



CottonInfo Extension Activity Report

Part 1 - Summary Details

Please use your TAB key to complete Parts 1 & 2.

CRDC Project Number: CSD2103

CSD: CSD2103

Project Title: CottonInfo Field Demonstration Trial: Irrigation Tool-Box Series - Farm Walks

Project Commencement Date: 30/10/2020 **Project Completion Date:** 31/3/2021

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Part 2 – Contact Details

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Signature of Research Provider Representative:



Date submitted: 07/05/21



Part 3 – Final Report

(The points below are to be used as a guideline when completing your final report.)

Background

1. Outline the background to the project.

Siphon irrigation accounts for around 77 per cent of irrigated cotton production (CRDC Grower Survey 2020). The 2017/18 irrigation performance assessments conducted by CottonInfo have shown there is still room for improvement. In fact, 75 percent of the irrigation events measured had an application efficiency of less than 80 percent (industry standard for minimum performance). There are simple management practices that can lift irrigation performance.

The project was an extension activity to provide training to inexperienced irrigation operators or managers. The aim was to demonstrate that simple management practices can be implemented to improve irrigation efficiency and water productivity.

This project contributes to the CottonInfo Strategic Plan Goal 1: Improving rate and reach of adoption and adaptation of research and development; key focus area: New technologies and management practices adapted; and activity: Investigate and facilitate the development of beneficial new technologies, management practices and systems for cotton farms; progressing towards out 2023 target of 1.3 bales/ML (GPWI).

Objectives

2. List the project objectives (from the application) and the extent to which these have been achieved.

1. Change in practice – siphon placed so water discharging below water level. - Achieved
2. Increased understanding of the impacts of flow rate and cut-off time on application efficiency. - Achieved
3. Increased knowledge of how to optimise an irrigation event, siphon placement, run times, flow rates. - Achieved
4. Increased aspirations to optimise irrigation performance - Achieved

Methods

3. Detail the methodology and justify the methodology used. Include any discoveries in methods that may benefit other related projects.

This project was an extension activity that involved visual demonstration, group learning, researcher/grower interaction and peer to peer learning.

Workshops were conducted at "Farm 1", Toobeah, "Farm 2" Talwood and "Farm 3" Mungindi, "Farm 4" Brookstead and "Farm 5 and Farm 6" in the Lower Namoi.

Dr Joe Foley, USQ was engaged to deliver workshops on a head ditch with new/inexperienced irrigation staff before an irrigation was about to take place. He was assisted by Ben Crawley, CottonInfo WUE Technical Lead. The workshops included:

- Simple mathematics and physics on how siphon size and placement effects flow rates through a siphon.
- Information sheets provided to individuals that showed the relationship between siphon diameter, pressure head and flowrate – Siphon Charts. These information sheets were from CottonInfo resources. <https://www.cottoninfo.com.au/publications/irrigation-toolbox-series-overview>
- Demonstration of how to measure siphon internal diameter size correctly using callipers.

- Once siphon size was established, a modified manometer (Brickies level) was set-up to demonstrate the difference in pressure head (head height) between the water in the head ditch and water in the furrow.
- Participants were asked to find the expected flowrate based on the siphon size and pressure head from the information sheet.
- A siphon with an attached Irrimate™ flowmeter was started and the flow rate was observed. This value would be equal or close to the value expected from the siphon charts.
- The siphon's placement was then moved to reduce the pressure head to demonstrate its effect on reducing flowrate.
- The total volume of water that could pass through a siphon was then calculated for different flowrates at different pressure heads for the expected irrigation runtime eg. 10 hours.
- The difference in flowrates would equate to thousands of litres over a 10 hour period down a single furrow
- The difference was also estimated for a full field (E.g 100 furrows).
- The importance of having all siphons placed consistently to achieve equal flow rates and adjusting run times to improve irrigation efficiency.
- Soil infiltration as a major driver of irrigation management and application efficiency.
- The importance of maintaining a constant head of water in the head ditch, timing when siphons are pulled, impact of soil type, and field design on irrigation performance.

The methodology was effective as Dr Joe Foley & Ben Crawley was able to explain the scientific literature and then demonstrate it through a practical demonstration that was engaging to participants and easy to understand.

Outcomes

4. Describe how the project's outputs will contribute to the planned outcomes identified in the project application. Describe the planned outcomes achieved to date.

The planned outcomes were:

Economic: Higher water productivity as losses are reduced and more productive irrigation farms.

Environmental: Less losses from evaporation and deep drainage from shorter irrigation times and more efficient use of water

Social: Networking between participants, peer – to – peer learning, improved irrigation application efficiency and increased social licence

47 participants including 12 farm managers , 34 farm staff and 1 consultant have a better knowledge and understanding of simple management practices that can be implemented to improve irrigation application efficiency.

The Project's outputs, which consisted of farm walks/head ditch talks and demonstrations, provided an efficient and easy to understand method of conveying the science and engineering concepts of how to improve irrigation efficiency and water productivity of an irrigation. Therefore by improving water productivity and irrigation efficiency, greater economic, environmental and social outcomes are expected.

5. Please report on any:-

- a) Feedback forms used and what the results were
- b) The highlights for participants or key learnings achieved
- c) The number of people participating and any comments on level of participation

a) Feedback forms were not used on the day. Evaluation was conducted by observation and asking questions of participants.

Irrigation staff were keen to participate in demonstrations at all the workshops, measuring siphon diameter, taking measures of head, checking flow rates on the flow meters and calculating differences in flow rate with different siphon placement.

Some participants were actively writing down flow rates and channel height measurements for future reference.

It was noted that farm staff were quite amazed at how accurate the field measurement of the siphon size and pressure head was at estimating the flowrate through the siphon. (Comparison of siphon charts and flow meter data).

Another highlight for the participants was how a small difference in siphon placement can have a significant impact on the overall volume of water applied to a furrow and the impacts of un-even flow across the field from inconsistent siphon placement.

Staff were really interested and started to do calcs about the difference the siphon position makes over a whole irrigation – Namoi Workshop.

Great discussion about alternative irrigation systems and ways to improve current syphon irrigation – “Farm 4”, Brookstead Workshop.

Growers and workers had a very good concept of the discussion points and asked plenty of questions – “Farm 4”, Brookstead Workshop

“This is why I get you to place the siphons right”, “Farm 3” Mungindi, to his farm staff.

“Thank you very much for taking the time to show us all some really good things to take away from the day. We all got plenty out of it”, Irrigation Manager, “Farm 2” Talwood.

Regional Manager of Farm 5, kept the two different sized siphons and the IrriMATE flow meter to measure flows and applied irrigation volumes at a field level for each irrigation on his farm “Why Not”. He used this information for different benchmarking scenarios.

“The main thing we got out of the workshops was balancing flow rate, run time to limit tail waters, while still successfully recharging the soil profile during an irrigation event”, Rod Gordon, Regional Manager, Hancock Farmland Services.

“I’d really like to run these workshops during our first irrigation in December so our staff can then implement what was learnt throughout the season”, Rod Gordon, Regional Manager, Hancock Farmland Services.

b) Highlights included:

- The strong engagement from participants. Genuine interest in factors that affect irrigation application efficiency and irrigation performance. The interaction between participants with Joe Foley, Ben Crawley and CottonInfo REO’s was excellent and this is shown in the photos provided at the end of this report.

Key Learnings:

- Flow rate can vary significantly with small changes in head
- To maximise & maintain flow rate siphons should be discharging below the water level in the rottobuck area.
- Maintain the height of water in the head ditch to ensure even flow rate throughout the irrigation.

- Soil infiltration has a significant influence on irrigation performance.
- Inflow rate typically has the largest influence of any variable that can be managed by the irrigator
- Time to cutoff is a key variable easily managed by the irrigator.
- Flow rate and time to cut-off should be managed together.
- effect siphon placement and siphon size has on flow rates, run times, tail water, water productivity and application efficiency.

C) 4 workshops were run by Joe Foley in Queensland in the Border Rivers and Darling Downs and 2 were run by Ben Crawley in the Namoi.

- A total of 47 participants
 - 34 participants attended the 3 Border Rivers sessions
 - 8 at the Darling Downs and
 - 5 attended the Namoi (smaller family farms).

Conclusion

6. Provide an assessment of the likely impact of the results and conclusions of the research project for the cotton industry. What are the take home messages?

The workshops are an example of how CottonInfo can connect growers with not only researchers but other growers to provide an avenue for growers to learn about irrigation system performance to improve irrigation application efficiency.

The field demonstrations were excellent refresher for irrigators on the simple management practices they can implement to improve irrigation performance. They also provided information for new irrigators to understand the basics of soil hydraulics and how their irrigation practices can influence application efficiency. The IrriMATE flow meter is an excellent tool to demonstrate the impacts of some of these practices. An in-field toolbox meeting at the start of each irrigation, using an IrriMATE flow meter is a great way to ensure irrigators have a better knowledge of the principles behind siphon irrigation and how they can impact the irrigation performance.

The take home message from the workshops were that small and simple changes to irrigation practices can make a significant difference to irrigation performance, irrigation efficiency and water productivity over a single irrigation and a whole season.

Extension Opportunities

7. Detail a plan for the activities or other steps that may be taken:

- (a) To tell other CGAs/growers/regions about your project – At cotton catch-ups and in CottonInfo Regional Newsletters.
- (b) To keep in touch with participants – Participant registrations provided contact details to include in CottonInfo REO contact lists for communications. Participants will be reminded prior to the next irrigation season of the Irrigation toolbox series, and availability of Siphon Flow Meters.
- (c) For future projects – Given the success of these workshops, CottonInfo plan to continue “Head-ditch talks” in a similar format during the 2021/22 cotton season.

"Farm 5" Lower Namoi, 16th January 2021



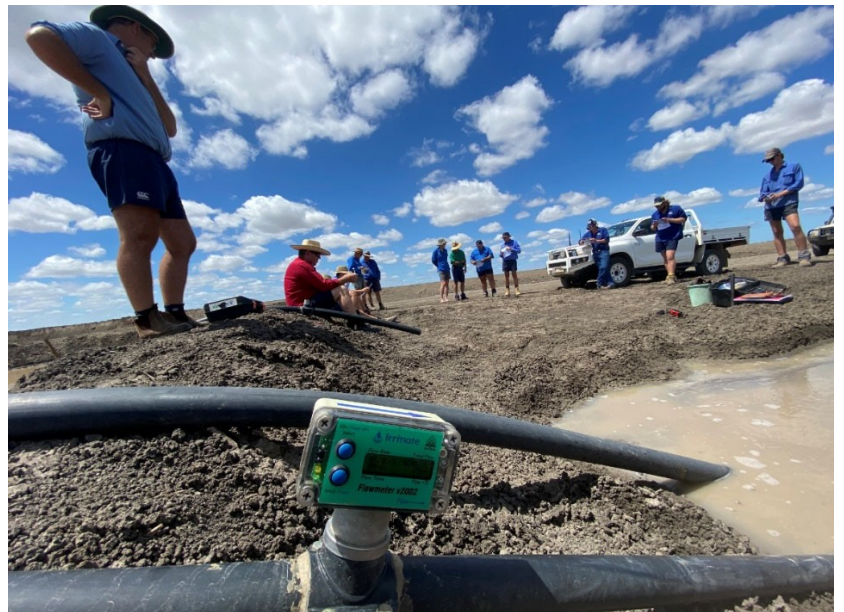
"Farm 6" Lower Namoi, 31st January 2021



"Farm 4", Brookstead 18th February 2021



"Farm 1", Toobeah 1st February 2021



"Farm 2", Talwood 1st February 2021



"Farm 3", Mungindi 1st February 2021

