

The Queensland Alliance for Agriculture and Food Innovation
CENTRE FOR CROP SCIENCE



Queensland Alliance for Agriculture and Food Innovation

QAAFI is an agricultural and food sciences research institute of The University of Queensland – one of the world's leading research providers in tropical and subtropical agriculture and food production.

At QAAFI, our mission is to harness high tech science for sustainable agriculture and food production. To achieve this, we use game-changing technologies like artificial intelligence (AI), nanotechnology, genomics, gene editing and big data to produce safer, more nutritious food, using fewer resources.

Not only is UQ number one for agricultural science in Australia and one of the most highly ranked institutions in the world in this field, it is located in tropical and subtropical environments and, therefore, well placed as a hub for digital agriculture and delivering step-change innovations for the growth and production of sustainable and nutritious food.

Through our alliance with the Queensland Government, QAAFI researchers utilise world-class research field station facilities throughout tropical and subtropical environments in Queensland.

QAAFI delivers high-impact science to significantly improve the productivity, competitiveness and sustainability of tropical and subtropical food, fibre and agribusiness industries.

High impact science for sustainable agriculture and food

QAAFI is comprised of four inter-related research centres, with a focus on the challenges facing tropical and subtropical food and agribusiness sectors in the tropical and subtropical systems.

- Centre for Animal Science
- Centre for Crop Science
- Centre for Horticultural Science
- Centre for Nutrition and Food Sciences

Centre for Animal Science

The Centre for Animal Science delivers world-class research to support and transform Australia's livestock industries. We aim to enhance productivity, profitability, and sustainability across the livestock sector, with particular expertise in northern Australia's beef industry, the feedlot sector and strong programs in poultry and pork.

We combine expertise in genetics and genomics, reproductive performance, animal health and welfare, biosecurity and vaccine development, and nutrition and growth, distinguished by an integrated systems approach that links animal biology, environment, and management to deliver solutions for tropical and subtropical livestock production.

Centre for Crop Science

The Centre for Crop Science conducts world-leading research targeting enhanced profitability and sustainability of cereal and legume cropping systems in tropical and sub-tropical environments.

We pursue excellence in crop science at molecular, whole plant, and production system levels. Our integrated research capabilities include crop genetics, physiology, and modelling, along with soil science and weed biology. We work closely with industry and government, and seek synergies to meet challenges in crop science at a national and international level.

Centre for Horticultural Science

The Centre for Horticultural Science delivers improvements to productivity, profitability and sustainability of horticulture industries. Our researchers drive innovation and industry adoption to increase the competitiveness of Australia's horticultural industries.

Our expertise includes; horticulture crop breeding, agronomy, plant protection, biosecurity and diagnostics, plant propagation, orchard design and productivity improvements in existing orchards.

Centre for Nutrition and Food Sciences

The Centre for Nutrition and Food Sciences supports enhanced health outcomes and economic benefits for Australia, by conducting integrated fundamental and applied research to improve the taste, quality, appearance, nutritional value and safety of food.

We aim to understand the fundamental characteristics of food that influence processing, food quality, consumer perception and nutritional value, and translate insights into added-value ingredients, new products and new opportunities for growers and food manufacturers.

Our Rankings



UQ is ranked #1 in Australia and #6 globally for agriculture

According to the NTU Performance Ranking of Scientific Papers for World Universities 2025.



UQ is ranked #1 in Australia and #15 globally for environmental sciences

According to the QS World University Rankings by Subject 2025.



UQ is ranked #1 in Australia and #15 globally for agriculture and forestry

According to the QS World University Rankings by Subject 2025.



UQ is ranked #1 in Australia and #17 globally for food science and technology

According to the 2024 Shanghai Ranking's Global Ranking of Academic Subjects.

Our research capabilities in crop science



Crop improvement

Integrated pre-breeding research programs delivering advanced lines to industry based on advanced genetics, phenotyping, bioinformatics, trait physiology and modelling

Our research includes:

- Germplasm development with structured populations, advanced phenotyping, and speed breeding in sorghum, barley, and wheat
- Traits delivering adaptation to water limited environments and resistance to pests and diseases
- Strong industry and international links



Crop physiology and modelling

Integrating crop science from the molecular to whole plant levels to enhance food production in the face of climate change

Our research includes:

- Exploring the physiological and molecular bases of drought adaptation in the world's major cereals
- Combining phenotype-to-gene and gene-to-phenotype approaches
- Evaluating the efficiency with which resources (radiation, water and nitrogen) are utilised by crop plants



Farming systems and agronomy

Integrating field experimentation, modelling tools, and socioeconomic data, to generate new science that supports decision-making for economic, environmental, and social outcomes

Our research includes:

- Designing farming systems better able to deal with production, climate and market risks
- Working with farmers to reduce yield gaps, manage risks, and enhance resilience and sustainability of production systems
- Collaborations with farmers, industry, CGIAR institutes, and national and international Universities

Highlights of QAAFI's research into crop science

Sorghum genetics and breeding

QAAFI has a world-leading research group focussed on the genetic improvement of grain sorghum. As a long-standing collaborative program with DPI at Hermitage Research station, the sorghum pre-breeding program has produced genetic material which can be found in almost all current sorghum hybrid cultivars. Our expertise includes biotechnological approaches to improving key traits with CRISPR gene editing, harnessing high-throughput phenotyping for resilience traits such as root architecture, staygreen and yield parameters. We are pioneering the use of predictive breeding techniques to accelerate the rate of genetic gain in sorghum.



Growing talent to feed the world: a new ARC Training Centre in Predictive Breeding


An innovative ARC Training Centre dedicated to training the next generation of plant and animal breeders has begun its work. The ARC Training Centre in Predictive Breeding for Agricultural Futures is supported by the Australian Research Council and 36 partner organisations representing a diverse range of important agricultural species.



Contacts

Centre Administration:

 qaafi.uq.edu.au/crop-science

 (07) 3346 2161

 qaafi.cropscienceadministration@uq.edu.au

Queensland Alliance for Agriculture and Food Innovation

qaafi.uq.edu.au
qaafi@uq.edu.au
+61 7 3346 0550

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