



FINAL REPORT

(due within 3 months on completion of project)

Part 1 - Summary Details

Cotton CRC Project Number: 5.01.23

Project Title: Regional Extension St George & Dirranbandi

Project Commencement Date: 01.07.07 Project Completion Date: 30.06.09

Cotton CRC Program: Extension

Part 2 – Contact Details

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Part 3 – Final Report Guide (due within 3 months on completion of project)

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

Background

1. Outline the background to the project.

Regional Extension – St George & Dirranbandi

Due to the ongoing drought throughout the cotton growing regions there has been a decline in both investment dollars and human resources. This decline had impacted on the Cotton CRC's ability to extend new research from the scientific community to the industry's growers. Unfortunately a number of the extension officer's positions had been vacant throughout many of the cotton valleys for a period of time.

Therefore it was decided to look at an alternate approach to fulfilling the needs of growers and ensure that they were being informed of the latest research and best management practices via the extension model. As such a project (5.01.23con) was initiated so as to employ on a part time basis the services of an independent consultant in the Lower Balonne region (St George, Dirranbandi & Thallon) to extend these new research outcomes to growers in these areas.

Dallas King via Balonne Agricultural Consultancy was contracted for two years to provide this service to the Lower Balonne region.

Objectives

2. List the project objectives and the extent to which these have been achieved.

Project Objectives

Extension Officer Local Services:

- Conduct on farm trials, demonstration and adaptation of emerging research trials to regional scale.
- Communication and presentation of latest research outcomes (e.g. Workshops, Field Days)
- Technical information support for assisting with regional issues (e.g. Cotton Tales)
- Coordination of local monitoring programs (e.g. Egg collecting)
- Coordination of responses to emerging issues – local & national (e.g. Whitefly & bio-security)
- Delivery & support of industry programs (e.g. BMP, IPM, IRMS)
- Foster linkages between local industry and researchers and CRC partners.

- Develop focussed information products (e.g. Pest Management guide, nutrient sampling guidelines)

National Services:

- Extension & adoption of research outcomes for industry benefit.
- Coordination of responses to industry wide issues
- Input to national projects and programs.

Achievement of these Objectives:

2. Conduct on Farm trials, demonstration and adaptation of emerging research trials to regional scale

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3. Communication and presentation of latest research outcomes (e.g. Workshops and Field Days)

On farm trials were conducted throughout the 2 year contract though due to the part time basis the number of these were limited. However workshops to promote and extend the research outcomes from large scale trials conducted in other areas was considered to be a more efficient way to disseminate these results to growers. As such a large number of workshops, farm walks and field days were held at St George & Dirranbandi throughout the two years, these included:

- **Soil Health Workshops at Dirranbandi, St George & Mungindi**
 - 3 x Soil Pit field days conducted with Pat Holme
 - 2 x Soil Nutrition & Interpretation workshops with Pat Holme
- **Area Wide Management Meetings**
 - 6 AWM meetings each in St George and 4 in Dirranbandi during the 2007/08 cotton season.
 - 3 AWM meetings in St George and 3 in Dirranbandi during the 2008/09 cotton season.
 - These were conducted with researchers Richard Sequira, Dave Murray, Melina Miles, Zara Ludgate, Sharon Downes, Rod Mahon, Mary Whitehouse and Colin Tann.
- **Trials conducted included:**
 - Mirid Threshold Survey
 - Irrimate Irrigation Efficiency trials at Thomas Cotton.
 - Storage and Seepage evaluations at Kia-Ora.
 - Soil Compaction reduction trials at Iona with Helen Squires.
 - Evaporation Mitigation Trials at Burgorah.

- **Spray Application, Awareness & Management Workshops**
 - 2 workshops conducted with local cotton growers in both St George and Dirranbandi with Bill Gordon during the 2007/08 & 2008/09 season.
 - 1 Spray Dye Night workshop conducted during 2008/09 season in both St George & Dirranbandi.
 - 1 workshop conducted with local broadacre farmers at both St George & Dirranbandi so as to increase awareness of potential damage and reduce the incidence of 2,4-D damage to cotton crops.
- **Pump Efficiency Workshops**
 - 1 workshop held at St George and 1 workshop at Dirranbandi in conjunction with the RWUE team (e.g. Janelle Montgomery & Peter Smith).
 - Attended with 3 growers the Centre Pivot & Lateral Move workshop held at Goondiwindi.
- **Alternative Crop Meetings**
 - These meetings were conducted in both St George & Dirranbandi during the 2007/08 season when flood waters arrived in late November and were too late for mass plantings of cotton.
- **E-BMP Pilot Workshop**
 - In conjunction with Liz Adcock coordinated growers to participate in the E-BMP pilot program.
- **Borehole & Groundwater Monitoring Project**
 - 2 meetings with growers and Des McGarry explaining the results and impacts from the borehole monitoring project conducted in the St George irrigation area since the early 1970's.
- **St George & District Sensitive Crop Map 2008/09**
 - The collection and coordination of information so as to develop a District Map showing where sensitive crops such as cotton and pigeon peas had been planted. Thus reducing the possible impact of 2,4-D and Roundup Ready chemistry.
- **Lower Balonne Field Day 2008**
 - February 2008 field day attended by 18 local growers viewing WUE, IPM & variety trials throughout St George & Dirranbandi.
- **Auscott & ACRI Grower Tour 2009**
 - Grower trip to Auscott and the ACRI incorporating the "Big Day Out" at Keytah. 21 growers from Dirranbandi & St George attended.

3. Coordination of local monitoring programs (e.g. Egg Collecting)

The coordination of local monitoring programs such as the collection of Helicoverpa eggs and larvae and whitefly samples is continually emphasized by growers in both regions as being integral to the Extension Officer's role.

The level of importance placed on this activity is easily underscored by the fact that over the past two seasons St George & Dirranbandi have had the highest collections of eggs and larvae provided to the CSIRO researchers at Narrabri of any area.

The difficulties experienced in the St George region with the control of Helicoverpa Bollgard II survivors ensures that this is a highly valued extension service.

As with the Helicoverpa collections previous collections of Whitefly sent to Dave Murray and Zara Ludgate from the basis of our Area Wide Management meetings conducted before and during the cotton season.

4. Coordination of responses to emerging issues – local & national (e.g. Whitefly & Bio-security).

The coordination of responses to emerging issues is a vital part of being able to conduct well attended Area Wide Management (AWM) meetings and have been integral to the continuing management of Whitefly in both St George & Dirranbandi. The support and willingness from researchers such as Dave Murray, Melina Miles, Zara Ludgate has made it easier to coordinate field walks and on farm breakfast meetings for growers.

This willingness to travel large distances and give up their own time has also been a key part in the response by Sharon Downes' team to the local and now national issue of Bollgard II survivors.

I was also responsible for the coordination of the extension to the Bollgard II planting window in conjunction with the Dirranbandi & St George Cotton Grower Association Presidents and our local ACGRA representative Cleave Rogan. This application was successful and saw an extra 3500ha of cotton planted in the region as flood water became available in the last days of November 2007.

Having a good rapport and knowledge of the local farms, growers and consultants has also made this coordination process easy and thus efficient.

5. Delivery & support of industry programs (e.g. BMP, IPM & IRMS)

I have and continue to support the Cotton Australia team with the implementation of the BMP program. Although the need for coordination has reduced now

compared to the 2007/08 season once the new E-BMP is introduced the role of Extension Officer will be a major contributor to ensuring what is a much needed industry program.

The level of support I had achieved during the 2007/08 season was commented on very favourably by both Bec Smith and Adam Kay. I had contacted Bec Smith in regards to 6 growers whom were keen to complete their PCA's and coordinated the completion of two growers Land & Water Management Plan through the BMP module.

I have also coordinated with Cotton Australia the growers for the pilot E-BMP workshop conducted during January 2009.

As mentioned previously IPM is an important part of the St George & Dirranbandi growers plans for handling pests such as Whitefly. The fact that I have organised and coordinated a total of 16 AWM meetings for the region during the past 2 seasons further emphasises the importance of having an extension officer for this region. I believe it is because of the one on one contact these meetings allow growers and consultants to have with the researchers that we were able to achieve such a higher level of control last season compared to other valleys.

Considering the difficulties that both St George & Dirranbandi have experienced with insect pests, growers have placed great importance on the adherence to the IRMS and support for the IRMS road show. As has been commented on by the IRMS team the Lower Balonne meeting is one of the best supported meetings with growers and consultants. During the two past years meetings we have had only one consultant not able to attend and high numbers of growers whom have attended.

6. Foster linkages between local industry and researchers and CRC partners.

I believe the support and willingness of researchers to attend the workshops and field walks I have organised for growers in the Lower Balonne region demonstrates my ability to foster healthy relationships between the local industry and researchers.

It has been this ability along with the repour I have been able to establish with growers and consultants that have ensured their support and as such the success of such work shops, farm walks, meetings and field days.

I have maintained strong linkages with the Cotton Australia staff and Dave Kelly during the past two years. This can be verified with the number of growers whom completed BMP PCA's and Land & Water Management Plans.

Attending the local Grower Association meetings has given me an opportunity to ask growers what information or research they may be interested in and allows for priority plans to be developed for the up coming season. These meetings also enable the transfer of idea's between the growers and extension staff whilst raising pertinent issues.

7. Develop focussed information products (e.g. Pest Management Guide, Nutrient Sampling guidelines).

The prime example I believe of having developed a focussed information product was the initiation and completion of a Sensitive Crop Map for the St George Irrigation Map. Once this information was gained from growers and collated into the map it was then distributed amongst local cotton and broadacre growers so as to reduce and minimise the impact of 2,4-D chemistry on cotton and Roundup Ready onto surrounding wheat crops.

To coincide with the launch of this map the Spray Application & Management Workshops were held with Bill Gordon for both Cotton and broadacre growers. This map was emailed to all of the local growers of which Jon & Joanne Grainger are part of. It is from here that due to contact with Joanne a similar map was deemed necessary for the MacIntyre and Gwydir valleys.

This map has now also become an important part of the research project being conducted by Geoff Baker and Colin Tann into the Spatial Relationship of Bollgard II Refuges in the St George District.

Due to the part time basis of the contract the ability to help develop these information products is generally restricted to the winter months. As such we as an Extension Team have just completed the updating of the Pest Management Guide for the 2009/10 season in conjunction with industry researchers.

I have helped in the coordination of material from researchers in regards to the GVB's, Pale Cotton Stainers and the Beneficial Impact Matrix.

Methods

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

Not Applicable to this project.

Results

9. Detail and discuss the results for each objective including the statistical analysis of results.

Not Applicable to this project, please refer to the Outcomes section.

Outcomes

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

Evaluating outcomes from any project can be difficult though with a project related to extension services or the extension of latest research and best farming practices they are perhaps more easily identified.

Mirid Threshold Meetings: One of the greatest outcomes achieved of Project 5.01.23con has been the increase in Mirid thresholds throughout both the St George & Dirranbandi area. Due to meetings and workshops being held directly with the 4 local consultants we have achieved through Mary Whitehouse's and Mozzam Khan's work a tangible result over a wide geographic area.

The major impact that has occurred is that consultants will now wait until they have a 3 mirid/m threshold before considering treating fields. These thresholds have even been taken further if plant mapping of fruit retention suggest little yield damage is occurring. One consultant now works with a threshold of 4 mirids/m.

The reason that this is having a major impact is because it has reduced the early flaring of whitefly for our areas. Last year the St George & Dirranbandi areas averaged only 1 insecticide for mirids and in the majority of cases 1 insecticide for whitefly.

As such this change to pest management has affected a potential of 48,600ha in a "full season".

Although there are very few if any advantages to Whitefly, one is that they have once again stressed the importance of IPM and AWM and as such has made the AWM meetings once again relevant to growers.

Area Wide Management meetings remain one of the most valuable tools Extension Officers have of being able to communicate effectively with both local growers and consultants. In the case of St George and Dirranbandi these have been extremely well supported due to a number of factors including IPM for Whitefly and the pests produced by alternative crops such as Sunflowers, Soybeans, Corn and sorghum. These meetings have also allowed for the exchange of ideas between growers as they are normally held late afternoon at a field with a few beers. Other growers have taken away ideas such as the 2 metre bed system etc to trial on their own farms.



One of the many Area Wide Management IPM meetings held at Dirranbandi

Providing an opportunity for growers to meet and interact has the advantage of allowing us as Extension Officers to gain a better understanding of what type of research growers may be interested in.

The Soil Health Workshops: have also changed the mindset of many growers convincing them to change their farming practices so as to reduce tillage and compaction. 5 growers farming just over 4600ha have since converted to 2 metre beds with a variation on the old 2 metre bed system. The new system utilizes GPS technology and has the tractor and depth wheels of the equipment on top of the bed leaving all the furrows with no traffic. This has then allowed for better infiltration of irrigation water as none of the sides of the beds have been compacted whilst also resulting in a more even outflow of the furrows. Because the water emerges from all of the rows evenly has meant a reduction in tail water pumping as there are no “wheel track” rows racing through early.



Local grower developing the new version of 2 metre beds.

This two metre bed system in conjunction with Roundup Ready cotton has also resulted in a reduction in fuel usage as growers decrease the number of cultivations required as well as lighter tooling being used for the middle beds.

The Soil Nutrition and Interpretation Workshops with Pat Holme whilst utilizing the data from Ian Rochester's work has also resulted in less N being applied and wasted as has occurred in other areas. Although both St George and Dirranbandi have traditionally only applied up to 200kg/ha of N the research from Ian and the fact that growers can now also interpret their own soil test results means that growers do not feel pressured into applying extra nitrogen to their fields. The obvious outcome of this is a reduction in their carbon footprint.



Soil Health Workshop at St George with Pat Holme & Helen Squires

Irrigate Irrigation Efficiency trials have convinced quite a few local growers to evaluate their own on farm efficiency with a private irrigation consultant, Justin Schultz having now based himself in St George for the Lower Balonne region. He will be conducting evaluations with 6 growers during the 2009/10 season which will cover approximately 2,100ha. The drought continues to have an impact on the acres that can be evaluated. Due to the interest raised at the Storage Seepage and the Pump Efficiency Workshops, Justin has also gained contracts to conduct further evaluations for both storages and pumps. This once again will reduce the impact local irrigators have on the environment through fuel reduction via more efficient pumps and a reduction of deep drainage from storages.



Jim Purcell addressing growers at the Lower Balonne Field day in February 2008

Spray Application, Awareness & Management Workshops: resulted in the reduction of 2,4-D incidences on cotton within the Lower Balonne region during the 2008/09 cotton season when compared to 2007/08.

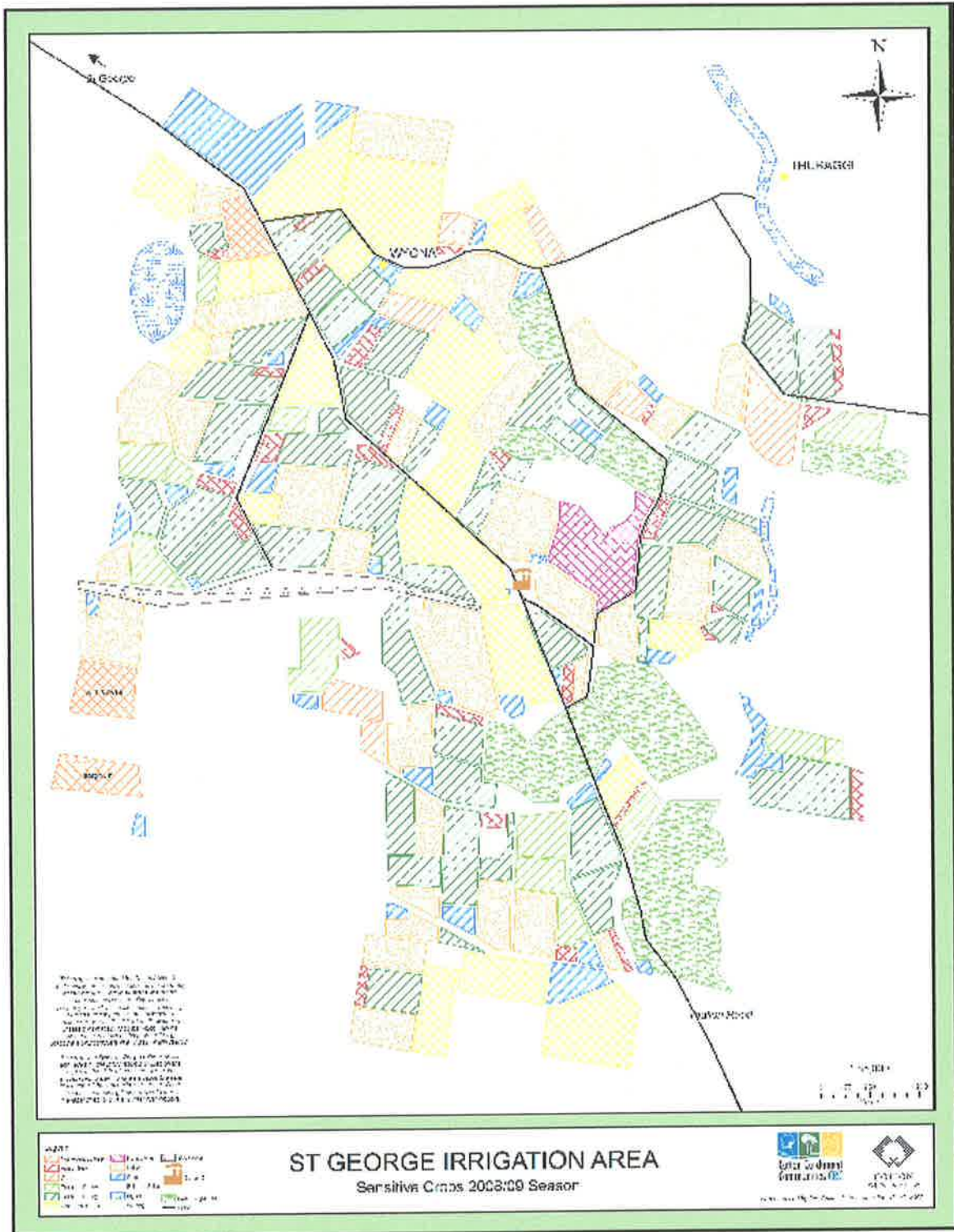
Through the production of the Sensitive Crop Map and the coordination of Application workshops with both local cotton and boardacre growers we were able to raise the awareness of the impact on yield that 2,4-D causes to cotton. Similarly we were able to make cotton growers aware of the impact early season Roundup Ready causes on wheat which is filling grain.



Bill Gordon conducting a Spray Application & Management Workshop in St George

Although climatic conditions were certainly different from the 2007/08 season last year there were only 3 reported cases of 2,4-D symptoms with these being very light damage. The combination of meetings, workshops, maps and radio advertising was successful in reducing each of the industry's impacts upon one another. The final outcome has been that the Lower Balonne was able to produce 20,200ha of cotton without yield damage from 2,4-D whilst slowly building better relationships with our broadacre neighbours.

Another outcome is that these local initiatives lead to the creation of a similar map for the Macintyre & Gwydir valleys and although there were 2,4-D incidences it may have helped to greatly reduce the potential number of fields affected.



Sensitive Crop Map developed in conjunction with Bec Smith & local growers

Pump Efficiency Workshop's: were successfully conducted in both St George and Dirranbandi throughout the 2 year contract. Although the St George meeting was not as well attended as the Dirranbandi meeting it was held at Kia-Ora which has 16 pumps and covers 10,000 irrigated hectares. Due to the savings delivered at the end of the day the new owners have now employed the services of an Irrigation Consultant, Justin Schultz whom participated in the course to further evaluate the

remaining 15 pumps. The calculated fuel savings alone totalled \$26,000 if this particular storage was to be filled during a flood harvesting event. Obviously over a farm of this size the savings in fuel and as such carbon output is massive.



Pump Efficiency Workshop conducted at Kia-Ora near St George.

Alternative Crop meetings: held during early December 2007 were highly successful and were certainly the most well attended of any workshop. The reason for this is that the Lower Balonne has been a cotton monoculture for the past 30 years and growers and consultants required as much information as possible in regards to these new crops. The St George meeting had all of the local consultants and all bar 4 growers attend whilst Dirranbandi had all of the consultants and only 1 grower unable to attend.

It could be considered strange for the Cotton CRC to be facilitating such a meeting though the cotton window had closed and the water had arrived too late. Therefore growers were looking at possible cropping alternatives. These meeting allowed us to have researchers discuss with growers and consultants the pest management issues of these crops and the impact that they would have on the surrounding cotton fields. This need for knowledge then instigated monthly AWM/IPM meetings with Dave Murray, Zara Ludgate and Melina Miles as well as a number of other researchers. The information from these meetings also persuaded consultants and growers to plant crops such as corn, sunflowers and sorghum rather than soybeans due to concerns with whitefly.



Alternative Crop meetings held at St George & Dirranbandi in December 2007 with a range of researchers.



E-BMP Pilot Workshop: was coordinated with Louise Adcock during January 2009. The new BMP program impressed the pilot growers with a number of comments that they will be able to utilize it is a tool for the farm rather than a folder which has to be "ticked off" every 12 months. The information available to growers via this program will be extremely valuable and I perceive this as a great opportunity to involve the wives of growers in regards to the rollout of this program.

The Borehole & Groundwater Monitoring Project: has raised the awareness of the potential danger of deep drainage from inefficient irrigation practices. As mentioned previously a number of growers have now contracted an independent irrigation consultant to evaluate their own properties and practices. One of the growers whom participated in the Irrimate trial has reduced his run times on 1km length rows from an average of 13hours to 6 hours and on calculations has therefore reduced his deep drainage losses by up to 1.2mg/ha over his old practices. These water savings then allow for extra fields to be planted to more cotton. Combined with Sarah Hood's work there have been over 91 Irrimate evaluations performed over the past 4 seasons.

Currently I am coordinating with Des McGarry an update of his work with a meeting to be held in January.

The Auscott & ACRI Grower Tour 2009. This tour was conducted during late February and coincided with the Keytah "Big Day Out". The response from growers to this trip was and continues to be extremely rewarding. The tour was coordinated in conjunction with both the St George & Dirranbandi Cotton Grower Associations and had 8 growers from the Dirranbandi region and 13 growers from St George attend.



Dirranbandi & St George growers on the Farm Tour which incorporated Auscott, ACRI and the Keytah "Big Day Out".

The first part of the tour encompassed Auscott Narrabri and covered a multitude of farming practices. These included irrigation via Lateral Move Machines, 2 metre bed systems, electronically controlled pump stations and minimal till options. Ben Stephens was extremely generous with both his time and knowledge throughout the morning.

The afternoon was spent at the ACRI followed by a tour and dinner at CSD. At the ACRI growers were able to discuss in a small group environment as well as one on one with researchers such as Greg Constable, Sharon Downes, Lewis Wilson, Colin Tann and Mike Bange. All of these researchers were also extremely generous with their time and information when discussing relevant projects. All of the growers were impressed with and gained a greater insight into Sharon Downes' work with a tour of the insectaries and explanation of her work. Due to Sharon's work within the St George & Dirranbandi region the growers were able to gain a greater understanding of the process of testing of the survivors from their crops.

Due to Greg Constable's in field discussion with the growers they were able to follow the process required to constantly create improved varieties and the linkages between the CSIRO plant breeding team and the marketing of these varieties via CSD. The discussion and tour of CSD allowed growers a better understanding of why CSD is such a pivotal part of the Australian Cotton industry and the ownership structure which ensures that it continues to remain owned by Australian growers.



Touring the CSD facility at Wee Waa.

The remainder of the tour was the Keytah "Big Day Out" which did and continues to raise quite a lot of discussion amongst some of the younger growers within both areas. A number of growers have since begun to adapt their farms to a minimum till system. One grower in the Dirranbandi region is now growing cotton this season on 60" beds the same as Keytah so as to conserve and better utilize the available water and moisture. It is difficult to list the effect that this tour has had as each grower certainly gained knowledge that will benefit his property. However it has resulted in the younger farmers on the tour now regularly discussing different farming issues between one another and sharing ideas for sustainable farming practices.

11. Please describe any:-

- a) technical advances achieved (eg commercially significant developments, patents applied for or granted licenses, etc.);
- b) other information developed from research (eg discoveries in methodology, equipment design, etc.); and
- c) required changes to the Intellectual Property register.

Due to the nature of the project no patents or licenses are required and no changes are required to the Intellectual Property register.

Conclusion

12. 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?

Conclusion:

The Australian Cotton Industry has always been held in high regard by the Australian and World Agricultural sector's due to its innate ability to focus on and overcome the challenges it faces. This has continually been achieved due to the industry's commitment to our researchers and our ability to effectively and efficiently disseminate this information to the growers and their consultants via the current extension method.

I believe this project has provided many positive examples of the need for delivery of current research outcomes and best farming practices. I also believe due to the feedback from growers that I have the support of the greater majority of the farmers in the St George, Dirranbandi and Thallon region. Their continual support and attendance at the workshops, field walks, meetings and grower tours only further substantiates this.

Considering the difficulties the industry is having in finding staff for the extension services due to the ongoing drought and the continual pull of the mining sector for human resources from rural areas, this particular model may well be adapted to other valleys. This project has shown that there is a need within the growing areas for a designated person to organise, coordinate and ensure that the different facets of the industry are working together.

I have gained a great deal of experience and exposure to many growers, researchers and industry personnel and would like to thank the Cotton CRC and its partners for this truly amazing opportunity. I believe the Extension Team provide an invaluable service to the whole of industry and have seen first hand the exchange of ideas and knowledge that occurs when growers, consultants, researchers and industry staff are brought together, thus ensuring that we as an industry are progressing towards a sustainable future.

Extension Opportunities

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

- (a) to further develop or to exploit the project technology.
- (b) for the future presentation and dissemination of the project outcomes.
- (c) for future research.

This project may act as a potential model for the delivery of Extension Services in other areas.

Publications

9. A. List the publications arising from the research project and/or a publication plan.

(NB: Where possible, please provide a copy of any publication/s)

B. Have you developed any online resources and what is the website address?

There have been no publications in regards to this particular model of delivery of Extension Services.

Part 4 – Final Report Executive Summary

Provide a one page Summary of your research that is not commercial in confidence, and that can be published on the World Wide Web. Explain the main outcomes of the research and provide contact details for more information. It is important that the Executive Summary highlights concisely the key outputs from the project and, when they are adopted, what this will mean to the cotton industry.

Due to ongoing drought throughout the cotton growing regions of Australia there has been a decline in the availability of both investment dollars and human resources. This decline has impacted on the Cotton industry's ability via the Cotton CRC to extend new research from the scientific community to the industry's growers thus ensuring that the Australian growers remain the most efficient and sustainable in the world.

With a number of Extension Officer positions having been vacant or unable to be filled it was decided to look at an alternative approach. As such a project (5.01.23con) was initiated so as to employ on a part time basis the services of an independent consultant in the Lower Balonne region (St George, Dirranbandi & Thallon) to coordinate with scientists at the Australian Cotton Research Institute and growers the extension of these new research outcomes.

Dallas King via Balonne Agricultural Consultancy was contracted for two years to provide this service to the Lower Balonne region.

This project has shown that there is an opportunity to exploit the existing network of private consultants so as to deliver tangible outcomes for the whole of industry. Reductions in both insecticide usage for whitefly and mirids and a dramatic decrease in the incidence of 2,4-D damage is further justification of the successful nature of this partnership between the Cotton CRC and cotton consultants.

I believe the Extension Team provides an invaluable service to the whole of industry and have seen first hand the exchange of ideas and knowledge that occurs when growers, consultants, researchers and industry staff are brought together, thus ensuring that we as an industry are progressing towards a sustainable future.

