

PhD Position: Forest responses to extremes - how does drought affect tree seed production?

<https://www.findaphd.com/phds/project/acce-dla-programme-forest-responses-to-extremes-how-does-drought-affect-tree-seed-production/?p189643>

Project overview: Forests are under severe and increasing pressure from climate change and other drivers, and their ability to persist depends on the resilience of every stage of life of trees. We know that climate extremes like drought reduce growth and survival of seedlings, juvenile and adult trees, but how seed production responds remains largely unknown in forest trees. This gap in knowledge is crucial, as more than 90% of forests regenerate from seeds, and the supply of tree seeds are crucial for global efforts to expand and restore forest cover. This project addresses this gap, focusing on understanding how droughts affect the ability of forest trees to produce seeds, and the potential of those seeds to germinate and establish the next generation of trees. For example, we don't know whether seed production declines in drought years, or whether it is resilient, or how the effects of a drought play out over time. We predict that the response to drought will vary across species, and likely varies with local growing conditions, but this remains untested. We expect that seeds produced during droughts retain a memory of that event which affects their germination and establishment potential, but this remains poorly understood for forest trees. This project will address these gaps in knowledge using new field data (with fieldwork in the UK, Europe and with an option for fieldwork in the tropics), lab- and growth-chamber experiments at Kew, and by leveraging existing long-term monitoring datasets.

1. Quantify the response of tree seed production to summer drought
2. Investigate how drought responses vary across species and climate gradients, and whether species-specific responses vary predictably, consistent with prior research on response of growth and mortality.
3. Characterise the sensitivity of tree seed germination and establishment to summer drought

Training & Research environment: You will be provided with training and support to develop advanced scientific skills, including in field and laboratory work, data analysis, and in the diverse forms of scientific communication. Fieldwork training will be provided in UK study sites, and there will be opportunities for fieldwork in the UK, Europe and in the tropics. The group works extensively with a large network of collaborators, so we will prioritise developing your confidence and skills in team-working and scientific collaboration. As part of this, there will be multiple opportunities for placements and lab visits in Europe and further afield. Your primary registration will be at the University of Liverpool, but you will be registered as a PhD student at Kew, joining a network of >100 Kew-affiliated PhD researchers and providing access to Kew facilities, collections, training and events.

The project has been developed in collaboration with Defra, who will provide you with a mentor throughout your PhD. This will allow you to gain valuable experience at the intersection of science and policy in the UK, and maximise the impact of your research. For example, you will have the opportunity to contribute to evidence gathering within the context of UK tree seed supply (e.g. impacts of climate change on seed sourcing for woodland expansion). On a global scale, working with Kew will help you to maximize the impact of your work on global forest restoration efforts.

Supervisors: [Dr Andrew Hacket-Pain](#) (University of Liverpool), [Dr Belen Fadrique](#) (University of Liverpool), [Dr Charlotte Seal](#) (Kew Gardens), [Dr Louise Colville](#) (Kew Gardens)

How to Apply: Notes and details of how to apply are available here: <https://accedtp.ac.uk/how-to-apply/>