Automated irrigation systems: Precision automated furrow irrigation for the Australian sugar industry

1. What is the project about?

Irrigation is the key driver of sugar cane production in many Queensland milling areas. Much of this land is irrigated using furrow irrigation which is a form of irrigation with high labour requirements, lower energy inputs, and often poor water use efficiency. Previous research conducted in the Burdekin region has shown that automation of furrow irrigation improves water use efficiency and reduces labour and energy requirements.

This project is further developing and refining automated furrow irrigation systems for the southern Queensland growing area. Automated furrow irrigation is a potential option for growers outside the Burdekin region. However, there is a lack of knowledge on costs, benefits, and applicability of this technology to other regions.

2. Is automated furrow irrigation feasible?

Initial research found automated furrow irrigation is a viable option and since the completion of the original research project there has been additional investment in furrow automation systems in the Burdekin region. Growers are using these systems to improve irrigation scheduling through more timely application of irrigation events.

This project provides an opportunity for southern area growers to be involved in demonstration activities to test the feasibility of furrow irrigation automation in their milling areas. Research and demonstration activities include the installation and assessment of an automated irrigation system on a farm in the Bundaberg region. This site is enabling a comparison of irrigation system performance pre- and post-installation of automation.

3. How will the research benefit irrigators?

Irrigators will have a better understanding of whether automated irrigation is an option for their farming system. Research activities are directly addressing the issues involved in adapting existing automation technology to different water supplies and on farm water delivery infrastructure; different soils and cropping practices and different field layouts.

They are also assessing whether furrow automation systems can collect the necessary data to provide accurate estimates of water applied, runoff and deep drainage losses and enable better irrigation scheduling decisions. The information gathered will inform the development of design guidelines and indicative system costs and benefits and will include an economic analysis of the feasibility of automated irrigation systems in the southern region.

4. Key results to date

Research activities have focused on the use of SISCOWeb to generate irrigation efficiency, uniformity, and control decisions. This means that the same logic can be applied to furrow irrigation of both Sugarcane and Cotton or any instance where conventional furrow irrigation is practiced.

Testing of SISCOweb was conducted in sugarcane fields in Bundaberg where data was collected, processed and analysed automatically and in real time by SISCOweb. This testing also included the sending of SMS alerts of optimal shut off times whilst the irrigation was still underway. This testing identified some areas for improvement in terms of the sensors but the SISCOweb modelling worked as anticipated. This was the first complete field test of the SISCOweb taggle integration and provided valuable data for further refinement of the system.

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A procedure for analyzing data collected by the WiSA systems is being implemented which greatly improves the ability to process measurements and control decisions made by the automation system. These algorithms need further development before they are ready to be released. The algorithms integrate volumetric data from the flow measurements with valve control times in order to partition water to individual fields. Where infield advance or drain sensors are available, a simplified version of SISCO is employed to analyse the field data and generate performance metrics.

The project team is also investigating the use of Padman automation infrastructure which provides a cloud-based alternative to the farm based WiSA systems installed in the Burdekin.

For more information visit the Smarter Irrigation for Profit website and watch the videos:

- https://smarterirrigation.com.au/ial-icid-webinar-addressing-the-global-water-challenge-through-autonomous-irrigation/
- https://smarterirrigation.com.au/sugarcane-growers-teaming-up-with-researchers-as-part-of-the-sip2-program/

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