stage larvae 1.3-1.5mm long through to final stage larvae, which are up to 20 mm long. Females can store male sperm within their abdomen and therefore remain capable of producing offspring in the absence of males for up to 6 months. Each female can produce up to 1000 eggs. Larvae (and pupa) are present in soil and could therefore be spread via the movement of soil or machinery/equipment that is contaminated with soil (Gonzalez, 1983).

The peaks of adult emergence for *N. xanthographus* are in September-October and December-February (Gonzalez, 1983). This overlaps with the main season for table grapes in Chile (late November-late April, i.e. late spring-mid autumn).

Little information is available on *Geniocremnus chiliensis.* SAG (2002) commented that it is native to Chile, can be found accidentally feeding on leaves in grapevines, cannot fly, is subterranean and adults can easily be detected during phytosanitary inspection.

References:

Bentancourt, C.M. and Scatoni, I.B. (1992). Catalogo de insectos y acaros de importancia agricola y forestal en el Uruguay. Universidad de la Republica, Facultad de Agronomia Notas Tecnicas No. 10.

Caballero, V.C. (1972). Some aspects of the biology and control of Naupactus xanthographus Germar (Coleoptera, Curculionidae) on peach trees in Chile. Revista Peruana de Entomologia 15:190-194.

Gonzalez, R.H. (1983). Manejo de plagas de la vid. Publicacions en Ciencids Agricolas No. 13. Facultad de Ciencias Agrarias, Veterinarias y Forestales, Universidad de Chile, Santiago, Chile.

Ripa, S.R. (1986). Study of the food-plants of the larva of the fruit-tree weevil *Naupactus xanthographus* (Germar) (Coleoptera: Curculionidae). Agricultura Tecnica 46:15-19.

SAG (2002). Response to the Technical Issues Paper from Chile.

3.1.4 Mediterranean fruit fly

Ceratitis capitata (Wiedemann) [Diptera: Tephritidae] – Mediterranean fruit fly

Synonyms and changes in combination: *Ceratitis citriperda* Macleay; *Ceratitis hispanica* De Brême; *Pardalaspis asparagi* Bezzi; *Tephritis capitate* Wiedemann.

Hosts: *C. capitata* is a highly polyphagous species whose larvae develop in a very wide range of unrelated tropical and temperate fruits, vegetables, ornamental plants and wild hosts. Reported hosts include over 200 species from the families Anacardiaceae, Chrysobalanaceae, Cucurbitaceae, Ebenaceae, Loganiaceae, Malpighiaceae, Meliaceae, Oleaceae, Podocarpaceae, Rosaceae, Rubiaceae, Rutaceae, Sapotaceae, and Solanaceae. Hosts include: *Actinidia chinensis* (Chinese gooseberry, kiwi fruit); *Anacardium occidentale* (cashew); *Annona* spp. (custard apple); *Artocarpus altilis* (breadfruit); *Artocarpus heterophyllus* (jackfruit); *Asimina* spp. (pawpaw); *Asparagus* spp. (asparagus); *Averrhoa carambola* (carambola); *Brassica oleracea* (broccoli, cabbage, cauliflower, wild cabbage); *Cananga odorata* (ylang ylang); *Capsicum* spp. (capsicum, chilli, pepper, wild red pepper); *Citrus* spp. (citrus); *Coffea* spp. (coffee); *Cucumis* spp. (melon); *Cucurbita* spp. (marrow, pumpkin, squash); *Cydonia oblonga* (quince); *Cydonia sinensis* (Chinese quince); *Cyphomandra betacea* (tamarillo, tree tomato, tomato tree); *Diospyros decandra* (persimmon); *Diospyros ebenum* (black sapote); *Ficus* spp. (fig); *Fortunella* spp. (kumquat); *Gossypium* spp. (cotton); *Juglans* spp. (walnut); *Litchi chinensis* (litchi, lychee); *Lycopersicon esculentum* (tomato); *Malus* spp. (apple); *Mangifera indica* (mango); *Musa* spp. (banana, plantain); *Pandanus odoratissimus* (breadfruit); *Pandanus tectorius* (screw pine); *Passiflora* spp. (passion flower, passion vine); *Persea americana* (avocado); *Phaseolus lunatus* (bean); *Phoenix dactylifera* (date, date palm); *Phyllanthus acidus* (Ceylon gooseberry, Indian gooseberry, Malay gooseberry, Otaheite gooseberry, star gooseberry); *Prunus* spp. (cherry, hog plum, peach, plum, prune); *Pyrus communis* (pear); *Ribes* spp. (currant); *Robinia* spp. (locust); *Rosa* spp. (rose, roseberry); *Rosmarinus officinalis* (rosemary); *Rubus* spp. (blackberry, caneberry, dewberry, loganberry, raspberry, youngberry); *Syzygium* spp. (brush cherry, lillypilly, Malay apple); *Terminalia* spp. (tropical almond); *Vaccinium* spp. (blueberry, cranberry, huckleberry); *Vicia faba* (broad bean); *Vitis* spp. (grape) (CABI, 2004). For detailed discussion on hosts of Medfly see White and Elson-Harris (1994).

Distribution: *C. capitata* is considered to be eradicated from Chile. Albania, Algeria, Angola (restricted distribution, rd), Argentina (rd), Australia (Western Australia only), Benin, Bolivia, Botswana, Brazil, Burkina Faso, Burundi (rd), Cameroon, Cape Verde, Colombia, Congo (rd), Congo Democratic Republic, Corsica, Costa Rica, Côte d'Ivoire, Croatia (rd), Cyprus, Ecuador (rd), Egypt, El Salvador (rd), Ethiopia, France (rd), Gabon, Ghana, Greece, Guatemala (rd), Guinea (rd), Honduras (rd), Israel, Italy, Jamaica, Jordan, Kenya, Lebanon, Liberia, Libya (rd), Madagascar (rd), Malawi, Mali, Malta, Mauritius, Mexico, Morocco, Mozambique (rd), Netherlands (absent, not established), Netherlands Antilles, Nicaragua, Niger, Nigeria (rd), Panama, Paraguay, Peru, Portugal, Réunion (rd), Russian Federation, Saint Helena (rd), Sao Tome and Principe (rd), Saudi Arabia, Senegal, Seychelles (rd), Sierra Leone, Slovenia (rd), South Africa, Spain, Sudan, Switzerland (rd), Syria, Tanzania, Togo, Tunisia, Turkey, Uganda, Uruguay, USA (rd), Venezuela, Yemen, Yugoslavia (rd), Zimbabwe.

Biology: A comprehensive data sheet on Mediterranean fruit fly is provided in CABI/EPPO (1997). Eggs are laid below the skin of host fruit and attacked fruit will usually show signs of oviposition punctures. The eggs hatch 2-18 days later and the larvae then feed for another 6-11 days (at 13-28ºC). Adults can be monitored by traps baited with male lures (trimedlure and terpinyl acetate but not methyl eugenol). Adult flight and infested fruit are considered to be the main means of movement and dispersal with *C. capitata* capable of flying at least 20km. *Ceratitis capitata* is an A2 pest for EPPO and is of quarantine significance throughout the world (e.g. USA, Japan). Its presence in Europe, even as temporary adventive populations, is considered to potentially lead to severe constraints of fruits to uninfested areas in other continents.

The cost of eradicating this pest from Western Australia has been estimated at $70m and the current costs incurred by South Australia due to this pest are estimated at $1.4m per annum (based on trapping, manned check point and 1.5 incursions per year) (Mumford *et al.*, 2001).

References:

CABI (2004). Crop Protection Compendium. CAB International, Wallingford, UK.

CABI/EPPO (1997). Quarantine Pests for Europe – Data sheets on quarantine pests for the European Union and for the European and Mediterranean Plant Protection Organization. Smith, I.M., McNamara, D.G., Scott, P.R. and Holderness, M. (Editorial Committee); Burger, B. (Associate Editor). CAB International, Wallingford, UK, in association with the European and Mediterranean Plant Protection Organization (EPPO).

Mumford, J.D., Knight, J.D., Cook, D.C., Quinlan, M.M., Pluske, J. and Leach, A.W. (2001). Benefit Cost Analysis of Mediterranean Fruit Fly Management Options in Western Australia. Imperial College, Ascot, United Kingdom. http://www.agric.wa.gov.au/programs/app/medfly/medflyindex.htm

White, I.M. and Elson-Harris, M.M. (1994). Fruit flies of economic significance: their identification and bionomics. CAB International, Wallingford, UK.

3.1.5 Mealybugs

Pseudococcus calceolariae (Maskell) [Hemiptera: Pseudococcidae] – Citrophilus mealybug

Pseudococcus maritimus (Ehrhorn) [Hemiptera: Pseudococcidae] – Grape mealybug

Synonyms and changes in combination (where applicable):

Pseudococcus calceolariae: *Dactylopius calceolariae* Maskell, *Erium cal*ceolariae (Maskell) Lindinger, *Pseudococcus citrophilus* Clausen, *P. fragilis* Brain, *P. gahani* Green.

Pseudococcus maritimus: *Dactylopius maritimus*, *Planococcus maritimus*, *Pseudococcus bakeri*, *P. capensis*, *P. latipes*, *P. omniverae*.

Hosts:

Pseudococcus calceolariae: *P. calceolariae* is a highly polyphagous species that has been recorded from hosts in 40 plant families. Primary hosts are: *Abutilon* (Indian mallow), *Arachis hypogaea* (groundnut), *Brachychiton*, *Brassica*, *Ceanothus*, *Chenopodium* (Goosefoot), *Citrus medica* (citron), *Conium maculatum* (Poison hemlock), *Crataegus* (hawthorns), *Cydonia oblonga* (quince), *Daucus carota* (carrot), *Dodonaea viscosa* (switch sorrel), *Eugenia*, *Ficus*, *Fragaria*, *Geranium* (cranesbill), *Hedera helix* (ivy), *Helianthus*, *Heliotropium arborescens* (Cherry-pie), *Hibiscus* (rosemallows), *Juglans regia* (walnut), *Laburnum anagyroides* (laburnum), *Ligustrum*, *Lolium* (ryegrass), *Malus pumila* (apple) & *M. sylvestris* (crab-apple tree), *Malva* (mallow), *Musa paradisiaca* (plantain), *Nerium oleander* (oleander), *Palmae* (plants of the palm family), *Pelargonium* (pelargoniums), *Pinus radiata* (radiata pine), *Pisum sativum* (pea), *Pittosporum tobira* (Japanese pittosporum) & *P. undulatum* (Australian boxwood), *Polyscias*, *Prunu* spp. *Pyrus communis* (European pear), *Rheum hybridum* (rhubarb), *Rhododendron* (Azalea), *Ribes sanguineum* (Flowering currant), *Rosa* (roses), *Rubus* (blackberry, raspberry), *Schinus molle* (California peppertree), *Sechium edule*, *Solanum tuberosum* (potato), *Theobroma cacao* (cocoa), *Vitis vinifera* (grapevine) (CABI, 2004).

Pseudococcus maritimus: *Annona cherimolav* (cherimoya), *Cydonia oblonga* (quince), *Hippeastrum*, *Howeia forsteriana*, *Juglans regia* (walnut), *Malus domestica* (apple), *Prunus*

armeniaca (apricot), *P. domestica* (plum), *P. persica* (peach), *Pyrus communis* (pear), *Solanum tuberosum* (potato), *Vitis vinifera* (grapevine) (CABI, 2004).

Distribution:

Pseudococcus calceolariae: Australia (except Western Australia), Chile, China, Czechoslovakia, France, Georgia (Republic), Ghana, Italy, Madagascar, Mexico, Morocco, Namibia, Netherlands, New Zealand, Portugal, South Africa, Spain, Ukraine, United Kingdom, USA.

Pseudococcus maritimus: Argentina, Azerbaijan, Brazil, Canary Islands, Chile, Egypt, Georgia, Gibraltar, Guatemala, Hawaii, Hungary, Iran, Mexico, New Zealand, Poland, Peru, South Africa, Sri Lanka, UK, USA. Reports of this species in Australia are based on misidentifications of *P. affinis*, *P. caleolariae* and *P. longispinus* (Williams, 1985).

Interceptions: This group of pests has been detected in association with table grapes imported from Chile to New Zealand (NZ MAF, 2002). *Pseudococcus maritimus* was detected in association with table grapes from California destined for Australia during the first season of trade for this commodity (APHIS/AQIS, 2003).

Biology: In general, damage to table grapes caused by mealy bugs is due to the pests contaminating clusters with cottony egg sacs, larvae, adults, and honeydew. In addition, species such as *Pseudococcus maritimus* can transmit grape viruses (UC, 2003). *Pseudococcus calceolariae* is regarded as a major pest in the Riverland region of South Australia and an occasional or minor pest in Victoria and New South Wales (Gullan, 2000).

The lifecyle of *Pseudococcus maritimus* is similar to that for most mealy bugs: egg, 1st- 4th instars, 5th instar (male) and adult. The adult male is approximately 1mm long, a weak flyer and only lives for a few days during which mating takes place. The adult female is approximately 4mm long, wingless and quite sedentary. Reproduction is sexual with females reported to produce an average of 110 eggs (Grimes & Cone, 1985). This species is considered to spread slowly in the USA but once it is present in an orchard the infestation is difficult to clean up (TFREC, 2003). In California, feeding and subsequent damage is mainly on leaves and adult females migrate to the trunk for oviposition. In California it is mainly considered as a pest of grape, pear and apricot (ScaleNet, 2003).

Pseudococcus calceolariae is oval shaped and up to 4mm long and adult females are covered in white secretions (Willams, 1985). Reproduction is sexual and there are 3-4 generations per year on citrus in Australia (Victoria and New South Wales) (ScaleNet, 2003).

Eight species of *Pseudococcus* (APPD, 2004) are reported in Australia, demonstrating the suitability of the climatic conditions for their survival.

References:

APPD (2004). Australian plant pest database. http://www.planthealthaustralia.com.au/our_projects/display_project.asp?category=4&ID=1

APHIS/AQIS (2003). Interception records for the Californian table grape pre-clearance program 2002 season. Summary of identifications provided by APHIS January 2003.

CABI (2004). Crop Protection Compendium. CAB International, Wallingford, UK.

Grimes, E.W. and Cone, W.W. (1985). Life history, sex attraction, mating and natural enemies of the grape mealybug, *Pseudococcus maritimus* (Homoptera: Pseudococcidae). Annals of the Entomological Society of America 78: 554-558.

Gullan, P.J. (2000). Identification of the immature instars of mealybugs (Hemiptera: Pseudococcidae) found on citrus in Australia. Australian Journal of Entomology 39: 160-166.

NZ MAF (2002). Interception data for table grapes from Chile. Provided by the Ministry of Agriculture and Forestry (New Zealand) to Biosecurity Australia, email 29 November 2002.

ScaleNet (2003). http://www.sel.barc.usda.gov/scalenet/scalenet.htm

TFREC (2003). Pear Entomology: Pest Gallery. Tree Fruit Research Centre, Washington State University. http://entomology.tfrec.wsu.edu/pearent/pest_gallery.htm

UC (2003). Grape mealybugs (Pseudococcus). University of California Statewide Integrated Pest Management Program. www.ipm.ucdavis.edu

Williams, D.J. (1985). Australian mealybugs. British Museum (Natural History).

3.1.6 Scales

Icerya palmeri Riley-How [Hemiptera: Margarodidae] – Margarodes scale

Parthenolecanium corni (Bouché) [Hemiptera: Coccidae] – European fruit lecanium scale

Synonyms and changes in combination (where applicable):

Parthenolecanium corni: *Coccus rosarum* Snellen van Volenhoven, *C. tiliae* Fitch, *Eulecanium corni corni* (Bouché); Schmutterer, *E. fraxini* King, *E. guignardi* King, *E. kansasense* (Hunter) King, *E. rosae* King, *E. vini* (Bouché) Cockerell, *Lecanium* (*Eulecanium*) *armeniacum* Craw; Cockerell & Parrott, *L. (E.) assimile* Newstead; Reh, *L. (E.) aurantiacum* Hunter, *L. (E.) canadense* Cockerell; Cockerell & Parrott, *L. (E.) caryarum* Cockerell, *L. (E.) corylifex* Fitch; Cockerell, *L. (E.) crawii* Ehrhorn; Cockerell & Parrott, *L. (E.) cynosbati* Fitch; Cockerell & Parrott, L. *(E.) fitchii* Signoret; Cockerell & Parrott, *L. (E.) kingii* Cockerell, *L. (E.) lintneri* Cockerell & Bennett; Cockerell, L. *(E.) maclurarum* Cockerell, *L. (E.) ribis* Fitch; Cockerell & Parrott, *L. (E.) rugosum* Signoret; Cockerell, *L. (E.) tarsale* Signoret; Cockerell & Parrott, *L. (E.) vini* Bouché; King & Reh, *L. adenostomae* Kuwana, *L. armeniacum* Craw, *L. assimile* Newstead, *L. canadense* Cockerell; Cockerell, *L. caryae canadense* Cockerell, *L. corni* Bouché, *L. corni robiniarum* Marchal, *L. coryli* (Linnaeus); Sulc (misidentification), *L. corylifex* Fitch, *L. crawii* Ehrhorn, *L. cynosbati* Fitch, *L. fitchii* Signoret, *L. folsomi* King, *L. juglandifex* Fitch, *L. kansasense* Hunter, *L. lintneri* Cockerell & Bennett in Cockerell, *L. maclurae* Hunter, *L. obtusum* Thro, *L. persicae crud*um Green, *L. pruinosum armeniacum* Craw, *L. rehi* King in King & Reh, *L. ribis* Fitch, *L. robiniarum* Douglas, *L. rugosum* Signoret, *L. tarsalis* Signoret, *L. vini* Bouché, *L. websteri* King, *L. wistariae* Signoret, *Parthenolecanium corni* (Bouché); Borchsenius, *P. coryli* (Linnaeus); Sulc (misidentification).

Hosts:

Icerya palmeri: *Vitis vinifera* (grapevine).

Parthenolecanium corni: *P. corni* is highly polyphagous, attacking some 350 plant species placed in 40 families. It attacks a wide range of crops, mostly woody fruit trees and ornamentals. Primary hosts are: *Crataegus* (hawthorns), *Malus* (ornamental species apple), *Prunus domestica* (damson), *Prunus persica* (peach), *Ribes nigrum* (blackcurrant), *Ribes. rubrum* (red currant), *Rosa* (roses), *Vitis vinifera* (grapevine).

Distribution:

Icerya palmeri: Chile.

Parthenolecanium corni: Afghanistan, Albania, Algeria, Argentina, Armenia, Australia (except Western Australia), Austria, Azerbaijan, Belgium, Brazil, Bulgaria Canada, Chile, China, Czech Republic, , Denmark, Egypt, Finland, France, Georgia (Republic), Germany, Greece, Hungary, India, Iran, Italy, Japan, Kazakhstan, Korea (North), Korea (South), Kyrgyzstan, Latvia, Lebanon, Libya, Lithuania, Luxembourg, Malta, Mexico, Moldova, Mongolia, Netherlands, New Zealand, Norway, Pakistan, Peru, Poland, Portugal, Romania, Russian Federation, Spain, Sweden, Switzerland, Syria, Tajikistan, Turkey, Turkmenistan, Ukraine, United Kingdom, USA, Uzbekistan, Yugoslavia (CABI, 2004).

Interceptions: This group of pests has been detected in association with table grapes imported from Chile to New Zealand (NZ MAF, 2002).

Biology: Natural enemies normally maintain populations of *Parthenolecanium corni* below economic thresholds in the USA but damaging populations can occur especially when natural enemies are affected by pesticide application. Host plants can be directly and indirectly affected by infestations. The honeydew that is excreted provides a substrate for the growth of black sooty moulds that can reduce photosynthesis (causing premature leaf drop) and reduce the commercial quality of the produce (CABI, 2004).

Icerya palmeri is reported in association with *Vitis* spp. in Chile (Prado, 1991) but further information on the biology of this species is not known. Females in this family (Margarodidae) have distinctly segmented bodies usually covered in a waxy secretion. Adult males are winged. Specimens can be mistaken for mealy bugs (Hill, 1975).

Parthenolecanium corni is widely distributed in temperate and subtropical regions and can be a serious pest of deciduous orchards, vines and ornamentals (Ben-Dov, 1993). This species reproduces sexually and parthenogenetically, has 1-3 generations a year. On apples females are reported as laying 502-4025 eggs each. It disperses as the first-instar crawler by wind, animal vectors and movement of infested material by humans. Life stages are mostly sedentary apart from the winged male. Crawlers settle and feed on the underside of leaves and later stages often migrate to stems and branches. Adult females are convex or hemispherical and up to 6mm long and 5mm wide. The shape, size and colour are extremely variable and depend on maturity, host and what part of the plant it has infested (CABI, 2004).

Two species of *Parthenolecanium* (APPD, 2004) are reported in Australia, demonstrating the suitability of the climatic conditions for their survival.

References:

APPD (2004). Australian plant pest database. http://www.planthealthaustralia.com.au/our_projects/display_project.asp?category=4&ID=1

APHIS/AQIS (2003). Interception records for the Californian table grape pre-clearance program 2002 season. Summary of identifications provided by APHIS January 2003.

Ben-Dov, Y (1993). A systematic catalogue of the soft scale insects of the world (Homoptera: Coccoidea) with data on geographical distribution, host plants, biology and economic importance. Sandhill Crane Press Inc.

CABI (2004). Crop Protection Compendium. CAB International, Wallingford, UK.

Hill, D.S. (1975). Agricultural insect pests of the tropics and their control. Cambridge University Press.

NZ MAF (2002). Interception data for table grapes from Chile. Provided by the Ministry of Agriculture and Forestry (New Zealand) to Biosecurity Australia, email 29 November 2002.

Prado, E.C. (1991). Artropodos y Sus Enemigos Naturales asociados a Plantas Cultivadad en Chile, Instituto de Investigaciones Agropecuarias. Serie Boletin Tecnico No. 169.

3.1.7 Leafrollers

Accuminulia buscki Brown [Lepidoptera: Tortricidae] – Tortricid leafroller

Accuminulia longiphallus Brown [Lepidoptera: Tortricidae] – Tortricid leafroller

Chileulia stalactitis (Meyrick) [Lepidoptera: Tortricidae] – Grape berry moth

Proeulia auraria (Clarke) [Lepidoptera: Tortricidae] – Chilean fruit tree leafoller

Proeulia chrysopteris (Butler) [Lepidoptera: Tortricidae] – Fruit leafroller

Proeulia triquetra Obraztsov [Lepidoptera: Tortricidae] – Grape leafroller

Synonyms and changes in combination (where applicable):

Chileulia stalactitis: *Eulia stalactitis* Meyrick

Proeulia auraria: *Eulia auraria* Clarke

Proeulia chrysopteris: *Eulia chrysopteris* Meyrick, *Tortrix chrysopteris* Butler.

Hosts:

Accuminulia buscki: *Prunus armeniaca* (apricot), *Prunus domestica* (plum), *Prunus persica* (peach); *Vitis* spp. (grapevine).

Accuminulia longiphallus: details unknown.

Chileulia stalactitis: *Austrocedrus chilensis*, *Citrus paradisi* (grapefruit), *Citrus sinensis* (orange), *Prosopis tamarungo* (mesquite), *Prunus armeniaca* (apricot), *Prunus cerasus* (cherry), *Prunus domestica* (plum), *Prunus salicina* (Japanese plum), *Vitis vinifera* (grape).

Proeulia auraria: This species is a general feeder on deciduous as well as on evergreen wild host plants and crops. It was first found on a native shrub, *Aristolochia chilensis* (Aristolochiaceae) and then on a variety of endemic trees belonging to the families *Myrtaceae* and *Rosaceae*, among others. Exotic host trees include ornamentals such as the sycamore (*Platanus orientalis*) and false acacia (*Robinia pseudoacacia*), Horticultural hosts include: *Actinidia deliciosa* (kiwi), *Citrus sinensis* (navel orange), *Malus pumila* (apple), *Prunus armeniaca* (apricot), *Prunus avium* (cherry), *Prunus domestica* (damson), *Prunus persica* (peach), *Pyrus communis* (European pear), *Vitis vinifera* (grapevine).

Proeulia chrysopteris: From the wide array of native host plants in over 16 families of higher plants, this species has been slowly moving to economic crops, particularly fruit trees in the families Rosaceae, Vitaceae and Rutaceae (citrus group), *Acer pseudoplatanus* (great maple), *Actinidia deliciosa* (kiwi fruit), *Citrus sinensis* (navel orange), *Diospyros* (malabar ebony), *Malus pumila* (apple), *Mespilus germanica* (medlar), *Platanus orientalis* (plane), *Prunus armeniaca* (apricot), *Prunus domestica* (damson), *Prunus persica* (peach), *Pyrus communis* (European pear), *Simmondsia chinensis*, *Vitis vinifera* (grapevine).

Proeulia triquetra: *Vitis vinifera* (grapevine)

Distribution:

Accuminulia buscki: Chile.

Accuminulia longiphallus: Chile.

Chileulia stalactitis: Chile.

Proeulia auraria: Chile (restricted distribution).

Proeulia chrysopteris: Chile (restricted distribution).

Proeulia triquetra: Chile.

Interceptions: This group of pests has not been detected in association with table grapes imported from Chile to New Zealand in approximately 70 consignments during 3 seasons of trade (NZ MAF, 2002). Adult and juvenile (pupa) stages (including Geometridae, Noctuidae, Pyralidae and Torticidae) were detected in association with table grapes from California destined for Australia during the first season of trade for this commodity (APHIS/AQIS, 2003).

Accuminulia buscki, was intercepted in the USA in a consignment of Chilean table grapes in 1926 (Brown, 1999). Nearly all interceptions of Lepidoptera in the USA are larvae but as the larvae of *Accuminulia* are unknown it is not possible to determine if this genus is among these interceptions (Brown, 1999).

Biology: Most larval tortricinae are leaf rollers but a few genera are known to bore into the fruit of host plants (Brown, 1999). These genera include *Proeulia*, *Chileulia* and *Accuminulia*. This contrasts with the report of Pucat (1994) who noted that larvae of *Proeulia* are external feeders that leave the host plant before harvest. Brown and Passoa (1998) describe the larvae of *Proeulia* as polyphagous leaf rollers that are also known to feed on the surface of fruit.

Proeulia auraria and *P. triqueta* are known to destroy buds, berries and vegetative material of *Vitis* in Chile and their presence is characterised by the presence of rolled up leaves. Damage to the berries can vary from superficial to completely destroyed. *Proeulia auraria* was initially considered a pest of citrus but has grown in importance as a pest of *Vitis*. *Proeulia auraria* is the most common species of this genus in Chile and the other species are considered to be of less significance. This genus is considered to be of quarantine concern for table grapes exported from Chile to the USA (Gonzalez, 1983).

The genus *Proeulia* is capable of flight with some species known to fly throughout the year. For example, *Proeulia auraria* is an abundant native insect in Chile and flies virtually throughout the year with peaks during January and April and September-November (Gonzalez, 1983). *Proeulia* overwinters on deciduous hosts as first instar larvae protected in webs but develops throughout winter on evergreen hosts. Eggs masses are laid on leaves. Leaves and flower debris are often attached to damaged fruit and severely affected young fruit can dry and fall off (Pucat, 1994).

The genus *Accuminulia* has been recently described (Brown, 1999) and is considered to be a potential future pest problem for Chile (Gonzalez, 2000). *Accuminulia buscki* is considered to be a native species of Chile that has expanded its host range to include agricultural crops (Brown, 1999). The biology of *A. longiphallus* is not known (Brown, 1999).

Chileulia stalactitis feeds on foliage, mature fruit and developing fruit. It is considered a secondary pest of *Vitis* in Chile but is capable of causing significant damage. Damage caused to *Prunus* by this species is considered to be more significant that that caused by species of *Proeulia*. *Proeulia* species overwinters as larvae inside hollow fruit or dried up bunches. In spring it feeds on leaves and in summer on leaves and flowers. Adults begin to emerge at the beginning of winter and can frequently be seen flying during August. Eggs are laid on leaves (Gonzalez, 1983).

References:

APHIS/AQIS (2003). Interception records for the Californian table grape pre-clearance program 2002 season. Summary of identifications provided by APHIS January 2003.

Brown, J.W. (1999). A new genus of tortricid moths (Tortricidae: Euliini) injurious to grapes and stone fruit in Chile. Journal of the Lepidopterists Society 53: 60-64.

Brown, J.W. and Passoa, S. (1998). Larval foodplants of Euliini (Lepidoptera: Tortricidae): from Abies to Vitis. Pan-Pacific Entomologist 64: 1-11.

Gonzalez, R.H. (1983). Manejo de plagas de la vid. Publicacions en Ciencids Agricolas No. 13. Facultad de Ciencias Agrarias, Veterinarias y Forestales, Universidad de Chile, Santiago, Chile.

Gonzalez, R.H. (2000). Biological antecedents of the codling moth, Cydia pomonella (L.), in pome fruit orchards. Revista Fruticola 21: 11-26.

NZ MAF (2002). Interception data for table grapes from Chile. Provided by the Ministry of Agriculture and Forestry (New Zealand) to Biosecurity Australia, email 29 November 2002.

Pucat, A.M. (1994). Fruit leaf folders – *Proeulia* spp. Agriculture and Agri-Food Canada, Plant Health Risk Assessment Unit.

3.1.8 Thrips

Drepanothrips reuteri Uzel [Thysanoptera: Thripidae] – Grape thrips

Frankliniella australis Morgan [Thysanoptera: Thripidae] – Chilean flower thrips

Frankliniella occidentalis (Pergande) [Thysanoptera: Thripidae] – Western flower thrips

Synonyms and changes in combination:

Drepanothrips reuteri: *Drepanothrips viticola* Mokvzechi

Frankliniella australis: *Frankliniella cestrum* Moulton; *Frankliniella argentinae* Moulton

Frankliniella occidentalis: *Frankliniella californica* (Moulton); *Frankliniella helianthi* (Moulton); *Frankliniella moultoni* Hood; *Frankliniella trehernei* Morgan

Hosts: Thrips are generally polyphagous pests, for example, there are 244 plant species from 62 families recorded as hosts for *F. occidentalis* (CABI/EPPO, 1997). Commercial hosts in the USA include *Allium*, *Citrus*, Cucurbitaceae, *Gladiolus*, *Lycopersicon esculentum* (tomato), and *Phaseolus*, *Prunus* and *Rosa*. *Drepanothrips reuteri* is only reported in association with *Vitis* (CABI, 2004).

Distribution:

Drepanothrips reuteri: Chile, France, Italy, Switzerland, Turkey, USA (California), USSR.

Frankliniella australis: Argentina, Bolivia; Chile.

Frankliniella occidentalis: Indigenous to North America (Canada, Mexico, continental USA). Began to spread internationally in about 1980 and has now been reported from countries in all continents of the world (CABI/EPPO, 1997). Albania (restricted distribution, rd), Argentina, Australia (rd), Austria, Belgium, Brazil, Bulgaria (rd), Canada (rd), Chile, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic (rd), Denmark (rd), Dominican Republic, Ecuador, Estonia (rd), Finland, France (rd), Germany (rd), Greece (rd), Guatemala, Guyana, Hungary, Ireland, Israel,

Italy, Japan (rd), Kenya, Korea, Kuwait, Lithuania, Macedonia, Malaysia, Malta (rd), Martinique, Mexico (rd), Netherlands, New Zealand (rd), Norway (rd), Peru, Poland (rd), Portugal (rd), Puerto Rico, Réunion, Romania, Russian Federation (rd), Slovakia, Slovenia (rd), South Africa, Spain, Sri Lanka, Swaziland, Sweden, Switzerland, Turkey (rd), United Kingdom, USA, Venezuela, Zimbabwe.

Interceptions: This group of pests (Thysanoptera) has not been detected in association with table grapes imported from Chile to New Zealand in approximately 70 consignments during 3 seasons of trade (NZ MAF, 2002) nor in association with table grapes from California destined for Australia during the first season of trade for this commodity (APHIS/AQIS, 2003).

Biology: A comprehensive data sheet on *Frankliniella occidentalis* is provided in CABI/EPPO (1997).

This group of pests can directly affect plant production by reducing yield and quality or transmitting viruses. Indirectly their presence on a crop can result in access to particular markets being denied (CABI, 2004). Thrips are recognised as vectors of a range of plant viruses, for example tomato spotted wilt virus (TSWV) and tobacco streak ilavirus (TSV) by *F. occidentalis.* Only nymphs can acquire the virus and they remain infective for 3-10 days (CABI/EPPO, 1997).

Drepanothrips reuteri has been recorded as representing a major (e.g. 70%) part of the thrips populations associated with table grapes in certain areas of Chile. This species, along with *F. cestrum* (*F. australis*), are considered to be significant pests of *Vitis* in Chile (Gonzalez, 1983; Ripa, 1994). *Frankliniella australis* is also a recognised pest of *Prunus* with significant reductions in production of marketable fruit reported from Chile (Ripa, 1988; Ripa & Rodriguez, 1993). In contrast to these reports, SAG (2002) commented that *F. australis* is associated with flower petals during their development and is not considered to cause economic damage.

There is some debate over the exact symptoms on *Vitis* in Chile caused by various species of thrips and whether they cause symptoms on berries in addition to vegetative plant parts (Gonzalez, 1983). *Frankliniella occidentalis* and *D. reuteri* are known to cause scarring of berries in California, which can make some white varieties unmarketable (UC, 2000).

Adult thrips are tiny, for example, the adult female of *F. australis* 1.6 to 1.8 mm of long (Gonzalez, 1983) and adults of *F. occidentalis* are generally less than 2mm (CABI/EPPO, 1997). Colouration of adults can vary, for example, pale, intermediate and dark forms of *F. occidentalis* occur at different times of the year in the USA (CABI/EPPO, 1997).

The small size of thrips allows them to secrete themselves into small crevices and tightly closed plant parts. Localised spread could occur via wind, human vectors (e.g. in hair, on clothes), on equipment/containers and international spread is possible on plants for planting and cut flowers (CABI/EPPO, 1997). Specimens of *F. australis* can be found under the bark of *Vitis* and other hosts during winter (Gonzalez, 1983). SAG (2002) considers that specimens of *F. australis* can be detected during phytosanitary inspection.

Under favourable conditions, thrips such as *F. occidentalis* can reproduce continually. Up to 15 generations per year have been recorded under glasshouse conditions with females producing 20-40 eggs each (CABI, 2004).

Frankliniella occidentalis is under official control in Northern Territory, Tasmania and parts of Victoria. Interstate restrictions on the movement of certain *F. occidentalis* host material exist in Australia. For example, the movement of cut flowers, leafy vegetables or nursery stock of *F. occidentalis* hosts into the State of Tasmania.

References:

APHIS/AQIS (2003). Interception records for the Californian table grape pre-clearance program 2002 season. Summary of identifications provided by APHIS January 2003.

CABI (2004). Crop Protection Compendium. CAB International, Wallingford, UK.

CABI/EPPO (1997). Quarantine Pests for Europe – Data sheets on quarantine pests for the European Union and for the European and Mediterranean Plant Protection Organization. Smith, I.M., McNamara, D.G., Scott, P.R. and Holderness, M. (Editorial Committee); Burger, B. (Associate Editor). CAB International, Wallingford, UK, in association with the European and Mediterranean Plant Protection Organization (EPPO).

Gonzalez, R.H. (1983). Manejo de plagas de la vid. Publicacions en Ciencids Agricolas No. 13. Facultad de Ciencias Agrarias, Veterinarias y Forestales, Universidad de Chile, Santiago, Chile.

NZ MAF (2002). Interception data for table grapes from Chile. Provided by the Ministry of Agriculture and Forestry (New Zealand) to Biosecurity Australia, email 29 November 2002.

Ripa, R. S. (1988). Damage to plum and apricot shoots associated with thrips. Acricultura Técnica 48: 46-47.

Ripa, R. (1994). Fruit trees in Chile. IPM Bulletin of Pest Management. Issue 4. www.nri.org/IPMEurope/ipmwd/issue4/iss4uk00.htm

Ripa, S. R. and Rodriguez, A. F. (1993). Relationship between the presence of thrips during flowering of nectarines and their incidence on russeting of fruits at harvest. Agricultura Técnica Santiago 53: 23-29.

SAG (2002). Response to the Technical Issues Paper from Chile.

UC (2000). UC Pest Management Guidelines – grape thrips. University of California Statewide Integrated Pest Management Program. www.ipm.ucdavis.edu

3.1.9 Black widow spider

Latrodectus mactans (Fabricius) [Araneae: Theridiidae] – Black widow spider

Comprehensive biological and sanitary related information on this species (and spiders in general) is provided in a series of documents recently produced by the New Zealand Ministry of Agriculture and Forestry and Ministry of Health (see below). The Pest Risk Assessment document is particularly relevant in providing similar technical information to that presented in the data sheets for other pest groups in this IRA. Stakeholders are recommended to consult these documents for technical information on *L. mactans*.

- Pest Risk Assessment of Spiders Associated with Table Grapes from United States of America (State of California), Australia, Mexico and Chile. Ministry of Agriculture and Forestry, Wellington, New Zealand (NZ MAF, 2002a).
- Mitigation Measures for the Management of Risks Posed by Exotic Spiders Entering New Zealand in Association with Imported Table Grapes. Ministry of Agriculture and Forestry, Wellington, New Zealand (NZ MAF, 2002b).
- Towards a Health Impact Assessment Relating to Venomous Spiders Entering New Zealand in Association with Imported Table Grapes: A Discussion Document. Ministry of Health, Wellington, New Zealand (NZ MAF, 2002c).

- Review of Submissions (*to the above 3 documents*). September 2002. Ministry of Agriculture and Forestry, Ministry of Health and Department of Conservation (NZ MAF, 2002d).

These documents are available electronically at http://www.maf.govt.nz/biosecurity/pests-diseases/plants/risk/spiders-grapes/index.htm

References:

NZ MAF (2002a). Pest Risk Assessment of Spiders Associated with Table Grapes from United States of America (State of California), Australia, Mexico and Chile. Ministry of Agriculture and Forestry, Wellington, New Zealand.

NZ MAF (2002b). Mitigation Measures for the Management of Risks Posed by Exotic Spiders Entering New Zealand in Association with Imported Table Grapes. Ministry of Agriculture and Forestry, Wellington, New Zealand.

NZ MAF (2002c). Towards a Health Impact Assessment Relating to Venomous Spiders Entering New Zealand in Association with Imported Table Grapes: A Discussion Document. Ministry of Health, Wellington, New Zealand.

NZ MAF (2002d). Review of Submissions (to NZ MAF 2002a, 2002b, 2002c) Ministry of Agriculture and Forestry, Ministry of Health and Department of Conservation. September 2002.

3.2 Pathogens

3.2.1 *Phomopsis viticola* (Sacc.) Sacc. Type 2

Synonyms and Changes in Combination: *Phoma viticola* Sacc.; *Phomopsis viticola* (Taxon 2), *Phomopsis viticola* (type 2), *Phoma flaccida* Viala & Ravaz; *Cryptosporella viticola* Shear [teleomorph]; *Diaporthe viticola* Nitschke [teleomorph]; *Fusicoccum viticolum* Reddick

Common name(s): Phomopsis of grapevine; Phomopsis cane and leaf spot; black knot: grapevine; black rot: grapevine; dead-arm: grapevine; necrosis of grapevine; Phomopsis cane and leaf blight.

Hosts: *Vitis vinifera* (grape); *Vitis rupestris* (sand-grape); *Vitis labrusca* (fox grape); *Parthenocissus quinquefolia* (Virginia creeper).

Plant part affected: This pest is known to infect leaves, stems, inflorescences, canes, rachis and berries (Erincik *et al.*, 2001).

Distribution: *Phomopsis viticola* is present throughout viticultural areas world-wide, including Asia, Europe, Africa, North America, New Zealand and Australia (CABI, 2004). *P. viticola* has been reported in Chile (Farr *et al.*, 2004), information pertaining to the distribution of the pest in Chile could not be obtained prior to this analysis. In Australia, *P. viticola* has been recorded in Victoria, New South Wales, and South Australia. *P. viticola* is present in the viticultural areas of Coonawarra, Mildura, Rutherglen, Mudgee, Hunter Valley and the Barossa Valley. Only *Diaporthe viticola* (= *P. viticola* Type 1, not *P. viticola*) has been recorded in the viticultural regions of Western Australia. *Diaporthe viticola* has also been reported from Yarra Valley (VIC), Adelaide Hills (SA), Mornington Peninsula (VIC), Hunter Valley (NSW) and Berridale (TAS) (Merrin *et al.*, 1995).

Note: Two strains are reported in Australia (type 1 and type 2). Type 2 produces severe symptoms as is attributed to *P. viticola*, type 1 the common strain do not.

Biology: *Phomopsis viticola* was initially described as *Phoma viticola* from *Vitis vinifera* canes in France. Reddick (1909) described the causal agent of dead-arm *as Fussicoccum viticolum* in the USA, and Shear (1911) identified the teleomorph of *F. viticolum* as *Cryptosporella viticola*. *C. viticola* has not been found since. It is now considered that *Phomopsis viticola* takes precedence over *F. viticolum* (CABI, 2004).

More recently, two strains of *Phomopsis viticola* were described in Australia by Merrin *et al.* (1995), being Taxon 1 and Taxon 2. Taxon 2 was associated with heavier and more obvious scarring of the canes and with leaf spots and bleaching of the canes typically associated with Phomopsis cane and leaf spot (Merrin *et al.*, 1995). Further research into the two strains of *P. viticola* has led to the finding of a sexual stage of the Australian *P. viticola* Taxon 1 fungus. This stage was originally identified in Australia as *Diaporthe viticola* (Scherper *et al.*, 2000), and Phillips (1999) suggested the name *D. perjuncta* for the sexual stage of *P. viticola*.

Molecular analysis has shown that *D. perjuncta* is the same as the Australia *P. viticola* Taxon 1 isolates, and that the Australian *P. viticola* Taxon 2 isolates clustered with *P. viticola* isolates collected from other viticulural regions of the world (Melanson *et al.*, 2002). The accepted nomenclature for these fungi is now *Diaporthe perjuncta* for the Taxon 1 isolates, and *Phomopsis viticola* for the Taxon 2 isolates (Rawnsley, 2001).

Only the asexual stage of *Phomopsis viticola* is known to occur in relation to Phomopsis cane and leaf spot. *P. viticola* is a serious problem in Australia and other areas of the world. *Phomopsis viticola* invades nearly all stem tissues causing necrotic areas leading to the girdling of the shoots resulting in the 'dead-arm' condition. Major symptoms are the death of vines or some of the arms, desiccation of stocks and shoots, stunting of branches, deformation of leaves, flower abortion and drying of buds. Symptoms of *P. viticola* are also bleaching of canes, lesions on the canes, and small dark spots surrounded by yellow halos on the leaves of grapevines (CABI, 2004; Punithalingam, 1979).

Infection of grapevines generally occurs in spring at the time of bud opening (Bugaret, 1990). The disease is most destructive in geographical regions with a moderate spring climate with sufficient rain at budburst to keep the grapevines wet for several days (Hewitt & Pearson, 1988). Rain and mild temperatures are the most important environmental factors required for the disease (Bugaret, 1986). In spring at least 10 hours of rain are required for conidium production from conidiomata, and after conidium dispersal, a further 8-10 hours or more of very high relative humidity of surface wetness are required for infection (Emmet *et al*., 1992).

References:

Bugaret, Y. (1986). Données nouvelles sur l'épidemiologie de l'excoriose et leurs conséquences pour la lutte. Phytoma. Défense des Cultures 375: 36-41.

Bugaret, Y. (1990). Dead-arm disease. Technical Report, AG/TR/MR/334. Bordeaux, France: Institut National de la Recherche Agronomique.

CABI (2004). Crop Protection Compendium. Wallingford, UK, CAB International.

Emmett, R.W., Harris, A.R., Taylor, R.H. and McGechan, J.K. (1992). Grape Disease and Vineyard Protection, pp 242-243. In: Coombe, B.G. and Dry, P.R. (eds.) Viticulture - Vol II, Practices. Underdale, South Australia: Winetitles.

Erincik, O., Madden, L.V., Ferree, D.C. and Ellis, M.A. (2001). Effect of growth stage on susceptibility of grape berry and rachis tissues to infection by *Phomopsis viticola*. Plant Disease 85: 517-520.

Farr, D.F., Rossman, A.Y., Palm, M.E. and McCray, E.B. (2004). Fungal Databases, Systematic Botany and Mycology Laboratory, ARS, USDA. Online: http://nt.ars-grin.gov/fungaldatabases/

Hewitt, W.B. and Pearson, R.C. (1988). Phomopsis cane and leaf spot, pp 17-18. In: Pearson, R.C. and Goheen, A.C. (eds.). Compendium of Grape Diseases. St. Paul, Minnesota, USA: APS Press.

Melanson, D.L., Rawnsley, B. and Scherper, R.W.A. (2002). Molecular detection of *Phomopsis* taxa 1 and 2 in grapevine canes and buds. Australasian Plant Pathology 31: 67-73.

Merrin, S.J., Nair, N.G. and Tarran, J. (1995). Variation in *Phomopsis* recorded on grapevine in Australia and its taxonomic and biological implications. Australasian Plant Pathology 24: 44-56.

Phillips, A.J.L. (1999). The relationship between *Diaporthe perjuncta* and *Phomopsis viticola* on grapevines. Mycologia 93: 146-167.

Punithalingam, E. (1979). *Phomopsis viticola*. CMI Descriptions of Pathogenic Fungi and Bacteria No. 635, Commonwealth Mycological Institute, England.

Rawnsley, B. (2001). *Diaporthe* – the new name for 'Phomopsis Type One', Australian Viticulture: Nov/Dec 2001, 12-13.

Reddick, D. (1909). Necrosis of the grape vine. Cornell University, Agricultural Experiment Station of the College of Agriculture 263: 323-343.

Scherper, R.W.A, Crane, D.C., Whisson, D.L. and Scott, E.S. (2000). The *Diaporthe* teleomorph of *Phomopsis* Taxon 1 on grapevine. Mycological Research 104: 226-231.

Shear, C.L. (1911). The ascogenous form of the fungus causing dead-arm of the grape. Phytopathology 1:116-119.