



Australian Government

Cotton Research and
Development Corporation

CAPITAL ITEM FINAL REPORT 2014

Part 1 - Summary Details

CRDC Project Number: DAQ1401C

Project Title: **Major Capital: Biodegradable Film Layer**

Project Commencement Date: April 2014 Project Completion Date: September 2014

Research Program: The Farm

Part 2 – Contact Details

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Date submitted: 17/9/14

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PRINCIPAL COORDINATOR
(EXTERNAL FUNDING)

(Please return to CRDC with a completed financial statement within 40 Business days from purchase of Capital Item)

Part 2 – Final Report

1. Background

Research being conducted as part of project DAQ1401 – “Strengthening the Central Highlands Cotton Production System” has identified an opportunity for reducing peak summer climatic risks associated with either heatwaves or cloudy wet weather through the investigation of tactics for bringing forward boll setting through earlier crop sowing. Typically cotton is sown on the Central Highlands from September onwards as the risk of cool weather recedes rapidly. August is generally considered to be too cool to reliably plant, however an analysis of historical temperature records suggest that if temperatures could be raised by 2-3°C, planting may be reliable and allow earlier crop establishment.

During the 2013/14 season we began examining the potential to use biodegradable plastic films to raise soil temperatures and allow cotton establishment during August. The preliminary results from this research demonstrated that clear films raised soil temperatures by 2-4°C and enabled more rapid germination and early season crop development. However, these films were laid by hand which significantly curtailed the ability to manage treatment plots to best exploit these benefits.

It became clear after the first season that the only way to test the potential of biodegradable films for cotton production would be to increase the scale of deployment. This would require equipment to lay film post sowing, and the manufacturing of a film to suit the machine and cotton hills, which included slots that enabled cotton seedling emergence through the film upon germination.

A capital request was made to build and purchase a 3 point linkage film layer designed to lay film on cotton hills.

2. Objectives

The objective of this capital project was to purchase a plastic film layer that was customised to lay biodegradable film upon cotton hills for trial purposes. A prototype machine would allow commercial style deployment of film to much larger areas of cotton crop and enable commercial scale application, in-field management, and picking.

3. Methods

Various agricultural machinery manufacturers were approached to provide quotations for the designing and construction of a plastic film layer for our purposes. The only company that showed interest in these enquiries was Ellis Equipment based in Kingaroy. Ellis Equipment retail fully imported film layers that have a market for small scale vegetable production where polyethylene films are commonly used. After a fairly fruitless search for a company to custom build something to our specifications, discussions with Ellis Equipment confirmed that utilising the componentry from two bed film layers onto one tool bar may well work for laying much narrower width rolls of film to 1 metre cotton hills. A basic unit utilising off the shelf components was assembled by Ellis and delivered in May 2014.

The unit was transported to Emerald for field testing and to determine the likely parameters required to manufacture a matching biodegradable film. In this aspect the project team had excellent co-operation from Mr David McGrath from Econverte, a company who have developed a degradable film marketed as Degricover™. A range of test runs with different width rolls of film and different film thicknesses indicated that a roll width of 450 mm was sufficient to allow film to be successfully laid on cotton hills with 30 cm of exposed film and the remainder used to “tuck” in the sides of the film to keep it in place. A 12 µm film was also sufficient to cope with mechanical laying on hills at speeds of 8 km per hour under fair to average field conditions (e.g. cloddy hills with high cotton trash

content). The pre-punching of slots in the centre of the roll prior to laying did not appear to effect the integrity of the film during application.

Based on the performance of the film layer, David McGrath from Econverte has arranged for the custom manufacture of 450 mm wide rolls of Degricover pre-slotted to allow cotton seedling emergence in time for the 2014/15 season.

The initial performance of the film layer was limited. Conceptually it achieved the purpose of applying film to cotton hills. However, the components of the film layer were all 'fixed' to the tool bar and offset discs were used to deposit soil onto the edges of the film to keep it in place. It was clear during preliminary testing that some components would be better mounted in a 'floating' configuration and that the use of Alabama sweeps to deposit soil along the edges of the film would be more effective than the discs. These modifications and adaptations were devised and conducted by Mr Carlo Stanherlin, a farm manager at Cowral Agriculture "Orana" on the Central Highlands.

The modifications were tested together with the custom made Degricover film prior to the commencement of the 2014/15 trial program in July and were found to be an effective combination.

4. Results.

The biodegradable film layer was utilised to deploy film to plots 8 rows wide by 500 m long within a large scale replicated planting date trial at "Orana". With minor adjustments, the film layer has very effectively deployed film onto cotton hills resulting in a total covered area of more than 4 hectares.

The film layer will be transported to Darlington Point for use by Heath McWhirter (Elders) to conduct similar trial work during September 2014, and possibly also used at Moree by Michael Braunack (CSIRO) during October 2014 before being returned to Emerald for future research.

The utilisation of this film layer within our project and by others in the cotton industry will enable commercial scale evaluation of degradable film technology and its potential or otherwise for cotton production.



Degradable film layer underway laying film on cotton hills.



Profile photo showing film mechanically laid on top of a hill.



First film treatments sown and laid on 3 August 2014.

The same plot 3 September 2014 showing successful cotton emergence and establishment.

5. Conclusion

After some modification, the film layer has been an effective capital item and will allow commercial scale assessment of degradable films for cotton production, not only in the Central Highlands for project DAQ 1401 but also at other locations within the industry.

6. Staff

Collaborators in this project have included
Carlo Stanherlin – Cowral Agriculture
David McGrath – Econverte.
Jamie Iker – Spackman Iker Ag Consulting
Paul Grundy & Gail Spargo - QDAFF

7. Extension opportunities

Several field days will be conducted at Emerald during the 2014/15 season to showcase the research being undertaken and the impact of early planting with films. It is anticipated that Heath McWhirter will also showcase his research with degradable films applied with this equipment at Darlington Point.

8. Publications

Any publications arising from this work will be reported as part of DAQ 1401 – “Strengthening the Central Highlands Cotton Production System”.

Part 3 – Final Report Executive Summary

This small project funded the purchase of a plastic film layer that was custom built to allow the application of degradable films to standard cotton hills. This allowed the commercial scale testing of degradable films for cotton production that might enable earlier sowing, better soil moisture conservation and more rapid plant development. The film layer that was developed is a three point linkage implement that applies plastic film to two cotton hills in a pass. Film is applied as a separate operation immediately after sowing.

With a number of post manufacturing modifications and the use of film produced to specific dimensions, the film layer allowed the effective and rapid deployment of film to large plots that will enable the testing of this technology. This film layer will be used by other researchers in the industry at Darlington Point and Moree to test the use of films for cotton production. After many years of small scale testing of biodegradable films in cotton by a number of researchers, the investment in this equipment and the advent of tailor-made film will enable a commercial assessment of film's potential.



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