	Organism(s)	Means of spread	Control measures	Control approaches being used in other countries	Detection/ diagnostics	Scale of damage commercial loss amenity, landscape (die back, reduced vigour, tree mortality)	Knowledge gaps	Research in progress	Opportunities to work with others? Who?	Impact of research on control	Likelihood of developing practical control options	Longer term options
Established												
Acute oak decline	Likely complex of bacteria and insect	Unknown, but pruning tunes machinery, human transmission implicated. Also possible involvement of insects, birds or animals.	Research required so advice can be evidence based. e can be evidence based. In the interim use preventative measures. Raise public and sector awareness through information and training. Notices at woodland entrances. Disinfection of implements, machinery, footware. If necessary cordon off affected areas.	Felling, but status of disorder uncertain elsewhere	Identification of micro-organism likely to be involved underway	Dieback and/or rapid mortality of infected native oaks. On average 25% of trees on an affected site symptomatic, over one year of monitoring 1% of trees died. Currently limited distribution GB wide	Causes of the condition - role played by organisms, host status, environmental conditions, effects of climate change. Epidemiology and transmission; extent and severity in Britain, rate of change; control and management. Research is critical to determine these aspects so that management practises can be tested and implemented.	Cause of condition: agents currently under identification and testing for role in the decline. Aspects of epidemiology and monitoring.	Some national and international networks already in place (Wales, Spain, Belgium, South Africa)	MEDIUM especially as currently very little know about this decline	MEDIUM; made more complex by the number of potentially interacting agents	Understanding interaction with climate change could improve mangement options
Bleeding canker Horse chestnut	*Pseudomonas syringae* pv aesculi (bacterium)		None available, prune affected branches	None	Real-time PCR, developed by FR	70% HC trees affected by symptoms in parts of England, 36% in Wales and 42% in Scotland (based on 2007 survey)	Pathways of spread into and within Europe, genetic processes facilitating infection of woody parts of the tree, spread and survival outside of the host	Epidemiology of Pae epidemic in Europe. Evolution of Pae . Survival of Pae in soil and water. Functional analyses of genes considered to be important to infection of HC	University of Edinburgh on bacterial evolution. International collaboration with pathologists in India where the causal agent originates	Understanding genetic processes of infection, eventually understanding mechanisms for tree resistance	MEDIUM based on sound epidemiological and genetic research	Identification of resistance mechanisms
Dothistroma needle blight. Nb - two pathogens cause the disease, *D. septosporum* a nd *D. pini* , and only the former is known to be present in GB.	*Dothistroma septosporum* (fungus)	Long-distance: Planting material and C17potentially seed lots contaminated with needle debris.; Locally: Rain, and longer distances by wind-blown mists	Destruction of infected planting stock. Use of alternative (resistant) species). Silvicultural practices i.e. increased planting density, good weed control, thinning reducing humidity and inoculum can provide some benefit. Copper based fungicides in nurseries (but not approved for use in the forest) - these suppress the disease but do not eradicate it.	As for control measures but a greater reliance on aerial spraying of copper fungicides (e.g. New Zealand). Some tree breeding of P. radiata also undertaken but the reduction in tree susceptibility is not great. although management methods are fairly well developed, large losses still occur regardless e.g. ca. £10 million/annum in NZ.	Detection limited to june/july when symptoms inc. fruit bodies are most evident. Diagnosis well developed where fruit bodies are present i.e. mainly June/July (both through microscopic analysis of spores and standard and real-time PCR; Also PCR methods to distinguish mating type and microsat and RAPD genotyping methods.	Most commercial pine spp susceptible; Now found across Britain. As well as and major loss of timber yield, increasing and rapid mortality being observed, particularly in LP. Increasing reports on SP (including nurseries where fungicides applied) resulting in concerns not only for commercial forestry but also native Caledonian pine forests.	**Monitoring and diagnostics:** Extent on all susceptible commercial species (including spruce, DF); Severity and rate of change on above; the potential for using aerial surveys/remote sensing; Improved monitoring and detection, particularly when fruit bodies are not present; Assessment of the population structure and how it is changing (inc. presence/absence of D. pini and M. Pini as well as D. s septosporum;. **Disease epidemiology i**ncluding timing of spore dispersal, dispersal distance, spore persistence and critical loads, impacts of other environmental factors including climate change, relationship with other P&D; **Management under GB condition**s including silvicultural practices, use of a range of fungicides, host resistance mechanisms; **Economic, environmental and social impact inc**luding volume loses, mortality rates, rates of decay, timber properties, fire risk, ground nesting birds, recreation, health, Caledonian forest ecosystems.	Some aspects of monitoring, epidemiology, management and impact.	COST Action just about to start including representatives from 20+ European countries, NZ, Canada, South Africa, Russia and the Ukraine.	HIGH	MEDIUM/HIGH	
Large pine weevil	*Hylobius abietis* (weevil)	Predominantly by adult flight. Some potential for international spread in infested bark.	Protection of conifer transplants with insecticides. Some potential for biocontrol with parasitic nematodes. Limited potential for use of physical barriers on transplants. Monitoring (pine) and Management Support System (spruce) to minimise risk to transplants. Fallow period.	Insecticides. Scarification of planting site. Spray-on physical barrier.	Larval population in root-stumps at clearfell site. Feeding damage to stem of transplants. Transplant mortality.	Around 30% mortality of unprotected transplants in areas at risk. Nationwide risk in conifer plantation forestry.	Impact of climate change on population dynamics and damage. Methods of improviing transplant resistance. Variation in pathogenicity of nematodes and synergism with pathogenic fungi in biocontrol.	Development of Management Support System. Optimisation of biocontrol. Development of models to predict effect of climate change on damage intensity.	Large programme of research in Scandinavia.	Novel (non-chemical) methods of control all research based.	Several methods of minimising damage being incorporated into management programmes.	Plant resistance. Changes in forest management. Possible biocontrol
Great spruce bark beetle	*Dendroctonus micans* (beetle)	International spread: Unbarked spruce logs/spruce bark from regions where native or established. Single females can establish. Local spread: Movement of infested material. Natural spread by adult flight	Biocontrol. Thinning to remove infested trees.	Biocontrol. Monitoring and destruction of infested trees	Resin bleeding/resin tubes on stem. Discolouration of foliage. Galleries in bark	Significant mortality in infested stands	Influence of climate change on semi-voltine life cycle and damage. Potential to escape biocontrol as climate warms	Effect of temperature on the bark beetle, its predator and their interaction.	Some contact with Belgian and French workers	Biocontrol research-based.	High	Monitoring and forest management. Biocontrol. Provenance variation in resistance.