

COTTON RESEARCH & DEVELOPMENT CORPORATION

# Spotlight

AUTUMN 2014 on Cotton R&D



**WHAT MAKES A GROWER  
OF THE YEAR?**

*Best Practice*





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IMAGE: MELANIE JENSON



**Monsanto Cotton Grower of the Year John 'Cowboy' Cameron with consultant Jamie Innes.**

## IN THE SPOTLIGHT



In a great way to start this edition of *Spotlight* we acknowledge the achievements of the Monsanto Cotton Growers of the Year, John and Ros Cameron. I was fortunate to be able to join in with everyone else at

the field day at their Darling Downs property in February. It is always inspiring to hear people like John talk about their farming practices. Its people like this that generously give so much of their time, ideas and energy to the industry that make it a success. So we hope you enjoy the overview of his management, as it serves as a wonderful example of best practice.

Addressing threats from insects and weeds remains in a proactive way continues to focus much of our attention and resources. The occurrence of mealybug and a new case of glyphosate resistant weed (sowthistle) are prime examples, but we take heart in the approach our industry has shown in the past to tackle these issues through research and collaboration with growers and consultants to ensure best practices are implemented to avoid or reduce negative impacts.

As the release of Bollgard III nears, it is timely to take a look at the importance of Resistance Management Plans. The Brazilian cotton industry's experience with the arrival of *Helicoverpa* demonstrates the critical importance of getting this right. We also delve into what goes into the formulation of our RMPs and outline how CRDC has been front and centre in its support of research into resistance management, both present and future to help produce the world's best science in this field.

There is little doubt that the broad adoption of new round module pickers has revolutionised cotton harvest. In response to grower information needs the CRDC has invested in research to better understand how these machines have changed harvesting and what growers might do to better adapt and integrate this new technology into their farming systems. While on the topic of harvest I note the article on safety and the information resources available to help you achieve a safe and successful harvest.

We have included some articles on recent

research and initiatives which are targeting CRDC's goal to improve the sustainability and environmental outcomes for industry. These initiatives are very important in addressing the recommendations from the Third Environmental Assessment undertaken in 2012. In particular, we outline the recent work on benchmarking and helping growers reduce energy use through the Improving Energy Efficiency on Irrigated Cotton Farms initiative, which has already seen growers keen to be part of this. In the face of rising energy costs, both financially and environmentally, CRDC is committed to helping growers become more efficient in this space.

Furthermore, climate plays a huge role in the efficiency and sustainability of our farms. As the need for climate-specific knowledge becomes greater, climate study has been added to the curriculum of the Cotton Production Course, which CRDC supports. Not only does a better understanding of climate help growers and consultants mitigate risk, being able to navigate through climate and carbon policy has become a requirement for today's agriculture.

Our environmental performance is also a key factor in Australia's reputation as a supplier of sustainably-grown cotton as Cotton Australia CEO Adam Kay points out in his article on Cotton to Market. By example the new Cotton LEADS initiative emphasises the responsible growing practices of Australian and US growers, providing assurance to our customers that they are sourcing, not only a superior product, but one that is backed up by our best management practices through *myBMP* and stewardship.

CRDC recognises the initiative being taken by Cotton Australia to drive new marketing approaches for Australian cotton in collaboration with the industry. These new marketing approaches strongly align with past CRDC research findings on markets for Australian cotton, concerns for competition from man-made fibre, opportunities for market recognition of Australia's sustainable cotton production practices and for capturing greater value for Australian cotton. CRDC's current research continues to explore these matters with Cotton LEADS also representing a great chance for CRDC to foster its international research partnerships with the US. 

Bruce Finney



### Australian Government Cotton Research and Development Corporation

*Spotlight* is brought to you by Australia's cotton producers and the Australian Government through the publisher Cotton Research & Development Corporation (CRDC). CRDC is a research and development partnership between the Australian cotton industry and the Australian Government. Cotton Research and Development Corporation ABN: 71 054 238 316

**Our vision:** A globally competitive and responsible cotton industry

**Our mission:** Invest and provide leadership in research, innovation, knowledge creation and transfer.

**Our outcome:** Adoption of innovation that leads to increased productivity, competitiveness and environmental sustainability through investment in research and development that benefits the Australian cotton industry and the wider community.

**Corporate background:** CRDC was established in 1990 under the Primary Industries and Energy Research and Development Act 1989 (PIERD Act.) which outlines its accountability to the Australian Government and to the cotton industry through the Cotton Australia. CRDC is responsible to the Australian Government through the Minister for Agriculture, Barnaby Joyce. CRDC is committed to fulfil its legislated charter to: Invest in and manage an extensive portfolio of research, development and extension projects to enhance the ecological, social and economic values associated with cotton

production systems and to benefit cotton industry participants, regional communities and the Australian community.

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IMAGE: MELANIE JENSON



# PRECISELY: THE WAY TO OPERATE

ATTENTION TO DETAIL, PRECISION AND FORWARD PLANNING MAKE JOHN AND ROS CAMERON'S COTTON GROWING ENTERPRISE ON THE DARLING DOWNS THE SUCCESS STORY IT IS. MELANIE JENSON CAUGHT UP WITH JOHN AT THE MONSANTO COTTON GROWER OF THE YEAR FIELD DAY IN FEBRUARY.

**G**rowing 10 bales per hectare is no mean feat, let alone in a dryland situation, but that's exactly what the Camerons achieved last year at their property "Kintyre", 20 kilometres north of Pittsworth.

After planting on 'just enough' moisture, some lucky rain fall events early in the season, record heat in January followed by a couple of substantial rain events culminated to produce the record crop.

However, the Camerons' success isn't just down to the weather. Planning and precision management is paramount, with crops planned up to two years in advance. A strict year-in, year-out cotton-wheat rotation works both from a financial and soil health perspective.

"Try to keep it simple – but regimented," are John's key words of advice.

"All thinking and planning is done in the fallow, so when we plant the crop

we are able to get out of it and leave it alone," John says.

With the help of agronomist, Jamie Innes, this includes selection of row configuration, fertiliser types and rates, and likely insect weed or disease management issues. These decisions are based on the soil profiles and weather forecast modelling.

John has a good understanding of his soil, and the moisture holding capacity, typically planting single skip configuration on a full moisture profile, however will use double skip if the planting moisture isn't quite there. John also manages risk by planting half fields across the farm as this increases the chances of at least getting some of the crop under a storm.

## Soil health

John describes his soil as "the most important asset" and knowing and maintaining the health of this soil is the cornerstone of the operation. Good

soil health ensures John can retain and make the most of any moisture, vital to this dryland system. As such soil testing, stubble retention and compaction mitigation techniques are key operations.

"Soil testing over 20 years has given a good indication of trends and needs," John said at the field day.

"We've got a measure on nutrition which makes it easier to make decisions around that.

"We know what moisture and nutrients are needed to obtain certain yields. We also need to know what is going on in the soil at any given time.

"We spend a lot of time and money in the crop before and at planting, and once the crop has established and growing, the measure of success is not having to make management changes mid-crop.

"Soil testing after the crop gives a rough indication of how much the crop has used, and this can then be

**John Cameron, otherwise known as "Cowboy" and his wife Ros have been recognised for their outstanding farm management practices, which has earned them the award of 2013 Cotton Grower of the Year. Nominations are open for the 2014 awards.**



compared against yield as an indicator of crop efficiency. It also gives an idea of mineralisation and the start point for the next crop, usually double-cropped wheat.”

Testing in May after the 10 bale/ha crop which had 200kg of nitrogen applied, identified that there was still 40kg of nitrogen left over for the following wheat crop.

Composted feedlot manure (not raw manure) – sourced from nearby local feedlots – is surface applied during the fallow (not incorporated) in a three-to four year cycle to replenish micro-nutrients such as phosphorus, potassium, sulphur, zinc and calcium. Ever the opportunist though, John says if compost prices are too high, they won't apply it that year.

### Stubble cover

Stubble cover is maintained through the wheat rotation crop.

“We plant wheat on the next rain after pupae busting, when any N needed is applied,” John says.

“Because we then have bare country we want to get a stubble situation back immediately.

“We grow wheat because it is an easy crop to get up, and we need the stubble to carry through, being on a floodplain, for both erosion and moisture retention.”

Without it there would be gullies on his otherwise pristinely flat fields.

“And for moisture retention, this was especially pertinent this year given we have had only 20mm of in-crop rainfall,” he says.

Cotton is planted between the standing wheat stubble rows, which offers protection to the young cotton. John gave the example of early season storms and the need for a cotton re-plant on areas not protected by standing stubble.

“It's critical to be precise,” John says. “At planting we are very careful not to disturb the stubble and keep it in place.”

Wheat planting is a separate operation to pupae busting to avoid compromising either operation.

“We always aim to do everything right the first time, hoping to only have to perform each operation once.

“We use a two-metre wheel-track,



IMAGE: MELANIE JENSON

John describes his soil as “the most important asset” and knowing and maintaining the health of this soil is the cornerstone of the operation. Good soil health ensures John can retain and make the most of any moisture, vital to this dryland system. As such soil testing, stubble retention and compaction mitigation techniques are key operations.

12-metre system so all working gear runs in the same tracks from one season to the next.”

This also aids in alleviating compaction, which is a consideration in the farming system.

The picker is the only implement which doesn't follow the same wheel tracks. To minimise this effect, John has converted his 7760 picker to eight metre headstocks (six heads pick three pairs of single skip cotton) which he says results in not only 30 percent less wheel tracks, but less fuel use per picked hectare.

And while the cracking grey clay soils at “Kintyre” have stood up well in relation to compaction from the new pickers, John says he hasn't had a wet pick with them yet.

This picking configuration, while offering more ‘efficiency’, John says “only works well if you take care with your guidance systems at planting time with 12-metre planters because of the issues with the 12-metre system where guess rows can be challenging”.

### Pest management

Dynamic thresholds are used for insect pest control decisions, with the aim to intervene as little as possible.

“Quite often if we have to intervene, down the track, we see the effects show

up with flaring of other pests,” John says.

“The best case scenario is when we can stay out of the fields, and nature can handle issues for us, and we can leave it alone.”

In regard to weeds, “cotton is our major weed and can involve serious costs”.

“When we root cut we make sure it is done properly and we don't normally have problems with ratoon cotton,” John said.

“Unfortunately last season we did have a small area where ratoon cotton was a problem. We modified our root cutter to dual drive discs and re-root cut that area.”

This operation disturbed the stubble cover however John recognises the risks from ratoons and takes a “zero tolerance” approach.

“If we have volunteers in a fallow after spraying, we get out on the bike and manually chip them out.”

To avoid glyphosate resistance developing other weeds are carefully controlled using a chemical rotation. Rotating herbicides between cotton and wheat, use of residuals in the fallow, pupae busting and hand spot spraying or chipping are all utilised to try and prevent weed seed set.

“Know the biology of your weeds,” is John's advice, “and don't be afraid to use a bit of cold, hard steel every now and again, especially for shallow seeded weeds like fleabane and feathertop Rhodes grass if you feel you are losing control.”



**“TRY TO KEEP IT SIMPLE —  
BUT REGIMENTED.”**



# MEALYBUGS EMERGE AS AN ISSUE AT ST GEORGE AND DARLING DOWNS

For the first time, *Solenopsis* mealybug (*Phenacoccus solenopsis*) hotspots have been reported around St George, QLD, highlighting the importance of removing volunteer cotton plants and preventing a green bridge. Areas of dead or severely affected plants were detected on two farms during February 2014, and in many hotspots a ratoon plant could be identified as the source of the outbreak with affected plants radiating out with decreasing severity from this plant.

There have also been hotspots reported to CRDC on the Darling Downs in the Condamine Catchment.

CottonInfo Disease, Pest and Biosecurity Technical Specialist Susan Maas said the risk posed by ratoons is not always immediately apparent or visible.

"The extreme dry would have meant that these ratoons looked dead at the start of the season.

"Mealybug survives over the winter underground on the roots of a large number of hosts, so these plants provide a starting place for these populations to build."

Susan said management should always be structured as if mealybugs are present in the area.

"Adopt a zero-tolerance approach to rogue cotton, and control other weeds, especially pig weed, parthenium and amaranth," she advises.

"Management of *solenopsis* mealybug relies on preserving beneficials including *Cryptolaemus* and other lady beetles, lacewings, spiders and cockroaches as well as the mealybug parasitoid

*Aenaisius bambawalei*.

"Every spray decision needs to be carefully thought through as flaring is a real risk."

While individual mealybugs were found in this region in the past, this is the first time that plant damage has been reported. Mealybug has previously been found in Emerald and Burdekin regions in 2010, and more recently in Dawson Valley, South Burnett and parts of the Darling Downs.

With no insecticides registered for the control of mealybug, and insecticides not expected to be the main means of control, mealybug management relies on:

- minimising the population prior to planting, through zero tolerance of rogue cotton and management of other weed hosts; and
- preserving natural enemies including ladybeetles, lacewings, native cockroaches, earwigs spiders, red and blue beetles, and the mealybug parasitoid *Aenaisius bambawalei*, by thorough adherence to recommended thresholds for other pests, and careful selection of softest options for insecticides.

## Come Clean. Go Clean

To help minimise the spread of mealybug, it is essential that field equipment is cleaned down prior to movement between fields and farms. Following the initial outbreak in Emerald, a permit was issued for a wash down product, however it is now advised that thorough wash down with removal of all dirt and plant material using Farm-cleanse, as occurs to prevent movement of *Fusarium*, is sufficient.



IMAGE: PAUL GRUNDY



**ABOVE:** For the first time at St George, QLD, *Solenopsis* mealybug hotspots have been reported and in many hotspots a ratoon plant could be identified as the source of the outbreak, highlighting the critical need for the control of rogue cotton over winter.

**LEFT:** A meeting was held in early March at St George with entomologists, researchers and industry representatives to discuss the mealybug outbreak there.

## For more information:

Management strategies for *solenopsis* mealybug in the Australian cotton farming system

<http://tinyurl.com/pap95zw>

*Solenopsis* mealybug in Australia – an overview

<http://tinyurl.com/o5ze33p>

Come Clean. Go Clean fact sheet

<http://tinyurl.com/puv2awq>

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# ROGUE COTTON: FREE LUXURY ACCOMMODATION FOR NEXT SEASON'S PESTS AND DISEASES

AS GROWERS LOOK TOWARD THE END OF THE SEASON, A REMINDER OF THE IMPORTANCE OF EFFECTIVE POST-HARVEST MANAGEMENT OF COTTON CROP RESIDUES IS TIMELY.

As well as being the first step in preparing a field for the next crop, destruction of crop residues is important for the management of insect pests and diseases. Ratoon and volunteer cotton harbour both over winter, facilitating the infection of the next season's crop.

A requirement of the Bollgard II Resistance Management Plan (RMP) is crop residues are destroyed as soon as practical after picking. This usually

involves mulching and root cutting, followed by cultivation to fully destroy the plant root system. There are several factors which will determine the choice of operation to effectively eliminate crop residue, including equipment availability and the moisture status of the soil.

CottonInfo's Ngaire Roughley says the 2010 and 2011 Crop Consultant's surveys identified the root cutting operation as the most critical success factor for avoiding ratoon cotton. "Therefore





it is vitally important that machinery is set up properly to cut roots below the cotyledon level, and for operators to make adjustments to cutting depth and speed to suit specific field conditions,” she said.

“Other high risk factors for ratoons identified in the survey included growing back to back cotton, wet conditions interrupting cultivation operations, poor pupae busting and minimum till practices.”

The same message was echoed at this year’s Cotton Grower of the Year field day, at John and Ros Cameron’s “Kintyre” at Bonge on the Darling Downs.

John spoke to the 170-strong audience of “zero tolerance” for rogue cotton on his property.

Despite the critical importance of minimum tillage for moisture and stubble conservation in his dryland cotton system, the prevention of problems that stem from poor control of rogue cotton is an even higher priority. The root cutting operation is repeated if in the first pass 100 percent removal is not achieved.

“We always aim to do everything right the first time, but unfortunately last season we did have a small area where ratoon cotton was a problem.



## “ADOPT A ZERO-TOLERANCE APPROACH TO ROGUE COTTON...”

CottonInfo's Ngaire Roughley

“We modified our root cutter to dual drive discs and re-root cut that area.

“If we have volunteers in a fallow after spraying, we get out on the bike and manually chip them out.”

Cotton bunchy top surveys by industry plant pathologists say it is becoming increasingly common to have outside rows of plants with high levels of ratoons, so care needs to be taken to ensure that the entire field is properly root cut.

“Ratoon cotton is extremely difficult to control with herbicides due to the relatively small leaf area for herbicide absorption, compared to the large root system available for carbon and nutrient supply,” Ngaire said.

“Often plants that have been sprayed

appear dead, however regrow once water is available.”

Trials with a range of herbicides on ratoon cotton have been conducted; however none have proven to be effective.

“Reducing the amount of viable seed left in fields (through clean picking and stubble management) and around farm (through cleaning up after module removal and spillages) will also reduce the number of volunteers that can germinate,” Ngaire says.

“It is important to remember that cotton plants left to set seed can also contribute to future volunteers.”

Volunteers that appear post-harvest can be managed in-field with both cultivation and herbicides, however both tactics require the plants to have germinated and emerged before control can begin. Research has shown that when volunteers have exceeded six to 10 nodes, herbicides are not a reliable control option, however some double knock techniques can improve efficacy.

“Some growers have reported success with using WeedSeeker technologies for spot spraying of missed cotton volunteers,” Ngaire said.

“Planning to control volunteers is a key component of integrated weed management and managers should consider issues such as rotational crops, herbicide resistance risk and other weeds in the field.”

Ratoons are the most effective mechanism in the farm environment for enabling cotton bunchy top to carry over between seasons and inoculum of soil-borne diseases such as black root rot, Fusarium and Verticillium builds up where ratoons are present in field.

In addition to disease carry-over these plants also act as highly preferred overwintering hosts for cotton aphids, spider mites, mealybugs and whitefly. Insect pests already on farm at the start of the cotton season put farm managers on the back foot early in terms of successful Integrated Pest Management (IPM). Rogue cotton exacerbates insect pressure as the season progresses, compromising IPM as subsequent control can flare outbreaks of other insect pests.

**Rogue cotton is the number one host for mealybugs to survive over winter, ready to infest next season's crops. Control is imperative.**



IMAGE: MELANIE JENSON



# TIME FOR SOME STRAIGHT SHOOTING... KEEP IT CLEAN

COME CLEAN. GO CLEAN IS ONE OF THE SIMPLEST YET MOST EFFECTIVE STRATEGIES FOR MINIMISING THE SPREAD OF WEEDS, DISEASES AND PESTS.

**C**ome Clean. Go Clean does take a certain level of commitment, especially during busy periods such as harvest, but the risks are real, so ensure that all equipment and people stop and clean down.

Industry Disease and Biosecurity Technical Specialist Susan Maas encourages growers to make Come Clean. Go Clean a priority.

"Avoiding a problem is always better than having to manage it," Susan says.

"There are no quick-fixes to issues which can be brought onto your farm - such as difficult to control or herbicide resistant weeds, new insect pests such as mealybug and soil borne diseases - these problems, once permitted entry to your farm, require ongoing management."

This is of vital importance as the industry moves into harvest, with pickers and associated equipment moving from one region to another, from one farm to another and from one field to another.

"It is important that we all pay particular attention to ensuring vehicles and equipment entering farms are thoroughly washed down prior to gaining access," Susan says.

"Practising good farm hygiene will help prevent the entry and spread of diseases, weeds and pests onto your farm. These pests will impact on your business so you need to make sure that Come Clean. Go Clean is part of your business."

## THE PROCEDURE

### Step 1: Wash down

Park on a clean wash-down pad where contaminants can be trapped. Apply high pressure water to all surfaces to remove all trash and mud, being sure to get into crevices where residual mud or trash might be trapped. Don't forget to clean out the inside of the cab and vehicle foot pedals and other surfaces that have come into contact with dirty footwear.

### Step 2: Decontaminate

Apply decontaminant (eg 10 percent water dilution of Castrol Farmcleanse



IMAGE: MELANIE JENSON

or equivalent) liberally to all surfaces especially areas that are dirty. Also decontaminate mats, tools and footwear. Leave the decontaminant to work for 10 minutes unless directed otherwise by the label.

### Step 3: Final Rinse

Rinse off the decontaminant then clean all mud off the wash-pad with high pressure water so it is clean for the next person and mud and debris aren't picked up by wet tyres. Where equipment has not been cleaned down on farm, thoroughly inspect to ensure cleanliness.

### Inform people

Well designed signage informs visitors that Come Clean. Go Clean is important and they share responsibility for protecting the farm from risk.

Signs should be placed at all external entrances, directing visitors to have clean vehicles and to contact the farm office

before entering.

Come Clean. Go Clean requirements should be communicated with contractors and consultants well in advance.

### Wash-down facilities needed

On-farm facilities allow farm employees, contractors and visitors to clean vehicles and equipment in an easy to manage area where waste water can be contained. Facilities should be readily accessible, have sealed or packed gravel surface, access to high pressure water, wash-down product and power, and be away from production areas and not drain into waterways or cropping areas.

For more information go to [www.mybmp.com.au](http://www.mybmp.com.au) or CottonInfo Disease & Biosecurity Specialist Susan Maas [susan.maas@crdc.com.au](mailto:susan.maas@crdc.com.au) 0477 344 214

see our website

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# CRDC WORKING TO DEVELOP NEW HERBICIDE RESISTANT MANAGEMENT STRATEGY

GLYPHOSATE TOLERANT AND GLYPHOSATE RESISTANT WEEDS ARE NOW A REALITY IN THE COTTON FARMING SYSTEM.

**C**RDC has begun a project to provide growers and agronomic consultants with more support in making changes to weed control practices through the development of an industry-wide Herbicide Resistance Management Strategy (HRMS).

"The changing spectrum of weeds comes at a time when there is significant upward pressure on the costs of production," CRDC R&D Manager Tracey Leven says.

"Practices to either delay/avoid herbicide resistance or to control glyphosate-tolerant species brings with them the need to allocate additional resources for weed management.

"Farm managers and consultants are faced with difficult trade-offs between maintaining profitability in the present; and the cost-efficiency of increasingly difficult weed situations in the future.

"Currently there are significant information resources available about management options for specific weeds in cotton, the impacts a wide range of herbicides can have on cotton and on alternative control tactics such as cultivation or double knocks.

"However feedback from growers, consultants and researchers indicates that what is needed is a way to navigate these resources and assist in recognising those that offer the greatest value for specific situations.

"That is why CRDC is supporting a project being undertaken by Annabelle Guest, a Narrabri-based consultant, who is working with cotton industry weeds researchers to draft a cotton industry HRMS that demonstrates the principles underpinning sustainable weed management."

As the project progresses, Annabelle will work with regional Cotton Grower Associations to introduce the Cotton HRMS as a framework for responding to changing weed threats.

Annabelle is currently developing

Annabelle Guest has more than 20 years' experience largely in commercial product development of crop protection products, predominantly in Northern NSW.

"I was one of the inaugural graduates of the UNE post grad certificate in cotton production which ignited my passion for learning about all facets of the cotton industry," Annabelle says.

"In the last 10 years or so with the last downturn due to drought, I believe there has been a gap in getting the information from all the fantastic research that is done out there into a usable format for growers and consultants.

"I am glad to be able to be involved in this process through a project such as putting together the HRMS.

"The changing face of weed management practices since the widespread adoption of herbicide tolerant crops is something I find very interesting. Currently there is an almost complete reliance on glyphosate and I want to get the message out there that if we just keep doing this, there are dire consequences ahead based on the US experience.

"Herbicide resistance is increasing in cotton cropping areas and growers need to act now and incorporate other weed management tactics into their strategies."



**Annabelle Guest is working with cotton industry weeds researchers to draft a Herbicide Resistance Management Strategy.**

a draft HRMS with the Transgenic and Insect Management Strategies (TIMS) Committee's Herbicide Technical Panel and over coming months will also work with cotton industry stakeholders such as Crop Consultants Australia, CropLife and the Grains Research and Development Corporation's Farming Systems Groups to refine the strategy and test its capacity to be universally relevant in the industry.

Once feedback has been sought and the draft is finalised, it will be presented to the TIMS Committee for industry endorsement.

"CRDC and the TIMS Committee will have an ongoing commitment to the HRMS," Tracey says.

"Together we will see that it is reviewed annually, remains highly relevant to the field management of weeds in cotton and is reflective of current weeds research."

Being part of a family-owned spraying business, Annabelle is no stranger to the issues growers face in managing herbicide resistance, and understands the importance of an

effective strategy, for both individuals and the industry generally.

"The successful development of a HRMS, and commitment from across the industry to see it implemented, will enable the cotton industry to adopted changes to weed management that are both effective in controlling weeds and in reducing the evolution of herbicide resistances in target weed populations," Annabelle said.

"As a consequence, the HRMS will create new capacity for cotton growers to progress towards goals of input efficiency, maintaining the currently minimal losses of cotton yields from unmanageable weeds, and shifting towards weed control practices that can offer reliable weed management over the long term."

## More information

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THE WORLD'S FIRST CASE OF GLYPHOSATE RESISTANT SOWTHISTLE HAS BEEN FOUND AT GUNNEDAH ON THE LIVERPOOL PLAINS OF NSW, PROVIDING A STARK REMINDER TO GROWERS THAT VIGILANCE IS NEEDED IN INTEGRATED WEED CONTROL.

# GLYPHOSATE RESISTANT SOWTHISTLE HERALDS STERN WARNING

**T**he discovery is a real concern to farmers throughout North and North-West NSW to Southern QLD, due to the capacity of sowthistle to spread via wind-borne seed, highlighting the premise that when it comes to weed control, "We're in it together".

"Due to its wind borne seed, glyphosate resistant (GR) sowthistle populations will spread rapidly, similar to flea-bane," DPI Technical Specialist Weeds, Tony Cook said.

"Reduced-tillage agriculture and repeated use of glyphosate has aided the spread of resistant strains in recent years.

"However now that we have confirmed the problem landholders are better able to make critical decisions regarding weed management on their property.

"It is a stark reminder that glyphosate resistance is a continuing problem and as such vigilance is paramount when managing weeds. It's not just about spraying and forgetting anymore.

"Follow up inspections and the removal of survivors is critical, keeping in mind that failure to do so not only affects the contaminated farm, but those around it.

"How each individual approaches their weed control and resistance management is everyone's issue.

"It is important to have sowthistle samples tested for glyphosate and Group B resistance if growers are concerned."

## Managing resistant strains

At stem elongation-early flowering, which is when many growers spray sowthistle, 80 to 90 percent of the resistant populations survived the application of 1.6 L/ha glyphosate CT in NSW DPI's glasshouse trials. The research shows that once a resistant plant grows beyond the rosette stage its ability to survive glyphosate increases rapidly.

"We have found that timing is crucial and to treat the plants at the early rosette stage to ensure effective control.

"Rates of glyphosate used in this experiment varied between 0.8 to 4L/ha of the standard 450g/L glyphosate formulation.

"We have plants surviving the 4L/ha treatment, especially



The variable control of sowthistle can be seen in this field and is probably due to resistance, Tony Cook says.

IMAGE: TONY COOK

once they develop a stem.

"This is of concern as it is the maximum allowable dose via a WeedSeeker detector boom, otherwise the maximum allowable dose is 1.6L/ha when using a standard boom.

"Growers need to place less dependence on glyphosate and use other herbicide groups as well as non-chemical options.

"Depending on crop rotation, other effective herbicide options available to growers include actives from Group C (eg atrazine), G (eg saflufenacil), H (eg isoxaflutole) and L (eg paraquat) to take selection pressure of Groups B, I and M.

"The most common treatment growers use to counteract the GR issues in cotton crops is to use herbicides such as diuron (Group C). Apart from controlling sowthistle, diuron also controls awnless barnyard which may have developed GR in some cotton growing districts."

There is also widespread resistance to Group B herbicides such as chlorsulfuron and metsulfuron in the northern cropping zone, so this reduces the number of successful herbicide options for use in rotation crops. Antagonism between glyphosate and 2,4-D when tank mixed also reduces control of sowthistle in fallow situations.

Like barnyard grass and wild radish control, the size of plants treated and rate of herbicide applied have a big effect on the level of control. Importantly, the smaller plants are more easily controlled with glyphosate despite having some resistance.

NSW DPI researchers have extensive experience and expertise in glyphosate resistance research and works collaboratively with the Grains Research

## CRITICAL POINTS TO SUCCESSFUL SOWTHISTLE MANAGEMENT

- Stop all seed set
- Get sowthistle on your farm tested for glyphosate and Group B resistance
- Spray weeds when rosettes are no bigger than the top of a drink can. This may mean spraying more often
- Use full label rates when sowthistle is present and use appropriate water volumes for the herbicide
- Have spray rigs properly calibrated to deliver the maximum amount of the herbicide to the weeds
- 'Double knock' with another mode-of-action or tillage
- Use other modes of action such as Group L, I, L+Q
- Use targeted shallow cultivation if needed
- Control large survivors with a Weed-seeker or Weed-it sprayer
- Control sowthistle and other weeds around fences, buildings, roads, irrigation channels

and Development Corporation and Queensland Department of Agriculture, Fisheries and Forestry.

If you suspect glyphosate resistant sowthistle on your farm phone Tony Cook at Tamworth on 0447 651 607 or Graham Charles at the Australian Cotton Research Institute on 02 6799 1524.

For more information on managing glyphosate and paraquat resistance visit [www.glyphosateresistance.org.au](http://www.glyphosateresistance.org.au)

For information on herbicide sustainability visit *WeedSmart* - [www.weedsmart.org.au](http://www.weedsmart.org.au)



## QUICK FACTS

- Sowthistle can germinate at variable temperature – from minus 5°C to 35°C, but mostly at around 20°C, therefore it tends to emerge all year round
- Research shows sowthistle seed germination seems to require at least 10mm of rain, with emergence occurring three to seven days after rainfall
- Sowthistle germinates from the surface, it does not like to be buried
- Plants can produce up to 8000 seeds
- Seeds can persist for about a year on the surface, with a large proportion dying after a couple of months. When buried at depths of five to 10cm, studies have shown a small proportion of seed persists for over two and a half years.
- Growth rates are temperature dependant - slower in cooler conditions, but generally, the maximum 'sprayable' size (drink can size) occurs two to three weeks after germination and flowering occurs two to three months after germination.





# COTTON'S ULTIMATE PEST NEMESIS ARRIVES IN BRAZIL

**SPOTLIGHT SPEAKS WITH HELICOVERPA RESISTANCE RESEARCHER DR SHARON DOWNES AND COTTON BIOSECURITY SPECIALIST SUSAN MAAS ABOUT NEW CHALLENGES AHEAD FOR BRAZILIAN COTTON GROWERS, WHICH ARE A REMINDER TO THE AUSTRALIAN INDUSTRY ABOUT THE VALUE OF BEING ON THE FRONT-FOOT WHEN MANAGING THREATS.**

**R**ight now, a team of Australian scientists is working closely with colleagues in Brazil as *Helicoverpa armigera* sweeps its way across fields of soybean, corn, cotton and other crops. In the last two growing seasons, unusually high infestations of larvae assumed to be *Helicoverpa zea* were found across cropping areas, resulting in losses estimated at \$10 billion Brazilian reais (AUD \$4.7bn).

*H. armigera* had never been detected in the field anywhere on the American continents, despite over 4400 interceptions at US ports of entry since 1985.

As the scale of spread and destruction was monitored, Brazilian scientists began to suspect that the invasion was *H. armigera* not *H. zea* as originally thought, and approached CSIRO for assistance.

Recognised internationally for their

expertise with *Helicoverpa* genomics and resistance science, the team at CSIRO who also work closely with the cotton industry in Australia, used mitochondrial DNA markers to confirm that *H. armigera* has now successfully invaded Brazil.

Collaborating researcher Dr Sharon Downes visited Brazil in September 2013 to discuss with local researchers the key considerations for resistance management of this pest.

"There is a lot of curiosity in Australia about what this biosecurity incursion means for Brazil. The systems of cotton production in Brazil and Australia have many differences which will influence the approach Brazil takes in facing the new challenge compared with systems and practices in place in Australia," Sharon said.

"For a start, no formal RMPs currently exist for any insecticidal or Bt technology."





### No RMPs for Bt Crops

Sharon said prior to the invasion of *H. armigera*, mandatory RMPs for Bt crops were not a high priority because the target pests did not have the same reputation of causing significant economic losses and rapidly developing resistance in the same way as *H. armigera*.

Discussions have revealed that significant gaps exist in Brazil's knowledge about local pest ecology and the performance of Bt products.

"There hasn't been time to develop information on the resistance frequencies within the newly arrived *H. armigera* population and similar programs have only recently been put in place for other pest species," Sharon says.

"There is also very limited locally-generated data available publicly on the seasonal Bt expression profiles of the various Bt crop options."

Based on her extensive experience in Australia, Sharon says that without these building blocks, it is difficult for Brazil to accurately assess how primed the *H. armigera* population is for resistance and how strict RMPs would need to be to achieve appreciable delays.

"The cotton industry in Brazil has certainly recognised the need to instate at least a voluntary plan," she said.

"A grower group has recently developed a RMP based on the Australian model which will be adapted as local data becomes available."

"But the road ahead will be challenging, their plan is not yet mandatory in cotton, implementation is expected to be difficult and collective involvement across corn and soybean is yet to be secured.

"Seeing the impact *H. armigera* has already had on the Brazilian cotton industry is a good reminder to the Australian cotton industry not to be complacent.

"Australia's successful approach to pre-emptive Bt management is the result of an industry culture of product stewardship, underpinned by robust science.

"This culture has been built from decades of experience responding to the formidable capability of this pest to adapt: first with pyrethroid, carbamate and organophosphate resistances during the 80s and 90s and more recently in recognising the much higher than expected background levels of resistance to Cry2Ab toxin in Bollgard II."

### BRAZIL'S WET TROPICS CROPPING SYSTEM



IMAGE: STEVE YEATES

Each year around one million hectares of cotton, 13 million hectares of corn, and 30 million hectares of soybean plus other minor crops are grown in Brazil.

Each year around one million hectares of cotton, 13 million hectares of corn, and 30 million hectares of soybean (plus other minor crops) are grown in Brazil. The tropical climate means that each crop can be grown over much of the year with planting windows stretching over many months.

Annual rainfall is in the order of 2000mm, mostly falling between October and June. No-till farming practices are common, as is the production of two crops within a 12-month period. Frequent rain makes insect and weed control difficult and causes the need for routine use of fungicides to protect yield from foliar diseases. Fallows and crops are commonly contaminated with volunteer and ratoon crop plants from the previous crop rotation.

The climate and cropping system supports a large pest complex that can cause significant yield losses in spite of the Bt options and makes implementing IPM programs difficult. The key pests are: soybean looper, fall armyworm, black armyworm, southern armyworm, tobacco budworm, corn earworm and now, cotton bollworm. Pests can be active all year round, using weed hosts and vast areas of natural vegetation as well as crop hosts to complete more generations per year than occurs in Australia.

In cotton, the pest complex also includes aphids, whiteflies, stinkbugs and the boll weevil. Controlling boll weevil is a significant impediment to IPM in cotton as typically this is achieved through a series of pyrethroid applications which commence early season.

In addition to year round selection pressure, the elevated resistance risk from *H. armigera* newly arrived in Brazil is made more complicated by the use of a number of Bt crop options, some with one Bt gene, others with two Bt genes. Bt crop options exist in cotton, corn and soybean (see Table 1).

Corn is almost exclusively Bt, and up to 30 percent of the soybean is a single gene Cry1Ac product. It is likely that insects which develop resistance, for example to Cry1Ab corn, will also be resistant to the Cry1Ac in the two-gene cottons and Cry1 toxins in two-gene corns. This then creates much stronger selection pressure for Cry2A, increasing the likelihood that it too will be compromised.

### BGIII and resistance

With the anticipated introduction of third generation cotton in Australia from 2015, research has already provided a very important insight.

"Our resistance monitoring program has found that resistance to Vip3A (the new toxin in Bollgard III) in Australian pest populations is higher than expected and greater than the starting frequencies for Cry2Ab," Sharon explains.

"It is important to us that we share this information with the industry ahead of time so that growers are aware of the risks."

The research effort that underpins insect resistance management for cotton in Australia is substantial, with 10 to 15 percent of the CRDC's annual research and development budget being devoted to this area.

The strong research partnerships between cotton growers, through their levies, the Australian Government, research institutions like CSIRO and Monsanto as the technology provider have cemented both the need for and commitment to pre-emptive resistance management for Bt technologies in Australia.

## " BRAZIL HAS NO FORMAL RMPs "





Resistance monitoring is part of Australia's successful approach to pre-emptive Bt management which is the result of an industry culture of product stewardship, underpinned by robust science.



Sharon reflects that in contrast, the cotton industry is comparatively young in Brazil and despite its size (more than twice that of the Australian industry) it is not supported by such a well-established model of research, product stewardship and extension.

Sharon has also identified a clear lesson for Australia, which is prevention is better than cure, “growers in Australia shouldn’t underestimate the value of quarantine and biosecurity preparedness”.

#### Biosecurity at home

Industry Disease, Pest and Biosecurity Technical Specialist and member of CRDC’s R&D Management Team, Susan Maas, is only too aware of the biosecurity threats that could become part of the Australian industry’s future.

“Our own cotton industry could be

in a similar state of turmoil if we were to face a biosecurity incursion and find ourselves ill-prepared,” she said.

“The situation in Brazil highlights how quickly an outbreak can spread, as well as the impact that one pest can have on an entire farming system.

“For us, the arrival of a highly Bt-resistant strain of *H. armigera* from elsewhere in the world is an obvious threat but there are others.

“A completely new pest such as the cotton boll weevil would see us needing to substantially rethink IPM and our current low reliance on insecticides.

“A new plant virus such as cotton leaf curl disease would mean changing our yield expectations.

“As part of our preparedness, it’s important to understand what would become the strengths and weaknesses

of the current production system in the event of an incursion.”

#### Early detection

In terms of the biosecurity threats that arise from the arrival of pests with different resistance profiles, Australia is very well prepared. Both the industry and Monsanto run separate, but complementary, monitoring programs for Bt resistance.

“While designed specifically to monitor the success of the Bollgard II RMP and flag the early onset of increasing resistance from our own use of the technology, the programs will also assist early detection of something that arrives from further afield,” Susan said.

“In similar ways, industry supported monitoring programs for insecticide resistance in aphids, mites and whitefly also play a role in our biosecurity preparedness.”

Susan said CRDC also invests in monitoring and preparation for threats from entirely new pests and diseases.

“Local research capacity for early diagnosis, development of innovative surveillance techniques, scoping the potential for breeding solutions and mapping contingency plans are activities are currently being undertaken behind the scenes to prepare the Australian industry for uncertainties in its future,” she said.

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Crop	Technology	Cry1	Cry2	VIP
Corn	YieldGuard, Agrisure TL Herculex Viptera Agrisure Viptera Optimum Intrasect VT Pro Powercore, VTPROMax	Cry1Ab Cry1F  Cry1Ab Cry1Ab + Cry1F Cry1A.105 Cry1A.105 + Cry1F	   Cry2Ab Cry2Ab	VIP3A VIP3A
Cotton	Bollgard Bollgard II Widestrike Twinlink	Cry1Ac Cry1Ac Cry1Ac + Cry1F Cry1Ab	Cry2Ab  Cry2ae	
Soybean New in 13/14	Intacta RR2 PRO	Cry1Ac		

Table 1: Commercial Bt crop options currently available in Brazil.





IMAGE: MELANIE JENSON



# WORLD'S BEST SCIENCE: BASIS OF THE BOLLGARD III RMP

**CRDC R&D MANAGER TRACEY LEVEN EXPLAINS HOW BT RESISTANCE RISKS ARE BEING ASSESSED AND HOW HOME-GROWN RESEARCH IS USED IN THE DEVELOPMENT OF A RESISTANCE MANAGEMENT PLAN FOR BOLLGARD III.**

**T**he process of applying for regulatory approvals to commercialise Bollgard III in Australia is now well underway. In the latter half of 2014 Monsanto aims to submit to the Australian Pesticides and Veterinary Medicines Authority (APVMA) the data package for the product's Resistance Management Plan (RMP).

In the lead up to this, Monsanto and the Bt Technical Panel of Cotton Australia's Transgenic and Insect Management Strategies (TIMS) Committee are working closely together to review resistance risks using local and international research.

The resistance risks associated with Bt cotton today are less obvious

than the situation experienced by the industry in the mid 1990s. Bt cotton has virtually eliminated yield losses from *Helicoverpa* across the industry and back-up from foliar insecticides is rarely required.

In the Bollgard era, we're no longer used to experiencing product failures due to resistance. It is the reliability of the very high levels of control that have been achieved with Bollgard II that the RMP has aimed to protect. This aim will continue with Bollgard III.

While risks are less obvious than in the past, the underlying resistance risks for Bt cotton are potentially much greater than that for conventional insecticides.

Bt toxins are expressed by cotton plants all season long, greatly increasing exposure and selection pressure when compared to individual spray events. Additionally, local research demonstrates that genes for resistance to two of the three Bt toxins are common in *Helicoverpa* populations – both *H. armigera* and *H. punctigera*.

The core strength of the Bollgard III product that counters these risks is the independent modes of action of each of the three Bt toxins. If the insect carries resistance to one toxin, it will be killed by either of the other two. Critical to this is the consistency with which each of the toxins is expressed by the crop throughout the season. Periods of time during which the expression of one or more of the toxins falls are of concern, particularly if it increases the survival of individuals carrying resistance compared to individuals that do not.

The measure of 'redundant killing' will be at the centre of discussions

**Increasing knowledge of *Helicoverpa* ecology in Australia has included research into changes in migration patterns, diapause and seasonal abundance in cotton areas and understanding local flight capacity.**





between Monsanto and the TMS Bt Technical Panel in coming months.

Data to answer these questions is very labour intensive to collect and quite different from questions that aim to assess the efficacy of the product. Discussion around the resistance risk profile of Bollgard III compared with Bollgard II can't really progress until the results from this season's intensive work are available for consideration.

Discussions are currently focused on objectively reviewing the performance of the resistance management tactics used with Bollgard II – planting windows, refuges and pupae busting.

If resistance mitigation tactics are still required with Bollgard III, CRDC wants to ensure that discussions between Monsanto and the TMS Committee are focused on the tactics that have most effect in countering the ecological strengths of the target pests and any expression weaknesses detected in the product.

The science of resistance management is complex and has been a priority area for CRDC research investment since 2008. While seasonal monitoring of resistance frequencies to the Bt toxins, and characterisation of the detected resistance mechanisms are investments that have been in place each year since the release of Bollgard II, the lead up to the commercialisation of Bollgard III has seen CRDC investing across a broader range of research questions in recent years.

CRDC's research investments informing the discussions between Monsanto and the TMS Bt Technical Panel include projects with focus on:

#### The Product

- Determining the expression characteristics of each of the toxins contained in Bollgard III at key crop growth stages.
- Determining baseline resistance frequencies to Vip3A, the additional toxin contained in Bollgard III.

#### The Australian Pests

- Investigating whether individuals

## “THE SCIENCE IS COMPLEX AND HAS BEEN A PRIORITY AREA FOR CRDC INVESTMENT SINCE 2008”

that carry resistance to the Vip3A toxin incur fitness costs such as producing less offspring.

- Increasing knowledge of *Helicoverpa* ecology, including changes in migration patterns, diapause and seasonal abundance in cotton areas and understanding local flight capacity.
- Assessing the potential for cross resistance between Bt toxins and foliar-applied insecticide chemistries.
- Exploring the potential for alternative mechanisms of Bt resistance to occur.

#### The Australian Environment

- Assessing the effectiveness of key tactics in the current RMP such as: do planting windows limit selection pressure on Bt? Are refuges producing moths at the same time as Bt cotton? Are refuges producing as many moths as was envisaged and how does agronomic management of refuges affect their production of moths?
- Evaluating ‘moth busting’ with ‘Magnet Attract and Kill’ as an alternative mitigation tactic.
- Understanding how different crop types in the landscape impact on Bt selection pressure and *Helicoverpa* mating success.
- Assessing the extent of cotton plants on the landscape outside cotton farms and the selection potential from feral populations.



# INDUSTRY MANAGEMENT

THE AUSTRALIAN COTTON INDUSTRY HAS A UNIQUE AND IMPORTANT ROLE IN HOW RESISTANCE MANAGEMENT PLANS ARE DEVELOPED. **SALLY CEENEY, TECHNICAL SPECIALIST FOR BT AND INSECTICIDE STEWARDSHIP, EXPLAINS THE HISTORY AND PROCESSES IN PLACE TODAY.**

Prior to introducing the first commercial Bt transgenic cotton in 1995, the Australian cotton industry was well aware of the risks to production associated with insecticide resistance. *Helicoverpa armigera* had already developed resistance to conventional insecticides, particularly pyrethroids.

The efficacy of many insecticides was short-lived in the field, providing only a few days protection. Spray failures were common, as was the practice of using more than one active ingredient in spray mixtures to increase the likelihood of satisfactory control.

It was recognised by both industry and the owners of Bt technology that the success of transgenic cotton cultivars in Australia would be dependent on an effective and well-supported resistance management strategy.

In order to develop a robust resistance management plan to support the release of the first Bt cotton, Ingard, representatives of the Australian cotton industry, including the local scientific community worked closely with Monsanto. In providing knowledge from research relevant to the Australian pest species and the Australian cropping environment, as well as industry knowledge as to how the management of resistance risks might be best achieved in practice, the Australian cotton industry's involvement in the development of RMPs for commercial Bt cottons became established.

Since then the process of making changes to existing RMPs or introduc-



Geoff Baker, Senior Principal Research Scientist with CSIRO, presenting to Monsanto and the Bt Technical Panel the results of recent study into the impact of planting windows on potential exposure of *Helicoverpa spp.* to Bt cotton.



# ENGAGEMENT IN RESISTANCE ENT DECISION MAKING

ing new RMPs with the Australian regulatory authorities has involved industry consultation as an important step in the process. The RMPs for Ingard, Bollgard II and Widestrike cottons have all been developed using the process being currently undertaken to develop the RMP for Bollgard III.

## The Role of the TIMS Committee

In 1995 the Australian Cotton Growers Research Association formed a broadly representative, grower-led group named the Transgenic and Insect Management Strategies Committee (TIMS). This committee was established to oversee the development of the industry's resistance management strategies for insecticides and Bt cotton and later herbicide-tolerant cotton traits.

The TIMS Committee now facilitated by Cotton Australia, functions as a cotton industry stewardship group with broad representation from growers, research organisations, crop consultants and members of the pulse and grains industries.

The TIMS Committee is strongly supported by three discipline-based technical panels. The panels offer the committee advice on the scientific merit of proposed new or amended resistance management strategies. The technical panels are comprised of appointed researchers with specific expertise in resistance management. The three technical panels advising the

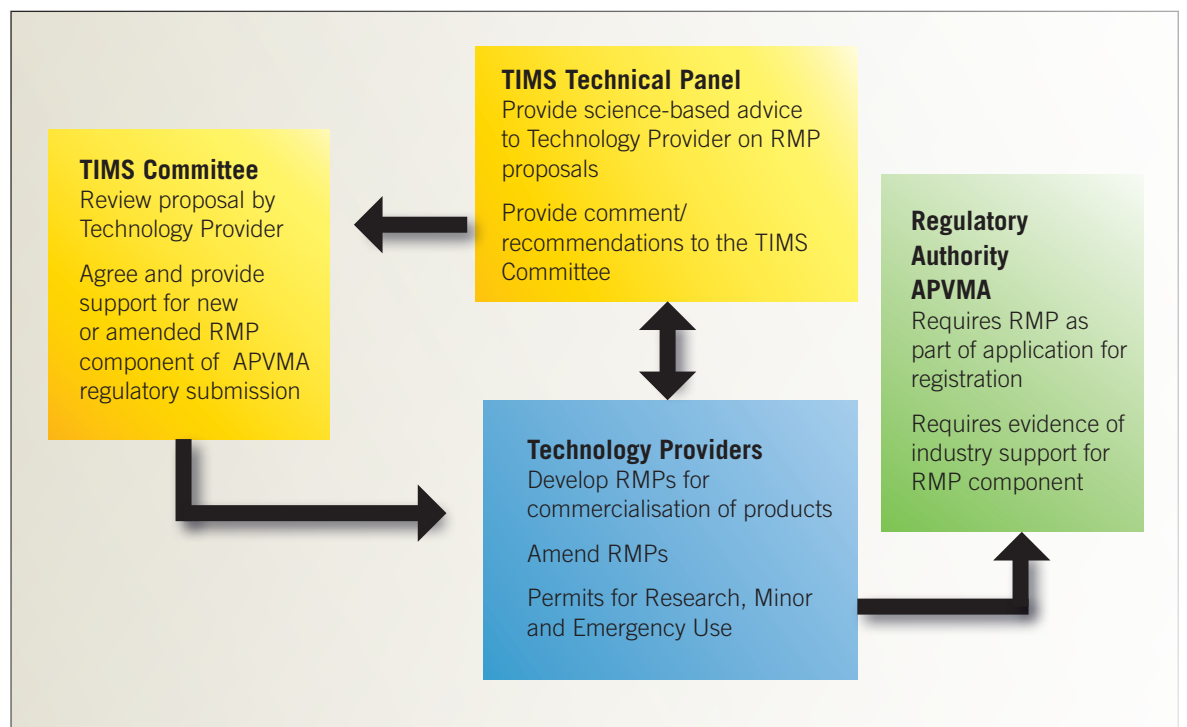


Figure 1. The process that occurs when new or amended RMPs for cotton are proposed.

committee cover the areas of:

- Insecticides
- Herbicide tolerant crops
- Bt insect resistant crops

An important role of the TIMS Committee is to endorse amendments to existing RMPs for Bt transgenic cotton and any proposed RMPs for new Bt products coming into the market, such as Bollgard III. Registrants are required as part of their application to the APVMA, to demonstrate industry

support for the proposed RMP. In cotton, the TIMS Committee is recognised as the group that performs this role.

The TIMS Bt Technical Panel provides independent, scientific advice to Monsanto and the TIMS Committee on these issues. Figure 1 shows the overall process that occurs between the TIMS Committee, its Bt Technical Panel, the Technology Provider and the regulatory authorities when new or amended RMPs are proposed.

As part of the review of Bt resistance research, the TIMS Committee and CRDC facilitate an annual review of Bt resistance research and extension activities as part of the REFCOM forum meetings.

Held in July-August each year, REFCOM brings together researchers, growers, consultants and representatives from technology providers and the industry CottonInfo team, to discuss research project progress and communication on Bt resistance.



The TIMS Committee Bt Technical Panel met with Monsanto to discuss the Bollgard III RMP in February. At back are Rick Roush (University of Melbourne), CSIRO's Sharon Downes, Tom Walsh, Lewis Wilson, Paul Grundy (DAFF QLD), Kristin Knight (Monsanto), Peter Gregg (UNE), Tony May (Monsanto) At front are CSIRO's Geoff Baker, Mary Whitehouse, Tracey Leven (CRDC), Greg Kauter (CA), industry Bt and Insecticide Stewardship Specialist Sally Ceeney. (Absent CSIRO's Colin Tann, Nancy Schellhorn, Gary Fitt, NSW DPI's Lisa Bird.)





## COUNTDOWN TO THE AUSTRALIAN COTTON CONFERENCE BEGINS

THE AUSTRALIAN COTTON INDUSTRY IS GEARING UP FOR ITS BIENNIAL CONFERENCE FROM AUGUST 5-7 ON THE GOLD COAST.



Barb Grey

A volunteer industry committee, led by Mungindi cotton grower Barb Grey, has started planning this flagship event that brings together all sectors of industry

right through the supply chain.

"In these early stages of planning the focus is on generating sponsorship so that we can keep registration prices down," Barb said.

"The Australian Cotton Conference remains one of the lowest cost conferences in the agricultural sector and this is due to the generous support we receive from our commercial partners.

"Any business or organisation out there who would like to support the Conference and secure a significant profile in the industry, please contact us to develop an appropriate package of support and sponsor recognition.

"We're also working hard to develop a program of speakers and topics to cover the broad spectrum of our industry, from technical on-farm research that benefits growers right through to the challenges of marketing cotton to brand owners and retailers.

"Delegates can also look forward to a line-up of speakers who can help us challenge traditional thinking and improve the inter-related aspects of our business and personal lives.

"Of course one of the major benefits of a gathering of this scale is the networking opportunities that arise and the subsequent learning from peers, generating new business, and extending our own webs of support.

"There will be many formal and informal networking opportunities as well as the usual support for families, students and those new to the cotton industry."

For more information, please visit [www.australiancottonconference.com.au](http://www.australiancottonconference.com.au) and follow us on Facebook at [www.facebook.com/australiancottonconference](https://www.facebook.com/australiancottonconference)

## OUR FIBRE, OUR FOCUS, OUR FUTURE – CONFERENCE PROGRAM SHAPING UP

***Our fibre, our focus, our future:* this is the theme that will bring together an exhaustive plenary program with a strong base in research, development, extension and technology.**

Topics likely to be covered include farm performance and innovation, plant physiology and genetics, water-nutrition interactions, *myBMP*, climate forecasting, herbicide resistance, Bollgard III and digital farming. CRDC, as a major sponsor, will have input into the research themes they'd like to see covered by the conference program.

"The Cotton Conference has a long history as a research conference, and this remains a focus today," Program Coordinator Guy Roth said.

"In more recent times the program has been expanded to include topics such as markets, inspirational leadership, farmer health and regional development, however there will be many opportunities for new research to be presented this year.

"In addition, there will be a range of interesting keynote speakers on topics designed to provoke our thinking and challenge us to continually improve.

"We aim to make the Conference the industry's main platform for the best available science and data from world's leading experts, to learn from cotton growers leading the pack and importantly to test ideas and new thinking with each other.

"The next few months will be spent building the program and locking in expert speakers under agreed topics.

"It's a continually evolving and challenging process that involves the whole committee as a sounding board."

Program Updates will be posted to Facebook ([www.facebook.com/australiancottonconference](https://www.facebook.com/australiancottonconference)) and also available at [www.australiancottonconference.com.au](http://www.australiancottonconference.com.au)

## IT'S YOUR CONFERENCE: WHAT YOU SAID IN 2012

**A comprehensive survey conducted after record numbers of delegates attended the 2012 Australian Cotton Conference revealed that networking opportunities, the trade hall and speaker presentations were the best rated aspects of the conference experience.**

Organisers have taken these survey results into account to develop a Conference plan for 2014 that maximises networking and social opportunities and offers an interesting and engaging speaker program.

The 2012 survey showed 98 percent of attendees rated the overall conference experience either excellent or good, with almost 70 percent rating networking opportunities as excellent. The overwhelming majority also believed the conference was good value for

money and offered relevant plenary sessions.

### What you said:

"The plenary sessions had meaningful information related not only to cotton but agriculture as a whole."

"One of the most impressive things about the cotton industry is the commitment to R&D and its obvious success and benefits."

"Sharing of knowledge is excellent. We need to be able to explain what it means and the expectations of producers from this research."

"I really enjoyed the conference, I found a good deal of the presentations relevant, interesting and engaging and the trade hall proved a valuable place to ask lots of questions of those with an interest in the industry."





# SPEAKER PROFILE: 2013 CSD RESEARCHER OF THE YEAR, JANELLE MONTGOMERY

**The Australian Cotton Industry Awards recognise excellence and high achievement in Australia's cotton industry throughout the supply chain, from growers and ginners to product suppliers, consultants, agronomists, researchers and extension.**

Janelle has made an outstanding contribution to the national cotton effort to improve water use efficiency by stimulating practice change and improving the knowledge of growers, consultants and researchers.

Janelle's career started with a Cotton CRC-funded PhD studying the soil water balance for irrigated cotton. This was one of the early "deep drainage" studies that later led to the cotton industry's renewed interest in deep drainage science, and subsequently improvements in irrigation management.

From 2006 to 2013 Janelle championed water use efficiency and productivity gains in cotton as an Irrigation Extension/Delivery Officer with NSW DPI across the entire cotton industry. CRDC has funded her position through three projects:

1. Advancing Water Management, NSW
2. Water Smart Cotton and Grains
3. Promoting Water Smart Infrastructure Investment, NSW

Janelle's beneficial outcomes for the cotton industry are in four broad areas:

- Establishment of irrigation benchmarks for the Australian Cotton Industry, providing vital industry data. Janelle and her team have measured, and benchmarked water use on farms from Emerald to the Murrumbidgee.
- Increased knowledge and adoption of best irrigation management practice and training of consultants and growers.
- Adoption and increased awareness of new WUE technologies
- Initial studies for on-farm energy use monitoring and measurement

While the program is only just being put together now, Janelle will speak on the topic of Sustainable Irrigation.



## EXCELLENCE CELEBRATED AT COTTON AWARDS

**Nominations have opened for the 2014 Australian Cotton Industry Awards. The Awards recognise excellence and high achievement in Australia's cotton industry throughout the supply chain, from growers and ginners to product suppliers, consultants, agronomists, researchers and extension.**

Cotton Awards Taskforce Chairman, Geoff McIntyre, says the Awards recognise individuals and farming teams who have contributed to the industry.

"The cotton industry is one of the most innovative and productive agricultural industries in Australia at the moment and it is important that we shine a light on those leading the way," Geoff says.

"The Cotton Awards Dinner has a great reputation as a fantastic night networking and socialising as well as paying tribute to our Award winners."

The 2014 Australian Cotton Industry Awards has five categories:

- Monsanto Grower of the Year
- AgriRisk High Achiever of the Year
- Chris Lehmann Trust Young Achiever of the Year, sponsored by Bayer CropScience



- Cotton Seed Distributors Researcher of the Year
- Incitec Pivot Fertilisers Service to Industry Award

Cash prizes are on offer for the winners, with a travel bursary offered for the Young Achiever of the Year category.

Individuals can nominate others or themselves and can enter in one of three ways:

1. Use the online form at: [www.australiancottonawards.com](http://www.australiancottonawards.com); or

2. Submit the form via email to: [admin@australiancottonawards.com](mailto:admin@australiancottonawards.com); or
3. Mail a form to 2014 Australian Cotton Industry Awards, PO Box 987 Narrabri NSW 2390

Entries closed March 28 however entries may be accepted by contacting the above e-mail or Sally Hunter on 0459 944 778.

Winners of the 2014 Australian Cotton Industry Awards will be announced at the Awards Dinner on the last evening of the Conference on August 7.

"I encourage everyone involved in cotton to think of those special individuals in the industry who deserve recognition, and consider nominating them for an award," Geoff said.

"The 2014 Australian Cotton Industry Awards is not about who is 'best', it is about making a positive contribution to our industry.

"It's also about celebrating and sharing the great work, personal achievements and commitment of people through the entire cotton supply chain."





# PLAN NOW FOR BETTER COTTON ESTABLISHMENT IN 2014: AVOID SEEDLING GROWTH ISSUES FROM ALLELOPATHY

COTTON PATHOLOGISTS HAVE ADVISED GROWERS THAT IF CONDITIONS REMAIN DRY, EARLY INCORPORATION OF CROP RESIDUES MAY BE NEEDED TO REDUCE THE NEGATIVE IMPACTS ON COTTON SEEDLING GROWTH AND MORTALITY NEXT SEASON.

**D**AFF QLD pathologist Linda Smith has given this advice now so growers can start to plan and manage next season's cotton crop and hence avoid a repeat of last season, which did not start well for growers in many regions.

Early season disease surveys of cotton in Emerald, Theodore, St George, Dirranbandi and the Darling Downs in November 2013 revealed a common problem of poor emergence, poor root growth and stunting of seedlings, and Linda says the likely culprit was allelopathy.

## What is it?

Allelopathy is the suppression of plant growth and development by the release of toxic chemicals from the roots or residues of another plant.

"An increase in seedling diseases such as black root rot and rhizoctonia was particularly prevalent on the Darling Downs, where a number of fields were replanted only to have the same growth problems emerge," Linda said.

"And while growers work to maintain good stubble cover to save soil moisture, the dry conditions would not have favoured crop residue decomposition and it was noted that there was an unusually large amount of crop residue on the soil surface and in the soil profile.

"It is therefore highly likely that the seedling issues in some of these fields were due to allelopathy."

## What causes it?

Linda said it is known that planting into freshly incorporated, unweathered crop residues can lead to allelopathic

effects. Damage to emerging cotton was observed in November 2013 in fields with cotton planted into sorghum and wheat residues. Phytotoxicity has also been reported when residues of sorghum remain on the soil surface in reduced tillage systems.

"The lack of moisture in the soil profile through winter and spring would have influenced the rate of residue decay which is why a large amount of crop residue was observed," Linda said.

"The major requirement for breakdown of crop residues is an active microbial population in contact with the residue. Soil microbes (fungi, bacteria, and actinomycetes) are most active and thrive under moist, warm conditions and decomposition is slow when soil is barely moist to the touch but not dusty dry (less than 40 percent water-filled pore space) and stops in soils that are air dry (dusty, hard and crumbly to the touch, near a crop's permanent wilting point)."

Above average temperatures coupled with well below average rainfalls over winter and spring depleted soil moisture levels creating unfavourable conditions for planting, resulting in a high water-usage start and it took a lot more water than normal to wet-up soils post plant.

"When soils were irrigated following planting, the microbial population would have become active and conditions would have been favourable for residue decomposition," Linda says.

"After the toxic compounds leach from the residue they are degraded into harmless compounds by microorganisms in the soil.

"If seed was planted adjacent to crop residues, the release of toxic

THIS IMAGE: Poor stand establishment with stunted and uneven seedlings and plant death.

INSET: Abnormal roots with blacken root tips are typical symptoms of allelopathy.



IMAGES: LINDA SMITH

chemicals could have had a detrimental effect on emergence and subsequent plant growth."

## How to reduce it

Prompt tillage of the residue after harvest affects leaching and degradation of the allelopathic compounds.

"Tillage breaks up the residue into smaller particles, thereby exposing greater residue surface area to microbial attack," Linda said.

Pre-irrigation of fields would be better than watering up, as this would activate microbial populations earlier to speed up decomposition of crop residue and breakdown of toxic compounds ahead of crop establishment, thereby reducing allelopathic effects.

"However as observed this season, if soil moisture is too low, microbial activity will be low and decomposition will be slow," Linda says.

"Therefore planning well in advance and bringing forward operations to incorporate stubble will extend the time available for decomposition of crop residues before cotton planting and alleviate allelopathy.

"The benefits of adequate of soil moisture also suggest that irrigation of dry soil could promote decomposition and lessen the allelopathic on cotton, particularly from sorghum residues."

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email us

IT MAY COME AS NO SURPRISE CRDC'S 2013 COTTON GROWER PRACTICES SURVEY FOUND THAT 82 PERCENT OF THE COTTON AREA WAS HARVESTED BY JOHN DEERE 7760 PICKERS.

# IMPROVED UNDERSTANDING OF COTTON HARVESTING SYSTEMS AND GROWER PRACTICE

**W**ith results confirming the JD7760 has been rapidly adopted by Australian cotton growers since its introduction in 2009, it also highlights the need to understand its impact and attitudes associated with its use. The survey indicated that the area of cotton picked by conventional pickers has almost halved with each subsequent season since 2011.

A series of survey questions regarding harvesting technology systems were prepared by Dr John McLean Bennett, Senior Research Fellow at the National Centre for Engineering in Agriculture (NCEA), to gather information from growers for a harvesting assessment project being carried out by NCEA (see article over page). The CRDC-funded project aims to identify, measure and assess the impacts of round bale harvesting on cotton farming systems and develop associated BMP guidelines. Preliminary analysis of the survey results has been used by NCEA to develop field experiments for the project.

## Motivation for uptake

In order to more clearly understand the driving force behind the rapid adoption of this new technology, growers were asked to indicate their initial motivations to use the JD7760. A 'decrease in labour required for picking' was the most selected reason with the 'ability to pick crops more quickly' and 'decreased workforce WH&S risk' following closely.

Results indicate the technology is delivering on these expectations. Review of the number of respondents reporting the use of the various picking technologies shows that fewer JD7760s, as a percentage of respondents, are required to pick the same area as the conventional system.

"These results also support an

IMAGE: MELANIE JENSON



interrelated notion that the conventional system is generally being retained by smaller operators," John said.

"For example, 47 percent of respondents reported using the conventional system to pick just 18.2 percent of the reported area.

"We have found through our subsequent project that the cost of the conventional and JD7760 systems has been considered on par by the industry and comparative costs of the two systems will be calculated as part of the project.

"However, it is apparent that, irrespective of any actual financial savings, the prospect of a financial saving did act as an adoption driver for a large proportion of responding growers."

## Under utilisation

Related to this perspective may be an under utilisation of many machines purchased by growers.

The survey found during the 2012-2013 season, the majority of JD7760 use was by contract harvesting (60.3 percent), but where machines were purchased (47.3 percent of growers), the vast majority of picking was performed by one picker.

Further, the average reported area picked by owned/leased JD7760 machines was 650.36 ha, but three growers indicated that a single machine was capable of picking twice that.

"This appears to reveal there may be a potential saturation of JD7760 machines in the Australian market, with results indicating that even though more people utilised a contractor for harvest, the area of cotton picked by contracted machines was less," John said.

"Those purchasing/leasing a JD7760 also indicated that they are considering contract harvesting which

**Decreasing labour requirements at harvest was the most selected reason for using round bale pickers by respondents in CRDC's 2013 Grower Survey.**

**"THE PROSPECT OF A FINANCIAL SAVING DID ACT AS AN ADOPTION DRIVER FOR A LARGE PROPORTION OF RESPONDING GROWERS"**





will likely be a pressure on the contract harvesting market and therefore the future availability of contract pickers.

“Those using contractors agreed that their crop was more reliably picked when it was ready to be picked, which may indicate contractors could be ‘waiting’ to fulfil contracts.”

Respondents using the 7760s were then asked a number of questions in relation to soil compaction, attitudes towards paying off machines and machine performance.

It was found that growers who owned their JD7760 thought that harvesting cotton was more important than causing soil compaction, but conversely were not inclined to pick when soil moisture content was higher just because the machine had the capability.

“This suggests that if climatic conditions and external circumstances require cotton be picked at detrimental soil moisture, then it will be, but if the situation isn’t dire growers will try to avoid traffic in poor conditions,” says John.

Similarly, growers who were using contract JD7760 machines showed a clear priority to removing cotton from the field rather than avoiding soil compaction, and did not feel more inclined to pick at high soil moisture just because the machine could do so. However, some of these growers did report feeling slightly pressured to pick according to contractor availability, despite high soil moisture levels.

“The survey results reveal that despite many growers believing that they are not currently causing soil compaction, they perceive it is an issue,” John said.

“Approximately 60 percent of all additional comments supplied through the survey related to concerns about soil compaction and this was the only category that had more than three comments from growers.”

CRDC and the survey authors Roth Rural thank the 165 growers who participated in the 2013 Cotton Practices Survey. For further information about the survey and the 2013 results, visit the CRDC website: [www.crdc.com.au](http://www.crdc.com.au)

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# COTTON HARVEST TECHNOLOGY ASSESSMENT SHOWS A STRONG AND ADAPTABLE INDUSTRY



John McLean Bennett

WORK IS UNDERWAY TO QUANTIFY THE IMPACTS OF THE JD7760 ROUND BALE PICKER AND DEVELOP BEST MANAGEMENT PRACTICES FOR HARVESTING SYSTEMS AS PART OF A NEW PROJECT BEING CARRIED OUT BY THE NATIONAL CENTRE FOR ENGINEERING IN AGRICULTURE (NCEA).

**D**r John McLean Bennett is a Senior Research Fellow at NCEA and is heading up the CRDC-funded project along with Senior Research Fellow Dr Troy Jensen, Research Fellow Dr Dio Antille and research engineer Nathan Woodhouse. The project started last year and will conclude in 2015.

John says cotton growers are driven by the need to perform more work with less labour, in a safe manner.

“The new JD7760 machines have offered this required increase in Effective Capacity (EC), amplifying their capacity to produce,” he said.

“However the potential impacts of this new technology are not well understood.

“The bulk of impacts caused by the JD7760 cotton picker are perceived as positive, however soil compaction, ginning and transport issues, and the cost of wrap are negative aspects confirmed by the NCEA project through grower consultation, the Cotton Practices Survey 2013 and an extensive literature review.

John says the industry very quickly dealt with the issues relating to ginning and transport of round bales, which is a testament to the strength and viability of the cotton industry.

“The cost of wrap is also considered a problem and initial investigations suggest that if the wrap could be produced domestically with lower associated costs it would make a significant reduction to the JD7760 system costs, although this is anecdotal at this point.

“The extent and impact of soil compaction however is not well understood.

“There are latent impacts associated with soil compaction and work is now underway as part of our project to quantify its impact to both the farming system and economics.”

#### The weight factor

With the JD7760 weighing in at around 36 tonnes fully loaded and with a rear axle load reaching approximately 16.5 tonnes, the new round bale pickers are approximately twice as heavy as conventional pickers.

“The engineering solution to heavier axle loads is dual wheels however the actual wheel load being supplied to the soil even under dual wheels is still very high,” John said.

“More importantly in terms of soil compaction, the rear wheel for the JD7760 versus that of conventional pickers (JD9996) is about double. The manufacturers’ solution to this was to use a bigger and wider rear wheel.”

However, the researchers say, this does not solve the problem, it only changes it.

“If you think of the wheel pressure under a wheel being a three-dimensional bulb, even though the depth of impact under the rear wheel of a round bale picker is only slightly greater than under the rear wheel of a conventional picker, the width of the soil compression is significantly greater as the machine builds modules and increases rear wheel load,” John said.

#### In-field research

With these preliminary findings and soil compaction measurements taken in 2013, the project team is now working towards assessing the soil damage and implications for soil works and as-

sociated costs such as additional tillage required for adequate bed preparation, as well as any issues with plant growth, development and productivity in subsequent seasons.

A number of different field experiments have been set up to measure the impacts of round bale harvesting on the farming system and assess differences between the new JD7760 system and the conventional system including:

- A detailed comparison of the JD7760 with dual and single front wheel configuration to determine the value of controlled traffic farming under these machines in the Darling Downs;
- A comparative analysis of the cumulative impacts of JD7760 traffic compared to conventional picker traffic; and
- An assessment of increased tillage requirements, along with subsequent crop effects, is being investigated in the Macintyre Valley.
- Information derived from the field experiments will contribute to a benefit versus cost analysis of the new harvesting system, incorporating the associated latent costs of increased soil compaction.

John says an overall comparative analysis of the different harvesting system will also be carried out.

“One of the outcomes of our grower consultation process is that growers generally believe the JD7760 system is roughly cost neutral to the previous conventional harvesting system,” he says.

“The project will include an economic assessment to quantify this belief and identify where potential optimisation of system energy consumption can occur.

“As part of the project, energy and labour audits will be conducted providing data for the economic assessment.

“We are currently seeking and will be working with key growers to quantify system inputs, compare these between the JD7760 and conventional system, and identify system components to optimise the incorporation of the JD7760 into the cotton industry future.”

All of the information from the analysis phase of the project will then be used to develop and evaluate strategies to minimise the impacts of



IMAGE: MELANIE JENSON

round bale harvesting systems and to establish guidelines for BMP for the different harvesting systems.

#### Practical tools

“The project aims to develop practical tools for growers to make decisions regarding soil traffic and purchasing of heavy machinery,” says John.

“For example, in addition to BMP guidelines, we hope in the future to develop a tool to help forecast the likely impact of a machine in the field given the field characteristics and likely conditions, allowing growers to make informed decisions concerning traffic and soil compaction.”

Another long term outcome of the project is development of an impact assessment framework for evaluating new machinery innovations for cotton.

“We hope that the JD7760 project will provide a platform to come up with a generic list of decision making points.

“By engaging the industry in discussion, reviewing current information on harvesting system implementation and performance, auditing system efficiency, and measuring soil impact, the project aims to determine a series of indicators that can be measured in-field to assess field impacts and machine performance prior to introducing similar new innovations.”

**A number of different field experiments have been set up to measure the impacts of round bale harvesting on the farming system and assess differences between the JD7760 and conventional system.**

**“ ENERGY AND LABOUR AUDITS WILL BE CONDUCTED PROVIDING DATA FOR THE ECONOMIC ASSESSMENT”**

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A CSIRO STUDY IS AIMING TO QUANTIFY DIFFERENCE IN COMPACTION BETWEEN THE JOHN DEERE 7760 COTTON PICKERS AND CONVENTIONAL MODELS.

# SOIL MOISTURE THE BIGGEST CONTRIBUTOR TO COTTON PICKER COMPACTION



IMAGE: MELANIE JENSON

**A**s the new JD7760 is around twice the weight of conventional pickers, there is a perception that they cause greater compaction, however the study found soil moisture is the greatest contributor to compaction.

To understand the extent of compaction, CSIRO research scientist Dr Michael Braunack collected a range of measurements including soil strength at eight typical cotton fields across NSW in a single harvest season. The fields covered a range of soil types and soil moisture conditions. Measurements were taken before and after the passage of fully laden pickers.

Increased soil strength indicates compaction and while both machines generally increased soil strength in the wheel tracks and in adjacent rows, the effects extended deeper into the profile under the 7760. Overall, Michael says, the measurements were varied, however soil moisture had the greatest influence on the impact of both pickers.

“When the soils were wetter than the plastic limit - that is the point at which the soil goes from breaking in a brittle manner to one where it performs more like plasticine - the change in soil strength was greater,” Michael said.

“Variation was also attributed to the inherent nature of

the different soils studied, variation in each soil’s plastic limit, and field history.

“Soil compaction was measured down to at least 50cm under the wheel tracks of the JD7760 on soils that contained moisture above the soil plastic limit and simulation studies indicate that this may occur around 75 percent of years in irrigated cotton systems.

“Notwithstanding the difference in soils and soil moisture at the time of traffic, we found that in five of the eight sites the degree of change was greater in surface soils (10-30cm) under both pickers.

“Furthermore, change in soil strength was generally greater in the surface 10cm and varied with depth at all sites measured, which reflected the general profile soil moisture being higher than the soil plastic level at the time of picking at seven out of the eight sites.”

Michael used the OZCOT cotton crop simulation model to give an indication of soil compaction risks at harvest. Results indicated that for the soil types and locations where measurements were taken, the timing of harvest is likely to occur when soil is wetter than its plastic limit in about 75 percent of years in irrigated systems and 14

percent of years in dryland systems.

He said soil compaction could be limited by monitoring soil strength in the top 30cm layer to provide some indication as to whether the soil can support the picker.

“However, growers will often reluctantly compromise if rainfall is imminent or harvest contractors need to move to the next property,” he said.

“If a zone of high strength develops, particularly in the subsoil (greater than 30cm), subsequent crop performance may be compromised.

“Further work needs to be undertaken to assess the long-term effect of the round module pickers on soil conditions, more specifically subsoil conditions.

“The effectiveness of different strategies for alleviating subsoil compaction also needs to be researched and Best Management Practice (BMP) guidelines developed to assist growers in managing their harvesting systems.”

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**“ SOIL COMPACTION WAS  
MEASURED DOWN TO AT  
LEAST 50CM UNDER THE  
WHEEL TRACKS”.**





# KEEPING UP WITH WORKFORCE CHANGE: EVERYONE'S RESPONSIBILITY

PRIOR TO HARVEST IS A GOOD TIME TO ASSESS THE ON-FARM SAFETY SITUATION AND TAKE STEPS TO ENSURE SAFETY MANAGEMENT MEETS LEGAL REQUIREMENTS AND PROVIDES PROTECTION FOR ONE OF THE FARM'S MOST VALUABLE RESOURCES – ITS WORKFORCE.

**“W**ith the cotton harvest here, growers need to review their farm's Work Health and Safety (WHS) particularly with the introduction of the new national Work Health and Safety laws that replaced the state based Occupational Health and Safety laws last year,” says John Temperley, Farm Safety Program Leader at the Australian Centre for Agricultural Health and Safety.

“Cotton leads all Australian agricultural industries in WHS.

“Modern production practices are part of the success so there are relatively few safety incidents but when it does happen, it is usually serious as equipment tends to be quite large.”

In response to the introduction of new national WHS laws, the cotton industry has stepped up its provision of grower services to assist with compliance for individuals and ensure the industry is as safe as it can be for all workers. A comprehensive source of information and tools for growers is the cotton industry's *myBMP* website.

“WHS was added into the Human Resources (HR) module of cotton's *myBMP* in October last year when the online service was upgraded,” says *myBMP* Program Manager Jim Wark.

“The new module includes checklists, templates, resources and loads of other information for cotton growers to simplify the process of managing farm safety for all workers whether they are family members, employees or contractors.”

## New *myBMP* HR module

The new HR and WHS module has four standards relating to WHS including:

- The business has a WHS plan and policy that is available to all workers



IMAGE: MELANIE JENSON

(employees and contractors);

- There are regular inspections of building, structures and machinery to eliminate hazards in the workplace;
- All workers are provided safety information, training and their skills are assessed before they start work; and
- The business keeps records - including all workplace issues, injury, serious near miss incidents and other records.

There are a number of checklist items that make up each of the standards. The majority of items on

the *myBMP* checklist for WHS are Level 1 – that is they are a legislative requirement.

Growers can access the *myBMP* HR and WHS module and all the supporting resources by registering online. Becoming *myBMP* certified is then optional.

Development of the updated HR and WHS module in *myBMP* was managed by John Temperley.

## Changes in responsibility

John says one of the key changes to the legislation is the introduction of the term ‘person conducting a business or

**Coming into contact with power lines can be deadly and costly, and with the increased height of the new round bale pickers, extra caution needs to be exercised.**





undertaking' (PCBU) which replaces the term 'employer', as a PCBU means not only the grower running the farm but also contract companies or any other person who is conducting business on the farm.

"Additionally the term 'worker' replaces the term 'employee' and now includes anyone doing work on the farm including employees, contractors, visitors and volunteers.

"This is particularly relevant at harvest time when many workers on the farm are contractors.

"Another important change is that some of the key responsibilities for the PCBU have increased. All PCBUs now have an obligation to provide a safe workplace, and all workers are now to be involved in workplace safety and hazard reporting."

Data from Australian Centre for Agricultural Health and Safety shows that during cotton harvest, fatalities and serious injuries and the associated events that occurred have included: electric shock from machinery coming into contact or near contact with overhead powerlines; injuries and drowning from vehicles and machinery running into irrigation channels; burns associated with picker fires; crush injury and loss of limbs associated with cotton pickers (in and under picker heads and under picker baskets) and module builders (under trampers, rear doors, and during raising and lowering of module builder doors); operator injury from pickers and tall machinery tipping; loss of limbs, fatality and burns due to explosions in farm workshops.

Growers need to also address and manage fatigue in workers. Fatigue can be a factor in many of the accidents that occur during harvest.

#### **New technology – new risks**

A fatigue management plan is important for busy times such as picking when operators work long hours for weeks on end. This is particularly important with the new 7760 round bale

### **CAMPAGNING FOR A SAFE HARVEST**

Cotton Australia is also providing information and advice to help growers, farm managers and workers in the industry to ensure a safe, efficient and smooth harvest this season. Safety and efficiency requires an understanding of:

- potential hazards, safety requirements and duty of care to workers
- industry best practice around loading and transport, particularly for modules and moving pickers
- the factors that can affect cotton quality during picking
- good farm hygiene practices, particularly with the movement of picking machinery between farms and valleys
- management of defoliant and gin trash.

*Be Harvest Ready in 2014* provides information and links to essential information and resources, on-line tools and other information – everything growers need to know for harvest.

With total industry production of around four million bales expected this year, it is anticipated demand for contract harvesters will again be high. 'Pick N Match' is a Cotton Australia program to assist in bringing growers and picking contractors together to make sure of a smooth harvest.

To download *Be Harvest Ready in 2014* and access the Pick N Match service, go to [www.cottonaustralia.com.au](http://www.cottonaustralia.com.au)

pickers as drivers now often work long hours on their own.

Other new hazards and risks grower to need to manage involving 7760s are their increased height over conventional pickers, so extra care needs to be taken with overhead power lines. The use of telehandlers to move and load round cotton modules requires new risk management as well as various mandatory levels of training and licensing of operators depending on the type of machinery being used.

"The PCBU must ensure that machinery operators have any necessary licences, have received adequate information and training, and/or are supervised, so that any risks to health and safety are minimised," John says.

"For growers still using some of the older types of machinery, especially dryland growers who plant cotton opportunistically, these older setups tend to have a greater risk of injury.

"These older setups require casual

labour which means extra management as opposed to growers using new module pickers where the operators are more likely to be permanent and experienced."

#### **Costs to business**

The cost to farm business resulting from workplace injuries is very high, not only due to the down time but also medical and legal costs.

"All serious work related injury, fatality and serious near miss incidents (notifiable incidents) must be reported to the Work Health and Safety Authority and Workers Compensation insurer immediately when there is time off work and a workers compensation claim will be made," John said.

"WHS is not rocket science, it is a doing thing.

"Keep records, do your inspections, provide inductions, ensure operators are properly trained, develop the necessary management plans and finally, have an Emergency Response Plan with personnel trained to provide first aid."

#### **JOHN TEMPERLEY SUGGESTS THE FOLLOWING TIPS FOR WORK HEALTH AND SAFETY PREPARATION ON YOUR FARM THIS HARVEST:**

1. Carry out a pre-picking inspection of machinery, making sure that all machinery is safe to use, tractor steps, handrails, seats, doors and guards are in place.
2. Carry out a safety induction for all workers involved in picking so they know the hazards and risks and how these are being managed.
3. Ensure that all tractor, boll buggy, module, picker and telehandler operators are trained in the safe use and operation of their machinery.
4. Have developed a traffic management plan for picking to prevent contact with overhead powerlines, runover of other workers, and collision with other vehicles, machinery or irrigation infrastructure (gates, drop boxes and channels).
5. Have an Emergency Response Plan developed with personnel trained to provide First Aid.

For more information, go to [www.myBMP.com.au](http://www.myBMP.com.au)

Telescopic Handler Association of Australia [www.tsha.com.au](http://www.tsha.com.au)  
NSW WorkCover

[www.workcover.nsw.gov.au](http://www.workcover.nsw.gov.au) and  
Queensland Workplace Health and Safety  
<http://tinyurl.com/k33rjtn>





# WORKING TO IMPROVE ENERGY EFFICIENCY ON IRRIGATED COTTON FARMS

**A NEW ENERGY AWARENESS CAMPAIGN AIMS TO EMPOWER GROWERS TO IMPROVE ENERGY EFFICIENCY AND REDUCE COSTS.**

**T**he *Improving Energy Efficiency on Irrigated Australian Cotton Farms* project aims to help growers cope with rising energy costs and an increasing desire to reduce greenhouse gas (GHG) emissions.

“CRDC identified the opportunity to give our growers the skills to improve their understanding of their farm’s energy use to improve on-farm efficiency,” CRDC’s Allan Williams says.

“This project aims to help growers to make informed decisions about energy efficiency as this area can be relatively



IMAGE: MELANIE JENSON

Gwydir Valley CottonInfo Regional Development Officer Alice Devlin along with the rest of the officers have been working with NCEA Energy Specialist Phil Szabo.

“Reducing energy use is often not as simple as reducing the revs in the tractor or at the pump to reduce usage.

“To simplify and bring this information to growers we have enlisted specialists from the National Centre for Engineering in Agriculture (NCEA) to provide training and specialist knowledge to the CottonInfo Regional

“The RDOs will be available to support growers in finding the best opportunities for energy saving as well as helping growers with the use of the EnergyCalc Lite application to assess energy use and also link growers to industry expertise at NCEA.

“The team from NCEA will also undertake on-farm energy assessments to identify energy use, possible cost savings and also benchmarking data the whole of industry can utilise.”

## GETTING A BETTER PICTURE

In the Southern Region, RDO Kieran O’Keefe says energy assessments have been going well, with growers finding the exercise very worthwhile. One of these was a Level 3 assessment at Gavin Dal Broi’s “Warrawest” at Griffith, on one of his bore pumps - a 310hp Hino diesel motor with three-stage pump.

While the final results aren’t in, Gavin says the assessment on his pumps has thrown up some interesting results.

“Fuel usage per megalitre was the main factor for the assessment and to find the sweet spot in the pumping rev range,” Gavin said.

“We feel that as fuel is one of our major expenses we need to have more control on its use and to have it being used to its highest efficiency in all our operations, not only pumping, but as this is the easiest to identify it has been done first.

“The NCEA guys were very professional and the assessment showed some concerning issues, with more information yet to come.

“The instant issue was of the meter reading being some 15 percent-plus off what the NCEA meters were showing, so if that would be averaged over a full season it would eventuate to 300ML per year, as the meter has been showing higher flow than what is being pumped.

“I’ve yet to get StateWater to confirm the discrepancy but that will be looked at soon.

“We hope that more farmers in the area have Level 3 assessments done as it will give an overview of the most efficient pumps and how others can get to that level.”



Grower Gavin Dal Broi “Warrawest” with NCEA’s Phil Szabo and Gary Sandell undertaking a Level 3 Assessment.

## Why study energy use in cotton?

Direct energy consumption includes water pumping, tractors, harvesters and transport. There is also indirect energy consumption through chemicals, fertilisers and capital investments.

NCEA’s specialists including Joseph Foley, Gary Sandell, and irrigation technician Phillip Szabo have been enlisted by the CRDC to provide up-to-date, in-depth knowledge and advice to growers through the CottonInfo RDOs.

“Cotton farming is energy intensive and therefore a big cost to cotton growing - which is slated to rise,” Gary Sandell says.

“Better understanding energy use will help growers control production costs and where to target savings.

“There is also an element of environmental responsibility that goes with this, in Australia’s reputation internationally as a sustainable and most efficient producer of cotton globally.

“Energy savings also makes environmental sense.”

RDOs are currently guiding growers through the easy-to-use EnergyCalc Lite program, which offers an assessment





of on-farm energy use, allowing growers to identify priority areas for improvement. The Energy and Greenhouse Gas Module of *myBMP* will also be refined to ensure it contains the most up-to-date research and information on best management practices for energy efficiency on cotton farms.

The NCEA team has also conducted Level 2 and 3 energy assessments on cotton farms in the Macquarie Valley and Southern region around Griffith.

“Through on-farm energy assessments we then have the ability to use this information to benchmark energy use,” Allan Williams says.

“Benchmarking will be used by CRDC to provide information back to growers and the industry and identify the most important areas to target in terms of improving efficiency.

“It will also inform what information is needed to keep the *myBMP* modules and information to growers through the RDOs relevant and timely.

“We are also planning to provide interested consultants with specialised energy information and training in the use of EnergyCalc Lite.”

The *Improving Energy Efficiency on Irrigated Australian Cotton Farms* project is supported by the Commonwealth Department of Industry as part of the Energy Efficiency Information Grants Program. 



## ENERGY ASSESSMENTS: WHAT THEY ENTAIL

### ■ Energy assessments quantify energy use across the enterprise

- Identify where and how efficiently energy is used
- Index of performance, Energy GJ/ha or Energy GJ/bale
- Benchmarking energy use efficiency

### ■ Highlight potential cost savings and improvements in productivity

- Focus on high input areas
- How savings can be made eg change/refinement of management practices, alternative fuel, tariff negotiation

#### Level 1 Assessment:

- Overview of whole farm
- Simple, collect energy receipts and production details
- Works well for one commodity
- Data entered into EnergyCalc
  - on-line energy assessment tool
  - Summary of whole farm energy use
  - Benchmarking information

#### Level 2 Assessment

- Itemises energy used in key processes or in individual operations, for example energy used for irrigation, planting, harvesting etc
- EnergyCalc – on-line energy assessment tool
- EnergyCalc Lite – cotton industry App

#### Level 3 Assessment

- Assessment of a specific operation
- Typically investigate large energy cost areas identified from a level 2 assessment
- Conduct detailed analysis of site / process performance
- Determine indicators for energy efficiency / performance (i.e. pump efficiency; tractive efficiency)
- Eg pump test

**IF YOU WOULD LIKE TO ARRANGE AN ASSESSMENT ON YOUR FARM, CONTACT YOUR LOCAL COTTOINFO RDO.**

# KEEPING INDUSTRY UP TO DATE ON CLIMATE KNOWLEDGE

## CLIMATE STUDY HAS BEEN ADDED TO THE COTTON PRODUCTION COURSE.

**A**s the need to understand climate and carbon policy becomes more imperative to cotton growing, so too does the need to stay abreast of the science that informs their development. The cotton industry has responded by adding climate subjects to the Cotton Production Course at The University of New England (UNE).

The new subjects will review current domestic and international climate policy settings as part of the course's Cotton and the Environment Unit. It will also convey updated findings from the Intergovernmental Panel on Climate Change (IPCC 5) which were released in October 2013.

The new curriculum is an integral part of the Extension and Outreach grant co-funded by the Federal Government and CottonInfo with the primary objective of assisting primary producers to respond to climate opportunities and risks.

The subject material has been designed by CottonInfo Carbon Technical Specialist Jon Welsh and course co-ordinator Brendan Griffiths of UNE.

### Specialist Input

Jon provides a unique perspective on compiling the subject material; 18 years primary production experience together with eight years of liaising with international and domestic climate researchers on understanding the drivers of variability and understanding key climatic indicators. He says the new course developments are great news for participants.

“Participants will receive an

introduction to climate science and how projected changes to the earth's temperature and carbon dioxide levels impact on agriculture and cropping production systems,” he said.

“It will cover the latest research identifying the major contributors to the greenhouse gas footprint of cotton production, including the importance of nitrogen fertiliser use and the role of soil carbon levels in managing environmental sustainability.

“Students will also develop an understanding of potential adaptation and mitigation strategies for cotton production under the projected changes listed in the IPCC 5 report.

“A brief overview of the Carbon Farming Initiative and the Emission Reductions Fund enables students to understand how Australian domestic carbon policy is aligned with global emissions reduction targets and the Kyoto agreement.”

### Heeding the call

The inclusion of climate-specific knowledge into the course has come about due to a request from many within the industry to have more access to this type of information and policy.

“Cotton course participants range from prospective through to experienced agronomists, farmers, and agribusiness staff, as well as undergraduate students. This subject of ‘Cotton and the Environment’ aims to provide students with an understanding of issues around climate change and policy and the Carbon Farming Initiative, as part of the curriculum,” says cotton lecturer Brendan Griffiths.

“Feedback from industry suggests many issues surrounding climate and policy are unclear, so we aim through this course to teach our up and coming industry people about these things as a matter of course.



“Climate sceptic or not, we live in a variable climate and as such it is important to explain what climate change is and outline what tools are available to measure variability.

“Providing a better understanding of climate variability and climate modelling provides us with more information about the season ahead and therefore aids planning and resource allocation, as well as risk management.

“Whether involved in dryland or irrigated cotton growing, understanding and managing climate risk is an advantage.”

### Everything climate

The climate related topics will include content on climate variability and climate risk management, with a focus on three areas; understanding the Australian climate in a global context; understanding the key drivers of climate variability; and seasonal applications to agriculture and risk management.

“Understanding the historical behaviour of the El-Niño Southern Oscillation (ENSO) is a key component of climate variability in Australia,” Jon Welsh says.

“The new chapter covers recent research on linkages between ENSO and major droughts in Eastern Australia and how temperature changes in the past 50 years have intensified these events.

“ENSO is one of a host of remote climate drivers that will be examined in this course.”

Climate drivers including the Indian Ocean Dipole, Southern Annular Mode, Madden-Julian Oscillation and the formation of East Coast Lows which impact many cotton growing regions to varying degrees over months, seasons and years to influence our rainfall.

“How and when these drivers of



## “ UNDERSTANDING AND MANAGING CLIMATE RISK GIVES AN ADVANTAGE ”

rainfall impact on grains and cotton enables students to build risk profiles for agricultural businesses and plan for extreme climatic events,” Jon said.

“A series of workshops and case studies covering a range of geographic locations also assists in gaining an appreciation of calculating rainfall reliability and sourcing historical information.

“A key learning objective of the Managing Climate Variability and Climate Risk Management chapter is interpreting regular commentary from the Commonwealth Bureau of Meteorology on changes in climatic indicators and how these changes affect the climate in cotton growing regions.

“A suite of information resources is also available to students with the

aim of providing future growers and advisors with the necessary skills and tools to understand, plan and manage extremes in climate variability.”

### CRDC's long-term vision

CRDC R&D Program Manager Allan Williams says the key learning objectives of the new content are aligned with the CRDC five-year strategic plan, particularly in productive resource efficiency.

“The introduction of climate change policy, managing climate variability and risk management content will focus on increasing the quality and accessibility of information for decision making as well as the availability of tools and technologies that facilitate more precise application of resources,” Allan said.

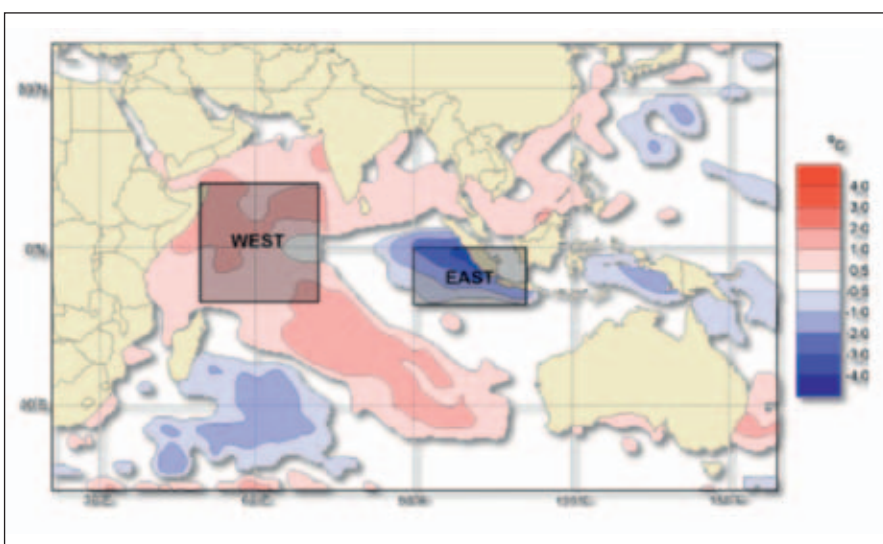
“The long term profitability of cotton farming will rely on finding innovations and strategies that allow the cotton farming system to adapt in a changing environment.

“We also believe the unique content offered in the course allows the future advisors and farmers in the cotton industry to become leaders in climate and resource risk management in Australian agriculture.”

### More information:

Enquiries on enrolments for the Graduate Certificate in Cotton Production at the University of New England or the new subjects in the *Cotton and the Environment* unit (COTT303 & 503) should contact course co-ordinator, Brendan Griffiths - [griffb@bigpond.com](mailto:griffb@bigpond.com)

**ABOVE:** Students of the UNE Cotton Production Course had a close up look at cotton production at the Gwydir Valley Irrigators Field Day in late February at “Keytah” Moree. Some of the group, pictured with course co-ordinator Brendan Griffiths were Anna Rose from Echunga in SA, Harriette Nation “Olde Moppity” Young, Isabel Davidson “Yarran” Young and Brooke McAlister of Tamworth.



Locations in the eastern and western Indian Ocean are used to measure the Indian Ocean Dipole, which is a key climate driver for Australia. The diagram shows a Positive Indian Ocean Dipole, which indicates reduced availability of convective moisture during winter and spring through South Eastern Australia which generally means drier conditions.







# CAN TREES HELP SOLVE RISING GROUNDWATER ON IRRIGATION FARMS?

TREES ON IRRIGATION FARMS SERVE MANY PURPOSES, YET ONE THAT IS NOT WELL UNDERSTOOD IS THEIR ROLE IN 'SOAKING UP' EXCESS DEEP DRAINAGE.

A new CRDC and Queensland Murray-Darling Committee (QMDC) project will evaluate the role of trees on irrigation farms in Southern Queensland. The project is led by Mark Silburn, Andrew Biggs and Jenny Foley from Queensland's Department of Natural Resources and Mines, in conjunction with the National Centre for Engineering in Agriculture.

Mark Silburn says most people accept deep drainage in paddocks and leakage from structures is problematic and has been well studied by the cotton industry in the past decade.

Mark's previous research showed deep drainage of greater than 100mm per year is 'the norm' for furrow irrigation systems. What varies is in some cases it is a lot higher, and the type of groundwater system underneath. (See Mark's deep drainage review *Crop & Pasture Science* 2013).

Fellow researcher Andrew Biggs adds that deep drainage is an economic problem, as it's already cost growers to get the water to the field, coupled with nitrous oxide leaching. Then there are environmental costs of issues such as leached nutrients, pesticides and rising groundwater, he said.

Mark Silburn says while the role of efficient water use is well appreciated, deep drainage is a natural process and occurs even in the most efficient systems.

"In this project, we hope to look at management solutions to reduce the likelihood of adverse impacts from deep drainage," Mark said.

"We already have methods to quantify if and how much groundwater trees use. From there we can estimate how many trees a farm might need to mitigate excess recharge of groundwater.

"A key focus is measuring water use of native trees primarily in the Border Rivers Catchment - poplar box, coolibah, belah and brigalow."

## Managing excess recharge

In terms of water availability, Mark says there are two types of irrigation areas. Those that overlay and use 'clean' groundwater – usually with declining water tables – and those overlaying saline groundwater that is not used. This creates a big difference in the capacity to manage excess recharge through groundwater use.

"If the water can't be used for agriculture, what other ways are there to 'consume' it?" he asks.

"In some instances, shallow water tables may naturally discharge in ways that do not cause impacts, through gradual leakage into deeper aquifers or lateral leakage.

"In other cases this doesn't occur and there is only one way for the groundwater to travel – up! Just like filling a bucket.

"The role of floods as a recharge mechanism is a topic that also requires further investigation."



DNRM's Andrew Biggs and QMDC's Paul Webb near Talwood in the Border Rivers Catchment west of Goondiwindi, QLD, where they are exploring the role of trees in alleviating the adverse effects of deep drainage on water tables supplying irrigation water.

## Combating salinity

The researchers say while only a small number of salinity problems on irrigation farms in Southern Queensland, signs are emerging of problems, particularly in the Border Rivers where groundwater is very saline and not used for irrigation, unlike the Condamine Catchment where groundwater is extensively used.

This project is part of a longer-term plan to better understand the scale of the issue and assist farmers to avoid future problems. Some investigation sites will target 'problem' areas on farms and attempt to demonstrate management options with farmers, local Landcare groups and QMDC.

Another key focus is to develop a better understanding of the impact of poor quality, saline irrigation groundwater in southern inland Queensland.

"Working in with Dr Bryce Kelly from UNSW and researchers at USQ (see article Spring 2013 *Spotlight*) the project will benchmark the extent of poor quality groundwater used on cotton farms and its impact on soils, particularly in the Condamine Catchment," CRDC R&D Manager Jane Trindall said.

## QUICKFACTS

- Deep drainage is a natural process – it even occurs under native vegetation, but can be greatly increased by irrigation. It can lead to groundwater recharge and rising water tables.
- A large tree can use hundreds of litres of water daily.
- Trees can also use saline groundwater although the degree to which native species do so is poorly understood.
- Tree water use is measured by measuring the sap-flow in the trunk using tiny needles that measure how fast a heat pulse moves through the wood.
- Whether trees use groundwater can be confirmed by studying the ratio of naturally occurring isotopes in trees, soil and groundwater.

"We should then be able to provide farmers with better decision-making framework about the costs and impact of poor quality water."







# ENHANCING AND IMPROVING SUSTAINABILITY

## THE THIRD AUSTRALIAN COTTON INDUSTRY ENVIRONMENTAL ASSESSMENT WAS UNDERTAKEN IN 2012 AND THE FINDINGS WILL HELP THE INDUSTRY TO BETTER CONVEY ITS GOOD NEWS STORY.

Since 1991, the Australian cotton industry has proactively sought independent appraisal of its environmental management and performance. This 21-year commitment to independent environmental reviews is unique among agricultural industries. With increasing demands for industries to prove their environmental credentials the cotton industry needs to continue to build on this record.

The Third Environmental Assessment identified future environ-

mental priorities for the industry and makes six specific recommendations for the industry to continue to reduce its environmental footprint.

1. Develop a five-year RD&E strategy for continuous improvement
2. Continue to improve *myBMP*
3. Improve contact databases
4. Deliver evidence based reporting of environmental performance
5. Engage in market-based initiative
6. Research how people use contemporary media

### Working group formed

In response to these recommendations, Cotton Australia (CA) and CRDC have joined forces to form the Environmental Assessment Working Group. The group includes Greg Kauter (CA), Leah Ross (CA), Allan Williams (CRDC) and Jane Trindall (CRDC) who have been working to address the recommendations.

"In particular we are focusing on addressing recommendations one and four by working towards delivering the first ever Australian Cotton Industry Sustainability Report, set to be launched at this year's Australian Cotton Conference in August," CRDC R&D Manager Jane Trindall said.

"To deliver the Australian cotton industry's first ever sustainability report, a set of sustainability indicators needs to be developed and agreed on that are relevant to a diverse range of stakeholders: cotton growers, the industry, government, the community and international brands."

The working group has initially developed a set of key environmental indicators, an important step to defining sustainability indicators for the Australian cotton industry.

In response to the recommendations of the cotton industry's Third Environmental Assessment, Cotton Australia (CA) and CRDC have joined forces to form the Environmental Assessment Working Group, at a recent meeting were CRDC R&D managers Allan Williams and Jane Trindall, CA Communications Manager Chris Larsen, CA Research Direction and Stewardship Manager Greg Kauter, *myBMP* manager Jim Wark, CA Policy Officer Leah Ross and CRDC and CottonInfo Communications Manager Ruth Redfern.

### SUSTAINABILITY REPORTING – WHY DO IT?

Internationally, nationally and locally: consumers, governments and communities are increasingly interested in the sustainability of agriculture and its products. This is often referred to as "as social licence to farm".

In response, many companies and industries are working to define, measure and report sustainability metrics. In Australia, the National Farmers' Federation, in its *Blueprint for Australian Agriculture 2013-2020* has a high priority goal – "Improve and promote the agricultural industry's environmental sustainability". One of the strategies identified is to develop sustainability indicators linked to whole of industry (all of agriculture).





## Sustainability indicators

Sustainability indicators consist of economic, social and environmental indicators, and as such the next step for the group is to complete the industry's set of sustainability indicators by including economic and social indicators. Once the indicators are shortlisted and endorsed the group is well on the way to being able to report the Australian Cotton Industry's Sustainability scorecard in August.

A comprehensive inventory of potential indicators was developed by consultant Guy Roth in 2010, which compiled data from a wide suite of published and unpublished research; and monitoring data sets to provide and overall picture of the sustainability trends of the Australian cotton industry.

"This set of indicators was assessed and updated by the working group, taking into account international supply chain sustainability initiatives (Better Cotton Initiative, Cotton LEADS, and the Social, Environmental and Economic Performance of Cotton Production (SEEP) Panel) with consideration of national initiatives (Dairy Sustainability Initiative, Department of Agriculture Ecosystem Services research, National Environmental Accounts research and CSIRO's Agro Ecosystem Health research) as the basis for shortlisting indicators," Jane said.

The environmental indicators were selected using an objective ranking system which scored indicators against six selection criteria focussed on two key issues.

- Relevance (or materiality) - to cotton and external stakeholders including market, government,

## A "SUSTAINABLE AUSTRALIA"

Last year the Australian Government released the Sustainable Australia Report which provides information and analysis on key trends and emerging issues for Australia's sustainability. It reports against a set of sustainability indicators covering social and human, natural and economic factors.

Notably, at its 2013 annual Plenary Meeting, the International Cotton Advisory Committee (ICAC) received a report from its Expert Panel of SEEP, *Measuring sustainability in cotton farming systems: Towards a guidance framework*.

CRDC Program Manager Allan Williams chairs the SEEP panel and says it provided recommendations about the indicators that should be used to measure sustainability in cotton production at the global level.

"The recommended indicators cover the three pillars of sustainability: social, environmental, and economic," he said.

"There was a consensus among Plenary Meeting participants that any framework for measuring sustainability needs to be implemented on a country-by-country basis, and that committees should be formed in each country to create the initial framework of metrics and to ensure that the framework is updated as production practices evolve."

## TOOLS FOR SUSTAINABILITY

The downstream cotton supply chain – in particular retailers and brands - are developing tools to assess the sustainability performance of the range of raw materials used to make their products, including cotton growing.

Allan said these tools are also going to be used to track (anticipated) improvement over time in the environmental footprint of the products being sold by the participating retailers. The tools: the Clothing Footprint Calculator of the Waste and Resource Action Plan (WRAP) in the UK, the Higg Index of the Sustainable Apparel Coalition (SAC) from California and the Environmental Benchmark for Fibres from Made-By in the Netherlands, use production data to generate raw material scores, which are then taken into account in product development and design decisions.

"The opportunity exists for improvements in scores for cotton as a raw material (for example through adoption of improved practices that lower the environmental impact) to be one of the options available to the users of these tools to demonstrate their improved environmental impact," Allan said.

community; and

- Data collection – cost-effectiveness, technical difficulty, usefulness, accuracy.

The following environmental indicators were ranked as high priority for the cotton industry:

1. Soil health (soil carbon, nitrogen

use efficiency, sodicity)

2. Water use efficiency (bales/ML)
3. Groundwater (levels and quality)
4. Riparian (area, condition and erosion)
5. Stewardship (chemical use and IPM)
6. Energy use (bales/kJ)
7. Biodiversity (area and condition)
8. Water quality (rivers)
9. Weeds (density and distribution)
10. Genetic modification (resistance)
11. Disease

To enable the cotton industry to report and communicate its environmental credentials there is some important information to put these environmental indicators into context.

1. Total area - of cotton farms, cotton planted, irrigated hectares,
2. Yield - and quality
3. GM - area planted by trait, percentage of industry using GM technology
4. *myBMP* - practice change, percentage of certified bales shipped, number of farms participating and certified.

*myBMP* was identified as a critical platform to measure on-farm practice change (and eventually for environmental performance) to demonstrate continuous environmental performance by the Australian cotton industry.



## SUSTAINABILITY REPORTING – WHAT ARE WE DOING?

Cotton Australia's Greg Kauter says the industry has the foundation for its own system.

"We've had BMP since 1996 and we believe that is has been the catalyst for significant practise change on cotton farms," Greg said.

"Now we need to utilise this to verify the improved environmental performance on our farms.

"The existence of robust data would allow the industry to engage with the organisations maintaining these tools, and ultimately the users of the tools – the retailers and brands."

As well as ensuring that the approach used to assess the sustainability of cotton is reasonable and fairly reflects its environmental impacts, Greg says it would also provide another avenue for Australia to promote the credentials of its cotton.

The industry has established a partnership with the US cotton industry under the Cotton LEADS Program (see article next page) and is currently pursuing a partnership with the Better Cotton Initiative.

*myBMP* General Manager Jim Wark told *Spotlight* that in an effort to better position *myBMP* and achieve recognition for sustainably produced Australian cotton, the Australian industry is exploring the value of participating in global sustainability marketing initiatives.

"Both programs require ongoing performance reporting against key criteria.

"To demonstrate our environmental credentials Cotton Australia and CRDC will utilise the Australian Government Innovation Grant to add value to *myBMP* by enabling it to provide evidence on our key environmental indicators."



# WHY COTTON TO MARKET IS THE FUTURE FOR OUR INDUSTRY



**COTTON AUSTRALIA IS THE PEAK REPRESENTATIVE BODY FOR THE**

**AUSTRALIAN COTTON GROWING INDUSTRY. CEO ADAM KAY EXPLAINS HOW A NEW INITIATIVE PLACES AUSTRALIAN COTTON MORE EFFECTIVELY AROUND THE WORLD.**

**L**ate last year Cotton Australia and its international partners, including Cotton Incorporated, launched the Cotton LEADS initiative, a program that emphasises the responsible growing practices of cotton farmers in Australia and the US.

In the few short months since its launch, Cotton LEADS has made incredible progress, with more than 100 textile companies formally acknowledging the merits of cotton produced within the program and including it within their sustainable sourcing guidelines.

The organisations signed up to Cotton LEADS are suppliers to some of the world's most recognisable apparel brands, and include Fruit of the Loom; Brooks Brothers; Central Textiles; Tuscarora Yarns; Mount Vernon Mills; and the Esquel Group.

Cotton Australia is tremendously pleased with the progress of this important program, which has gathered support even more quickly than we had dared hope at the beginning of the campaign. However, with such a strong showing in a very short time we anticipate more companies and brands will sign on and specify Cotton LEADS cotton, which is very good news for cotton growers in Australia and the US.

## **Continuous improvement**

Cotton LEADS is committed to continuous improvement in farm production practices, environmental stewardship and the dissemination of best practices information broadly throughout the



**ABOVE:**  
**Committed to a sustainable future:**  
**J. Berrye Worsham of Cotton Incorporated and Cotton Australia CEO Adam Kay signing off on the Cotton LEADS partnership at the launch in Hong Kong.**

## **WHAT IS COTTON LEADS?**

Cotton LEADS™ is a joint program of the Australian and United States cotton industries and is a project of The Cotton Foundation. Its founding members are Cotton Australia, the National Cotton Council of America, Cotton Council International and Cotton Incorporated. The program is designed to raise awareness of the responsible growing practices and commitment to continuous improvement among cotton producers in the member countries. More information on Cotton LEADS can be found at: [www.cottonleads.org](http://www.cottonleads.org) Signatories to Cotton LEADS include some of the largest textile companies in the world, and includes:

### **USA**

Fruit of the Loom  
Brooks Brothers  
Contempora Fabrics  
Pickett Hosiery  
Frontier Spinning  
Mount Vernon Mills  
Carolinas Cotton Growers Cooperative  
Tuscarora Yarns  
Springs Creative Products Group

### **TAIWAN**

Tah Tong Textile Company, Ltd. (Taiwan)

### **EUROPE**

Hermann Buhler AG (Switzerland)  
IMAP Export S.p.A. (Italy)  
Vincenzo Zucchi S.p.A. (Italy)

### **CHINA/HONG KONG**

Huafang Co. Ltd.  
Yixing Lucky Textiles  
Datsun Weaving Factory Ltd.  
Jasonwood Jeans Corp., Ltd.  
Shijiazhuang Changshan Textile Co., Ltd.  
Shanghai Imagine Home Textiles Co., Ltd.  
Ningbo Peacebird Men's Wear Co., Ltd.  
Shandong Huale New Materials Science And Technology Co., Ltd.  
TexHong Textiles  
Esquel Group  
Nice Dyeing Company  
Central Textiles (H.K.) Ltd.  
Shenzhen PurCotton Technology, Co. Ltd.  
Central Textiles (H.K.) Ltd.  
Ibena Shanghai Technical Textiles Co., Ltd.  
Shanghai Konglong Textile Ornaments Co., Ltd.  
Jihua 3542 Textile Co., Ltd.  
Foshan Seazon Textile and Garment Co. Ltd.  
Dongguan Kefang Textile Co., Ltd.





world's cotton producing countries.

The Cotton LEADS program emphasises the environmental gains achieved at a national level within the two current member nations, as well as the national oversight and national capabilities of the cotton industries in the US and Australia.

Cotton LEADS helps fill a supply gap in the world market for responsibly produced cotton. Combined, the production from Cotton LEADS countries accounts for roughly 17 percent of global cotton production.

But this initiative is not the only program Cotton Australia is using to take Aussie cotton to the world - Cotton LEADS complements our participation in the Better Cotton Initiative (BCI) and our home-grown stewardship program, *myBMP*.

### Future of the industry

Together, they are 'Cotton To Market', an initiative that joins these three important programs – and allies Cotton Australia with other organisations including CRDC and Australian Cotton Shippers Association (ACSA) - in order to place Australian cotton more effectively around the world.

We believe Cotton To Market is the future for our industry. Why?

Because even though cotton is the number one natural fibre in the world, its market share has declined in the global fibre market over the past decade. Part of that decline has been due to economic factors – pricing of cotton against synthetic fibres is a key determinant of our market share.

But there are other factors at play here.

### Understanding customer demands

When we think about our cotton, we don't always think about the end product. But global brands and big manufacturers certainly do.

In recent years, global brands have been demanding – and specifying – that the fibres they use be from responsible sources, and sustainable. That demand goes right back through the supply chain, and impacts how we – as cotton growers – are able to compete in the world market.

In this regard, the Australian and US cotton industries have great stories to tell. We produce high-quality, strong fibre – responsibly. Our growers are good stewards of the land. We invest



### BETTER COTTON INITIATIVE

As this edition of *Spotlight* went to press, Cotton Australia - which is a member of the Better Cotton Initiative (BCI) – had been conducting meetings with BCI, working to harmonise standards and practices between BCI and *myBMP*, Australia's own best management practice system.

Discussions are proceeding well and Cotton Australia hopes that, by the end of the year's first quarter, common standards can be aligned and a mutually beneficial agreement agreed upon. If successful, this would allow certified *myBMP* cotton to be incorporated within BCI's global supply chain.

heavily in research and development and – in partnership with CRDC - apply those lessons well. We are committed to continuous improvement, not just in efficiency but also in environmental standards.

We have a powerful message about leadership in cotton production worldwide.

Cotton To Market – with its individual, complementary components – is how we tell that great story to the world, how we build the brand of Australian cotton in years to come. But this program is not about competing against other countries. We are competing against other fibres, particularly synthetics. Manufacturers of synthetic

fibres are constantly changing their brand images to grow market share. Cotton To Market is our response.

Together with our Australian and US allies, we will help improve the overall level and standards of world cotton production.

The Cotton To Market program is already working. The swift adoption of the Cotton LEADS program is not the only proof of that, but it does underline the strong global demand for cotton that is recognised as responsibly produced.

With the support of our partners, we are pushing Australian cotton to new markets in ways like never before, particularly to vital Asian economies.

Stay tuned for more news about Cotton To Market – this is a long-term investment in the health of our industry, and there are plenty of exciting opportunities yet to be realised.



**“ TOGETHER WITH OUR AUSTRALIAN AND US ALLIES, WE WILL HELP IMPROVE THE OVERALL LEVEL AND STANDARDS OF WORLD COTTON PRODUCTION.”**