

## PhD opportunity

### Strategies to maintain and increase genetic diversity in the Chickpea Breeding Australia (CBA) program

#### Question to address

Cultivated chickpea (*Cicer arietinum*) is recognised for a narrow genetic base. Genetic diversity is further narrowed within a breeding program due to the need to maintain disease resistance, agronomic plant type and grain quality attributes. As CBA implements modern breeding approaches such as genomic selection, a strategy is required to maintain and subsequently increase the genetic diversity within the program.

#### Background

- CBA is a national breeding collaboration of NSW DPI and GRDC.
- The objectives of the breeding program are to deliver varieties with increase yield, grain quality and resistance to biotic and abiotic stresses.
- NSW DPI's chickpea breeding program has been running since the late 1970's and a number of major barriers to Australian chickpea production have been overcome through breeding (plant type for mechanical harvesting, improved grain quality and disease resistance).
- Since the 1980s diverse germplasm has been utilised by the program to address production constraints, particularly *C. echinospermum* as a key source of resistance to Phytophthora root rot (PRR).
- GRDC invested in a new collection of *C. echinospermum* and *C. reticulatum*, and a number of Australian and international pre-breeding projects have generated diverse material which is available in the Australian Grains Genebank (AGG)

#### Proposal objectives

1. Estimating genetic diversity within and between chickpea varieties and CBA advanced breeding lines.
2. Comparison of yield, grain quality and resistance to biotic and abiotic stresses of commercial varieties, advanced breeding lines and wild/international/landrace chickpea germplasm.
3. Optimisation of high throughput phenotyping for high priority traits.
4. Optimal contribution selection for optimal use of the AGG to increase genetic diversity within CBA for high priority traits.

#### Application

Please send cover letter and CV to Susanne Hermes at [Susanne.Hermesch@une.edu.au](mailto:Susanne.Hermesch@une.edu.au) for further information. Other key researchers are Kristy Hobson, Ahsan Asif and Li Li at NSW DPI and AGBU.