



focus on **WATER** research

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Canopy temperature algorithm: rolling out the technology to cotton growers

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What are you researching?

Cotton growers in Australia work hard to make the most of limited water available for irrigation. Optimised irrigation scheduling is one key to achieving high water productivity as both overwatering and water stress reduces yield.

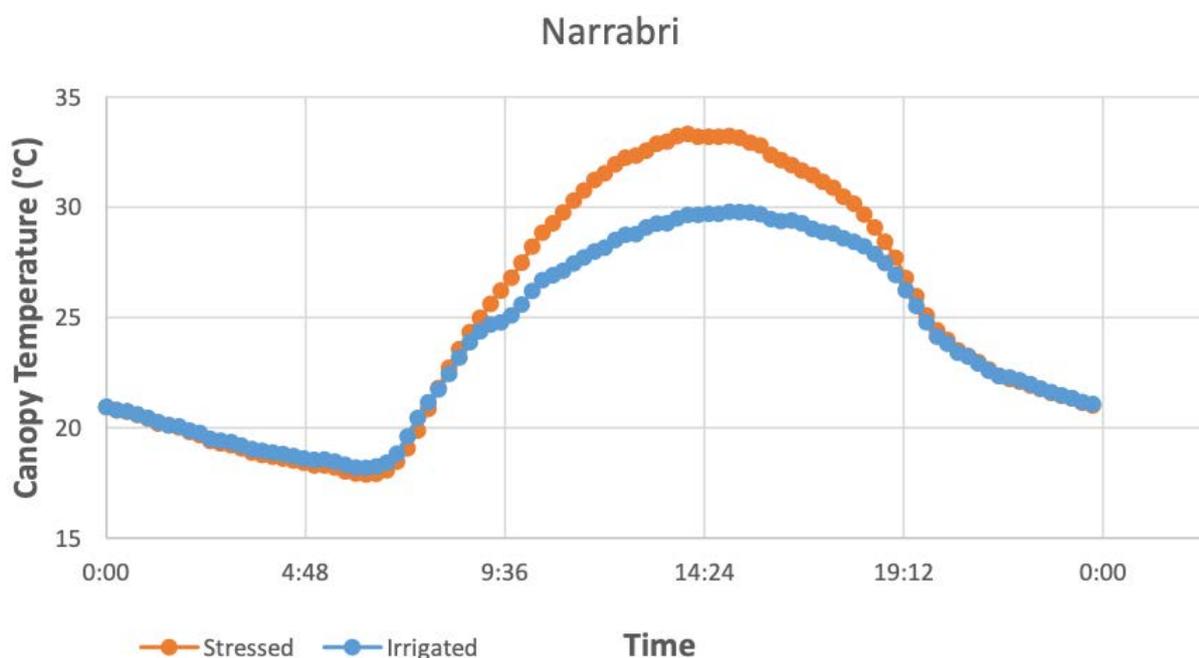
As canopy temperature is a direct response to plant's access to (or lack of) soil water (Fig. 1), we used this understanding to develop an irrigation scheduling method based on continuous monitoring of canopy temperature and underpinning physiology.

Figure 1: The difference in canopy temperature of a well-watered (blue) and a water-stressed (orange) crop at CSIRO trials in Narrabri during the course of a day.

What have you found?

The results from different trials conducted in last 10 years at the Australian Cotton Research Institute and on commercial farms show strong relationships between canopy temperature and cotton yield and fibre quality.

The yields from crops irrigated using canopy temperature approach matched with the yields achieved by some of the top growers in cotton industry and sometimes achieved that with one less irrigation. These results are encouraging and suggest this technology may help improve crop water use efficiency while maintaining the high yields.



Why is it important?

Continuous monitoring of crops reflects crop conditions approaching the need for irrigation; this is the key to the methodology – avoiding plant stress to improve water productivity. This decision making tool will help making an irrigation decision based on crop's response to current soil water status rather than relying on a fixed soil water deficit.

Being a plant-based approach, canopy temperature offers different but complementing information to soil and weather based approaches. Canopy temperature infrared sensors are affordable, easy to use and maintain, and will hopefully be a valuable addition to the suite of tools available to growers for making important irrigation decisions.

The canopy temperature approach is based on the understanding that all plants have an optimum temperature for physiological functioning, eg. 28 °C for cotton – not unlike a person going to the doctor when the body temperature is higher than 37 °C. The time the cotton canopy temperature stays above 28 °C - and meeting some other criteria - are called 'deficit hours'.

The crop needs an irrigation once the cumulative deficit hours since last reach a certain 'threshold' determined

by CSIRO research supported by the Cotton Research and Development Corporation (CRDC).

Responding to grower feedback that they often need to plan ahead, we developed a model to predict canopy temperature a few days in advance using the forecasted weather conditions. This predictive capability will enable growers to plan their irrigations a few days in advance to allow flexibility in the system.

How can I apply the research/what should I do about it?

The canopy temperature technology will be available to growers in the 2019-20 cotton season. CSIRO and CRDC entered into a formal agreement with the Goanna Ag to extend this technology out to growers. Tom Dowling and his team at the Goanna Ag are currently working with CSIRO researchers to integrate the canopy temperature algorithms into their existing platforms being used by growers.

Where do I go for more information?

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Figure 2: Canopy Sensor in action

