POSITION DESCRIPTION

Position Title: Postdoctoral Research Fellow in Agronomy
Organisation Unit: School of Agriculture and Food Sciences
Position Number: TBA
Type of Employment: Full time, fixed term for 3 years
Classification: Academic Level A
Location: Gatton

THE UNIVERSITY OF QUEENSLAND

The University of Queensland (UQ) contributes positively to society by engaging in the creation, preservation, transfer and application of knowledge. UQ helps shape the future by bringing together and developing leaders in their fields to inspire the next generation and to advance ideas that benefit the world. UQ strives for the personal and professional success of its students, staff and alumni. For more than a century, we have educated and worked with outstanding people to deliver knowledge leadership for a better world.

UQ ranks well within the top 100 universities worldwide, measured through a number of major independent university rankings: the Academic Ranking of World Universities, Times Higher Education World University Rankings, US News Best Global Universities Rankings, QS World University Rankings and Performance Ranking of Scientific Papers for World Universities, and is indeed in the top 50 in some of these rankings. In 2013, UQ attracted more Australian Research Council funding than any other Australian university or research body.

UQ has an outstanding reputation for the quality of its teachers, its educational programs and employment outcomes for its students. Our students remain at the heart of what we do. The UQ experience – the UQ Advantage – is distinguished by a research enriched curriculum, international collaborations, industry engagement and opportunities that nurture and develop future leaders. UQ has a strong focus on teaching excellence, winning more Australian Teaching and Learning Council Awards for Teaching Excellence than any other in the country and attracting the majority of Queensland’s highest academic achievers, as well as top interstate and overseas students.

UQ is one of Australia’s Group of Eight, and a founding member of Universitas 21, an international consortium of leading research-intensive universities. UQ is also the largest university in Queensland.

Our 50,000-plus strong student community includes more than 13,000 postgraduate scholars and more than 12,000 international students from 144 countries, adding to its proud 215,000-plus alumni. The University has more than 7,000 academic and professional staff and a $1.6 billion annual operating budget. Its major campuses are at St Lucia, Gatton and Herston, in addition to teaching and research sites around Queensland and Brisbane city. The University has six Faculties and four University-level Institutes. The Institutes, funded by government and industry grants, philanthropy and commercialisation activities, have built scale and focus in
research areas in neuroscience, biomolecular and biomedical sciences, sustainable minerals, bioengineering and nanotechnology, as well as social science research.

Organisational Environment

The School of Agriculture and Food Sciences is one of the largest Schools of this type in Australia, comprising research and teaching experts in plant and soil science, animal science, agricultural business, environmental science and food, nutrition and technology. With a diverse group of internationally regarded scientists, our experts deliver knowledge, skills and research that provide solutions to world issues in climate change, feeding the world, managing the environment, replacing fossil fuels with biofuels, maintaining biodiversity and supporting economic and community development.

Located at St Lucia and Gatton, the School is a large and dynamic multidisciplinary hub focused on applied research and teaching within the Faculty of Science committed to finding innovative and technology focused solutions to global challenges. The School offers a range of undergraduate and postgraduate coursework and research degrees encompassing agriculture and related disciplines ranging from Bachelor Degree to Doctorate. Quality laboratories and facilities and strong partnerships with industry, community and government bodies, provide an environment that enables world class research and research training in a collaborative and cooperative spirit for postgraduate students and researchers.

Further information on the School’s teaching programs, research focuses and community activities can be accessed at www.uq.edu.au/agriculture. Faculty of Science information covering 7 Schools and 19 Centres is available at http://www.uq.edu.au/science and information on the Queensland Alliance for Agriculture and Food Innovation – a joint initiative between The University of Queensland and the Queensland State Government, which the School is closely aligned with, is available at www.qaafi.uq.edu.au.

Information for Prospective Staff

Information about life at UQ including staff benefits, relocation and UQ campuses is available at - http://www.uq.edu.au/current-staff/working-at-uq

The University of Queensland Enterprise Agreement outlines the position classification standards for Levels A to E.

DUTY STATEMENT

Primary Purpose of Position

Broad acre cropping systems in northern Australia are predominantly located on clay soils that are reliant to a considerable extent on utilization of moisture reserves stored in the soil profile to achieve successful crop production. Agronomic practices have evolved to maximize the efficient capture and storage of rainfall and the use of that moisture for the production of grain or fibre. However, while these systems have been evolving the traditionally moderate to high fertility reserves in these soils have been eroded through export in harvested produce and inadequate nutrient replacement strategies. As a result, the reliance on external nutrient inputs is rapidly increasing. Low legume frequencies in cropping systems have meant that most of these inputs are coming from expensive synthetic fertilizers, and the rising costs and widening list of nutrient inputs required (N, P, K, S and Zn) are challenging systems viability.
Two strategies are being explored to address this growing problem – (i) a focus on legume species or production practices to improve the reliability of these crops so that they become more prevalent in crop rotations, thereby reducing fertilizer N requirements; and (ii) developing fertilizer application strategies that maximize the return on fertilizer investment while maintaining resource sustainability.

The second of these strategies is particularly challenging when dealing with relatively immobile nutrient like phosphorus (P) and potassium (K), which are required in significant quantities to produce biomass but which are not redistributed with water movement down through the soil profile. The combination of lack of soil profile mixing characteristic of minimum or zero tillage cropping systems, clay soils, immobile nutrients and a reliance on subsoil root activity for crop productivity has resulted in increasingly widespread evidence of subsoils that are depleted in P and K. The most effective strategy for dealing with this issue has proven to be the occasional application of banded fertilizers at depths of 15-25cm, below the topsoil layer that dries out most rapidly, but still in the zone of high root density and nutrient acquisition. Yield responses to deep bands of 20-30% have been recorded on sites with severely depleted subsoils.

While the industry-funded research program focusses on where and how to efficiently apply nutrients into subsoil layers (critical soil concentrations that mandate fertilizer addition, band spacings, product formulations), there are two areas where fundamental research to support this field-based program are required. The first involves developing a better understanding of how crop root systems exploit heterogeneously distributed nutrient-rich patches (eg. fertilizer bands), and whether traits that deliver efficient patch-utilization are consistent with other characteristics that deliver advantages in exploitation of deep subsoil moisture stores. A postdoctoral appointment has recently been made at UQ Gatton to explore these relationships.

The second, and the focus of this advertised position, is to undertake more mechanistic research into the fertilizer – soil interactions that underlie effective application strategies. Specific questions are arising around (i) the most effective form of P fertilizer to maximize P bioavailability in the short and longer term in soils with differing clay contents, pH, P sorption capacity and Ca status; and (ii) the interactions between fertilizer products when applied in mixtures at high in-band concentrations. This is particularly relevant when deep bands are being applied in fields to address multiple nutrient deficiencies, or when N applications are made simultaneously with deep P/K banding to reduce the number of passes during fertilizer application.

The agronomy group at UQ Gatton has active research programs exploring agronomic and genetic approaches to improving grain legume production and reliability, and to developing improved fertilizer decision making and application strategies. This position will form part of that research team, with the appointee asked to focus on fertilizer – soil interactions that underpin effective application strategies to maximize the efficient use of applied fertilizer. This work will likely be a combination of laboratory, glasshouse and field research activity that could also involve summer and winter cereals and pulse crops.

This research is conducted as part of a collaboration between the School of Agriculture and Food Science and the Queensland Alliance for Agriculture and Food Innovation at the University of Queensland and the Grains Research and Development Corporation (GRDC).

Duties

Duties and responsibilities include, but are not limited to:

Research
Undertake innovative research in a variety of soil types to identify the fertilizer reaction products that form in and around a fertilizer band, the extent of nutrient diffusion out from the band into the surrounding soil and the bioavailability of different reaction products in terms of plant acquisition.

Maintain clear and accurate records of work performed

Assist in the preparation of reports and high quality, peer-reviewed publications

**Administration**

- Provision of regular progress reports to the University and funding body

**Service and Engagement**

- Perform a range of administrative functions in the School
- Contribute to the processes that enable the academic team to manage the work of the School, including participate in School decision-making and serve on School committees
- Foster the School’s relations with industry, government departments, professional bodies and the wider community.
- Any other duties as reasonably directed by your supervisor

**Other**

Ensure you are aware of and comply with legislation and University policy relevant to the duties undertaken, including:

- 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 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 Mike Bell, Chair in Tropical Agronomy.
SELECTION CRITERIA

**Essential**

Appointments will be based on academic merit and demonstrated research experience and will meet the following essential criteria.

- You must hold a PhD in Agricultural Science, Environmental Science, or Science, with expertise in crop nutrition or soil chemistry. An understanding of field crop agronomy would also be advantageous.
- Excellent written and verbal communication skills
- A willingness to be involved in research in remote locations, and to travel overseas to conduct specific analyses
- Organisational and problem solving skills
- Experience in assisting with the production of scientific reports, publications and standard operating procedures
- Well-developed interpersonal skills, including the ability to work and communicate well in a multidisciplinary team.
- Good time management skills with the ability to prioritise workloads, work independently and meet deadlines.

**Qualification Verification**

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

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The University of Queensland values diversity and social inclusion.

Employment opportunities are not limited by race, ethnicity, religion, disability, age, sexuality, gender or other protected attributes. Applications are encouraged from Aboriginal and Torres Strait Islander peoples. For further information please contact our Indigenous Employment Coordinator at: atsi_recruitment@uq.edu.au