

POSITION DESCRIPTION

Position Title:	Postdoctoral Research Fellow/Research Fellow in Quantitative Genetics for Plant Network Biology
Organisation Unit:	Australian Research Council Centre of Excellence for Plant Success in Nature and Agriculture
Position Number:	NEW
Type of Employment:	Full-time or Part-time (0.8FTE); Fixed term
Classification:	Academic Level A/B

THE UNIVERSITY OF QUEENSLAND

The University of Queensland (UQ) is one of Australia's leading research and teaching institutions. For more than a century, we have been bringing together outstanding educators, researchers and innovators – across a range of disciplines – to inspire the next generation and to advance ideas that can benefit the world.

Today, UQ is [ranked among the world's leading universities](#) and we are consistently recognised as one of the top 5 universities in Australia.

Each year, we teach around 55,000 students across 6 faculties, located at our 3 beautiful campuses at St Lucia, Herston and Gatton – as well as online. We aspire to broaden the knowledge and skills of these students, so that they're equipped to achieve their professional goals and make a positive contribution to our society, and the world.

The University is also home to 8 research institutes and more than 100 separate research centres with an interdisciplinary community of more than 1500 researchers, who have come to UQ from all over the globe. This outstanding community of researchers is continuing to build upon UQ's long and proud tradition of discovery science, invention, innovation, translation and commercialisation.

At UQ, we recognise that our people are our greatest asset. As such, we seek to recruit innovative people who are passionate about helping us to advance our mission and broaden our impact.

Our culture is built on the things that we value most highly – the pursuit of excellence; creative and independent thinking; honesty and accountability; mutual respect and diversity; and providing support for our people. Through the promotion of these values, we're creating a culture that encourages our people to bring their very best, authentic self when they come to work at UQ.

Organisational Environment

The Australian Research Council (ARC) Centre of Excellence (CoE) for Plant Success in Nature and Agriculture is a research Centre within the School of Biological Sciences, School of Mathematics and Physics, School of Law and the Queensland Alliance for Agriculture and Food Innovation (QAAFI). The ARC CoE for Plant Success is administered at The

University of Queensland and has Nodes at the University of Tasmania (UTAS), Monash University, Macquarie University (MQ) and Queensland University of Technology (QUT). There are also a number of domestic and international partner institutions.

The ARC CoE for Plant Success will discover the adaptive strategies underpinning productivity and resilience in diverse plants and deepen knowledge of the genetic and physiological networks driving key traits. Using novel quantitative and computational approaches, the Centre will link gene networks with traits across biological levels, giving plant breeders an unparalleled predictive capacity. The Centre will accelerate technologies to transfer successful networks into crops and build legal frameworks to secure this knowledge. With a uniquely multidisciplinary team, the Centre will deliver new strategies to address the problems of food security and climate change, establishing Australia as a global leader in these areas.

The Australian Research Council funded the CoE for Plant Success in late 2019 and work is underway to establish the Centre, which has 17 chief investigators, 11 partner investigators and 27 associate investigators.

Career Development

The Centre has an emphasis on early career development and there will be opportunities for formal career development and skills training as well as mentoring. Researchers will be embedded in a dynamic team and participate in a range of Centre related activities aimed at developing leadership skills.

Diversity and Inclusion

The Centre recognises and values equity and diversity, and encourages applications from any individual who meets the requirements of this position irrespective of gender, sexuality, race, ethnicity, religion, disability, age or other protected attributes. The Centre strives to provide an inclusive working environment, and along with the University is committed to supporting staff with family and caring responsibilities by providing policies, programs and initiatives to help balance work and family responsibilities.

Information for Prospective Staff

Information about life at UQ including staff benefits, relocation and UQ campuses is [available online](#).

There are three positions available within the Beveridge-Cooper UQ Plant Success Laboratory as part of a large team in the Centre investigating network implications for predictive plant biology. The three positions include Quantitative Genetics for Plant Network Biology, Modelling and Plant Network Biology and Plant Molecular Physiology; spanning quantitative mathematics through to plant biology. These three positions will link research areas in the Centre including (i) discovery of mechanisms and networks for plant success (ii) model plant development to enable prediction for breeding and network analysis and (iii) model integration for quantitative genetics and breeding. They will use model systems (e.g., Arabidopsis) and agriculture species (e.g., Sorghum and Maize) with an initial focus on shoot architecture. Shoot architecture is an important agricultural trait heavily influenced by environment (e.g., nutrients and light), plant hormones, sugar signalling and sugars in relation to source-sink partitioning.

DUTY STATEMENT

Primary Purpose of Position: Quantitative Genetics for Plant Network Biology

The ARC Centre of Excellence for Plant Success in Nature and Agriculture has been funded for 7 years, ending December 2027. This position will work within the UQ Plant Success Laboratory with Professors Mark Cooper, Christine Beveridge, Graeme Hammer and David Jordan and their research groups.

The Beveridge laboratory has developed conceptual and mathematical models of the networks of hormones involved in determining shoot architecture and applied these to a number of plant species. The UQ Plant Success Laboratory aims to use these network models to discover and model quantitative genetic properties of the gene networks that determine plant architecture traits and investigate their roles in plant adaptations to diverse agricultural and natural environments. This will involve connecting the dynamic models involved in hormone crosstalk within individual plants to determine shoot architecture with crop models that can be applied to study crop performance within agricultural systems. Novel genomic prediction methods will be developed for applications to plant breeding using prior knowledge of the gene and hormonal networks.

The primary purpose of this position is to undertake novel quantitative genetic analyses of sequences of plant populations evolving under the influences of directional selection for shoot architecture traits. Arabidopsis and sorghum will be key plant species for the experimental components of these investigations. The position will be responsible for leading the development and application of quantitative genetic models to study the genomic to phenomic relationships within experimental populations that expose genetic variation for shoot architecture traits. The position will investigate modelling methods that leverage prior knowledge of hormone networks that is a focus of the Beveridge laboratory discovery research. The experimental results will be used to develop novel predictive models for plant architecture traits for applications to plant breeding and evolutionary studies.

The research will include studies of molecular and whole plant phenotypes measured on populations created over multiple cycles of selection for plant architecture traits. The sequence of experimental populations created by controlled selection pressures will be used to investigate stationary and non-stationary effects of allelic variation for genes determining

shoot architecture traits and the properties of the underlying gene and physiological networks as revealed by the influences of selection pressures.

The experimental studies will enable novel quantitative genetic analyses of network biology for predictive plant breeding applications.

The position will have primary responsibility for studies focused on the model species *Arabidopsis* and will collaborate with other team members conducting similar studies on agricultural species, primarily sorghum and maize. All experimental and modelling investigations will be conducted within the Centre of Excellence team environment and through collaborations with Centre partnerships including scientists from Corteva Agriscience and CIMMYT. The position is highly collaborative including these partners and within the Centre of Excellence as a whole.

Duties

Duties and responsibilities may include, but are not limited to:

- Undertake design and supervise execution of sequences of plant selection experiments, synthesis of data, new analyses.
- Undertake iterative experimental-modelling studies to test and improve genetic models of plant architecture traits.
- Undertake and report on literature searches.
- Preparation of scientific papers from the research.
- Actively undertake or contribute to collaborative, multidisciplinary research.
- Communicate research outcomes, in the form of oral and written presentations to stakeholders including research partners and collaborators, at meetings, in reports, conferences, and in highly ranked peer-reviewed publications, where agreed.
- Participate in the supervision of postgraduate and undergraduate students, and visitors.
- Participate in industry engagement activities.
- Contribute to development of funding proposals, including research grant applications and tenders.
- Contribute to the work and activities of the Centre's committees.
- Perform a range of Centre and University-level administrative functions and service roles, as reasonably directed by your supervisor.
- Foster and support relations with industry, government departments, professional bodies and the wider community.
- Participate in the activities of the ARC Centre of Excellence for Plant Success in Nature and Agriculture, including outreach activities.
- Ensure that projects are delivered in compliance with all relevant contractual, regulatory and policy requirements, including ethics, integrity, privacy, data security and intellectual property obligations.

Other

Contribute to processes that support being part of a high-functioning academic group, including participation in group decision-making and serving on committees and working parties, as required.

Undertake other duties as agreed and which are in alignment with career development strategies.

Ensure you are aware of and comply with the Centre's Charter, and University policy and legislation relevant to the duties undertaken, including but not exclusive to:

- the [University's Code of Conduct](#)
- requirements of the Queensland occupational health and safety (OH&S) legislation and related [OH&S responsibilities and procedures](#) developed by the University or Institute/School
- the adoption of sustainable practices in all work activities and compliance with associated legislation and related University [sustainability responsibilities and procedures](#)
- requirements of the Education Services for Overseas Students Act 2000, the National Code 2007 and associated legislation, and related [responsibilities and procedures](#) developed by the University

Organisational Relationships

The position reports to Professor Mark Cooper.

SELECTION CRITERIA

Level A

- Possess (or be in the process of obtaining) a PhD or equivalent in quantitative genetics for plant breeding or plant adaptation analysis.
- Demonstrated ability to carry out research in the field of quantitative genetics including strong knowledge of modern trait mapping methods using genome sequence and high throughput phenomics data.
- Experience applying plant physiology, crop physiology and crop modelling methods for plant adaptation analysis would be considered an advantage.
- Demonstrated experience in R programming for statistical and quantitative genetics analyses.
- Demonstrated experience working in a High-Performance Computing environment.
- Experience in programming in other relevant languages, including Matlab, Mathematica, Python, or C, would be considered an advantage.
- Demonstrated experience in studying the influence of sources of genetic non-additivity, including epistasis, pleiotropy and genotype by environment interactions, on the power of trait mapping methods, such as GWAS, and genomic prediction.
- Track record of publication of research findings in peer reviewed journals and conferences.
- Evidence of, or an ability to commence establishing effective relationships to represent and promote the research area at a University and wider community level, including industry, government and professional bodies.
- Demonstrated ability to conduct research independently and collaboratively.
- High levels of personal integrity, transparency and capability.

Level B

In addition to the above, and relative to opportunity, the applicant will also be expected to have demonstrated clear evidence of leadership, such as being successful in more than one of the following:

- Excellent knowledge, skills and demonstrated expertise in Bayesian statistical modelling research.
- Experience in application of Approximate Bayesian Computation to population genetics and quantitative genetics applications would be considered an advantage.
- Experience working on innovative multidisciplinary discovery projects designed to model gene discoveries for plant traits within a gene-network and biological-network context.
- A strong track record of leading and working on multiple projects and producing timely, high quality outputs and outcomes. This could include contributions beyond their core research project and grant success.
- High level interpersonal and communication skills, including the ability to work collaboratively in multidisciplinary teams.
- A record of publication in high-ranking refereed journals and other research outlets.
- A record of supervision of postgraduate research students.

Qualification Verification

An appointment to this position is subject to the verification of the highest academic qualification from the conferring institution.

The University of Queensland values diversity and inclusion and actively encourages applications from those who bring diversity to the University. Please refer to the [University's Diversity and Inclusion webpage](#) for further information and points of contact if you require additional support.

This role is a full-time position. However, flexible working arrangements may be negotiated.

Accessibility requirements and/or adjustments can be directed to recruitment@uq.edu.au.