Psa research library

May 2012

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
Genomics		Scortichini et al., (2011) PLoS ONE, 6 (11):1-17.	Describes the genome for *Pseudomonas syringae* pv. *actinidiae* and the reputed origin of the pathogen, including closely related pathovars.	Provides a genetic insight into the mode of action of this pathogen. This information will be valuable for understanding the epidemiology and opportunities for managing this pathogen.	http://atlasplantpathogenicbacteria.it/journal.pone.0027297.pdf
Epidemiology	*Pseudomonas syringae* pv. *actinidiae:* a re-emerging, multi-faceted, pandemic pathogen	Scortichini et al., (2012) Molecular Plant Pathology DOI: 10.1111/J.1364-3703.2012.00788.X	*Pseudomonas syringae* pv. *actinidiae* can be considered as a pandemic disease of kiwifruit. This pathogen can easily colonise kiwifruit vines throughout the year.	An integrated disease control approach will need to take into consideration the epidemiology of the pathogen and the environment that it is grown in. Ideally this should be based on solutions that dramatically reduce bacterium inoculum levels while recognizing that the disease will need to co-exist with a crop husbandry regime which minimises the environmental and food safety impacts.	http://www.atlasplantpathogenicbacteria.it/MPP%20PSA.pdf

Bio-control	Assessment of the importance of similarity in carbon source utilization profiles between the biological control agent and the pathogen in biological control of bacterial speck of Tomato.	Ji and Wilson, (2002). Applied and Environmental Microbiology, 68(9):4383-4389.	Evaluates the utilization of carbon sources by bacterial strains for the bio-control of bacterial speck of tomato. Demonstrates that the suppression of bacterial speck was correlated with the nutritional similarity between the pathogenic and non-pathogenic bacteria.	Suggests that preemptive utilization of carbon sources by bio-control bacteria could assist in the control of plant pathogenic bacteria.	https://www.ncbi.nlm.nih.g ov/pmc/articles/PMC12406 3/pdf/0073.pdf
Bio-control	Bacteriophage: A viable bacteria control solution.	Jackson and Jones, (2004). Omnilytics, Inc. White Paper, 10p	Provides results on the pre-treatment of greenhouse and field crops of Tomato with bacteriophage for bacterial wilt and bacterial spot diseases.	This technology is currently being developed for application to Psa in kiwifruit.	http://omnilytics.com/docum ents/Phage%20Article%20 v5.p df
Bio-control	Bacteriophages for plant disease control.	Jones et al., (2007). Annual Reviews in Phytopathology, 45:245-262.	Reviews the application of bacterial phages (virus that can infect bacteria) for the control of bacterial diseases.	This technology is currently being developed for the control of Psa on kiwifruit.	http://ddr.nal.usda.gov/dspac e/bitstream/10113/9300/ 1/IN D44003789.pdf
Bio-control	Biocontrol of *Bacillus subtilis*	Bais et al., (2004). Plant Physiology,	Demonstrates the mechanism that the bio-control agent	Protective antibacterial bio-films on plant surfaces may	http://www.ncbi.nlm.nih.g ov/

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	against infection of *Arabidopsis* roots by *Pseudomonas syringae* is facilitated by biofilm formation and surfactin production.	134: 307-319.	*Bacillus subtilis* uses to protect plant roots against pathogenic bacteria such as *Pseudomonas syringae* pv. *tomato*.	provide control for Psa if such biofilms can be established on the plant surfaces that support pathogen population growth or provide entry points for the pathogen.	/1340307.pdf
Bio-control	Biocontrol of plant disease: a (Gram-) positive perspective	Emmert and Handelsman, (1999). FEMS Microbiology Letters, 17:1-9.	Reviews the bio-control of gram negative plant pathogens with gram-positive bacteria.	Gram positive bacteria such as *Bacillus* are under evaluation as bio-control agents for Psa on kiwifruit.	http://www.plantpath.wisc.edu/pp-old/joh/fems1999.pdf
Bio-control	Biological control of kiwifruit and tomato bacterial pathogens.	Balestra et al., (2008). 15th IFOAM Organic World Congress Proceedings, 4pp.	Reports on the natural extracts from fig and garlic on *Pseudomonas syringae* pv *syringae* and *P. viridiflava* that are pathogens on kiwifruit.	Natural extracts from plants may provide a source of compounds for the control of Psa.	http://orgprints.org/13148/1/Balestra_13148_ed.doc
Bio-control	Biological control of *Pseudomonas syringae* pv. *syringae* and nutritional similarity in carbon source utilization of pathogen and its potential	Kotan and Sahin, (2006). Journal of Turkish Phytopathology, 35(1-3):1-13.	Reports on a study that recovers 206 bacteria naturally growing on apple trees and tests these bacteria for antagonistic activity against a pathogenic *Pseudomonas syringae* pv. *syringae* found on apple trees.	Demonstrates that bacteria that have a similar nutritional profile to the pathogen could be suitable bio-conrol agents.	http://arsiv.fitopatoloji.org.tr/indir/2006/vol35_makale1.pdf

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	biocontrol agents.				
Bio-control	Commercialization and implementation of biocontrol.	Fravel, (2005). Annual Reviews in Phytopathology, 43:337-59.	Provides an overview of the current trends in the development and commercialization of bio-control products for disease control.	Bio-control agents could be a component of an integrated management program for the control of Psa on kiwifruit.	http://ddr.nal.usda.gov/dspace/bitstream/10113/26252/1/IND43884102.pdf
Bio-control	Compost use for pest and disease suppression in NSW.	Campbell, (2006). Recycled Organics Unit Report: 113pp.	Reviews literature on the use of composts to suppress plant diseases.	Composts have been shown to suppress plant foliar diseases in stone fruit caused by *Pseudomonas* species. This approach warrants closer investigation in relation to Psa in kiwifruit.	http://www.recycledorganics.com/publications/reports/diseasesuppression/diseasesuppression.pdf
Bio-control	Development, registration and commercialization of microbial pesticides for plant protection.	Montesinos, (2003). International Microbiology, 6:245-252.	Reviews the process and progress for commercialization of microbial pesticides for plant protection. A significant gap exists between the range of options available at the research level and commercial products available for growers.	For the control of Psa on kiwifruit priority has been given to screening commercially available bio-control agents and compounds.	http://revistes.iec.cat/index.php/IM/article/viewFile/4c457c561b3a6.002/9429
Bio-control	Differential induction of systemic resistance in *Arabidopsis* by biocontrol bacteria.	Wees et al., (1997). Molecular Plant-Microbe Interactions, 10(6):716-724.	Demonstrates that rhizosphere pseudomanads are active in inducing an induced systemic resistance response in plants that can provide protection against pathogens.	Potential to use both salicylic acid and rhizobacteria to stimulate plant immunity.	http://faculty.ksu.edu.sa/shoeib/Lectures/Mic%20521/Students%20Activities/Biocontrol%20of%20Plant%20Diseases/Biocontrol%20Bacteria.pdf

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Bio-control	Diversity and ecology of biocontrol *Pseudomonas* spp. in agricultural systems	McSpadden Gardner, (2007). The American Phytopathological Society, 97(2): 221-226.	Reviews the ecology of biocontrol *Pseudomonas* species introduced into the field. Indicates that bio-control inoculation in a field situation can be effective, even though complex interactions can occur with existing microbial communities.	For field application of bio-control organisms against Psa on kiwifruit it will be important to assess existing microbial communities and their response after treatment.	http://www.oardc.ohio-state.edu/mcspaddengardenerlab/PHYTO-97-2-0221.pdf
Bio-control	Enhanced epiphytic coexistence of near-isogenic salicylate-catabolizing and non-salicylate-catabolizing *Pseudomonas putida* strains after exogenous salicylate application.	Wilson and Lindow, (1995). Applied and Environmental Microbiology, 61(3):1073-1076.	Describes the application of a nutritional amendment to favour a competitive bacteria strain to *Pseudomonas syringae* is demonstrated.	A future biological control approach may be based on selectively enhancing competitive epiphytic populations of bacteria.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1388389/pdf/hw1073.pdf
Bio-control	FZB24® *Bacillus subtilis* – mode of action of a microbial agent enhancing plant vitality.	Kilian et al., (2000). Pflanzenschutz-Nachrichten Bayer, 1 (1):72-93.	Provides a good overview of the mechanism of mode of action of FZB24® *Bacillus subtilis* as a bio-control agent. Can be applied as either a leaf or root zone treatment.	Could form part of a management solution for Psa through stimulation of plant resistance, competition and antibiotic effects.	http://www.abitep.de/content/pdf/kilian_2000.pdf
Bio-control	Induced Systemic	Bakker et al.,	Reviews the bacterial traits	Plant growth promoting	http://apsjournals.apsnet.o

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	Resistance by Fluorescent *Pseudomonas* spp.	(2007). The American Psychopathological Society	associated with beneficial *Pseudomonas*-mediated induced systemic resistance.	*rhizobacteria* have the potential as a bio-control tool for Psa on kiwifruit once suitable strains and delivery mechanisms have been developed.	rg/doi/pdf/10.1094/PHYTO-97-2-0239
Bio-control	Induction of antimicrobial 3-deoxyflavonoids in pome fruit trees controls fire Blight.	Halbwirth et al., (2004). Verlag der Zeitschrift fur Naturforschung, 58c:765-770.	Describes the induction of novel antimicrobial compounds in plants to control bacterial pathogens due to the application of the growth regulator, prohexadione-Ca Regalis®.	Prohexadione-Ca is being evaluated on kiwifruit against Psa.	http://www.znaturforsch.com/ac/v58c/s58c0765.pdf
Bio-control	Infection and systemic invasion of deciduous fruit trees by *Pseudomonas syringae* in South Africa.	Hattingh et al., (1989). Plant Disease 73(10)784-789.	Overviews bacterial diseases on deciduous fruit trees, including points of entry and control.	As natural openings in the plant can be a significant point of entry, a combination of surface protectant and systemic control are needed.	http://www.apsnet.org/publications/PlantDisease/BackIssues/Documents/1989Articles/PlantDisease73n10_784.pdf
Bio-control	Integrated biological control of bacterial speck and spot of Tomato under field conditions using foliar biological control agents and plant growth-promoting	Ji *et al.*, (2005). Biological Control 36: 358-367.	Plant growth promoting *rhizobacteria* strains may induce plant resistance under field conditions, providing effective suppression of bacterial speck and spot of tomato. There may be some benefit from combining *rhizosphere*-applied PGPR and foliar-applied biological control agents.	Both the root zone and foliar treatments are being considered for the control of Psa on kiwifruit.	http://www.ag.auburn.edu/enpl/faculty/documents/5kloepper.pdf

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	rhizobacteria.				
Bio-control	Invasion and exclusion among coexisting *Pseudomonas syringae* strains on leaves.	Kinkel and Lindow, (1993). Applied and Environment Microbiology, 59(10) 3447-3454.	Investigates the competitive interactions between *Pseudomonas syringae* strains introduced onto leaves.	Suggests that a number of complementary bio-control bacteria should be considered when considering management strategies to exclude pathogenic bacteria from the leaf surface.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC182472/pdf/aem00039-0291.pdf
Bio-control	Investigations on testing the treatments with inhibitory effects over phytopathogenic bacteria.	Livadariu et al., (2010). Romanian Biotechnological Letters, 15(1)62-68 Supplement.	Demonstrates that compounds extracted from *Bacilus subtilis* can have comparable control of pathogens such as *Pseudomonas syringae* when compare against a conventional antibiotic treatment.	These materials warrant closer study in relation to Psa.	http://ebooks.unibuc.ro/biologie/RBL/rbl1vol15Supplement/9%20Livadariu%20Oana.pdf
Bio-control	Management of bacterial blight of cotton using a mixture of *Pseudomonas fluorescens* and *Bacillus subtilis.*	Salaheddin et al., (2010). Plant Protection Science, 46(2): 41-50.	Demonstrates the potential of antagonistic *rhizobacteria* to manage bacterial blight diseases.	Although control by the best foliar treatments with bio-control bacteria were not as high as the control obtained from streptomycin these treatments still showed significant promise as a control approach to investigate in relation to Psa.	http://www.agriculturejournals.cz/publicFiles/21173.pdf
Bio-control	Management of Tomato Bacterial Spot in the field by foliar applications	Obradovic et al., (2004). Plant Disease, 88(7):736-740.	Various combinations of plant immunity elicitors and bacteriophages were compared for controlling tomato bacterial	Bacteriophages in combination with plant elicitors gave more effective control of tomato bacterial	http://www.omnilytics.com/documents/Management%20Obradovic.pdf

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	of *bacteriophages and SAR inducers*		spot in field experiments.	spot than the standard copper-based control treatments.	
Bio-control	Mixtures of plant growth-promoting *rhizobacteria* enhance biological control of multiple cucumber pathogens.	Raupach and Kloepper, (1998). Phytopathology,8 8(11): 1158-1164.	Demonstrates that plant growth promoting *rhizobacteria* strains can be used as bio-control agents.	Research on the application of *rhizobacteria* to stimulate immunity in kiwifruit plants to resist Psa is under development.	http://www.bashanfoundation.org/kloepper/kloeppermixtures.pdf
Bio-control	Plant perceptions of plant growth-promoting *Pseudomonas*.	Preston, (2003). Philosophical Transactions of the Royal Society of London, B, 359: 907-918.	Reviews the interaction between plants and *Pseudomonas* from a plants perspective.	Beneficial *Pseudomonas* species may provide a potent tool for managing Psa on kiwifruit.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1693381/pdf/15306406.pdf
Bio-control	Priming in plant–pathogen interactions.	Conrath et al., (2002). Trends in Plant Science, 7(5): 210-216.	Plants can acquire enhanced resistance to pathogens after treatment with necrotizing attackers, nonpathogenic root-colonizing pseudomonads, salicylic acid, β-aminobutyric acid and many other natural or synthetic compounds.	Identifying the most effective ways of stimulating plant resistance to pathogens may provide a more long-term tool for managing Psa.	http://igitur-archive.library.uu.nl/bio/2006-0209-201129/piete_02_priming_interactions.pdf
Bio-control	Protection of tomato seedlings against infection by *Pseudomonas*	Bashan and de-Bashan, (2002). Applied and Environmental	Demonstrates that bio-control strains of *rhizobacteria* can displace bacterial diseases in tomato.	Foliar and root applications of commercial bio-control formulations are being considered for the control of	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC123946/pdf/1811.pdf

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	syringae pv. tomato by using the plant growth-promoting bacterium *Azospirillum brasilense.*	Microbiology, 68(6):2637-2643.		Psa on kiwifruit.	
Bio-control	*Pseudomonas* Biocontrol agents of soilborne pathogens: looking back over 30 years.	Weller, (2007). Phytopathology, 97(2):250-256	Reviews the research progress made on the on the use of *Pseudomonas* spp. as bio-control agents.	Development of effective methods of introducing beneficial strains of *rhizobacteria* will be critical for field application of this technology to stimulate plant immunity against Psa.	http://ddr.nal.usda.gov/bitstream/10113/9460/1/IND43883057.pdf
Bio-control	Reduction of infection by *Pseudomonas syringae* pv. tomato using a nonpathogenic, copper-resistant strain combined with a copper bactericide.	Cooksy, (1988). Disease Control and Pest Management, 78(5):601-603.	Found that when a nonpathogenic strain of *Pseudomonas syringae* resistant to high levels of copper was co -inoculated with a copper sensitive pathogen on tomato leaves treated with copper, disease control was greater than that achieved with either the non-pathogen or the copper treatment alone.	Using non-pathogenic bacteria to compete with a pathogen, particularly in combination with a selective treatment such as copper can improve disease control. However, in this case care would need to be taken to avoid the transfer of copper resistance genes from the non-pathogen to the pathogen.	http://www.apsnet.org/publications/phytopathology/backissues/Documents/1988Articles/Phyto78n05_601.PDF
Bio-control	Signaling in plant-microbe Interactions.	Baker et al., (1997). Science, 276: 726-733.	Reviews the signaling interactions that occur between bacterial pathogens and plants.	Knowledge on the signaling interaction bacterial between pathogens and plants will	http://ddr.nal.usda.gov/dspace/bitstream/10113/70/1/IND20599306.pdf

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				assist in the control of Psa on kiwifruit.	
Bio-control	Systemic resistance in *Arabidopsis* induced by biocontrol bacteria 1s Independent of salicylic acid accumulation and pathogenesis-related gene expression.	Pieterse *et al.*, (1996). The Plant Cell, 8:1225-1237.	Demonstrates that the systemic acquired resistance response due to root colonizing bio-control *rhizobacteria* differs from the salicylic acid-based systemic acquired resistance that occurs with pathogenic bacteria..	*Rhizobacteria* bio-control approaches may compliment salicylic acid based treatments in the control of Psa on kiwifruit.	http://www.plantcell.org/content/8/8/1225.full.pdf
Bio-control	Towards biological control of Pistachio dieback	Salowi, (2010), Thesis, Masters in Agricultural Science, University of Adelaide, 111pp.	Presents findings on biological control of the bacterial dieback disease of Pistachio in Australia.	The applications of bacterial antagonists such as Bacillus are being evaluated on Psa in kiwifruit and links are being made with research teams involved in antimicrobial peptides.	http://digital.library.adelaide.edu.au/dspace/bitstream/2440/63478/1/02whole.pdf
Bio-control	Use of plant growth-promoting bacteria for biocontrol of plant diseases: principles, mechanisms of action, and future	Compant et al., (2005), 71(9):4951-4959.	This review surveys the advances of plant-plant growth promoting bacteria (PGPB) interaction research focusing on the principles and mechanisms of action of PGPB, both free-living and endophytic bacteria, and their use or potential use for the	Trials are being developed to evaluate the feasibility of plant growth promoting bacteria for the control of Psa on kiwifruit.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1214602/pdf/0035-05.pdf

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	prospects.		biological control of plant diseases.		
Control	A biopolymer chitosan and its derivatives as promising antimicrobial agents against plant pathogens and their applications in crop protection.	Badawy and Rabea, (2011). International Journal of Carbohydrate Chemistry, 2011:1-29.	Provides an overview of the antimicrobial effects, mechanisms, and applications of biopolymer chitosan and its derivatives in crop protection.	Biopolymer chitosan is being trialed for Psa control on kiwifruit.	http://downloads.hindawi.com/journals/ijcc/2011/460381.pdf
Control	A new composition of nanosized silica-silver for control of various plant diseases.	Park *et al*., (2006). The Plant Pathology Journal, 22(3): 295-302.	Evaluates the efficacy of nanosized silica-silver for controlling plant pathogenic microorganisms .	Silver has strong anti-microbial properties. Formulation is critical in relation to cost, persistence and efficacy. Several silver formulations are under investigation for the control of Psa.	http://www.ppj-online.org/folder.php?a=down&id=43453
Control	Active Oxygen species in plant defense against pathogens	Mehdy, (1994). Plant Physiology, 105:467-472.	Describes the reactive oxygen mechanism that plants use in their resistance against plant pathogens.	Treatments to control Psa, including copper and elicitors, induce reactive oxygen species such as hydrogen peroxide in plants in their defense against pathogens.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC159383/pdf/1050467.pdf
Control	Antibacterial activity of some	Iacobellis et al., (2004).Managem	Evaluates a range of essential oils against a wide range of bacteria	The more effective essential oils warrant closer study in	http://www.unibas.it/utenti/iacobellis/pubblicazioni%2

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	essential oils.	ent of Plant and Arthropod Pests by BCAs, IOBC/wrps Bulletin, 27(8):223-226.	including *Pseudomonas syringae*. Demonstrates the efficacy of specific essential oils and reviews likely compounds responsible for efficacy.	relation to Psa, although phytotoxicity could be an issue when applied to leaf tissue.	0pdf/rivista%20internazionale/Iacobellis%20et%20al.,%202004.pdf
Control	Antimicrobial peptides of multicellular organisms.	Zasloff, (2002). Nature, 415(24): 389-395.	Animals and plants possess potent, broad-spectrum antimicrobial peptides which they use to fend off a wide range of microbes. These compounds appear more difficult for bacteria to evolve resistance against when compared against antibiotics.	Antimicrobial peptides are being isolated and evaluated to control plant bacterial diseases such as fire blight and may have application to Psa.	http://uregina.ca/suhdaey/courses/BIOC%20430/reading/10R29%20AMPs%20Nature.pdf
Control	Antimicrobial peptides.	Rao, (1995), The American Phytopathological Society, 8(1):6-13.	Reviews antimicrobial peptides, including categories and their application.	Contact has been made with researchers involved in the synthesis and application of antimicrobial peptides for the control of bacterial diseases in plants.	http://www.apsnet.org/publications/mpmi/BackIssues/Documents/1995Articles/Microbe08-6.pdf
Control	Apidaecins: antibacterial peptides from honeybees.	Casteels et al., (1989). The EMBO Journal, 8(8):2387-2391.	Found honeybees to be a novel source of antimicrobial peptides that exhibit bactericidal activity.	Contact has been made with researchers involved in the synthesis and application of antimicrobial peptides for the control of bacterial diseases in plants.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC401180/pdf/emboj00132-0258.pdf
Control	Bacterial canker: Mechanisms,	Kirkpatrick et al., (1999), California	Summarizes five years of research on bacterial canker on	Care needs to be taken in interpreting orchard	http://ucce.ucdavis.edu/files/repositoryfiles/1999-

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	pathogen characterization and control.	Dried Plum Board Research Reports, 32p.	prune. Highlights the complex role of plant, pathogen, environment and management on disease incidence in orchards.	observations of disease incidence as cause and effect due to these complex interactions.	130.pdf-79078.pdf
Control	Bacterial problems in Belgian pear growing.	Deckers and Schoofs, (2001). The Compact Fruit Tree, 34(4):121-124.	Describes the factors that influence infection of *Pseudomonas syringae* pv. *syringae* in pear orchards and discusses control measures.	The role of plant vigour and the cultural practices used within the production system need closer study in relation to Psa on kiwifruit.	http://www.virtualorchard.net/idfta/cft/2001/october/page121.pdf
Control	Bactericide effect of alkaloids present in *Lupinus*.	Muzquiz et al., (1996). Towards the 21st Century, Proceedings 8th International Lupin Conference, p540-544.	Assesses the bactericidal effect of lupin alkaloids against bacteria including *Pseudomonas syringae* pv *tomato*. Found the alkaloid lupinine had bactericidal activity against the four bacteria studied.	This group of plant extracts warrants closer investigation in relation to efficacy against Psa on kiwifruit and toxicology issues.	http://wwwx.inia.es/webcrf/referencias/docs/ID193.pdf
Control	Basic aspects of food preservation by hurdle technology.	Leistner, (2000). International Journal of Food Microbiology, 55:181-186.	Reviews hurdle technology as a means of preservation of foods against microbial contamination and deterioration.	The general approach of "hurdle technology" may provide a framework for managing Psa on kiwifruit.	http://envismadrasuniv.org/Physiology/pdf/Basic%20aspects%20of%20food%20preservation.pdf
Control	Chemical and cultural control of bacterial blossom blight of kiwifruit caused by *Pseudomonas syringae* in	Koh et al., (2001). NZ J. Crop and Horticultural Science, 29:29-34.	Evaluates a range of control options for the control bacterial blossom blight in Hayward kiwifruit, including trunk injections of acetic acid.	The results reported for girdling as a potential control option for bacterial blight may not be as applicable to the virulent strain of Psa.	http://www.tandfonline.com/doi/pdf/10.1080/01140671.2001.9514157

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	Korea.				
Control	Chemical forms of copper on leaves in relation to the bactericidal activity of cupric hydroxide deposits on plants.	Menkissoglu and Lindow, (1991). The American Phytopathological Society, 81(10):1263-1270.	Determined the amount of soluble but complexed copper and the concentration of free Cu^{2+} ions on the surface of navel orange and bean leaves treated with different amounts of copper hydroxide under field conditions.	The amount of free Cu^{2+} ions and there persistence on the leaf is a key variable in the control of epiphytic bacteria such as Psa.	http://www.apsnet.org/publications/phytopathology/backissues/Documents/1991Articles/Phyto81n10_1263.pdf
Control	Chitosan as a potential natural compound to control pre and postharvest diseases of horticultural commodities.	Bautista-Banos *et al.* (2006). Crop Protection, 25: 108-118.	Reviews current knowledge on chitosan, a biodegradable compound derived from crustaceous shells that have been shown to have control on a range of pre and postharvest diseases.	Biopolymer chitosan is being trialed for Psa control on kiwifruit.	http://ddr.nal.usda.gov/bitstream/10113/6846/1/IND43774323.pdf
Control	Citrus blight: attempts to get remission of symptoms by chemotherapy	Lee et al., (1981). Proceedings of the Florida State Horticultural Society, 94:21-25.	Evaluates a range of systemic compounds on citrus blight and describes distribution of these compounds within treated trees.	Severely infected plants may be slow to respond to systemic treatments due to pathogen damage to plant vascular tissues.	http://www.fshs.org/Proceedings/Password%20Protected/1981%20Vol.%2094/21-25%20(LEE).pdf
Control	Copper as a biocidal tool.	Borkov and Gabbay, (2005). Current Medicinal Chemistry, 12:2163-2175	Reviews the biocidal properties of copper, the mechanism by which copper is toxic to microorganisms and the systems by which many organisms can resist copper.	Monitoring Psa for copper resistance will be critical to ensure the effectiveness of copper for the control of Psa.	http://204.9.77.212/clients/cupron.us/Articles/Current_Medicinal_Chemistry.pdf

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Control	Copper fungicides in the control of Olive diseases.	Roca et al., (2007), FAO Olive Network, 26:48-50.	Reviews the efficacy of copper formulations for the control of Olive diseases, including *Pseudomonas savastanoi* pv. *savastanoi.*	The persistence of copper activity on leaves was less dependent on the kind of copper salt or rate of application, but were related to commercial formulation, indicating adjuvants were an important part of the efficacy.	http://olivediseases.com/articles/olive/vera_spain_cooper.pdf
Control	Copper, an ancient remedy returning to fight microbial, fungal and viral infections.	Borkow and Gabbay, (2009). Current Chemical Biology, 3: 272-278.	Reviews the biocidal mechanisms of copper and the current usages of copper and copper compounds as antibacterial, antifungal and antiviral agents, with emphasis on novel health related applications.	The localized production of free radicals such as hydrogen peroxide around or within cells through a redox reaction is a key mode of action of copper toxicity to bacteria.	http://www.benthamscience.com/ccb/samples/ccb3-3/0003CCB.pdf
Control	Differential wound responses in Southern California Avocado (*Persea americana* cv., Lauraceae) plantations comparing three distinct injection methodologies 2-years following treatment.	Doccola et al., (?), Arborject Internal Report, 17p.	Compares different trunk injection methods, including tree wound responses. Both trunk injection method and formulation influence the response of the tree to systemic treatment.	Optimisation of systemic treatments for the control of Psa on kiwifruit will be critical to ensure long-term effectiveness of the treatments.	http://www.soilzone.com/Library/Crops/Avocado/Disease%20management/Differential%20Wound%20Response%20Paper%20-%20Southern%20Avocado.pdf
Control	Draft Report: Pest risk analysis report	Biosecurity Australia (2011)	Summarizes the current border controls relating to Psa and the	Provides guidance on the plant material movement into	http://www.daff.gov.au/__data/assets/pdf_file/0007/

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Subject	Title	Reference	Key Points	Implications	Source
	for *Pseudomonas syringae* pv. *actinidiae* associated with Actinidia (kiwifruit) propagative material.	Department of Agriculture, Fisheries and Forestry, Canberra. 41p.	presence of low virulence strains in Australia.	Australia.	1937392/Draft_PSA_PRA.pdf
Control	Evaluation of a trunk injection technique to control grapevine wood diseases.	Darrieutort and Lecomte, (2007). Phytopathology Mediterranean, 46: 50-57.	Presents findings from five years of trunk injection trials to control Eutypa dieback in grapes. Results suggest that trunk injection will form part of a wider disease management program.	Costs of trunk injection can be high and methods to improve efficiency and the identification of vines at risk for preventative control will be important.	http://fupress.net/index.php/pm/article/viewFile/1853/1788
Control	Field evaluation of treatments for the control of the bacterial apical necrosis of mango (*Mangifera indica*) caused by *Pseudomonas syringae* pv. *syringae*.	Cazorla et al., (2006). European Journal of Plant Pathology, 116:279-288.	Compares a wide range of chemical options for the control of *Pseudomonas syringae* pv *syringae* infection in mango. Elicitor compounds that stimulate plant immunity showed promise in control of this bacterial disease	A range of elicitor compounds are under evaluation for Psa on kiwifruit.	http://digital.csic.es/bitstream/10261/4587/1/Field%20evaluation%20of%20treatments.pdf
Control	Growth inhibition of *Clavibacter michiganensis* subsp. *michiganensis* and	Ozdemir, (2009), Journal of Plant Pathology, 91(1):221-224.	Reports on the effects of citric acid and olive mill wastewaters on the growth of seed-borne bacterial pathogens. Results of this study suggest that citric acid	Citric acid is currently used on kiwifruit as a pre-harvest spray for the removal of staining from the fruit surface. The effect of citric	http://www.sipav.org/main/jpp/volumes/0109/010928.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
	Pseudomonas syringae pv. tomato by olive mill wastewaters and citric acid.		at 0.1 mol l-1 concentration can prove useful for the elimination of both pathogens from tomato seeds.	acid on epiphytic populations of Psa on kiwifruit at current rates should be assessed.	
Control	Influence of ring nematode infestation and calcium, nitrogen, and indoleacetic acid applications on peach susceptibility to *Pseudomonas syringae* pv. *syringae.*	Cao et al., (2006). Phytopathology, 96(6): 608-615.	Found that ring nematode infection of roots increased the susceptibility of peach trees to bacterial canker. Susceptibility was also found to be negatively correlated to plant tissue nitrogen content and positively correlated to calcium content.	The nitrogen status of plants and their susceptibility to bacterial diseases such as Psa may be confounded by other factors such as nematode infection.	http://apsjournals.apsnet.org/doi/pdf/10.1094/PHYTO-96-0608
Control	Inhibition of fungal and bacterial plant pathogens in vitro and in planta with ultrashort cationic lipopeptides.	Makovitz *et al.,* (2007). Applied and Environmental Microbiology, 73(20):6629-6636.	Results suggest that ultrashort lipopeptides have antimicrobial properties that are economically feasible for use in plant protection.	Contact with research teams working on these types of materials are being made for evaluation on Psa in kiwifruit.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2075073/pdf/1334-07.pdf
Control	Inhibition of Plant-Pathogenic Bacteria by short synthetic cecropin A-	Ferre *et al.*, (2006). Applied and Environmental Microbiology,	Describes the synthesis and efficacy of novel antimicrobial peptides against plant pathogens such as *Pseudomonas syringae*.	Links have been established with teams working on synthetic antimicrobial peptides to assess application to Psa on kiwifruit.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1472336/pdf/0115-06.pdf

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Subject	Title	Reference	Key Points	Implications	Source
	melittin hybrid peptides.	72(5):3302-3308.			
Control	Injector-size and the time of application affects uptake of tree trunk-injected solutions.	Sanchez Zamora and Fernandez Escobar, (2000). Scientia Horticulturae, 84: 163-177.	Evaluates three different trunk injection systems on 23 different tree species, at different times of the year.	Optimisation of trunk injection will need to consider injector diameter in relation to wounding, healing time, uptake and leaf phytotoxicity.	http://www.iraqi-datepalms.net/uploadedfiles/injector%20size%20and%20time%20application.pdf
Control	Integrated management of bacterial spot on Tomato in Florida.	Momol et al., (2002). University of Florida IFAS Fact Sheet PP192, 5pp.	Describes the integrated management program used for the control of bacterial spot caused by *Pseudomonas syringae* in Tomato.	Control of Psa on kiwifruit is likely to be based on an integrated management approach rather than a single curative.	http://edis.ifas.ufl.edu/pdffiles/PP/PP11000.pdf
Control	Management of fire blight: A case study in microbial ecology.	Johnson and Stockwell, (1998). Annual Reviews of Phytopathology, 23:227-248.	Reviews the management of the apple bacterial disease, fire blight.	Long term of Psa on kiwifruit is likely to be based on integrated management involving both chemical and biological control alongside prediction systems and a knowledge of the ecology of the pathogen.	http://www.unine.ch/nccr/pages/education/gs/courses2005_2006/9-BD.pdf
Control	Network properties of robust immunity in plants.	Tsuda *et al.*, (2009). PLoS Genetics, 5(12):1-16.	Describes the plant immunity response against plant pathogens.	A combination of kiwifruit genomics and Psa genomics information should provide better insights into managing plant immunity for the control of Psa in kiwifruit.	http://www.plosgenetics.org/article/fetchObjectAttachment.action;jsessionid=C3B89D1AF076658DD721F471FD8CFE13.ambra02?uri=info%3Adoi%2F10.1371%2Fjournal.pgen.1000772&repre

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
					sentation=PDF
Control	Occurrence of bacterial canker of kiwifruit in Japan: description of symptoms, isolation of the pathogen and screening of bactericides.	Serizawa et al., (1989) Annals of the Phytopathology Society of Japan, 55:427-436.	Describes bacterial canker disease of kiwifruit in Japan, including the climatic conditions such as low temperatures, strong winds and heavy rainfall that appear to promote the disease. Applications of streptomycin, kasugamycin or inorganic copper formulations reduced disease development on leaves.	The pathogenicity of the disease on other *Actinidia* species and cultivars is currently under investigation to identify resistance.	http://ci.nii.ac.jp/lognavi?name=nels&lang=en&type=pdf&id=ART0003040278
Control	Plant immunity: it's the hormones talking, but what do they say?	Verhage et al., (2010). Plant Physiology, 154:536-540.	Provides an overview of the plant Immunity system, and describes how pathogens such as Pseudomonas syringae interact with this system.	Management of the plant immunity system could provide a critical tool in the management of Psa on kiwifruit.	http://igitur-archive.library.uu.nl/bio/2010-1008-200353/PlPh-Verhage-2010.pdf
Control	Plant Pathogenic Bacteria	Editors: M. Lemattre, S. Freigoun, K. Rudolp & J.G. Swings, (1992). Proceeding of the 8th International Conference on Plant Pathogenic Bacteria, 1029p.	Provides a wide range of papers on the epidemiology, genetics and control of plant pathogenic bacteria, including *Pseudomonas syringae*.	A check list for the ideal bactericide is described. The bactericide should be cheap, have a wide host range, some systemic activity, reaches infection sites, does not induce resistance, not used for medical or veterinary use and complies with national and international regulations.	http://horizon.documentation.ird.fr/exl-doc/pleins_textes/divers09-11/40441.pdf
Control	Potential of plant extracts for controlling citrus canker of Lime.	Leksomboon et al., (2001). Kasetsart Journal of Natural	Demonstrates the potential of aqueous extracts of Tamarind fruit pulp to reduce the incidence of lime leaf infection by citrus	Plant extracts should be explored as potential control options for Psa. They could play a role in an integrated	http://www.rdi.ku.ac.th/KU_Journal/Sciences/doc/Ku35(4).pdf#page=34

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Subject	Title	Reference	Key Points	Implications	Source
		Sciences, 35: 392-396.	canker.	management programme designed to reduce the risk of disease resistance to copper or antibiotics.	
Control	Pseudomonas Syringae Pathovars and Related Pathogens				http://www.bashanfoundation.org/gmaweb/pdfs/alternative.pdf
Control	Reaction of avocado wood on injections into the trunk				http://www.avocadosource.com/journals/saaga/saaga_1999/saaga_1999_pg_039-047.pdf
Control	Streptomycin resistance management strategy for plant pathogenic bacteria.	Vanneste, (2005). Pesticide Resistance: Prevention and Management Strategies 2005, NZ Plant Protection Society, p41-45.	Provides management guidelines for the use of streptomycin on pip fruit, stone fruit and tomato.	Similar guidelines will need to be established for the management of Psa in kiwifruit to avoid resistance to streptomycin.	http://www.nzpps.org/resistance/pdfs/streptomycin.pdf
Control	Sulphur as an alternative to copper for the control of bacterial blast on nectarine fruit	McLaren et al., (2005). NZ Plant Protection 58:96-100.	Found foliar applications of sulphur to the Nectarine cultivar "Fantasia" had less bacterial damage due to *Pseudomonas syringae* than copper applications.	Although promising, these results appear to be very specific to a single stone fruit cultivar and the results appear less transferrable to other stone fruit cultivars.	http://www.nzpps.org/journal/58/nzpp_580960.pdf
Control	The effect of bactericides, tank	Jones and Jones, (1985).	Compares various copper bactericide formulations for	Similar trials on the efficacy of various copper formulations	http://www.fshs.org/Proceedings/Password%20Protec

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Subject	Title	Reference	Key Points	Implications	Source
	mixing time and spray schedule on bacterial leaf spot of tomato	Proceedings of the Florida State Horticultural Society, 98:244-247.	efficacy in the control of bacterial spot on tomato.	are being evaluated for the control of Psa on kiwifruit.	ted/1985%20Vol.%2098/244-247%20(JONES).pdf
Control	Tree injection: perspective macro-injection/micro-injection	Costonis, (1981). Journal of Arboriculture, 7(10):275-277.	Discuses the advantages and disadvantages of injection technologies. Demonstrates that wound damage can be reduced by diameter and length of the injection sites in the trunk.	Trials are currently underway to investigate trunk injection responses on kiwifruit trunk tissues.	http://www.protectyouroaks.com/Micro-Macro.pdf
Control	Use of tetracycline antibiotics	McCoy (1982), Plant Diseases, July 1982: 539-542.	Describes the systemic treatment of the "yellows disease" in palm trees with antibiotics.	The importance of management guidelines for the use of these materials is emphasized and will be incorporated into any use of these materials on Psa.	http://www.apsnet.org/publications/PlantDisease/BackIssues/Documents/1982Articles/PlantDisease66n07_539.PDF
Control	Uses of antimicrobials in plant agriculture.	Vidaver, (2002). Clinical Infectious Diseases, 34 (Suppl 3): S107-S110.	Describes the current status of antimicrobial control in plants and discusses alternatives to antimicrobials.	Resistance to antibiotics has been found to be linked to copper resistance. There is a need to broaden antimicrobial control strategies to limit the build-up of antibiotic and copper resistant strains.	http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1065&context=plantpathpapers
Epidemiology	Bacteria in the leaf ecosystem with emphasis on *Pseudomonas syringae* — a	Hirano and Upper, (2000), Microbiology and Molecular Reviews. 64(3):	*Pseudomonas syringae* on leaves is used as a case study to illustrate the ecology of bacteria on leaf surfaces. Demonstrates that competition for resources	The application of competitive bacterial on leaves in the field can reduce the population size of pathogenic bacteria. Bacterial populations can	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC99007/pdf/mr000624.pdf

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Subject	Title	Reference	Key Points	Implications	Source
	pathogen, ice nucleus, and epiphyte.	624-653.	between bacteria rather than antimicrobial antagonism is the prevalent competitive strategy used to colonize leaves. Suggests that understanding the processes that lead to development of large population sizes may be more critical than understanding the mechanism by which bacteria causes leaf lesions.	increase when addition nutrients are applied to leaves. It would be prudent to ensure that existing foliar treatments do not contain nutrients that stimulate pathogenic strains of bacteria.	
Epidemiology	Bacterial blight in California	Conn et al., (1993). Plant diseases, 77(3):228-230.	Found *Pseudomonas viridiflava* caused significantly more flower bud rot and blossom blight, but not leaf spot, than *P. syringae. P. fluorescens* was not pathogenic.	Identification of a bacterial pathogen can be confounded by the presence of similar but non-pathogenic bacteria that can be isolated from infected tissues.	http://www.apsnet.org/publications/PlantDisease/BackIssues/Documents/1993Articles/PlantDisease77n03_228.pdf
Epidemiology	Bacterial pathogens in plants: Life up against the wall.	Alfano and Collmer, (1996). The Plant Cell, 8: 1683-1698.	Describes the lifecycle of bacterial pathogens such as pseudomonas that colonize the apoplast between cell walls.	Effect and enduring control of Psa in kiwifruit will be dependent on understanding haow the bacteria systemically colonizes the kiwifruit tissues.	http://www.plantcell.org/content/8/10/1683.full.pdf
Epidemiology	Current status of bacterial canker spread on kiwifruit in Italy	Balestra et al., (2009). Australian Plant Disease Notes, 4:34-36.	Reports on a survey of Italian kiwifruit orchards during 2007-08. Found *Pseudomonas syringae* pv. *actinidiae* was repeatedly isolated from infected plants.	A robust monitoring system to determine infected orchards so that they can be protected and isolated from disease-free areas is critical to the management of the disease.	http://www.springerlink.com/content/wv0xr71383872373/fulltext.pdf
Epidemiology	Current status of	Balestra *et al.*,	Presents the findings of a survey	Similar symptoms reported in	ftp://124.42.15.59/ck/2011

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	bacterial canker spread on kiwifruit in Italy.	(2009), Australian Plant Disease Notes, 4:34-36.	undertaken in Italy during 2007-08 detecting damage caused by bacterial canker.	this study have occurred in New Zealand over 2010-11.	-04/165/073/402/531/Current%20status%20of%20bacterial%20canker%20spread%20on%20kiwifruit%20in%20Italy.pdf
Epidemiology	Emerging infectious diseases of plants: pathogen pollution, climate change and agrotechnology drivers.	Anderson et al., (2004). Trends in Ecology and Evolution	Reviews emerging infectious diseases of plants and provides recommendations for improving strategies for the surveillance and control of these pathogens.	Weather and the spread of infected plant material are key drivers in the emergence of bacterial pathogens.	http://bio.research.ucsc.edu/people/kilpatrick/READINGS%20DE10/Readings/Anderson%20TREE%202004.pdf
Epidemiology	Epidemiology and predisposing factors of some major bacterial diseases of stone and nut fruit trees species	Scortichini, (2010). Journal of Plant Pathology, 92(1, Suppliment): S1.73-S1.78.	Reviews the main epidemiological aspects and predisposing factors of some important bacterial diseases of stone and nut trees.	Cultivar susceptibility and the presence of entry points such as pruning wounds and hail damage are important factors that influence bacterial infection.	http://www.sipav.org/main/jpp/volumes/0410/041009.pdf
Epidemiology	First report of bacterial canker of *Actinidia deliciosa* caused by *Pseudomonas syringae* pv. *actinidiae* in Portugal.	Balestra et al., (2010). New Disease Reports 22: 10.	*Pseudomonas syringae* pv. actinidiae was isolated from two year old *Actinidia deliciosa* cv. Summer plants growing in Portugal.	Psa can infect some *Actinidia deliciosa* cultivars as well as *Actinidia chinensis*.	http://www.ndrs.org.uk/pdfs/022/NDR_022010.pdf

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Subject	Title	Reference	Key Points	Implications	Source
Epidemiology	Identification of an emergent and atypical *Pseudomonas viridiflava* lineage causing bacteriosis in plants of agronomic importance in a Spanish region.	Gonzalez et al., (2003). 69(5): 2936-2941.	Identifies emerging *Pseudomonas* species as pathogens of kiwifruit, lettuce and tomato in Spain.	The emergence of a more pathogenic form of *Pseudomonas viridiflava* on kiwifruit flowers in Spain highlights the risk that these bacteria pose to kiwifruit.	http://aem.asm.org/cgi/reprint/69/5/2936.pdf
Epidemiology	Impact of host plant xylem fluid on *Xylella fastidiosa* multiplication, aggregation and attachment.	Toscano *et al.*, (2004). Pierce's Disease Research Symposium, p.60-63.	Describes the response of the Pierce Disease bacterium to xylem fluid extracted from grape and a symptomless host, grapefruit.	Differences in xylem fluid composition should be considered in relation to cultivar tolerance in kiwifruit in response to Psa.	http://files.piercesdisease.org/proceedings/2004/2004_71-74.pdf
Epidemiology	Infection and plant defense responses during plant-bacterial interaction.	Buonaurio, (2008), Plant-Microbe Interactions, p. 169-197, Ed. E. Ait Barka and C. Clement	Describes how plant pathogenic bacteria suppress plant defense systems to access plant nutrients.	By understanding how bacteria such as Psa can suppress plant defense in kiwifruit plants and how the multilayered system of active and defensive mechanisms operate to protect the plant could open up new disease control techniques.	http://www.agr.unipg.it/dapp/Buonaurio/Materiale%20didattico%202010-11/Biblio%20BFA/A3-Batteri.pdf
Epidemiology	Mechanisms of	Rost et al., (2004).	Describes xylem differences	Xylem differences may affect	http://files.piercesdisease.o

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Subject	Title	Reference	Key Points	Implications	Source
	Pierce's disease transmission in grapevines: the xylem pathways and movement of *Xylella fastidiosa*. comparison of the xylem structure of susceptible/ tolerant grapevines and alternate plant hosts.	Proceedings of Pierce's Disease Research Symposium, p.351-357.	between grape cultivars tolerant and susceptible to the bacterial pathogen Pierce's disease.	the susceptibility of kiwifruit cultivars to Psa.	rg/proceedings/2007/2007_284-288.pdf
Epidemiology	Microbiology of the phyllosphere.	Lindow and Brandl, (2003), Applied and Environmental Microbiology. 69(4): 1875-1883.	Describes the microbial communities on a leaf surface and discusses the leaf surface as a microbial habitat. Shows how microbial modification can occur to make the leaf surface more suitable habitat	Leaf surfaces are a challenging microbial habitat. Some strategies used by bacterial to make a leaf more habitable are reliant on the production of compounds that are similar to agrochemicals applied by growers.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC154815/pdf/1728.pdf
Epidemiology	Occurrence of *Pseudomonas syringae* pv. *actinidiae* in Jin Tao kiwi plants in Italy.	Balestra *et al.*, (2009). Phytopathology Mediterranea. 48: 299-301.	Identified *Pseudomonas syringae* pv. *actinidiae* as the cause of bacterial canker in Jin Tao.	Susceptibility to Psa is not restricted to Hort16a as infection and vine death can occur in other *Actinidia chinensis* cultivars such as Jin Tao.	http://www.fupress.net/index.php/pm/article/viewFile/2821/2846
Epidemiology	Outbreak of bacterial canker	Koh et al., (2010). NZ J Crop and	Bacterial canker was first observed on Hort16A in the	Learning's from the disease and progress on control	http://www.tandfonline.com/doi/pdf/10.1080/011406

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Subject	Title	Reference	Key Points	Implications	Source
	on Hort16A (Actinidia chinensis Planchon) caused by *Pseudomonas syringae* pv. *actinidiae* in Korea.	Horticultural Science, 38(4): 275-282.	spring 3006 on Jeju Province, Korea. The symptoms closely resemble those that occur on Hayward kiwifruit. Contaminated pruning shears and climatic conditions appear to be significant factors in the spread of the disease.	options in Korea are being are being used by research teams in New Zealand and Europe in the management of Psa.	71.2010.512624
Epidemiology	*Pseudomonas* canker of Kiwifruit.	Opgenorth *et al.* (1983). American Phytopathological Society	A bacterial canker disease that contained bacteria isolates typical of Pseudomonas syringae was reported for kiwifruit growing in California.	Kiwifruit bacterial canker diseases can occur under a diversity of climatic conditions, including those found in California.	http://www.apsnet.org/publications/PlantDisease/BackIssues/Documents/1983Articles/PlantDisease67n11_1283.pdf
Epidemiology	*Pseudomonas* content of cherry trees.	Cameron, (1970). Phytopathology, 60:1343-1346.	Describes the distribution of pathogenic Pseudomonas spp. within diseased and healthy-appearing sweet cherry trees.	Endophytic populations of bacteria within infected plants can reduce the ability of external protectant sprays to control bacterial diseases.	http://www.apsnet.org/publications/phytopathology/backissues/Documents/1970Articles/Phyto60n09_1343.pdf
Epidemiology	*Pseudomonas syringae* phytotoxins: Mode of action, regulation, and biosynthesis by peptide and polyketide synthetases.	Bender et al., (1999). Microbiology and Molecular Biology Reviews, 63(2):266-292.	Summarizes current understanding of the mechanism of action, biosynthesis, and regulation of four distinct classes of phytotoxins produced by *Pseudomonas syringae.*	Phytotoxins such as the syringomycins are produced by Psa as part of its pathogenicity against kiwifruit.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC98966/pdf/mr000266.pdf

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Subject	Title	Reference	Key Points	Implications	Source
Epidemiology	Quorum sensing in bacteria.	Miller and Bassler, (2001). Annual Reviews in Microbiology, 55:165-99.	Reviews the quorum sensing mechanism used by bacteria to regulate gene expression in response to fluctuations in gene expression.	It is possible that the virulence in Psa is induced through quorum sensing mechanism when bacterial populations reach a certain population threshold.	http://www.lib.ku.ac.th/html2/dmdocuments/QUORUM%20SENSING%20IN%20BACTERIA.pdf
Epidemiology	Raindrop momentum triggers growth of leaf-associated populations of *Pseudomonas syringae* on field-grown snap bean plants.	Hirano et al., (1996). Applied and Environmental Microbiology, 62(7):2560-2566.	Reports on the results of observational and microclimate modification experiments to determine the role of the physical environment on the population dynamics of *Pseudomonas syringae* in the phylloplane.	Rainfall momentum plays a role in the growth triggering effect of intense rain on *Pseudomonas syringae* populations.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1388900/pdf/hw2560.pdf
Epidemiology	Seasonal fuctuations in kiwifruit phyllosphere and ice nucleation activity of *Pseudomonas viridiflava.*	Balestra and Varvaro, (1998). J. Plant Pathology. 80(1), 151-156.	Describes the epidemiology of *Pseudomonas viridiflava*, the causal agent of bacterial blight, on kiwifruit.	Provides insights into the lifecycle of a bacterial pathogen related to Psa on kiwifruit and highlights the interaction of climate and plant phenology on population dynamics.	http://www.sipav.org/main/jpp/volumes/0298/029806.pdf
Epidemiology	Surprising niche for the plant pathogen *Pseudomonas syringae.*	Morris et al., (2007). Infection, Genetics and Evolution, 7:84-92.	Investigates the niches that plant pathogenic *Pseudomonas syringae* occupy outside agricultural environments. Findings suggest that the wide spread dissemination of *P.*	More knowledge is needed on the host environment for Psa outside the kiwifruit orchard environment.	http://sansan.phy.ncu.edu.tw/~hclee/SB_course/0709/C3_Surprising_niche_for_the_plant_pathogen_Pseudomonas_syringae.pdf

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Subject	Title	Reference	Key Points	Implications	Source
			syringae occurs via aerosols and precipitation.		
Epidemiology	Survey on the occurrence of abiotic diseases on Kiwifruit in Korea	Koh *et al*., (2007), Plant Pathology Journal, 23(4):308-313.	Findings from a survey of abiotic diseases on kiwifruit from sixty-two orchards in Korea are presented.	Frost damage appears to be associated with the disease incidence of *Pseudomonas syringae* on kiwifruit in Korea.	http://www.ppj-online.org/folder.php?a=down&id=53513
Epidemiology	Survival, growth, and localization of epiphytic fitness mutants of *Pseudomonas syningae* on leaves.	Beattie and Lindow, (1994). 60(10):3790-3798.	Uses epiphytic mutants of *Pseudomonas syringae* pv. *syringae* to understand survival and growth on leaf surfaces.	The ability to locate, multiply in, and/or survive in protected sites on the leaf surface appears important for successful colonization of the leaf.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC201888/pdf/aem00027-0320.pdf
Epidemiology	The structure of xylem vessels in grapevine (vitaceae) and a possible passive mechanism for the systemic spread of bacterial disease.	Thorne *et al*., (2006). American Journal of Botany, 93(4):497-504.	Investigates the structure of xylem vessels and the movement of xylem-living bacteria within these vessels. Bacteria were able to move readily from the stem to leaves through these vessels.	Psa appear to move from leaves down through the stem and further work is needed to understand this mechanism in kiwifruit.	http://www.amjbot.org/content/93/4/497.full.pdf+html
Epidemiology	*Trichoderma* species — opportunistic, avirulent plant symbionts.	Harman et al., (2004). Nature Reviews Microbiology: 2:43-56.	Reviews recent knowledge on Trichoderma spp., including their ability to induce localized and systemic resistance responses in plants that can protect against a	Root inoculation with *Trichoderma* spp. have been shown to provide protection against foliar *Pseudomonas syringae* diseases in other	http://ddr.nal.usda.gov/bitstream/10113/25508/1/IND44168159.pdf

Subject	Title	Reference	Key Points	Implications	Source
			broad range of plant pathogens.	crops and should be investigated in relation to Psa.	
Genetics	Comparative analysis of *Pseudomonas syringae* pv. *actinidiae* and pv. *phaseolicola* based on phaseolotoxin-resistant ornithine carbamoyltransferase gene (argK) and 16s-23s rRNA intergenic spacer sequences.	Sawada, (1997). Applied and Environmental Microbiology, 63(1): 282-288.	Compares and contrasts phylogenetic development in *Pseudomonas syringae* pv. *actinidiae* and pv. *phaseeolicola*.	Current work on the Psa genome will provide more knowledge on the origin and evolution of this pathogen.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC168320/pdf/630282.pdf
Genetics	Genetic basis of copper resistance in New Zealand strains of *Pseudomonas syringae.*	Vanneste and Voyle, (2003). NZ Plant Protection 56:109-112.	Strains of *Pseudomonas syringae* able to grow on a minimal media containing 500mg/litre of copper sulphate were selected from a collection of streptomycin-resistant strains.	Resistance to both copper and streptomycin can occur in the same strain of *Pseudomonas syringae*.	http://www.nzpps.org/journal/56/nzpp_561090.pdf
Genetics	Genetic diversity, presence of the syrB gene, host preference and virulence of *Pseudomonas syringae* pv. *syringae*	Scortichini *et al.,* (2003). Plant Pathology, 52: 277-286.	Describes the genetic relatedness for a range of Pseudomonas syringae pathovars, including Psa.	Isolates obtained from kiwifruit exhibited similar but distinctive patterns according to the geographic region, California and Italy, where the isolates were collected. This is consistent with other research that shows the origin	http://onlinelibrary.wiley.com/doi/10.1046/j.1365-3059.2003.00860.x/pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)

Subject	Title	Reference	Key Points	Implications	Source
	strains from woody and herbaceous host plants.			of particular Psa strains can be linked to specific geographic origins.	
Genetics	Genetic relatedness among Pseudomonas avellanae, *P. syringae* pv. *theae* and P.s. pv. *actinidiae*, and their identification.	Scortichini *et al*. (2002). European Journal of Plant Pathology, 108: 269-278.	Strains of Psa could be group on their basis of geographic origin. Pathogenicity tests clearly indicated that each of the Psuedomonas groups is specifically pathogenic only on the host plant species from which it was originally isolated.	Psa could live as a symptomless non-pathogenic bacteria on other plant host species.	http://www.atlasplantpathogenicbacteria.it/Genomospecies%208%20EJPP.pdf
Genetics	Genomic and phenotypic characterization of the bacterium causing blight of kiwifruit in New Zealand.	Young et al., (1997). Plant Pathology, 46:857-864.	Found that the bacterium responsible for causing kiwifruit bacterial blight in New Zealand that had previously been described as *Pseudomonas viridifolia* was more closely related to *Pseudomonas savastanoi*.	The bacterial flower blight that occurs in New Zealand kiwifruit is distinctly different from the Psa strains that have been found in New Zealand.	http://onlinelibrary.wiley.com/doi/10.1046/j.1365-3059.1997.d01-72.x/pdf
Genetics	Molecular and phenotypic features of *Pseudomonas syringae* pv. *actinidiae* isolated during recent epidemics of	Ferrante and Scortichini, (2010). Plant Pathology, 58(5): 954 -962.	Demonstrates that the Psa strains obtained in Italy during 2008-09 have a similar PCR fingerprint profile to each other but they differed from strains previously isolated in Italy and Japan. The recent Psa strains isolated in Italy all had the hopA1 effector	The *hopA1* effector protein has been associated with plant defense suppression in *P. syringae* pathovars in other crops. The *hopA1* effector has been previously shown to suppress Jasmonic Acid and ethylene mediated plant	http://www.atlasplantpathogenicbacteria.it/_/Ferrante-Scortichini.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
	bacterial canker on yellow kiwifruit (*Actinidia chinensis*) in central Italy.		protein.	defense/stress signaling systems.	
Genetics	Molecular bases of high-level streptomycin resistance in *Pseudomonas marginalis* and *Pseudomonas syringae* pv. *actinidiae.*	Han *et al.*, (2003). The Journal of Microbiology, 41(1) 16-21.	Describes the genetic basis for streptomycin resistance in Psa strains collected in Japan and Korea.	Psa strains collected in kiwifruit orchard samples should be monitored routinely for resistance to streptomycin and copper to ensure any plant protection program is optimized for current pathogenic strains.	http://www.msk.or.kr/jsp/downloadPDF1.jsp?fileName=411-0310.pdf
Genetics	Occurrence of the strA-strB streptomycin resistance genes in *Pseudomonas* species isolated from kiwifruit plants.	Han *et al.*, (2004). The Journal of Microbiology, 42(4) 365-368.	Provides updated details on the genetic basis for streptomycin resistance in Psa strains collected in Japan and Korea.	Genetic knowledge on streptomycin resistance in Psa can be used to monitor the emergence of resistance in orchard samples of Psa.	http://www.msk.or.kr/jsp/downloadPDF1.jsp?paperSeq=2096&fileName=p.365-3680.pdf
Genetics	Quorum sensing: Cell-to-cell communication in bacteria	Waters and Bassler, (2005). Annual Reviews in Cell Development and Biology, 21:319-346.	Reviews the architectures of bacterial chemical communication networks, including how within and between species communication is accomplished.	Through recent insights in quorum sensing research teams are developing compounds as well as approaches to disrupt quorum sensing in bacterial and control infections.	http://andrew-michaelson.com/Genetics/AdditionalPaperstoRead/Regulation_Reading/Dec20/1.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
Genetics	Roadmap to new virulence determinants in *Pseudomonas syringae*: Insights from comparative genomics and genome organization.	Lindeberg et al., (2008). Molecular Plant-Microbe Interactions, 21(6):685-700.	Reviews the genetic basis of virulence in *Pseudomonas syringae* strains.	The Psa genome is currently being mapped and will be published. This will provide more definitive information on the genetic basis virulence in Psa.	http://ddr.nal.usda.gov/bitstream/10113/20139/1/IND44086219.pdf]
Genetics	The application of polymerase chain reaction for characterising strains of *pseudomonas syringae* isolated from New Zealand rivers.	Vanneste et al., (2009). NZ Plant Protection 62: 256-261.	Describes the Polymerase Chain Reaction (PCR) protocols used to characterize *Pseudomonas syringae* strains. Demonstrates that *P. syringae* strains can be isolated from free flowing waterways in NZ.	Although Psa was not isolated from the Waikato River or Whakapapnui stream it cannot be ruled out that pathogenic bacterium such as Psa are present or transported in NZ waterways.	http://www.nzpps.org/journal/62/nzpp_622560.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
Bio-control	Assessment of the importance of similarity in carbon source utilization profiles between the biological control	Ji and Wilson, (2002). Applied and Environmental Microbiology, 68(9):4383-4389.	Evaluates the utilization of carbon sources by bacterial strains for the bio-control of bacterial speck of tomato. Demonstrates that the suppression of bacterial speck was correlated with the	Suggests that preemptive utilization of carbon sources by bio-control bacteria could assist in the control of plant pathogenic bacteria.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC124063/pdf/0073.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)

Subject	Title	Reference	Key Points	Implications	Source
	agent and the pathogen in biological control of bacterial speck of Tomato.		nutritional similarity between the pathogenic and non-pathogenic bacteria.		
Bio-control	Bacteriophage: A viable bacteria control solution.	Jackson and Jones, (2004). Omnilytics, Inc. White Paper, 10p	Provides results on the pre-treatment of greenhouse and field crops of Tomato with bacteriophage for bacterial wilt and bacterial spot diseases.	This technology is currently being developed for application to Psa in kiwifruit.	http://omnilytics.com/documents/Phage%20Article%20v5.pdf
Bio-control	Bacteriophages for plant disease control.	Jones et al., (2007). Annual Reviews in Phytopathology, 45:245-262.	Reviews the application of bacterial phages (virus that can infect bacteria) for the control of bacterial diseases.	This technology is currently being developed for the control of Psa on kiwifruit.	http://ddr.nal.usda.gov/dspace/bitstream/10113/9300/1/IND44003789.pdf
Bio-control	Biocontrol of *Bacillus subtilis* against infection of *Arabidopsis* roots by *Pseudomonas syringae* is facilitated by biofilm formation and surfactin production.	Bais et al., (2004). Plant Physiology, 134: 307-319.	Demonstrates the mechanism that the bio-control agent *Bacillus subtilis* uses to protect plant roots against pathogenic bacteria such as *Pseudomonas syringae* pv. *tomato*.	Protective antibacterial bio-films on plant surfaces may provide control for Psa if such biofilms can be established on the plant surfaces that support pathogen population growth or provide entry points for the pathogen.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC316310/pdf/1340307.pdf
Bio-control	Biocontrol of plant disease: a (Gram-) positive	Emmert and Handelsman, (1999). FEMS	Reviews the bio-control of gram negative plant pathogens with gram-positive bacteria.	Gram positive bacteria such as *Bacillus* are under evaluation as bio-control	http://www.plantpath.wisc.edu/pp-old/joh/fems1999.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
	perspective	Microbiology Letters, 17:1-9.		agents for Psa on kiwifruit.	
Bio-control	Biological control of kiwifruit and tomato bacterial pathogens.	Balestra et al., (2008). 15th IFOAM Organic World Congress Proceedings, 4pp.	Reports on the natural extracts from fig and garlic on *Pseudomonas syringae* pv *syringae* and *P. viridiflava* that are pathogens on kiwifruit.	Natural extracts from plants may provide a source of compounds for the control of Psa.	http://orgprints.org/13148/1/Balestra_13148_ed.doc
Bio-control	Biological control of *Pseudomonas syringae* pv. *syringae* and nutritional similarity in carbon source utilization of pathogen and its potential biocontrol agents.	Kotan and Sahin, (2006). Journal of Turkish Phytopathology, 35(1-3):1-13.	Reports on a study that recovers 206 bacteria naturally growing on apple trees and tests these bacteria for antagonistic activity against a pathogenic *Pseudomonas syringae* pv. *syringae* found on apple trees.	Demonstrates that bacteria that have a similar nutritional profile to the pathogen could be suitable bio-conrol agents.	http://arsiv.fitopatoloji.org.tr/indir/2006/vol35_makale1.pdf
Bio-control	Commercialization and implementation of biocontrol.	Fravel, (2005). Annual Reviews in Phytopathology, 43:337-59.	Provides an overview of the current trends in the development and commercialization of bio-control products for disease control.	Bio-control agents could be a component of an integrated management program for the control of Psa on kiwifruit.	http://ddr.nal.usda.gov/dspace/bitstream/10113/26252/1/IND43884102.pdf
Bio-control	Compost use for pest and disease suppression in NSW.	Campbell, (2006). Recycled Organics Unit Report: 113pp.	Reviews literature on the use of composts to suppress plant diseases.	Composts have been shown to suppress plant foliar diseases in stone fruit caused by *Pseudomonas* species. This approach warrants closer	http://www.recycledorganics.com/publications/reports/diseasesuppression/diseasesuppression.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
				investigation in relation to Psa in kiwifruit.	
Bio-control	Development, registration and commercialization of microbial pesticides for plant protection.	Montesinos, (2003). International Microbiology, 6:245-252.	Reviews the process and progress for commercialization of microbial pesticides for plant protection. A significant gap exists between the range of options available at the research level and commercial products available for growers.	For the control of Psa on kiwifruit priority has been given to screening commercially available bio-control agents and compounds.	http://revistes.iec.cat/index.php/IM/article/viewFile/4c457c561b3a6.002/9429
Bio-control	Differential induction of systemic resistance in *Arabidopsis* by biocontrol bacteria.	Wees et al., (1997). Molecular Plant-Microbe Interactions, 10(6):716-724.	Demonstrates that rhizosphere pseudomanads are active in inducing an induced systemic resistance response in plants that can provide protection against pathogens.	Potential to use both salicylic acid and rhizobacteria to stimulate plant immunity.	http://faculty.ksu.edu.sa/shoeib/Lectures/Mic%20521/Students%20Activities/Biocontrol%20of%20Plant%20Diseases/Biocontrol%20Bacteria.pdf
Bio-control	Diversity and ecology of biocontrol *Pseudomonas* spp. in agricultural systems	McSpadden Gardner, (2007). The American Phytopathological Society, 97(2): 221-226.	Reviews the ecology of biocontrol *Pseudomonas* species introduced into the field. Indicates that bio-control inoculation in a field situation can be effective, even though complex interactions can occur with existing microbial communities.	For field application of bio-control organisms against Psa on kiwifruit it will be important to assess existing microbial communities and their response after treatment.	http://www.oardc.ohio-state.edu/mcspaddengardnerlab/PHYTO-97-2-0221.pdf
Bio-control	Enhanced epiphytic coexistence of	Wilson and Lindow, (1995). Applied and	Describes the application of a nutritional amendment to favour a competitive bacteria strain to	A future biological control approach may be based on selectively enhancing	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1388389/pdf/hw1073.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
	near-isogenic salicylate-catabolizing and non-salicylate-catabolizing *Pseudomonas putida* strains after exogenous salicylate application.	Environmental Microbiology, 61(3):1073-1076.	*Pseudomonas syringae* is demonstrated.	competitive epiphytic populations of bacteria.	
Bio-control	FZB24® *Bacillus subtilis* – mode of action of a microbial agent enhancing plant vitality.	Kilian et al., (2000). Pflanzenschutz-Nachrichten Bayer, 1 (1):72-93.	Provides a good overview of the mechanism of mode of action of FZB24® *Bacillus subtilis* as a bio-control agent. Can be applied as either a leaf or root zone treatment.	Could form part of a management solution for Psa through stimulation of plant resistance, competition and antibiotic effects.	http://www.abitep.de/content/pdf/kilian_2000.pdf
Bio-control	Induced Systemic Resistance by Fluorescent *Pseudomonas* spp.	Bakker et al., (2007). The American Psychopathological Society	Reviews the bacterial traits associated with beneficial *Pseudomonas*-mediated induced systemic resistance.	Plant growth promoting *rhizobacteria* have the potential as a bio-control tool for Psa on kiwifruit once suitable strains and delivery mechanisms have been developed.	http://apsjournals.apsnet.org/doi/pdf/10.1094/PHYTO-97-2-0239
Bio-control	Induction of antimicrobial 3-deoxyflavonoids in pome fruit trees controls fire Blight.	Halbwirth et al., (2004). Verlag der Zeitschrift fur Naturforschung, 58c:765-770.	Describes the induction of novel antimicrobial compounds in plants to control bacterial pathogens due to the application of the growth regulator, prohexadione-Ca Regalis®.	Prohexadione-Ca is being evaluated on kiwifruit against Psa.	http://www.znaturforsch.com/ac/v58c/s58c0765.pdf

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Subject	Title	Reference	Key Points	Implications	Source
Bio-control	Infection and systemic invasion of deciduous fruit trees by *Pseudomonas syringae* in South Africa.	Hattingh et al., (1989). Plant Disease 73(10)784-789.	Overviews bacterial diseases on deciduous fruit trees, including points of entry and control.	As natural openings in the plant can be a significant point of entry, a combination of surface protectant and systemic control are needed.	http://www.apsnet.org/publications/PlantDisease/BackIssues/Documents/1989Articles/PlantDisease73n10_784.pdf
Bio-control	Integrated biological control of bacterial speck and spot of Tomato under field conditions using foliar biological control agents and plant growth-promoting *rhizobacteria*.	Ji *et al.*, (2005). Biological Control 36: 358-367.	Plant growth promoting *rhizobacteria* strains may induce plant resistance under field conditions, providing effective suppression of bacterial speck and spot of tomato. There may be some benefit from combining *rhizosphere*-applied PGPR and foliar-applied biological control agents.	Both the root zone and foliar treatments are being considered for the control of Psa on kiwifruit.	http://www.ag.auburn.edu/enpl/faculty/documents/5kloepper.pdf
Bio-control	Invasion and exclusion among coexisting *Pseudomonas syringae* strains on leaves.	Kinkel and Lindow, (1993). Applied and Environment Microbiology, 59(10) 3447-3454.	Investigates the competitive interactions between *Pseudomonas syringae* strains introduced onto leaves.	Suggests that a number of complementary bio-control bacteria should be considered when considering management strategies to exclude pathogenic bacteria from the leaf surface.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC182472/pdf/aem00039-0291.pdf
Bio-control	Investigations on testing the treatments with	Livadariu et al., (2010). Romanian Biotechnological	Demonstrates that compounds extracted from *Bacilus subtilis* can have comparable control of	These materials warrant closer study in relation to Psa.	http://ebooks.unibuc.ro/biologie/RBL/rbl1vol15Supplement/9%20Livadariu%20Oa

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Subject	Title	Reference	Key Points	Implications	Source
	inhibitory effects over phytopathogenic bacteria.	Letters, 15(1)62-68 Supplement.	pathogens such as *Pseudomonas syringae* when compare against a conventional antibiotic treatment.		na.pdf
Bio-control	Management of bacterial blight of cotton using a mixture of *Pseudomonas fluorescens* and *Bacillus subtilis.*	Salaheddin et al., (2010). Plant Protection Science, 46(2): 41-50.	Demonstrates the potential of antagonistic *rhizobacteria* to manage bacterial blight diseases.	Although control by the best foliar treatments with bio-control bacteria were not as high as the control obtained from streptomycin these treatments still showed significant promise as a control approach to investigate in relation to Psa.	http://www.agriculturejournals.cz/publicFiles/21173.pdf
Bio-control	Management of Tomato Bacterial Spot in the field by foliar applications of *bacteriophages and SAR inducers*	Obradovic et al., (2004). Plant Disease, 88(7):736-740.	Various combinations of plant immunity elicitors and bacteriophages were compared for controlling tomato bacterial spot in field experiments.	Bacteriophages in combination with plant elicitors gave more effective control of tomato bacterial spot than the standard copper-based control treatments.	http://www.omnilytics.com/documents/Management%20Obradovic.pdf
Bio-control	Mixtures of plant growth-promoting *rhizobacteria* enhance biological control of multiple cucumber pathogens.	Raupach and Kloepper, (1998). Phytopathology,88(11): 1158-1164.	Demonstrates that plant growth promoting *rhizobacteria* strains can be used as bio-control agents.	Research on the application of *rhizobacteria* to stimulate immunity in kiwifruit plants to resist Psa is under development.	http://www.bashanfoundation.org/kloepper/kloeppermixtures.pdf
Bio-control	Plant perceptions	Preston, (2003).	Reviews the interaction between	Beneficial *Pseudomonas*	http://www.ncbi.nlm.nih.g

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
	of plant growth-promoting *Pseudomonas*.	Philosophical Transactions of the Royal Society of London, B, 359: 907-918.	plants and *Pseudomonas* from a plants perspective.	species may provide a potent tool for managing Psa on kiwifruit.	ov/pmc/articles/PMC1693381/pdf/15306406.pdf
Bio-control	Priming in plant–pathogen interactions.	Conrath et al., (2002). Trends in Plant Science, 7(5): 210-216.	Plants can acquire enhanced resistance to pathogens after treatment with necrotizing attackers, nonpathogenic root-colonizing pseudomonads, salicylic acid, β-aminobutyric acid and many other natural or synthetic compounds.	Identifying the most effective ways of stimulating plant resistance to pathogens may provide a more long-term tool for managing Psa.	http://igitur-archive.library.uu.nl/bio/2006-0209-201129/piete_02_priming_interactions.pdf
Bio-control	Protection of tomato seedlings against infection by *Pseudomonas syringae* pv. tomato by using the plant growth-promoting bacterium *Azospirillum brasilense.*	Bashan and de-Bashan, (2002). Applied and Environmental Microbiology, 68(6):2637-2643.	Demonstrates that bio-control strains of *rhizobacteria* can displace bacterial diseases in tomato.	Foliar and root applications of commercial bio-control formulations are being considered for the control of Psa on kiwifruit.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC123946/pdf/1811.pdf
Bio-control	*Pseudomonas* Biocontrol agents of soilborne pathogens: looking back over	Weller, (2007). Phytopathology, 97(2):250-256	Reviews the research progress made on the on the use of *Pseudomonas* spp. as bio-control agents.	Development of effective methods of introducing beneficial strains of *rhizobacteria* will be critical for field application of this	http://ddr.nal.usda.gov/bitstream/10113/9460/1/IND43883057.pdf

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Subject	Title	Reference	Key Points	Implications	Source
	30 years.			technology to stimulate plant immunity against Psa.	
Bio-control	Reduction of infection by *Pseudomonas syringae* pv. tomato using a nonpathogenic, copper-resistant strain combined with a copper bactericide.	Cooksy, (1988). Disease Control and Pest Management, 78(5):601-603.	Found that when a nonpathogenic strain of *Pseudomonas syringae* resistant to high levels of copper was co -inoculated with a copper sensitive pathogen on tomato leaves treated with copper, disease control was greater than that achieved with either the non-pathogen or the copper treatment alone.	Using non-pathogenic bacteria to compete with a pathogen, particularly in combination with a selective treatment such as copper can improve disease control. However, in this case care would need to be taken to avoid the transfer of copper resistance genes from the non-pathogen to the pathogen.	http://www.apsnet.org/publications/phytopathology/backissues/Documents/1988Articles/Phyto78n05_601.PDF
Bio-control	Signaling in plant-microbe Interactions.	Baker et al., (1997). Science, 276: 726-733.	Reviews the signaling interactions that occur between bacterial pathogens and plants.	Knowledge on the signaling interaction bacterial between pathogens and plants will assist in the control of Psa on kiwifruit.	http://ddr.nal.usda.gov/dspace/bitstream/10113/70/1/IND20599306.pdf
Bio-control	Systemic resistance in *Arabidopsis* induced by biocontrol bacteria 1s Independent of salicylic acid accumulation and pathogenesis-	Pieterse *et al.*, (1996). The Plant Cell, 8:1225-1237.	Demonstrates that the systemic acquired resistance response due to root colonizing bio-control *rhizobacteria* differs from the salicylic acid-based systemic acquired resistance that occurs with pathogenic bacteria..	*Rhizobacteria* bio-control approaches may compliment salicylic acid based treatments in the control of Psa on kiwifruit.	http://www.plantcell.org/content/8/8/1225.full.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
	related gene expression.				
Bio-control	Towards biological control of Pistachio dieback	Salowi, (2010), Thesis, Masters in Agricultural Science, University of Adelaide, 111pp.	Presents findings on biological control of the bacterial dieback disease of Pistachio in Australia.	The applications of bacterial antagonists such as Bacillus are being evaluated on Psa in kiwifruit and links are being made with research teams involved in antimicrobial peptides.	http://digital.library.adelaide.edu.au/dspace/bitstream/2440/63478/1/02whole.pdf
Bio-control	Use of plant growth-promoting bacteria for biocontrol of plant diseases: principles, mechanisms of action, and future prospects.	Compant et al., (2005), 71(9):4951-4959.	This review surveys the advances of plant-plant growth promoting bacteria (PGPB) interaction research focusing on the principles and mechanisms of action of PGPB, both free-living and endophytic bacteria, and their use or potential use for the biological control of plant diseases.	Trials are being developed to evaluate the feasibility of plant growth promoting bacteria for the control of Psa on kiwifruit.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1214602/pdf/0035-05.pdf
Control	A biopolymer chitosan and its derivatives as promising antimicrobial agents against plant pathogens and their applications in crop protection.	Badawy and Rabea, (2011). International Journal of Carbohydrate Chemistry, 2011:1-29.	Provides an overview of the antimicrobial effects, mechanisms, and applications of biopolymer chitosan and its derivatives in crop protection.	Biopolymer chitosan is being trialed for Psa control on kiwifruit.	http://downloads.hindawi.com/journals/ijcc/2011/460381.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
Control	A new composition of nanosized silica-silver for control of various plant diseases.	Park *et al*., (2006). The Plant Pathology Journal, 22(3): 295-302.	Evaluates the efficacy of nanosized silica-silver for controlling plant pathogenic microorganisms .	Silver has strong anti-microbial properties. Formulation is critical in relation to cost, persistence and efficacy. Several silver formulations are under investigation for the control of Psa.	http://www.ppj-online.org/folder.php?a=down&id=43453
Control	Active Oxygen species in plant defense against pathogens	Mehdy, (1994). Plant Physiology, 105:467-472.	Describes the reactive oxygen mechanism that plants use in their resistance against plant pathogens.	Treatments to control Psa, including copper and elicitors, induce reactive oxygen species such as hydrogen peroxide in plants in their defense against pathogens.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC159383/pdf/1050467.pdf
Control	Antibacterial activity of some essential oils.	Iacobellis et al., (2004).Management of Plant and Arthropod Pests by BCAs, IOBC/wrps Bulletin, 27(8):223-226.	Evaluates a range of essential oils against a wide range of bacteria including *Pseudomonas syringae*. Demonstrates the efficacy of specific essential oils and reviews likely compounds responsible for efficacy.	The more effective essential oils warrant closer study in relation to Psa, although phytotoxicity could be an issue when applied to leaf tissue.	http://www.unibas.it/utenti/iacobellis/pubblicazioni%20pdf/rivista%20internazionale/Iacobellis%20et%20al.,%202004.pdf
Control	Antimicrobial peptides of multicellular organisms.	Zasloff, (2002). Nature, 415(24): 389-395.	Animals and plants possess potent, broad-spectrum antimicrobial peptides which they use to fend off a wide range of microbes. These compounds appear more difficult for bacteria	Antimicrobial peptides are being isolated and evaluated to control plant bacterial diseases such as fire blight and may have application to Psa.	http://uregina.ca/suhdaey/courses/BIOC%20430/reading/10R29%20AMPs%20Nature.pdf

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Subject	Title	Reference	Key Points	Implications	Source
			to evolve resistance against when compared against antibiotics.		
Control	Antimicrobial peptides.	Rao, (1995), The American Phytopathological Society, 8(1):6-13.	Reviews antimicrobial peptides, including categories and their application.	Contact has been made with researchers involved in the synthesis and application of antimicrobial peptides for the control of bacterial diseases in plants.	http://www.apsnet.org/publications/mpmi/BackIssues/Documents/1995Articles/Microbe08-6.pdf
Control	Apidaecins: antibacterial peptides from honeybees.	Casteels et al., (1989). The EMBO Journal, 8(8):2387-2391.	Found honeybees to be a novel source of antimicrobial peptides that exhibit bactericidal activity.	Contact has been made with researchers involved in the synthesis and application of antimicrobial peptides for the control of bacterial diseases in plants.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC401180/pdf/emboj00132-0258.pdf
Control	Bacterial canker: Mechanisms, pathogen characterization and control.	Kirkpatrick et al., (1999), California Dried Plum Board Research Reports, 32p.	Summarizes five years of research on bacterial canker on prune. Highlights the complex role of plant, pathogen, environment and management on disease incidence in orchards.	Care needs to be taken in interpreting orchard observations of disease incidence as cause and effect due to these complex interactions.	http://ucce.ucdavis.edu/files/repositoryfiles/1999-130.pdf-79078.pdf
Control	Bacterial problems in Belgian pear growing.	Deckers and Schoofs, (2001). The Compact Fruit Tree, 34(4):121-124.	Describes the factors that influence infection of *Pseudomonas syringae* pv. *syringae* in pear orchards and discusses control measures.	The role of plant vigour and the cultural practices used within the production system need closer study in relation to Psa on kiwifruit.	http://www.virtualorchard.net/idfta/cft/2001/october/page121.pdf
Control	Bactericide effect of alkaloids	Muzquiz et al., (1996). Towards	Assesses the bactericidal effect of lupin alkaloids against bacteria	This group of plant extracts warrants closer investigation	http://wwwx.inia.es/webcrf/referencias/docs/ID193.p

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)

Subject	Title	Reference	Key Points	Implications	Source
	present in *Lupinus*.	the 21st Century, Proceedings 8th International Lupin Conference, p540-544.	including *Pseudomonas syringae* pv *tomato*. Found the alkaloid lupinine had bactericidal activity against the four bacteria studied.	in relation to efficacy against Psa on kiwifruit and toxicology issues.	df
Control	Basic aspects of food preservation by hurdle technology.	Leistner, (2000). International Journal of Food Microbiology, 55:181-186.	Reviews hurdle technology as a means of preservation of foods against microbial contamination and deterioration.	The general approach of "hurdle technology" may provide a framework for managing Psa on kiwifruit.	http://envismadrasuniv.org/Physiology/pdf/Basic%20aspects%20of%20food%20preservation.pdf
Control	Chemical and cultural control of bacterial blossom blight of kiwifruit caused by *Pseudomonas syringae* in Korea.	Koh et al., (2001). NZ J. Crop and Horticultural Science, 29:29-34.	Evaluates a range of control options for the control bacterial blossom blight in Hayward kiwifruit, including trunk injections of acetic acid.	The results reported for girdling as a potential control option for bacterial blight may not be as applicable to the virulent strain of Psa.	http://www.tandfonline.com/doi/pdf/10.1080/01140671.2001.9514157
Control	Chemical forms of copper on leaves in relation to the bactericidal activity of cupric hydroxide deposits on plants.	Menkissoglu and Lindow, (1991). The American Phytopathological Society, 81(10):1263-1270.	Determined the amount of soluble but complexed copper and the concentration of free Cu^{2+} ions on the surface of navel orange and bean leaves treated with different amounts of copper hydroxide under field conditions.	The amount of free Cu^{2+} ions and there persistence on the leaf is a key variable in the control of epiphytic bacteria such as Psa.	http://www.apsnet.org/publications/phytopathology/backissues/Documents/1991Articles/Phyto81n10_1263.pdf
Control	Chitosan as a potential natural compound to	Bautista-Banos *et al.* (2006). Crop Protection, 25:	Reviews current knowledge on chitosan, a biodegradable compound derived from	Biopolymer chitosan is being trialed for Psa control on kiwifruit.	http://ddr.nal.usda.gov/bitstream/10113/6846/1/IND43774323.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)

Subject	Title	Reference	Key Points	Implications	Source
	control pre and postharvest diseases of horticultural commodities.	108-118.	crustaceous shells that have been shown to have control on a range of pre and postharvest diseases.		
Control	Citrus blight: attempts to get remission of symptoms by chemotherapy	Lee et al., (1981). Proceedings of the Florida State Horticultural Society, 94:21-25.	Evaluates a range of systemic compounds on citrus blight and describes distribution of these compounds within treated trees.	Severely infected plants may be slow to respond to systemic treatments due to pathogen damage to plant vascular tissues.	http://www.fshs.org/Proceedings/Password%20Protected/1981%20Vol.%2094/21-25%20(LEE).pdf
Control	Copper as a biocidal tool.	Borkov and Gabbay, (2005). Current Medicinal Chemistry, 12:2163-2175	Reviews the biocidal properties of copper, the mechanism by which copper is toxic to microorganisms and the systems by which many organisms can resist copper.	Monitoring Psa for copper resistance will be critical to ensure the effectiveness of copper for the control of Psa.	http://204.9.77.212/clients/cupron.us/Articles/Current_Medicinal_Chemistry.pdf
Control	Copper fungicides in the control of Olive diseases.	Roca et al., (2007), FAO Olive Network, 26:48-50.	Reviews the efficacy of copper formulations for the control of Olive diseases, including *Pseudomonas savastanoi* pv. *savastanoi.*	The persistence of copper activity on leaves was less dependent on the kind of copper salt or rate of application, but were related to commercial formulation, indicating adjuvants were an important part of the efficacy.	http://olivediseases.com/articles/olive/vera_spain_cooper.pdf
Control	Copper, an ancient remedy returning to fight microbial, fungal and viral	Borkow and Gabbay, (2009). Current Chemical Biology, 3: 272-	Reviews the biocidal mechanisms of copper and the current usages of copper and copper compounds as antibacterial, antifungal and	The localized production of free radicals such as hydrogen peroxide around or within cells through a redox reaction	http://www.benthamscience.com/ccb/samples/ccb3-3/0003CCB.pdf

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Subject	Title	Reference	Key Points	Implications	Source
	infections.	278.	antiviral agents, with emphasis on novel health related applications.	is a key mode of action of copper toxicity to bacteria.	
Control	Differential wound responses in Southern California Avocado (*Persea americana* cv., Lauraceae) plantations comparing three distinct injection methodologies 2-years following treatment.	Doccola et al., (?), Arborject Internal Report, 17p.	Compares different trunk injection methods, including tree wound responses. Both trunk injection method and formulation influence the response of the tree to systemic treatment.	Optimisation of systemic treatments for the control of Psa on kiwifruit will be critical to ensure long-term effectiveness of the treatments.	http://www.soilzone.com/Library/Crops/Avocado/Disease%20management/Differential%20Wound%20Response%20Paper%20-%20Southern%20Avocado.pdf
Control	Draft Report: Pest risk analysis report for *Pseudomonas syringae* pv. *actinidiae* associated with Actinidia (kiwifruit) propagative material.	Biosecurity Australia (2011) Department of Agriculture, Fisheries and Forestry, Canberra. 41p.	Summarizes the current border controls relating to Psa and the presence of low virulence strains in Australia.	Provides guidance on the plant material movement into Australia.	http://www.daff.gov.au/__data/assets/pdf_file/0007/1937392/Draft_PSA_PRA.pdf
Control	Evaluation of a trunk injection technique to control grapevine	Darrieutort and Lecomte, (2007). Phytopathology Mediterranean,	Presents findings from five years of trunk injection trials to control Eutypa dieback in grapes. Results suggest that trunk injection will	Costs of trunk injection can be high and methods to improve efficiency and the identification of vines at risk	http://fupress.net/index.php/pm/article/viewFile/1853/1788

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
	wood diseases.	46: 50-57.	form part of a wider disease management program.	for preventative control will be important.	
Control	Field evaluation of treatments for the control of the bacterial apical necrosis of mango (*Mangifera indica*) caused by *Pseudomonas syringae* pv. *syringae.*	Cazorla et al., (2006). European Journal of Plant Pathology, 116:279-288.	Compares a wide range of chemical options for the control of *Pseudomonas syringae* pv *syringae* infection in mango. Elicitor compounds that stimulate plant immunity showed promise in control of this bacterial disease	A range of elicitor compounds are under evaluation for Psa on kiwifruit.	http://digital.csic.es/bitstream/10261/4587/1/Field%20evaluation%20of%20treatments.pdf
Control	Growth inhibition of *Clavibacter michiganensis* subsp. *michiganensis* and *Pseudomonas syringae* pv. tomato by olive mill wastewaters and citric acid.	Ozdemir, (2009), Journal of Plant Pathology, 91(1):221-224.	Reports on the effects of citric acid and olive mill wastewaters on the growth of seed-borne bacterial pathogens. Results of this study suggest that citric acid at 0.1 mol l-1 concentration can prove useful for the elimination of both pathogens from tomato seeds.	Citric acid is currently used on kiwifruit as a pre-harvest spray for the removal of staining from the fruit surface. The effect of citric acid on epiphytic populations of Psa on kiwifruit at current rates should be assessed.	http://www.sipav.org/main/jpp/volumes/0109/010928.pdf
Control	Influence of ring nematode infestation and calcium, nitrogen, and indoleacetic acid applications	Cao et al., (2006). Phytopathology, 96(6): 608-615.	Found that ring nematode infection of roots increased the susceptibility of peach trees to bacterial canker. Susceptibility was also found to be negatively correlated to plant tissue nitrogen content and positively	The nitrogen status of plants and their susceptibility to bacterial diseases such as Psa may be confounded by other factors such as nematode infection.	http://apsjournals.apsnet.org/doi/pdf/10.1094/PHYTO-96-0608

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Subject	Title	Reference	Key Points	Implications	Source
	on peach susceptibility to *Pseudomonas syringae* pv. *syringae*.		correlated to calcium content.		
Control	Inhibition of fungal and bacterial plant pathogens in vitro and in planta with ultrashort cationic lipopeptides.	Makovitz *et al.,* (2007). Applied and Environmental Microbiology, 73(20):6629-6636.	Results suggest that ultrashort lipopeptides have antimicrobial properties that are economically feasible for use in plant protection.	Contact with research teams working on these types of materials are being made for evaluation on Psa in kiwifruit.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2075073/pdf/1334-07.pdf
Control	Inhibition of Plant-Pathogenic Bacteria by short synthetic cecropin A-melittin hybrid peptides.	Ferre *et al.*, (2006). Applied and Environmental Microbiology, 72(5):3302-3308.	Describes the synthesis and efficacy of novel antimicrobial peptides against plant pathogens such as *Pseudomonas syringae*.	Links have been established with teams working on synthetic antimicrobial peptides to assess application to Psa on kiwifruit.	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1472336/pdf/0115-06.pdf
Control	Injector-size and the time of application affects uptake of tree trunk-injected solutions.	Sanchez Zamora and Fernandez Escobar, (2000). Scientia Horticulturae, 84: 163-177.	Evaluates three different trunk injection systems on 23 different tree species, at different times of the year.	Optimisation of trunk injection will need to consider injector diameter in relation to wounding, healing time, uptake and leaf phytotoxicity.	http://www.iraqi-datepalms.net/uploadedfiles/injector%20size%20and%20time%20application.pdf
Control	Integrated management of bacterial spot on	Momol et al., (2002). University of Florida IFAS	Describes the integrated management program used for the control of bacterial spot	Control of Psa on kiwifruit is likely to be based on an integrated management	http://edis.ifas.ufl.edu/pdffiles/PP/PP11000.pdf

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Subject	Title	Reference	Key Points	Implications	Source
	Tomato in Florida.	Fact Sheet PP192, 5pp.	caused by *Pseudomonas syringae* in Tomato.	approach rather than a single curative.	
Control	Management of fire blight: A case study in microbial ecology.	Johnson and Stockwell, (1998). Annual Reviews of Phytopathology, 23:227-248.	Reviews the management of the apple bacterial disease, fire blight.	Long term of Psa on kiwifruit is likely to be based on integrated management involving both chemical and biological control alongside prediction systems and a knowledge of the ecology of the pathogen.	http://www.unine.ch/nccr/pages/education/gs/courses2005_2006/9-BD.pdf
Control	Network properties of robust immunity in plants.	Tsuda *et al*., (2009). PLoS Genetics, 5(12):1-16.	Describes the plant immunity response against plant pathogens.	A combination of kiwifruit genomics and Psa genomics information should provide better insights into managing plant immunity for the control of Psa in kiwifruit.	http://www.plosgenetics.org/article/fetchObjectAttachment.action;jsessionid=C3B89D1AF076658DD721F471FD8CFE13.ambra02?uri=info%3Adoi%2F10.1371%2Fjournal.pgen.1000772&representation=PDF
Control	Occurrence of bacterial canker of kiwifruit in Japan: description of symptoms, isolation of the pathogen and screening of bactericides.	Serizawa et al., (1989) Annals of the Phytopathology Society of Japan, 55:427-436.	Describes bacterial canker disease of kiwifruit in Japan, including the climatic conditions such as low temperatures, strong winds and heavy rainfall that appear to promote the disease. Applications of streptomycin, kasugamycin or inorganic copper formulations reduced disease development on leaves.	The pathogenicity of the disease on other *Actinidia* species and cultivars is currently under investigation to identify resistance.	http://ci.nii.ac.jp/lognavi?name=nels&lang=en&type=pdf&id=ART0003040278

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Control	Plant immunity: it's the hormones talking, but what do they say?	Verhage et al., (2010). Plant Physiology, 154:536-540.	Provides an overview of the plant Immunity system, and describes how pathogens such as Pseudomonas syringae interact with this system.	Management of the plant immunity system could provide a critical tool in the management of Psa on kiwifruit.	http://igitur-archive.library.uu.nl/bio/2010-1008-200353/PlPh-Verhage-2010.pdf
Control	Plant Pathogenic Bacteria	Editors: M. Lemattre, S. Freigoun, K. Rudolp & J.G. Swings, (1992). Proceeding of the 8th International Conference on Plant Pathogenic Bacteria, 1029p.	Provides a wide range of papers on the epidemiology, genetics and control of plant pathogenic bacteria, including *Pseudomonas syringae*.	A check list for the ideal bactericide is described. The bactericide should be cheap, have a wide host range, some systemic activity, reaches infection sites, does not induce resistance, not used for medical or veterinary use and complies with national and international regulations.	http://horizon.documentation.ird.fr/exl-doc/pleins_textes/divers09-11/40441.pdf
Control	Potential of plant extracts for controlling citrus canker of Lime.	Leksomboon et al., (2001). Kasetsart Journal of Natural Sciences, 35: 392-396.	Demonstrates the potential of aqueous extracts of Tamarind fruit pulp to reduce the incidence of lime leaf infection by citrus canker.	Plant extracts should be explored as potential control options for Psa. They could play a role in an integrated management programme designed to reduce the risk of disease resistance to copper or antibiotics.	http://www.rdi.ku.ac.th/KU_Journal/Sciences/doc/Ku35(4).pdf#page=34
Control	Pseudomonas Syringae Pathovars and Related Pathogens				http://www.bashanfoundation.org/gmaweb/pdfs/alternative.pdf
Control	Reaction of avocado wood on injections into the trunk				http://www.avocadosource.com/journals/saaga/saaga_1999/saaga_1999_pg_039-047.pdf

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Subject	Title	Reference	Key Points	Implications	Source
Control	Streptomycin resistance management strategy for plant pathogenic bacteria.	Vanneste, (2005). Pesticide Resistance: Prevention and Management Strategies 2005, NZ Plant Protection Society, p41-45.	Provides management guidelines for the use of streptomycin on pip fruit, stone fruit and tomato.	Similar guidelines will need to be established for the management of Psa in kiwifruit to avoid resistance to streptomycin.	http://www.nzpps.org/resistance/pdfs/streptomycin.pdf
Control	Sulphur as an alternative to copper for the control of bacterial blast on nectarine fruit	McLaren et al., (2005). NZ Plant Protection 58:96-100.	Found foliar applications of sulphur to the Nectarine cultivar "Fantasia" had less bacterial damage due to *Pseudomonas syringae* than copper applications.	Although promising, these results appear to be very specific to a single stone fruit cultivar and the results appear less transferrable to other stone fruit cultivars.	http://www.nzpps.org/journal/58/nzpp_580960.pdf
Control	The effect of bactericides, tank mixing time and spray schedule on bacterial leaf spot of tomato	Jones and Jones, (1985). Proceedings of the Florida State Horticultural Society, 98:244-247.	Compares various copper bactericide formulations for efficacy in the control of bacterial spot on tomato.	Similar trials on the efficacy of various copper formulations are being evaluated for the control of Psa on kiwifruit.	http://www.fshs.org/Proceedings/Password%20Protected/1985%20Vol.%2098/244-247%20(JONES).pdf
Control	Tree injection: perspective macro-injection/micro-injection	Costonis, (1981). Journal of Arboriculture, 7(10):275-277.	Discuses the advantages and disadvantages of injection technologies. Demonstrates that wound damage can be reduced by diameter and length of the injection sites in the trunk.	Trials are currently underway to investigate trunk injection responses on kiwifruit trunk tissues.	http://www.protectyouroaks.com/Micro-Macro.pdf
Control	Use of tetracycline	McCoy (1982),	Describes the systemic treatment	The importance of	http://www.apsnet.org/pu

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Subject	Title	Reference	Key Points	Implications	Source
	antibiotics	Plant Diseases, July 1982: 539-542.	of the "yellows disease" in palm trees with antibiotics.	management guidelines for the use of these materials is emphasized and will be incorporated into any use of these materials on Psa.	blications/PlantDisease/BackIssues/Documents/1982Articles/PlantDisease66n07_539.PDF
Control	Uses of antimicrobials in plant agriculture.	Vidaver, (2002). Clinical Infectious Diseases, 34 (Suppl 3): S107-S110.	Describes the current status of antimicrobial control in plants and discusses alternatives to antimicrobials.	Resistance to antibiotics has been found to be linked to copper resistance. There is a need to broaden antimicrobial control strategies to limit the build-up of antibiotic and copper resistant strains.	http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1065&context=plantpathpapers
Epidemiology	Bacteria in the leaf ecosystem with emphasis on *Pseudomonas syringae* — a pathogen, ice nucleus, and epiphyte.	Hirano and Upper, (2000), Microbiology and Molecular Reviews. 64(3): 624-653.	*Pseudomonas syringae* on leaves is used as a case study to illustrate the ecology of bacteria on leaf surfaces. Demonstrates that competition for resources between bacteria rather than antimicrobial antagonism is the prevalent competitive strategy used to colonize leaves. Suggests that understanding the processes that lead to development of large population sizes may be more critical than understanding the mechanism by which bacteria causes leaf lesions.	The application of competitive bacterial on leaves in the field can reduce the population size of pathogenic bacteria. Bacterial populations can increase when addition nutrients are applied to leaves. It would be prudent to ensure that existing foliar treatments do not contain nutrients that stimulate pathogenic strains of bacteria.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC99007/pdf/mr000624.pdf
Epidemiology	Bacterial blight in California	Conn et al., (1993). Plant	Found *Pseudomonas viridiflava* caused significantly more flower	Identification of a bacterial pathogen can be confounded	http://www.apsnet.org/publications/PlantDisease/BackIssue

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Subject	Title	Reference	Key Points	Implications	Source
		diseases, 77(3):228-230.	bud rot and blossom blight, but not leaf spot, than *P. syringae*. *P. fluorescens* was not pathogenic.	by the presence of similar but non-pathogenic bacteria that can be isolated from infected tissues.	s/Documents/1993Articles/PlantDisease77n03_228.pdf
Epidemiology	Bacterial pathogens in plants: Life up against the wall.	Alfano and Collmer, (1996). The Plant Cell, 8: 1683-1698.	Describes the lifecycle of bacterial pathogens such as pseudomonas that colonize the apoplast between cell walls.	Effect and enduring control of Psa in kiwifruit will be dependent on understanding haow the bacteria systemically colonizes the kiwifruit tissues.	http://www.plantcell.org/content/8/10/1683.full.pdf
Epidemiology	Current status of bacterial canker spread on kiwifruit in Italy	Balestra et al., (2009). Australian Plant Disease Notes, 4:34-36.	Reports on a survey of Italian kiwifruit orchards during 2007-08. Found *Pseudomonas syringae* pv. *actinidiae* was repeatedly isolated from infected plants.	A robust monitoring system to determine infected orchards so that they can be protected and isolated from disease-free areas is critical to the management of the disease.	http://www.springerlink.com/content/wv0xr71383872373/fulltext.pdf
Epidemiology	Current status of bacterial canker spread on kiwifruit in Italy.	Balestra *et al.*, (2009), Australian Plant Disease Notes, 4:34-36.	Presents the findings of a survey undertaken in Italy during 2007-08 detecting damage caused by bacterial canker.	Similar symptoms reported in this study have occurred in New Zealand over 2010-11.	ftp://124.42.15.59/ck/2011-04/165/073/402/531/Current%20status%20of%20bacterial%20canker%20spread%20on%20kiwifruit%20in%20Italy.pdf
Epidemiology	Emerging infectious diseases of plants: pathogen pollution, climate change and	Anderson et al., (2004). Trends in Ecology and Evolution	Reviews emerging infectious diseases of plants and provides recommendations for improving strategies for the surveillance and control of these pathogens.	Weather and the spread of infected plant material are key drivers in the emergence of bacterial pathogens.	http://bio.research.ucsc.edu/people/kilpatrick/READINGS%20DE10/Readings/Anderson%20TREE%202004.pdf

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Subject	Title	Reference	Key Points	Implications	Source
	agrotechnology drivers.				
Epidemiology	Epidemiology and predisposing factors of some major bacterial diseases of stone and nut fruit trees species	Scortichini, (2010). Journal of Plant Pathology, 92(1, Suppliment): S1.73-S1.78.	Reviews the main epidemiological aspects and predisposing factors of some important bacterial diseases of stone and nut trees.	Cultivar susceptibility and the presence of entry points such as pruning wounds and hail damage are important factors that influence bacterial infection.	http://www.sipav.org/main/jpp/volumes/0410/041009.pdf
Epidemiology	First report of bacterial canker of *Actinidia deliciosa* caused by *Pseudomonas syringae* pv. *actinidiae* in Portugal.	Balestra et al., (2010). New Disease Reports 22: 10.	*Pseudomonas syringae* pv. actinidiae was isolated from two year old *Actinidia deliciosa* cv. Summer plants growing in Portugal.	Psa can infect some *Actinidia deliciosa* cultivars as well as *Actinidia chinensis*.	http://www.ndrs.org.uk/pdfs/022/NDR_022010.pdf
Epidemiology	Identification of an emergent and atypical *Pseudomonas viridiflava* lineage causing bacteriosis in plants of agronomic importance in a Spanish region.	Gonzalez et al., (2003). 69(5): 2936-2941.	Identifies emerging *Pseudomonas* species as pathogens of kiwifruit, lettuce and tomato in Spain.	The emergence of a more pathogenic form of *Pseudomonas viridiflava* on kiwifruit flowers in Spain highlights the risk that these bacteria pose to kiwifruit.	http://aem.asm.org/cgi/reprint/69/5/2936.pdf

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Subject	Title	Reference	Key Points	Implications	Source
Epidemiology	Impact of host plant xylem fluid on *Xylella fastidiosa* multiplication, aggregation and attachment.	Toscano *et al*., (2004). Pierce's Disease Research Symposium, p.60-63.	Describes the response of the Pierce Disease bacterium to xylem fluid extracted from grape and a symptomless host, grapefruit.	Differences in xylem fluid composition should be considered in relation to cultivar tolerance in kiwifruit in response to Psa.	http://files.piercesdisease.org/proceedings/2004/2004_71-74.pdf
Epidemiology	Infection and plant defense responses during plant-bacterial interaction.	Buonaurio, (2008), Plant-Microbe Interactions, p. 169-197, Ed. E. Ait Barka and C. Clement	Describes how plant pathogenic bacteria suppress plant defense systems to access plant nutrients.	By understanding how bacteria such as Psa can suppress plant defense in kiwifruit plants and how the multilayered system of active and defensive mechanisms operate to protect the plant could open up new disease control techniques.	http://www.agr.unipg.it/dapp/Buonaurio/Materiale%20didattico%202010-11/Biblio%20BFA/A3-Batteri.pdf
Epidemiology	Mechanisms of Pierce's disease transmission in grapevines: the xylem pathways and movement of *Xylella fastidiosa*. comparison of the xylem structure of susceptible/ tolerant grapevines and alternate plant hosts.	Rost et al., (2004). Proceedings of Pierce's Disease Research Symposium, p.351-357.	Describes xylem differences between grape cultivars tolerant and susceptible to the bacterial pathogen Pierce's disease.	Xylem differences may affect the susceptibility of kiwifruit cultivars to Psa.	http://files.piercesdisease.org/proceedings/2007/2007_284-288.pdf

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Subject	Title	Reference	Key Points	Implications	Source
Epidemiology	Microbiology of the phyllosphere.	Lindow and Brandl, (2003), Applied and Environmental Microbiology. 69(4): 1875-1883.	Describes the microbial communities on a leaf surface and discusses the leaf surface as a microbial habitat. Shows how microbial modification can occur to make the leaf surface more suitable habitat	Leaf surfaces are a challenging microbial habitat. Some strategies used by bacterial to make a leaf more habitable are reliant on the production of compounds that are similar to agrochemicals applied by growers.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC154815/pdf/1728.pdf
Epidemiology	Occurrence of *Pseudomonas syringae* pv. *actinidiae* in Jin Tao kiwi plants in Italy.	Balestra *et al.*, (2009). Phytopathology Mediterranea. 48: 299-301.	Identified *Pseudomonas syringae* pv. *actinidiae* as the cause of bacterial canker in Jin Tao.	Susceptibility to Psa is not restricted to Hort16a as infection and vine death can occur in other *Actinidia chinensis* cultivars such as Jin Tao.	http://www.fupress.net/index.php/pm/article/viewFile/2821/2846
Epidemiology	Outbreak of bacterial canker on Hort16A (Actinidia chinensis Planchon) caused by *Pseudomonas syringae* pv. *actinidiae* in Korea.	Koh et al., (2010). NZ J Crop and Horticultural Science, 38(4): 275-282.	Bacterial canker was first observed on Hort16A in the spring 3006 on Jeju Province, Korea. The symptoms closely resemble those that occur on Hayward kiwifruit. Contaminated pruning shears and climatic conditions appear to be significant factors in the spread of the disease.	Learning's from the disease and progress on control options in Korea are being are being used by research teams in New Zealand and Europe in the management of Psa.	http://www.tandfonline.com/doi/pdf/10.1080/01140671.2010.512624
Epidemiology	*Pseudomonas* canker of Kiwifruit.	Opgenorth *et al.* (1983). American Phytopathological	A bacterial canker disease that contained bacteria isolates typical of Pseudomonas syringae	Kiwifruit bacterial canker diseases can occur under a diversity of climatic	http://www.apsnet.org/publications/PlantDisease/BackIssues/Documents/1983Ar

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Subject	Title	Reference	Key Points	Implications	Source
		Society	was reported for kiwifruit growing in California.	conditions, including those found in California.	ticles/PlantDisease67n11_1283.pdf
Epidemiology	*Pseudomonas* content of cherry trees.	Cameron, (1970). Phytopathology, 60:1343-1346.	Describes the distribution of pathogenic Pseudomonas spp. within diseased and healthy-appearing sweet cherry trees.	Endophytic populations of bacteria within infected plants can reduce the ability of external protectant sprays to control bacterial diseases.	http://www.apsnet.org/publications/phytopathology/backissues/Documents/1970Articles/Phyto60n09_1343.pdf
Epidemiology	*Pseudomonas syringae* phytotoxins: Mode of action, regulation, and biosynthesis by peptide and polyketide synthetases.	Bender et al., (1999). Microbiology and Molecular Biology Reviews, 63(2):266-292.	Summarizes current understanding of the mechanism of action, biosynthesis, and regulation of four distinct classes of phytotoxins produced by *Pseudomonas syringae.*	Phytotoxins such as the syringomycins are produced by Psa as part of its pathogenicity against kiwifruit.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC98966/pdf/mr000266.pdf
Epidemiology	Quorum sensing in bacteria.	Miller and Bassler, (2001). Annual Reviews in Microbiology, 55:165-99.	Reviews the quorum sensing mechanism used by bacteria to regulate gene expression in response to fluctuations in gene expression.	It is possible that the virulence in Psa is induced through quorum sensing mechanism when bacterial populations reach a certain population threshold.	http://www.lib.ku.ac.th/html2/dmdocuments/QUORUM%20SENSING%20IN%20BACTERIA.pdf
Epidemiology	Raindrop momentum triggers growth of leaf-associated populations of *Pseudomonas*	Hirano et al., (1996). Applied and Environmental Microbiology, 62(7):2560-2566.	Reports on the results of observational and microclimate modification experiments to determine the role of the physical environment on the population dynamics of *Pseudomonas*	Rainfall momentum plays a role in the growth triggering effect of intense rain on *Pseudomonas syringae* populations.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1388900/pdf/hw2560.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
	syringae on field-grown snap bean plants.		*syringae* in the phylloplane.		
Epidemiology	Seasonal fuctuations in kiwifruit phyllosphere and ice nucleation activity of *Pseudomonas viridiflava.*	Balestra and Varvaro, (1998). J. Plant Pathology. 80(1), 151-156.	Describes the epidemiology of *Pseudomonas viridiflava*, the causal agent of bacterial blight, on kiwifruit.	Provides insights into the lifecycle of a bacterial pathogen related to Psa on kiwifruit and highlights the interaction of climate and plant phenology on population dynamics.	http://www.sipav.org/main/jpp/volumes/0298/029806.pdf
Epidemiology	Surprising niche for the plant pathogen *Pseudomonas syringae.*	Morris et al., (2007). Infection, Genetics and Evolution, 7:84-92.	Investigates the niches that plant pathogenic *Pseudomonas syringae* occupy outside agricultural environments. Findings suggest that the wide spread dissemination of *P. syringae* occurs via aerosols and precipitation.	More knowledge is needed on the host environment for Psa outside the kiwifruit orchard environment.	http://sansan.phy.ncu.edu.tw/~hclee/SB_course/0709/C3_Surprising_niche_for_the_plant_pathogen_Pseudomonas_syringae.pdf
Epidemiology	Survey on the occurrence of abiotic diseases on Kiwifruit in Korea	Koh *et al*., (2007), Plant Pathology Journal, 23(4):308-313.	Findings from a survey of abiotic diseases on kiwifruit from sixty-two orchards in Korea are presented.	Frost damage appears to be associated with the disease incidence of *Pseudomonas syringae* on kiwifruit in Korea.	http://www.ppj-online.org/folder.php?a=down&id=53513
Epidemiology	Survival, growth, and localization of epiphytic fitness mutants of *Pseudomonas*	Beattie and Lindow, (1994). 60(10):3790-3798.	Uses epiphytic mutants of *Pseudomonas syringae* pv. *syringae* to understand survival and growth on leaf surfaces.	The ability to locate, multiply in, and/or survive in protected sites on the leaf surface appears important for successful colonization of the	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC201888/pdf/aem00027-0320.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)

Subject	Title	Reference	Key Points	Implications	Source
	syringae on leaves.			leaf.	
Epidemiology	The structure of xylem vessels in grapevine (vitaceae) and a possible passive mechanism for the systemic spread of bacterial disease.	Thorne *et al.*, (2006). American Journal of Botany, 93(4):497-504.	Investigates the structure of xylem vessels and the movement of xylem-living bacteria within these vessels. Bacteria were able to move readily from the stem to leaves through these vessels.	Psa appear to move from leaves down through the stem and further work is needed to understand this mechanism in kiwifruit.	http://www.amjbot.org/content/93/4/497.full.pdf+html
Epidemiology	*Trichoderma* species — opportunistic, avirulent plant symbionts.	Harman et al., (2004). Nature Reviews Microbiology: 2:43-56.	Reviews recent knowledge on Trichoderma spp., including their ability to induce localized and systemic resistance responses in plants that can protect against a broad range of plant pathogens.	Root inoculation with *Trichoderma* spp. have been shown to provide protection against foliar *Pseudomonas syringae* diseases in other crops and should be investigated in relation to Psa.	http://ddr.nal.usda.gov/bitstream/10113/25508/1/IND44168159.pdf
Genetics	Comparative analysis of *Pseudomonas syringae* pv. *actinidiae* and pv. *phaseolicola* based on phaseolotoxin-resistant ornithine carbamoyltransferase gene (argK)	Sawada, (1997). Applied and Environmental Microbiology, 63(1): 282-288.	Compares and contrasts phylogenetic development in *Pseudomonas syringae* pv. *actinidiae* and pv. *phaseeolicola*.	Current work on the Psa genome will provide more knowledge on the origin and evolution of this pathogen.	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC168320/pdf/630282.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
	and 16s-23s rRNA intergenic spacer sequences.				
Genetics	Genetic basis of copper resistance in New Zealand strains of *Pseudomonas syringae.*	Vanneste and Voyle, (2003). NZ Plant Protection 56:109-112.	Strains of *Pseudomonas syringae* able to grow on a minimal media containing 500mg/litre of copper sulphate were selected from a collection of streptomycin-resistant strains.	Resistance to both copper and streptomycin can occur in the same strain of *Pseudomonas syringae*.	http://www.nzpps.org/journal/56/nzpp_561090.pdf
Genetics	Genetic diversity, presence of the syrB gene, host preference and virulence of *Pseudomonas syringae* pv. *syringae* strains from woody and herbaceous host plants.	Scortichini *et al.,* (2003). Plant Pathology, 52: 277-286.	Describes the genetic relatedness for a range of Pseudomonas syringae pathovars, including Psa.	Isolates obtained from kiwifruit exhibited similar but distinctive patterns according to the geographic region, California and Italy, where the isolates were collected. This is consistent with other research that shows the origin of particular Psa strains can be linked to specific geographic origins.	http://onlinelibrary.wiley.com/doi/10.1046/j.1365-3059.2003.00860.x/pdf
Genetics	Genetic relatedness among Pseudomonas avellanae, *P. syringae* pv. *theae* and P.s. pv. *actinidiae*, and their	Scortichini *et al.* (2002). European Journal of Plant Pathology, 108: 269-278.	Strains of Psa could be group on their basis of geographic origin. Pathogenicity tests clearly indicated that each of the Psuedomonas groups is specifically pathogenic only on the host plant species from which it was originally isolated.	Psa could live as a symptomless non-pathogenic bacteria on other plant host species.	http://www.atlasplantpathogenicbacteria.it/Genomospecies%208%20EJPP.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)

Subject	Title	Reference	Key Points	Implications	Source
	identification.				
Genetics	Genomic and phenotypic characterization of the bacterium causing blight of kiwifruit in New Zealand.	Young et al., (1997). Plant Pathology, 46:857-864.	Found that the bacterium responsible for causing kiwifruit bacterial blight in New Zealand that had previously been described as *Pseudomonas viridifolia* was more closely related to *Pseudomonas savastanoi*.	The bacterial flower blight that occurs in New Zealand kiwifruit is distinctly different from the Psa strains that have been found in New Zealand.	http://onlinelibrary.wiley.com/doi/10.1046/j.1365-3059.1997.d01-72.x/pdf
Genetics	Molecular and phenotypic features of *Pseudomonas syringae* pv. *actinidiae* isolated during recent epidemics of bacterial canker on yellow kiwifruit (*Actinidia chinensis*) in central Italy.	Ferrante and Scortichini, (2010). Plant Pathology, 58(5): 954 -962.	Demonstrates that the Psa strains obtained in Italy during 2008-09 have a similar PCR fingerprint profile to each other but they differed from strains previously isolated in Italy and Japan. The recent Psa strains isolated in Italy all had the hopA1 effector protein.	The *hopA1* effector protein has been associated with plant defense suppression in *P. syringae* pathovars in other crops. The *hopA1* effector has been previously shown to suppress Jasmonic Acid and ethylene mediated plant defense/stress signaling systems.	http://www.atlasplantpathogenicbacteria.it/_/Ferrante-Scortichini.pdf
Genetics	Molecular bases of high-level streptomycin resistance in *Pseudomonas marginalis* and *Pseudomonas*	Han *et al*., (2003). The Journal of Microbiology, 41(1) 16-21.	Describes the genetic basis for streptomycin resistance in Psa strains collected in Japan and Korea.	Psa strains collected in kiwifruit orchard samples should be monitored routinely for resistance to streptomycin and copper to ensure any plant protection program is optimized for	http://www.msk.or.kr/jsp/downloadPDF1.jsp?fileName=411-0310.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
	syringae pv. *actinidiae.*			current pathogenic strains.	
Genetics	Occurrence of the strA-strB streptomycin resistance genes in *Pseudomonas* species isolated from kiwifruit plants.	Han *et al.*, (2004). The Journal of Microbiology, 42(4) 365-368.	Provides updated details on the genetic basis for streptomycin resistance in Psa strains collected in Japan and Korea.	Genetic knowledge on streptomycin resistance in Psa can be used to monitor the emergence of resistance in orchard samples of Psa.	http://www.msk.or.kr/jsp/downloadPDF1.jsp?paperSeq=2096&fileName=p.365-3680.pdf
Genetics	Quorum sensing: Cell-to-cell communication in bacteria	Waters and Bassler, (2005). Annual Reviews in Cell Development and Biology, 21:319-346.	Reviews the architectures of bacterial chemical communication networks, including how within and between species communication is accomplished.	Through recent insights in quorum sensing research teams are developing compounds as well as approaches to disrupt quorum sensing in bacterial and control infections.	http://andrew-michaelson.com/Genetics/AdditionalPaperstoRead/Regulation_Reading/Dec20/1.pdf
Genetics	Roadmap to new virulence determinants in *Pseudomonas syringae*: Insights from comparative genomics and genome organization.	Lindeberg et al., (2008). Molecular Plant-Microbe Interactions, 21(6):685-700.	Reviews the genetic basis of virulence in *Pseudomonas syringae* strains.	The Psa genome is currently being mapped and will be published. This will provide more definitive information on the genetic basis virulence in Psa.	http://ddr.nal.usda.gov/bitstream/10113/20139/1/IND44086219.pdf]
Genetics	The application of polymerase chain	Vanneste et al., (2009). NZ Plant	Describes the Polymerase Chain Reaction (PCR) protocols used to	Although Psa was not isolated from the Waikato River or	http://www.nzpps.org/journal/62/nzpp_622560.pdf

Publically available peer reviewed scientific publications of relevance for personal research on *Pseudomonas syringae* pv. *actinidea* (Psa)					
Subject	Title	Reference	Key Points	Implications	Source
	reaction for characterising strains of *pseudomonas syringae* isolated from New Zealand rivers.	Protection 62: 256-261.	characterize *Pseudomonas syringae* strains. Demonstrates that *P. syringae* strains can be isolated from free flowing waterways in NZ.	Whakapapnui stream it cannot be ruled out that pathogenic bacterium such as Psa are present or transported in NZ waterways.	