



National Tree Improvement Strategy

Action Plan

	Short term (1-5 years)	Mid-term (1-10 years)	Long term (1-25 years)
Governance	Review the governance arrangements and amend as the partnership evolves.	Regular review of the governance arrangements to ensure they remain fit for purpose, and reflect current realities.	
	Look at international examples of tree improvement and learn from them – what models of governance do they use? Can we evolve or develop those?		
	Look at governance options including (i) not-for-profit company; (ii) Community Interest Company; (iii) registered charity (iv) the current arrangement of a collection of representatives from other organisations.		
	Decide where and who should host the joint knowledge base.		
	Agree terms of reference and focus of work.		
Funding	Explore the opportunities for tax relief to support research.	Explore opportunities for combined research calls with for example NERC & BBSRC (via universities), Woodland Trust, and UKAPH Partnership.	Maximise income from IP to benefit future research.
	Explore ways of extending the FTT model for funding research involving private charitable trusts.	Short-term research contracts – but we need a long-term platform of basic resources e.g. research fellowships, PhD students, staff.	
	Explore novel sources of research funding such as venture capitalists, corporate investors, and private investors of high net worth.		
	Secure current level of public funding for the next 5-years.		



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Research	New breeding plans for emerging species	Find plus trees for alternative and minor species and safeguard in clone banks according to a written strategy.		
		Establish and manage species trials designed to widen choice at higher elevations.		Understand the scope of hybrids in tree breeding for improved performance.
		Establish the scientific basis for productivity gains according to species and provenance choice for different bioclimatic zones (linked to ESC).		
		More field-based genetic testing of plus trees across the species.		
		Establish new seed orchards using plus trees from existing and new alternative conifers and broadleaf species.		Results from genetic field trials leading to establishment of new Tested Seed Orchards.
	Establish a database of phenotypically superior stands for both existing and alternative species, e.g. Silvifuture and FRM Register.			
	Understanding the use to society of non-commercial species in a non-woodland setting.			
	Investigation of more advanced breeding techniques	Commence development of DNA-finger printing or genotyping selected trees within most species for reasons of pedigree certification, measurement of genetic diversity, measuring deviations from panmixis (when all parents in a seed contribute equally to the harvested seed) and external pollen contamination in seed orchards.		Further development of DNA markers leading to genomic selection (GS) for specific traits in key species.
		Establishment of genetic field trials of more established species leading to tested seed orchards.	Successful tissue culture or vegetative propagation of key broadleaf and conifer species.	Operational genomic selection using DNA-markers for important economic traits (wood quality; vigour; disease resistance; seed production) of key species.
		Species breeding plans to include strategy regarding management of genetic diversity.	Understand the genetic basis and markers for shake in oak.	
Techniques to control flowering in conifer and broadleaf seed orchards.				

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Research	Impact of Tree Breeding	Develop plans to investigate if new 'Yield Models' are required for improved planting stock.			
		Up-dated realised gain figures and financial benefits of improved material based on early plantings – include aspects of stem and wood quality.		Evidence to support silvicultural advice for improved material based on findings from estimations of realised gains.	
		Impact of tree breeding on wood quality – conifer and broadleaf species; established and emerging species.			
		Report on societal impacts of tree breeding.			
		Plan Reciprocal Transplant Experiments for key broadleaf species to assist future provenance selection in a warming climate.	Provide evidence on where to source stock of UK-grown species.		
	Understand how tree breeding can contribute to carbon sequestration values and other ecosystem services.				
	Resistance Breeding and anticipated climate change	Advance plans to develop a Chalara (ash die-back) tolerant breeding programme which can then act as a model and lessons learnt for other species.			Investigate species in need of resistance breeding in collaboration with other countries.
		Programme of work to establish priorities for resistance and resilience breeding.	How to deploy resistant or climate tolerant material – seed orchards, VP, tissue culture. Commission research as appropriate.		
		Investigations into how selection and breeding can reduce grey squirrel damage in broadleaf tree species.			
		Collate a comprehensive database of past and current work on UK tree breeding.	Establish realised gain trials (as opposed to predicted gain) for key species; includes quality and quantity traits. Evaluate percentage gains and financial benefits.		
		Database of genetic resources currently available across the species; seed stands, plus trees, orchards.	Evaluate possibility of breeding for alternative traits e.g. Biofuels.	Record and retain old experiments to provide long term information about a variety of characteristics.	



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Intellectual Property	Decide how to resolve IP issues within the partnership and establish a protocol for managing these.	Consider joint spin outs of IP including exploitation of commercial opportunities to benefit the NTIS.	Ensure control of IP retained in the genomic age.
	Ensure all MoUs and MTAs for exchange of data and material are held in a central location.	Make shared IP freely available and encourage uptake and development.	
Communication	Make the database of past and current work widely available.	Species specific pages on website relating to level of genetic improvement, uses of the timber and plans for the next 10-years.	
	Ensure research outputs and impacts of NTIS are well publicised.	Consider need for an NTIS ambassador.	Centre communication hub for all information relating to tree breeding, FRM, availability of improved stock and current tree breeding research.
	Target our communications more effectively to achieve greater engagement with landowners.	Set up a communications sub group to manage tasks.	
	Set up a website for the NTIS.	Engage with other disciplines to broaden the research demand.	
	Discuss with countries opportunities for making use of the planting grant schemes, weighted to favour improved stock.	Secure these grants for planting improved material.	
		Provide advice on matching planting stock with sites to give correct end-product.	
	Seek views on 'Strategic Research Needs' from others not currently engaged.		
	Formulate a strategy towards Genetically Modified Organisms (GMOs).		
	Maintaining dialogue with relevant stakeholder groups through meetings, seminars, newsletters and other forms of preferred communication.		