

## PHC2018\_10 Appendix 1 - Bibliography

Source	Plant health	Horticulture	Agriculture	Tree health	Environment	Pest and/or disease (if specified in abstract)	Country	Notes
ADAS. (2002) <i>The Awareness, Use and Promotion of Integrated Crop &amp; Pest Management Amongst Farmers and Growers</i> Survey on Behalf of DEFRA and the CPA.		x	x			General	UK	Presents findings from a survey commissioned to identify the most important sources of information used by farmers and growers on pest, disease and weed control technology, and to determine the most cost-effective means of promoting IPM/ICM principles. Consultants and farming press were considered the most influential sources, emphasising the value placed on personal contacts. Demonstration farms were ranked low, possibly reflecting limited demonstration facilities.
Aldosari F, Mubshar M and Baig MB. (2018) ASSESSMENT OF FARMERS KNOWLEDGE ON PESTICIDES AND TRAININGS ON PESTICIDE WASTE MANAGEMENT IN CENTRAL PUNJAB - PAKISTAN. <i>Journal of Experimental Biology and Agricultural Sciences</i> : 168-175.			x					Reveals a communication gap between farmers and agencies/advisors on pesticide use, particularly how to ensure that pesticide applications match the burden of pest infestation. Education and training sessions were recommended.
Alexander, J., Lee, C.A., 2010. Lessons Learned from a Decade of Sudden Oak Death in California: Evaluating Local Management. <i>Environmental Management</i> 46, 315-326.				x		Sudden Oak Death ( <i>Phytophthora Ramorum</i> )	USA	Five case studies are presented to explore how local-level management has attempted to control Sudden Oak Death. From these case studies, the authors glean three lessons: connections count, scale matters, and building capacity is crucial. These lessons may help management, research, and education planning for future pest and disease outbreaks.
Alexander, J.M., Frankel, S.J., Hapner, N., Phillips, J.L., Dupuis, V., 2017. Working across cultures to protect Native American natural and cultural resources from invasive species in California. <i>Journal of Forestry</i> 115, 473-479.				x			USA	The authors surveyed Native American and nontribal environmental leaders in California to gauge differences in importance, impacts, and control strategies for invasive species and management of forest health. They found differences between Native American and nontribal responses in the pests of highest concern and in the understanding and perceived application of integrated pest management (IPM) techniques.
Bailey AS, Bertaglia M, Fraser IM, et al. (2009) Integrated pest management portfolios in UK arable farming: results of a farmer survey. <i>Pest Management Science</i> 65: 1030-1039.	x	x					UK	Presents the results of a survey of UK cereal producers, including questions about sources of PM advice and information and the important characteristics of PM technologies. The results help to identify the type of IPM portfolios considered to be adoptable by farmers. Identifies main limitations to uptake of biocontrols, from practitioner and researcher perspectives. Limitations to uptake include: risk averse and unwieldy regulatory processes; increasingly bureaucratic barriers to access to biocontrol agents; insufficient engagement and communication with the public, stakeholders, growers and politicians of the economic benefits of biocontrol; and fragmentation of biocontrol sub-disciplines. The authors recommend improved communication of economic, environmental and social successes and benefits of biological control for insect pests, weeds and plant diseases, targeting political, regulatory, grower/land manager and other stakeholder interests.
Barratt BIP, Moran VC, Bigler F, et al. (2018) The status of biological control and recommendations for improving uptake for the future. <i>Biocontrol</i> 63: 155-167.			x					Limited relevance. Focuses on recommendations for change rather than providing evidence for knowledge sources or flows.
Barzman M, Bärberri P, Birch ANE, et al. (2015) Eight principles of integrated pest management. <i>Agronomy for Sustainable Development</i> 35: 1199-1215.	x	x						potato growers of measures intended to reduce disease incidence. Reasons for non-adoption are identified as lack of advantages compared with existing PVY management practices, incompatibility between growers' priorities relating to the desire for isolation and avoidance of cross contamination, overly complex logistics, inability to conduct trials on a small scale, and lack of readily observable impacts. Growers'
Beissinger A, Goldberger JR, Benedict CA, et al. (2018) Seed Potatoes, Virus Management, and the Nonadoption of an Agricultural Innovation. <i>Rural Sociology</i> 83: 598-629.	x	x				Potato Virus Y (PVY)	USA	Presents strategy designed to produce systematic maps that compile scientific evidence for different plant disease protection strategies for the main Swedish arable crops (wheat, barley, oat, potato, sugar beet and oilseed rape). Plant health and pathogen reduction will be included as a proxy for potential increase in crop quality and yield. Outputs will include a searchable database per crop for cataloguing evidence for researchers and stakeholders, especially authorities and advisory organizations. Systematic maps aid the identification of areas that need further research and can guide funding agencies and policymakers when deciding where research resources should be allocated. The search will include academic and grey literature from relevant organisations across Europe (including Eppo), and search terms were informed by board of agriculture advisors. Outputs (i.e. systematic maps) do not yet appear to be available.
Berlin A, Kallstrom HN, Lindgren A, et al. (2018) Scientific evidence for sustainable plant disease protection strategies for the main arable crops in Sweden. A systematic map protocol. <i>Environmental Evidence</i> 7.			x				Sweden	Concludes that Dutch growers were generally willing to apply risk management measures, and that poor risk management was mainly due to perceived barriers, such as high costs and doubts regarding efficacy of management measures. The management measures applied varied considerably among growers, depending on production sector and farm-specific circumstances. The results highlight the importance of a holistic perspective to farm level management of invasive pathogen risk, including the entire package of management measures and accounting for sector- and farm-specific circumstances.
Breukers, A., van Asseldonk, M., Bremmer, J., Beekman, V., 2012. Understanding Growers' Decisions to Manage Invasive Pathogens at the Farm Level. <i>Phytopathology</i> 102, 609-619.		x					Holland	Details efforts to dissemination and implementation of knowledge on integrated pest management to facilitate the transition to sustainable agriculture in the Netherlands. Involves dialogue and regional networks of farmers engaged in testing and improving best practices, and sharing effective measures with other farmers. The network is most effective when common interests can be identified, particularly a tailored match between best practices and stakeholder interests and core business. This requires enhanced social skills amongst researchers and extension workers. Therefore it is necessary that the people who will work with the network approach are trained in these skills.
Brinks H and de Kool S. (2006) Farming with future: Implementation of sustainable agriculture through a network of stakeholders. 7th European IFSA Symposium on New Views for Rural Areas.			x					Considers the adoption of biologically integrated agricultural practices from the perspective of farm management style, since adoption of farming practices depends on their fit with a broader farm decision-making context. Draws on a study of California almond and winegrape growers to demonstrate that management styles differ substantially among farmer. These differences affect use of information sources and adoption of biologically based practices on the farm. The study characterises farmer responses to information, degree to which they were likely to attend field days and be influenced by social networks, and likelihood of adopting innovations based on farm management styles.
Brott S, Klonsky K, Tourte L, et al. (2004) Influence of farm management style on adoption of biologically integrated farming practices in California. <i>Renewable Agriculture and Food Systems</i> 19: 237-247.			x				USA	The authors use an extensive dataset on acute oak decline (AOD) to ask how verified data received from the public can be used. Information on the distribution of AOD was available as (i) systematic regulatory surveys conducted throughout England and Wales, and (ii) ad hoc sightings reported by landowners, land managers and members of the public (i. e. 'self-reported' cases).
Brown N, van den Bosch F, Parnell S, et al. (2017) Integrating regulatory surveys and citizen science to map outbreaks of forest diseases: acute oak decline in England and Wales. <i>Proceedings of the Royal Society B: Biological Sciences</i> 284: 20170547.				x		Acute Oak Decline	England, Wales	Unlike other types of pollution, invasive species are not diluted in time but, on the contrary, can expand in numbers, density and geographical extent - often exponentially. This paper presents case studies of good management practice for managing invasive alien species (IAS), including prevention, ecosystem approaches, adaptive management and stakeholder involvement. Communities, conservation groups, NGOs and agencies undertaking prevention and management activities need ready access to science-based biological and ecological information about target species, prevention strategies and management techniques, as well as case studies from other regions facing similar problems. Information exchange is a key component of effective responses to biological invasions and global-scale information exchange mechanisms are described.
Browne M, Pagad S and De Poorter M. (2009) The crucial role of information exchange and research for effective responses to biological invasions. <i>Weed Research</i> 49: 6-18.			x					Includes a cost-benefit analysis of Forestry Tasmania's research project to develop and use an Integrated Pest Management (IPM) program for the leaf beetle <i>Paropsisterna bimaculata</i> .
Cameron N, Wardlaw T, Venn T, et al. (2018) Costs and benefits of a leaf beetle Integrated Pest Management (IPM) program II. Cost-benefit analysis. <i>Australian Forestry</i> 81: 53-59.				x		Leaf beetle	Australia	The paper provides an overview of the forest health Survey unit (FHSU), which commenced operations in 1996 in New South Wales, Australia.
Carnege AJ, Cant RG and Eldridge RH. (2008) Forest health surveillance in New South Wales, Australia. <i>Australian Forestry</i> 71: 164-176.				x		Various	Australia	Examines how videos and workshops can be used by agricultural extension workers to promote pest management innovations beyond farmer-capacity-building methods like Farmer Field Schools. Explains how video engages farmers in the use of botanical pesticides in Bogra District, NW Bangladesh. Findings suggest that video improves the ability of farmers to communicate pest management amongst themselves and with other stakeholders. Video-mediated learning sessions were more effective than conventional workshop training in enhancing farmers' knowledge, changing attitudes and encouraging uptake. They conclude that agricultural extension is more effective with the use of facilitated video learning which clarifies complex agro-ecological principles, bias and normative perceptions of the learners. Video-mediated learning is transferable across villages and works well in combination with media like radio, television and mobile phones.
Chowdhury A, Odame HH, Thompson S, et al. (2015) Enhancing farmers' capacity for botanical pesticide innovation through video-mediated learning in Bangladesh. <i>International Journal of Agricultural Sustainability</i> 13: 326-349.			x				Bangladesh	Deals with control measures for Eldana saccharina Walker in the South African sugar industry. Aimed to understand farmers' perceptions of pests and pest management to improve rates of adoption of pest management strategies, specifically for knowledge-intensive area-wide integrated pest management (AW-IPM). Farmer interviews indicate that experiential learning activities with small, local groups of farmers are suitable for introducing new pest management strategies. Locally-oriented field days and model farms are likely to be effective at helping adapt methods to local conditions.
Cockburn I, Coetzee H, Van den Berg J, et al. (2014) Large-scale sugarcane farmers' knowledge and perceptions of Eldana saccharina Walker (Lepidoptera: Pyralidae), push-pull and integrated pest management. <i>Crop Protection</i> 56: 1-9.			x				South Africa	Not yet found article/abstract
Curtis D, Nadelny C and Ford HA. (1995) Lessons from a network of dieback repairers. <i>Nature conservation</i> 4: 175-186.				x				A survey was mailed to more than 4,000 households in a five-county region of north central Colorado to gauge public awareness and attitudes regarding invasive plant species, helping to illuminate whether the public shows a capacity to help land managers detect and respond to invasive plants before they profoundly alter the local ecosystem. Although 88% of respondents had heard or read about invasive plant species, far fewer were familiar with specific, locally targeted species, and fewer still had taken any action to control these species. The overall awareness and concern about invasive plants in the area indicated a capacity for more public participation in management.
Daab MT and Flint CG. (2017) Public Reaction to Invasive Plant Species in a Disturbed Colorado Landscape. <i>Invasive Plant Science and Management</i> 3: 390-401.				x		Invasive plants; Mountain Pine Beetle	USA	This working paper explores tree health stakeholder. It includes an analysis of what can create a stake in tree health, an overview of who can actually have a stake, and how stakes can change along with the outbreak evolution and 'stage'.
Dandy et al (2013) Working Paper 2: Tree Health Stakeholder Analysis – Identification and Classification. Unpublished (CONFIDENTIAL)				x		General	UK	The authors ask the question "what does it mean to have a 'stake' in tree health?" They then use a case-study analysis to explore the stakeholder concept in relation to tree health. They develop a framework to underpin better understanding of the stakeholder landscape in tree health and through which to categorise individuals and groups within it.
Dandy N, Marzano M, Porth E, et al. (2017) Who has a stake in ash dieback? A conceptual framework for the identification and categorisation of tree health stakeholders. In: Vasisit R and Enderle R (eds) Dieback of European Ash ( <i>Fraxinus spp.</i> ): consequences and guidelines for sustainable management., 15-26.				x		Ash Dieback	Great Britain	This working paper presents four case-study descriptions and their outcomes to begin to analyse the respective stakeholder landscapes (including their evolution), and to stimulate the identification and discussion of cross-cutting themes and dimensions. Some cases include interest-influence matrices to illustrate the current stakeholder.
Dandy et al (n.d.) Working Paper 3: Case Studies of Tree Pest Outbreaks. Unpublished (CONFIDENTIAL)						Various	North America, UK	

de Bruin A, Knight S, Cinderby S, et al. (2013) Dutch Elm Disease management in East Sussex: Lessons for other tree health management schemes. Final report. York: Stockholm Environment Institute, University of York.	x			Dutch Elm Disease	UK	The DED Management in East Sussex (DED MES) project undertakes an integrated, interdisciplinary assessment of the non-statutory interventions against DED carried out by East Sussex County Council (ESCC) on the south coast for the last 40 years and analysed potential future scenarios of management.
de Buck A and Baurma J. (2004) Speeding up innovation processes through socio-technical networks: a case in Dutch horticulture. In: Bokelmann W (ed) <i>Proceedings of the Xvth International Symposium on Horticultural Economics and Management</i> 175-182.	x	x				A narrow knowledge system hampers the transition to sustainable agriculture in the Netherlands. The paper proposes a new system for effective knowledge flows and implementation through a socio-technological network involving a coalition of stakeholders and innovation-led professionals. A case study on chrysanthemum-growing which includes technological development, IPM knowledge development and institutional development regarding knowledge flows.
Dwyer J, Mills J, Ingram J, et al. (2007) <i>Understanding and influencing positive behaviour change in farmers and land managers – a project for Defra, CRI and The Macaulay Institute.</i>	x	x	x	Various	UK	This project aimed to investigate how advice provided by Defra and its agencies can best be delivered to encourage and enable long-term, positive behaviour change in land managers. It focused specifically on environmental behaviour with respect to soils, water and waste. The report summarises key strategies from existing literature (e.g. the need to present credible messages, train extension agents, develop solutions with farmers) and uses case studies to develop guidelines for more effective engagement and behaviour change (e.g. value of social networks, financial advantages, collective events, importance of validating farmer knowledge against other sources, need for succinct but not simplistic messages). Key messages for knowledge exchange include the need for a hierarchy of approaches to connect with various phases in the cycle of farm decision making. A regular flow of articles in widely-consulted farming press, on radio or TV can influence thinking in the 'scanning phase', as can similar material targeted through sectoral or other specialist farming groups, and regional or national seminars and events. For educational/technical know-how and demonstration phases, personal engagement between advisers, specialists, individual farmers or groups of farmers are needed and should be carefully attuned to the main drivers and networks of the target groups.
Eigenbrode SD, Binns WP and Huggins DR. (2018) Confronting Climate Change Challenges to Dryland Cereal Production: A Call for Collaborative, Transdisciplinary Research, and Producer Engagement. <i>Frontiers in Ecology and Evolution</i> 5.			x			Conference identified the need for coordinated, large scale, transdisciplinary efforts, coordination and improved integration among knowledge communities. Pests, weeds and pathogens was one of the conference themes. While the need for stakeholder involvement is mentioned, the paper focuses on academic research.
Everett RA. (2000) Patterns and pathways of biological invasions. <i>Trends in Ecology &amp; Evolution</i> 15: 177-178.	x			Various	Australia	The author draws attention to how information can be targeted to fit in with consumer purchases such as in Australia where people searching for plant seeds on the internet are warned of regulatory restrictions against importing exotic material.
Fellenor J, Barnett J, Potter C, et al. (2017) The social amplification of risk on Twitter: The case of ash dieback disease in the United Kingdom. <i>Journal of Risk Research</i> : 1-21.			x	Ash Dieback	UK	This paper presents an empirical analysis of 25,600 tweets in order to explore what people were saying about ash dieback on Twitter, who was talking about it and how they talked about it.
Flint CG, McFarlane B and Müller M. (2009) Human dimensions of forest disturbance by insects: An international synthesis. <i>Environmental Management</i> 43: 1174-1186.			x	Bark beetle	Various	This article discusses the human context of forest disturbances by insects by reviewing four cases of bark beetle forest disturbance from British Columbia in Canada, Bavarian Forest National Park in Germany, the Kenai Peninsula in Alaska, and the north central region of Colorado.
Fulcher A, LeBude A, White SA, et al. (2017) Advancing Integrated Pest Management Adoption and Achieving Extension Impact: A Working Group Success Story. <i>Horttechnology</i> 27: 759-764.	x					Provides guidance and experience of what makes an effective network of experts working with nursery crop growers in south-eastern USA (the Southern Nursery Integrated Pest Management working group). The paper describes key attributes for building a lasting WG, outlines its effectiveness and successes in terms of publications, projects and awards that translate stakeholder needs into problem-solving grants and share information; identifies improved synergy as the key benefit over time. Working towards common goals that bridge technology and serve member interests is identified as important for continued effectiveness.
Fuller L, Marzano M, Peace A, et al. (2016) Public acceptance of tree health management: Results of a national survey in the UK. <i>Environmental Science &amp; Policy</i> 59: 18-25.				Various	UK	A nationally representative survey of 2000 members of the UK public was used to address two research questions: (1) How acceptable are tree health management methods to the public? (2) How do opinions about woodland functions, concern and awareness of tree pests and diseases, and demographics influence acceptance of management methods?
Gadino AN, Brunner JF, Chambers U, et al. (2016) A perspective on the extension of research-based information to orchard management decision-makers: Lessons learned and potential future directions. <i>Biological Control</i> 102: 121-127.			x			Aimed to develop timely, effective and relatively low-cost strategies for disseminating research information on biological control in western orchards, Washington State, USA. Guided by an advisory panel of stakeholders and scientists, approaches included a simulcast short course, interactive workshops, online media, as well as presentations and print articles. Paper summarises successes, constraints and lessons learned during development and implementation of the outreach program.
Garin C, Vanwindelens F, Scholberg JMS, et al. (2017) Drivers of adoption of agroecological practices for winegrowers and influence from policies in the province of Trento, Italy. <i>Land Use Policy</i> 68: 200-211.			x		Italy	Evaluated farmers' motivations for the adoption of agroecological practices in the viticulture sector in Trento province, Italy, with a focus on the influence of EU CAP measures. Major drivers of adoption of agroecological practices are autonomous choices rather than coercion, so incentives for change may be more effective where they foster individual farmer motivations.
Glavendekić M, Nanov B, Džinović M, et al. (2015) EDUCATIONAL TECHNOLOGY IN DEVELOPING PUBLIC AWARENESS OF TREE PESTS AND PATHOGENS. <i>Sumarski List</i> 139: 455-463.	x	x	x		Serbia	A survey of levels of knowledge and public awareness of 5 non-native tree pests and pathogens at a horticultural fair in Belgrade revealed low ability to match symptoms to disease, but participants were aware of the risks associated with buying imported plants and most reported that they purchase plants from registered nurseries or distributors. Most frequent sources of information on tree pests and pathogens are the internet, face-to-face learning from educational establishments (lectures, seminars etc.), newspapers and trade journal articles. Respondents were motivated to gain knowledge about pests and pathogens and the introduction pathways, with the internet, TV programmes, printed brochures and books identified as the most preferred sources.
Goldberger JR, Lehrer N and Brunner JF. (2011) Azinphos-methyl (AZM) phase-out: Actions and attitudes of apple growers in Washington State. <i>Renewable Agriculture and Food Systems</i> 26: 276-286.			x			Survey of growers' attitudes and approaches the phase-out of AZM as part of IPM. Larger growers (in terms of acreage and income) and growers more familiar with Washington State University's educational resources were more likely to have already reduced AZM use. This suggests that larger farms can play important role in dissemination and encouraging change in practices. Agricultural extension services should extend outreach to smaller growers and others lagging in the transition to more sustainable apple pest management.
Gupta A. (2010) Emerald ash borer first detector: A volunteer early detection programme. <i>New Zealand Journal of Forestry Science</i> 40: 123-132.				Emerald Ash Borer	USA	The author provides an early evaluation of the engagement programme 'Forest Pest First Detector'. The programme began as a broadly focused plant pest early detection network, but developed into a sizable citizen-science early tree pest detection initiative.
Halbleib ML and Jepsen PC. (2015) Adapting an Outcome-Based Education Development Process to Meet Near Real-Time Challenges to Sustainable Agricultural Production. <i>Journal of Agricultural Education &amp; Extension</i> 21: 109-126.			x			Examines the benefits of using outcome-based education (OBE) within agricultural extension outreach programmes for professional and farmer audiences. Results show that focused, short-duration programmes can produce meaningful skill development and impacts at the farm level, but need to respond adaptively to local circumstances and unanticipated changes. OBE integrates science, technology and social learning, including a group process to elicit an accurate view of the agricultural context, and enables feedback between all stages of programme development and implementation. This allows learning beyond the classroom.
Harwood TD, Tomlinson J, Potter CA, et al. (2011) Dutch elm disease revisited: Past, present and future management in Great Britain. <i>Plant Pathology</i> 60: 545-555.			x	Dutch Elm Disease	Great Britain	The authors develop a spatial model at a 1 km <sup>2</sup> resolution. Following parameterization to replay the historical epidemic, the model is used to explore previously proposed counterfactual management strategies.
Hathaway JM, Basman CM, Barro SC (2002) Assessing tree care professionals' awareness and knowledge about the Asian Longhorned Beetle. In: Van Sambeek JW, Dawson JO, Ponder F, Jr Loewenstein EF, Fralish JS (eds) <i>Proceedings, 13th central hardwood forest conference, April 1-3, Urbana IL. Gen. Tech. Rep. NC-234. St Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station</i>			x	Asian Longhorn Beetle	USA	Tree care professionals in Chicago were surveyed on their levels of awareness of Asian Longhorn Beetle. Out of the 34 tree care companies that participated in the survey, 85% stated that they were informed through television programmes but 65% received information from the United States Department of Agriculture. The government source was considered to be more credible. Tree care professionals stated that printed bulletins was their most preferred method to receive information.
Hopkin A, Fenech A, Liljahto H, et al. (2001) The Ontario forest health data co-operative. <i>Environmental Monitoring and Assessment</i> 67: 131-139.			x	Various	Canada	A co-operative has been formed to compile tree data (including PSD info) and to make it more easily accessible. Information from these projects is available through the co-operative web site and can be extracted to report on forest health in a region of the province, or on an individual tree species.
Hurley BP, Slippers J, Wingfield M, et al. (2012) Perception and knowledge of the Sirex woodwasp and other forest pests in South Africa. <i>Agricultural and Forest Entomology</i> 14: 306-316.			x	Sirex woodwasp	South Africa	The authors considered the impacts that the arrival of the pest and the awareness campaign have had on perceptions and knowledge of <i>S. noctilio</i> , as well as other forestry pests, amongst members of the forestry community.
Hurley BP, Slippers B, Sathyapala S, et al. (2017) Challenges to planted forest health in developing economies. <i>Biological Invasions</i> 19: 3273-3285.			x	Various	Sub-Saharan Africa	The authors suggest that a regional strategy is needed for developing regions, where limited resources can be optimized and shared risks managed collectively. This strategy should look beyond the standard recommendations and include the development of an inter-regional phytosanitary agency, exploiting new technologies to identify insect pests, and the use of "citizen science" projects.
Ibery, B., 2012. Interrogating food security and infectious animal and plant diseases: a critical introduction. <i>The Geographical Journal</i> 178, 308-312.			x	Various		This introduction to a themed section on food security, plant and animal disease identifies the importance of micro-scale studies to help understand the practicalities of applying biosecurity controls at local geographical scales
Ibery B, Maye D, Ingram J, et al. (2013) Risk perception, crop protection and plant disease in the UK wheat sector. <i>Geoforum</i> 50: 129-137.	x	x	x			Presents evidence for perception and management of endemic plant disease risks in UK wheat sector. Most interviewees felt that plant disease is a controllable risk that rests mainly at the point of production (i.e. with farmers). Reliance on fungicides reduces the sense of risk attributable to disease outbreaks, leading farmers to grow higher-yielding wheat varieties that are less disease-resistant. The potential banning of certain fungicides under EU legislation and climate change were perceived as future threats that could increase uncertainty and lead to more use of disease-resistant wheat varieties. More research is needed on how different wheat sector actors will contribute to the control of plant diseases and the development of more integrated plant disease management under these future scenarios.
Ingram J. (2008) Agronomist-farmer knowledge encounters: an analysis of knowledge exchange in the context of best management practices in England. <i>Agriculture and Human Values</i> 25: 405-418.			x	General	UK	Explores how knowledge is exchanged between agricultural advisors and farmers in the context of sustainable farming practices in England, focusing on one group of advisors, agronomists, and farmers. Although they find that many agronomist-farmer knowledge exchange encounters are characterized by an imbalance of power, distrust, and divergence of knowledge, other encounters enable farmer learning in a transition to more sustainable practices.

									Indicates that IPM is subject to almost constant redefinition and shifting of semantic boundaries whenever it is expedient. Constraints to uptake of IPM may decrease after a pest crisis, when different perceptions can converge and radical changes in control practice can emerge. Conversely, barriers can arise where changes in pest control practice are sought in situations with no immediate crisis, where there is no convergent perceptions of a need for change, e.g. with transitions towards sustainability, organic farming and with the introduction of novel crops (including GM). Under these circumstances, the hegemony of the pest specialist is likely to decline, with any shared perception being formed around the crop, cropping system or surrounding landscape.
Jeger MJ. (2000) Bottlenecks in IPM. <i>Crop Protection</i> 19: 787-792.		x	x						This paper reports the findings of a survey of informed UK publics on the acceptability of various potential strategies to deal with ash dieback, including "no action".
Jepson PR and Arakelyan I. (2017) Developing publicly acceptable tree health policy: public perceptions of tree-breeding solutions to ash dieback among interested publics in the UK. <i>Forest Policy and Economics</i> 80: 167-177.					x	Ash Dieback		UK	This study presents evidence on the public acceptability of tree-breed solutions to the spread of Chalara, with the main aim to provide science and policy with an up-stream 'steer' on the likely public acceptability of different tree breeding solutions.
Jepson P and Arakelyan I. (2017) Exploring public perceptions of solutions to tree diseases in the UK: Implications for policy-makers. <i>Environmental Science &amp; Policy</i> 76: 70-77.					x	Ash Dieback		UK	
Jordan N, Schut M, Graham S, et al. (2016) Transdisciplinary weed research: new leverage on challenging weed problems? <i>Weed Research</i> 56: 345-358.									TWR is defined as an integrated process of inquiry and action that addresses complex weed problems in the context of broader efforts to improve economic, environmental and social aspects of ecosystem sustainability. To deal with complex multi-level settings and unpredictable conditions, TWR involves a cyclic process of (problem formulation, stakeholder recruitment, deliberation, negotiation and design of an action agenda for systemic change, implementation action, monitoring and assessment of outcomes, and then reformulation of the problem situation and renegotiation of further actions. This can provide powerful leverage for current weed research.
Jors E, Lander F, Hulci O, et al. (2014) Do Bolivian small holder farmers improve and retain knowledge to reduce occupational pesticide poisonings after training on Integrated Pest Management? <i>Environmental Health</i> 13.					x	Unspecific		Bolivia	Evaluates the training of small holder farmers on pesticide handling and ecological alternatives to reduce the negative pesticide effects, including follow-up surveys 2 years after farmer field schools. Improvements were strongest in farmers who attended the field school, mostly in pesticide handling. Emphasises the value of training for behaviour change and improving the sustainability of food production. Focused on WHO class 1 pesticides, with no reference to specific pests or diseases
Keskitalo ECH, Strömberg C, Pettersson M, et al. (2018) Implementing Plant Health Regulations with Focus on Invasive Forest Pests and Pathogens: Examples from Swedish Forest Nurseries. Springer, 193-210		x			x				Appeared in WoS search but text not yet found
Klapwijk MJ, Hopkins AJM, Eriksson L, et al. (2016) Reducing the risk of invasive forest pests and pathogens: Combining legislation, targeted management and public awareness. <i>Ambio</i> 45: 223-234.						General		Europe	This paper examines current mechanisms for prevention and management of potential introductions of forest insect pests and pathogens in the EU and recommends public engagement to combat the spread of invasive P&D.
Kruger et al (2009) Engaging in Biosecurity: Gap analysis. Australian Government: Bureau of Rural Sciences.								Australia	Full text not available
Kruger et al (2010) Biosecurity Engagement Guidelines: Practical advice for involving communities. Australian Government: Bureau of Rural Sciences.	x	x			x	Various		Australia	This document explains how effective community engagement in biosecurity can be undertaken and is based on practical experiences within Australia. The approach acknowledges the wide range of circumstances in which biosecurity engagement operates in terms of local context, available resources and stakeholders
Kubeck G. Exploring stakeholders' attitudes and beliefs regarding behaviors that prevent the spread of invasive species: a focus group study. MSc dissertation, Oregon State University.						Various		USA	This research explores the barriers that prevent stakeholders from changing their hobby behaviours to help prevent the spread of invasive species in Oregon. Using the Theory of Planned Behaviour as a framework, the attitudes, norms and perceived behavioural controls regarding preventive behaviours were elucidated during four focus groups.
Lamichhane JR, Akkas B, Andreassen CB, et al. (2018) A call for stakeholders to boost integrated pest management in Europe: a vision based on the three-year European research area network project. <i>International Journal of Pest Management</i> 64: 352-358.								Europe	Evaluates the potential of each actor in the food chain to ensure a higher level IPM adoption in Europe. Key findings include the need to coordinate EU-level withdrawal and introduction of pest control measures to allow replacement products/measures to be tested and adopted; need to understand farmer motivation; need for extension services to bridge research and practice including farming realities; lack of robust evidence for economic benefits of IPM compared with conventional approaches; value of demonstration farms that include financial viability of farming; communication strategies that avoid simplified good/bad visions of complex topics; work on retail standards and public acceptability of IPM
Lamichhane JR, Aubertot JN, Begg G, et al. (2016) Networking of integrated pest management: A powerful approach to address common challenges in agriculture. <i>Crop Protection</i> 89: 139-151.		x	x	x		Various, including Western Corn Borer		Europe	Examines external (e.g. increasing need to manage pests due to climate change, pesticide resistance) and internal challenges facing IPM (e.g. decreasing budgets allocated to IPM, scarcity of expertise, lack of knowledge transfer into practice and communication gaps within and between countries, lack of networked IPM research). Discusses a decade of IPM networking experience in Europe, also drawing on wider evidence, and emphasises the need for broader level networking. Although farmer field schools are rare in Europe compared with Asia and Africa, evidence from Europe reinforces benefits of participatory training of growers, which can facilitate the uptake of IPM. Efforts to establish a European network of advisors have had limited success, so cross-border exchanges needed to manage the dynamic behaviour of pest and diseases remains challenging. Climate change effects on the effectiveness of IPM remain under-studied.
Lamichhane JR, Bischoff-Schafer M, Bluemel S, et al. (2017) Identifying obstacles and ranking common biological control research priorities for Europe to manage most economically important pests in arable, vegetable and perennial crops. <i>Pest Management Science</i> 73: 14-21.					x			Europe	Many European countries have intensified national efforts on biocontrol research and innovation (R&I), but such initiatives are often fragmented and transitionally coordinated approaches are needed, as most economically important pests are similar across Europe. Proposes a common European framework, identifies generic R&I bottlenecks, needs and priorities for arable, vegetable and perennial crops. Key obstacles to development and adoption of biocontrols are the gap between market biocontrol solutions and grower demands, lengthy and expensive registration process for biocontrols and varying effectiveness due to variable climatic conditions and site-specific factors.
Machekano H, Mvumi BM and Nyamukondiwa C. (2017) Diamondback Moth, <i>Plutella xylostella</i> (L) in Southern Africa: Research Trends, Challenges and Insights on Sustainable Management Options. <i>Sustainability</i> 9.		x	x			Diamondback Moth, <i>Plutella xylostella</i>		Southern Africa	Diamondback moth (DBM), a global economic pest of brassicas, in Southern Africa. IPM adoption was mainly limited by lack of locally-developed packages, lack of stakeholders' concept appreciation, limited alternatives to chemical control, knowledge paucity on biocontrol, climate mismatch between biocontrol agents' origin and release sites, and poor research expertise and funding. The authors recommend that alternative IPM options are disseminated through IPM-Farmer Field School for widespread adoption.
Mackenzie BF and Larson BMH. (2010) Participation Under Time Constraints: Landowner Perceptions of Rapid Response to the Emerald Ash Borer. <i>Society &amp; Natural Resources</i> 23: 1013-1022.						Emerald Ash Borer		Canada	This paper explores landowner reactions to EAB rapid response management. Given the significantly negative reactions of landowners, the authors suggest 'rapid participatory methods' to engage SH in decision-making processes.
Macleod K, Farbotko C, Mankad A, et al. (2018) Building social resilience to biological invasions: A case study of Panama Tropical Race 4 in the Australian Banana Industry. <i>Geoforum</i> 97: 95-105.					x			Australia	Indicates the need for management programmes and activities to support affected actors to cope with the impacts of invasion, while working to eradicate or contain the invasive species. They highlight the need for biosecurity measures to include short term immediate (crisis) management actions and longer-term development of support institutions and processes to enable growers to learn to live with a new species in the landscape or cope with future invasions.
Macleod A, Jones GD, Anderson HM, et al. (2016) Plant health and food security, linking science, economics, policy and industry. <i>Food Security</i> 8: 17-25.	x							International	Introduction to a special issue from an international conference that brought together natural scientists, economists, industry representatives and plant health policy makers to report on the state and future research needs for interdisciplinary working to deliver plant protection policy and improved food security. Participants identified greater international co-operation as a key mechanism to reduce international plant health risks, with co-operation over analysis and along supply chains identified as key issues.
Macleod A, Pautasso M, Jeger MJ, et al. (2010) Evolution of the international regulation of plant pests and challenges for future plant health. <i>Food Security</i> 2: 49-70.		x			x			International	Reviews the history of international cooperation and regulatory systems in this area. Despite cooperation, decision making can be slow and border inspections poorly targeted. Close relationships between regulatory scientists and policy makers on agricultural and horticultural production are changing to involve a broader stakeholder community so that decisions regarding the environment draw upon a wider knowledge base.
Magarey RD, Colunga-García M and Fieselmann DA. (2009) Plant Biosecurity in the United States: Roles, Responsibilities, and Information Needs. <i>Biosecurity</i> 59: 875-884.		x			x				Examines the roles, responsibilities, and information needs of US agencies involved in plant biosecurity. Costs and information needs increase dramatically as a pest penetrates deeper into the continuum from offshore activities to the management of newly established exotic pests. To help meet these information needs, the authors propose a cyberinfrastructure for plant biosecurity to link phytosanitary agencies, researchers, and stakeholders, including industry and the public.
Mankad A, Loebel B and Measham PF. (2017) Psychosocial barriers and facilitators for area-wide management of fruit fly in southeastern Australia. <i>Agronomy for Sustainable Development</i> 37.						Queensland fruit fly		Australia	Examines social mechanisms underpinning effective collaborative approaches to pest management, using the example of Queensland fruit fly. Growers and stakeholders expressed high acceptance of some measures but reported limited knowledge of them. Factors that facilitate acceptance include perceptions of increased market access, increased social awareness, operationalising community champions and value chain actors, and dissemination of credible scientific evidence. Trust in the individuals advocating new approaches, and interpersonal trust between neighbours had important impacts on adoption. Barriers to acceptance included perceptions of costs and ongoing funding needs, lack of knowledge, apathy towards control, compatibility of new techniques with current practices and a lack of social cooperation amongst growers.
Marzano M, Dandy N, Papazova-Anakieva I, et al. (2016) Assessing awareness of tree pests and pathogens amongst tree professionals: A pan-European perspective. <i>Forest Policy and Economics</i> 70: 164-171.		x			x			UK	Presents a survey of pest awareness amongst tree professionals. Respondents utilise multiple sources to gain information about tree pests but the internet was the most popular. A considerable amount of pest information is already available online and the authors recommend that different approaches to raising awareness are trialled, including the use of experienced tree professionals as knowledge brokers and exploring new ways of using digital technologies as a learning tool.
Marzano M, Fuller L and Quine CP. (2017) Barriers to management of tree diseases: Framing perspectives of pinewood managers around Dothistroma Needle Blight. <i>Journal of Environmental Management</i> 188: 238-245.		x			x	Dothistroma Needle Blight		UK	Interviews revealed broad awareness of the disease amongst forest managers and threat it poses, but also high levels of inaction. Lack of action was associated with causes and perceived severity of DNB, locating responsibility for prevention and management, mistrust/scepticism of advice and uncertainties over the future impact.
Marzano M and Dandy N. (2012) Recreationist behaviour in forests and the disturbance of wildlife. <i>Biodiversity and Conservation</i> 21: 2967-2986.									This paper provides a summary of current social and natural scientific knowledge on disturbance caused by walking, cycling, mountain biking, horse riding, off-road vehicles use, camping, and some other recreational activities in forests. The authors identify more than 40 ecological studies of recreational impacts on forests.

Marzano M, Dandy N, Bayliss HR, et al. (2015) Part of the solution? Stakeholder awareness, information and engagement in tree health issues. <i>Biological Invasions</i> 17: 1961-1977.	x	General			We provide a summary of this available evidence, related to key stakeholder groupings, their levels of awareness and current modes of information provision and reception. It shows what can at best be described as mediocre levels of awareness, and highlights the role of traditional media, such as television and newspapers, as sources of information. It further notes the urgent need for research to more fully map the tree health stakeholder landscape and to further our understanding of how to increase awareness and effect changes in behaviour
Marzano M, Dandy N, Papazova-Anakieva I, et al. (2016) Assessing awareness of tree pests and pathogens amongst tree professionals: A pan-European perspective. <i>Forest Policy and Economics</i> 70: 164-171.	x	General	Europe		A questionnaire survey of tree professionals was carried out across nine European countries. Results from 392 tree professionals show relatively low levels of self-reported awareness for a number of pests and pathogens.
Marzano M, Allen W, Haight RG, et al. (2017) The role of the social sciences and economics in understanding and informing tree biosecurity policy and planning: a global summary and synthesis. <i>Biological Invasions</i> 19: 3317-3332.	x	General	Global		The authors present available evidence on six key dimensions: (1) the role of different stakeholders and the broader public within tree health; (2) levels of knowledge and awareness of tree pests and diseases amongst the variety of end-user 'stakeholder' groups, and influences on their attitudes and practices; (3) social acceptability of management approaches; (4) the impact of formal and informal governance arrangements; (5) risk communication; (6) economic analyses on the impact of tree pests.
Marzano M, Fuller L and Quine CP. (2017) Barriers to management of tree diseases: Framing perspectives of pinewood managers around Dothistroma Needle Blight. <i>Journal of Environmental Management</i> 188: 238-245.	x	Dothistroma Needle Blight	UK		The authors studied how managers have responded to the threat of Dothistroma Needle Blight (DNB), a disease which can affect growth and cause mortality of many pine species, and the key frames influencing their responses. Frames involve values and beliefs and allow people to make sense of, and interpret, events, experiences or issues. Interviews revealed broad awareness of the disease and threat it poses, but also high levels of inaction.
Marzano et al (n.d.) Working Paper 7: Review of Public Engagement Strategies. Unpublished (CONFIDENTIAL)	x				The aim of this working document is to review available evidence relating to effective forms of public engagement and awareness raising. The authors provide an overview of ideas, interventions and challenges in public engagement, with a particular focus on available evidence from four sectors. They state that it is now commonly understood that any engagement needs to build on current knowledge, awareness and attitudes of target individuals and groups in order to understand the diversity of issues that drive decision-making and behaviour. Engagement interventions need to take into account willingness and/or ability to change as well as facilitate the capacity of individuals and groups to evaluate the reliability of different sources of information and deal with scientific disagreement (Whitmarsh et al 2013). A crucial outcome is to understand the nature and degree of engagement that is required for different stakeholders, whether different types of engagement are likely to translate into 'better decisions' or some form of behaviour change (and the 'trigger points' for action) and what sorts of information or engagement is needed to promote behaviour change.
Marzano et al (n.d.) Working Paper 8 (Draft): Stakeholder Behaviours – Evidence From Tree Health. Unpublished (CONFIDENTIAL): Includes Review	x	Various	Various		In section 3, the authors summarise and provide a review of the, albeit limited, published evidence relating directly to behaviours in a tree health context. This evidence focuses in particular on information provision and, usually implicitly, on behaviour at an individual, 'operational' scale. Some of it also reports on engagement initiatives or programmes in the field of tree health and in Section 4 of this report we identify a number of these – providing some further details of each where possible. Again, many of these initiatives focus on changing the behaviour of individuals, at operational levels.
Maye, D., libery, B., Little, R., 2012. Rationalising risk: grower strategies to manage plant disease in the UK wheat and potato sectors. <i>The Geographical Journal</i> 178, 338-347.	x		UK		The authors conclude that plant disease is viewed by growers as a significant but controllable risk mostly through the (generally) prophylactic use of spray chemicals. The introduction of revised European legislation governing and potentially restricting the use of such agro-chemicals may reduce this level of control in the future. Decisionmaking is rational, but enculturated as a practical farm management priority rather than pure scientific risk strategy.
Mayfield AE, Nowak J and Moses GC. (2006) Southern pine beetle prevention in a Florida: Assessing landowner awareness, attitudes, and actions. <i>Journal of Forestry</i> 104: 241-247.	x	Southern Pine Beetle (SPB)	Florida, USA		In a survey of nonindustrial private forest landowners, awareness of the SPB, forest management plan use, importance of timber income, and implementation of preventive management practices all decreased with decreasing ownership size. The authors discuss some broadly applicable landowner education strategies that may help address this challenge.
McAllister RRL, Robinson CJ, Maclean K, et al. (2015) From local to central: a network analysis of who manages plant pest and disease outbreaks across scales. <i>Ecology and Society</i> 20: 67.	x	Black sigatoka ( <i>Mycosphaerella fijiensis</i> )	Australia		The authors applied novel network theoretical methods to assess the propensity of growers, local industry, local state government, and state and national government head offices to foster either within- or across-scale coordination during the successful 2001 Australian response to the outbreak of the fungal pathogen black sigatoka ( <i>Mycosphaerella fijiensis</i> ).
McFarlane B L., Stumpf-Allen, R. C. G., & Watson, D. O. (2006). Public perceptions of natural disturbance in Canada's national parks: The case of the mountain pine beetle ( <i>Dendroctonus ponderosae</i> Hopkins). <i>Biological Conservation</i> , 130 (3), 340–348. McFarlane BL, Stumpf-Allen RCG and Watson DO. (2006) Public perceptions of natural disturbance in Canada's national parks: The case of the mountain pine beetle ( <i>Dendroctonus ponderosae</i> Hopkins). <i>Biological Conservation</i> 130: 340-348.	x	Mountain pine beetle	Canada		This study was undertaken to examine public attitudes, knowledge, issue salience, and management preferences for MPB in Banff and Kootenay national parks.
McFarlane BL, Parkins JR and Watson DOT. (2012) Risk, knowledge, and trust in managing forest insect disturbance. <i>Canadian Journal of Forest Research</i> 42: 710-719.	x	Mountain pine beetle	Canada		The authors examined regional variation in public perceptions of risk, compared public and land managers' perceptions, and examined knowledge and trust as factors in shaping public perceptions of a mountain pine beetle infestation. They highlight more participatory forms of engagement that go well beyond straightforward information provision and 'communication'. These include, for instance, the 'community champion', trusted individuals who can use various local media and other formats to warn of the risks and consequences of an outbreak.
Midega CAO, Murage AW, Pitchar JO, et al. (2016) Managing storage pests of maize: Farmers' knowledge, perceptions and practices in western Kenya. <i>Crop Protection</i> 90: 142-149.	x		Kenya		Interviews and focus groups with farmers in western Kenya were used as a basis for developing efficient integrated pest management (IPM). Results showed that education and experience build farmers' understanding of storage pests, and that local maize varieties were perceived as resistant to pests. The underlying mechanisms for this need to be established to develop effective IPM approaches.
Mills J, Gibbon D, Ingram J, et al. (2011) Organising Collective Action for Effective Environmental Management and Social Learning in Wales. <i>The Journal of Agricultural Education and Extension</i> 17: 69-83.	x				Explored key factors that might lead to successful agri-environmental social learning and collective action to deliver landscape-scale resource management within AES. Important factors for organising and delivering collective AES were: locally adaptable engagement strategies; working with group members previously known to each other; institutional arrangements that limited group size and which allowed groups to develop their own solutions and implementation rules; and external support offering the services of a local facilitator and funding for both planning and management stages. Results showed the extent to which business and social confidence can grow within such groups.
Mills P, Dehnen-Schmutz K, libery B, et al. (2011) Integrating natural and social science perspectives on plant disease risk, management and policy formulation. <i>Philosophical Transactions of the Royal Society B: Biological Sciences</i> 366: 2035-2044.	x	Various			Modes of effective engagement between policy makers and stakeholders are explored in the paper, together with an assessment of such engagement in two case studies of contemporary non-indigenous diseases in one food and in one non-food sector.
Molnar JJ, Schelhas J, Holeski C (2003) Controlling the Southern Pine Beetle: Small landowner perceptions and practices. <i>Bulletin</i> 649, Auburn University, Alabama	x	Southern Pine Beetle	USA		Although current research suggests that printed materials are largely ineffective in encouraging action without other means of engagement (Dandy et al, Working Paper 6), this study found that for forest landowners the most preferred format to receive information was through printed bulletins and newsletters. Forest landowner preferences were reported. Face-to-face contact was considered important for forest landowners dealing with the Southern Pine Beetle with owners of large holdings (85 or more acres) preferring to receive information from private forestry consultants while small and medium-sized landowners preferred the 'Extension Service County Agent'.
Moser KW, Barnard EL, Billings RF, et al. (2009) Impacts of Nonnative Invasive Species on US Forests and Recommendations for Policy and Management. <i>Journal of Forestry</i> : 320-327.	x	Various	USA		The paper provides an overview of the impacts of nonnative invasive species (NNIS) within the United States and includes recommendations for NNIS policy and management.
Mullerman S, Wigboldus S and Leeuwis C. (2018) Scaling and institutionalization within agricultural innovation systems: the case of cocoa farmer field schools in Cameroon. <i>International Journal of Agricultural Sustainability</i> 16: 167-186.	x		Cameroon		Investigates lessons from a public-private partnership (PPP) based farmer field school (FFS) that did not lead to adoption of a cocoa innovation system in Cameroon. Adoption and institutionalization were impeded by the lack of an adaptive approach to up-scaling the FFS curriculum, limited investment and buy-in by extension actors, failure to adapt between the pilot and the up-scaling, and lack of strategic competencies to guide the process. Findings Emphasises that pilots need to be translated and adapted in light of specific context and institutional conditions, rather than approached as a linear rolling-out process, with implications for the spread of multi-stakeholder up-scaling processes.
Mulo S, Jenkins I and O'Hare P. (2016) Development of video based extension materials for decision-making and practice change in the Australian macadamia industry. In: McConchie R, Jones B, Stanley J, et al. (eds) <i>Xix International Horticultural Congress on Horticulture: Sustaining Lives, Livelihoods and Landscapes</i> . 173-177.	x		Australia		Examines the use of online content for knowledge sharing and behaviour change in the Australian macadamia industry. The project recognised that leading growers are importance sources of knowledge and experience as well as effective agents for promoting change. A survey of users indicated that more than two thirds changed practices on farms as a direct response to videos.
Norton GA, Lowe I and Aitken LG. (1998) <i>Science, technology and society: IPM re-visited</i> 6th Australasian Applied Entomological Research Conference.	x		Australasia		Examines the role of the traditional linear model of research, development, extension and adoption and of the farmer first approach in IPM, using international examples. Participatory IPM can provide a clearer understanding of key factors and processes influencing the development and response to pest problems, and mechanisms for developing a coordinated strategy of IPM research, extension, communication, training and implementation. Unclear if this involved farmers; full text not available
Ogden SC. (2015) Connecting government and industry for better trade outcomes. In: Hale C, Hunter D, Roberts W, et al. (eds) <i>Xix International Horticultural Congress on Horticulture: Sustaining Lives, Livelihoods and Landscapes</i> 357-363.	x				Stresses the importance of connecting government and industry to balance biosecurity risks with economic and livelihood opportunities associated with new plant species and cultivars. In particular, connectivity is needed to better communicate risks, prioritise trade access, and to establish phytosanitary measures that are cost effective, feasible and least trade restrictive.
Ooi PAC. (1996) Experiences in educating rice farmers to understand biological control. <i>Entomophaga</i> 41: 375-385.	x				Examines how of modern pest problems have arisen as a result of simplistic messages offered to farmers about pest control during the 20th century, focusing on the rise of the brown planthopper as a serious pest of rice in Asia owing to destruction of natural predators due to insecticide use. Details FAO and scientist involvement in legislative change and a non-formal farmer education process of learning by experimenting and discovery. Rice fields became classrooms for Farmer Field Schools. Facilitating farmers to understand biological control through field investigations is the key to successful implementation of Integrated Pest Management.

Oude Lansink A, Schut M, Kamanda J, et al. (2018) A multi-level and multi-actor approach to risk governance: a conceptual framework to support policy development for Ambrosia weed control. <i>Journal of Risk Research</i> 21: 780-799.	x	x				Focuses on biosecurity risks posed by the invasive annual weed, Ambrosia, across multiple stakeholders. The authors conclude that policies which promote a mix of public and private weed management strategies are likely to be better suited to the needs and interests of different stakeholder groups, rather than seeking a one-size-fits-all approach. Collaboration is valuable for enhancing biosecurity and risk management. However, multiple strategies need to be aligned to ensure coordination of effort and that the public receive coherent messages.
Paini DR, Worner SP, Cook DC, et al. (2010) Using a self-organizing map to predict invasive species: sensitivity to data errors and a comparison with expert opinion. <i>Journal of Applied Ecology</i> 47: 290-298.	x				Australia	Comparison of expert opinion and predictive model on invasion risk from insect crop pests in Australia aimed to reduce subjectivity associated with different expert opinions. Results showed list of pests was robust but there were significant differences in the estimates of establishment risk. The method can complement current consultative processes.
Parsa S, Morse S, Bonifacio A, et al. (2014) Obstacles to integrated pest management adoption in developing countries. <i>Proceedings of the National Academy of Sciences</i> 111: 3889-3894.	x	x				Examines reasons for low rates of IPM uptake in developing countries and concludes that a key obstacle is the challenge of encouraging participation and collective action. This contrasts with high-income countries, where a shortage of IPM experts was prioritised as the main issue.
Pautasso M, Doring TF, Garbelotto M, et al. (2012) Impacts of climate change on plant diseases-opinions and trends. <i>European Journal of Plant Pathology</i> 133: 295-313.	x			x		Uncertainty in models of plant disease development under climate change calls for a diversity of management strategies, from more participatory approaches to interdisciplinary science. Involvement of stakeholders and scientists from outside plant pathology shows the importance of trade-offs.
Pautasso M. (2016) Scientometrics of Forest Health and Tree Diseases: An Overview. <i>Forests</i> 7.	x			x		In this overview, the author provides some examples of studies of patterns in the scientific literature related to forest health and tree pathogens. They find that scientometric tools can help balance research attention towards understudied emerging risks to forest trees, as well as identify temporal trends in public interest in forests and their health.
Peterson K and Diss-Torrance A. (2012) Motivation for compliance with environmental regulations related to forest health. <i>Journal of Environmental Management</i> 112: 104-119.				x	USA	This study extends previous research on motivations for compliance with environmental regulations. It addresses contexts where regulatees have primarily sporadic short term interests, where costs of compliance are modest, and where costs of non-compliance are low. The behaviour studied is the movement of firewood for camping, a principal cause for the spread of the emerald ash borer.
Pocock MJO and Evans DM. (2014) The Success of the Horse-Chestnut Leaf-Miner, <i>Cameraria ohridella</i> , in the UK Revealed with Hypothesis-Led Citizen Science. <i>PLoS ONE</i> 9: e86226.			x		UK	The authors demonstrate the opportunities provided by short-term hypothesis-led citizen science through the 'Conker Tree Science' project. The authors considered the potential to detect adult oak processionary moths ( <i>Thaumetopoea processionea</i> ) by amateur naturalists recording moths at light traps.
Pocock MJO, Roy HE, Fox R, et al. (2017) Citizen science and invasive alien species: Predicting the detection of the oak processionary moth <i>Thaumetopoea processionea</i> by moth recorders. <i>Biological Conservation</i> 208: 146-154.			x		UK; Netherlands	The authors explore the conflict between rapid response management and prescribed best practices for stakeholder engagement through the 2012 ALB outbreak in Kent. By considering the specific impacts of tree health management on a local level, the authors recommend that outbreak management programmes take an 'open' approach (Leach 2010). This includes focusing on good communication and long term democratic engagement, which are crucial for cultivating trust and promoting biosecurity citizenship.
Porth EF, Dandy N and Marzano M. (2015) "My garden is the one with no trees:" Residential lived experiences of the 2012 Asian longhorn beetle eradication programme in Kent, England. <i>Human Ecology</i> 43: 669-679.		x			UK	The authors argue that disease-driven interactions between biology, public policy and human agency along pathways of introduction and at outbreak sites will become increasingly common in the Anthropocene. They discuss the subsequent policy and behavioural responses to two disease outbreaks made by policymakers and stakeholders in the UK.
Potter C and Urquhart J. (2017) Tree disease and pest epidemics in the Anthropocene: A review of the drivers, impacts and policy responses in the UK. <i>Forest Policy and Economics</i> 79: 61-68.			x		UK	This paper looks to historical experience with the Dutch elm disease (DED) epidemic of the 1970s to see what can be learned about an outbreak and attempts to prevent, manage and control it. The paper draws on an interdisciplinary investigation into the history, biology and policy of the epidemic.
Potter C, Harwood T, Knight J, et al. (2011) Learning from history, predicting the future: The UK Dutch elm disease outbreak in relation to contemporary tree disease threats. <i>Philosophical Transactions of the Royal Society B: Biological Sciences</i> 366: 1966-1974.			x		UK	Author reviews the threats to tree health from invasive pests and diseases and considers how plant biosecurity might be improved, including through more effective regulation of the horticultural trade. Reviews responses to ash dieback, particularly from government, and highlights that the broader trade dimension is largely absent from 'expert' discussions.
Potter C. (2013) Saving Britain's trees: Countering the growing threat from invasive pests and diseases. <i>Ecos</i> 34: 25-30.		x	x		UK	Analysis of IPM adoption shows that growers implement weed and insect control measures, but that general and ecosystem management components are significantly less often adopted. This indicates the need for a more nuanced approach to studying the uptake and effectiveness of IPM. Only relevant if more detail is available regarding understanding of the components and the obstacles to broader implementation of IPM to improve ability to adapt to new pests and diseases.
Puente M, Darnall N and Forkner RE. (2011) Assessing Integrated Pest Management Adoption: Measurement Problems and Policy Implications. <i>Environmental Management</i> 48: 1013.		x		x		This paper integrates literature from a range of disciplines to generate methodological and theoretical insights that may enable decision-makers to effectively map and analyse biosecurity stakeholders, and enable more transparent, inclusive and adaptive governance of biosecurity. It then reviews a range of theoretical approaches to stakeholder mapping, before critically analysing alternative methods for stakeholder mapping and analysis, which could be used in biosecurity interventions. These theories and methods are then discussed in relation to biosecurity governance, drawing on recent applications of stakeholder mapping in biosecurity policy and practice.
Reed MS and Curzon R. (2015) Stakeholder mapping for the governance of biosecurity: a literature review. <i>Journal of Integrative Environmental Sciences</i> 12: 15-38.		x		x		Aims to identify enablers and barriers to co-innovation in adoption of biopesticides in New Zealand. Identifies sectoral differences in perception and co-innovation relating to institutional incentives for co-innovation, sense of ownership of technologies by stakeholders, differing levels of urgency in each sector, and in the ease with which biopesticides integrate into the sector value chains. Importance of sector-specific identification of obstacles and incentives for change to deal with pests and pathogens.
Rijswijk K, Bewessl D, O'Callaghan M, et al. (2018) The Next Generation of Biopesticides: Institutional barriers and enablers to co-innovation in a science and commercialisation programme. <i>Rural Extension and Innovation Systems Journal</i> 14: 52-61.			x		New Zealand	South Carolina cotton growers were surveyed to assess if they were low, medium or high IPM users. Greater implementation of cultural pest management practices is necessary to prevent and/or avoid pest problems in cotton before they occur and would likely have the greatest impact contributing to further reduction in pesticide use. No mechanisms for achieving uptake are mentioned
Robertson MJ, Zehnder GW and Hamming MD. (2005) Adoption of integrated pest management practices in South Carolina cotton growers. <i>Journal of Extension</i> 43.		x			USA	Examines system-based approaches to dealing with the increasing occurrence of parasitic weeds in rain-fed rice in sub-Saharan Africa. Problems identified were lack of farmer knowledge, of trained extension workers with capacity to visit farms, and lack of coherent policies on parasitic weed control. Merits and challenges of an integrated multi-stakeholder and multi-level research project are discussed.
Rodenburg J, Schut M, Deimont M, et al. (2015) Systems approaches to innovation in pest management: reflections and lessons learned from an integrated research program on parasitic weeds in rice. <i>International Journal of Pest Management</i> 61: 329-339.			x		sub-Saharan Africa	The author attempts to evaluate the effectiveness of the 'Don't move firewood' campaign which featured a range of information provision activities.
Runberg D. (2011) Educating Pacific Northwest Campers on the Risk of Spreading Invasive Forest Pests through Firewood: Developing a Mental Model. Unpublished MSc dissertation, Oregon State University.				x	USA	Looks at the role of Treekeepers - local trained volunteers - in monitoring and protecting Chicago's urban forests. Examined farmers' knowledge, attitudes, and practices regarding agricultural pest management and synthetic pesticide use in Southeast Asia, focusing on leaf mustard and yard-long bean in Cambodia, Laos and Vietnam. Results emphasise how the source of information (neighbours, pesticide shopkeepers), gender and adoption of biopesticides affect the quantities of pesticides used. This identifies relevant entry points for interventions aimed at reducing pesticide dependence.
Sacco (2004) The attack of the urban forest eaters : how a dedicated and educated group of volunteers is responding to the invasion of Asian long-horn beetles and gypsy moths in Chicago. <i>Proceedings: 4th International Urban Wildlife Symposium</i> . Shaw et al. (Eds.)			x		USA	Parasitic weeds in smallholder rice production systems form an increasing problem for food and income security in sub-Saharan Africa (SSA). Paper identifies institutional and political constraints and opportunities for innovation to address this problem, using multi-stakeholder workshops, interviews and surveys in Tanzania and Benin. Fallings in crop production systems, limited access to credit and lack of skills and resources were the key constraints. More structural collaboration between key stakeholder groups is needed for better recognition of problem weeds and more timely identification of feasible solutions
Schreinemachers P, Chen HP, Nguyen TTL, et al. (2017) Too much to handle? Pesticide dependence of smallholder vegetable farmers in Southeast Asia. <i>Science of the Total Environment</i> 593: 470-477.			x		Cambodia, Laos, Vietnam	This analysis of adoption of IPM amongst Californian veg and fruit growers showed the influence of networks on uptake. Farmers whose pest control advisors were not affiliated with chemical distributors used a higher intensity of IPM and were more likely to change their practices. Farmers tend to over-state their intensity of IPM use in self-descriptions compared with accounts of the practices used to control specific pests
Schut M, Rodenburg J, Klerkx L, et al. (2015) Participatory appraisal of institutional and political constraints and opportunities for innovation to address parasitic weeds in rice. <i>Crop Protection</i> 74: 158-170.			x		sub-Saharan Africa	Using mint and hop farmers and industry specialists, the authors assess how changes in farm practices are communicated to farmers as a potential reason for the slow adoption of IPM. Relationships with experts emerge as a key factor in pest management decisions by farmers. Specialists may represent competing interests and farmers value their own experiential and multi-generational knowledge, to the extent that they are sceptical of experts and paid consultants. Farmer motivations for adopting IPM are varied and unstable. Long-term relationships with and trust in experts matter to farmers, as do good communication skills. These expert communication skills differ from approaches that scientists are accustomed to, and require an understanding of how to deal with recommendations that challenge accepted behaviour and experience.
Shenan C, Cecchetti CL, Goldman GB, et al. (2001) Profiles of California farmers by degree of IPM use as indicated by self-descriptions in a phone survey. <i>Agriculture, Ecosystems &amp; Environment</i> 84: 267-275.		x	x		USA	Hop aphid ( <i>Phorodon humuli</i> ), twospotted spider mites ( <i>Tetranychus urticae</i> ), downy mildew ( <i>Pseudoperonospora humuli</i> ), and powdery mildew ( <i>Podosphaera macularis</i> )
Sherman J and Gent DH. (2014) Concepts of Sustainability, Motivations for Pest Management Approaches, and Implications for Communicating Change. <i>Plant Disease</i> 98: 1024-1035.		x	x		USA	Although many of the contributing factors to the changed disease scenarios are anthropogenic, there has been a reluctance to control them by legislation, other forms of government authority or through public involvement." This paper looks at why this may be the case. Spring barley production amongst Scottish farmers. Reveals significant gaps between perceived and actual practice in three IPM measures: crop rotation, varietal disease resistance, and forecasting disease pressure. Concludes that more work is needed to understand why these gaps exist
Stenlid J, Oliva J, Boberg JB, et al. (2011) Emerging diseases in European forest ecosystems and responses in society. <i>Forests</i> 2: 486-504.				x	Europe	
Stetkiewicz S, Bruce A, Burnett FJ, et al. (2018) Perception vs practice: Farmer attitudes towards and uptake of IPM in Scottish spring barley. <i>Crop Protection</i> 112: 96-102.		x			Scotland	

Surendra GC, Mehmood S and Schelhas J. (2009) Segmenting Landowners Based on Their Information-Seeking Behavior: A Look at Landowner Education on the Red Oak Borer. <i>Journal of Forestry</i> 107: 313-319.	x		Red Oak Borer	USA	This study uses a segmentation technique to classify landowners into four relevant groups to explore their information-seeking behaviour about the red oak borer. Urban residents primarily received information about the red oak borer through mass media whereas rural residents relied on personal communication.
Sutherland L-A, Mills J, Ingram J, et al. (2013) Considering the source: Commercialisation and trust in agri-environmental information and advisory services in England. <i>Journal of Environmental Management</i> 118: 96-105.	x		General	England	Indicates that farmers build trust over the long term with advisory services and mistrust the 'hidden agenda' of advice from commercial businesses. Consistently allocating funding to well-known agencies or their affiliates is thus more likely influence farmer behaviour in the short term than 'contract' advisory projects awarded to novice service providers. Participants also trust services that are perceived as 'impartial' or actively 'pro-agriculture', although this incentivise advisors to provide information on easiest grant-funding routes, rather than encouraging pro-environmental behaviour.
Thompson L-J, Stenekes N, Kruger H, et al. (2009) <i>Engaging in Biosecurity: Literature review of Community Engagement Approaches</i> Canberra: Australian Government.	x				Reviews current literature on community engagement concepts and tools, and provides an overview of key principles that could be employed by the horticultural industry for biosecurity engagement activities.
Tomlinson I. (2016) The discovery of ash dieback in the UK: the making of a focusing event. <i>Environmental Politics</i> 25: 709-728.	x	x	Ash Dieback	UK	The identification of ash dieback in the UK is conceptualised as a successful 'focusing event', and the ways in which it was socially constructed by the media, stakeholders, and the government are analysed.
Tomlinson I, Potter C and Bayliss H. (2015) Managing tree pests and diseases in urban settings: The case of Oak Processionary Moth in London, 2006-2012. <i>Urban Forestry &amp; Urban Greening</i> 14: 286-292.	x	x	Oak Processionary Moth	UK	This paper examines how OPM was managed in London and asks why eradication proved so difficult. It explores the governance and management challenges faced by those involved in the attempted eradication campaign and assesses the extent to which the specifically urban setting of the outbreak intensified these difficulties.
Tomlinson I and Potter C. (2010) 'Too little, too late'? Science, policy and Dutch Elm Disease in the UK. <i>Journal of Historical Geography</i> 36: 121-131.		x	Dutch Elm Disease	UK	This paper presents a fresh analysis of DED in the UK. It seeks to explain the catastrophic outcome of the outbreak, not only in terms of the underlying (and highly malign) pathology of the disease itself, but also because of an initially inaccurate scientific assessment of the nature of the threat constructed within a small but influential community of forest pathologists and policy officials.
Tukey HB. (1999) Urban horticulture and the management of urban tree health. In: Lemattre M, Lemattre P and Lemaire F (eds) <i>International Symposium on Urban Tree Health</i> . 29-35.					Text/abstract not found
Urquhart J, Potter C, Barnett J, et al. (2017) Expert risk perceptions and the social amplification of risk: A case study in invasive tree pests and diseases. <i>Environmental Science &amp; Policy</i> 77: 172-178.		x	Ash dieback; Oak Processionary Moth	UK	This paper examines how 'experts' - defined as scientists, policy makers, outbreak managers and key stakeholders - construct and assemble their understanding of the risks associated with two invasive tree pest and disease outbreaks in the UK.
Urquhart J, Potter C, Barnett J, et al. (2017) Awareness, concern and willingness to adopt biosecure behaviours: public perceptions of invasive tree pests and pathogens in the UK. <i>Biological Invasions</i> 19: 2567-2582.		x	Various	UK	The authors use an online questionnaire involving 1334 respondents to assess awareness, concern and willingness to adopt biosecure behaviours. Despite revealing low levels of awareness and knowledge, the results indicate that the public is concerned about the health of trees, forests and woodlands and is moderately willing to adopt biosecure behaviours.
Vanninen I, Pereira-Queroil M and Engstrom Y. (2015) Generating transformative agency among horticultural producers: An activity-theoretical approach to transforming Integrated Pest Management. <i>Agricultural Systems</i> 139: 38-49.	x	x			Examines the role of a Change Laboratory as learning forum for IPM amongst greenhouse firms with a shared pest problem. Knowledge sharing and collaborative learning amongst the growers led to redesign of local IPM for whitefly without the need for externally-induced change.
White RM, Young J, Marzano M, et al. (2018) Prioritising stakeholder engagement for forest health, across spatial, temporal and governance scales, in an era of austerity. <i>Forest Ecology and Management</i> 417: 313-322.			Various	UK	The addressed research questions are: with whom, why and how should we engage across spatial, temporal and governance scales and with limited resources to achieve philosophical and practical goals regarding tree health? How do we prioritise engagement efforts to obtain 'best value'? The authors undertook two tree health projects, both using and investigating the concept of 'stakeholder engagement' in the UK: (1) exploring the concept of resilience with tree health stakeholders; (2) exploring how stakeholder engagement could enhance technology development for the early detection of tree pests and pathogens.
Wychkhuys KAG, Bentley JW, Lie R, et al. (2018) Maximizing farm-level uptake and diffusion of biological control innovations in today's digital era. <i>Biocontrol</i> 63: 133-148.		x			Evaluates the extent to which social science aspects have been incorporated into biological control research over the past 25 years, particularly elements that restrict diffusion and adoption at farm-scale. Their review indicates that <2% of papers on biological control address social science or technology transfer. Paper identifies effective communication strategies to enhance farmer learning and identifies shortcomings that restrict adoption and diffusion. Adult education programmes and the use of video, smart phones or tablets are recommended as effective means of communicating information and technologies and facilitating social learning.

PHC2018\_10 Appendix 2 – Stakeholder Map



PHC stakeholder analysis

Stakeholders

	Vector	Governor	Manager	Monitor	Networker	Non professional interest	Forestry	Agriculture	Horticulture	Natural environment
<b>Governors</b>										
DEFRA/ PHSI		x			x		x	x	x	x
APHA		x		x			x	x	x	x
SASA		x		x			x	x	x	x
Forestry England		x	x	x	x		x	x	x	x
Forest Research		x		x	x		x	x	x	x
Fera		x		x	x		x	x	x	x
Scottish Forestry		x	x	x	x		x	x	x	x
EPPO (European)		x		x	x		x	x	x	x
Local Authorities		x			x		x	x	x	
SNH		x	x		x		x	x		x
Forest and Land Scotland										
EFSA (European)										
SEPA								x		
Scottish Government		x						x		
EFNA (European)										
Forest Enterprise Scotland (now Forestry and Land Scotland)										
<b>Knowledge networkers</b>										
researchers				x	x		x	x	x	x
entomologists				x	x		x	x	x	x
geneticists				x	x		x	x	x	x
social scientists				x	x		x	x	x	x
botanists				x	x		x	x	x	x
ecologists				x	x		x	x	x	x
Royal Horticultural Society				x	x				x	
Agricultural extension officers			x	x	x			x		
pathologists				x	x		x	x	x	
economists								x		
agronomists				x	x			x		
agricultural scientists								x		
psychologists										
geographers										
colleges and universities								x	x	x
CABI										
Landscape Institute										
Plant health centre (PHC)				x	x		x	x	x	x
Agriculture and horticulture development board (AHDB)					x			x	x	
farming press								x		
JNCC				x	x					x
International Plant Sentinel Network					x					
Trees and Design Action Group					x		x	x	x	x
<b>Practitioners</b>										
landscape architects	x		x				x		x	
plant nurseries	x		x				x		x	x
garden designers										
Forest agents										
foresters			x				x			

farmers				x					x		
farm workers									x		
Horticultural plant growers				x						x	
parks departments				x				x		x	
forestry agents											
landscape contractors											
tree officers (eg London)											
arboriculturalists											
golf course managers											
managers of private clubs, sports grounds etc with plants											
Highways Agency											
Network Rail											
MOD											
RAF											
<b>Private Sector (apart from practitioners in the field)</b>											
Companies developing technologies (including pesticides)					x			x	x	x	x
Plant breeders								x	x	x	
Traders of plants/seed		x						x	x	x	
Traders of material using wood packaging		x						x			x
garden centres and large retailers											
growers											
logistic companies											
small retailers											
Horticultural Trade association											
NFU											
CONFOR											
Institute of groundsmanship											
Forest Stewardship Council											
BALI										x	
ICF								x			
Royal Forestry Society								x			
<b>NGOs</b>											
OPAL								x			
Woodland Trust				x	x	x		x			x
WWF						x					x
Friends of the Earth						x					x
Community Woodland Association				x		x		x			x
Royal Botanic Gardens Edin					x	x		x		x	x
Royal Highland Show					x	x			x		
Tree Council (English?)											
Reforestation Scotland											
RSPB									x		
National Trust											
Scottish Wildlife Trust											
Permaculture Association											
Plantlife											
Butterfly conservation											
Union for Ethical Biotrade											
BASE UK (conservation agriculture)									x		

Linking enviroment and farming (LEAF)										X		
Soil association										X	X	
Trees for Life				X					X			X
<b>Publics</b>												
community groups locally		X					X	X				X
mountain bikers		X					X	X				X
hikers and ramblers		X					X	X	X			X
gardeners		X		X			X	X			X	
urban residents (street trees and parks)							X	X			X	
small woods association				X				X				