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Research shows automation of irrigation stacks up with a range of benefits

Sugar Research Australia Limited

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A recent SRA-funded project has examined the potential for automation of furrow irrigation at three very different farms in the Burdekin.

The National Centre for Engineering in Agriculture (NCEA) received funding from SRA to investigate the automation of furrow irrigation in the sugar industry. This involved a review of potential commercially available control hardware, sensors and radio systems and the installation of this equipment on three farms. These farms were chosen because they represented three different, but common, types of irrigation infrastructure in the Burdekin. The sites are: delta farm with multiple pumps, interconnected pipelines and recycling; BRIA farm with channel supply and no pumping or recycling; BRIA farm with river pumps and recycling. The costs and benefits associated with each site are unique to that setting and are only intended as a guide.

(Above) Using WiSA technology and solar power, here the automation controls the actuators to open and close valves.

Summary of automated sites

	RUSSELL JORDAN UPPER HAUGHTON	AARON LINTON LEICHHARDT	DENIS POZZEBON AIRVILLE
Irrigation delivery system	Gravity feed	River pumps and recycling	Bores, open water and recycling pumps
Area (ha)	82	53	27
Total Cost	$49,700	$68,365	$59,700
Cost/ha	$606	$1,290	$2,211
Annual Cost (assuming 7 yr life)	$6,957	$9,766	$8,529
Annual Benefit	$12,653	$20,034	$8,581
Annual Benefit - Cost	$5,553	$10,268	$53
Summary of Benefits			
Water saving	√√ Approx. 10-15%	Blocks were being underwatered	√√ Approx 20%
Energy use saving— reduced pumping time	Gravity system, no pumping	Not applicable	√√√
Saving from changing electricity tariff	No pumping	√√√√ >40% reduction	Potential saving but not investigated during project
Labour saving— time spent changing/checking irrigation and travelling to the farm	√√√√	√√√√	√√√√
Vehicle cost saving	√√	√√√√√ > 10,000 km/yr	√
Improved record keeping— irrigation is automatically captured	√√	√√	√√
Social or family benefits	√√√√	√√√√	√√√√
Water quality improvement	√√	√√	√√
Reduced deep drainage losses (water table impacts)	√√√	√	√√

KEY PROJECT FINDINGS

- Automation of furrow irrigation is possible, practical and in many cases cost effective.
- Many systems in the Burdekin can be automated with minimal changes to on-farm infrastructure.
- The installed automation systems allow farmers to control, schedule and monitor irrigations from offsite.
- Automation provides the major benefit of a reduction in farm labour.
- Automation once used to its full potential allows better timeliness of irrigations leading to potential reductions in water and energy use.
- Automation allows irrigators to better target off-peak power tariffs.
- End of row sensors and within field sensors allow the system to adapt to changes in soil intake and/or flow rates and adjust the irrigation timing appropriately.
- The system is commercially available.

CONCLUSIONS

The three farms in this project have demonstrated a range of costs and benefits. The different farm layouts and irrigation systems have highlighted the fact that a favourable cost benefit scenario is reliant on the farm design, water sources and current management. Not all growers will see a positive cost benefit outcome from installing automation, or they may only achieve a positive outcome if the automation allows them to improve their irrigation scheduling and management. On the other hand, some growers may see extensive benefits. It should also be noted that the cost of borrowing money to install an automation system has not been considered in these scenarios.

Growers who are considering automation are encouraged to seek assistance with developing their own cost benefit analysis to inform their decision on whether to invest in this technology. ■

A series of detailed information sheets have been developed on the project and are available under the irrigation section of *www.sugarresearch.com.au.*

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