

2022 Global Change Youth Research Project Description

Please use this template to create a description of each research project, eligibility requirements and expected deliverables. Project details can then be uploaded to each faculty, school, institute, and centre webpage prior to the launch of the program.

Project title:	Artificial Intelligence for better beans
Project duration, hours of engagement & delivery mode	<p>Duration of the project:</p> <p>4 weeks during Winter Vacation and 1 day a week during semester 2, 2022.</p> <p>Hours of engagement must be between 20-36hrs per week</p> <p>COVID-19 considerations: Project can be completed under a remote working arrangement if required.</p>
Description:	<div style="text-align: center;"> </div> <p>Globally, demand for protein is increasing. Future products made with pulse protein will require over 100,000 tonnes of legume protein by 2030. Mungbean is an important food and cash crop grown in tropical and subtropical regions globally. Despite increasing demand for mungbean protein, expansion of mungbean is limited in Australia due to its low yield and variability between environments.</p> <p>To meet these challenges, improved mungbean varieties are required for the future with ideal combinations of traits. However, selecting the genomic regions of interest for targeted crossing is challenging because of interactions between genotypes and their environment. Artificial intelligence is a power technology ideally suited to estimate complex network relationships and large datasets. Applying artificial intelligence to mungbean crop improvement will help to accelerate the development of improved mungbean varieties for the future.</p> <p>The aim of this research project is to use artificial intelligence via deep learning algorithms to deconvolute complex relationships between</p>

	genotype, the environment and phenotype. Improved algorithms will be investigated for their ability to associate key genomic regions associated with yield development in mungbean. Algorithms will be developed using <i>in-silico</i> breeding trial datasets and evaluated using real data from a mungbean pre-breeding population tested in the field.
Expected outcomes and deliverables:	Skills and experience will be gained in data collection, quality control, curation, reproducible research documentation and analysis. The specific tasks will include software analyses of associations between genetic fingerprints (DNA markers) and could include taking plant measurements. Potential for inclusion of student in research publications.
Suitable for:	<i>Plant Science, Genetics and Computational Science Students.</i>
Primary Supervisor:	Dr Owen Powell, Queensland Alliance For Agriculture and Food Innovation (QAAFI)
Further info:	<ul style="list-style-type: none"> • Dr Owen Powell, o.powell2@uq.edu.au • Associate Advisors: Dr Millicent Smith (SAFS/QAAFI) <p><u>Location:</u> St Lucia Campus</p>