



Strategy

2022-2032



BREATHING NEW LIFE INTO OUR WOODLANDS

Mission Statement

We are an organisation dedicated to promoting resilient, healthy and productive forests and woodlands by creating genetically diverse breeding populations of tree species.

Vision Statement

We envision that all productive forests and woodlands in the UK will contain a proportion of selected or genetically improved trees to enhance diversity and resilience to climate change, pests and diseases. The wood they produce will be used in the construction of net zero carbon buildings, locking up carbon for decades and helping to mitigate the impacts of climate change.

Issues facing forestry and trees today

Forestry today is facing many challenges. Some of the key issues are:

- **A changing climate** which brings with it uncertainty as to how our trees will thrive and grow.
- **A lack of tree planting** in general. In 2020/2021, just over 13,400 ha of new planting were established in Great Britain, with only 2,180 ha in England and 290 ha in Wales.
- **A lack of availability of planting stock** for minor species necessary to maintain and increase diversity. While it is recognised that new woodlands and forests should contain more species to assist with diversity and resilience, sourcing this material for minor species from UK origins is challenging.
- **The recent introduction of many novel pests and pathogens.** New pathogens have not evolved with our native tree population meaning that there is little resilience to them.
- **We import 80% of the timber we use,** with associated carbon miles, at a cost of £7.5 billion.
- **Bottle necks in seed supply** to meet ambitious government planting targets.
- **A lack of available labour** and skills with an aging professional workforce.

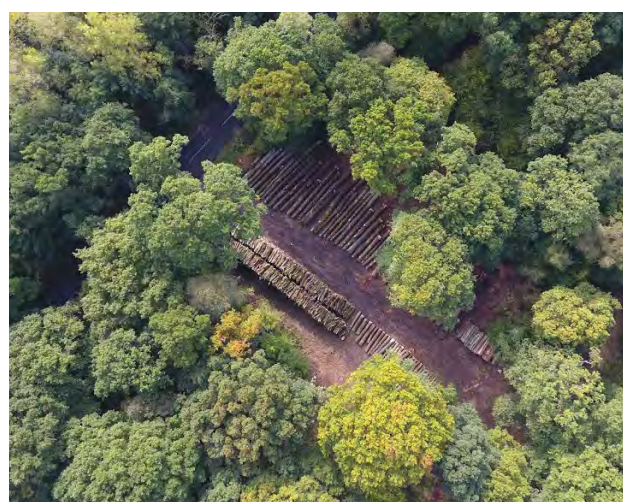


Introduction: why do tree improvement?

Healthy, productive and sustainable forests that provide high-quality timber offer many benefits through their natural and economic capital.

Healthy forests that have high levels of genetic diversity are expected to be better adapted to environmental fluctuations, including long-term climate changes, and to be more resilient to diseases and pest attacks. Trees with improved growth and form will have an increased rate of carbon sequestration and can be used for a wider range of wood products that act as long-term carbon stores. Such forests should be an essential part of a multi-faceted approach to climate change. The conservation and utilisation of forest genetic resources is thus vital for forest adaptability and resilience, and to ensure their future productivity and contribution to climate change mitigation. Breeding strategies for forest trees must take all these into account.

Gains in yield and other traits such as stem form or disease resistance cannot be achieved without robust scientific research and with the participation of diverse partnerships. Today's high agricultural yields have been gained through centuries of breeding, while tree improvement is a relatively new discipline. With continuing advances in molecular genetics and the development of techniques such as marker-assisted selection (MAS), Future Trees Trust believes that there is potential for significant gains in both tree productivity and tree health in the coming decades.

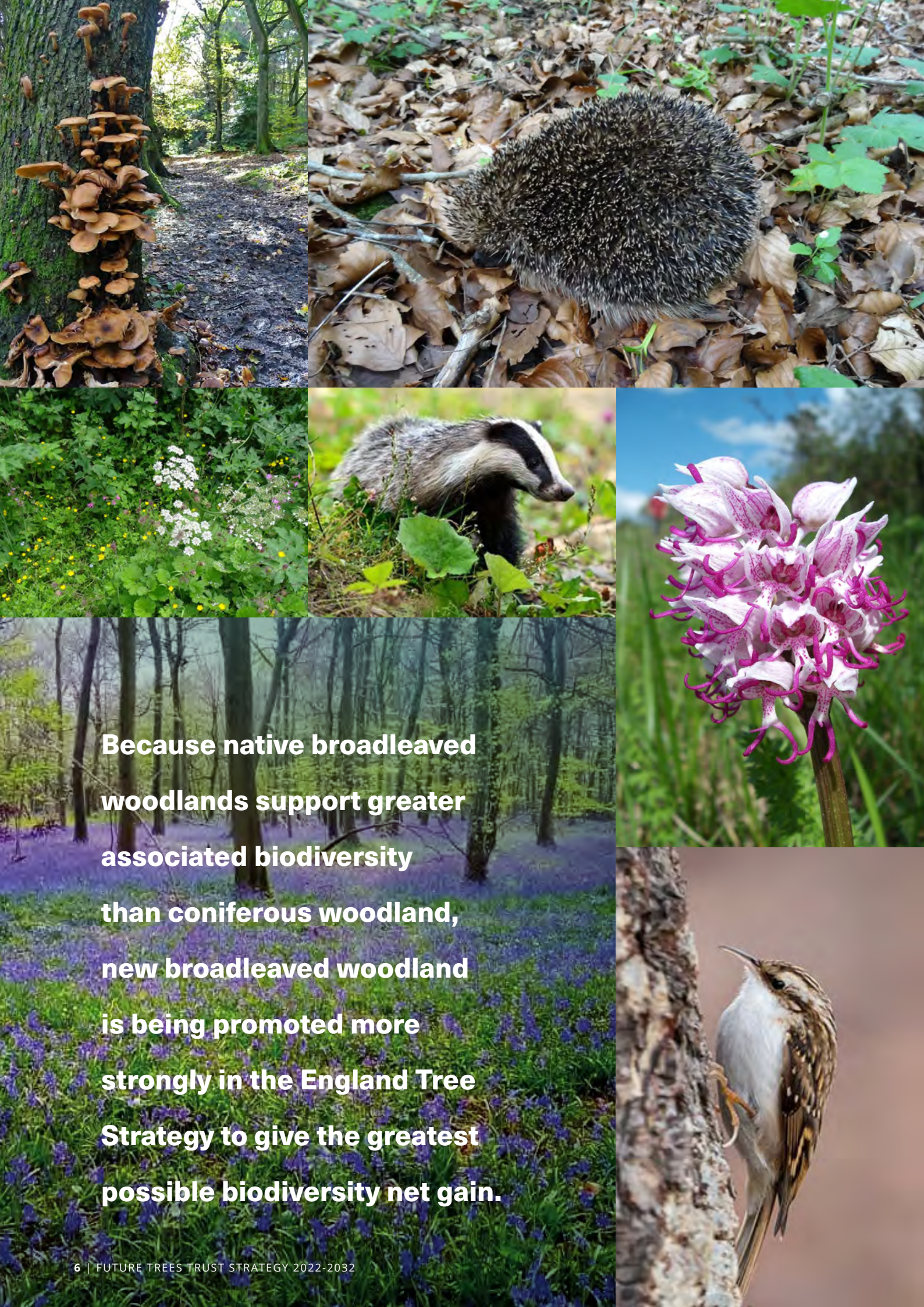


Historically, tree improvement in the UK has focussed on coniferous species, most notably Sitka spruce. Broadleaved tree improvement has received a low level of support that has slowed its progress and limited the availability of improved broadleaved planting stock. Future Trees Trust is the only charity dedicated to broadleaved tree improvement, focusing on both wood production and forest resilience through the provision of genetically diverse breeding populations.

Woodland owners seeking to include improved broadleaves in new woodlands are still faced with very little choice in terms of improved planting stock. At present, improved material (defined as *qualified*) of silver birch, wild cherry and sycamore is available, although this is not widely recognised or sought after by those planting trees.

This strategy outlines how we will meet our goals of bringing improved (*qualified* and *tested*) material to market for the UK's main broadleaved species and commence breeding for improved yields, how we diversify species availability to help meet ambitious government planting targets and how we improve awareness of tree improvement programmes and availability of improved planting material.

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Strategic Context

Over the last decade, we have seen a gradual shift in perceptions of what forestry means both to practitioners and to the public.

There is an identified need to increase our woodland cover as a tool to help the UK reach net zero carbon by 2050, as outlined in the Climate Change Act of 2019. The England Tree Strategy (May 2021) identified a target of 30,000 ha of new planting a year by 2025 to this end. Forestry England's strategy Growing the Future: 2021-2026 identifies action for climate as 'The nation's forests being resilient to climate change, increasing their value for communities by producing high-quality, sustainable timber and absorbing carbon emissions' which will be delivered through at least 2,000 ha of new, productive and predominantly broadleaved woodlands planted. Scotland and Wales too, have ambitious tree planting targets as laid out in their strategic documents.

Because native broadleaved woodlands support greater associated biodiversity than coniferous woodland, new broadleaved woodland is being promoted more strongly in the England Tree Strategy to give the greatest possible biodiversity net gain. Increasingly, diversity of woodlands is seen as a key function of resilience. Diversity often refers to biodiversity (the number of different species) but also includes diversity at the species level – genetic diversity – which is needed to ensure that species can survive, adapt and evolve under changing environmental conditions.

Productive forests that yield high recoverable volumes of timber will help to store increasing amounts of carbon. The amount of carbon stored will increase not only in parallel with the yield increase expected from breeding programmes, but also with the expected increase in the area planted. Higher growth and productivity also mean that less land is required to achieve the same goals. The higher value of the timber from improved seed will also help to encourage new plantations and timber uses that are likely to lock up carbon for long periods. Local timber is more likely to be used if it is of a high quality. Nationally, using home-grown timber reduces

dependence on imports and transport (carbon miles). Locally, it makes economies stronger and creates employment and innovation.

Future Trees Trust believes passionately in productive broadleaved woodlands that are genetically diverse and adapted to UK growing conditions. Our main aim has been to increase the availability of improved planting material (*qualified* and *tested*) for productive broadleaved species, both native and non-native. Climate matching research suggests that incorporating some planting stock from 3° south (and possibly as much as 5° south) of a planting site is a sound approach given the uncertain future climate. Sourcing some near-continental material for inclusion in breeding populations therefore seems sensible. Ambitious new planting targets for Britain, coupled with the worrying rise in pests and disease, emphasize the need for home-grown trees from a wide range of species to help the forestry sector meet these targets. Identifying appropriate sources of planting stock for minor species is therefore addressed in this strategy as well as taking forward the breeding programmes for our well-established species.

Well-managed and species-rich woodlands offer a great deal to society. In addition to timber production, forests clean the air, filter watercourses and reduce flooding and erosion. They sustain biodiversity, improve mental wellbeing in urban spaces and provide people with opportunities for recreation, education and cultural enrichment. All woodlands offer these benefits but establishing new woodland with improved planting stock offers many key advantages. Trees get established more quickly, reducing early mortality and the amount of herbicide required. Trees grow more quickly and so rotation times are reduced. Tree form is improved, increasing the volume of recoverable timber that can be used in construction and wood products that lock up carbon for decades. Woodlands established with improved material are more likely to be well managed and deliver all these benefits to society.

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What we have achieved to date

Originally starting in 1991 as the Ash Improvement Programme instigated by Oxford university, 30 years on, we have developed into the premier organisation for broadleaved tree improvement work.

We have been working mainly with eight commercially important broadleaved species, selecting plus trees, and bringing material from these selections together in archives and clonal seed orchards. We have a limited number of progeny trials for ash, oak and sycamore. We lead on the Living Ash Project, finding trees with tolerance to ash dieback.

We have:

- *Basic material:* over 1600 plus trees selected.
- *Clonal material:* some but not all basic material is secured in clonal archives. Clonal seed orchards exist for wild cherry (5), sycamore (4), silver birch (3), sweet chestnut (1) pedunculate oak (1) and sessile oak (3).
- *Progeny trials:* ash (testing 36 parents); oak (testing 64 parents across two species); sycamore (testing 35 parents).
- Established the national archive of ash trees with tolerance to ash dieback through the Living Ash Project.
- Been instrumental in creating the National Tree Improvement Strategy (NTIS), which is concerned with utilising genetic resources, and the UK Forest Genetic Resources Strategy (UKFGR) which is concerned with conserving genetic resources.

In the last two years, we have undergone substantial development. We have consolidated our research base and created a database of our resources which is accessible and available to all. We have reviewed our core species work, and for each species we have outlined work required over the next 5 – 10 years to produce *tested* forest reproductive material. We have created a [platform](#) for UK Forest Genetic Resources which catalogues all our trials and plus trees as well as the UK's Genetic Conservation Units (managed by EUFORGEN) and seed collections sources made by the UK Native Tree Seed Project (Royal Botanic Gardens, Kew).



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How we will take our work forward



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Through Tree Breeding

Tree breeding programmes begin with the selection of the best individuals for any desired trait – known as plus trees – which form the foundation breeding population. This material enters the breeding programme with several aims, namely to:

- 1 Reduce rotation length by selecting individuals with faster growth rates.
 - 2 Increase recoverable volume by selecting for traits such as reduced forking or finer/lighter branching.
 - 3 Maintain tree health by selecting individuals with no symptoms of disease or pest damage.
 - 4 Investigate adaptation and gene flow. With the projected changes in climate, it is increasingly important to understand the adaptive capacity of trees and to maintain a broad genetic base.
- First generation progeny trialling will identify genetically superior trees which can be crossed with each other.

Through Resilience

Resilient forests are those that can absorb and adapt to disturbances such as climate change and attacks by pests and diseases. Trees planted now may not thrive in the climatic conditions that they will experience over their lifetimes, or they may be at risk of greater pest and disease attack. There are many ways that forests can be planted and managed to help build resilience. At Future Trees Trust, we are concerned with the composition of the planting stock, ensuring that it is genetically diverse and adapted to UK growing conditions now and in the next 30 years. There are several objectives we can carry out to support resilient woodlands:

- 1 Look at augmenting basic material by including material from nearby continental Europe which may be better adapted to future climates in the UK.
- 2 Genotype basic material to ensure high and representative genetic diversity, prioritising oak, then sycamore, cherry and finally birch.
- 3 Work with minor species to augment species diversity.
- 4 Consider establishing reciprocal transplant experiments for key species to provide information on adaptation to different climatic conditions.

Through Tree Health

Protecting trees from pests and disease is essential. Outbreaks of disease are not just devastating to our natural environment, they affect our economy and wellbeing. The asset value of our trees is estimated at £175 billion. The cost of addressing ash dieback alone is estimated at £15 billion. Biosecurity is essential as highlighted in the England Tree Strategy (2021) and the Tree Health Resilience Strategy (2018). Research into and supporting tree health is therefore vital. We will:

- 1 Continue work on the Living Ash Project and look to breed trees of greater tolerance in the future.
- 2 Make populations and resources available to partners to work on other species and pathogens, e.g., acute oak decline; chestnut blight; Dutch elm disease.
- 3 Be open to partnership working in research for healthy broadleaved trees.
- 4 Support the promotion of the Plant Healthy Certification scheme of nurseries.

Through Communication and Technology Transfer

Communication and outreach are key to the success of any research programme. The categories of basic material are not well understood by industry and use of improved material where available is not always seen as a first priority. To address this, we will:

- 1 Establish demonstration plots to illustrate difference in performance of various categories of forest reproductive material (FRM).
- 2 Create orchard deployment maps to inform land managers of the availability and suitability of planting stock from Future Trees Trust's work programmes.
- 3 Create a series of infographics on topics relevant to what we do, e.g., seed orchard management; managing seed stands.
- 4 Host an annual supporters' day for the dissemination of results.
- 5 Create policy briefs to inform the sector of our work.
- 6 Work with nurseries and seed producers to promote our work.
- 7 Create promotional material for funding proposals and dissemination to the forestry sector.

Our Goals

Carry out research to further our aims and objectives

We will:

- Continue progeny trialling** all our core species to bring *tested* material to the market and to better understand adaptive traits.
- Continue work on the Living Ash Project** and be open to working in partnership on other tree health projects.
- Future proof our breeding populations** by incorporating up to 20% non-UK origin trees, still adapted to UK growing condition.
- Commence work on minor species** by locating plus trees and creating clonal seed orchards of *qualified* material, prioritising species for wood production and woodland resilience.
- Carry out genotyping** of all our plus trees to characterise and better understand the genetic diversity of our breeding populations.
- Demonstrate the gains** that can be made from using improved material through a series of demonstration plots around the country.

Grow our organisation and increase our impact

We will:

- Actively seek partnerships** to deliver our targets in the most cost-efficient manner.
- Raise awareness** of the benefits of using improved trees. The concept of improved trees and the many benefits they bring to society needs to be embedded in policy and practice in the UK.
- Communicate our research** through peer-reviewed publications and more accessible formats such as industry journals and social media.
- Develop a Future Trees Trust brand**, renowned for its excellence.
- Work with nurseries and seed suppliers** to promote the use of improved material where appropriate.

Sound governance and sustainability

We will:

- Invest in our people** by offering training and development programmes and wellbeing initiatives, so they can enjoy fulfilling work lives.
- Encourage young professionals** through our doctoral and scholarship programmes through access to government funds such as the Green Recovery Challenge Fund, Kickstart and the National Skills Fund.
- Ensure robust financial sustainability** by diversifying our income streams and always retaining six month's core operating costs.

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Measures of Success

What you will see in the next ten years

Increased research

We will:

- Establish three progeny trials for sycamore.
- Establish three progeny trials for silver birch.
- Complete plus tree selections for downy birch and establish clonal seed orchards.
- Identify a minimum of 30 plus trees for five minor broadleaved species.
- Establish clonal seed orchards of phenotypically superior trees for five minor broadleaved species to bring *qualified* seed to industry.
- Develop plans to establish progeny trials for wild cherry and for oak that test at least 100 plus trees.

Increased resilience

We will:

- Genotype all plus trees for our core species to further understand our genetic resource.
- Incorporate up to 20% of non-UK material in our breeding populations to aid adaptation to a warming climate.
- Produce and promote ash trees tolerant to ash dieback.
- Make our extensive genetic resource available to any research partner to improve tree health in the UK and abroad.

Increased outreach

We will:

- Plant demonstration plots to illustrate the benefits of using improved material.
- Established a recognised and respected brand, identifiable with improved planting stock.
- Make *qualified* or *tested* seed available for eight core and five minor broadleaved species.
- Increase our social media presence which currently reaches over 25,000 people.
- Publish peer-reviewed papers in academic journals.
- Support and engage new young professionals through our scholarship programme, embedding the benefits of tree improvement and use of forest genetic resources in their working lives.
- We also have an ambitious target to begin controlled breeding programmes for one or two key species such as oak and ash. To undertake this work, we need a site where we can establish an archive of all our basic material. We will review options in taking this work forward.

We will increase research including progeny trials, plus tree selections and establishing clonal seed orchards; work to increase resilience in native trees and share our genetic resource; and create multiple channels for outreach and promotion.

Birch seedlings at Maelor Forest Nurseries. Even at this stage of growth, those on the right, grown from improved genetic stock, show significant gains in size and robustness.





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