PROJECT TITLE: Wax on or wax off? How important are plant cuticle and epicuticular wax production to environmental stress tolerance as a plant ages.

Project Science Theme: Evolution and Biodiversity
Project keywords: Plant environmental stress tolerance

Lead Institution: Bristol
Lead Supervisor: Jim Fouracre, Bristol, School of Biological Sciences
Co-Supervisor: Rox Middleton, University of Bath, Department of Physics

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Project aims and methods:

The plant cuticle and its epicuticular wax (EW) coating provide an initial barrier against environmental stresses, including drought, heat, and excess light. These protective layers are highly dynamic, with their composition and structure changing both in response to external conditions and during development. Juvenile and adult leaves often differ markedly in cuticle thickness, wax coverage, and permeability, yet the physiological implications of these differences are poorly understood.

The developmental switch from juvenile to adult growth provides a natural experimental system to investigate how cuticle/EW traits influence stress tolerance. The Doctoral Researcher will compare juvenile versus adult stages of plants with temporal cuticle/EW variation (e.g. maize, Arabidopsis), along with genetic mutants that affect cuticle/EW production, to investigate how plant age influences tolerance of different stress responses, including heat, drought and UV light.

This project will provide fundamental training in characterising cuticular/EW properties, quantifying plant environmental stress responses, and concepts in plant development and will be co-supervised by Dr. Rox Middleton (Department of Physics, Bath) and Dr. Jim Fouracre (School of Biological Sciences, Bristol). The Doctoral Researcher will have extensive input as to which direction to take the project in (e.g. biophysics of cuticular properties or experimental manipulations of environmental responses).

Useful recruitment links:

For information relating to the research project please contact the lead Supervisor via: jim.fouracre@bristol.ac.uk

Bristol NERC GW4+ DTP Prospectus:
https://www.bristol.ac.uk/study/postgraduate/research/great-western-four-doctoral-training-partnership-nerc/

How to apply to the University of Bristol:
http://www.bristol.ac.uk/study/postgraduate/apply/

The application deadline is Thursday 8 January 2026 at 2359 GMT