Charles Sturt University

Gulbali Institute
Agriculture Water Environment

GB Pant Partnership scholarship prospectus

Expression of Interest

Charles Sturt University - TEQSA Provider Identification:
PRV12018 (Australian University). CRICOS Provider: 00005F.

Charles Sturt University

Who we are

Charles Sturt University is Australia's leading regional university – with a global perspective.

Our history of innovation and educational empowerment reaches back as far as 1895 with the establishment of the Bathurst Experimental Farm. That was the first step in connecting people, communities and industry to make a real difference. Professionally. Socially. Economically.

Formally incorporated in 1989, we are Australia's largest regional university. We have campuses across New South Wales, and teaching partnerships in Canberra, Goulburn and Wangaratta.

We also have diverse international partnerships and provide online education nationally and across the globe.

Our university is grounded in the qualities we draw from our regional roots – our sense of community, our will for hard work, and our resilience when times get tough. We have turned the challenge of connecting multiple campuses across hundreds of kilometres into an opportunity – to apply the lessons we have learned to connect students across Australia and the world.

Our student body – numbering some 43,500 – stretches from the banks of the Murrumbidgee River to the Rocky Mountains of Canada and beyond. And our alumni – 220,000 strong and counting – are applying their learning everywhere too, from the red centre and the white wilds of Antarctica to the heart of the world's megacities.

And that's not just the case for our students. We have research and industry partnerships that reach across the nation and around the globe – sharing knowledge, driving change, fostering growth.

Yindyamarra winhanganha

It means the wisdom of respectfully knowing how to live well in a world worth living in. And it's what we strive for. Every day. How? By making connections.

Connecting our students with the knowledge and wisdom to shape the world and reach their potential.

Connecting our research to real-world issues.

Connecting new technologies with traditional wisdom to protect ecosystems and forge a more sustainable future.

And connecting people, industry and government to share ideas, build knowledge and find innovative solutions to today's – and tomorrow's – challenges.

Our vision

Our vision as Australia's leading regional university, is to advance the careers of our students, inspire research excellence and drive regional outcomes with global impact. We seek to empower the leaders of tomorrow through innovative education and applied research, and we have a strong commitment to learning from and working with Australia's First Nations Peoples.

It's why we are committed to the transformative University Strategy 2030. It's our commitment to our communities. To our partners. To our students.

To our regions. A long-term strategy deepens our relationships, enabling us to build a stronger tomorrow together.

Studying in Australia

An experience like no other

At Charles Sturt, we're geographically gifted. We have five campuses across regional Australia in Albury-Wodonga, Bathurst, Wagga Wagga, Orange and Port Macquarie.

Our campuses are safe, close-knit communities. Your lectures, tutorials, practical workshops, cafés, gym and the all-important library, are just a short walk from one another.

Our PhD Supervisors have small student cohort sizes which means targeted and specialised tuition.

At Charles Sturt, we have a strong student community. You'll study alongside students from across the country and the world - 24% of our students are international students from 113 countries - making lifelong friends along the way.

Gulbali Institute

Agriculture, Water and Environmental Research

We acknowledge and pay respect to our Wiradjuri First Nations people by using their native language in the naming of this research institute.

“Gulbali ngurambang” is Wiradjuri which translates to “to understand country". After consultation with First Nations people, we use this phrase respectfully as the name of our research institute.

The Gulbali Institute creates impactful integrated agriculture, water and environment research, grounded in Charles Sturt's footprint across the Murray-Darling Basin, but with impact across Australia and globally.

We emphasise return on investment to increase productivity for farmers, improve natural environments, and reduce risk in agricultural and environmental management.

The Gulbali Institute will maintain Charles Sturt's existing research program and its strong relationships, particularly with Research Development Corporations, key State and Commonwealth departments and agencies, and private industry to achieve outstanding outcomes.

The Institute undertakes multi- and interdisciplinary research and innovation, focusing on large scale programs in the field of:

- Biosecurity
- Agriculture, Food and Beverage Innovation
- Sustainable Aquatic Systems
- Cultural Connection and Environmental stewardship

Find out more

→ research.csu.edu.au/gulbali

The GB Pant PhD program

Details and rationale

The GB Pant PhD program provides candidates with the opportunity to undertake research programs (Dual PhD Award Program) at Charles Sturt University and Govind Ballabh Pant University of Agriculture and Technology (GBPUAT) resulting in the award of a dual Doctor of Philosophy degree from each Institution. (For clarity, this is a single degree from each Institution.)

Selection Criteria

1. Previous Academic Performance: (50% of the assessment). This assessment considers the level of the applicant's highest, relevant qualification and grade point average in line with CSU entry requirements for PhD courses.

2. Research and/or Professional Experience: Evidence of an applicant's research achievements and relevant professional experience (35% of the assessment). This includes such aspects as peer-reviewed research outputs, high esteem academic awards and prizes, relevant research and/or professional experience.

3. Research Alignment with Charles Sturt strategic research priorities and strengths (15% of the assessment). This includes the strength of alignment with the Charles Sturt 2030 Research strategy: the supervisory capacity, Field of Research (FoR) alignment with Coaldrake, and the expected impact and end user engagement of the proposed research.

Who is eligible?

- Prospective PhD students with the relevant skills, experience and interest in one of the project pitches.
- Students considering entry into a PhD program in session 2 in 2026.
- Students can undertake the program:
    - onshore at GBPUAT in India for the first 12 months (Year 1);
    - onshore at Charles Sturt in Australia for the following 24 months (Years 2 and 3); and
    - onshore at GBPUAT in India for the final 6 months (or the final 12 months if approved for an extension).

How to apply?

The first stage will require applicants to prepare a ONE PAGE cover letter indicating which project is of interest, along with a professional CV and transcripts to directorgulbali@csu.edu.au.

Candidates will then be shortlisted and top applicants, and supervisors, will be invited to complete the Charles Sturt admissions process.

Closing date for EOIs is **28th February 2026.**

Shortlisting will take place in early March with highly ranked students will be invited to submit enrolment applications by end of April 2026.

Key Details

Commencement: Students must commence in session 2 2026.

Study load: Only **full-time** applicants will be accepted for short-listing.

Stipend: Charles Sturt will provide a stipend (to the value of $35,000 AUD per annum) for the duration that each candidate is onshore at Charles Sturt (for up to two (2) years only).

Tuition Fees:

International candidates: Students will be onshore at CSU for up to 2 years but will need to be enrolled for the full 3 years of their candidature. CSU fee exemption will be for the period equivalent to three years (six sessions) for PhD at full-time study.

Operating Funds: Scholarship candidates are allocated an allowance to assist with the reimbursement of costs associated with a candidate's research. The annual amount reflects CSU policy on whether the project is linked to specific field of education codes, lab-based, non-lab-based and/or first-nations focused.

Visa: Note that international students will require a valid student visa and insurance to commence. Processing can take up to 4 months. Costs, including travel, relocation, accommodation, health insurance, and living expenses need to be met by the candidate.

English language proficiency: Shortlisted International students must upload evidence of English language proficiency, as part of the enrolment process, in line with minimum CSU standards. This equates to:

1. Providing evidence of having completed a sufficient standard of study in English
2. Having obtained an Academic IELTS within the last 2 years with:
   i. a minimum overall score of 6.5
   ii. no individual score below 6.0
3. Obtaining a qualification deemed to be equivalent to Academic IELTS (and its minimum scores) by Charles Sturt.

CSU Doctor of Philosophy entry requirements:

Applicants must have achieved at least one of the following:

1. Qualified for the award of a master by research with an acceptable level of performance.
2. Completed a bachelor degree followed by a one-year honours degree with class 1 or class 2(1) honours, specialising in the same discipline or a closely similar discipline.
3. Gained class 1 or class 2(1) honours in a bachelor degree of at least four years full-time duration, specialising in the same discipline or a closely similar discipline.
4. Qualified for the award of a coursework masters:
   i. including a research component subject or research component subjects totalling at least 16 Charles Sturt University points, or equivalent; and
   ii. normally with a grade average equivalent at class 2(1) honours or better.
5. Demonstrate a capability for research at a doctoral level through research experience or research experience plus completion of another combination of undergraduate and postgraduate qualifications. Assessment of these applications may require case-by-case consultation between the Dean, Graduate Research (or nominee), Faculty Sub-Dean and Faculty Associate Dean, Research (or institute equivalent).

Project pitch: 01

Title of project / area of research

Harnessing macroalgal supplements to enhance reproductive efficiency in beef cattle

Principal supervisor

Dr Cyril Stephen

Associate Professor in Veterinary Reproduction

Faculty/institute

Faculty of Science and Health and Gulbali Institute

Proposed starting session

Session 2 2026

PhD project abstract

Reproductive performance is a critical determinant of profitability in beef production, with failed or lost pregnancies contributing to significant economic losses worldwide. Innovative approaches are required to improve fertility outcomes. Seaweeds (macroalgae) contain diverse bioactive compounds, including minerals, antioxidants, and secondary metabolites, with potential effects on animal physiology. Although widely investigated for their ability to reduce methane emissions, their influence on cattle reproduction has not been systematically studied.

This PhD project will investigate the impact of dietary supplementation with different types and levels of seaweed on reproductive efficiency in beef cattle. Key outcomes include cow reproductive health, hormonal profiles, immune responses, pregnancy rates, and calf production. Additionally, the project will identify bioactive compounds responsible for any observed effects.

If successful, this research will establish seaweed as a novel, natural feed additive to support reproductive efficiency, profitability, and sustainability in beef production, while advancing knowledge at the livestock - marine interface.

Preferred candidate

The ideal candidate requires research master's in veterinary science/medicine with hands-on experience in cattle handling, reproductive techniques, and nutritional management. Demonstrated skills in data collection, analysis, and critical thinking are essential, alongside practical herd management knowledge. A demonstrated interest in applied research that improves livestock health and reproductive potential will be highly valued. Strong written and verbal communication skills are important for effective collaboration within multidisciplinary teams.

Campus location and place of work

- Charles Sturt University, Wagga Wagga Campus, NSW, Australia
- Private cattle farms in the Riverina region (around Wagga Wagga)

Direct enquiries to

Dr Cyril Stephen

Email: cstephen@csu.edu.au

Project pitch: 02

Title of project / area of research

Targeted uterine microbiome modulation to enhance breeding success in cattle

Principal supervisor

Dr Cyril Stephen

Associate Professor in Veterinary Reproduction

Faculty/institute

Faculty of Science and Health and Gulbali Institute

Proposed starting session

Session 2 2026

PhD project abstract

The success of Assisted Reproductive Technologies (ART), such as Artificial Insemination (AI) and *in vitro* fertilization (IVF), in cattle is plateauing, presenting a significant challenge to global food security. Traditional focus has centred on semen quality and hormonal interventions, largely overlooking the crucial role of the reproductive tract microbiome. Increasing evidence links both the uterine and vaginal microbiomes to fertility outcomes, yet their precise composition and manipulability in high-value livestock remain poorly characterised.

This PhD project will investigate the hypothesis that targeted modulation of the uterine microbiome can significantly enhance ART success. The project will use next-generation sequencing to characterise the reproductive tract microbial communities in cattle with historically high versus low AI/IVF success. This foundational data will inform the development of targeted probiotic or prebiotic interventions designed to cultivate a 'fertility-friendly' microbial environment.

Finally, the efficacy of these novel interventions will be tested *in vivo*, measuring their effect on conception rates, early embryonic survival, and subsequent calving rates.

Preferred candidate

The ideal candidate requires a research master’s in veterinary science with hands-on experience in cattle handling, reproductive techniques, and nutritional management. Demonstrated skills in data collection, analysis, and critical thinking are essential, alongside practical herd management knowledge. Experience with next-generation sequencing data analysis and molecular biology techniques are desirable. A demonstrated interest in applied research that improves livestock health and reproductive potential will be highly valued. Strong written and verbal communication skills are important for effective collaboration within multidisciplinary teams.

Campus location and place of work

- Charles Sturt University, Wagga Wagga Campus, NSW, Australia
- Private cattle farms in the Riverina region (around Wagga Wagga)

Direct enquiries to

Dr Cyril Stephen

Email: cstephen@csu.edu.au

Project pitch: 03

Title of project / area of research

Resolving taxonomy of Metarhizium and Beauveria spp. - entomopathogenic fungi of Order Hypocreales

Principal supervisor

Dr Nirodha Weeraratne

Faculty/institute

Gulbali Institute

Proposed starting session

Session 2 2026

PhD project abstract

Entomopathogenic fungi of Order Hypocreales include ecologically and economically important species such as *Metarhizium* and *Beauveria* spp. which are ubiquitous organisms commonly isolated from soil and infected arthropods and sometimes found as endophytes. Their persistent nature in the rhizosphere makes them ideal biopesticides offering a sustainable and eco-friendly alternative to chemical insecticides.

Globally, the taxonomy of these species has changed quite significantly over the last 20 years by using molecular markers to infer phylogeny. However, the taxonomical diversity of Australian *Metarhizium* and *Beauveria* isolates remain unclear, hindering the accurate identification and description of species thus, providing a foundation to study the evolution of their host specificity, host range and distribution.

The proposed project will use an extensive collection of *Metarhizium* and *Beauveria* isolates from curated historical collections in Australia to generate a molecular phylogenomic framework for *Metarhizium* and *Beauveria* species in Australia. This new framework will provide tools for accurate identification, generate species profiles, and infer phylogenetic relationships thus revising the records of these genera in Australia.

Preferred candidate

The ideal candidate will hold suitable qualifications for admission to a PhD and also be naturally inquisitive and passionate about making an original intellectual contribution to microbial sciences. A good background knowledge and research experience in microbiology, molecular biology, and systematics is essential. Experience in bioinformatics will be advantageous. The ability to work independently in a PC2 laboratory adhering to standard protocols, as well as the ability to co-operate within a multidisciplinary team is vital.

Campus location and place of work

The candidate is required to work regularly in National Life Science Hub (NaLSH) laboratories on CSU Wagga Wagga campus, during their time studying at Charles Sturt.

Direct enquiries to

Dr Nirodha Weeraratne

Email: kweeraratne@csu.edu.au

Project pitch: 04

Title of project / area of research

Microbial Communities Associated with Weed Patches in Broadacre Crops and their Chemical Relationships

Principal supervisor

Dr Nirodha Weeraratne

Faculty/institute

Gulbali Institute

Proposed starting session

Session 2 2026

PhD project abstract

Persistence of weeds in broadacre cropping systems remains a major constraint to productivity and sustainability. Allelopathy, i.e., chemical inhibition of plant growth by other plants, is a well-documented phenomenon. However, its ecological relevance in field conditions is often mediated by soil microbial communities. Microbes can degrade, transform, or amplify allelochemicals, thereby influencing their bioavailability and phytotoxicity.

Recent studies have shown that microbial communities associated with weed rhizospheres differ significantly from those in weed-free zones, suggesting selective recruitment or microbial facilitation of allelopathic effects. However, the specific microbial taxa and functional pathways involved in these interactions remain largely unexplored in broadacre cropping systems.

This project aims to identify microbial taxa and functions potentially involved in allelopathic interactions and infer ecological relationships between microbial community composition, allelochemical profiles, and weed persistence. This research will advance understanding of the ecological underpinnings of weed-crop-microbe interactions, offering novel avenues for sustainable weed control in broadacre agriculture. It aligns with emerging trends in regenerative agriculture and microbiome-informed crop management.

Preferred candidate

The ideal candidate will hold suitable qualifications for admission to a PhD and also be naturally inquisitive and passionate about making an original intellectual contribution to microbial sciences. A good background knowledge and research experience in plant biology, microbiology, molecular biology, and biochemistry is essential. Experience in metagenomics and metabolomics will be advantageous. The ability to work independently in a PC2 laboratory adhering to standard protocols, as well as the ability to co-operate within a multidisciplinary team is vital.

Campus location and place of work

The candidate is required to work regularly in National Life Science Hub (NaLSH) laboratories on CSU Wagga Wagga campus, during their time studying at Charles Sturt.

Direct enquiries to

Dr Nirodha Weeraratne

Email: kweeraratne@csu.edu.au

Project pitch: 05

Title of project / area of research

Nanotechnology-Enabled Microbial Biofertilisers for Enhanced Yields in Grain and Bean Crops.

Principal supervisor

Associate Professor Li Li

Faculty/institute

Gulbali Institute

Proposed starting session

Session 2 2026

PhD project abstract

Grain and legume (bean) production is increasingly challenged by declining soil fertility, nutrient inefficiency, and the rising cost and environmental burden of synthetic fertilisers. Although microbial biofertilisers—especially nitrogen-fixing and phosphorus-solubilising rhizobacteria—offer a sustainable alternative, their adoption remains limited. Major barriers include poor microbial survival during storage and transport, rapid loss of viability in harsh soil environments, inconsistent field performance across diverse Australian soil types, and competition with native soil microbiota. These challenges hinder the reliability, scalability, and farmer confidence required for broadacre deployment.

This PhD project aims to overcome these limitations through the development of nanotechnology-enabled microbial biofertilizers using advanced biomineral nanoencapsulation strategies. The project will engineer functional biomineral with cellulose to protect, stabilise, and enhance the delivery of beneficial microbes. Through rational design of nanoencapsulation structures, the project seeks to significantly improve microbial shelf-life, stress tolerance, soil adhesion, and targeted colonisation of the rhizosphere. Ultimately, the aim is to create a robust, high-performance microbial biofertilizer platform that consistently enhances nutrient-use efficiency and crop yields in grain and bean production.

By integrating nanotechnology, biomineral chemistry, microbial biotechnology, and plant–soil interaction science, this project will contribute to developing scalable and sustainable nutrient management solutions. The outcomes will support reduced reliance on synthetic fertilisers, improve soil health, and deliver tangible productivity benefits for growers operating in highly variable conditions.

Preferred candidate

The ideal candidate requires to have a research-focused Master’s degree in materials science, microbiology, biotechnology, chemistry, or soil science, or a closely related field, with hands-on experience in laboratory-based research. Practical experience/ skills in microbial culture, nanomaterial/biomineral formulation, or soil and plant experiments and quantitative data analysis is highly desirable. Motivation, reliability, and the ability to work both independently and as part of a multidisciplinary research team are essential.

Campus location and place of work

The candidate is required to work regularly in National Life Science Hub (NaLSH) laboratories on CSU Wagga Wagga campus, during their time studying at Charles Sturt.

Direct enquiries to

A/Prof Li Li

Email: lili@cus.edu.au

Project pitch: 06

Title of project / area of research

Responsive Seed Coating Technologies for Targeted Delivery of dsRNA or Microbial Inoculants Using Functional Nanomaterials

Principal supervisor

Associate Professor Li Li

Faculty/institute

Gulbali Institute

Proposed starting session

Session 2 2026

PhD project abstract

Seed coating is a transformative approach to deliver biological inputs directly to the germinating seed, offering precise, early-stage protection and enhanced crop establishment. Yet conventional coatings are often chemically static, poorly compatible with biologicals, and ineffective under variable field conditions. Smarter, biologically compatible seed coating strategy, such as RNA-based pest control or microbial-based nutrient enhancement, is highly demanded in agriculture.

This PhD project aims to develop responsive seed coating platforms that can stabilize and deliver either double-stranded RNA (dsRNA) or beneficial microbial inoculants using engineered functional nanomaterials. The project will focus on moisture- and pH-sensitive coatings using functional biominerals that respond dynamically to the germination environment, enabling controlled release of active agents at the root–soil interface. The research will involve formulation and characterisation of coatings tailored to one of two biological payloads:

(i) dsRNA for non-GM gene silencing of pests or pathogens, or

(ii) microbial inoculants (e.g. nitrogen-fixed bacteria) for enhanced nutrient uptake.

Coatings will be evaluated for RNA or microbial stability, compatibility with seeds, release dynamics, and bioactivity under simulated soil conditions. Greenhouse trials will assess impacts on germination, plant health, and stress resilience. The delivery mechanism will also be investigated for preserving viability and uptake by seeds or pests.

This research will deliver novel, biologically compatible seed coating strategies to enable precision delivery of next-generation agricultural inputs, supporting sustainable crop protection and productivity without reliance on genetic modification or chemical overuse.

Preferred candidate

The ideal candidate requires to have a research-focused Master's degree in materials science, microbiology, biotechnology, chemistry, or soil science, or a closely related field, with hands-on experience in laboratory-based research. Practical experience/ skills in microbial culture, nanomaterial/biomineral formulation, or soil and plant experiments and quantitative data analysis is highly desirable. Skills in characterisation techniques or germination/plant assays will be an advantage. Motivation, reliability, and the ability to work both independently and as part of a multidisciplinary research team are essential.

Campus location and place of work

The candidate is required to work regularly in National Life Science Hub (NaLSH) laboratories on CSU Wagga Wagga campus, during their time studying at Charles Sturt.

Direct enquiries to

A/Prof Li Li
Email: lili@cus.edu.au