Smart irrigation for waterwise crops

CSIRO's WaterWise initiative focuses on providing Australian irrigators with digital solutions for determining when to apply irrigation water that optimises the water use, yield, and quality of the target crop. Water savings through improving water use efficiency will benefit industries as it could be applied to increase the area of crop and/or to increase yield in existing areas.

Research Overview

This four year research study is focused on developing digital solutions for precision irrigation as part of the CSIRO's Digiscape Future Science Platform. Ultimately, the aim is for our systems to be part of a fully integrated irrigation toolbox for growers delivering even more savings.

Improvements in wireless sensor technology and advanced data analytics enables use of plant- and soil-based sensing to continually monitor crops and soils, allowing application and a degree of precision not previously attainable on a commercial scale. For example, infrared thermometers that provide continuous measurements of crop canopy temperature to estimate whether a crop is approaching stress, can be used to identify the need for irrigation before stress is encountered. These systems can be tailored for different situations and crops.

This project will develop a platform that assists in irrigation decision making using both monitored and forecast crop water stress status to optimise crop yield, quality and water use for high-value irrigated crops. It will incorporate advanced data analytics, weather forecasts, spatial assessments, and novel physiology research of crop biochemistry.

This will be achieved through:

(i)   The development of a conceptual tool-box using a model crop to minimise the time of delivery of research to industry

(ii)   Identifying, monitoring, and validating the success and impact of the use of the WaterWise toolbox on at least two Australian high-value irrigated crops

(iii)   Scale from continuous data using a single sensor, to a small field (fixed thermal camera) and infrequent spatial measures over large areas (drones/satellites) to allow precision irrigation to occur.

About the research activities

A multi-disciplinary team consisting of crop physiologists, agronomists, data scientists, climatologists and software engineers will employ modern analytics and sensing technologies linked to field experimentation to generate algorithms that enable more efficient irrigation timing practice in at least two high-value irrigated crops. This will be achieved through firstly identifying and quantifying plant stress in response to water deficits; (ii) using advanced data analytics to integrate this knowledge with in-field sensing (both temporally and spatially) and weather forecasts; (iii) develop strategies that use this information to develop a precision irrigation decision making tool box; and (iv) exploiting the capability delivered through CSIRO's Digiscape 'CONFLUX' computing infrastructure to sustainably deliver commercial impact to industry.

What does being a research participant in this project involve?

We are seeking innovative growers and industry partners that are keen in working with us to develop, apply, validate and test our irrigation toolbox on-farm. A key component of this project is engaging with industry to understand issues faced by the irrigation sector to enable us to develop targeted and impactful solutions. We will be looking to deploy and test our toolbox in the field by deploying fixed sensors, cameras and use of drones monitoring in real-time; initially to gather data, and then using this data to validate and test the toolbox and its value in aiding decision makers.

Contact us to find out more

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