

PhD opportunity

Phytophthora resistance vs. height and root mass costs to *Cicer echinospermum* based resistance

Question to address

Cicer echinospermum crosses are the key source of resistance to Phytophthora root rot (PRR) in the national chickpea breeding program, but this resistance source can introduce plant height, yield and root mass costs. To reduce the bottleneck of large numbers of lines that require PRR resistance screening in the breeding process, methods are needed to identify crosses and lines that are short and have small root masses.

Background

- Tall chickpea plants with high set pods are favoured by industry for harvest efficiency.
- *C. echinospermum* crosses are the key source of resistance to Phytophthora root rot (PRR) in the chickpea breeding program.
- Controlled environment studies have shown that *C. echinospermum* lines have a small root system, and that plant height is a good predictor of root mass. However, knowledge of the root traits of Australian adapted chickpea material is very limited.
- Chickpea varieties with large or extensive root systems may provide production advantages in particular growing environments, such as where soil water at depth (>1.2m) needs to be accessed.
- QTL markers for chickpea root vigor have been identified in studies based in India

Proposal objectives

1. Evaluate the ability to use plant height to predict root mass in chickpea breeding lines and *C. echinospermum* crosses.
2. Evaluate the ability to use plant height as selection criteria to reduce the no. of *C. echinospermum* crosses required in PRR resistance screening, address effects of short line exclusion on subsequent range of resistance.
3. Evaluate the ability of published QTL markers for root vigor to identify chickpea breeding lines or *C. echinospermum* crosses with a large root mass
4. Identify if QTLs can be identified for plant height from current PRR phenotyping databases.

Application

Please send cover letter and CV to Susanne Hermesch at Susanne.Hermesch@une.edu.au for further information. Other key researchers are Sean Bithell, Kristy Hobson, Ahsan Asif and Li Li at NSW DPI and AGBU.