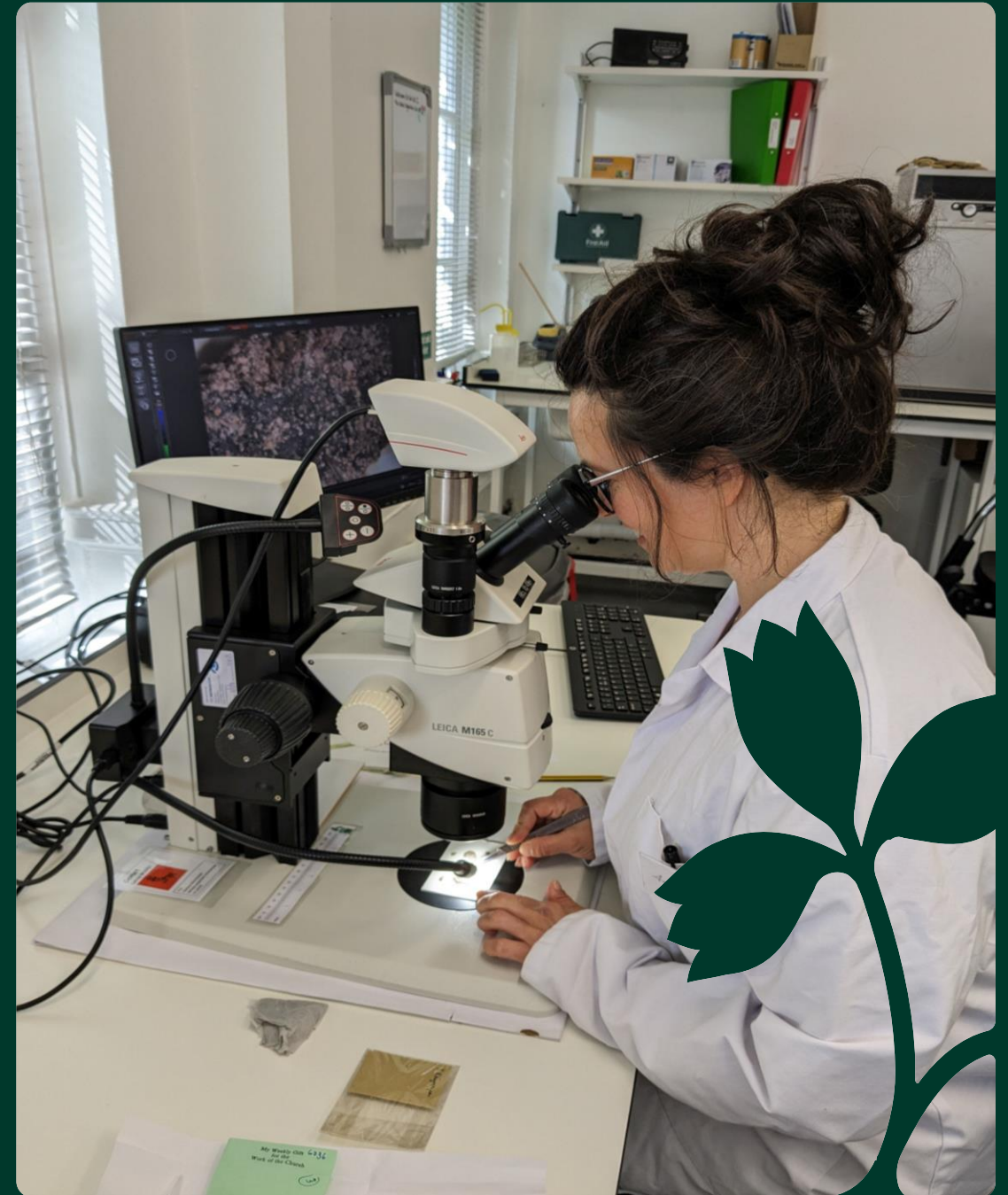


Botanics Foundation

Impact Report

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Introduction

The Botanics Foundation invests in key projects that fuel discovery and conservation across all areas of Royal Botanic Garden Edinburgh.

In this report, we'll share the impact these projects had during 2023/24 — showcasing how support helps us explore, conserve, and explain the world of plants and fungi.

Together, we're driving forward critical research, protecting biodiversity, and creating lasting change for the future of our planet.



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Unlocking the Secrets of Plant Symbiosis Education



Project Overview

Remarkable progress was made during 23/24, in a project uncovering the hidden alliances of the legume family.

These plants play a crucial role in ecosystems, agriculture, and economies worldwide. The project has supported RBGE researchers, staff, and students while establishing a global research focus on legumes.

With key research into how legumes and nitrogen-fixing bacteria (*Rhizobium*) work together to enrich the soil, and the biodiversity of the Brazilian Cerrado, this work is already leading to high-impact discoveries. Led by researcher Rafaela Trad, whose position is funded by the Botanic Foundation, the project is paving the way for groundbreaking findings.

Project successes

Rhizobia are a poorly understood bacteria but their impact on soil fertility through nitrogen-fixing makes them a key player in climate change mitigation. The analysis undertaken will be shared with researchers across the world.

Development and analysis of a new approach to data findings. The findings will help evidence future studies of climate impacts and environmental change.

Developed strong international relationships which means our researchers now have access to fully-permitted fieldwork for the coming decade in Brazil and Turkey - highly biodiverse areas.

"I am completely blown away by how much Rafaela has achieved, the invaluable support she has provided colleagues and students, and the potential impacts her research has in understanding environmental change, conservation and particularly legumes of major economic importance.

Her work is a fitting tribute to the incredibly kind donation that was given to the Foundation by Professor Janet Sprent, through the Sprent bequest."

- Greg Kenicer
Postgraduate Programmes Manager



The First Million: Digitisation to Enable Global Access Herbarium



Project Overview

This three-year project aimed to substantially accelerate digitisation of RBGE's Herbarium of 3 million specimens. Targets were set to database and image 420K specimens, bringing a total of one third of our Herbarium specimens online by autumn of 2024.

We know two key challenges can be addressed using herbarium specimens: identifying plant species and understanding where they occur.

By transforming herbaria into digital collections, we can make this vital data accessible to the world — for free — empowering conservation efforts globally with just an internet connection.

The investment in this project represented an important flagship commitment towards globally accessible biodiversity data.



FLORA OF Shetland
NAME *Lentinus lepideus*
LOCALITY
HABITAT Growing from a hole in an old
ALT.
REMARKS telephone pole
(now under a TV aerial), back of
the post office
COLLECTOR B. Tulloch
DATE Sept 6791
REF. NO.
det RW
Nat Herb 24271

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centimeters

Key impacts of investment

Skills and knowledge

- A skilled team of experts has been built in digitisation, with deep knowledge of different plant groups and specimen preparations

Digitisation and knowledge sharing

- Improvements in image processing and a new management system mean that images and data are now automatically processed and uploaded overnight
- This ensures that vital plant information is accessible online, connecting people everywhere to the world of plants and enhancing global conservation efforts

Progress by March '24

- Number of specimens databased within the project: 351,419
- Number of specimens imaged within the project: 409,270

We've fast-tracked the digitisation of our Herbarium, positioning us as a leader in the field. This is just the beginning.

By building on this success, we aim to scale up and continue digitising our collection — at a time where biodiversity data are crucial for biodiversity research.

With a fully digital Herbarium by 2030, we'll be ready to meet the urgent demand for biodiversity data, making a lasting impact for science and conservation in this critical decade.



Decoding the mysteries of Lichen Science



Project Overview

Barcoding lichens involves carefully extracting DNA from frozen lichen samples. Whether collected in the field or lab, these lichens are processed following our special protocols, ensuring each sample is handled with precision.

Different methods are used depending on the size and shape of the lichen, allowing us to unlock valuable genetic information.

This work helps us explore the diversity of life, contributing to a deeper understanding of these unique organisms and their role in the ecosystem.



Investment in this project has established RBGE as a key leader in UK lichen barcoding and has increased our visibility globally

Global Value

- We've streamlined and improved the methods used, helping to unlock this crucial genetic information
- Our team's expertise in these methods has been shared through detailed guides - available to other researchers and scientists across the world
- We've contributed to a collaborative research paper on lichen barcoding, helping advance the field globally

Statistics

- We've successfully barcoded over 200 lichen species (10% of the UK's total), with more than 800 specimens now catalogued
- We curated RBGE's lichen barcode data, covering nearly 200 species and 460 DNA sequences, to create a freely accessible online resource on the Barcode of Life Database (BOLD)

Expertise

- Gained and developed specialised skills in sampling and sequencing complex materials, using expert knowledge to make sure the data is useful for wider applicability

Summary

The investment from the Botanic Foundation of over £500,000 in 23/24 has boosted RBGE's role as a leader in conservation, driving progress toward protecting plants, people, and the planet.

The **Legume Phylogeny Project** has deepened our understanding of essential plant species, while pioneering research into their ecosystems.

Support for the **Herbarium Digitisation Project** has allowed us to fast-track digitisation, making our collections globally accessible, helping scientists worldwide tackle the biodiversity crisis.

Through the **Lichen DNA Barcoding Project**, we've contributed crucial data for conservation.

The collective impact of these funded projects highlights RBGE's growing global influence. We are creating invaluable resources for scientists, expanding knowledge of biodiversity, and safeguarding threatened species. These initiatives push the boundaries of scientific discovery.



Thank you for your support

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