



FINAL REPORT

(due on completion of project)

Part 1 - Summary Details

Cotton CRC Project Number: 5.01.2~~8~~ 7

Project Title: Delivering Regional Extension in Qld Cotton Farming Systems - Central Queensland

Project Commencement Date: 01/07/2008 Project Completion Date: 30/06/2011

Cotton CRC Program: The Adoption

Part 2 – Contact Details

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HELEN KAMEL
PRINCIPAL COORDINATOR
(EXTERNAL FUNDING)

Part 3 – Final Report Guide (due 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.

Extension of best practice continues to be essential to the cotton industry in ensuring highly productive & sustainable farming systems. This project continues the collaboration between the Cotton Catchment Communities Cooperative Research Centre (Cotton CRC) and DEEDI, in providing regionally relevant extension to Central Queensland Cotton Farming Systems and being involved in national extension initiatives.

The objective is to develop, adapt and promote the adoption of industry research outcomes relevant to cotton farming systems in Central Queensland. The Regional Cotton Extension Officer role has a strong focus on major industry production issues including, but not limited to; Integrated Disease Management, Integrated Pest Management (IPM), soils, nutrition and integrated weed management. These positions also have a supporting role in the implementation of national industry-wide programmes such as Best Management Practices (BMP) and 'Come Clean, Go Clean'. To achieve this, the adoption and extension programme delivery involves participative learning processes with both grower groups and individual growers including workshops, meetings, on-farm trials, demonstrations, integration of Decision Support Systems (DSS) tools, field days, publications and other innovative adoption tools.

Throughout the life of the project, the focus on the Regional Cotton Extension Officer role linking to National Priority Teams as part of a larger extension team, has transitioned to a focus on delivering outcomes in target lead areas, while maintaining a regional extension presence for Central Queensland cotton & grain farming systems.

In 2010 the project officer became the Industry Development and Delivery Team target lead for diseases & farm hygiene with a focus on achieving outcomes against:

- 50% of ha complying with industry best practice as defined by the BMP guidelines for control of volunteer re-growth cotton.
- 50% of ha compliant with industry best practice as defined by the BMP guidelines for disease management including farm hygiene practices.

Objectives

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

Objective 1.

Implement a regional participatory extension and adoption plan focussed on the delivery and industry uptake of emerging technologies and management strategies which contribute to increased productivity, profitability and sustainability of Cotton Farming System.

- *Conduct on farm trials, demonstration, validation and adaptation of emerging research trials to regional scale.*
- *Coordinate field days / farm walks / updates to address regionally relevant and topical issues.*
- *Use of relevant national and regional/local media to highlight research outcomes and/or extension activities.*
- *Technical information support for assisting with regional or national issues. (Cotton Tales)*
- *Delivery and support of industry programmes (eg. BMP, IPM, IRMS).*

Objective 2.

Extension programs aligned with the needs of key stakeholders.

- *Foster linkages between local industry, researchers and Cotton CRC partners.*
- *Incorporation of local priorities and adaptation of emerging research into regional extension strategies.*

Objective 3. - Within the Cotton CRC Adoption Programme actively participate as a member of the National Extension Team and Priority Teams, to deliver focussed information and knowledge to industry.

- *Target Lead - 50% of ha complying with industry best practice as defined by the BMP guidelines for control of volunteer re-growth cotton.*
- *Target Lead - 50% of ha compliant with industry best practice as defined by the BMP guidelines for disease management including farm hygiene practices.*
- *National Priority Team Participation (prior to Target Lead role)*

Objective 4.

Identify and evaluate outcomes and impacts of regional extension programme.

- *Conduct evaluation programmes to measure the impacts and outcomes of extension activities.*

Methods

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

This project has worked collaboratively at a local and national level to deliver adoption of best practice outcomes. Much of the work was conducted with grower groups and individual growers and consultants involving workshops, meetings, on farm trials and field days. Close relationships established with researchers and other extension officers have enabled the development of a number of fact sheets & publications, delivering national messages in a regionally relevant manner.

The project continued to foster and utilise strong links within the local industry, particularly cotton grower associations and groups (Central Highlands, Dawson Valley, Belyando and Biloela), Area Wide Management Groups (East Nogoia and West Nogoia), local agribusiness (resellers, pesticide applicators, processors), and Cotton Australia.

Results

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

Objective 1.

Implement a regional participatory extension and adoption plan focused on the delivery and industry uptake of emerging technologies and management strategies which contribute to increased productivity, profitability and sustainability of Cotton Farming System.

Conduct on farm trials, demonstration, validation and adaptation of emerging research trials to regional scale.

This project has ensured that Central Queensland has been included in relevant research through the provision of local support.

Tight lock trials

Susan Maas collaborated with Stephen Allen (CSIRO/CSD) to investigate possible controls for boll rot / tight lock which can impact on yields in CQ by as much as 25%. Five sites were set up, treated with fungicide/insecticide & sampled as per trial plan.

Outcome: There was no impact from any of the treatments.

Further plant density & nutrition trials were established in 2010/11 season however the trial sites were flood damaged.

Impact: Tight locking and boll rots continue to be a significant component of quality and yield loss in Central Queensland and more research is required.

Nitrogen Use Efficiency NUE

Four sites (3 farms, four fields), were sampled as part of the Plants & Soils team NUE benchmarking study being conducted in collaboration with Ian Rochester.

Outcome: Central Queensland sites have been included in this national investigation.

Impact – This monitoring continues on from the 2007/2008 season in which it was found that N fertiliser inputs could be reduced by 15-25%. This pooled data was used to develop an understanding between NUE and the N concentration of fuzzy seed (at the gin) and has contributed to the development of a simple diagnostic test at the end of the season to determine NUE. Results were communicated to growers & consultants at meetings & through cotton tales to encourage growers to optimise their fertiliser inputs. As a result of NUE benchmarking, Susan has followed up 3 grower inquiries with researchers to assist in grower decision making for nitrogen application.

The project has supported nutrition research by collecting soil, leaf and petiole sampling for various projects.

Regional Refuge Research

Susan collaborated with Mary Whitehouse to compare Bollgard II refuge options for CQ which, based on feedback from a local research and technical group meeting, has been identified as a key regional and industry priority. Three trial sites were established and monitored, each with pigeon pea, Bollgard II & early and late planted unsprayed conventional cotton. The trials are investigating whether a combination of early & late unsprayed cotton refuge would be the equivalent of 5% pigeon pea as well as validating for growers the continued efficacy of refuges.

Impact: Locally relevant research is included in refuges trial information.

Coordinate field days / farm walks / updates to address regionally relevant and topical issues.

This project has ensured regionally relevant and topical issues are communicated to growers and agronomists in a timely and relevant manner.

Increase consultant capacity

The project has contributed to updating & building consultant capacity locally through four consultant specific events, commencing with a full day IPM workshop, covering principles of IPM, secondary pests, Bollgard II resistance issues & IWM attended by 12 participants. This was followed up with three

short focused meetings across a couple of seasons, with visiting researchers (pathologists & entomologists) providing a research and issues update and a small amount of ID training. Regular contact with all consultants has been maintained and assistance (linkage to research, demonstration of Cottassist, etc) provided on an as needs basis.

Impact: Local agronomists are able to deliver best practice through improved knowledge & identification skills.

Area Wide/regional issue shed meetings/field walks

10 Area Wide/region issue shed meetings were held. These meetings cover a range of emerging & strategic industry issues including:

- Bt resistance/survivors
- SLW area wide management
- IRMS & Bollgard II RMP promotion
- Concerns about dominance of flex in system
- Cotton map & Spray drift issues
- Water issues
- BMP farm manager RPL
- Area wide focus on removing volunteer and regrowth cotton
- Come Clean Go Clean
- Burdekin cotton comparison to Central Highlands
- Emerging issues such as mealybugs

They linked with visiting industry researchers Dave Murray, Zara Ludgate, Melina Miles, Richard Sequeira, Richard Lloyd, Paul Grundy, Steve Yeates, and Monsanto researcher Kristen Knight)

Impact: Growers were able to coordinate management of issues together such that:

- No sticky cotton from SLW was reported
- No spray drift reports last season from the area where spray drift was the focus of the area wide meeting
- There has been 12 people undertake RPL assessments in CQ in response to strong local advertising & discussion at meetings
- Industry response to emerging issues such as mealybugs

Farming Systems meetings/field walks

The Regional Extension in Qld Cotton Farming Systems - Central Queensland project has also provided development extension support in crops that fit within the farming system. Profitable rotation crops break the cotton monoculture providing a key benefit in managing weed & disease issues.

Rice trials were conducted by growers & QDPI&F in conjunction with Sunrice. This project communicated findings from this research through two

field walks and a hand out with follow-up grower support. As a result upland rice continues to be viewed as a profitable rotation for the cotton system that will particularly help with weed species shift. The project officer has also influenced planting discussions for rice to ensure that risk of spray drift between two crops was considered.

Wheat is one of the main winter crops in the cotton farming system, and frequently double cropped back into cotton. A focus group was held with 7 growers + 1 consultant to document and share experiences of wheat growing in CQ. Growers were able to learn from each other through sharing experiences and 4 growers identified that they would definitely make practice changes as a result of meeting. Minutes from the meeting were circulated to all growers. This meeting highlighted the need for research in this area and a formal irrigated wheat meeting was held in Emerald attended by 25 growers and agronomists. Key note speakers were Allan Peak (CSIRO), lodging in wheat & Nick Poole (Foundation for Arable Research, NZ), canopy management. Growers provided direction to the Irrigated Farming Systems project proposal that was submitted to GRDC/CRDC. Two growers indicated that as a result of the meeting they had modified their planting rate and nitrogen applications.

Exotic Mealybug

P. Solonopsis has caused significant yield losses in Pakistan and India, and was first identified from Emerald in early 2010. Prior to identification of species, the project officer, Susan Maas alerted entomologists and industry regarding the need for research, and raised the issue at local agronomist meeting and area wide meetings. When notified of the species, Susan recognised it as an exotic and initiated the plant health biosecurity process.

In addition to acting as local contact point for growers, agronomists and industry, Susan Maas supported a number of biosecurity and industry measures, including

- Organised and facilitated
 - Field walk to raise awareness and share known knowledge about mealybug
 - CGA meeting attended by 52 growers to provide update on species and biosecurity response
 - CHCG&IA Research and Tech group to provide grower feedback into the wash down protocols
 - Bus trip for all growers (attended by ~45 growers) to view the issue and discuss options with other growers
- Participated in the industry working group
- Communicated with industry grower concerns about picking contractors
- Assisted entomologists with sampling for wash down trials and

- Participated in 5 teleconferences with industry, and biosecurity
- Attended CGA executive meeting to update them on mealy bug issue
- Assisted Central Highlands and Burdekin growers and consultants provide input into mealy bug research planned for the Burdekin
- Conducted some trial work including survival at temperatures

Susan Maas ensured wider industry awareness of exotic mealybug and washdown protocol through media (within biosecurity guidelines), newsletters, responding to inquiries, presenting at Downs and Dawson CGA meetings and contributing to Cotton Grower article (Charleston K, Addison S, Miles M, Maas S, (2010), "The Solenopsis mealybug Outbreak in Emerald", The Australian Cotton Grower, Volume 31, No.2).

Outcome:

Growers were happy with response to exotic incursion and significant crop losses were avoided. Management protocols developed will assist with management of mealybug in the future.

"I have been talking to the DPI officer and she's been really good"
Chris Ryan, affected grower.

'Sap-suckers making a meal of our cotton', CQ News Wednesday
10/02/2010.

Picking contractors would not have harvested CH cotton without the washdown protocols that were developed. This would have delayed or prevented picking of majority of cotton (17,000ha).

Workshops

CQ Yields meetings

Due to high variability and lower than industry yield average, Susan Maas assisted the organization of meeting between Emerald growers and CRDC. As follow up to this meeting Susan helped organize a 'CQ yields researchers brains trust' meeting in Narrabri & further follow up discussions resulting in local agronomist collaborating with CRDC to look at some farming systems trials. While this trial work was flood affected, it is intended to be repeated in future seasons.

Nutrition/soils

Three events were held to increase grower and consultant awareness of the issues. Mike Bell spoke at the first field day attended by 32 growers & agronomists and follow up interview with 5 growers, identified 4/5 growers were considering changing practice as result of field day (e.g. changing soil sampling methodology, application method for P&K).

Two workshops addressing soil concerns were conducted in Central Queensland as part of the DEEDI Flood Recovery Initiative. Entitled "Securing your soils for the future", they were held at Theodore on 14th of June and Emerald on 15th of June. Attendance was good with over 25 at Theodore (representing >90% of cotton growing enterprises in Dawson) and 22 at Emerald. Facilitated by Susan Maas, speakers included Tim Neale (Precision Agriculture) and David Lester (DEEDI Sustainable Farming Systems), Duncan Weir (Cotton CRC, DEEDI Cotton Extension) and Lance Pendergast (Cotton CRC, DEEDI Water Use Efficiency). The focus of discussions was on physical (compaction, erosion, infiltration) and nutritional soil issues associated with flooding and water logging with the emphasis on solutions.

The Theodore workshop was integrated with a FBA funded myBMP workshop run by Liz Alexander (Blue Dog Agribusiness). Susan Maas also led the section after the soil pit workshop where participants completed the soils and nutrition module of myBMP including using myBMP links to connect to and demonstrate use of Nutrilogic. As a result of myBMP workshop, all Dawson irrigated cotton growers except for two have completed two modules of myBMP, and are able to access NRM incentives up to \$40,000/enterprise from FBA. All participants indicated on their evaluation that they also intend on revisiting Nutrilogic and CottAssist. This has potential to be a great extension delivery model & further workshops are planned.

Regional Extension Support

Susan has provided extension support to water use efficiency project including 2 scheduling and probes workshops.

Flood Extension

Susan provided regional responses to flooding in Central Highlands & Dawson including:

- Support with ministerial involvement with growers
- Regional intelligence and updates on Dawson, Comet & Nogoia flooding into flood response group from Boxing Day up until New Years Eve
- DEEDI support to Dawson growers, including regular SMS on flood heights when local phone and internet services were lost
- Assisted with drafting DEEDI cotton industry flood response document
- Presentations to local council flood sub-committees & World Bank delegation reviewing flood response

Susan organised three of four flood agronomy meetings held in Central Highlands. This series of field days focused on crop recovery and

maximising yields and utilised Burdekin research experience. Feedback from one grower at field day identified that advice (not to slash flooded cotton) from previous field day in early 2011 had saved him over \$50k in yield in one field. Field walks were linked to series of case studies currently being developed as part of CRDC commissioned research project and Susan provided assistance in development of a Spotlight article on field walks and case studies.

Use of relevant national and regional/local media to highlight research outcomes and/or extension activities.

The project has used media to highlight research outcomes, emerging issues and extension activities.

Communication of Solenopsis Mealybug washdown protocol through media
(within biosecurity guidelines)

Cotton Grower article (Charleston K, Addison S, Miles M, Maas S, (2010), "The Solenopsis mealybug Outbreak in Emerald", The Australian Cotton Grower, Volume 31, No.2).

- Qld Country Life Online & Print 27/02/10 Cotton counts mealybug cost MELISSA MARTIN

Flood response:

- Qld Country Life Online 31/03/11, Time to Salvage What's Left, Julian Luke

Disease Awareness Raising

- Qld Country Life 13/12/10 Widespread wet triggers cotton fusarium disease alert
- Cotton Bunchy Top media release 21/04/11

Spray drift alert

- Qld Country Life 26/11/09 Early spray drift damage in CQ cotton

General Awareness in Extension

- Qld Country Life 26/10/10 CQ cotton planting optimism on a high
- Qld Country Life 18/11/09 Keen interest in cotton refuge trials

Susan Maas - Bayer Cropscience Chris Lehman Trust Young Achiever of Year

- Landline – Peter Lewis

<http://www.abc.net.au/landline/content/2010/s2827788.htm>

- ABC radio – Mitch Grayson 16/08/10

www.abc.net.au/rural/regions/content/201008/2983569.htm

mpegmedia.abc.net.au/rural/regions/201008/r620213_4157065.mp3

- CountryLife Online & Print 23/08/10
- Rural Weekly
- CQ News 20/08/2010

CQ Regional summary provided to Australian Cotton Grower magazine .for each bimonthly edition and annual summary for Central Highlands provided for Cotton Grower Year Book.

*Technical information support for assisting with regional or national issues.
(cottontales)*

Over the three years of this project, 45 Cotton Tales Newsletters have been produced and distributed to Central Queensland growers, and agronomists promoting new research, best practices and emerging issues in a regionally relevant manner.

Susan Maas has collaborated with numerous researchers to ensure that emerging research (eg. new insect thresholds, project initiatives, field walk follow up) is communicated to growers in a timely manner and that emerging issues such as mealybugs are communicated to growers, consultants and the wider industry are addressed quickly.

The newsletter also profiles local examples of growers practicing best management to encourage adoption.

There is clear local ownership of this newsletter, with growers and consultants actively suggesting topics and providing feedback.

Delivery and support of industry programmes (eg. BMP, IPM, IRMS).

Adherence to the IRMS and Bollgard II RMP has been promoted through Cotton Tales, media, and at grower meetings, by coordinating the collection of eggs and larvae for resistance testing and providing local coordination and advertising for the Resistance Roadshow. Following on from local promotion of resistance issues, CHCG&IA growers attended the Refcom meeting.

Susan has assisted Cotton Australia through coordination of the multiple applications to TIMS for planting window variation, as well as promoting outcomes of these decisions.

The project has provided support to myBMP through

- technical input in drafting modules (natural assets, biosecurity, IPM)
- Participating in myBMP training
- Providing technical assistance to numerous growers, including 5 growers preparing for audits and participated in 2 full audits.
- Familiarised local NRM group (CHRRUP) staff with myBMP system.

- And myBMP workshop linked to soil workshops as above.

Impact: CQ continues to have strong participation in BMP.

Objective 2.

Extension programs aligned with the needs of key stakeholders.

Foster linkages between local industry, researchers and Cotton CRC partners.

Research:

The project has maintained strong interactions with researchers across a range of disciplines. This has included collaboration on research as described above, provision of regional support to visiting researchers, including identifying potential collaborators and field sites for researchers and technical support, providing regional intelligence to researchers, organising and facilitating 4 focus groups with researchers and collaborating on extension material including fact sheets, articles & press releases.

The project has supported local concerns about yield decline through organising research and technical meeting with CRDC and a follow up meeting with researchers.

The project provided coordination and some logistics for the egg collection sampled by consultants, as well as providing sampling and collection of late season eggs and larvae. Susan Maas has contributed to industry research planning including Refcom, Fuscom & Glycom.

These established relationships with researchers have increased the capacity of researchers to conduct work in Central Queensland, and have ensured that important in season trials and monitoring are conducted. The project also ensures that growers and consultants are aware of the work being conducted in the area, and results are communicated to them.

CRC Partners

The project has worked closely with Cotton Australia, providing logistical support to Cotton Australia during visits to CQ, myBMP support and communication as discussed above, providing support to flood financial meetings in Emerald and regional support on complex CQ planting time arrangements.

Susan Maas has maintained collaboration with CSD sharing extension opportunities, including collaborating with CSD on field walk through identifying opportunity and demand for growers to discuss potential for high

yields with Greg Constable, speaking at their dryland meetings and co-facilitating breakfast meeting that covered new varieties and CSIRO breeding program as well as regional issues of current mealybug issues and reasons behind early senescence. This collaboration has ensured efficient delivery of industry messages.

Susan has maintained a strong relationship with regional NRM groups including

- An overview and demonstrating myBMP to CHRRUP
- Technical input to CHRRUP (NRM group) projects including written technical review of 7 projects linked to myBMP.
- Participated in 2 CHRRUP and 1 DCCA technical panels as irrigated industry representative. These panels provide technical comment and approval to NRM sub groups prior to final approval by Fitzroy Basin Association. Susan Maas was invited to participate in these panels when cotton industry projects were involved. Successful projects funded included farm mapping linked to myBMP, water quality monitoring, Irrigation system changes & improvements, field redesign and irrigation scheduling equipment.

Community Engagement:

Susan Maas has linked with school groups to promote careers in science and agricultural issues. These have included:

- Presentation to School of Air Yr 9 class about farming practices that reduce erosion
- Coordinated three interactive stands for CHRRUP NRM Expo in April. This expo was attended by over 700 Year nine and ten students from Central Highlands High Schools. Stands included soils and water interaction, living soil and Cotton Production and IPM. Feedback from CHRRUP, the local NRM group, that students and teachers indicated that the day was successful, relevant to the curriculum and a worthwhile learning experience
- Presentation to Year 7 Distance Education Class during their mini-school on cropping and cropping issues in the Central Highlands
- Coordinated and facilitated an interactive workshop for 60 students at a Gifted and Talented Camp on cropping and cropping issues in Central Highlands
- Presentation to 12 junior primary school classes on cotton industry and in particular IPM
- Coordinated Annual Teach the Teacher excursion, attended by about 40 teachers, aimed to educate Central Highlands teachers about

Incorporation of local priorities and adaptation of emerging research into regional extension strategies.

At a regional level, relationships with growers and consultants are maintained through regular attendance at meetings. The project is regarded as the key contact on emerging issues and has assisted with issues such as mealybug, survivors on Bollgard II and response to flooding. Susan Maas has facilitated discussion about research priorities between CHCG&IA and CRDC, and the CRDC Board, and specific CQ RMP concerns with TIMS & Cotton Australia. This feedback from growers saw the 2010/11 RMP trap crop requirements modified to enable better grower management of the trap crop. The project continues to encourage and support local growers and consultants to raise research issues.

Objective 3. - Within the Cotton CRCs Adoption Programme actively participate as a member of the National Extension Team and Priority Teams, to deliver focussed information and knowledge to industry.

Target	50% of ha complying with industry best practice as defined by the BMP guidelines for control of volunteer re-growth cotton.
Current level of usage	Regrowth cotton information collected during annual disease surveys by pathologists from I&I NSW, DEEDI Qld & CSD. The 10/11 survey based on visits to 42 farms in NSW and 18 farms in Queensland (Darling Downs not included) indicated that 73% (previous survey 48%) of farms had some regrowth (ranging from rare (1-10 volunteers/farm) to numerous (>100 volunteers/farm)). In NSW, 81% (previous survey 33%) of farms had some regrowth or volunteer cotton and in QLD 56% (previous survey 75%) of farms monitored had some level of regrowth or volunteer cotton. This indicates that this problem is escalating which is reinforced by an increase in associated issues, such as Cotton Bunchy Top.

	Activities undertaken (brief description and numbers attended)	Outputs (fact sheets/resources created for workshop)	Activity uptake (results of M&E no. of growers that have changed etc)
Volunteer/Re-Growth Cotton	1 Development of plan		
	Contact with relevant researchers to identify barriers to adoption.	Plan written and submitted	
	2 Industry promotion of mealybug issue with key message of need to control volunteers/ratoons		
	<ul style="list-style-type: none"> • Presentation to Dawson, CH & DD CGAs, • CH bus trip for growers to increase awareness & highlight weed/volunteer cotton issue (attended by 36 CH growers) • Two meetings held in Emerald (pre-season – 19 growers/agronomists & early season 35 growers/agronomists) to discuss mealybug issue. Issue of volunteer management was raised. 	<ul style="list-style-type: none"> • Cotton Grower article: Charleston K, Addison S, Miles M, Maas S, (2010), “The Solenopsis mealybug Outbreak in Emerald”, The Australian Cotton Grower, Volume 31, No.2 • Presentation developed for CSD to include in all their variety information meetings on importance of volunteer control to prevent mealybug issue. • Mealybug section included in 2010 Cotton Pest Management Guide • Beat Sheet Blog article: Good IPM starts in Winter (22/7/2010) 	A number of mealybug affected growers have reported increased focus on volunteer management, including chipping and burning of volunteers. This impact was not reflected in the disease survey, although this could be due to the large and regular amounts of rainfall at that time.

3	Industry promotion of cotton bunchy top issue with key message of need to control volunteers/ratoons as per CBT Campaign (disease section)		
4	General promotion of issue & technical information		
	<ul style="list-style-type: none"> • Cotton Conference presentation: Volunteer Cotton – Grower Case studies; 	<ul style="list-style-type: none"> • Contributed to Spotlight articles - Top 10 reasons why volunteer cotton should go. This article has formed the focal point of the plant Health Australia Biosecurity Management Brochure • Spotlight - Summer 2010 'Volunteer cotton a key biosecurity risk' (based on cotton conference presentation) • In collaboration with Nufarm, drafted a Volunteer/Ratoon technical section for upcoming Cotton Pest Management Guide 	Further M&E information will be collected as part of CCA CBT survey.

Target	50% of ha compliant with industry best practice as defined by the BMP guidelines for disease management including farm hygiene practices.
Current level of usage	Two new cases of Fov have been confirmed in areas that previously had not had the disease (Central Highlands & Southern NSW). Early & late season disease survey conducted by pathologists and made available on CRC website & CPMG.

	Activities undertaken (brief description and numbers attended)	Outputs (fact sheets created)	Activity uptake (results of M&E)
Disease Best Practice	1 Development of plan		
	Contact with relevant researchers to identify barriers to adoption.		
	2 Cotton Bunchy Top (CBT) Virus Campaign		
	<ul style="list-style-type: none"> In response to concern regarding potential CBT treat on the Darling Downs, coordinated organization of meeting on Cotton Bunchy Top (CBT). 18 consultants attended. Supported CRDC contract with CCA to conduct survey of growers that will gather M&E and research data and raise awareness including development of outputs. 	<p>Working with Lewis Wilson, Murray Sharman, Grant Herron, Duncan Weir and David Larson, Susan Maas led development of:</p> <ul style="list-style-type: none"> CBT media release. Cotton Australia used media release to develop Australian Cottongrower article. Cotton CRC CBT fact sheet Produced short article for Cotton Australia email newsletter. Electronic Risk assessment Survey & training video produced to support CCA survey. David Larson linked all new products and existing CRC tools to CBT survey page: http://tinyurl.com/66kef6e 	<ul style="list-style-type: none"> As a result of field walk, all consultants who participated committed to working with their clients to improve farm hygiene. CBT survey will collect M&E data. Video views & CBT downloads measurable

	3 Response to new Fusarium Wilt cases		
	<ul style="list-style-type: none"> • Provided support to James Hill to have Karen Kirkby provide Come Clean Go Clean message to growers at two Southern NSW field days. This event identified that FarmCleanse was not available locally. Further work by James ensured that it was available in time for picking. James Hill has also worked with local CGA to develop local Come Clean protocol including making facilities available to contractors. • Provided local coordination & communication for new case of Fusarium Wilt in CH and provided support to Southern NSW case 	<ul style="list-style-type: none"> • Fusarium Wilt Update - Coordinated with pathologists & David Larsen to produce Fusarium Wilt Update sheet (available on Cotton CRC website). This technical update focuses on practical management considerations for Fusarium Wilt and was available in time for public communication of new Fusarium Wilt findings. 	
	4 General Disease Extension		
	<ul style="list-style-type: none"> • Regular contact with pathology team has ensured that good relationships have been developed & D&D team is kept up to date with emerging disease issues; • Provided coordination support to pathology team including 2010 preseason opportunity for all pathologists to share plans & participate in BRR training and have contributed ideas to 2011 Fuscom. • Coordinated Disease hands-on-research session at 2010 Cotton Conference. 	<ul style="list-style-type: none"> • Inside cotton radio interview - Promotion of CH Come Clean Go Clean Protocol. • Spotlight – <ul style="list-style-type: none"> ○ Autumn 2010 Early season disease survey ○ Winter 2010 Cotton pathology 0910 ○ Autumn 2011 Spotlight, ‘Come Clean Go Clean’ • Cotton Tales produced and distributed for all areas <ul style="list-style-type: none"> ○ Fusarium best practice and recent research 	

	<ul style="list-style-type: none"> • Presentation at Cotton CRC science forum – disease delivery. • Identified, negotiated with collaborators and established boll rot trials in conjunction with Stephen Allen– linked to national priority (disease, and nutrition) as well as local priority of identifying restraints for CQ yields. • ‘Agronomy Gastronomy’ – lunch time training/workshop for agronomists for disease issues. Successful meeting was held @ Emerald, however remaining meetings were cancelled due to wet weather and meetings were not able to be rescheduled due to flooding • Responded to 4 direct inquiries from agronomists. 	<ul style="list-style-type: none"> ○ Cotton Bunchy Top & early aphid management (collaboration with S.Ceeney) • Reviewed and provided feedback in the development of the PHA Cotton Industry Biosecurity manual. 	
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National Priority Team Participation (prior to Target Lead role)

Prior to the introduction of Target lead role, Susan Maas was leader of the Crop Protection National Priority Team providing regular contact with researchers and the development of a number of activities including:

- Technical editor of Cotton Pest Management Guide
- Development of appropriate material for Moree Trade Show & Cotton Conference
- Development of SLW DVD and poster in conjunction with Richard Sequeira, Mark Hickman and David Larsen
- Leading the development of herbicide resistance workshop and resource material and organising the training of the wider extension team to deliver +this workshop. These workshops were not delivered to growers as this area became part of the Weed target lead role
- Production of a range of nationally relevant Cotton Tales on emerging issues such as SLW, resistance, survivors
- Attendance and follow up extension to REFCOM meetings and FUSCOM meetings
- Review of IPM & Biosecurity modules of myBMP
- Extension contact for all crop protection researchers

Impact: Despite reduction in number of members, Crop protection team was able to continue to meet planned goals and industry was engaged on emerging crop protection issues and research.

Objective 4.

Identify and evaluate outcomes and impacts of regional extension programme.

Conduct evaluation programmes to measure the impacts and outcomes of extension activities.

Evaluation has been built into all extension activities.

The CQ Regional summary has been provided to Australian Cotton Grower magazine for each bimonthly edition and annual summary for Central Highlands provided for Cotton Grower Year Book.

Outcomes

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

This project was established to contribute to the People and Knowledge program, through the CRDC's outputs of economic profitability, environmental sustainability and society/community through improved production, reduced environmental impacts by improving the capacity to use the knowledge and innovations gained

through research and development. The outcomes of this project were directly aligned with the Adoption program goals for the CRC.

The project addresses the strategy to support and coordinate a highly trained, efficient and effective Cotton Extension Team. During the course of the project, the focus on the Regional Cotton Extension Officer role linking to National Priority Teams as part of a larger Cotton extension team, has transitioned to a focus on delivering outcomes in target lead areas as part of Development and Delivery Team, while maintaining a regional extension presence for Central Queensland cotton & grain farming systems.

This project has resulted in outcomes:

- Strong regional extension and adoption program in Central Queensland including:
 - i. Response to emerging issues such as mealybug
 - ii. Promotion of industry best practice (Area Wide, BMP)
 - iii. Promotion and adaption of research.
 - Highly collaborative project that has promoted and coordinated further linkages between researchers, industry and growers.
 - Delivery of national extension priorities including major publications
6. 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.

Conclusion

7. 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?

This project has:

- Provided development extension support to cotton growers in Central Queensland that is the identifiable conduit between national directions in the cotton industry and local practices.
- Facilitated the adoption of industry best practice including Integrated Pest Management (IPM) principles, and Come Clean Go Clean, by regional cotton growers.
- Delivered national publications and extension strategies as part of both the National Cotton Extension team and as target lead for disease and farm hygiene as part of the cotton industry Development and Delivery Team.
- Provided cotton growers with a comparative analysis of local production practices to facilitate their adoption of Best Management Practice.

Extension Opportunities

8. 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

The project was initiated as a regional extension project focussed on the Central Qld region which transitioned with leadership role focused on delivering national outcomes in target lead area of Disease and Farm Hygiene as part of National Development and Delivery Team as detailed in this report.

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?

- Cotton Pest Management Guide 2008/09 & 2009/10 (www.cotton.crc.org.au)
- Cotton Grower article (Charleston K, Addison S, Miles M, Maas S, (2010), "The Solenopsis mealybug Outbreak in Emerald", The Australian Cotton Grower, Volume 31, No.2).
- 45 CQ Cotton Tales Newsletters (www.cotton.crc.org.au)
- Cotton Tales produced and distributed for all areas (www.cotton.crc.org.au)
 - Fusarium best practice and recent research findings.
 - Cotton Bunchy Top & early aphid management (collaboration with S.Ceeney)
- Beat Sheet Blog article: Good IPM starts in winter (22Jul2010) www.thebeatsheet.com
- Cotton CRC CBT fact sheet and Electronic Risk assessment Survey & training video produced to support CCA survey. (www.cotton.crc.org.au)
- Fusarium Wilt Update Fact Sheet (www.cotton.crc.org.au).
- Spotlight (www.crdc.com.au)
 - Summer 2010 'Volunteer cotton a key biosecurity risk' (based on cotton conference presentation)
 - Autumn 2010 Early season disease survey
 - Winter 2010 Cotton pathology 0910
 - Autumn 2011 Spotlight, 'Come Clean Go Clean'
 - Contributed to Spotlight articles - Top 10 reasons why volunteer cotton should go. This article has formed the focal point of the plant Health Australia Biosecurity Management Brochure

Part 4 – Final Report Executive Summary

The CQ Cotton Regional Extension project has been a key to the delivery of emerging, cutting edge research information and knowledge to the Central Queensland cotton industry. The direct relevance of southern research to cotton production under the conditions experienced in CQ always has been an issue which could be addressed through regional assessment and adaptation.

The project links the national research to the region through development and extension, with a strong focus on the major industry production issues including but not limited to disease, Integrated Pest Management (IPM), soils, nutrition and integrated weed management.

Susan Mass has supported the implementation of national industry-wide programs particularly the industry Best Management Practices program (myBMP).

This project has successfully transitioned to a focus on delivering national outcomes in target lead areas as part of National Development and Delivery Team established by Cotton CRC, CRDC and Cotton Australia, while maintaining a regional extension presence for Central Queensland cotton & grain farming systems.

Susan Mass has very effectively merged and integrated strong regional extension support to cotton growers in Central Queensland with delivery of industry extension priorities across the entire industry in the Development and Delivery Team model. Susan is the target lead for disease and farm hygiene.

Recognising the challenges of having regionally relevant research in Central Queensland, this project has facilitated locally based research including boll rot, Bt cotton resistance management, and mealybug biology through strong collaborations. This collaborative approach has included linkage to Department of Environment and Resource Management (DERM) groups and myBMP programs resulting in a high uptake in CQ.