

## Case study

# Increasing tree establishment and resilience through mycorrhizal fungi

How the Tree Production Innovation Fund supported Rhizocore Technologies to develop locally adapted mycorrhizal fungi pellets to enhance tree growth, resilience and soil carbon capture.

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### [Rhizocore Technologies Ltd](https://www.rhizocore.com/)

(<https://www.rhizocore.com/>), founded by plant scientist Toby Parkes and mycologist David Satori, specialise in the collection and production of locally adapted mycorrhizal fungi.

**Mycorrhizal fungi:** a group of network-forming soil fungi that form symbiotic associations (close relationships) with plants, including trees. They provide trees with increased access to soil nutrients, greater drought tolerance and resistance to soilborne diseases.

**Ectomycorrhizal fungi:** a type of mycorrhizal fungi that form around the surface of the roots rather than penetrate the root itself.

The company has developed a way to produce large quantities of native mycorrhizal fungi which form associations with commercially important UK tree species, such as pines, spruce, oak and birch. These associations are known as 'mycorrhizae' and have been shown to enhance tree establishment rates, resilience to environmental stressors and soil carbon capture.



Woodland creation site at Tilhill. Copyright Rhizocore Technologies Ltd

## Challenges Rhizocore are addressing

Trees are often planted in locations that have little or no natural symbionts that support their growth and survival. Planting sites, such as old agricultural sites, where trees have been absent for a long time tend to lack natural populations of ectomycorrhizal fungi.

In addition, Rhizocore have found that fungal symbionts, which form in tree nurseries, rarely survive when planted out in the field. This can limit the nutrients young trees can access when planted.

Mycorrhizal fungi can also be difficult to grow on a large scale and some do not form the necessary associations with commercially grown trees.

Toby Parkes, CEO and Founder, summarised Rhizocore's aims and objectives:

“There was a need to find a way of delivering native, local mycorrhizal fungi to tree planting operations so that locally adapted fungi could be deployed in the field and be able to survive long enough in planting sites for a mycorrhizal symbiosis to form.”

## The solution

Rhizocore created ‘[Rhizopellets](https://www.rhizocore.com/new-page-1)’ (<https://www.rhizocore.com/new-page-1>), which are designed to be placed into the topsoil with saplings during tree planting. These pellets keep the fungal symbionts they contain alive for months in the soil, enabling the formation of mycorrhizal associations with the planted trees.

Rhizocore collect the mycorrhizal fungi contained within their pellets from healthy, established woodlands and screen them through a process known as ‘bioprospecting’.

This process evaluates:

1. How beneficial the fungus will be for tree growth.
2. Rhizocore's ability to grow the fungus using fermentation technology.

Following bioprospecting, fungi meeting the above criteria are combined into pellets specifically designed to be used during tree planting. They are small, light, easy to transport and handle, making them ideal for contractors to use.



Close up of a Rhizocore fungi pellet being planted with a tree sapling. Copyright Rhizocore Technologies Ltd

## The Tree Production Innovation Fund (TPIF)

Rhizocore successfully applied for the first and second round of the [Tree Production Innovation Fund](https://www.gov.uk/guidance/tree-production-innovation-fund) (<https://www.gov.uk/guidance/tree-production-innovation-fund>) in 2021 and 2022, addressing 2 of the 3 challenges outlined for the TPIF.

- challenge 2: how can we develop growing systems to enhance their efficiency and resilience to change, whilst delivering improved quality and diversity of product?
- challenge 3: how can innovative environmentally sustainable weed control solutions be used to reduce reliance on herbicides?

Rhizocore's current project will evaluate how effectively different ectomycorrhizal species impact tree growth, sapling survival and carbon capture in newly planted woodlands. To do this, Rhizocore are testing a range of mycorrhizal applications on different tree species and in various soil types.

Rhizocore have used their TPIF funding to:



- develop a scalable production method to supply industrial quantities of locally adapted mycorrhizal fungi
- create a collection of fungal strains from multiple different species that they could deploy using their pellet method
- collect data from planting sites and nurseries to demonstrate the benefits of using Rhizopellets

Rhizopellets have now been used at multiple sites with the Cheshire Wildlife Trust. Field data has shown significant improvements to both tree growth rates, up to 13 times quicker after 12 months. Tree survival rates have also improved by more than 20%, 12 months after planting with Rhizopellets, compared to controls.



Two people planting Rhizocore fungi pellets.  
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Rhizocore are now able to produce between 2 to 3 million Rhizopellets per year from their production facility. This enables them to deliver multiple different ectomycorrhizal species to tree planting operations nationally.

Toby Parkes, Founder and CEO, Rhizocore said:

“TPIF funding has enabled Rhizocore to develop its products and systems, transitioning Rhizocore

from a research phase to a commercial phase and enabled us to develop the first commercially scalable system for delivering live, locally sourced ectomycorrhizal fungi to field planting sites.

“This foundational work has enabled Rhizocore to establish the data and systems needed for us to supply local ectomycorrhizal fungi to the forestry sector into the future.”

## The future of Rhizopellets

Rhizocore are in the final stages of their project and are currently replicating their mycorrhizal delivery method across the rest of the country. This will enable UK-wide coverage and the ability to deliver local fungi to all regions of the country.

In the future, Rhizocore will:

- continue to collect fungi and data on the performance of their Rhizopellets in different conditions and with different tree species
- develop a production system capable of supplying more than 10 million pellets annually
- quantify the increase in carbon capture in newly planted woodlands

The Rhizopellet is suited for both commercial forestry and native woodland creation projects, looking to plant trees and benefit from ectomycorrhizal fungi.



Woodland creation site. Copyright Rhizocore Technologies Ltd

The Rhizocore team have been attending forestry shows across the UK and delivering talks and seminars to industry bodies. They have also been hosting tours and talks at their facilities in Edinburgh. They plan to publish their results in academic journals and write articles in forestry magazines.

Find out how the [Tree Production Innovation Fund \(https://www.gov.uk/guidance/tree-production-innovation-fund\)](https://www.gov.uk/guidance/tree-production-innovation-fund) helps to support nurseries to increase and diversify UK tree supply.

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