Controlling your weeds:

Cotton growers share their on-farm weed control strategies

The increasing incidence of weeds that cannot be controlled with glyphosate is forcing a rethink on the range and diversity of weed management tactics used in cotton - with growers having to integrate a wider range of management tools.

The CottonInfo REOs recently went on farm with cotton growers to investigate how they are managing the threat of resistant weeds.

Darling Downs

Growers	Ross and Ingrid Uebergang David and Margot Uebergang Uebergang Agriculture
Cropping area	Total hectares: 1100 ha. Cotton: 400 ha irrigated
Soil type	Clay loam, brigalow belah, deep cracking self-mulching clays
Rotations	Three-year rotation: cotton (summer); covercrop back into cotton (winter, then summer); barley or wheat (winter); fallow (summer and winter); and cotton (summer)

Ross, Ingrid, David and Margot Uebergang have been growing cotton for 27 years at Miles on the Darling Downs.

They combat a series of weeds each year, in both their cotton and winter crops, including fleabane, feathertop Rhodes grass, barnyard grass, liverseed grass, bladder ketmia, black pigweed, caustic creeper, caltrop, volunteer cotton, milk thistle, fireweed, black oats and phalaris. Bellvine is an emerging problem on the farm, one Ross Uebergang suspects may become a larger problem down the track.

The Uebergang's are yet to do any resistance testing – something Ross hopes to implement this season – but suspect they may have resistant grass weeds.

As a result, they have implemented a whole-of-farm approach to integrated weed management, involving multiple weed-control tactics.

"If you keep relying on one tactic no matter what it is, a problem is going to arise," said Ross.

"We are trying to manage resistance and also the buildup of problem weed seeds. If we don't, resistant or hard-to-kill weeds will bring the whole farming system unstuck.

"For us, grasses are the main problem. We have Barnyard grass and feathertop Rhodes grass and we're unsure if they're resistant or just hard to kill," he said.

Ross doesn't rely on glyphosate: his approach includes pre-plant residuals, pre-emergent knock downs, and 'laybys' (residual herbicides used to control weeds in-crop), plus non-herbicide tactics including cultivations and spot chipping.

"Our current strategy is to apply a residual six-weeks prior to cotton planting and then to pre-irrigate to allow the volunteers and other hard-to-kill weeds to emerge.

"We follow this with pre- and post-planting knockdowns which include gramoxone (Group L). In crop, we apply two Group M's (glyphosate) and a Group A to target feathertop Rhodes grass and will also apply in-crop residual chemicals with shield spray in problem fields.

"After picking, we mulch and rootcut and then do heavy tillage passes to remove ratoon cotton and compaction and then the system starts again.

"For fields going into fallow, a layby is applied immediately post winter harvest, keeping fields clean for first flush of spring grasses," said Ross.

"We review our practices every year. Pre-season and post-season we have a meeting with our consultant, Tim Richards of MCA, to review our strategy.

"This is where we work out our rotations and fields, highlight problem areas and develop our residual program. We have a whole farm approach, but treat fields separately due to different weed spectrum and soil types.

"This is our third season of implementing this weed control program and it has really streamlined the whole operation of growing the crop, resulting in greater timeliness of operations which equates to better yields," he said.

Tim Richards of MCA says a successful integrated weed management system means taking a long-term approach.

"If a grower is looking further ahead than just this season and is willing to commit to a rotation, then it is easy to implement an integrated weed management system like this one. The spin-off benefit of such a system is superior operational timeliness, as we have – and are adhering to – a plan," Tim said.

Pictured: Ross Uebergang, Jess Mickelborough and Tim Richards.

Macintyre

Growers	Tom & Charm Arnott
Cropping area	Total hectares: 1400 ha. Cotton: 1400 ha irrigated
Soil type	Black clay Vertosol
Rotations	Two-year rotation: cotton (summer); double crop winter cereal or chickpeas (winter); long fallow (summer and winter); cotton (summer).

Tom and Charm Arnott have been growing cotton on 'Fairfield' at Boggabilla for 24 years.

They encounter a wide range of weeds in their farming operations: peachvine, barnyard grass, chinese lantern, feathertop Rhodes grass, fleabane, sesbania, climbing bellvine, pigweed, milkthistle, turnip and native vetch. Tom finds climbing bellvine a particular challenge in cotton, as once it is in the crop it is difficult to control, wrapping around the cotton and causing issues at harvest.

Tom is working with consultant Tony Taylor to implement an integrated weeds management strategy.

"Resistance in weeds is already impacting on our business. We have seen how quick it can get away and it can be hard to get back. There's also a cost associated with trying to get back," Tom said.

"As a result, Tony and I are mapping out a strategy to combat resistance. It's our first year, so it's very much a work in progress. To date, I have relied on an over the top glyphosate application and a light cultivation for weed control. We've learnt that spraying when the plants are too big doesn't work – you have to get in when they're small.

"We are now implementing a residual program, which will involve using selective pre-emergents at planting to target hard-to-kill weeds on a field-by-field basis.

"We will then use a mix of glyphosate in a double-knock approach, and conduct a more aggressive cultivation with discs and knives to cultivate closer to the plant line.

"We'll also apply a broadleaf 'layby' (a residual herbicide used to control weeds in-crop) to all fields to control late weeds coming through.

"We also chip weeds: particularly in the school holidays, with the whole family doing their bit. I always have a hoe in the ute!"

Tom found the recent CRDC, CottonInfo and ICAN weed management workshops useful in learning strategies to control glyphosate-resistant weeds.

"There was plenty of information, and a lot of experience among the growers in the group. It was good to kick around ideas and talk to the agronomists," Tom said.

Pictured: Tony Taylor, Taylor Ag Consultancy and Tom Arnott "Fairfield" Boggabilla

Border Rivers/Mungindi

Grower	Tristram Herstlet
Cropping area	Total hectares: 19,200 ha. Cotton: 6,700 ha irrigated (dryland when possible)
Soil type	Grey vertosol and red earth.
Rotations	Two-year rotation: cotton (summer); double crop winter cereal (winter); long fallow (summer and winter); cotton (summer).

Tristram Herstlet has been growing cotton on Reardon Farms at Talwood for 7 years.

He is faced with a series of weeds each season, including barnyard grass, fleabane, milk thistle, red pig weed, peachvine, feathertop Rhodes grass, bathurst burrs, black oats, phalaris and turnip weed – two of which are resistant: barnyard grass (resistant to Group M herbicides – glyphosate); and black oats (resistant to Group A).

Tristram expects to have additional problems with resistance in the future, particularly with feathertop Rhodes grass and glyphosate.

To manage the existing and potential future resistance threats, Tristram has implemented an integrated approach to weed management, in collaboration with consultant Michael Brosnan of B&W Rural at Mungindi.

“We regularly discuss our weeds management program with our agronomist. By the time we plant cotton, we have a program in place and know what we want to do,” Tristram said.

“Our strategy is threefold: to minimise future resistance, prolong the use life of each herbicide, and avoid the problem of weed shifts.

“We do this by having different tactics, such as rotating our chemical groups, cultivation, crop rotation and farm hygiene. We are well aware of the dire consequences of having multiple grass and broadleaf weeds resistant to glyphosate – and we are currently managing two cases of resistance, in barnyard grass and black oats,” Tristram said.

Tristram takes a holistic approach to integrated weed management.

“We use control methods at a whole farm level, at a management unit level, down to an individual field basis. And we apply as many options as possible to try and control the weeds that are resistant, and prevent further resistance developing,” Tristram said.

Pictured: Tristram Herstlet, Reardon Farms and Michael Brosnan B&W Rural

"We use a Group L treatment instead of glyphosate (Group M) to give the field a break. More recently, we are using a Group K as a post-plant, pre-emergent in cotton. We intend to follow this with cultivation. We haven't felt that we've needed a layby (a residual herbicide used to control weeds in-crop) as the other control methods are currently working.

"We also have a range of other tactics. All of our contractors are required to have clean gear when they come on farm. We practice Come Clean Go Clean primarily for disease protection, but an added benefit is weed management.

"We also use chippers, predominately in non-crop areas, but also in-crop if necessary, such as if fleabane has become an issue. We try to keep everything spotless, as the fewer the weeds, the fewer the seeds for next year."

Tristram believes the future of weed management lies in robotics and microwave technology.

"We have a camera spray system that we use on dryland areas, which we purchased in 2016. The driver behind the purchase was the ability to spray the dryland fallow area when cotton is in, and the ability to put on higher rates of chemical to kill fleabane without using a hormone," Tristram said.

"The system was a serious investment - a total of $640,000, including a tractor, sprayer and boom - but we're spraying at the moment and it costs only $5 per hectare with this new system, versus $11.60 per hectare with a full boom.

"Based on this, we're saving around $2,000 per day in chemical with the new system. Most importantly, we're really happy with the results: the cameras work on the chlorophyll in the plants, and the results are fantastic: we're getting a good weed kill," he said.

Namoi

Growers	Darren and Leanne Eather
Cropping area	Total hectares: 3,000 ha. Cotton: 400 ha irrigated and 300 ha dryland
Soil type	Vary from deep black soils to river loams and some hard setting soils
Rotations	Two-year rotation: Irrigated - cotton (summer); wheat (winter); long fallow (summer and winter); cotton (summer) Dryland – Cotton (summer); chickpeas, canola, wheat (winter); long fallow (summer and winter); cotton (summer)

Darren and Leanne Eather have been growing cotton east of Narrabri for some 20 years.

Darren encounters a range of weeds each season, particularly fleabane, windmill grass, liverseed, barnyard grass, turnip, milk thistle and volunteer cotton.

Darren's approach to weed management varies between his irrigated and dryland cotton, and is tailored field by field and crop by crop.

In his dryland crop, he strategically uses rotations to control weeds, along with different chemical modes of action. He applies a pre-plant residual herbicide, followed by an at-plant residual and glyphosate as a pre-emergent knock down.

"For grass control, Group D chemicals were our preferred option in order to rotate chemistries. However, we've found that windmill grass in particular is not consistently controlled and we get some escapees, which is why we've moved towards Group A's as an alternative. We're finding it is providing good control," Darren said.

In his irrigated country, he combines cultivations with two or three applications of post-emergent glyphosate. He aims to meet with his consultant each year following picking to discuss his approach.

Darren tends not to apply a layby residual, due to the long-lasting effects and subsequent reduction of options.

He believes weed control in non-crop areas of his farm is very important, and actively manages this.

"We purchased a farm around a decade ago where we had a very serious issue with black oat and black bindweed," Darren said.

"As a result, we were unable to grow chickpeas on that farm. Now, 10 years later, with a good strategy of weed control and selective crop selection we have controlled the weeds in our system to the stage where we can now grow chickpeas," he said.

Pictured: Darren Eather

Macquarie

Grower	Ben Thomas
Cropping area	Total hectares: 6000 ha. Cotton: 1500 ha irrigated
Soil type	Cracking clay
Rotations	Two-year rotation: cotton (summer); winter cereal or legume (winter); long fallow (summer and winter); cotton (summer)

Ben Thomas has been growing cotton for 15 years across three properties, two irrigated and one broadacre, at Warren in the Macquarie.

The most common weeds found on Ben's properties are fleabane, windmill grass, barnyard grass, sow thistle, turnip weed and ryegrass. Fleabane and windmill grass are the biggest challenges at present, with Ben expecting ryegrass, sow thistle, barnyard grass and feathertop Rhodes grass to emerge as issues in the future.

The threat of resistance is a core reason why Ben has an integrated management plan in place, developed with consultant Andrew Cooper of Landmark.

Ben's approach is to control weeds in his irrigated cotton through a range of tactics: pre-emergent knock downs, post-emergent herbicide applications, layby residuals and cultivations. Chipping is used if required.

The pre-emergents and laybys are used sparingly, as high disease levels and cold temperatures can lead to a slow start for the cotton, and he does not want to put any additional stress on the plant.

He calculates that the cost for controlling weeds ranges from $50-$80 per hectare across his fallow, broadacre and irrigation country.

Through CottonInfo, Ben has tested for resistance in fleabane, ryegrass and other weeds.

Pictured: Ben Thomas

Murrumbidgee

Growers	Matt and James Toscan
Cropping area	Total hectares: 4,200 ha. Cotton: 1,100 ha irrigated
Soil type	Majority Grey/brown self-mulching clay with some Transitional Red brown earth
Rotations	Two-year rotation: cotton (summer); durum wheat (winter); fallow (summer and winter); cotton (summer)

Matt and James Toscan have been growing cotton for seven years at Darlington Point in the Murrumbidgee.

The primary weeds encountered on their farm are barnyard grass, blackberry nightshade, sowthistle, fleabane, annual ryegrass and thistles.

Matt and James have tested barnyard grass, sowthistle and ryegrass for resistance over recent years. The barnyard grass and sowthistle were found to be susceptible to glyphosate (Group M), while the ryegrass was found to be resistant to by glyphosate and Group A herbicides.

To counter the threat of further incursion and resistance, Matt and James have an integrated weed management strategy (IWM) that is developed over the full course of the year, in close consultation with a crop consultant. The summer crop program is decided in July-August, and the winter crop program in March-April.

“We recognise that weed resistance is a threat to the long-term cropping viability of intensive irrigation areas, which is why an integrated weed management approach is so important to us,” said Matt.

“There are no new herbicides, so we need to preserve our chemical options by making use of non-chemical control tactics.

“Weed control in cotton will never be as easy as it is right now, while we are a new area and can rely on glyphosate for summer weed control. Being so easy and effective is both a strength and a weakness in the current weed control system. We need to think long term and use multiple tactics.”

The Toscan’s take a whole farm approach to management of weeds, with particular attention paid to non-cropped areas, such as the sides of fields, channels, roadways, drains and bankless channels.

Their IWM strategy involves a range of control measures, including pre- and at-plant residuals, pre-emergent knock downs, post-emergent herbicide applications and chipping, particularly for ryegrass and milk thistle. The pre-emergents are used sparingly, due to the possible cold conditions at the start of the crop.

Not all control measures have worked, so the strategy has evolved over time.

“We’ve learnt that spraying in less than ideal conditions can result in spray application failures – like spraying barnyard grass when it is too hot. Timing of applications is critical: there can be advantages re timing with aerial application,” James said.

Pictured: Matt Toscan.