



on the 2019-20 cotton season: A survey of consultants





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PURPOSE

The Cotton Research and Development Corporation (CRDC) commissions this survey each year to provide current and longitudinal knowledge of on-farm practices and attitudes, to aid the research, development and extension effort within the Australian cotton industry.

COVERAGE

Data was collected by Crop Consultants Australia Inc. (CCA) from 55 cotton consultants, who answered most or all of the questions about their own practices and attitudes, as well as those of their grower clients.

The consultants represented 194 cotton growers and covered 38,314 hectares: 64% of the Australia cotton production area for the 2019-20 season (not adjusted for row spacing). This is based on the 2019-20 production figure of 59,733 hectares (Cotton Australia). It should be noted that due to drought, this season was the lowest Australian cotton production in 40 years.

METHODOLOGY

The survey consisted of 59 quantitative and qualitative questions, which sought to draw out both the details of actual agronomic practices and consultants' views of those practices. It was conducted from July to August 2020, with questions referring to the 2019-20 cotton season. Questions that collected data on clients or areas were only made available to one participant from a consultancy to avoid duplication.

DATA COLLATION

The online Cvent survey program (www.cvent.com) was used to compile the data. Interpretations are up to the user. An asterisk indicates questions that are recurrent over time to identify trends.

ACKNOWLEDGMENT

Thank you to the consultants who took the time and effort to complete this survey. The data in this survey provides valuable information for researchers and industry organisations in planning and carrying out projects. Thank you to Crop Consultants Australia and Black Canvas graphic design for the compilation of this report.

DISCLAIMER

The Cotton Research and Development Corporation (CRDC) provides the information in this publication to assist understanding of the agronomic performance of the Australian cotton industry. CRDC accepts no responsibility or liability for the accuracy or currency of the information contained in this publication, nor for any loss or damage caused by reliance on the information and management approaches surveyed. While the 2019-20 survey contains information that should be of value to extension officers and researchers in defining future industry needs and as an information source in seeking to improve industry management practices, users of this publication must form their own judgement about the information it contains.

Crop Consultants Australia took all care in the gathering and collating of the data; however, the data was provided by individual consultants and agronomists and therefore is subject to associated constraints.



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ABOUT THE CONSULTANTS

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Are you completing the survey on behalf of the business or business unit?*

55 respondents

Note 38 consultants completed the survey on behalf of their business or business unit, which involved completing the specific questions relating to staff, hectares and number of clients. 17 consultants completed the survey questions only relating to individual practices and attitudes.

Which of the following best describes your employment as a consultant?*

54 respondents

(2

PRIMARY BUSINESS PERSON COMPLETING SURVEY





3

For how many seasons have you worked consulting in cotton?*

54 respondents

Number of consultants

Number of consultants

NUMBER OF SEASONS CONSULTING IN COTTON



4

Please list out any learnings or lessons that you have from experiencing the drought in the 2019-20 season.

46 respondents

There's not a lot we can do without moisture/water.

Need diversification so not all of our income is from direct agronomic consulting.

Whole of farm water use was extremely high. 15.2ML/ha due to pumping bore water early and storing bore water in large storages. Also, using a large channel system for a small area. All of this was

compounded by the small crop area. Applied water was 12ML/ha at the head ditch.

The flexibility cotton provides growers and consultants in a range of different circumstances and how adaptable and drought tolerant the crop can be under certain management.

Make the most of the quiet work and learn a new skill or upgrade the skills you have.

Quality stubble cover is an essential part of dryland cotton production and shouldn't be overlooked when deciding to grow cotton.

Pre irrigation potentially put up the overall water usage.

Early insect pressure is a lot greater in this situation.

Importance of accurate water budgeting/monitoring and managing crop to suit water availability.

Confirmation that the weather is the main culprit for the variance of yield.

Knowledge of infield soil moisture essential.

Never underestimate water loss due to evaporation. Pushing planting window later and allowing to fill bolls in cooler period.

It was a cold start, it was hot and dry through the flowering period and the last 3 months were wet and cold which all the made growing and finishing the cotton crop difficult.

Managing water availability was hard for all crops.

Saving money is key.

Spread risk when marketing.

No cotton.

Always have some put away for the tough times.

Balanced nutrition still very important.

Manipulate planting and irrigation timing based on water available.

If your business cannot survive a drought then you don't have a business.

Farmer, consultants and resellers still do not work well enough together.

Nil. All cotton was irrigation. The cool weather in February had the biggest impact.

I actually didn't see a lot of cotton this season as all of ours was in Condamine and the Downs. We need water!!

The varietal difference of winter cereals when in low rainfall years.

Be careful of herbicide residual due to lack of breakdown when extremely dry.

The usefulness of optical spot spraying tech has been important in keeping fallows clean and costs down in the last 3 years of drought.

Try to be positive!

Water budgets are key!

Water is everything.

Don't plant more ha than you can supply at least 7 meg for.

The importance of stubble cover in comparison to no cover.

The southern valleys suffered a very cool start and cool finish to the season. This was on top of very low area plantings mainly on bore water. With low yields and poor quality it was a harsh lesson in what the south can provide in 1/10 years.

Water use at the beginning of the season and for anyone who dared water cereals in 2019 spring was very high with the dry conditions.

Watering up before mid-October is key.

Don't underestimate how dry the topsoil is - plan for irrigation flush after very dry pre-season conditions.

Contain spending. Be supportive of clients' emotional needs. Importance of stubble cover. Role of Weedits to keep costs down and slow the development of resistance. Make hay while the sun shines, or rather when there is plenty of water. Managing expenses is more important than ever. Diversify income sources if possible. The mental toll on agronomists and growers was extremely high. Once again earliness was king. Final irrigation mid-March where we were chasing top bolls gave us more mic issues and a lot of picker compaction. Need to get the crop from seed to flower fast as possible. The importance of irrigation scheduling in dry years. Droughted crops are also checked different to a fully irrigated crop. It is important to be on the same page as the grower at all times. It never rains when you really need it to. Adapt and overcome Utilise the most moisture efficient crops and practices you can. Tough season. Cover important. Weed populations. Did not grow cotton 2019-20. Very happy with single skip irrigated cotton. 6 irrigations. Be conservative. Improved water use efficiency. Difficulty getting a response from Pix applications. Impact of subsoil constraints in tough seasons. Importance of getting defoliation and picking completed in a timely manner. Impact of reduced solar radiation. No two are the same! We expected high insect pressure and it wasn't, high heat years usually equate to high yields, again it didn't! Limited rainfall, no water, no income for all parties. Only plant on good moisture profile. Make the most of changes in the weather. Worst drought I have experienced thus far. Keep overheads and gearing low and in the land of droughts and flooding rains, keep tightening the belt until there is a break in the season. There are no easy answers to surviving or preparing for droughts of this magnitude, but you need to remain very mindful that they can and do happen. Water budgeting must be completed with a higher level of certainty than in normal years to lower risk. Cost management is extremely important in drought years. Consultants and agricultural contractors need access to FMD's or 5 year tax averaging the same as farmers so as to remain viable during the drought years. Considering the current Covid 19 issue this should be made available to all businesses so that you can prepare for the next drought or pandemic. Insufficient rainfall to provide any cotton plantings in the 19-20 season.

ABOUT THE CLIENTS

Q



6

5

How many cotton clients did the business (or business unit) service in 2019-20?*

38 respondents

Note A total of 194 clients were represented in the survey.

CLIENTS SERVICED PER BUSINESS



LOCATION OF CLIENTS



Number of clients

7

In which region/s are your cotton clients based?*

36 respondents

Note Some consultants have clients in more than one region, hence the total number of consultants is higher than the 36 respondents across the regions.

Region (Number of consultants)

Other: Barkley Tablelands, Northern Territory and Western Downs.





COVERAGE



10

In which region/s are the irrigated cotton hectares of your clients situated?* 37 respondents

IRRIGATED COTTON HECTARES BY REGION



Number of hectares / Percentage of total irrigated cotton area per region

1

In which region/s are the dryland cotton hectares of your clients situated?*

Region (Number of consultants)

25 respondents

DRYLAND COTTON HECTARES BY REGION



12

On average, what proportion of your recommendations do you think your clients follow?

54 respondents

TYPE OF ADVICE GIVEN TO CLIENTS



Do not give advice on this area
 Do give advice on this area

Number of consultants

PROPORTION OF RECOMMENDATIONS FOLLOWED BY CLIENTS

New technology	15%	5		15%		55%			5%	10%
Energy efficiency		2	27%		27%		27%	<mark>0%</mark>	19	9%
Farming system/rotations	8%	0 <mark>%</mark>		43%	b		31%		189	%
Spray application	8%	<mark>2%</mark>	13%		44%			3	3%	
Soil/nutrition management	8%	0 <mark>%</mark>	15%		42%			35	%	
Plant growth	8%	0 <mark>% 8</mark> '	%	1	36%			48%		
Irrigation management	8%	2%	10%		45%			35	%	
Farm hygiene	1	4%	<mark>2%</mark>		45%		25	%		14%
Disease management	8%	0 <mark>%</mark>	2	5%	31%			36	5%	
Weed management	6%	<mark>0%</mark> '	16%		35%			43%	6	
Pest management - other	9%	0 <mark>%</mark>	9%	23%			59%			
Pest management - product choice	8%	2 <mark>%</mark>	<mark>4</mark> %	21%			65%			
Pest management - when to spray	8%	0% <mark>2</mark> %	6	33%			579	%		

Not specified

Percentage advice followed

2019-20 SEASON

13

Describe the 2019-20 cotton season in THREE words or less.*

54 respondents

Note This was an open question. Please see the appendix for full individual responses. Cold Small Quiet Hot Dry Variable Wet Cool Tough Challenging

PLANTING



Number of hectares

Number of consultants

15

16

Select the reason/s why

multiple as required):*

31 respondents

replants were required (select

Other responses included: Other

responses included: excessive rain, waterlogged at planting before

water to replant, so dry soils wouldn't wet up on some slopes, soil crusting.

seedlings had emerged, hail, no

Of the dryland cotton hectares, how many were planted once, planted twice or more than twice?*

20 respondents

PLANTING OF DRYLAND HECTARES

PLANTING OF IRRIGATED HECTARES



Number of times planted



Reasons for replant

REASONS FOR REPLANTS

FARMING SYSTEM

17

Of your irrigated cotton hectares, how widespread in 2019–20 was the use of reduced tillage practices by your cotton clients?

36 respondents

Note Hectares may be allocated to both options.



Reduced tillage practice

REDUCED TILLAGE PRACTICES - IRRIGATED

18

Of your dryland cotton hectares, how widespread in 2019–20 was the use of reduced tillage practices by your cotton clients?

20 respondents

Note Hectares may be allocated to both options.

Number of hectares / Percentage of total dryland hectares **REDUCED TILLAGE PRACTICES - DRYLAND**



Reduced tillage practice

19

It is perceived that fields with a longer history of cotton have lower yield potential. Do you agree with this statement and if so what do you think are the drivers behind this yield impact?

53 respondents

DOES A LONG FIELD HISTORY OF COTTON AFFECT YIELD POTENTIAL?

This was an open question. Please see the appendix for full individual responses.



The key issues that affect yield in fields with a long history of cotton, as identified by these responses, are compaction, disease and declining soil health/increased nutritional requirements.

CROP PROTECTION

20

Bayer is currently preparing to launch the XtendFlex System in Australia (www.xtendflex.com.au). Where do you see the fit for this technology in your farming system, and what do you see as the most important issues the stewardship guidelines should address?

54 respondents

Will help with some hard-to-control weeds such as pigweed and fleabane.

Stewardship need to be around avoiding non-target drift onto non-XtendFlex crops.

Only on troublesome weeds if pre cotton residuals are either banned or not utilised. It does enable cotton to be grown in paddocks with fleabane and reduce reliance on Roundup for milk thistle control.

The XtendFlex products will only be used strategically where a problem weed could be better controlled. I have been disappointed with the efficacy of the additional chemistry I've seen in the demonstration plots so far. Stewardship will be all about off target drift and best application methods to achieve an acceptable spray result. Weed size at spraying, sprayer setup and minimising off target drift. Unfortunately, glyphosate is going to continue to be the pillar herbicide.

I don't believe it is a good fit in our system as dicamba isn't a herbicide which is very effective on some of our problem weed species. That being said, any rotation from the glyphosate reliance is a benefit. Drift will always be an issue for the stewardship but also making sure that post spray auditing is completed effectively and thoroughly.

Unsure of fit - maybe dryland. Drift onto sensitive vegetation and crops a major issue.

I am not sure I see a fit for this technology without extreme stewardship guidelines around the use of dicamba.

This is fitting in fields with high levels of difficult to control broad leaf weeds.

Issues of concern is dicamba's presence in the soil and drift issues on fields that are not growing this variety. Issues of killing volunteer cotton plants also comes to mind, limited choices.

Potentially if the grower misses the pre-emergent opportunity and can use the extend to pick up the escapes. I think we still need to use pre-emergence and alternate strategies to control the resistance.

In dryland situations and farms with known resistance in weeds to Roundup. Stewardship guidelines should still follow that of Bollgard 3 and spray guidelines for hormones over the summer period, as there will still be susceptible crops grown alongside cotton.

It will cause more problems that its worth. Education of non-cotton growers will need top priority and if we are still getting drift problems now, they will increase.

Give us more options in some situations where have glyphosate tolerant weeds. Still need non-chemical (cultivation/chipping) and/or residual herbicide program. Flexibility to target cotton weeds. Spray drift and Ratoon and volunteer cotton.

Over Laterals & Pivots were ground rigs can be easily operated. There will also be a fit over flood country when targeting Roundup Resistant ryegrass and canola if timing can be executed well.

The most important issues the stewardship guidelines should address is:

- 1. Applicator training and certification
- 2. Application timing
- 3. Sensitive crops and buffer zones
- 4. Application record keeping

Has a huge fit where we have particular broadleaf weed issues, things like fleabane and Roundup resistance will make this have a great fit. Hopefully some help on resistance ryegrass. Just another tool in the toolbox.

Flexible additional weed control.

Resistance management. Drift mitigation of dicamba.

Much better control of ipomea species. Protection against glyphosate resistance. Drift management will be the concern.

As long as high yields can be maintained XtendFlex will be a massive advantage to the cotton industry, allowing for improved weed control of hard to kill weeds and reducing the reliance on glyphosate. Need to introduce training days around the use of the vapor grip dicamba and glufosinate (as these are generally used very minimal today). Ensure all growers have been trained before being allowed to apply the product.

Roundup resistance in grasses will be helped along with gluphosinate. The dicamba is probably not a huge bonus but will be relevant as more weeds become resistant to Glyphosate.

May help control pigweed. Drift onto susceptible crops in diverse areas like the MIA and Hillston.

XtendFlex will be a valuable tool to help control hard to kill weeds that glyphosate alone is not overly effective on. The extra modes of action available will also help to manage weed resistance issues. The most important issues with stewardship will be around application parameters and drift mitigation, particularly around the dicamba component. Also still implementing a strong IWM program to ensure that MOA's are rotated and that non-herbicide tactics are also still used in the system.

Hopefully use it in the second year of a Roundup ready system to help control volunteers, and also other difficult weeds. Drift concerns would be the major stewardship issue that needs looking at very carefully. It will be a good fit where we have hard to kill broadleaf weeds in the system.

Spray drift management! - our industry cannot afford to be seen as having a negative impact on the wider farming community. There is the potential for grass weed control to be compromised with additional tank mixes.

Pre-plant knockdown glyphosate resistant weeds plus the inclusion of an alternative mode of action in crop.

lt won't.

Should be more useful in zero till dryland than conventional irrigation systems. Drift and weed resistance. Increased efficacy on fleabane, melon, bladder ketmia, etc. Issues include drift management and

potential impact to native vegetation and surrounding crops.

Ryegrass is a major issue in the southern valleys. The glufosinate component will have a good fit for these areas. Off-target drift will be the biggest issue with the new stewardship guidelines.

I see the fit here where it will give more weed control options.

May have a fit - however volunteer control does concern me.

Yes, it has a fit for herbicide resistance management as we are currently over relying on Roundup in the cotton farming system. Potential issues are drift (trees, neighbours, other crops, non XtendFlex cotton), soil residues, area wide management.

At this stage only a small fit in areas with Roundup tolerant or resistant weeds like Bellvine and FTR. Spray drift will be biggest stewardship issue.

It will fit well. I suspect that if the varieties and yield potential are the same or higher as for non-XtendFlex cotton, whole farm planting will be advisable to avoid drift damage to susceptible varieties. Awareness of neighbouring crops will become even more important (drift). In situations where glyphosate is not required (e.g. no grass weeds), a straight dicamba product should be registered and available. Registration for aerial application would be useful along with comprehensive applicator training (aerial application parameters).

I think more over the top knockdown herbicide options in cotton would be a good thing given we are currently relying heavily on glyphosate but I do question the usefulness of the inclusion of dicamba instead of 2,4-D as the hormone ingredient. Stewardship wise, I'm imagining it will be a gradual changeover to XtendFlex and that we will have a mix of RRFlex in fields so obviously things like cotton map and grower communication will be of high priority to avoid issues with spray drift. Also volunteer control will be very important as well.

Yes. Drift to non XtendFlex crops and other crops.

In paddocks where there are increasing numbers of glyphosate resistant weeds.

Important issues would be the importance of rotating herbicides, when to use them etc. Closely working with growers and consultants so they're aware and become comfortable to using the new technology.

This technology will have a great fit in our systems. Mainly by reducing the reliance on only glyphosate applications and thus reducing glyphosate resistance build-up.

The use of glufosinate will reduce the use of group A chemistry which will be of assistance in reducing resistance to this chemistry. Certain weeds which are more tolerant to glyphosate will be better controlled eg. the Ipomea spp. The stewardship guidelines need to have a large focus on safe herbicide application and drift management.

Once one grower uses it everyone else will be forced to adopt it because of the dicamba drift risk. We need different options with single herbicide tolerant varieties to rotate.

Control of hard to kill weeds and flexibility in managing herbicide resistance. A strong level of understanding of the risks of the dicamba component needs to be conveyed to growers.

Into sensitive areas. Possible issues will be from drift out of cotton onto other crops.

More information needed.

I believe I would use it to target the weeds in the cotton row such as peach vine by using naked sprays behind a cultivator. Proper stewardship will have to be observed to prevent off target damage and damage to our social license.

Dicamba is a waste of time, should have been 2,4-D (Corteva Enlist).

One of the greatest risks to growing both Irrig and DLC is herb drift, this being Gp I herb (24d).

The industry needs to be sustainable, dicamba is not what growers/industry needs. The industry will only expand with DLC, the introduction/implementation of Enlist would lower the risk to the grower when growing cotton in area's with a historical high use of 2,4-D for fallow weed control.

Glufosinate will be another herb option with advantages with regards to weed control.

Stewardship needs to address herbicide resistance development.

Stewardship needs to address herbicide off-target damage potential.

Good fit is allowing herbicides to be rotated more, taking pressure off Roundup resistance development and reducing a build-up of Roundup tolerant weeds.

Providing another option for managing resistant weed populations. Drift management onto non XtendFlex fields.

There is value in diversifying the chemistry options for weed control but nothing else.

Stewardship around understanding application conditions and factors leading to drift and volatilisation are essential. We do not need dicamba drift headlines like we are currently getting defoliation drift headlines.

Limited fit in irrigation, good fit in dryland but the rest of the farming community need to be educated on dicamba vs phenoxy general tolerance.

Rotation to reduce resistance. Understanding on non-cotton farms that not all cotton will be based on this system ie drift concerns.

Resistance Stewardship

It would provide additional weed control tools, so that possibly more in-crop herbicide rotation could be practised, and in situations where there are glyphosate resistant weeds an alternate chemical option could be deployed. The most important stewardship guidelines should be around avoiding any off-target drift. I don't think dicamba should be registered for aerial application in XtendFlex cotton systems. There is a fit for hard to kill broadleaf weeds and for a change in chemistry to reduce or limit the increase in glyphosate resistance. Drift will be the main issue.

This is a poor choice of a product to be forced upon the cotton industry and will cause nothing but major issues for the industry through off target drift as has been the case in the US. This product does not suit Australian conditions and was built for an American problem but is no doubt a great way to extract easy dollars from Australian growers for something they have little or no use for. This should not be sold within Australia but if it is forced upon the industry by Bayer and CSD then should be sold as a niche product as it has very little use in our farming system. The glufosinate and glyphosate product without the dicamba part would be a much better product for Australian conditions. The data so far supplied by Bayer with regards to the kill on weeds shows a much superior kill from the glyphosate and glufosinate than when using the glyphosate and dicamba mix. Unlike the American cotton industry, the Australian cotton industry's main weed problem is grasses such as Feather Top Rhodes and resistant Barnyard grass which the dicamba product offers no help for at all. We are now already spending extra dollars on applying residual herbicides such as Stomp or Triflur at planting and then Metolachlor in crop which is also helping to control other weeds such as peachvine, bellvine, pigweed etc as well as grasses. The dicamba is useless as it doesn't even offer growers protection from 2,4-D drift from surrounding dryland growers and to expect these farmers (a majority of which in our area don't grow dryland cotton) to use a much less effective and more expensive product such as dicamba on their weeds instead of 2,4-D products is completely unrealistic. CSD should work with Corteva so as to make available to growers a product that would be of much greater benefit to the Australian Cotton industry even if only from a crop protection point of view.

Improve control of cowvine and resistant grasses. Hopefully we have all learned that all herbicide reliant systems can and will be broken. Stewardship will need to impress on growers more control tactics other than herbicides. Even with RR failing many growers are reluctant to accept the need for other tactics.

I see a great fit in rotation with resistant weeds, especially fleabane and sowthistle.

I think continued stewardship as with the Roundup ready flex system, with great emphasis on spray drift and hazards and herbicide rotation.



21

Are there any pests (insect, weed, diseases) or situations where a lack of product registration, technology or information is limiting your ability to provide advice?

45 respondents

Not in cotton.

Yes, diuron not on widespread fallow registrations, some of the group A's aren't registered in cotton, more work needed to register some fungicides in cotton.

Soft chemistry options for thrip control early season. Liquid in furrow options for BRR. Alternaria options are limited.

Shield bugs are always a battle when they are present in the crop. Red-banded shield bugs are very hard to kill, despite the minor incursions we get.

Yes - we need wider herbicide registrations for use in fallow preceding a cotton crop both irrigated and dryland.

No, I think there are enough options that are registered to provide good advice.

Thrip and GVB, but more registrations coming online, early thrip control is paramount to keep the crop on time in the south.

Defoliation products (rates etc) need to be re-addressed, as management practices and varieties have changed since these products have been registered.

Beneficial insect release work (species and their impact on pest/ beneficial matrix in cotton system and rotations).

There are plenty of options out there but seen as 'too expensive'. We've had too many years of cheap single options.

DroppLiquid + Diuron defoliation mix not on label.

Early thrip management in high density seasons. Verticillium wilt - rotation benefits in \$.

Different irrigation strategies between 748/746.

Would like a better understanding of the effectiveness and timing of the use a fungicides for Alternaria in cotton.

Alternaria!

Whitefly

FTR, BY Grass (Need more gp A registrations)

Milk T resistance increasing. Need more labelled options.

Would like a quick and accurate way of assessing parasitoid levels in the field. I think this is a very practical way the government can support us.

Nil.

Grass weed pre-emergent herbicide application in cereal crops in a water up situation on beds.

Pale Cotton Stainers - limited registrations for cotton that fit an IPM program (soft options).

Not currently but there are a few pests that could be close - and new products could be needed in the near future.

Whitefly

Barnyard grass

Feathertop Rhodes grass

No

Some weeds, live feathertop and resistant barnyard grass. Fleabane.

Alternaria.

Effective rotational options for soft mirid control.

There will be a strong over usage of transform over the next few years.

Alternaria disease - we need product registrations in cotton urgently.

Mealybug (potential future issue)

Piezadorus

Roundup resistant grass

Milk thistle

Herbicides in defoliants to reduce regrowth - Diuron/starane/sharpen.



No

Grass weeds and fleabane in cotton still cause us headaches as does true bellvine. With regards to insects, I think we have some pretty good insecticide options but I guess just continuing to stay ahead of the curve with regards to whitefly and sticky lint and timing of sprays/spray thresholds. Early Alternaria at 2-8 leaf stage. Products to control mealy bugs. Movento is one product available but it is quite expensive and requires 2 applications to get an effective long lasting result. I had a huge problem controlling slaters on one farm this year. Resistant grasses and weed in general. Fungal diseases in late season cotton. Fall armyworm. Not at this stage. Whitefly and Mealy bug are the 2 insects where product registration needs to be kept up to date. All relevant options must be available. Soft chemistry to control thrips is limited. Cotton with multiple herbicide tolerance is required to allow herbicide use diversity. Chemistry to reduce Verticillium Wilt is required. Chemistry to reduce Fusarium Wilt is required. Chemistry to reduce Black Root Rot is required. Chemistry to reduce Rhizoctonia is required. Thrip management. Regrowth control. Glyphosate rates (too low). Sero - X price. Lack of soft options for mirid control. Mealy bug Disease No Not that I can think of at the moment. Generally not too bad. However from this first season in the NT I am finding GVB's to be quite prevalent at the end of the season and after having remained soft with mirid product choices want to avoid using a SP for these as I haven't recommended any SP in the last 14 years of consulting in my own business.

Probably

22

Rate the average impacts you think the following pests, weeds, diseases and disorders had on the profitability of your clients' cotton crops in 2019-20, either through budgeted or unbudgeted costs or through yield loss.*

54 respondents

Note Bollgard and Roundup ready fees are considered budgeted costs

23

With regards to insect pest management in 2019-20 cotton fields, how widely used (in terms of total irrigated and dryland hectares) are the practices listed below?*

37 respondents

IMPACT OF PESTS, WEEDS, DISEASES AND DISORDERS ON PROFITABILITY



Percentage of consultants

33,733	The industry's recommended sampling strategies are used to monitor pest abundance and plant damage
29,451	The industry's recommended thresholds are used when making pest control decisions whenever possible
32,346	The IRMS is followed when selecting insecticides/miticides
33,920	Pesticide selection aims to conserve beneficial insects whenever possible
31,969	Weed hosts are controlled to prevent pest build up
26,993	Rotations cropping and frequency of cotton decisions consider cotton pest risks
25,666	Rotations cropping and frequency of cotton used as part of integrated weed management strategy
25,317	Rotations cropping and frequency of cotton decisions

Practice

EXTENT OF INSECT PEST MANAGEMENT PRACTICES

920

88%

77%

84%

89%

83%

70%

67%

66%

Number of hectares / Percentage of total survey hectares

24

Of the irrigated and dryland cotton hectares over which you consulted in 2019-20, what is the total area (suspected or confirmed) with herbicide resistant weeds?

35 respondents

AREA WITH HERBICIDE RESISTANT WEEDS



25

Of the irrigated and dryland cotton hectares over which you consulted in 2019-20, please estimate how many tactics were used for the cotton crop, including in preparation. For this question a tactic is considered a weed control operation such as cultivation, herbicide, chipping.

37 respondents

26

Thinking about your cotton clients, and how they have managed weeds across their cotton farming system, how many use any of the following weed control tactics?

37 respondents

WEED CONTROL TACTICS



WEED CONTROL TACTICS USED



Number of clients / Percentage of total survey clients

DEFOLIATION

27

Thinking about your irrigated cotton hectares, how many applications of defoliant products were required?

37 respondents

APPLICATIONS OF DEFOLIANT PRODUCTS



28

Based on your general experience, what are the factors that lead to three or more defoliation passes? (select multiple as required) 51 respondents

FACTORS LEADING TO THREE OR MORE DEFOLIATION PASSES





Number of consultants who consider this a factor

NUTRITION MANAGEMENT

29

What is your best estimate on how much nitrogen was applied per hectare for your total irrigated cotton hectares in 2019-20?*

37 respondents

NITROGEN APPLICATIONS IN IRRIGATED COTTON



Application rate per hectare

30

What is your best estimate on how much nitrogen was applied per hectare for your total dryland cotton hectares in 2019-20?*

16 respondents

NITROGEN APPLICATIONS IN DRYLAND COTTON



Application rate per hectare

TIMING OF NITROGEN APPLICATION In 2019-20, when were the cotton crops' nitrogen Number of hectares fertiliser requirements applied?* 37 respondents 33,978 1,298 1,465 All N fertiliser applied All N fertiliser applied Split fertiliser before planting applications in-crop

Timing of application

32

31

In 2019-20, how were the cotton crops' nitrogen fertiliser requirements applied?

37 respondents

METHOD OF NITROGEN APPLICATION



33

What decision tools are used by you and/or your clients to assist with decisions regarding application of fertiliser for your cotton clients and their irrigated hectares and dryland hectares?

37 respondents

DECISION TOOLS FOR FERTILISER APPLICATION



Number of hectares

Decision tool (Number of clients)

NUTRITION

52 respondents

34 respondents

34

35

SOIL TESTS IN IRRIGATED COTTON



Every field every few years Never

Percentage of responses

36

Thinking about fields with irrigated cotton as part of the system, please select the statement that aligns closest with your experience.

Number of consultants

55 respondents

4 13 22 13 Organic Carbon in Organic Carbon in Organic Carbon Organic Carbon l do not monitor cotton soils is generally cotton soils is generally in cotton soils is in cotton soils is organic carbon levels in trending up trending down generally stable generally low fields where irrigated cotton is part of the rotation/farming system

Organic carbon status

ORGANIC CARBON IN IRRIGATED SOILS

37

Thinking about fields with dryland cotton as part of the system, please select the statement that aligns closest with your experience.

36 respondents



ORGANIC CARBON IN DRYLAND SOILS

38

Regarding the use of manure, how many of your cotton clients fit these categories?

36 respondents

WATER MANAGEMENT

39

For the irrigated cotton hectares over which you consulted, how much area in 2019-20 season was affected by limited water? Please also indicate your best estimates of yield in each situation.*

37 respondents

USE OF MANURE



Number of clients

IRRIGATED AREA AFFECTED BY LIMITED WATER





IRRIGATED YIELDS AFFECTED BY LIMITED WATER



Yield average (bales/ha)



Yield average (bales/ha)

SPRAY DRIFT IMPACT ON YIELD

YIELD IMPACT

41

What yield impacts do you estimate spray drift had on your clients' cotton crops this season? Please indicate your best estimate.*

37 respondents



Bales/hectare yield reduction

WIND AND WATER EROSION IMPACT 42 Regarding wind and water **Number of clients** erosion, how many of your cotton clients fit these categories?* 36 respondents 40 29 127 Are successfully Have no problem Have fields where erosion has or is likely managing for erosion with erosion to impact production

43

What impacts do you estimate compaction had on your clients' cotton yields this season?* Please indicate your best estimate of total hectares for your irrigated cotton and dryland cotton.

37 respondents

COMPACTION IMPACT Hectares 567 540 23,413 11,358 900 0 0 N/A 0 <1 1-2 2-4 4-6 >6

Bales/hectare yield reduction



SUSTAINABILITY

4

How important is cotton's "PLANET. PEOPLE. PADDOCK." sustainability program to the industry?

55 respondents



"PLANET. PEOPLE. PADDOCK." IMPORTANCE

Access to water. Access to crop inputs such as herbicides and insecticides.

Water.

Pesticides - and drift – 2,4-D, defoliants, dicamba the next one in the spotlight. China relationship.

Licenses.

ICENSES.

Work towards carbon neutral or carbon surplus which some farms already are. Must project and produce clean environmentally friendly cotton.

Demonstrating the positives of Australian grown cotton over world cotton. The environmental footprint

of cotton over synthetic fibres. Microfibres are a big issue for synthetics.

There is a significant opportunity to rebuild the cotton image in the world, particularly Australia by feeding the right information to the public. Cotton Australia is doing that; however this is also our biggest threat as the most vocal people are unlikely to believe the industry facts.

Opportunities - increased population, more people to clothe. Threats - Irrigation water security.

Sorry not aware of this program.

Water availability. Social perception of water use. Markets.

The biggest issue is the vulnerability of non-cotton growers when they rely on social media for information, and trolls out number 'normal' people who can't bother to check the facts.

Economic > Southern NSW cotton industry threatened by water availability, opportunity cost to sell water to tree crops and/or future water buy backs and black root rot.

Social > ? comes with water availability issues.

Environmental > ?

Reduced water allocations river, underground and overland flow. Increasing water costs due to competing agricultural markets. Increasing overseas ownership of prime agricultural land with antagonistic management ideals. People's perceptions of cotton industry. Poorer relationship with China. Overseas cotton growing areas improving management and increasing yield.

Most important listed in the following order.

- 1. Profitability
- 2. Water
- 3. Efficiency
- 4. Pesticides
- 5. Quality of work life
- 6. Well-being & social capital
- 7. Biodiversity
- 8. Carbon

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45

The Australian cotton industry's PLANET. PEOPLE. PADDOCK. framework manages issues likely to impact the industry's ability to operate now and in the future. What do you think are the industry's most important environmental, social and economic opportunities and threats between now and 2024?

48 respondents



SUSTAINABILITY

People perception of cotton.

Lack of water through drought and increase of permanent crops like almonds.

Environmental - drift management as cotton is the canary for agriculture.

Social - perception of sustainability and safety particularly around glyphosate use and in future the use if dicamba. Economic.

Community water perceptions.

Water availability, floodplain harvesting etc.

Opportunities to raise cotton social profile through more education.

Excess nitrogen. Water wastage. A decline in IPM practice for insects. Weed resistance.

Water sustainability/water efficiency.

Managing water runoff/ensure no pesticides end in off farm environments as increased testing will pick this up.

Highlighting cotton's sustainability and marketing as a renewable product.

Non-agricultural background consumers not using the product due to media portrayal of cotton being unsustainable and killing the environment.

Covid-19, trade with China, still in drought, water issues in the MDB.

Biggest threats:

1 - Water availability and drought

2 - Cotton price stability

3 - Our social licence to be cotton farmers, or the public view of cotton as a crop and its suitability to

Australian conditions

4 - Keeping a skilled workforce

The biggest threats are still water availability, land availability and environmental impacts (as perceived by metro population).

Opportunities are the increasing anti-sentiment towards synthetics due to their link to oil production and pollution. Also, the decline in the wool industry will also likely increase demand for cotton.

Biggest threat is further reductions/buybacks of water in MD Basin. Enhancing this threat is a lack of understanding by those not connected with industry, thinking cotton uses all the water.

Irrigation Water. Carbon sequestration.

Not much.

Water availability in irrigation.

Weed resistance in dryland.

Social - with not enough people knowing about the Plant People Paddock framework and overwhelmingly negative views on the industry.

Environmental - Water security.

Economic - recovering from drought and keeping cotton communities going. Also, market risks with China after Covid-19 tensions.

Biggest issue will be social license with water usage. Not the amount used as such but educating the public on water availability and allocations in general.

Pesticide usage, there is still a slight stigma out there.

I think the focus on renewable fibre isn't pushed hard enough. There could be a big opportunity to showcase that side of the industry.

Social media and under-education.

Water.

Increasing dissociation with agriculture (not as many 'city cousin' anymore).

Disease and weed control.

Social issues. The media.

Access to water. Access to chemicals.

Threats: Lack of water, Covid-19 and resulting effects on trade, finance institutions etc, negative public perception of irrigation industry, politics (Murray Darling), increasing foreign land ownership, increasing land value.

Opportunities: High unemployment in the cities may help farmers find qualified staff more easily if needed, increasing land value.



SUSTAINABILITY

Making sure we continue to be environmentally conscious as an industry and also try to continue to push the true facts about the cotton industry as opposed to the perceived downfalls and historical issues and information.

Opportunities:

Environmental - focusing on nutrient application to reduce amount that goes into waterway via sediment removal etc.

Social - become fully transparent with general public re: practices in cotton industry. Many only know half of the story and give cotton a bad name.

Economic - open spinning mills in Australia - generates jobs and more could potentially be manufactured in Australia.

Threats:

Social - general public skewed view of industry, effects our social licensing.

Economic - drought and other natural disasters effecting ability to grow crops.

Environmental - As we're close to the reef we have to be careful on sedimental removal from farms.

Biggest threat is synthetics.

Cotton must be promoted as a natural healthy product.

The problem is in the cities not the country.

The main threat to the industry stems from the social licence issue connected to water and the environment.

Negative press regarding water use, ill-informed public, perception that cotton is taking all the water. Drive to produce varieties that continue to yield in the heat and dry.

In a farm system try and build organic matter to absorb and retain as much moisture as possible.

Water, too much being allowed to flow down to South Australia.

Spray drift (defoliant and herbicide). Water. Labour.

Water security.

Opportunity - the importance of natural fibres compared to man made.

Opportunity - to get young people working in a supportive and progressive industry.

Opportunity - to grow higher yields and more profitable crops through progressive industry.

Threats - ill-informed people being negative about cotton growers.

Threat - water scarcity reducing profits.

Threats - water scarcity making good people leave industry.

Threats - other industries becoming more profitable than cotton.

Optimum use of irrigation water.

Impact of international relations on markets.

High land and water prices are a threat.

Water security. Pesticide losses/restrictions. Social licence for cotton - water, pesticides, nutrition.

Social media. Too many idiots with a voice.

Threats are water, competing crops especially when disease is reducing cotton yields

Water management.

Incorrect information in media.

Water access. Nitrogen usage.

The sustainability report is a great thing for the industry as it provides a baseline of where we started in the 1990's and how we are progressing and improving. I was able to use some of the statistics from this report for one of my checkers at UNE to counter a comment by one of the lecturers that farming is destroying the planet.

For the future, glyphosate usage will be an issue as will water always be an issue. Social licence will be difficult due to the lack of knowledge that not all farming land can be used for food production and that considering the impact of plastics on the environment that we do need natural fibres.

Social licence to operate/farm.

Availability of irrigation water (very close tie with the social licence).

Declining terms of trade with increasing input costs (chem-fert-labour etc).

Risk to trade (counter party risk for trading).





47

46

How well would you say you understand what the Cotton Research and Development Corporation (CRDC) does?

55 respondents

UNDERSTANDING OF CRDC



CRDC PERFORMANCE RATING

Driving continuous improvement in the industry	<mark>2% 16%</mark>		60%		2	2%
Working collaboratively with other agricultural industries	13% 0 <mark>%</mark> *	11%	29 %	40%		7%
Working collaboratively within the cotton industry	4% <mark>2%</mark> 4%	22%		54%		14%
Comminucating with industry about R&D investments	2 <mark>% 7%</mark> 24% 58%			9 %		
Listening to industry about R&D needs and priorities	<mark>4% 2% 7</mark> %	20%		52%		15%
Providing useful, credible information	<mark>2% 15%</mark>		63%			20%
Inevsting in cotton R&D	2% 20%		549	%	2	4%

Poor Excellent Don't know Very poor Okay Good

Percentage of responses

48

How would you rate the Cotton Research and **Development Corporation's** (CRDC) performance in these areas? 55 respondents



Number of consultants

Number of consultants

49

Overall, how supportive are you of CRDC's research and investment activities?

55 respondents



Level of support

CRDC RESEARCH AND INVESTMENT ACTIVITIES

50

Are you aware of CottonInfo - the cotton industry's joint extension program (consisting of regional development officers, technical specialists and *my*BMP)?

55 respondents

51

Do you source information from the CottonInfo team or information resources (e.g. Cotton Pest Management Guide, Cotton Production Manual, *my*BMP etc)? 55 respondents

CRDC JOINT EXTENSION PROGRAM



SOURCING INFORMATION FROM COTTONINFO



Level of access



52

Thinking about industry extension services and your ability to access research, what do you value and what would you like to see the industry do differently?

41 respondents

CottonInfo team look to be doing a pretty good job. COVID making it hard for them to hold events etc.

Need more basic research so there is information for extension to deliver.

CottonInfo be more active in our region.

I value being able to speak directly to a person that has good general knowledge of cotton research that is then able to put me in touch with the specific person or research article that can answer my questions.

There's a lot of research and valuable tools in every facet of cotton production.

Things that need improvement are public relations around cotton production.

I value the hardcopy literature that comes out to read and study.

Perhaps some webinars/recordings on certain topics would also be useful.

More focus on black root rot.

Direct contact with primary researchers and extensions officers. Would like to hear more about how other regions manage cotton/issues and rotations.

1. Continue with the field walks/day.

2. Continue with the disease surveys.

3. Continue with the seasonal valley reports.

4. Continue with the seasonal valley surveys.

The people are the biggest assets.

Need to offer tomorrow's leaders more, better and extended PD opportunities.

More assistance with research at the local level. Nobody understands these farms better than us and there are big differences between regions. We do not have time to do research on our own.

Disease/water research is valuable.

Reduce research on nitrogen and its effects on the environment (this is not furthering the industry any further only assisting researcher gain grants).

Compile all the trial data in the Macintyre valley to date?

See what our major issues are and proceed with more trials on this.

The collaboration of the industry.

The sharing of experience and research.

The ease of accessing extension staff.

I think that the extension services are doing quite a good job at linking industry with research. Having a 'central' place to go to, to find that sort of information (such as CottonInfo) is very useful and saves a lot of time.

I value all research and extension with regards to pest management, nutrition, disease and water management - I find access to this is good.

I think as long as access remains readily available all is good.

I value new and relevant replicated trial research that is conducted.

I would like to see trial results communicated more effectively.

More on-farm trial and demos.

Nothing different, really value the CottonInfo team and Moisture Manager.

CottonInfo is the most valuable part of extension services.

contoninio is the most valuable part of extension services.

The southern valleys being fairly new in the industry still operate in their traditional silos and growers are encouraged to come together as a valley area.

Definitely value extension programs.

Maybe more online content that we can access at any time - can't always make the field day.

Would like to see more on-farm trials.

More open to farm level research suggestions.

Regional extension staff. More Zoom sessions with researches presenting their findings. I don't like to have to travel to conferences and meetings.

Communication and access to information is easy.

Webinars have turned out to be a very useful tool and I would encourage continuing webinars offered by the various extension providers.



The Cotton Pest Management Guide is highly valuable to newcomers and still to myself as well (and the paper copy is very handy to carry around in the ute).

I like that we had two local researchers, one left - hopefully, they can be replaced.

I value the ease of accessing most resources. I would like to see more resources similar to CottASSIST available for consultants.

Very happy with how it is currently operating.

Pest management information.

Weed species information.

Moisture management information.

Fairly happy with how it presents at the moment.

All good.

Extension projects/research on relevant problems, listen to consultants/agronomists.

The CottonInfo team are great.

I would just like to see more trial work completed at a local level in each valley.

In season updates and cross valley communication is useful.

More local extension in smaller communities.

Retain experience in extension roles.

Access to the extension officer. Work with independent consultants to do trial work once they have established and obtained the necessary permits.

Value updates.

I value the research and development programs and would prefer to see more of the limited industry financial resources that are presently available directed into these areas, and less into the extension, as crop consultants are generally extending or helping to implement new research findings on clients farms where appropriate.

Sure, if research budgets weren't significantly constrained keep the extension going as is, but I don't think that's the case and I believe there is more value to be gained for the industry if the research is prioritised over extension when difficult decisions need to be made.

The combination of the CottonInfo Team and the CSD agronomist extension team do a great job. Janelle Montgomery for the Moree/Mungindi area is excellent.

Many information days are held at times when field agronomists are unable to attend due to work.

53

To what degree have the CottonInfo team, information resources and *my*BMP assisted you to improve practices on your client's farms in relation to these factors?

55 respondents

COTTONINFO AND INFORMATION ASSISTING TO IMPROVE PRACTICES

Seasonal forecasting & climate	2 <mark>% 7%</mark> 15%	33%	25%	18%
Water & moisture management	2 <mark>% 4</mark> % 16%	29%	40%	9%
Nutrition & soils	0% 20%	31%	42%	7%
Natural resource management	6% <mark>4%</mark>	36%	38%	16% 0%
Insects, weeds, diseases, resistance & biosecurity	0% 11%	29%	40%	20%
Energy use	18%	34%	26%	18% 2% 2%
	 N/A (not needed) 	ot at all 🔲 A little 📕 Moderate 📕 Signific	ant 🔳 Very significant	

Percentage of responses



54

Please give your opinion on each of the following statements.

55 respondents

OPINIONS OF COTTON INDUSTRY

<mark>4</mark> % 56%	CottonInfo is a trusted information source
<mark>2%</mark> 4% 58	CottonInfo provides useful, credible information
<mark>4%7</mark> %	Cotton R&D is readily available to me at the time I need it to aid my decision making with/for clients
<mark>4% 11</mark> %	Cotton industry R&D is effectively communicated to me
<mark>2%7</mark> %	I have ready access to research information in a way that suits my needs
<mark>2% 4% 6</mark> % 7%	The cotton industry has effective collaborative structures for prioritising research, development and extension
<mark>2% 45%</mark>	Research, development and extension drive continuous improvement of the Australian cotton industry
<mark>2%</mark> 4% 45%	l expect to be part of the cotton industry in 5 years' time
<mark>6%</mark> 4% 20%	The Australian cotton industry captures the full value of its products
13% 459	The Australian cotton industry is a global leader in sustainable agriculture
<mark>2% 7</mark> % (In most seasons my clients generate a viable profit
2% 24% 26	My clients can continue to farm productively using their current farming practices for 20 years
<mark>4% 15%</mark> 40	Cotton is profitable and consistently my client's crop of choice

%	56%		40%
<mark>%</mark> 4%	58%		36%
<mark>% 7</mark> %	67 %		22%
<mark>% 11</mark> %	69%	6	16%
<mark>.%7</mark> %	71%		20%
2 <mark>% 4% 6</mark> % 7%	% 65	5%	16%
2% 45 9	%	53%	6
<mark>%</mark> 4% 4	5%	49 %	6
% <mark>4% 20%</mark>	23%	43%	4%
<mark>13%</mark>	45%	4	2%
<mark>% 7</mark> %	67 %		24%
% 24%	<mark>26</mark> %	39%	6 <mark>9</mark> %
<mark>% 15%</mark>	40%	4	1%

Don't know
 Strongly disagree
 Disagree
 Neither agree nor disagree
 Agree
 Strongly agree

Percentage of responses

55

Would you or your staff like to participate in more training courses and/or workshops on how to use digital technologies?

53 respondents

INTEREST IN DIGITAL TECHNOLOGIES TRAINING FOR STAFF



56

Please indicate which topic/s of training courses / workshops you or your staff would like to participate in.

33 respondents

Precision ag as it evolves and becomes more integrated.

Would have to be tailored to individual small groups. Not a generic one.
PCT useful (which we do anyway) as well as Trimble, John Deere, Case and other training.
Doing well for training thanks.
Any digital technologies for agriculture to assess viability in our business.
Mainly keeping up with trends.
Soil VRT and Digital classifications.
Nitrogen sensing.
Canopy sensing and thermal use.
Field mapping data, water monitoring (crop water use and temperature), soil mapping.



Finding online webinars of small topics are much more convenient than meetings.

Irrigation management, minimising compaction, improving healthy soils, minimising long fallow disorder, disease management. Use of pre-emergent herbicides. Use of herbicides in crop (flex traits). Utilising em surveys. Effective use of CSD's BARRY program. Drones. Crop reflectant technologies. Water monitoring information. Pest alert systems. Yield mapping technologies. Anything! Always keen to learn new or improve on any technologies relevant to work. Excel course. Agworld course. Precision Agriculture. Irrigation applications. Nutrition/herbicide resistance. Remote sensing. Precision a Ag Skilled course. Irrigation management. Both in field and on farm. Nutrition management, more so P, K and Zn. Soil structural issues mainly sodicity and magnesic soils. Variable rate technology. Quick test nitrogen. Data analysis. Any new technologies that may be relevant in the future, any current technologies that are working that I haven't yet had access to. Almond production. Drone courses. Irrigation management/understanding probe data. NDVI and how to interpret. Precision ag. With an inundation of new tech we need to sit back and say "just because it is new doesn't make it better" rather than jumping on a bandwagon. All topics are of interest. Precision farming. Probably need to see what courses are available. Processing variable rate maps. Precision ag technology. Subsoil constraints. How to ban idiots on social media. Disease and soil management. Most things of interest. A general course would be great where perhaps people that are more involved in digital technologies could present a wide range of products and then look to have training on the products most voted by

the group. As unfortunately, more often than not, you don't know what is out there.



57

What is the biggest barrier to you increasing adoption of digital technology?

48 respondents

Consistency of a	lata quality and correct collection, poor history and track record for effort invested,
proving ROI unl	ess highly variable.
Time required. A	lot of technology doesn't actually provide a benefit, that's why we don't adopt.
Understanding	now it can be practically used in our business without it being a 'gimmick'.
Mobile receptio	n.
Usefulness.	
Cost effectivene	SS.
l'm relatively you	ung and quite adaptive to new technology, I don't see this as an issue for me.
Being able to co webinars are gre	instantly use it to keep up to speed and, time is also a big one that's where the recorded eat.
Time and alway	s changing.
No barrier - iust	no interest.
None	
Time Poor phor	ne internet recention. Software flevibility
Too many differ	ant nlatforms to choose from
Overload in tech	ye. 1 that is clunky.
Time needed to	use it and ability to integrate between different platforms.
Not one platforr	n does everything well.
It has to be prof technology that across so far.	Itable to myself and my clients and also ideally make life easier. Not interested in takes more time with little reward which seems to be most of what we have come
Time to look at a	all the different products and time to learn how to use these products.
Mobile service a	ind data.
Lack of phone/c	lata service in the field.
Direct cost of te	ch and subscriptions + time cost of learning new skills.
Time and cost re	ecovery.
Cost and unders	standing.
Internet access.	
Cost.	
For growers: cos easier for them.	t v benefit, needs to make a return, not tie growers up for any longer and make things
For me passing	the cost onto the grower
Lack of phone s	ervice for data access.
Too many 'new'	things promising it will be easy - and it isn't. Generally already using the easy ones.
Training.	
Time.	
Change barrier f	ör older staff.
A reluctance to	comprehensively embrace digital technology.
The benefits of s	some digital technologies are unclear.
Having the time manage the cro	in the middle of the cotton season to adopt/implement these technologies as well as p in general.
- There is none fo	r us.
It's educating th	e clients to use it.
-	



Return on investment for the technology and likelihood that is will stay relevant and current into the future.

raining to use it confidently.	
inding the right system to suit all machinery. Cost of programs.	
robably training etc.	
Inderstanding what's available.	
ime to learn and make use of this technology.	
Inderstanding the future economic benefit of the technology.	
Verload of options and unclear what actually brings value.	
bata coverage, is poor in my area of work.	
eturn on cost.	
ime and training.	
inding real value on a broadacre scale.	
lot knowing what is available.	•••••
any clients are uncomfortable with digital technology. Many new apps are not available on all tak	əlet
latforms. Internet access and phone service can be very unreliable in places. Some new remote di	igital
echnologies are simply too expensive for small business to justify.	

Mobile connectivity (in the field consistently).

Number of consultants



FEELINGS ABOUT THE COTTON INDUSTRY'S FUTURE

58

Overall, how do you feel about the future of the cotton industry? Would you say you feel...?

55 respondents



59

Is there any other feedback or any other issues that you would like to provide back to CRDC at this time?

22 respondents

Make it a high priority to maintain a core group of experienced, high quality researchers in each discipline - people who have seen a lot of cotton seasons and the variability which they bring. This needs to involve training up of younger people. When we run into the next challenge (whatever it may be) we then have good and experienced people to develop management strategies to solve them.

Doing well, keep up the good work.

No, they have been very helpful to me personally. Especially helping identify leaf diseases.

Irrigation water is the biggest issue in my area, I am excited about the CQ areas and the WA/NT pioneering areas, the underlying issue is water, we have the support and best techniques just no water.

Competition for water with tree crops in southern NSW is reducing availability of high security bore water resource for cotton going forward.

Tree crops also buying all general security water if have only a low allocation.

Cotton production will only ramp up in high gen sec water allocation years from now on. Maybe these not CRDC issue?

Time frame on the adoption and release of Corteva (Dow) Enlist Cotton Trait technology in Australia. What is happening in this space?

Keep working on improving the public's negative perceptions on nitrogen, water, insects etc. Note that on some occasions these feelings are justified.

We need to keep the funding for vital research projects going, even in times of drought when there is not much crop being planted.

Verticillium wilt in particular is a major concern for many growing regions yet funding has been cut over the last two years towards some very important projects that were starting to gain some momentum. There are a number of growers that I am aware of that are extremely frustrated that this has happened as they feel that despite the drought, this work should still happen so that solutions/management techniques can be achieved in a shorter time frame to get on top of the disease.

No.

I would like to see research information more widely available through Cotton Australia and CottonInfo and CCA (even if it just links to the research) - all industry groups need to be working together to pick up efficiencies.

More dryland investment.

Need more involvement in choosing research areas going forward. Maximising yield over social and environmental issues. The latter two are important but don't maximise the return per megalitre for the grower.

The disease is getting worse each year - BRR.

We now have multiple fields on farms we won't plant cotton for at least 3 years.

No.

Water or the lack of it, is the main driver of concern.

No.

Spend more time asking key growers in each valley what they want the time and money to be spent on. Please help the industry look after its experienced members. There's too much focus on the young

members.

No.

No.

Perhaps look at communicating with the NT and WA growers more - special communications with these growers so as to make them aware of a lot more about the industry. There was a great meeting at Douglas Daly run by Paul Grundy and Steven Yates but I know myself I haven't received any emails or phone calls contacting me about growing cotton in the NT. Anything I have seen such as field days or the workshop at Douglas Daly has come from NT Farmers rather than CRDC or CA. The logo's are displayed at the meetings but it doesn't seem as though the cotton industry is in charge or organising them? Maybe more direct contact with growers and agronomists and an EO for the NT and WA. I know that there is a perception that we don't want to be telling them...

No.



APPENDIX

QUESTION 13

Describe the 2019-20 cotton season in THREE words or less.*

A Challenge	Dry, tough, political
A non event	Dry, unexpected, solid
Abysmal	Finished well
Another learning experience	Had NO cotton
Bad weather extremes	Hard work
Basically non existent	Hot cool disappointing
Bloody dry	Hot dry tough
Bloody horrible	Interesting & variable
Bloody ordinary	Non-existent, disaster
Challenging and variable	Not enough DD
Challenging still rewarding	Not enough heat
Cloudy second half	Not sustainable
Cold and challenging	Quiet
Cold low yields	Relaxing
Cold, disappointing	Significantly reduced income
Cold, disappointing, micronaire	Small
Cold, unexciting, unrewarding	Small
Cool finish	Small, dry, tough
Cool low mic	Smallest ever
Difficult Average Season	Smallest on record
Disjointed	Surprising
Dry	Thirsty, big extremes
Dry quiet	Tough
Dry then wet	Uncomplicated but challenging
Dry then wet	Underestimate storage loss
Dry to wet	Unmanageable
Dry, extended	Variable temperatures

QUESTION 19

It is perceived that fields with a longer history of cotton have lower yield potential. Do you agree with this statement and if so what do you think are the drivers behind this yield impact?

Depends on management. With good monitoring of nutrition, application of amendments such as gypsum, use of rotation crops and some fallowing, fields should remain productive indefinitely. Yes but not entirely: you do tend to see compaction and disease as well as soil structure and chemical properties shift over time in these heavily cropped farms. Deep ripping and use of manures in the rotation can help alleviate some of these issues but the biggest gains to be had are through stubble retention in the system where possible.

No, the farm I provide advice to has a short term history of cotton production. Coming out of rice to row cropping, the farm has fields that have produced cotton over a time period of 1 to 18 years (not number of crops). Being Riverina soil, it is a dermosol that coming into production of cotton is low in fertility and has many soil structure issues. The more cotton that is grown, as well as other rotation crops, is having a significant impact on soil tilth and fertility. It is an easily buffered soil. Even cotton fallow cotton rotation sees an improvement to the soil structure and thus cotton yields improve. Irrigation infiltration improves over time as well thus driving yield. Less replants in mature soil due to improved subbing up.

I believe rotation is a key part to a healthy system, however long term back-to-back fields have not seen a significant yield decline in our region.



APPENDIX

Yes. Exhaust soil supplies of nutrients, water, organic matter, microbiota, also compaction.

Yes I agree. Main drivers would be a build up of compaction.

This all comes back to soil health, if growers implement proper nutrition management, soil amelioration, disease breaks then yields can be sustained.

If corners are cut, then yield is impacted by limited plant available nutrition, soil constraints (compaction), low AM soil borne fungi and decreased levels of organic matter.

Yes Lagree.

Disease is the biggest cause as we suffered from root rot and bad Alternaria.

Yes, due to disease and soil health (nutrition, microbial activity, sodicity & salinity) constraints.

Yes, disease issues more prevalent and in drought - water usage too high.

Yes generally seeing black root rot coming in areas within 5 cotton crops.

If black root rot has set itself up in the field it will not yield to its potential again.

Yes. Diseases, poor soil structure impacting infiltration/root growth, maintaining available nutritional pools.

Yes and the main drivers are disease, nutrition and field elevation.

Yes. Mainly root disease and compaction/soil degradation.

Compaction, disease.

I do. More pressure placed on lower nutrition and pest promotion.

Yes. Disease pressure increase, increased nutritional requirements that are not met.

Yes. There are issues such as disease and soil health which can contribute to this.

Yes and no. The second crop grown in a field, in my experience, will likely be higher yielding and more consistent than the first. However, once more than 5-7 crops have been grown in a field yields tend to decrease. Main reason is disease, BRR.

Yes and no. If managed well fields with a long history of cotton can still yield just as well as newer country.

Main impacts on fields with a long history that aren't performing are mainly due to cropping frequency (disease - vert, BRR), poor compaction management, nutrient depletion over time (not adequately replacing nutrient removal) and, in irrigation, poor maintenance of field drainage/gradients (low frequency of re-lasering).

No. If they are grown back to back all the time then yes I agree. However, if cotton is in a rotation with other crops or fallowed, yields tend to be on par with younger country.

Yes, mainly due to disease and high cropping production.

No.

Compaction and long term nutrient availability.

In some cases this is true, in the past back to back fields have performed just as well as fallow fields. 2019-20 though had cases of back to back fields suffering yield penalties due to alternaria from 2018-19 cotton trash leading to early infection of this years crop.

No, I disagree, I believe this is an incorrect assumption of a field with a poor rotation.

No. Apart from within the first few seasons of a development or re-grade I do not believe that a long cotton history is detrimental. As long as it is in a well planned rotation.

Yes - Verticillium Wilt.

Yes we agree. Disease and nutrition have a large impact on yield potential.

No I don't believe in this statement.

Yes. Compaction, disease, sodicity.

I think we have to fight harder to maintain higher yields in continuous cotton country but I would honestly say the same about a wheat or sorghum monoculture. I think rotation is a good thing not just for disease and weeds/herbicides but also just for general soil conditioning etc and also obviously water availability helps greatly but again I think it is wise to occasionally rotate paddocks away from cotton for a 'break crop' even if it's only for one season or if water allows a winter between cotton seasons.



APPENDIX

Yes. Disease, compaction.

In some cases yes, however, in CQ most farmers have a rotation into a winter crop. In marginal years such as this year, however, there will be a few more back to back fields and nutrition/irrigation management will be a focus.

Yes I agree. Seedling root disease eg Black root rot. Compaction.

Compaction. Soil health. Nutrient availability.

To some extent this is true mostly it has to do with disease pressure build up and a decline in fertility strongly linked to a reduction in organic matter levels and a decline in biodiversity.

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Declining soil fertility, disease.

Yes, because lower K and P and Zinc levels.

Higher incidence of disease.

More compaction at depth.

Longer history is fine as long as good rotations, weed control, herbicide rotation and proper nutrition practices are observed then yield won't be limited.

Don't agree, depends upon crop rotation, soil type and nutrition.

Disease is probably the major limiting factor with fields with a long history of cotton.

Yes

Soil structure decline.

Compaction accumulation.

Soil borne diseases increase.

Soil micro-organism decline.

Agree. Disease, nutrition and timing of ground preparation are key drivers.

Yes, slow and long term soil degradation from flood irrigation (subbing up, soil structural impacts, weight of water), removal of elements not regularly replaced (micro's), lack of rotations (in some cases), water guality on bore farms.

Don't agree, it depends on management practices and rotational history. Compaction can reduce yields, disease can reduce yields, biology or the lack of can reduce yields.

Agree - disease.

Yes sometimes.

Due to lower organic matter and soil diversity.

Moisture.

No, I don't believe that this statement is necessarily 100% accurate.

If managed fields are managed in a suitable rotation, nutrients replenished, there should not be an impact on yield. However, the back to back option will limit yield as there is insufficient time for mineralisation and break down of organic matter.

I agree with this statement if the fields are continually back to back with no fallow rotations. However due to the continuous drought cycles fields generally have 1-2 years of fallow every 5-6 years. Good growers are now applying larger than needed amounts of P, K, S & Zn so as to ensure there is enough nutrition available for high yielding crops. The reduced yields on continual back to back fields tends to be related to a multitude of issues such as compaction reducing the rooting zone of the plant and thereby limiting the ability of the plant to access nutrients even if there is plenty of nutrients available. Disease also impacts crop health after 2-3 years of back to back cotton or any crop being continually planted into the same fields...

Yes. Disease.

More compaction.

Changes in nutrient distribution through the profile.

Unfortunately had insufficient rainfall/ irrigation water to plant cotton in 19-20' season.

NOTES







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