kess 2 alumni

Ysgoloriaethau Sgiliau Economi Gwybodaeth
Knowledge Economy Skills Scholarships

CASE STUDY

THE COMPANY PARTNER

The National Botanic Garden of Wales is based in Llanarthne, Carmarthenshire. It is a tourist attraction that is dedicated to the research and conservation of biodiversity, to sustainability, lifelong learning, and the enjoyment of the visitor. The Garden is an internationally renowned centre for biodiversity conservation and research, particularly for plant-pollinator DNA metabarcoding.

Dr Laura Jones, from the National Botanic Garden of Wales said "The Garden is dedicated to training the next generation of plant scientists, a mission which is aided by collaborative projects such as KESS 2. The Science department has benefitted greatly from Abigail's project, contributing to our overall body of research on the foraging preferences of pollinators. Abigail has been a champion of the Garden, engaging with thousands of people across Wales and beyond through the medium of English and Welsh on the value of pollinators, disseminating our vital work and inspiring others to support biodiversity."

DR ABIGAIL LOWE

Botanical and Invertebrate Researcher at the National Botanic Garden of Wales

Gardens are important habitats for pollinators, providing flowering resources and nest sites. There is a great deal of public support for growing "pollinator-friendly" plants but, although there are lists of plants that are best for pollinators, they are usually inconsistent, poorly supported by scientific research, and target a limited group of pollinators. To tackle this problem, my PhD research entailed using DNA metabarcoding to identify which plants are visited by bumblebees, honeybees, solitary bees, and hoverflies. The key outcomes of this work are an increased knowledge of plant-pollinator interactions to support pollinator conservation, and the ability to improve plant recommendation lists for gardeners and landowners.

I completed my undergraduate degree in Biology at the University of Southampton, during which I undertook a year in industry at the National Botanic Garden of Wales (NBGW). During my year in industry, I was part of the team that piloted a successful project aiming to analyse the foraging patterns of honey bee colonies using DNA metabarcoding. This relationship with NBGW and Dr Natasha de Vere led me to apply for a KESS 2 scholarship for a follow up project investigating the foraging patterns of a wider range of pollinators. This project was a partnership between Bangor University (academic supervisor: Prof Simon Creer) and NBGW (company supervisor: Dr Natasha de Vere), where I was based for the entirety of my PhD.

Following the completion of my PhD, I secured a role as a Botanical and Invertebrate Researcher within the Science department. My role involves conducting and publishing research on plants and pollinators, collaborating with conservation organisations on projects that support biodiversity and providing advice, training, and engagement on pollinating insects to a range of audiences.

INDUSTRY COLLABORATION

Being based at the National Botanic Garden of Wales for my KESS 2 project provided a unique PhD experience with many benefits. NBGW is an internationally recognised organisation for plant-pollinator DNA metabarcoding and has been involved as a project partner in a number of KESS 2 projects. During the time of my project, I worked with two other KESS 2 students, Dr Laura Jones and Dr Lucy Witter, who were also undertaking PhD projects in the same research area. Working alongside researchers in the same field has been invaluable in providing support and collaborative opportunities. Equally, working within the Molecular Ecology and Evolution group at Bangor University provided vital molecular and statistical expertise from researchers using the same techniques for a wide range of applications.

Public engagement is at the forefront of the Garden's aims, enabling me to gain a great deal of experience presenting my research to a wide variety of audiences including school children, beekeeping and gardening groups, and scientists at conferences. As well as public talks, I have appeared on BBC's Springwatch, BBC Radio Wales and BBC Radio Cymru to discuss pollinators and my research. I've also disseminated my research to the Garden's Education department for bee-related activities, and led bee walks and related activities internally and externally.

IMPACT

This KESS 2 funded project has culminated in the publication of two research papers from my thesis, with a third in review and a fourth in preparation. I have also collaborated with other members of the Botanic Garden's research team, contributing as a co-author to two further publications on honeybee foraging. Outside my research team, I have collaborated with researchers from various institutions around the world on a review paper on pollen DNA metabarcoding which is currently in review, and a book chapter on design considerations for eDNA metabarcoding surveys. I have also worked with Welsh Government to provide advice on the most appropriate plants for pollinators for their Planting for Pollinators booklet as part of their Bee Friendly Scheme.

My research has contributed to the Botanic Garden's 'Saving Pollinators Assurance Scheme', a first of its kind label scheme that gives gardeners the confidence to know which plants are good for both pollinators and the environment. Plants displaying the Saving Pollinators logo are proven to support pollinators by DNA research and have been grown in peat-free compost without the use of synthetic insecticides.

KESS 2 PARTICIPATION HIGHLIGHTS

As part of my KESS 2 scholarship, I was fortunate to attend two international conferences to present my work. I attended the European Congress of Conservation Biology in Jyväskylä, Finland in my first year to present a research poster of my project. In my second year I gave an oral presentation at the International Barcode of Life Conference in Trondheim, Norway. Both of these conferences provided an excellent opportunity to network with ecologists and learn from a wide range of researchers.

Other highlights that have stemmed from my KESS 2 scholarship include meeting notable people such as HRH The Prince of Wales, the Chief Scientific Adviser for Wales (Peter Halligan) and numerous government officials on visits to the Botanic Garden, communicating the importance of pollinators and how my research contributes to their conservation.

KESS 2 allowed me to pursue my research within my home country of Wales and enabled me to continue working with an organisation that has been vital to my career development. The collaborative projects that KESS 2 supports are unique and integrated with high-level skills development, providing an attractive alternative to a traditional academic setting. KESS 2 provided me with a wealth of training opportunities to aid my career development which I am very grateful for. I am confident that I have gained valuable academic research skills alongside those required for a career in biodiversity conservation.

Abigail Lowe communicating her KESS 2 research to HRH The Prince of Wales

PUBLICATIONS

Lowe A., Jones L., Brennan G., Creer S., de Vere N. 2022a. Seasonal progression and differences in major floral resource use by bees and hoverflies in a diverse horticultural and agricultural landscape revealed by DNA metabarcoding. Journal of Applied Ecology. doi:10.1111/1365-2664.14144

Lowe, A., Jones, L., Witter, L., Creer, S., de Vere, N. 2022b. Using DNA Metabarcoding to Identify Floral Visitation by Pollinators. Diversity, 14, 236, doi:10.3390/d14040236.

Jones, L. **Lowe, A.**, Ford, C.R., Christie, L., Creer, S., de Vere, N. 2022. Temporal patterns of honeybee foraging in a diverse floral landscape revealed using pollen DNA metabarcoding of honey. Integrative and Comparative Biology, icac029, https://doi.org/10.1093/icb/icac029

Jones, L., Brennan, G.L., **Lowe, A.**, Creer, S., Ford, C.R., de Vere, N., 2021. Shifts in honeybee foraging reveal historical changes in floral resources. Communications Biology 4, 37. doi: 10.1038/s42003-020-01562-4

de Vere, N., Jones, L. E., Gilmore, T., Moscrop, J., **Lowe, A.**, Smith, D., … Ford, C. R. 2017. Using DNA metabarcoding to investigate honey bee foraging reveals limited flower use despite high floral availability. Scientific Reports, 7, 1–10. https://doi.org/10.1038/srep42838

PODCASTS & BLOGS

Flowerpot Podcast: The One with Dr Abigail Lowe

Another piece in the pollinator puzzle: New research reveals fascinating insights into the plants used by bees and hoverflies - March 30th 2022

Plant recommendations from Botanic Garden research - March 25th 2022

Where are all the bees? - December 21st 2020

Top plant families for pollinators in August - August 17th 2020

Get started with wildlife recording in your garden - April 20th 2020

Wildlife at the Garden: a review of 2019 - December 20th 2019

The search for the ivy bee continues.. - November 9th 2018

All about bee hotels and how to make your own - July 26th 2018

Introduction to our newest PhD student, Abigail Lowe! - January 29th 2018

Knowledge Economy Skills Scholarships (KESS 2) is a pan-Wales higher-level skills initiative led by Bangor University on behalf of the HE sector in Wales. It is part-funded by the Welsh Government's European Social Fund (ESF) convergence programme for West Wales and the Valleys. For further information about how your organisation could benefit from participating in KESS 2, please contact the **KESS 2 Central** team at Bangor at: kess2@bangor.ac.uk

National Botanic Garden of Wales
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