VARIwise technology for precision irrigation and control

Infield and remote sensing technologies have enabled the Australian cotton industry to be a world leader in water use efficiency, and new irrigation approaches can help continue to improve crop water productivity. One such approach is utilising cotton's sensitivity to water stress in different growth stages for irrigation management – where mild water stress in some growth stages does not impact yield or quality and can improve yield.

An irrigation technology 'VARIwise' has been developed that incorporates yield forecasting to inform irrigation decisions. In research trials, VARIwise delivered 5% in water savings and 5% productivity improvements.

VARIwise: technology for crop water productivity-driven irrigation decisions

Supported by CRDC funding, VARIwise software has been developed to automatically determine recommendations for irrigation dates and depths based on user-defined objectives (e.g. maximise predicted yield, crop water productivity).

VARIwise uses data from infield sensors and online sources, predictive yield modelling and an optimisation process to recommend irrigation dates and depths considering impacts on predicted yield. This may result in altering irrigation depth applied or timing in some growth stages.

Data from irrigation technology provider

Imagery-derived crop assessments

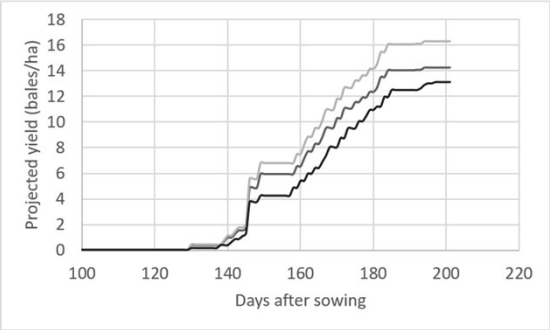
Soil properties and moisture

Seasonal management

Water availability

Weather

VARIwise runs irrigation optimisation using data and yield forecasting



Irrigation technology provider provides irrigation recommendations

Cotton Farm **Irrigation Schedule**

Plan: **Fields 1-6**

Planned irrigation (mm)

Site	Tue 28	Wed 29	Thu 30	Fri 31	Sat 1	Sun 2	Mon 3
Field 1	45						50
Field 2		45					
Field 3			76				
Field 4		54					
Field 5		50					
Field 6	60						55

Potential for full irrigation automation

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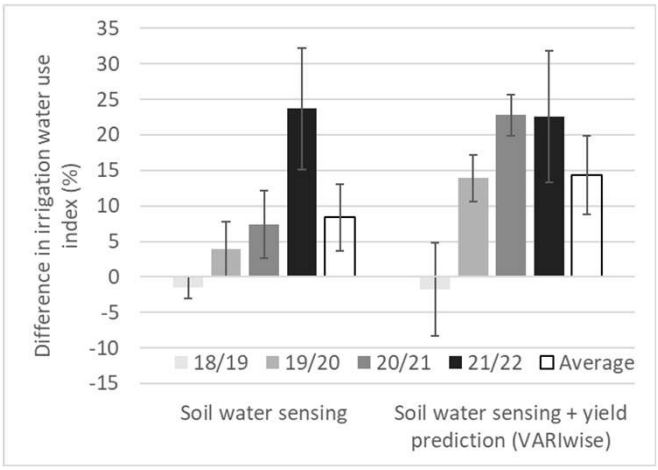
Results of research trials to date

Previous research trials have compared soil-water sensing and VARIwise, and results were:

- VARIwise slightly reduced irrigation depths after peak bloom and/or at boll opening
- Water stress during peak bloom to open bolls can cause young boll shedding but has less impact on yield than loss of early season bolls
- Less water applied during peak boll opening may hasten boll maturity, improve defoliation and reduce regrowth that may lead to increased yield and fibre quality

Results from trials in four seasons



Next steps

1. VARIwise is being developed into a format that can interface with any existing on-farm sensor and irrigation system
2. The project team is seeking feedback on your thoughts on the usefulness of VARIwise irrigation technology
3. The project team is working with commercial technology providers and consultants to pilot VARIwise technology to make sure it meets end user needs
4. The project will be conducting on-farm demonstrations of VARIwise irrigation technology in upcoming field trials and field days

Please share your thoughts on VARIwise

Research funding from Australian Government Climate-Smart Agriculture Program's Partnerships and Innovation Grant led by CRDC in partnership with irrigation technology provider SWAN Systems, precision agriculture advisory business Ag Logic and University of Tasmania, growers for field trial sites

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