

# Agri-Food and Biosciences Institute - Fast Growing Hardwood Native Trees

5/12



## Key Points



AFBI - 'Fast-growing' Oak tree project

Possible use in Agro-forestry systems to reduce early management costs, help absorb more carbon and reduce nutrient leakage through an improved root system.

Potential use for tree improvement programmes - as tree breeders seek to accelerate flowering of broadleaved trees. This is a serious problem for the oak tree breeding programme which can be delayed for a long time.

The trees have vigorous seed production which could provide income for farmers.

Adaptation through better quality Oak trees - better flood defence against the increased frequency and intensity of extreme weather projected for Northern Ireland.

This case details research by AFBI into fast-growing native trees which could have a large impact on forestry in Northern Ireland and further abroad. It sits within the Natural Environment category of the Northern Ireland Adaptation programme.

The 'Fast-growing hardwood native tree' project is one of several that AFBI has run in recent years in relation to forestry. Trees are one of the best natural adaptation systems against flooding and heat and they also have considerable capacity for climate mitigation through carbon dioxide absorption. The project aimed to develop and use a new method designed to improve the growth rate and accelerate the maturation of native hardwood trees.

The project placed special emphasis on increasing participation from and benefits to farming communities, through collaborative work with DARD and other organisations in the UK and Ireland.

AFBI and DARD supported the initiative in order to create a better understanding of the importance of trees to the economy, biodiversity and climate change. Other private organisations have recognised the innovative and collaborative approach taken in this project as potential best practice for growing Oak and alternative species. AFBI's work with Future Trees Trust and the UK Agroforestry Forum offer successful examples of collaboration.



## Overview

AFBI collaborated with a number of other organisations on a project to create fast-growing native oak trees using processes like screening and specially-designed containers. Two experimental sites were located in Northern Ireland and although more work needs to be done, this initial project was a success.

## Objectives

Reduction in time required to produce seed. This could lead to significant advances in tree improvement, making breeding efforts more efficient by accelerating the planting of tree breeding populations. This, in turn, will satisfy major economic and environmental needs.

Accelerate growth rate of trees for timber production and/or biomass fuel.

The project aims to promote this technology to selected forest nurseries, farmers and other private organisations both in the UK and abroad, for tree biomass and regeneration programmes.

## Process

The method is a multistep system which involves producing and screening tree seedlings and then growing them in specially-designed containers to encourage root growth through 'air pruning.' The process places emphasis on the root system, physiological parameters and the whole chain of tree production.

Using this method, Oak tree seedlings have been produced within eight months as opposed to the two years it takes using the standard bare-root transplant technique. The seeds from the project were planted in experimental sites in two locations in Northern Ireland. Oak trees produced using the new technology have improved survival, growth rates and flowering in the field.

## Challenges

Collaboration between multiple agencies and organisations can always be a challenge but every team involved worked well for this project. As with most scientific projects, establishing best practice can be a time-consuming experience.

In order to extend its commercial potential the technology still needs further research and development. AFBI would need to seek additional funding and support for this.

“Using this method, Oak tree seedlings have been produced within eight months as opposed to the two years it takes using the standard bare-root transplant technique.”

Rodrigo Olave, AFBI

## Successes

The project assessed the growth and carbon sequestration ability of Oak trees grown under this method. The results show that the fast-growing production method increases the growth of trees and hence increases the amount of CO<sub>2</sub> sequestered from the atmosphere. The increased root biomass does not have any effect upon soil processes for ten year old trees.

Results from these experimental sites suggest that growing Oak trees with this technique would induce flowering and seed production in a shorter time through accelerated root growth. The time required to produce seed is now 8 months, down from 2 years.

The findings could lead to significant advances in broadleaved tree improvement, creating market opportunities in improved tree seeds. This would also help to reduce seed imports from continental Europe across vulnerable supply chains, and will be more cost effective. In addition the speed of growth could help increase the amount of woodland cover in Northern Ireland to the 12% target set by the Forest Service.

This technology could be of value in ensuring better growth of trees for integration with grazing in an agroforestry and farm woodland systems. Using these trees in agroforestry and conventional forestry could reduce early management costs, may help to absorb more carbon and could reduce nutrient leakage because of a better root system. The trees also have vigorous seed production from earlier in the lifecycle, which could provide income for farmers.

## Climate Adaptation

The fast-growing oaks from this project are superior tree specimens and would be ideal for climate adaptation through an agro-forestry system or simply for the forestation of rural areas. They act as a better flood defence against the increased frequency and intensity of extreme weather projected for Northern Ireland. When used in farming, they protect animals and soil quality against periods of extreme heat.

The project produced stronger trees with a higher growth rate which improves their resilience to climate change. Current Oak trees are of insufficient quality; however the oak trees produced with this method will probably have better climatic adaptability and disease resistance to provide an economically viable timber resource. At the same time they will sequester more CO<sub>2</sub>.

## Lessons learned

AFBI learned that technology adoption and commercialisation need to work in parallel with research and development to increase the environmental and economic benefits of the research. The commercial and environmental potential can only be added to by validating the technology with more research and development.

AFBI would also “reinforce scientific skills within the project” and host additional events to transfer the technology in order to reinforce the benefits of project locally.

The seeds from the early production cycles could be used to restore wildlife areas where seeds are good food sources.

The project is currently in the process of seeking funding and support for further research and development.



[climatenorthernireland.co.uk](http://climatenorthernireland.co.uk)

5/12



Funded by



Administered by



**Dr Rodrigo Olave**

AFBI  
[rodrigo.olave@afbini.gov.uk](mailto:rodrigo.olave@afbini.gov.uk)

**Dr Jim McAdam**

AFBI  
[jim.mcadam@afbini.gov.uk](mailto:jim.mcadam@afbini.gov.uk)

Case Study 5 of 12: 2014

[jane@climatenorthernireland.org.uk](mailto:jane@climatenorthernireland.org.uk)

 [@climateni](https://twitter.com/climateni)

