Opportunities to improve grain legumes for future climates

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Grain legumes, such as mungbean and chickpea, play a valuable role in improving the sustainability of farming systems. Despite the potential value to production systems, grain legumes are often perceived by farmers as a risk, as production varies year on year, primarily due to abiotic stress. New breeding technologies provide opportunities to incorporate genetic variation into breeding programs and accelerate the development of pulse varieties better suited to sustainable farming systems. In this presentation we share the application of new breeding technologies through two case studies conducted in grain legume crops mungbean and chickpea. Firstly, we tackle the phenotyping bottleneck by developing and applying high throughput unmanned aerial vehicle platforms and longitudinal modelling approaches to predict canopy development. This was validated using a nested association mapping population evaluated in multi-environment field trials conducted in the Northern Grains Region of Australia. In the second case study, we share a new framework for fast tracking the deployment of chickpea to high temperature which brings together a multidisciplinary team across agronomy, crop physiology, plant breeding and genetics from major research entities working to advance chickpea production. By integrating phenomics, GxE modelling, genomic prediction tools, the approach can be applied more broadly to a range of pulse crops, to ensure farmers can maintain their competitive edge and maintain future growth in a changing climate.