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Chickpea Heat tolerance traits identified by Australian Researchers

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Chickpeas were exposed to heat stress, staggered sowing dates (with the late-sown replicates experiencing higher flowering temperatures), and in-field heat chambers to deliver heat stress for five days during the sensitive flowering period. The researchers analyzed the response to heat of anther and pollen development.

The associated genetics with interesting traits were mapped using the Chickpea DArTseq technology to identify traits linked to the novel heat tolerance traits. The heat-tolerant materials were also crossed with Australian-adapted chickpea germplasm to develop a population of pre-breeding lines. These new materials show substantial yield advantages under high temperatures, with some yielding almost double when grown in late summer.

The project is headed by Professor Richard Trethowan, director of the Plant Breeding Institute at the University of Sydney.

Professor Trethowan explains that the targeted germplasm came from three sources:

- material from the Australian Grains Genebank (AGG) that was collected from hot climates around the world;
- Australian cultivars identified from an analysis of performance in hot environments in National Variety Trials; and
- lines from India with heat tolerance.

These materials were used to develop a unique germplasm in the Australian Research Councilâ??s Legumes for Sustainable Agriculture (LSA) hub.

The LSA hub was established to drive gains in chickpea growth rates, nitrogen sustainability and resilience against the effects of climate change. It was designed to link trait discovery to breeding outcomes and, therefore, drive up farm production, environmental sustainability and profitability.

â??The high temperature project was a key subprogram and it was considered vital to achieving the hubâ??s overall objectives,â?• Professor Trethowan says. â??Much of the initial work was conducted by Dr Angela Pattison, who left the university at the conclusion of the LSA. However, the evaluation and development of new materials continued with the support of GRDC after the hubâ??s closure.â?•