Cotton Grower Practices

2011 Survey

A survey of selected cotton farming practices and grower views across the industry

2010-11 season

GHD Hassall with the

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Cotton Catchment Communities CRC

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Purpose

This survey of cotton growing practices on the 2010-11 season was undertaken for the Cotton Catchment Communities Cooperative Research Centre (Cotton CRC) and Cotton Research and Development Corporation (CRDC). It sought to establish the adoption of key farming practices by cotton growers to inform review of the impact and adoption of past research and future planning of research directions.

Survey sample and response

The survey was posted to a sample of cotton growers randomly selected from the Cotton CRC/CRDC industry list and followed up by telephone. To make up for low response rates, this randomly selected group was further supplemented through direct contact with others growers known to the interviewers. There is an element of potential bias in using a list of growers who are registered with or known to the Cotton CRC/CRDC .

A total of 177 growers completed the survey, representing 137,978 ha (160,032 field ha – comprising of 45,410 dryland and 114,622 ha irrigated) of cotton production in 2010-11. Of these 95 were completed by telephone interview and 82 were returned by mail, fax or email. A further 93 of the 645 growers contacted did not grow cotton in the 2010-11 season – some of these had not grown cotton for several years and some indicated that they are unlikely to grow cotton again but some wished to stay on the industry list.

As some growers had multiple farms which differed sufficiently to justify a separate entry per farm, the total number of 'respondents' is 183.

Table 1 Total hectares surveyed, by region

Region	Number of respondents*	Dryland (field ha)	Irrigated (ha)	Total Farm (ha)
Central Queensland	14	1,679	4,832	15,260
Darling Downs	36	6,446	9,519	48,979
Border Rivers (incl Mungindi)	8	3,283	8,002	23,164
St George / Dirranbandi	16	404	30,483	190,154
Gwydir	22	15,794	15,340	117,195
Lower Namoi (incl Walgett)	40	16,098	25,343	168,467
Upper Namoi	11	1,631	2,811	21,952
Macquarie	16	75	4,241	64,598
Bourke	3	0	3,025	57,400
Lachlan Murrumbidgee	17	0	11,027	414,723
TOTAL	**183**	**45,410**	**114,622**	**1,121,892**

* The distribution by region is reasonably in balance with the relative numbers of growers in each region.

Cotton Production

The 2010-11 cotton season

Surveyed cotton farms harvested a total of 137,978 ha of cotton comprising 114,622 ha of irrigated cotton and 23,357 Green ha (45,410 field ha) of dryland cotton. Table 2 indicates for each region the average harvested hectares of dryland and irrigated cotton, yield and rainfall experienced in the 2010-11 season. Dryland cotton was planted double or single skip, solid and some other configurations such as '3m super singles' and 60 inch rows. A further 2,140 ha of dryland cotton was planted but not harvested (Table 3) as well as some irrigated cotton that did not make it to harvest.

Table 2 Irrigated and dryland areas, yield and rainfall of surveyed farms

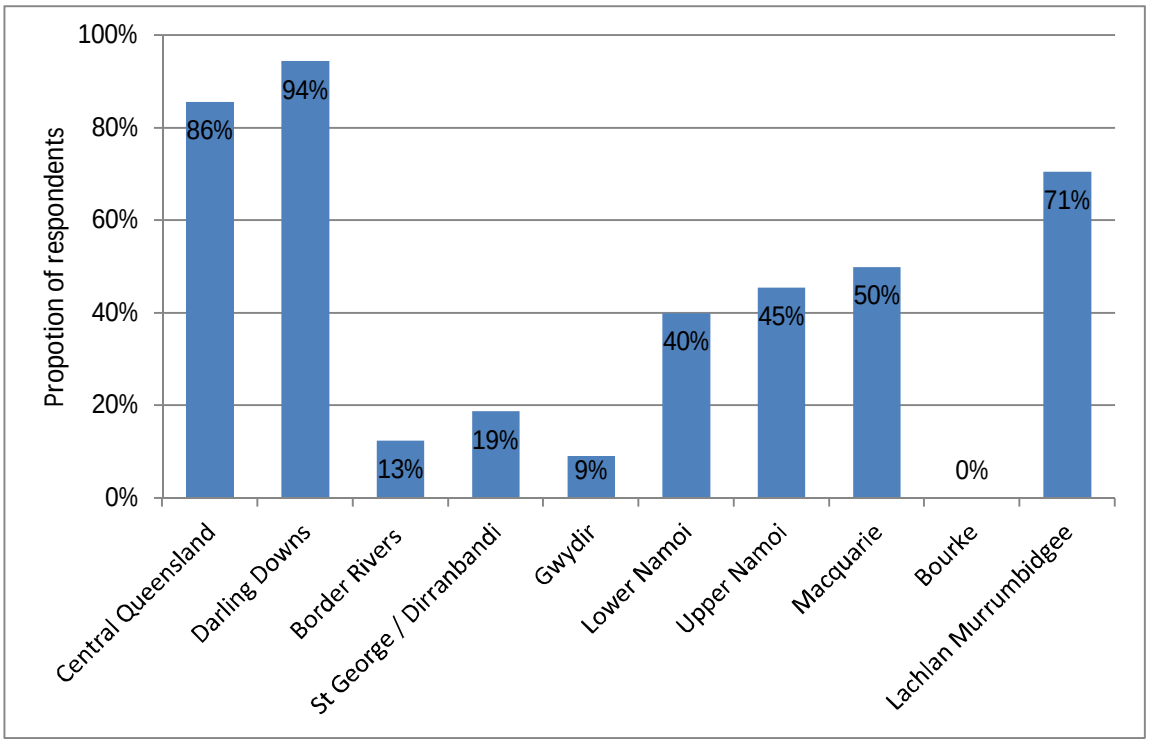
Region		Number of Farms	Avg Harvested hectares	Avg. Green hectares	Avg Yield (bales/ha)	Rainfall (mm)
Central Queensland	Dryland	3	929	234	1.3	1227
	Irrigated	13	807		6.1	982
Darling Downs	Dryland	26	560	148	2.8	937
	Irrigated	29	372		6.7	948
Border Rivers	Dryland	2	75	1071	2.4	410
	Irrigated	8	283		10.1	465
St George / Dirranbandi	Dryland	1	404	202	0.0	560
	Irrigated	16	1905		11.3	395
Gwydir	Dryland	17	1006	466	2.1	418
	Irrigated	19	685		9.8	503
Lower Namoi	Dryland	16	248	506	2.2	459
	Irrigated	37	328		10.2	475
Upper Namoi	Dryland	8	0	128	3.0	563
	Irrigated	10	649		8.8	557
Macquarie	Dryland	1	0	75	0.8	N/A
	Irrigated	15	1008		9.1	461
Bourke	Dryland	0	1642	0		N/A
	Irrigated	3	1000		9.9	225
Lachlan Murrumbidgee	Dryland	0	204	0		N/A
	Irrigated	17	281		9.5	436
ALL REGIONS	Dryland	**74**	**614**	**128**	**2.7**	**664**
	Irrigated	**167**	**686**		**9.2**	**579**

Table 3 Dryland areas planted but not harvested, by region

Region	Dryland cotton planted but not harvested (ha)
Central Queensland	1108
Darling Downs	578
Border Rivers	0
St George / Dirranbandi	404
Gwydir	0
Lower Namoi	30
Upper Namoi	20
Macquarie	0
Bourke	0
Lachlan Murrumbidgee	0
TOTAL	**2140**

Flooding occurred in a number of regions during the growing season (Figure 1). The actual proportion of farms experiencing flooding in Central Queensland may well have been higher as farms in Theodore were deliberately excluded from the survey as most had not been able to harvest a crop due to flooding.

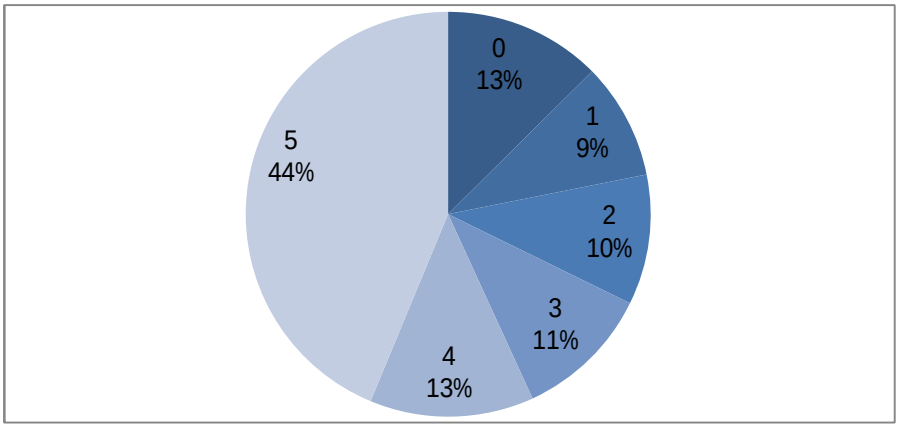
Figure 1 Proportion of farms in each region experiencing significant flooding of the crop



Recent seasons

Despite the difficult conditions of recent years, almost half of all respondents who grew cotton last season (2010-11) had also grown cotton on their farms in each of the past 5 seasons (Figure 2). 13% were new to cotton growing or returning after a period of 5 years or more. Ten respondents grew cotton for the first time in 2010-11.

Figure 2 Number of seasons in which cotton has been grown on the farm in 5 years prior to 2010-11



[A further 93 growers contacted were not surveyed as they had not grown cotton last season.]

Few growers surveyed were new or recent recruits to cotton production with 91% having grown cotton prior to the 2005-06 season (Table 4). An exception is the relatively new cotton growing region of Lachlan Murrumbidgee where 47% had not grown cotton more than 6 seasons ago.

The long experience with cotton production that most respondents have may be indicative of the industry broadly. It is also likely influenced by the nature of the Cotton CRC/CRDC industry list used which may not include all newer growers. (The grower list for the Lachlan Murrumbidgee region was supplemented for the survey with additional names by James Hill).

Table 4 Proportion of growers in each region who grew cotton in the 5 years prior to 2010-11 (ie 2005-6 to 2009-10 inclusive) and prior

	Number of years in which cotton was grown between 2005-6 to 2009-10*						Cotton growing prior to that
Region	**0**	**1**	**2**	**3**	**4**	**5**	
Central Queensland	7%	0%	0%	14%	29%	50%	100%
Darling Downs	3%	14%	11%	11%	11%	50%	97%
Border Rivers	13%	0%	13%	0%	50%	25%	100%
St George / Dirranbandi	6%	13%	6%	6%	19%	50%	100%
Gwydir	5%	5%	18%	14%	5%	55%	95%
Lower Namoi	5%	8%	13%	18%	10%	48%	98%
Upper Namoi	36%	0%	0%	9%	9%	45%	73%
Macquarie	31%	19%	13%	6%	6%	25%	81%
Bourke	0%	0%	67%	0%	0%	33%	100%
Lachlan Murrumbidgee	41%	18%	0%	6%	12%	24%	53%
Totals	**13%**	**9%**	**10%**	**11%**	**13%**	**44%**	**91%**

*All of these survey respondents had grown cotton in 2010-11.

People

Experience

The cotton industry is made up of a high proportion of growers who have many years of experience in cotton production. Growers were asked about how long they personally had been involved in cotton production and how long the farm enterprise in which they worked had grown cotton. These were generally closely matched and showed that half of the respondents and farms have over 20 years' experience in cotton production (Figure 3) and three quarters have over 15 years experience.

On closer investigation of the regional distribution of individual experience (Figure 4) and farm enterprise experience (Figure 5) in cotton growing, it becomes evident that several of those farms new to cotton growing involve owners or managers who have previously grown cotton.

Figure 3 Years of experience of individual growers and farms

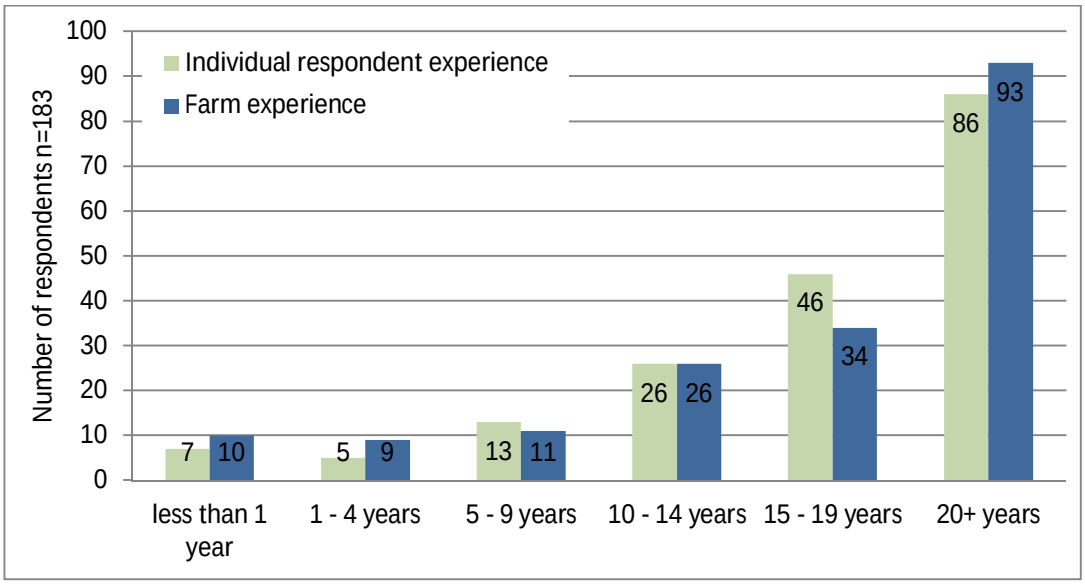


Figure 4 Years of individual grower experience in the cotton industry, by region

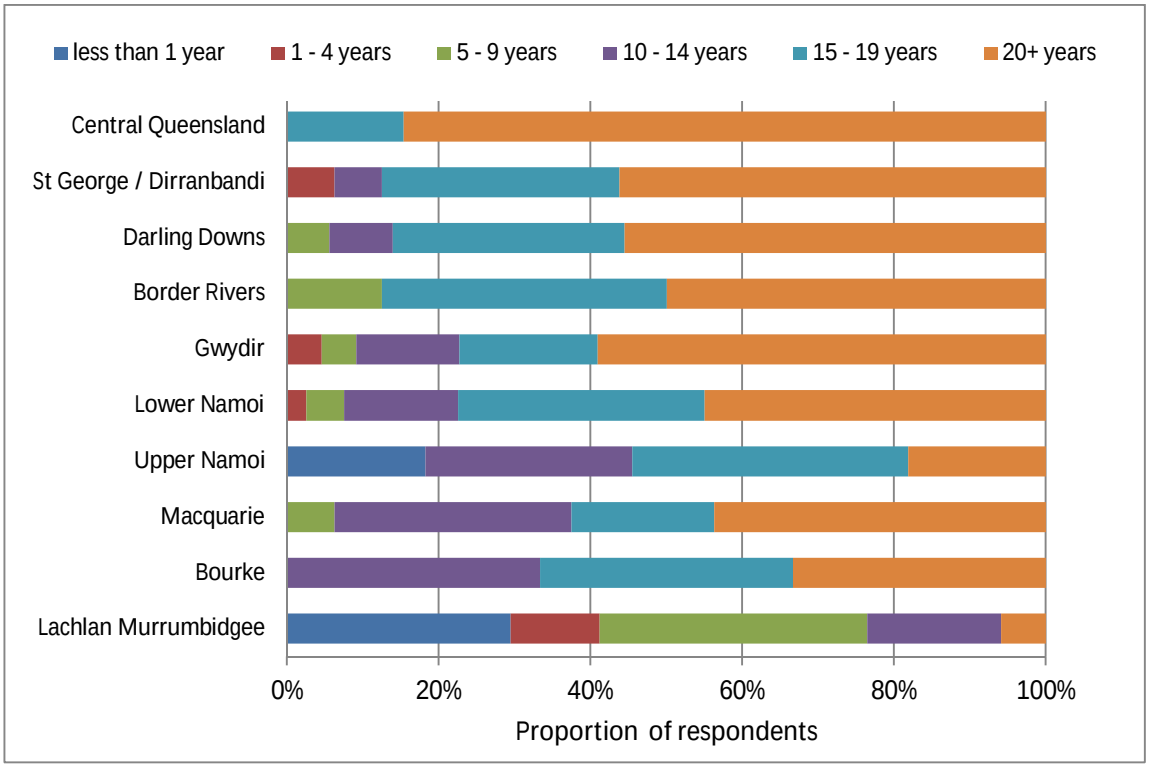
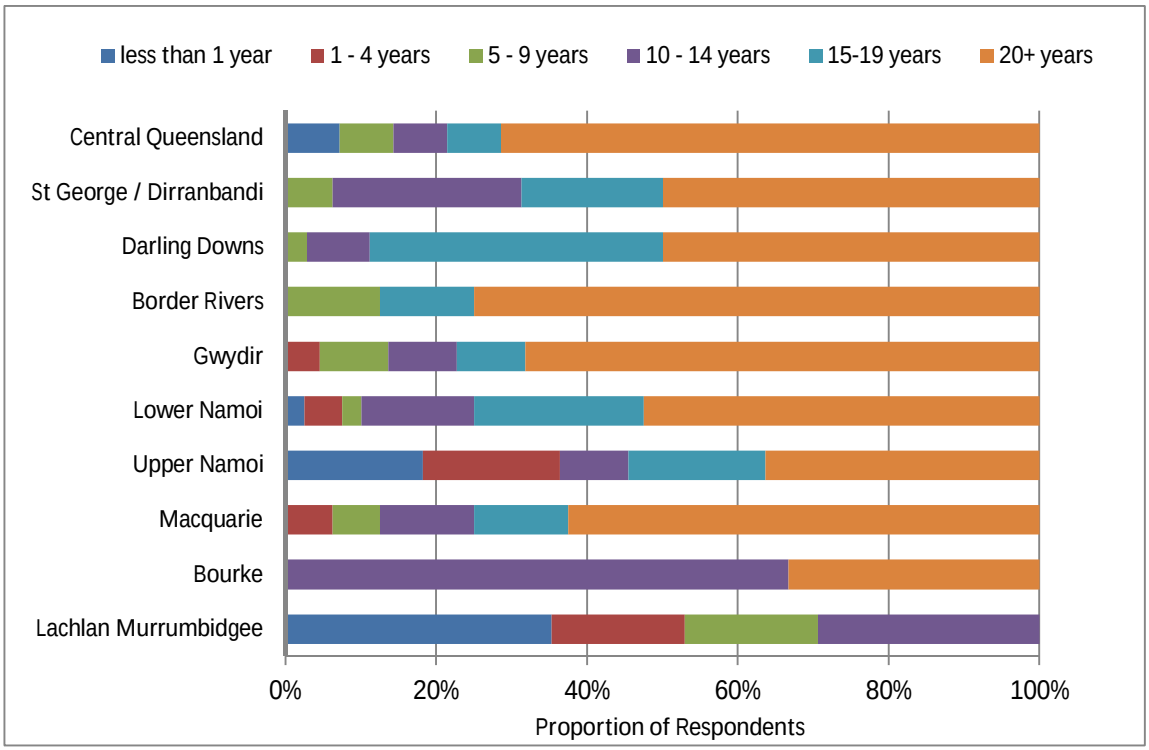


Figure 5 Years of experience in growing cotton for the farm enterprise, by region



Employment

Growers were asked the number of full time equivalent (FTE) staff employed year round on their farm, including themselves. It should be recognised that this is not a complete picture of farm employment as some farms will also employ seasonal staff, which will vary significantly depending on whether they self harvest or use harvesting contractors.

This information (Table 5) shows that employment on surveyed cotton farms has increased from the 2009-10 to the 2010-11 season.

Table 5 Average and range of full time employees on cotton farms per hectare

Employees	FTE 2010-11	FTE 2009-10
Average FTE/farm	4.01	3.47
Average FTE (per 1000 farm hectares)	0.65	0.57
Average FTE (per 1000 ha cotton)	4.59	3.96
Range of FTE/farm	0 – 45	0 - 35

Land use mix on farms where cotton is grown

Cotton growing farms surveyed had on average approximately 40% of their total land area dedicated to cultivation (of which cotton accounted for approximately 1/3 of the area in 2010-11) with a similar proportion dedicated to native vegetation (Figure 6). The land use mix varies substantially between regions (Figure 7) and by farm with the proportion of the farm dedicated to cultivation ranging from 1.5% to 100%.

Figure 6 Land use mix on surveyed cotton growing farms

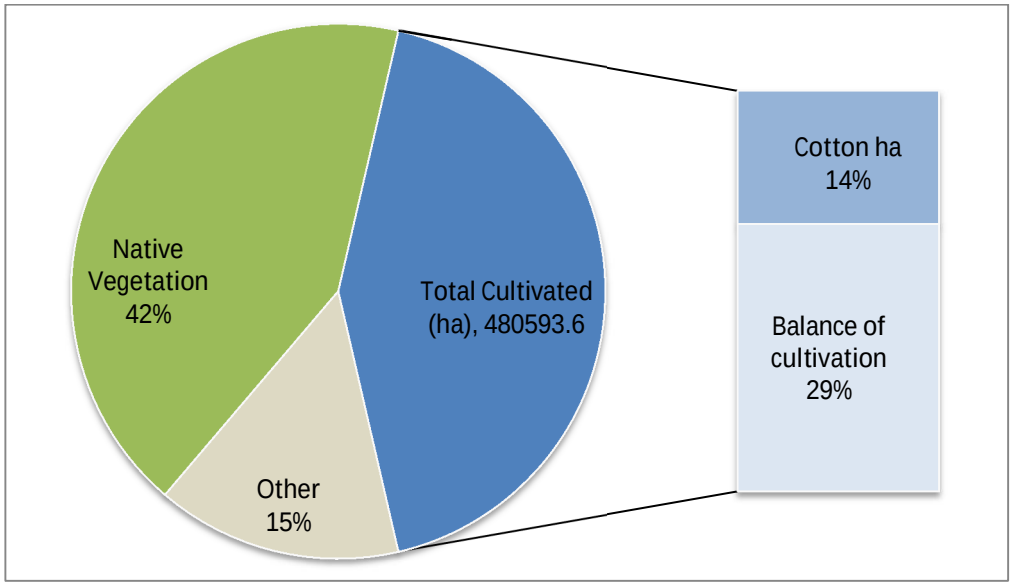
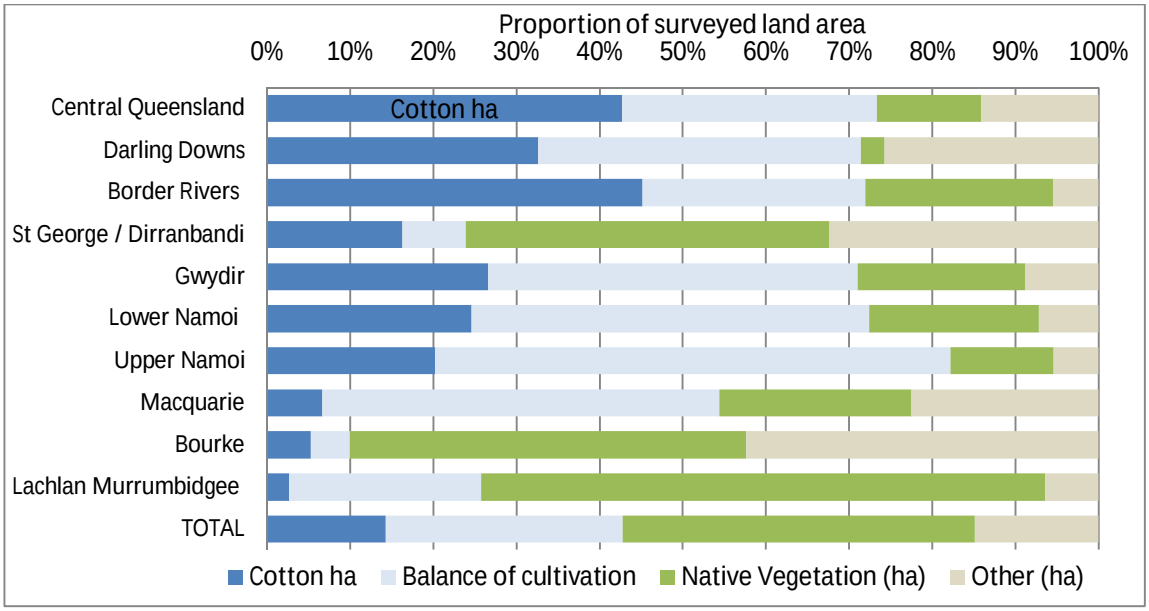


Figure 7 Average land use mix on surveyed cotton growing farms by region



Native Vegetation and Riparian Zones

As illustrated in Figure 6, cotton growers have significant areas of native vegetation on their properties, particularly in the more western regions. Table 6 indicates the proportion of growers and total area that has been revegetated or actively managed in the past 5 years and the riparian zones.

Table 6 Revegetation and active management of native vegetation and riparian zones in past 5 years and length of riparian zone on surveyed farms

	% Growers who revegetated	% Growers actively managing	Revegetated Area (Ha)	Area managed (Ha)	% Growers with riparian zone	Average (km)	Range (km)	Riparian zone actively managed (average km)
Central Queensland	7%	36%	4	261	57%	4	2 to 11	4
St George / Dirranbandi	6%	50%	20	47,846	63%	16	0.2 to 60	20
Darling Downs	6%	28%	3	812	56%	4	0.7 to 10	4
Border Rivers	50%	38%	1,107	900	75%	8	2 to 20	6
Gwydir	23%	59%	561	6,003	77%	14	3 to 44	6
Lower Namoi	13%	38%	838	17,546	60%	8	0.5 to 30	9
Upper Namoi	27%	45%	224	1,233	73%	6	2 to 10	4
Macquarie	13%	31%	120	3,380	69%	10	3 to 20	6
Bourke	0%	67%	0	5,100	100%	23	10 to 40	
Lachlan Murrumbidgee	29%	41%	145	13,242	53%	7	2 to 15	7
Totals	**15%**	**40%**	**3,021**	**96,323**	**63%**	**9**	**0.2 to 60**	**8**

Table 7 Comments on native and riparian area management

Comment
No stock
River on the boundary is fenced
Management consisting of limiting livestock.
Feels he is denied access to manage problems in riparian areas such as control of introduced weed e.g. mother of millions and manmade issues such thick box regrowth giving bare understorey that create bare areas. (Poor outcome near stream) he would like to have the ability to more actively manage.
In the last 20 years, not in the last 5, the farm has managed native creek
Trees planted and stock removed from riparian area
Green vegie bugs a big pest in revegetated area
Put in pipes to minimise erosion in riparian area. Zone is up to 100 m wide off the river
Controlling stock in riparian area
Hillston creek areas are seasonal - in good condition but not actively managed.
Native vegetation is managed through grazing management.
Native vegetation area not stocked, but not fenced. Actively managed so not stocked (good revegetation)
May need to consider managing riparian area
Leasee of land, not property owner
No revegetation - because they won't do a swap
Since buying & removing all stock all river & creek bank are natural
Native vegetation are fenced off and not stocked
Would like to manage riparian area but not allowed to (protected species)
Some field without tree lines
Native vegetation is an area of native grass that the EPA monitors on their land
Riparian areas were allowed to return to native veg over 15 years ago.
Fenced and unstocked.
Two water courses - Gwydir, Corale Crk
Sprays riparian area for noxious weeds
Graze around river 1 in 8 years
Actively manage by having fenced off majority of river to stock.
Very conscious of native vegetation and have no issues.
Grazed, mechanical weed maintenance and encouraged.
No bank issues with vegetation to the waterline.
Are not on the river but do have 36 ha of Native veg along the boundary of the property and surrounding house. Don't graze this area has been fenced off as a natural area.
Native vegetation area fenced off and selectively grazed.
Native vegetation actively managed is primarily to regenerate summer grasses
Removed citrus trees and reduced irrigated cropping area due to water cuts - returning to native scrub
Control some weeds , control burn , avoid disrupting the area , avoid spray drift into the area
Removed stock to give country a break - seeing good regeneration of young trees
Natural state/uncleared riparian
Timber around cultivation areas
Fenced riparian zone (with CMA), stock intermittently

Information and advice on cotton growing

Sources of information and advice

Table 8 illustrates that the majority of growers seek advice from a consultant agronomist. In many cases this is the primary and most important source of information, as illustrated further in Table 9 which lists those sources identified as being the two most important sources of information and advice.

Table 8 Sources of information and advice

Source of advice	# of Respondents (from a total of 183)
Consultant agronomist	161
Other growers (including family, neighbours, and staff)	79
CSD agronomist	32
Reseller agronomist	28
Extension officer	21
Researcher	18
Other consultant	10
Cotton Australia rep	11
Suppliers	7
Irrigation consultant	2
No-one	2
Other*	18

* 'Other' responses consist largely of various industry organisations and bodies such as ACRI, DEEDI, DPI and CSIRO, and their related publications. This also included accounting, marketing and business representatives. 2 respondents listed field days, and 3 indicated 'all sources available'.

Table 9 Most important information sources for respondents

Information Source identified as being one of the 2 most important	Number responses
Agronomist / consultant	132
Online tools	25
Other growers	25
CSD	21
Pest Management Guide	16
Own experience/family	10
CRC	10
Production Manual	8
Publications/other bodies	8
Field days	6
Internet	5
Weather/news	5
Education/courses	4
Research/DEEDI	4
Resellers/suppliers	3
James Hill	2

Table 10 provides a summary of the aspects on which advice is sought on from consultants with insect management and nutrition being the most commonly mentioned.

Table 10 Aspects of farming advised on by consultants

Choice	Response Total (n=183)
Insect management decision (sprays, etc)	126
Nutrition	102
Insect checking	100
Irrigation	86
Weeds	83
Rotations & crop selection (i.e. varieties)	76
Diseases	66
Soils	49
Plant mapping/fruit retention	43
Agronomy/general cotton growing advice^	29
Farm mapping	14
Marketing	12
Everything^	10
BMP	9
Crop management/growth control^	7
Planting/harvesting date (timing)^	5
Financial and business management	4
Human resource management	0
Other*	8
N/A (ie do not use a consultant)	4

* Note that this table has been adjusted for 'other' responses that fit into these categories. Due to the large number of responses, the following categories marked ^ were added to the original list for coding of the 'other' responses. Other aspects that were mentioned by respondents include: Tillage methods; Field selection; Technologies; Farm productivity (i.e. sustainable practices, budgeting, etc.)

Websites

Many respondents did not identify any websites that they particularly used. Cotton Seed Distributors' (CSD) website was the most commonly mentioned followed by that of the Cotton CRC.

Table 11 Websites used by growers

Website	Response Total
CSD Website	55
Cotton CRC website	37
Cotton Australia website	21
Weather sites	14
Google	10
CRDC	5
myBMP	5
Suppliers	4
Financial/market websites	4
CSIRO	2
Not specified	8
Other*	10

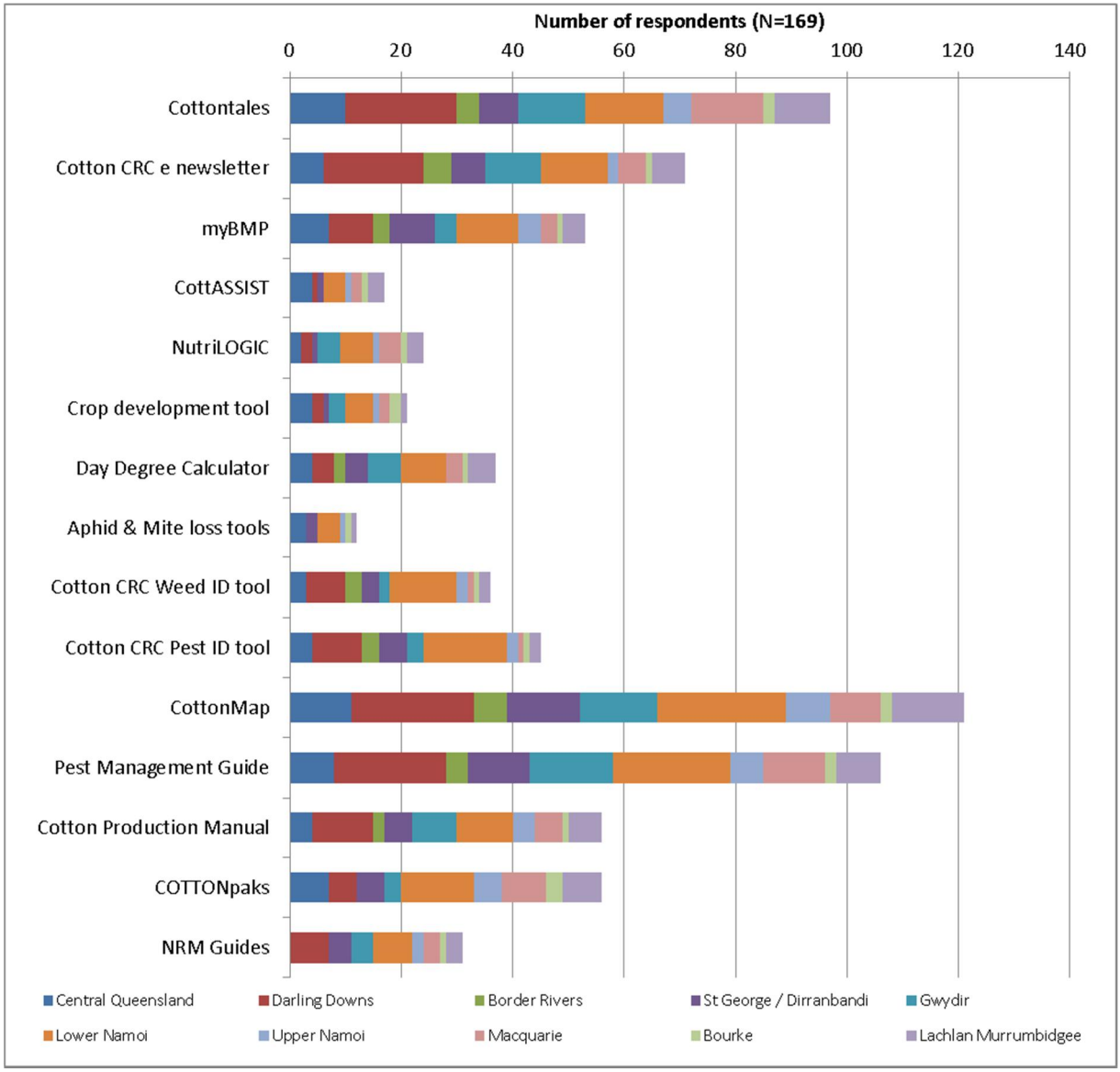
* Other websites mentioned include: Ag Facts; AGGRo; Namoi Cotton; Pestgenie; QLD DPI website; Cotton International; Cottassist; Spraywise; Australian Crop Consultant Association.

Cotton CRC tools and resources

CottonMap and the Cotton Pest Management Guide were the most widely used of the Cotton CRC tools, followed by CottonTales. The lowest usage was of the CottASSIST suite of tools followed by *my*BMP. However, there is comment from a grower that whilst he does not use CottASSIST himself, these tools are valuable and help to inform the advice from his consultant.

More growers were somewhat hesitant in their indications of using the COTTONpaks, NRM guides and *my*BMP than for the other tools. Conversely, the positive responses were more definite in relation to use of CottASSIST, the Aphid and Mite loss tools and CottonMap.

Figure 8 Usage of CRC tools and other information resources used



Other information

The most commonly mentioned other printed or email materials used for information about cotton growing are the Australian Cottongrower (Greenmount Press), CRDC's Spotlight newsletter and CSD information (Table 12).

Table 12 Other printed and email information/news used for information about cotton growing

Resource	Number of respondents	% of respondents
Australian Cotton grower	44	41%
Spotlight	33	31%
CSD email newsletter, Web on Wed.	23	21%
News from ginner/marketer	15	14%
The Land/Country Life	9	8%
Other cotton publications (CSD, CGS, cotton grain, etc.)	8	7%
Cotton Australia email updates	7	7%
Cotton outlook	7	7%
Marketing info brochures	4	4%
Supplier publications	4	4%
Local area publications	4	4%
Brochures from agronomist	3	3%
Cotton logic	2	2%
Weather updates	2	2%
Prices, news, market reports etc.	2	2%
[Total respondents for this question]	107	

Training

Most growers did not identify any training or educational courses that they had done and found helpful for their cotton production decisions. The course most commonly mentioned was Chemcert (and similar) followed by insect management training (including several mentions of the IPM short course and other courses on insect checking) as presented in Table 13.

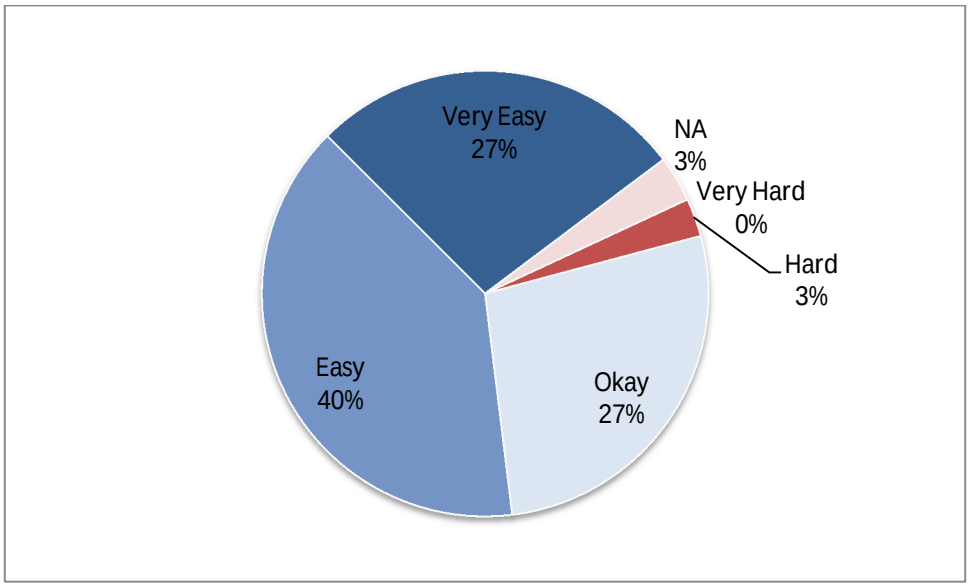
Table 13 Education and training courses undertaken and considered helpful by respondents

Training course	No. Respondents	% Respondents
Chemcert or similar chemical courses	23	13%
IPM courses	16	9%
Degree/Diploma	15	8%
Unspecified course (general agronomy)	15	8%
Cotton production course	13	7%
Spray application	8	4%
Conferences, tours	8	4%
Field day/walks	7	4%
Water wise /other water management courses	7	4%
Soil courses	6	3%
Irrigation course	6	3%
Monsanto accreditation	5	3%
Bollgard course	6	3%
Roundup ready training	3	2%
CRDC course – Field to Fabric	4	2%
No training specified	77	42%

Perceptions of information availability

75% of respondents thought that it was easy or very easy to find information that they were looking for. A few (marked N/A) said that they either didn't go looking for information or relied on their agronomist to source it.

Figure 9 Ease of finding information about cotton growing



When asked what additional information they would like that they could not find, most didn't have any issues. The following were identified:

- Improved Yield (6 respondents)
- Marketing/business/economics of growing (6)
- Weather/climate/flooding (5)
- Soil/Fertiliser/Nutrition (4)
- Pest/weed management (3)
- Markets/price (3)
- Water losses from storages (3)
- Irrigation/ water management (3)
- Local information/networking (3)
- Benchmarking (2)
- Ginning (1)
- New thinking (1).
- Information for high yielding crops (1).

A range of comments were made about information and advice on cotton growing as presented in Table 14.

Table 14 Further comments on information and advice

Further Comments
Information availability
Do things more simply now. Browse information - but you can have too much - selective about what to take in
Information available, usually only takes 1 phone call
Not aware of the CRCs tools – think that the aphid and mite loss tool would be handy.
Has direct contact with researchers and has researchers work on farm
Doesn't think a lot is going on in the industry - "very busted"
myBMP new web based system is very good for gaining info - big benefit in long term
Agronomists are another important information source for them Harder to find info from people in other areas - needs to be documented
Word of mouth is 'greatest tool we have' Heaps of info available. Industry is very progressive as a general rule. Doing a good job relative to other industries like wool.
Personally don't have time to go online to use tools - rely on agronomist a lot to do the job Walks/field days are good
Relies heavily on agronomist because he's new to cotton. Grows maize so has experience in similar systems
Publications are very handy (Spotlight, cotton tales etc.)
Looks at Weed and Pest ID tools but the agronomist advises them mostly. CSD Agronomist is from Extension and Development team
Always thinking about how to do it better This was first year back after a break of 5 - will start to look at info more next year
Doesn't use CRC e-newsletter would be interested
Expects his consultant to be looking at these resources/tools.
Lots of good quality research, Lots of talk
James Hill is helpful, Always trying to get us up to speed with BMP online
Agronomist keeps up to date and passes information on
Specific Issues
Conducted their own research into stopping deep infiltration however ran out of money to support ongoing research
GPS to improve farming technology a good thing but have to be careful you are not making management decisions on the wrong assumptions.
Pix applications subjective. Getting crop to finish when wanted.
Disease is a big issue e.g. Fusarium wilt
Water measuring programs are plentiful - but they use none. Concept isn't that complicated, they already know the numbers. 'Nothing like footprints in the paddock' Use soil corer from US, which makes a big different to WUE
Markets are the hardest thing to predict due to volatility Agricultural commodities are difficult to pick
Need better weather forecasting.

Irrigation Improvements

The information in this section is based on responses from the 167 survey respondents who were irrigators (Table 15).

Table 15 Number and proportion of irrigators per region

Region	Irrigated	% of respondents for region
Central Queensland	13	93
Darling Downs	29	81
Border Rivers	8	100
St George / Dirranbandi	16	100
Gwydir	19	86
Lower Namoi	37	93
Upper Namoi	10	91
Macquarie	15	94
Bourke	3	100
Lachlan Murrumbidgee	17	100
TOTAL	**167**	**91**

(58 of these irrigated growers also produced dryland cotton in the 2010-11 season.)

Water Use Efficiency

Table 16 provides a breakdown of the water use and yield for a range of in season rainfall categories whilst Table 17 provides the same information according to regional total and averages.

69 growers (41% of irrigator respondents) did not know their water use efficiency (WUE) in bales per ML. Of those who did, approximately one quarter had included rainfall in this calculation of water use efficiency.

A few growers mentioned that it was somewhat meaningless to consider WUE this season due to the extreme weather conditions (flood).

Table 16 Water usage, yield and water use efficiency grouped by rainfall categories

Seasonal Rainfall Aug-March mm	Number of respondents #	Total irrigated ha	Average Yield (bales/ha)	Average No. irrigations /field	ML applied (total ML)	ML/ irrigated ha	WUE bales/ML	
							Grower estimate*	Calculated^
0-100	2	1,424	11.9	8.0	10,658	7.5	-	1.6
100-200	4	1,559	9.0	6.7	8,593	5.5	1.4	1.6
200-300	7	5,635	10.1	6.4	36,384	6.5	1.3	1.6
300-400	16	11,244	9.9	9.0	46,842	4.2	1.7	2.4
400-500	20	42,295	10.0	6.0	234,331	5.5	1.7	1.8
500-600	23	11,697	9.7	6.1	63,275	5.4	1.7	1.8
600-700	14	9,612	9.0	5.5	41,081	4.3	1.6	2.1
700-800	4	883	6.7	6.3	1,992	2.3	2.6	3.0
800-900	2	1,356	8.3	3.9	3,703	2.7	2.8	3.0
900-100	5	1,675	5.9	2.1	1,758	1.0	2.0	5.6
1000-1100	9	2,215	4.9	2.3	4,180	1.9	1.8	2.6
1100-1200	4	1,315	3.9	1.5	1,655	1.3	1.3	3.1
1200-1300	3	2,200	9.3	2.7	2,820	1.3	2.8	7.3
1300-1400	1	757	9.3	6.0	4,921	6.5	1.5	1.4

This table present information from a total of 124 respondents as not all growers were able to provide a rainfall estimate

* 76% of respondents who gave an estimate of WUE indicated that rainfall was not included in their calculation

^ The calculated WUE is based on total water use and average irrigated yield/ha on each farm, it does not take rainfall into account

Table 17 Water usage, yield and water use efficiency grouped by region and total

Region *	Number of respondents	Total irrigated ha	Avg. Yield (bales/ha)	Avg. No. irrigations/ field	ML applied (total ML	ML/irrigated ha	WUE bales/ML	
							Grower estimate	Calculated
Central Queensland	13	4,832	6.1	3.3	12,658	2.6	1.6	2.3
Darling Downs	29	9,519	6.7	2.1^	13,290	1.4	2.6	4.8
Border Rivers	8	8,002	10.1	6.6	29,560	3.7	1.7	2.7
St George / Dirranbandi	16	30,483	11.3	7.4	209,487	6.9	1.8	1.6
Gwydir	19	15,340	9.8	6.3	85,246	5.6	1.8	1.8
Lower Namoi	37	25,343	10.2	6.3	91,735	3.6	1.5	2.8
Upper Namoi	10	2,811	8.8	4.5	7,558	2.7	2.4	3.3
Macquarie	15	4,241	9.1	6.5	25,801	6.1	1.3	1.5
Bourke	3	3,025	9.9	6.0	23,675	7.8	1.1	1.3
Lachlan Murrumbidgee	17	11,027	9.5	10.0	40,977	3.7	1.6	2.5
ALL REGIONS	**167**	**114,622**	**9.1**	**5.8**	**539,986**	**4.7**	**1.8**	**1.9**

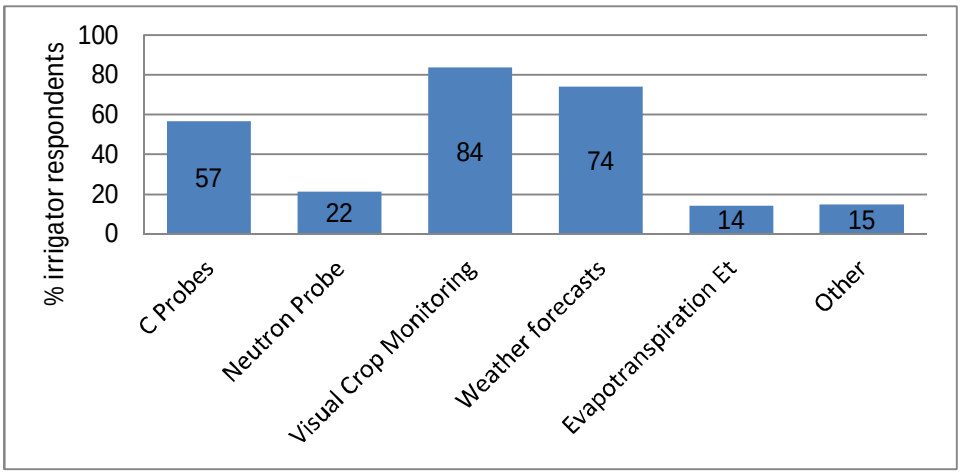
* Refer to notes on previous table which also apply here
^ Figure is lower due to supplementary irrigation on some farms on the Darling Downs

Irrigation scheduling

With the exception of 2 respondents all used some technique for scheduling irrigations with the most widely used being visual crop monitoring (Figure 10 and Figure 11). 40 respondents (24% of irrigator respondents) used only visual crop monitoring and/or weather forecasting for their irrigation scheduling.

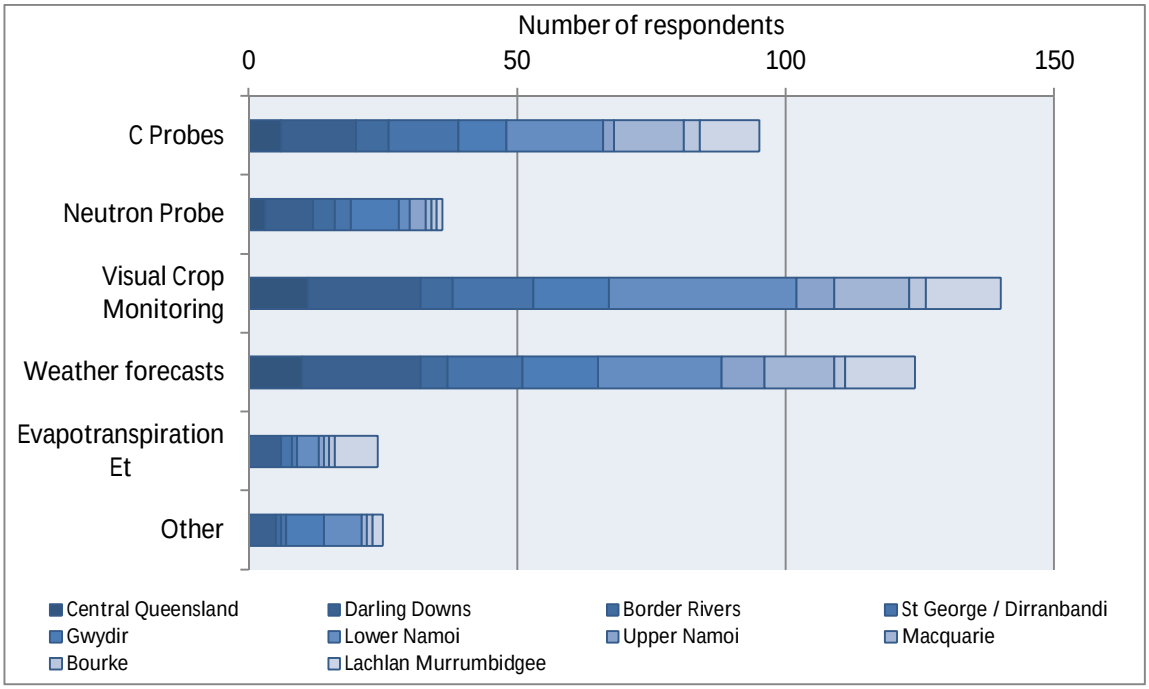
116 (70%) of irrigator respondents used either a capacitance probe (C-Probe, including Enviroscan) or neutron probe. A small number (8.5%) used both. It is interested to note the continuing use of neutron probes for moisture monitoring and scheduling.

Figure 10 Methods used for irrigation scheduling of cotton



"Other" irrigation scheduling methods used were: Shovel (6 respondents); Hand Probe (5); Experience/Instinct (4); Calender days (4); Capacity to water (2); Agronomist Plant Mapping (1).

Figure 11 Irrigation scheduling methods by region

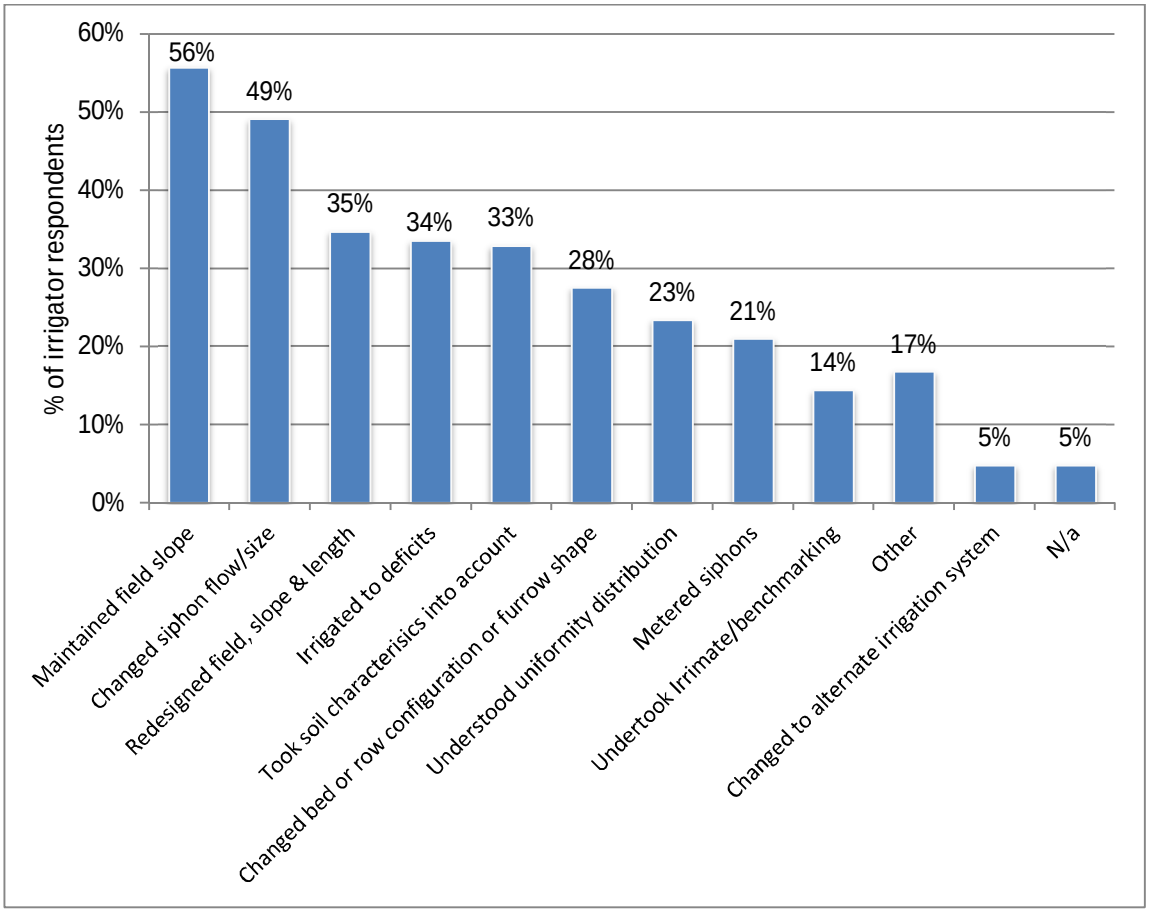


Irrigation improvements

Over the past 5 years, 96% of irrigators surveyed had made some form of improvement to their furrow irrigation systems or had changed to an alternate irrigation type. Figure 12 shows that maintenance of field slope was the most widely used.

Almost half of the surveyed irrigators had made changes to the flow or size of their siphons and 20% had metered their siphons. A small percentage (5%) of irrigator respondents had installed alternate irrigation systems.

Figure 12 Improvements to furrow irrigation



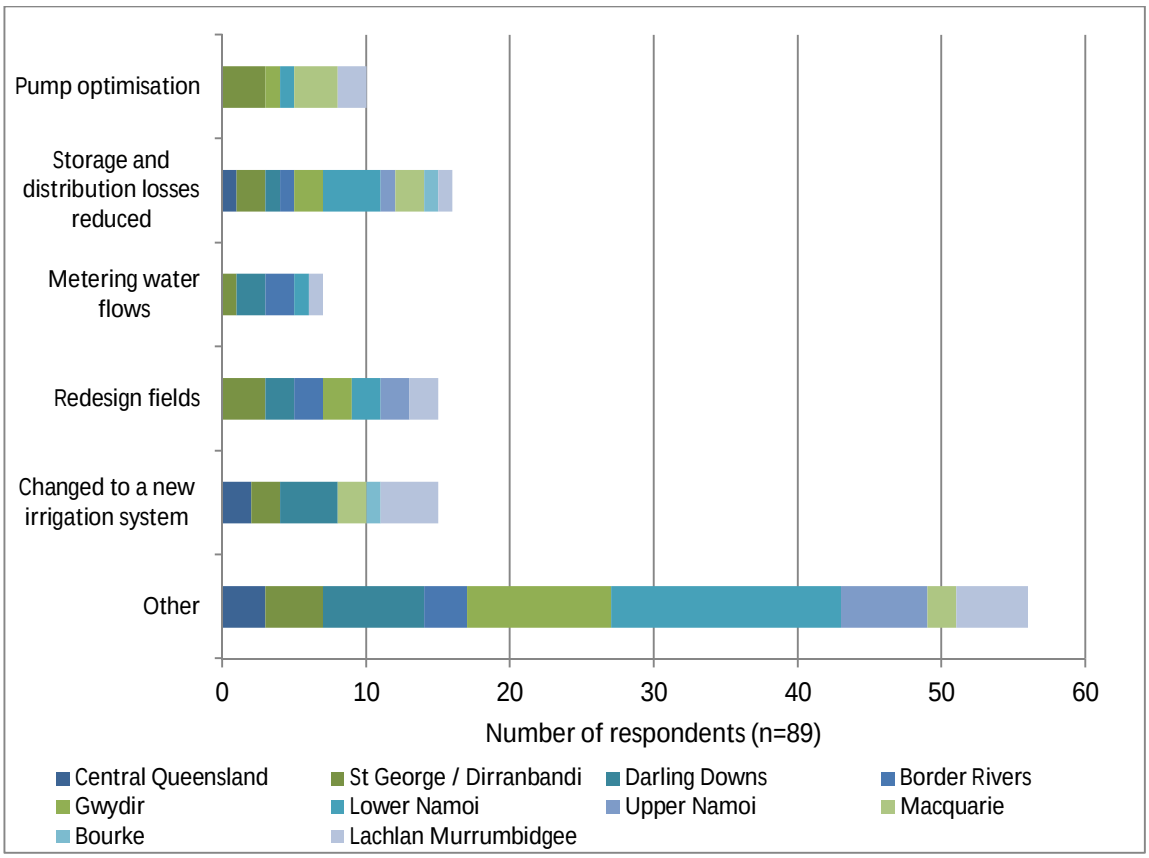
"Other" methods identified for improving furrow irrigation:

- Increased head/flow (6 respondents)
- Monitoring storage/water table/etc. (6)
- Timing (6)
- Use of probes (3)
- Channel maintenance/changes (3)
- Changes to water outlet (siphon/sprinkler) (3)
- Pipes through bank (PTB) (2).

Table 18 Irrigation efficiency improvements over the past 5 years

Improvement	Response Total	Response %
Redesign fields	22	20%
Changed to a new irrigation system	18	16%
Storage and distribution losses reduced	16	15%
Pump optimisation	14	13%
Metering water flows	11	10%
Distribution: banks/ditches/channels	10	9%
General improved maintenance/management	7	6%
Storage: bores/dams/capacity	7	6%
Tailor crop to suit irrigation methods	3	3%
Pipe through bank (PTB)	2	2%
Total	110	

Figure 13 Improvements to irrigation in the last five years, per region



"Other" includes those categories added in Table 18.

Table 19 Additional comments on irrigation

Irrigation Comments
Bankless channels. yield down due to cold season
Optimising irrigation - depths and shapes, trials with short irrigation cycles, early water shut-off and scheduling.
Supplementary irrigation of some fields: 165 ha, Double skip, 2 irrigations, 4.3 b/ha
Only small tweaks to redesign fields Dry during growing period
Irrigation tweaking restricted by bore delivery rates
72-82% efficiency on flood
Haven't done much in the way of improvement since '06
Slope and run length tailored to suit soil movement + irrigation efficiency Altering timing to refine flow rates, time of irrigation and intervals between irrigation Would like to know water use efficiency, but there is no set standard or clear explanation - not sure if there is a clear definition or how to go about it (i.e. recycled water? include pumped back water?)
Also uses a 100 ha drip from storage in WLD - 25 mm/day Furrow surprisingly efficient from storage. Saving a ML, growing 1 bale less Speed of getting water on has increased in recent years (up to 70 m/hr this year) Still calculating 2010/11 WUE value, but says it's going to be a higher value than 09/10. Previous years WUE were 1.44, 1.23, 1.58 (08/09, 07/08, 06/07 respectively) Mentioned that everyone measures irrigation different, so you're not comparing apples with apples (e.g. rainfall, soil moisture profile, etc. affects bales/ML measure)
Changed contractors Channel leakage Using consultant for measuring water
Due to drought not too much capital spent during last few years.
No water this season just 2 passes with lateral on 80 ha. Flooding responsible for low yields.
Cotton flooded, did not put out secondary roots so had to water to keep plant going regularly when soil was already wet
Not really full irrigators - just supplementary
Very reliable 3 day BOM forecasting for Narrabri Helps in irrigation scheduling
Disaster from floods 'Capacity to water' = how much water we have access to Change in row configuration from 2 m -> 1 m -> 2 m
Ginning not finished yet so doesn't know WUE - was difficult to accurately monitor water use lase season as some runoff from farm occurred and some unmetered pumping of overland flow Irrimate irrigation evaluation for 2 seasons and water track for 2 seasons
Not known sue to the very wet season and use of non-allocated water during whole season.
PWUI 1.39 bales/ml
Maximum of 10 hours of irrigation run. Electrifying the bore pumps Aim to gain 4% WUE per year. GVIA trials conducted Water supplies from: Bore, High security river flow and grey water ex Moree Town
4.5 bales/ml is for 2008/9 season under centre pivot - last 2 years too dry or too wet to give a fair comparison
Our properties were developed properly in the first place that would make them easy to irrigate and efficient. Most of rainfall was received by mid-December and very little when needed most
workload, allow time to get around all paddocks, experience with the system
Supplementary irrigation: 54 ha double skip 5.5 bales/ha
Have tended to reduce irrigation deficit on Bollgard II fields back to 55 mm rather than the 65 mm deficit use to use for conventional cotton.
Comment made about up grading irrigation pumps to get water on quicker and off quicker
Will have furrow and lateral move systems.

Starting soil moisture
We now measure only what we can manage
Irrigated cotton being grown as single skip. Dryland is double skip
Optimise irrigation - getting water on and off field quickly by pushing more water in the head ditch and shorting of irrigation cycles
Trialled: 1. Lateral move overhead irrigator; 2. Bay less irrigating; 3. various syphon configurations Analysis of overall farm water balance (during and post season)
Farm has irrigated cotton under a pivot
Have developed a fixed syphon irrigation system suited to his fields which tend to have red country at the top of the fields and black soil at the bottom.

Monitoring of Groundwater Quality

90 of the irrigator respondents were groundwater users. Some regions had no groundwater use (Bourke) or a very small number of groundwater users (Table 20).

Table 20 Number and proportion of surveyed farms using groundwater in each region

	Number of groundwater users	% of irrigator respondents
Central Queensland	4	31
Darling Downs	21	72
Border Rivers	2	25
St George / Dirranbandi	2	13
Gwydir	9	47
Lower Namoi	27	73
Upper Namoi	9	90
Macquarie	4	27
Bourke	0	0
Lachlan Murrumbidgee	12	71
Totals	90	54

The majority of groundwater users monitor every few years or not at all (Figure 14) with salinity being the most commonly measured parameter (Table 21).

Figure 14 Frequency of groundwater monitoring by region

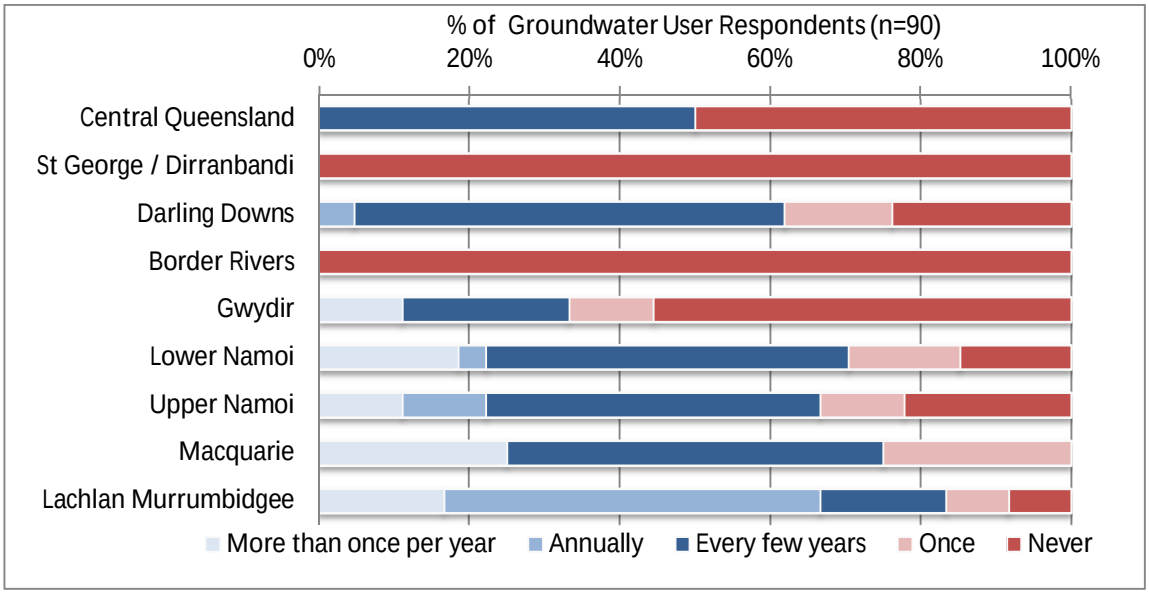


Table 21 Groundwater quality attributes monitored

	Number of respondents	% of groundwater user respondents
EC / Salinity	49	54%
pH	23	25%
SAR (Sodium Absorption Ratio)	8	9%
Nitrates	6	7%
Trace Elements	8	9%
Other:	17	19%
General water quality test	(5)	
Depth	(4)	
Hardness	(3)	
Temperature	(3)	
RDC	(1)	
Cone Index	(1)	

Table 22 Further comments on groundwater

Groundwater Comments
There has been little change over time
Groundwater is magnificent River-fed bore water is of drinking quality - no salinity issues etc.
Very good groundwater
Mainly concerned with EC especially with the lateral moves.
High quality town water
Uses groundwater only as a last resort
We regular monitor the ground water level from the surface and we also test for changes in water quality every few years.
Salt was the main answer. He asked should he be looking at water quality more often, he was under the impression ground water quality did not change very quickly over time.
No water quality testing conducted
Salt was the main concern for ground water

Crop Protection

Data on crop protection issues and pesticide usage is gathered in detail from the CCA survey. The questions included in this grower survey aimed to seek growers' views and practices in relation to some of the key crop protection issues.

Weeds

Respondents generally considered herbicide resistance to be an important issue which they actively manage for. Those who responded "not aware of herbicide resistance" were generally referring to the absence of it on their own farm. When asked about the changes in weed populations and management, the most frequent mentions were fleabane (Table 23) and Roundup Ready cotton (Table 24).

Figure 15 Perceived importance of herbicide resistance

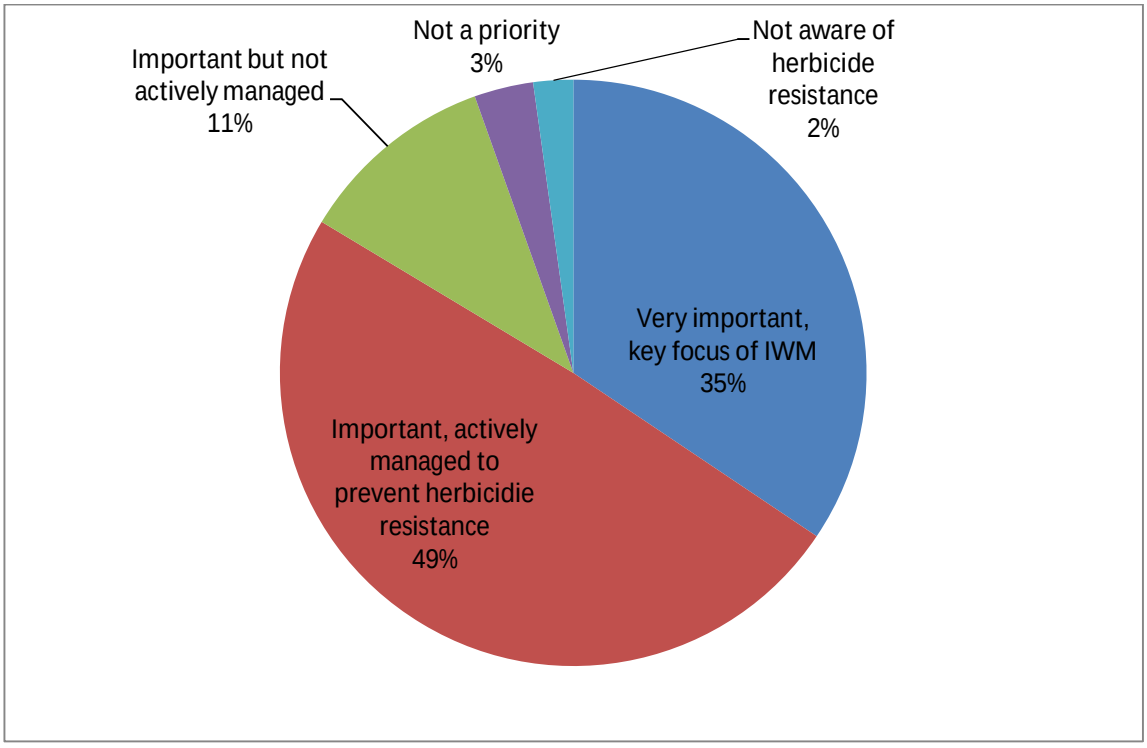


Table 23 Observed changes weed populations over the past 5 years

Comment	# of Respondents
Fleabane increase	78
Overall decrease in weeds	22
Overall increase in weeds	6
Volunteer cotton	15
Increased resistance	10
Increase in specific weeds: • Native barnyard grass • Ryegrass • Feather top rhodes grass • Windmill grass • Butter cup • Bellvine • White fly • Glyphosate • Phalaris • Polymeria • Umbrella grass • Anoda weed • Deadly nightshade	30

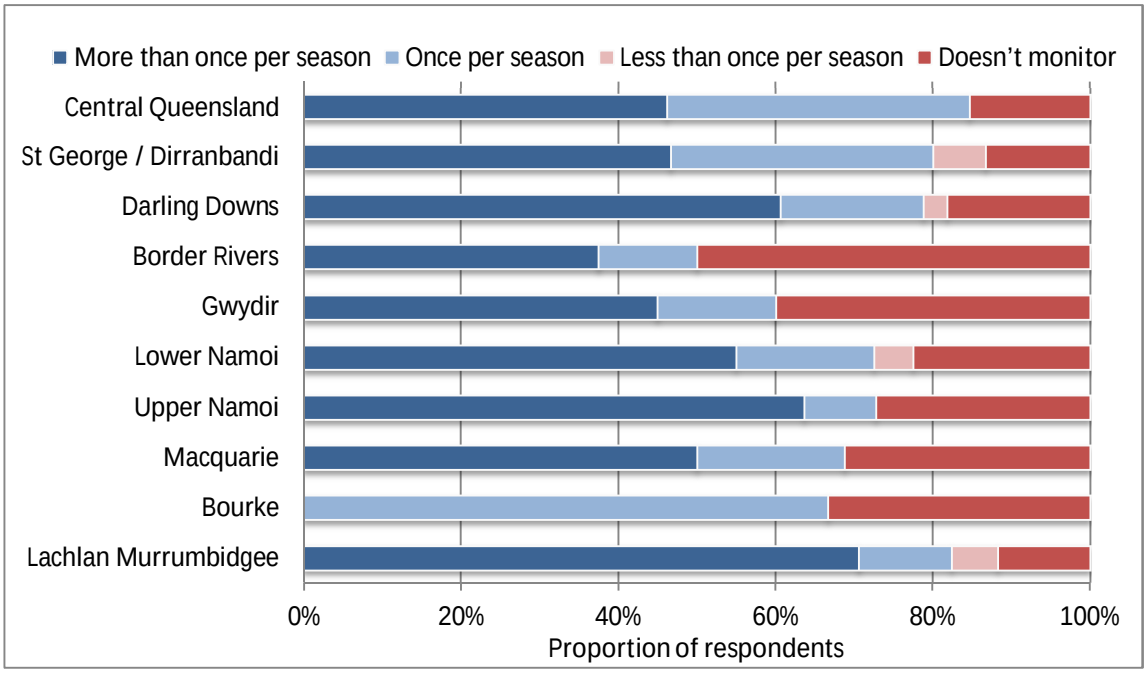
Table 24 Changes in weed management techniques over the past 5 years

Comment	# of Respondents
Roundup ready	55
Chemical rotation	40
Increase cultivation	29
Change in spray techniques	25
Crop rotation	20
Reduced Tillage (less cultivation)	12
Pre-emergence	6
More residual herbicides	4
Less use of residuals/chemicals	4
Weed seeker	4
Use of layby herbicides	4
Minimise seeding	4
Moisture control	2

Disease monitoring and management

Most growers undertake some disease monitoring (Figure 16). Growers commonly indicated that disease monitoring was undertaken by their consultant agronomist during regular crop checks. Some farms were part of the industry disease monitoring program and referred to that as their primary disease monitoring.

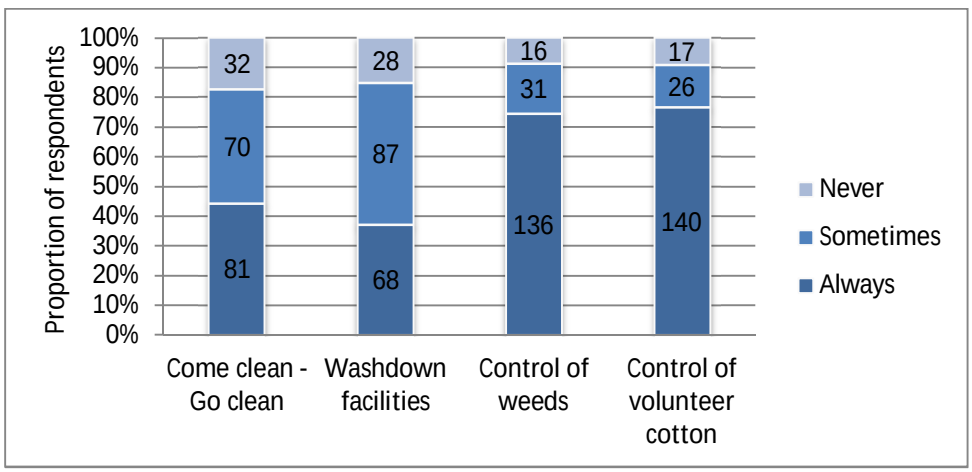
Figure 16 Frequency of disease monitoring, by region



* Note that some respondents are missing from this data - these respondents indicated that they monitored the presence of disease on their farms, but did not specify the frequency of this monitoring.

Whilst most respondents use farm hygiene practices some of the time (Figure 17), they are not highly diligent in using practices such as come clean-go clean (44% always do) and washdown (37% always). Closer heed is paid to control of weeds and volunteer cotton. Some mentioned that they were stricter about wash down of machinery where contractors were used. There was comment that come clean – go clean was not highly effective or feasible. There was little variation between regions with regard to the use of farm hygiene practices.

Figure 17 Frequency of use of farm hygiene practices for disease management



Insects

The majority of respondents consider IPM principles to be an important part of their pest management program (Table 25 and Figure 18) .

Table 25 Average ranking of IPM importance, by region

Region	Average ranking (where 10 is very important and 1 not important)
Central Queensland	9.3
St George / Dirranbandi	8.6
Darling Downs	8.1
Border Rivers	8.9
Gwydir	8.5
Lower Namoi	8.1
Upper Namoi	8.3
Macquarie	6.9
Bourke	7.7
Lachlan Murrumbidgee	8.8
TOTAL	8.2

Figure 18 Importance placed on IPM, by region

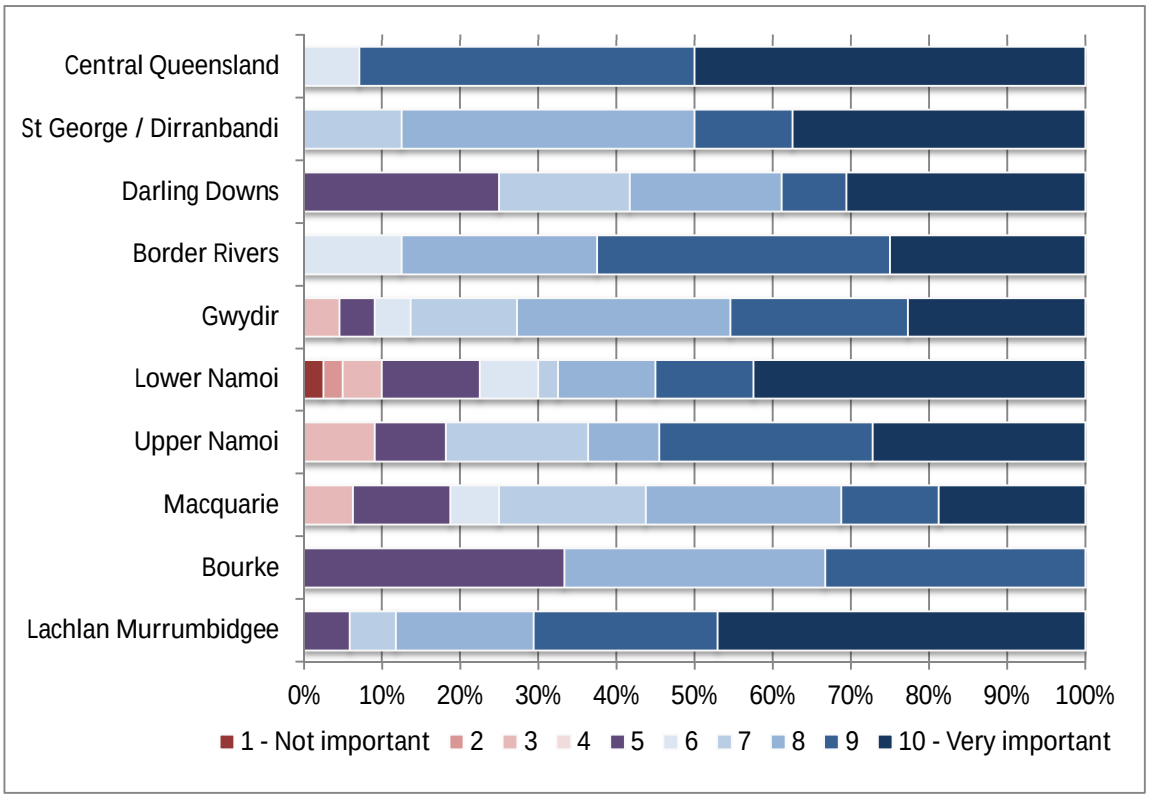
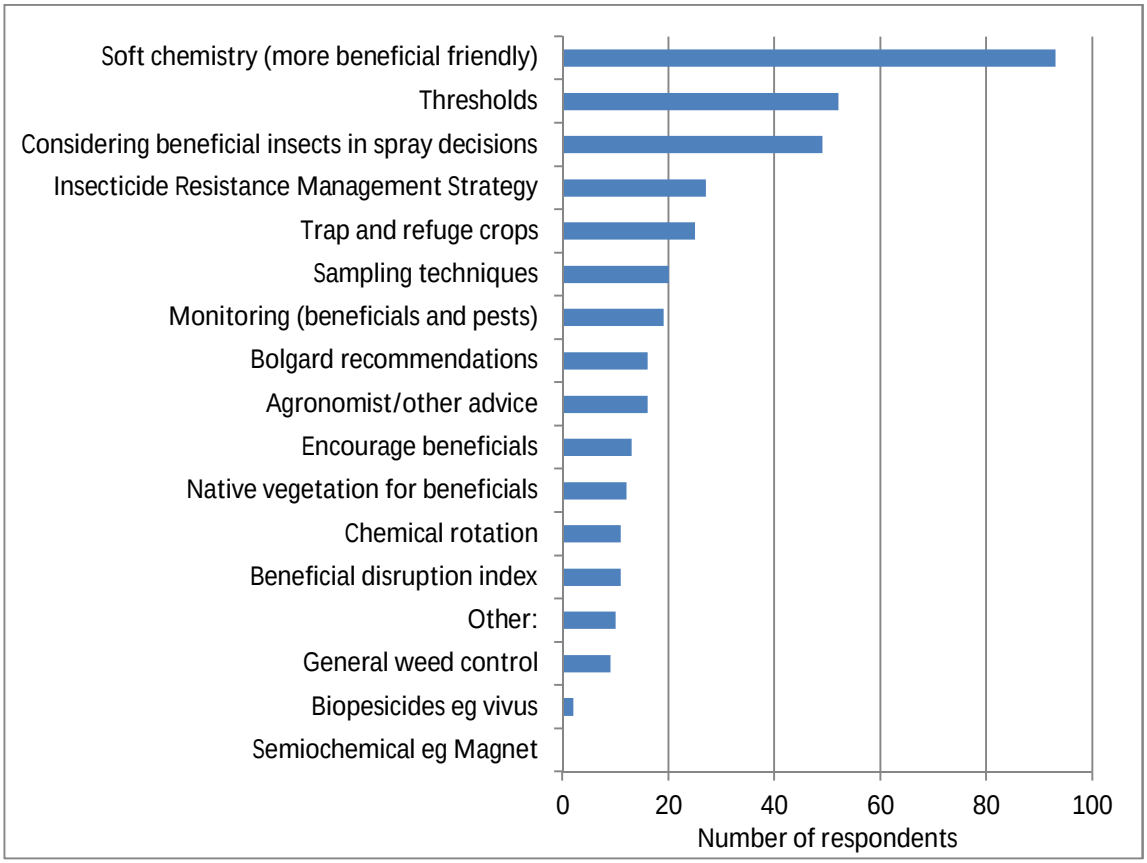


Figure 19 IPM strategies used by respondents



"Other" IPM strategies listed by respondents included: Avoid spray, Crop rotation, Own experience and knowledge, Fertiliser, Guidelines, Hygiene, clean farm, Pupae bust, Sprays.

The main economic benefits of IPM were considered to be less sprays, financial savings and environmental or social benefits (Table 26).

Table 26 Perceived economic benefits of IPM

Response	# of Respondents
Less chemicals/spraying	73
Dollar savings	24
Environmental/social benefits	14
Timing/management/lifestyle benefits	9
Easier control/less resistance of secondary pests	9
Yield increases/ quality increases	8
Willing to spend more to preserve beneficial's	6
Long term benefits	5
Yes (unspecified)	35
Somewhat (depends/ hesitant yes)	7
No benefits	2

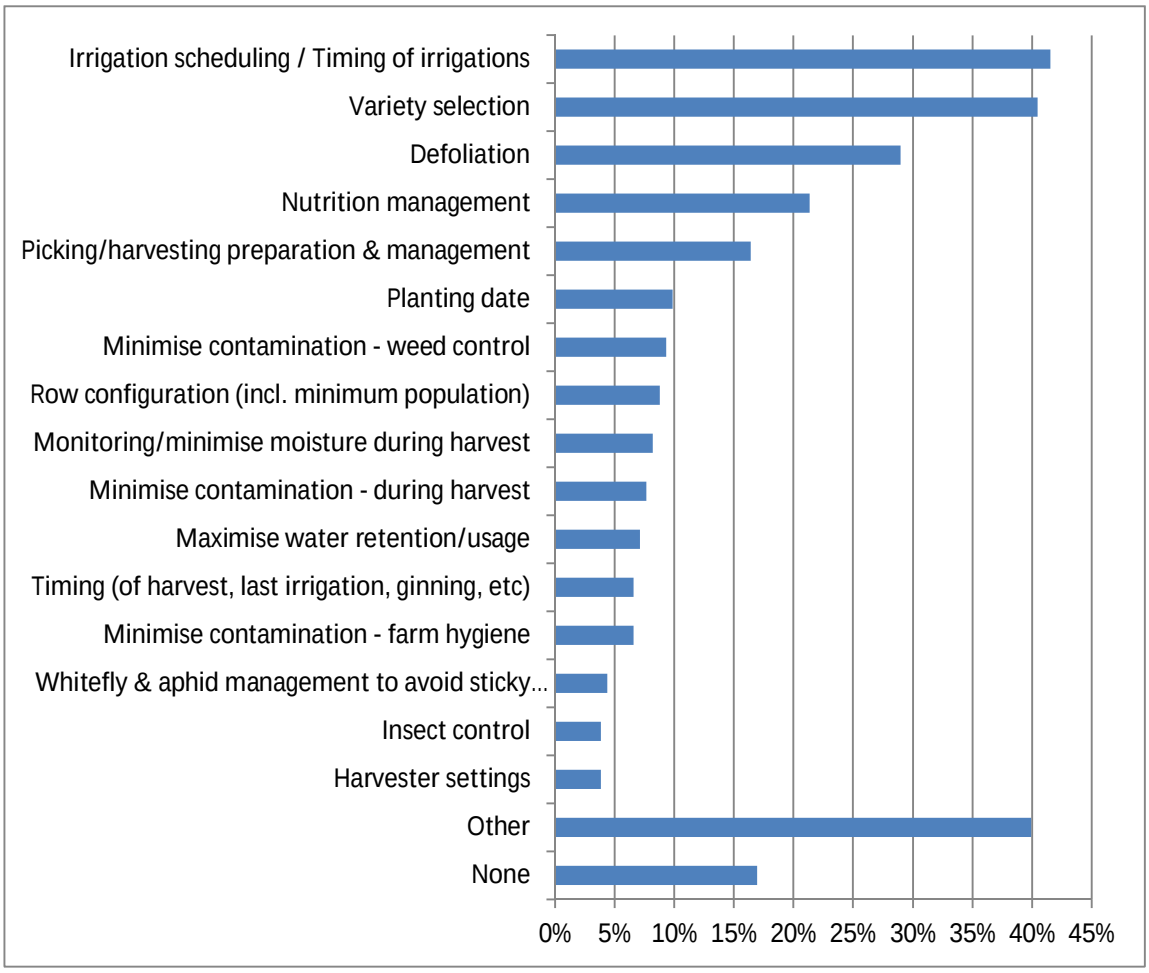
Table 27 Further comments on IPM

Response
There is always a compromise based on potential problem - eg certain mirid sprays may Increase whitefly
Need to know where on one's property and what's around in terms of pests
Slowly becoming more conservative about IPM (not spraying if in doubt) Selective about chemicals (low disruptive chemicals) Also using lower rates Using soaps and oils for Mealy bugs Takes a long time to reduce spraying reliance but once you can see it over time and monitor numbers you'll learn to be patient with the thresholds and avoid spraying too soon.
Some beneficials wipe out baddies. Have had sufficient beneficials and didn't have to spray.
IPM practices include -insect monitoring -selective soft insecticides -maintaining beneficial's - control of volunteer weeds and cotton
Aphids/white flies Sucking pests are most significant to watch
Soft chemistry now works better than hard chemistry
Not as necessary now we have Bollgard More sucking insects
Higher thresholds not as important now with Flex for heliothis
All decisions/issues are strongly debated with consultant and the final decision rests with me.
They sometimes needs to spray to remove bad pests when they can't keep up
With regard to thresholds, take account of beneficials and retention. Lots of beneficials associated with native vegetation.
Always stick to the industry thresholds of 3 mirids per metre would most likely not spray for grubs in Bollgard II unless significantly higher than the current threshold.
Understand importance of beneficial insects yet rely on agronomist
Rely heavily on consultant
Not sure of practices - need to talk to agronomist
"Guess the consultant would know what to say"

Agronomic practices for fibre quality

A range of management options are used to optimise fibre qualities (Figure 20). These mainly revolved around reducing plant stress.

Figure 20 Strategies used by respondents to manage fibre quality



"Other" included: Avoid stress (5 respondents), Best practice agronomy (6), Maximise Yield (3), Fertiliser/nutrition choices (4), Minimise/eliminate tillage (2), Rotations (3), Nature (weather, etc)3

Nutrition

Fertiliser application rate decisions are influenced by a variety of measures and factors as depicted in Figure 21 and on a regional basis in (Figure 21)End buggy for urea; Trials on fertiliser types and application rates; No fertiliser used; Ease of application - water run urea; People like Rocky (Dr Ian Rochester); Late application due to rain; MAP for phosphorus, NH3; Timing of application eg preplant or in-crop; TM21 compost; Gut feel, fertiliser trials; Measure biological activity, micorhizal fungi - strategies to manage and avoid; gypsum and lime.

Figure 22 Factors considered in determining fertiliser rates, by region

. Field history or crop rotations (including green manures), forecast yields and agronomist recommendation are the most widely used factors.

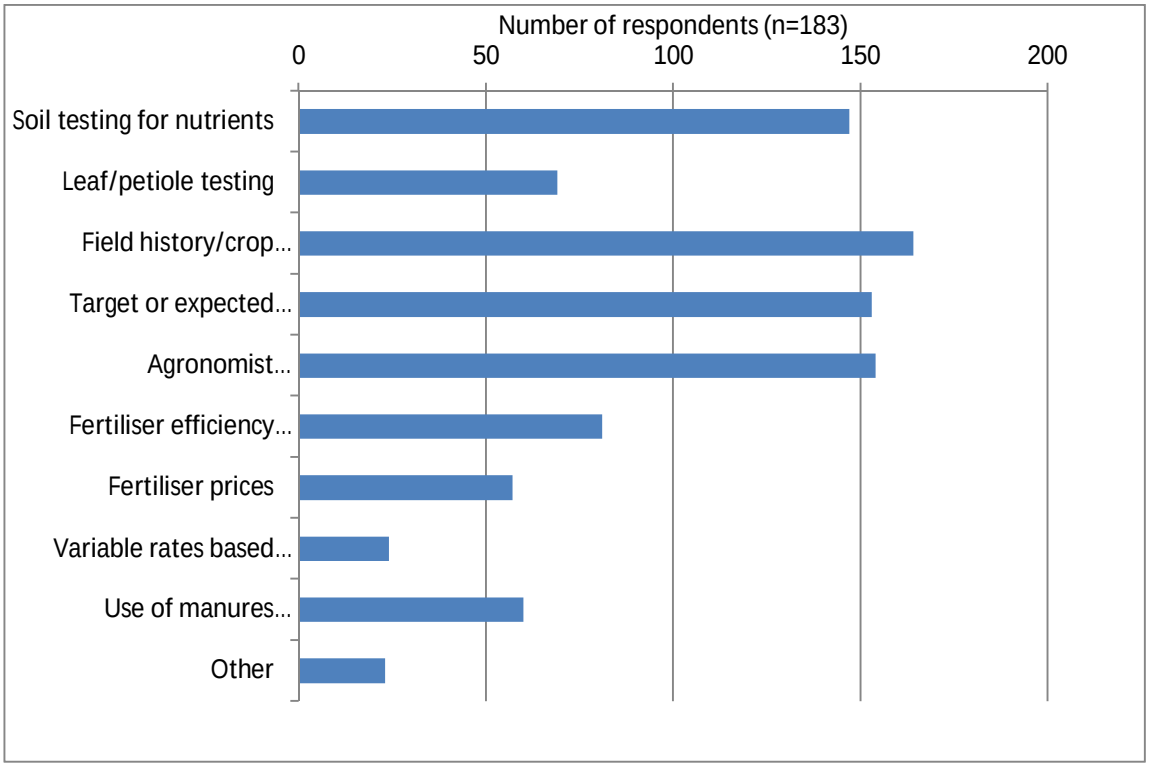
Soil testing is used by 81% of respondents whilst leaf and petiole testing is used by 38%.

Approximately 13% of respondents are using manures or composts in their nutrition programs (Figure 21 and Table 29).

Fertiliser price was not a key determinant of fertiliser rates for most people. Some altered fertiliser type or 'cut back a bit' on rates in response to prices.

The use of variable rates based on yield mapping remains low. There was comment that this would be the way of the future, the challenge lies in accessing appropriate advice to set up the system correctly.

Figure 21 Methods of calculating fertiliser application rates



"Other" methods included: End buggy for urea; Trials on fertiliser types and application rates; No fertiliser used; Ease of application - water run urea; People like Rocky (Dr Ian Rochester); Late application due to rain; MAP for phosphorus, NH3; Timing of application eg preplant or in-crop; TM21 compost; Gut feel, fertiliser trials; Measure biological activity, micorhizal fungi - strategies to manage and avoid; gypsum and lime.

Figure 22 Factors considered in determining fertiliser rates, by region

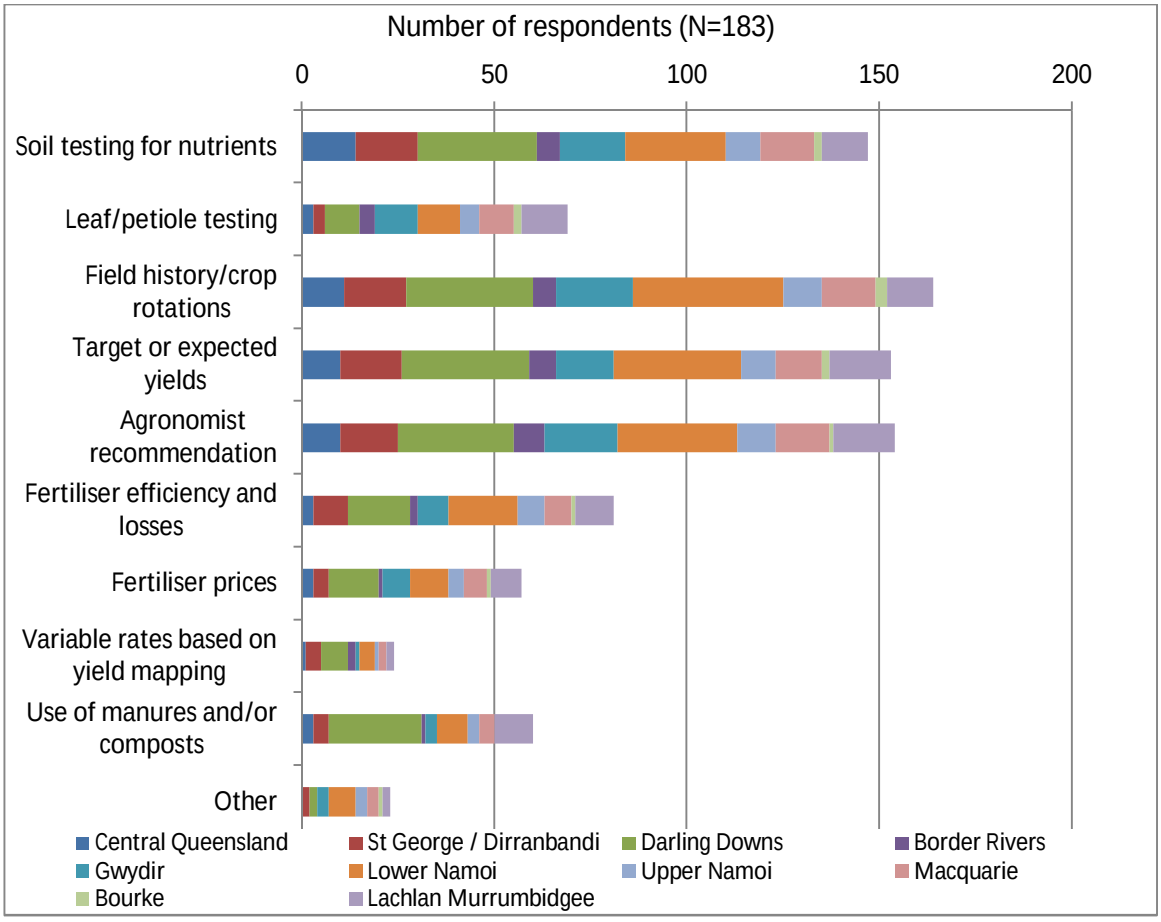

Number of respondents (N=183)
0
50
100
150
200
Soil testing for nutrients
Leaf/petiole testing
Field history/crop rotations
Target or expected yields
Agronomist recommendation
Fertiliser efficiency and losses
Fertiliser prices
Variable rates based on yield mapping
Use of manures and/or composts
Other
Central Queensland
St George / Dirranbandi
Darling Downs
Border Rivers
Gwydir
Lower Namoi
Upper Namoi
Macquarie
Bourke
Lachlan Murrumbidgee

Table 28 depicts the nutrient rates of fertiliser applied to irrigated and dryland cotton in the 2010-11 season. Note there are several limitations to this data, including:

- Not all growers were able to provide nutrient rates.
- Nutrient rates have been converted from fertiliser rates where possible.
- Some rates provided appeared to be fertiliser rather than nutrient rates and it was not always possible to ascertain this. Where logical we have converted these (eg urea to nitrogen) based on our understanding of the most likely scenario.
- Some growers indicated use of a nutrition and soil management program over several years to support their annual fertiliser inputs.
- Several farms mentioned the use of manures, these have not been included due to difficulty in determining the nutrient rates.
- Some dryland growers applied no fertiliser for the cotton crop, relying on carryover from the previous wheat crop instead.

Table 28 Applied fertilisers as nutrient rates for irrigated and dryland cotton

Applied Fertiliser (nutrient rates)	Irrigated			Dryland		
	Avg.	Min	Max	Avg.	Min	Max
Preseason nitrogen – solid fertiliser (kg/n/ha)	142	11	350	89	50	150
Preseason nitrogen – gas fertiliser (kg/n/ha)	155	60	300	84	50	140
In season nitrogen – solid fertiliser (kg/n/ha)	99	9	300	45	0	180
In season nitrogen – gas fertiliser (kg/n/ha)	83	11	200	40	20	60
In season nitrogen – water applied fertiliser (kg/n/ha)	57	9	250	5	5	5
Total applied Nitrogen	217	30	534	96	33	330
Preseason phosphorus – fertiliser (kg/p/ha)	42	1	250	14	2	50
In season phosphorus – fertiliser (kg/p/ha)	20	1.0	100	13	3	40
Total applied Phosphorus	40	1	250	16	2	50
Preseason potassium – fertiliser (kg/k/ha)	32.6	0.4	120	7.6	0.4	20
In season potassium – fertiliser (kg/k/ha)	15.2	1.1	60	2	2	2
Total applied Potassium	28.3	0.4	120.0	6.7	0.4	20
Zinc fertiliser (kg/zn/ha)	6.9	0.2	105	3.7	0.2	15
Sulphur (kg/s/ha)	6.3	0.1	55	2.4	1	6
Trace elements *	21	7	65	4.0	4	4

* Several of the replies relating to trace elements mentioned the products used without rates to calculate nutrient rates or were difficult to convert. These included: Super K, Amplifier, Foliar, Humates, Ignition bionutrient, Calcium carbonate.

A wide range of fertiliser application programs are followed, as evidenced below.

Table 29 Comments on nutrient use and management

Nutrition
Fertiliser program was unusual for 2010/2011 because it was too wet to soil sample, and couldn't put anything up front so applied urea by air.
25 kg of in season nitrogen fertiliser was placed after floodwater was drained
Use long fallow and biosolids and composts
What can you do about fertilizer prices?
Looks at fertiliser prices but doesn't determine choice Variable rates and yield mapping is the way of the the future - hard to find people with good info on how to set it up (he'd like to do this)
Gets own MAP blend made up (209kg/yr)
Not going to decrease fertiliser applications because of costs. Yield and quality losses would outweigh any potential savings on fertiliser.
Switching to solid preseason nitrogen as more effective in trials
Use potassium sulphate
Not convinced soil testing is as accurate as people think they are Taken a risk putting nitrogen in early - ir rain comes in over winter than he'll lose the nitrogen
No fertiliser applied for cotton - carryover from wheat crop
Regular programs used over a number of seasons: Cottonsustain, Murate of potash, Zincoxide, Zincsulphate, Sulphate of ammonia, Chook manure
crop destroyed
fertiliser price influences type used, not volume used
Note for fertiliser rates - long fallow over majority of farm following a low yielding irrigated wheat crop 2 years ago. therefore this seasons soil structure was nutrient charged and in good order.
Nutrients applied through lateral irrigation - FlowPhos inseason
Fertiliser
Zinc = cotton sustain
Water run Urea = 50 units; DAP 180 = phosphorus + nitrous
Use liquid fertiliser at planting for Zn (Stoller's Zinc); and P (Stoller's Clearstart)
Clearstart fertiliser
Uses 15 L of 13Z
Fertiliser used contains zinc, sulphur and trace elements - wasn't sure how much.
some Nipro flowphos 13z at planting . In season phosphorus (can't remnember rate /ha.
for all options between Presseaon Phosphouros and trace element in above table the answer was. 35kg/ha starter 7 (1%zinc)
20 units of the N was applied as a liquid foliar.
Used MAP - quoted P 100kg/ha, K 30kg/Ha , Z 3kg/ha
water applied fertiliser- 20 on a short fallow area. Phosphorus fertiliser- prescription blend not sure of actual p amount. Potassium fertiliser - as above. Zinc and sulphur - these nutrients also in blend.
Preseason Nitrogen called N46 at 100 units (liquid). No in season nitrogen because of severe flooding.
Use Cotton Sustain 40kg (NPK) pre season on irrigated and dryland.
Uses foliars and also had 1% zinc

Manures and composts
This year trialling manure and gypsum across the farm.
Uses manures - for P and other nutrition
Manures/composts too expensive
Use chicken litter as nutrient
chook manure 2.5t/ha
6T/ha feedlot manure
Applied 300tonnes manure this year. Some starter and composted gin trash applied.
manure - cow 4t/ha
Manure and compost spreading program.
Put biosolids (local treatment sewage) on 30tonnes on a 100 ha per year,
Manure is used across the farm.
Add manure from feedlot - 10 tonnes/acre/year - not sure of rates of nutrition.
only used manure compost pre season

Soil cultivation

Cultivation has generally decreased or remained similar over the past 5 years (Table 30). In some cases they have remained the same because cultivations had been substantially reduced more than 5 years ago. Where an increase in cultivations has occurred this was often due to a need to cultivate to control problem weeds such as fleabane.

Table 30 Changes in cultivation practices over the past 5 years

Change	# of respondents	%
Increase	**14**	**8%**
By more than 3	0	0%
By 3	1	1%
By 2	6	3%
By 1	4	2%
Similar	**59**	**34%**
Decrease	**99**	**58%**
By 1	9	5%
By 2	35	20%
By 3	23	13%
By more than 3	16	9%

Table 31 Comments about cultivation and soil management

Comments
More with cotton than rice etc
More tramlining over the last 5 years
Tramtracked for 15 years , GPS
One field rotation in crop cultivation to control volunteer cotton + fleabane
Changes 2 m beds Minimum tillage in last 12 years
Dryland is minimum till
Increased cultivation this season was for fleabane control
Slash & root cut 1x sweep cultivation in furrow 1 x sweep cultivation hill top 1 x gas appilcation 1 x rolling
Adaptive management- some years require more passes; eg after a wet harvest deep cross rip to remove wheels tracks
Cover crops rather than wheat stubble
Minimal work over last 5 years due to drought
Has gone to 2 metre beds and finds these are working well for him.
2/3 of property cultivated once a year.
Trying to go min till especially under lateral move - pupae bust
Less than 10-15 years ago
Went from wheat (minimum till) to cotton
Cultivation for weeds
cultivations increased for pupae busting
Comments about cultivation & Roundup Ready
Decreased cultivations due Roundup Ready
Round up flex has changed things - less invasive cultivation, minimises damage around the root zone
Decreased with roundup ready cotton.
increased cultivations to control Roundup Ready Volunteers
In crop- reduced because of roundup ready. Have been zero till in fallow for 20 years.
Cultivations decreased due to RR cotton
Reduced cultivation with use of RR cotton

Views about cotton research

The survey asked growers to rank their level of satisfaction on a scale from 1 (very dissatisfied) to 10 (very satisfied) with:

1. How the cotton industry is serviced by research and extension; and
2. The speed with which research and extension respond in critical times and to emerging needs such as mealy bug, whitefly, cotton strainers, bunchy top, flooding.

The majority of respondents are satisfied with the research and extension effort overall and in response to emerging issues. There is seen to be room for improvement, with several comments relating to a need for an increased extension effort. Comments expressed come concerns and disappointment about the need for the Cotton CRC to apply for funding to continue.

Figure 23 Satisfaction with how the cotton industry is serviced by research and extension

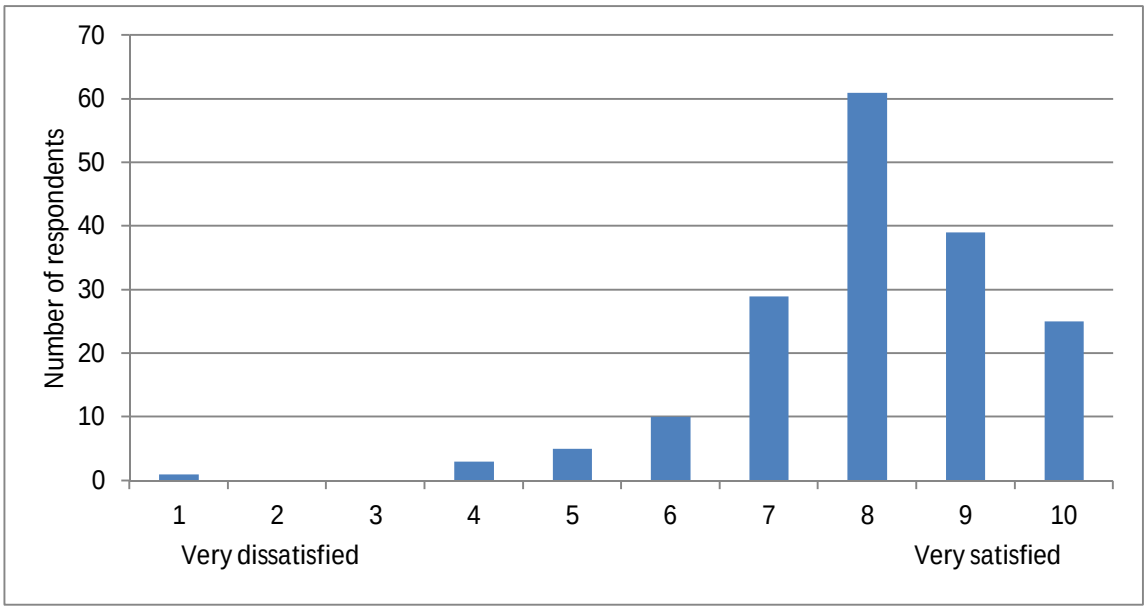


Table 32 Satisfaction with how the cotton industry is serviced by research and extension, by region

Region	Average Rating	Range
	1 (very dissatisfied) to 10 (very satisfied)	
Central Queensland	7.6	2 to 9
St George / Dirranbandi	8.3	6 to 10
Darling Downs	8	4 to 10
Border Rivers	8.5	7 to 10
Gwydir*	7.9	1 to 10
Lower Namoi	8	5 to 10
Upper Namoi	8.2	6 to 10
Macquarie	8.1	7 to 10
Bourke	7.7	7 to 8
Lachlan Murrumbidgee	8.4	6 to 10
TOTAL	8.1	1 to 10

*Note that with the exception of the respondent who chose '1' in the Gwydir region, the range would be 7 to 10 for Gwydir and 4 to 10 for the total survey.

Figure 24 Satisfaction with cotton research, by region

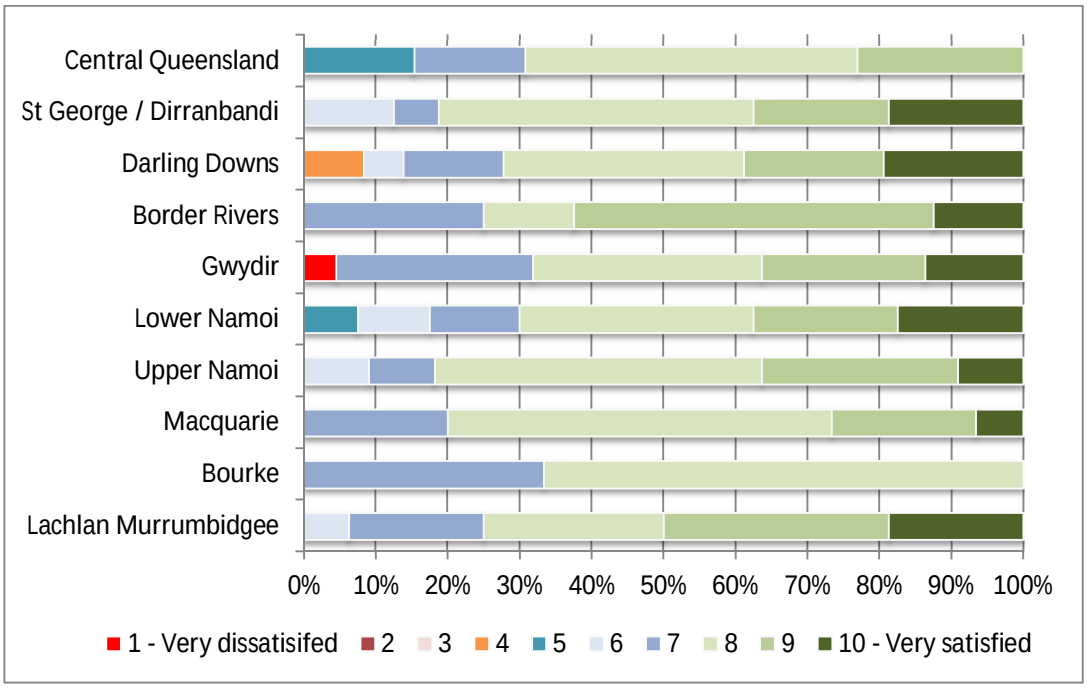


Table 33 Perceived responsiveness

Region	Average Rating	Range
	1 (not responsive at all) to 10 (excellent response rate)	
Central Queensland	6.7	1 to 9
St George / Dirranbandi	8.2	5 to 10
Darling Downs	7.7	3 to 10
Border Rivers	7.6	5 to 9
Gwydir	7.7	2 to 10
Lower Namoi	7.7	3 to 10
Upper Namoi	8.3	6 to 9
Macquarie	8.0	7 to 9
Bourke	7.0	7
Lachlan Murrumbidgee	7.9	5 to 10
TOTAL	7.7	1 to 10

Figure 25 Satisfaction with research and extension responsiveness to emerging need and critical issues

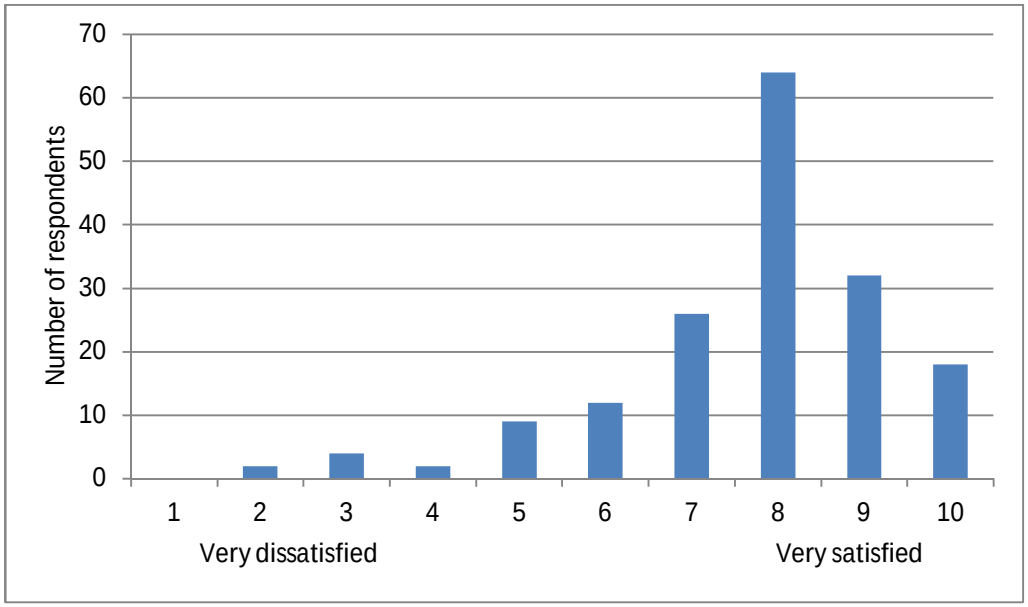


Figure 26 Satisfaction with research and extension response to critical need and emerging issues

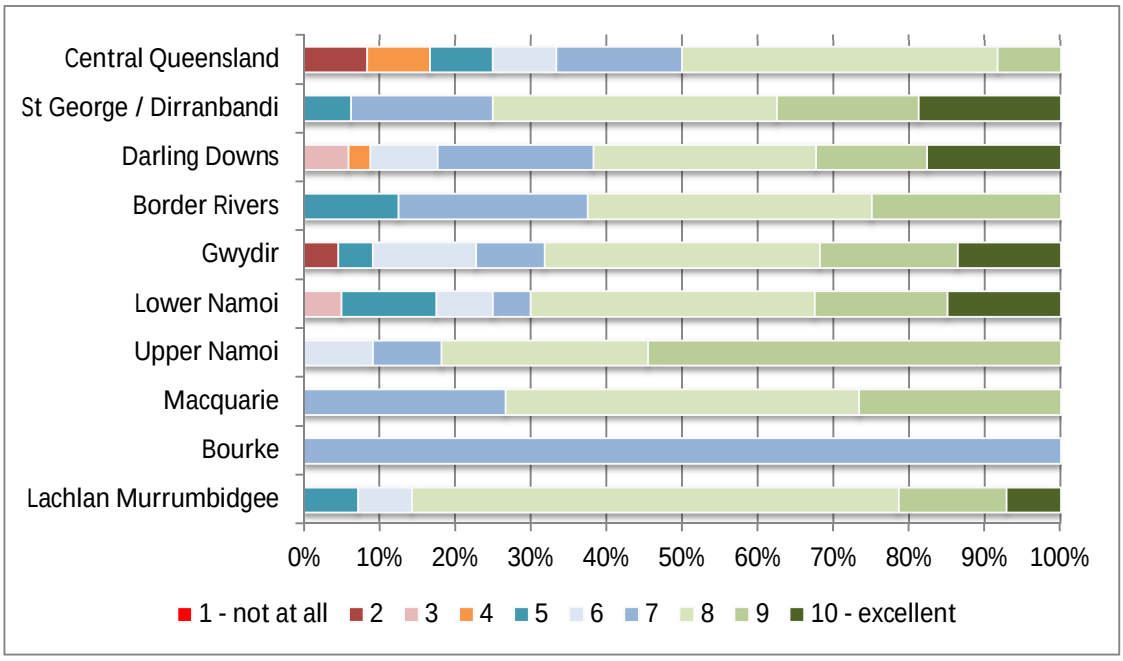


Table 34 Further comments about Cotton CRC and industry research and other issues

Research and development	
Central Queensland	The CRC has played an important role for our industry's progress & prosperity. If the industry is unsuccessful in the CRC Extension we will need to carefully map our R&D effort for the future.
	Want to see research and extension continue - it is an important part of the industry.
	Love to see continuation of Cotton CRC and practical research.
Darling Downs	Yes, it's very good.
	Little areas like Murgon fall through the cracks eg when there was an IDO we never saw them. Did some work with Dr M. Khan on sucking insects, was good
	Too centred on Narrabri
	Got us where we are - Critical.
	Worried about researchers aging. Need continuing funds available for implementation of research results. Unsure of where funding is heading to
	Innovative and progressive industry
	Cotton industry has flourished through good times and survives through tough times largely due to its progressiveness in research and development
	Great industry with great support.
	Don't follow it closely
	It is crucial that research and development continues to support our industry for its future and sustainability
Border Rivers	Primarily a grain grower, very actively engaged through Agforce in industry R&D and reasonably aware of cotton industry R&D. He commented on discussions in Qld in relation to RD&E in all ag industries and particularly grain and cotton field. A Dept restructure is being proposed with a focus on commodity based institutes such as BSES which allow for stakeholder and government investment and leadership. He discussed the tactical approach of consultants compared with a longer term strategic approach to RD&E.
	Generally, the industry research is excellent and is what keeps us all ahead of the game. The CRC extension bid being successful is a must for the industry.
	Lucky to have the researchers we do, have built the great varieties we have.
St George / Dirranbandi	Keep the CRC going
	Critical to the industry that needs to keep going
	Do a brilliant job. Hope they can keep funding to do it.
	Not sure- have not been following it for long enough
	WELL DONE!
	The CRC should continue
	Researchers do a great job.
	Happy with the job they do.
	Good research and information - keep the good work up.
Gwydir	The CRC does a great job and needs to be continued if possible.
	Doesn't feel directly uses research and extension, but his consultant does. "Keep up the good work."
	Pretty committed, efficient
	Make sure it continues
	Necessary industry
	All going very well

Lower Namoi (including Walgett)	Not enough co-operation with farmers only seem to work with farmers who do trials otherwise not interested Researchers not very accessible New or returning growers in dark for information
	the cotton industry is much more advanced and supported then any other agricultural industry
	Sometimes others ahead of dice to their area - they get told before it happens
	Research has been practical and results in information that can be applied on the farm
	Important that CRC keeps going. Important in coordinating R&E - preventing duplication. CRDC & CSD, Cotton Australia, all doing some R&E. Someone needs to coordinate.
	Last 20 years issue - endosulfan
	essential to my business
	The Cotton Industry has an ideal model of Cotton research in that growers have a say in the research directions and research is partly funded by growers. We have a unique situation in that we are close to the ACRI and have good communication with the researchers there.
	to many administration/managers and not enough researchers. too top heavy.
	Essential we have research and continue the good work
Upper Namoi	Some crops at the CRC appear to be worse than others commercially grown, they also mature later. Is insect control too soft?
	Stopped growing cotton a few year ago - may grow again Thinks the industry is good and CRC is doing a great job Very engaged compared to other industries
	Better serviced than most other industries
	First time growers but it has always been progressive from the outside
	Cotton CRC has been of great benefit to the industry There has been a huge improvement in varieties over the last 30 years
	Keep up the good work.
	Keep up the good work get value for money invested. Keep tellling growers how they benefit even if the benefits are intangible eg: better community education.
Bourke	Research has been excellent but I haven't kept up to speed with it
Macquarie	It's a shame CRC needs to chase funding again
	Having not been growing much over the past 5 years I have not been following the research but I will be now that we are at full production again.
	Keep up the good work you do for the industry
	Cotton research is close to growers and vice versa Problems are recognised quickly
	Good information about research and cotton.
	Very good information available
	Industry research continues to do an outstanding job
Lachlan Murrumbidgee	Cotton industry used to be better serviced but suffered through drought Overall thinks the industry does well, and is headed in the right direction. Using plenty of consultation to determine priorities
	Taken a good levy - hopefully doing a good job Not getting a lot of coverage due to not being in a growing area
	Very important and needs continued support.
	would like to use it more often

Responsiveness of RD&E	
Central Queensland	Some aspects of people respond quite quickly but sometimes the research + key question takes time to research and get the findings
	The industry showed quick response time to the Whitefly outbreak in 2001. The Mealybug response was slow & at times disorganised & unwilling to find people to act. I suppose the industry has changed significantly over those years and capacity has diminished. This is something our research funders need to address along with showing better intent to manage a crisis like Mealybug. It seems we all need to pull together and set a shared vision for how R&D will look in the future and ensure productive buy-in from all stakeholders.
Darling Downs	Not sure yet, relies 100% on agronomist to be up to date with current research.
	Slow response to floods
	Slow response to flooding issues
Lower Namoi (including Walgett)	In the whitefly situation more information has been given by the Ginners then the CRC.
Bourke	Too far away from RDE to know about responsiveness - assume it is
Lachlan Murrumbidgee	Whitefly response was quick, not so quick on mealy bugs Good people - cotton is one of the most forward industries, tackles problems usually before they become an issue
Extension	
Darling Downs	We used to get trial books and newsletters from CRDC. Used to get notes about grubs and the Beneficial Guide on pests and insects. We still get a monthly email from someone - the Darling Downs Cotton Catchment I think.
Border Rivers	An extension officer for Macintyre would be good.
St George / Dirranbandi	To get more up to speed with myBMP - district workshops would help eg on-farm workshop
Gwydir	Any industry research activites are currently being badly let down by the lack of extension undertaken in the Gwydir Valley since the area lost its extension officer (IDO) a couple of years ago.
	There is no industry development officer based in the Gwydir Valley and hense very little industry extension occurs within the Valley. We rely heavily on CSD for extension activities and cordination of research activities.
Lower Namoi (including Walgett)	Good service of industry in research. Extension is not as good
Upper Namoi	A cotton extension officer in the area would be AWESOME
	Lack of extension - all comes down to money. Can't be too critical; with resources available they've done well, but there's a greater need for extension.
Macquarie	Would like to see more done about BMP . Lots of people have done initial work on bmp and nothing happening to follow these people up. Would like to see more effort on getting previously audited growers back in the system and getting new growers on board.
	Even though I have only ticked 3 CRC tools that I use, I am familiar with most tools mentioned and believe most of the information provided is invaluable to those starting in the industry especially agronomists who need to be up to date on research and informed, to ensure information is delivered at grower level.
	can always find people if you want to know something

Industry	
Central Queensland	May grow again Experience transport issues - too much time to export Burdekin needs a gin Cotton seed monsanto fees were up - one reason why he walked away
Darling Downs	Will grow next year. Was in the industry for 25 years (about 10 years ago) but had too many disease problems. They were spending a fortune on sprays, etc. and were concerned about the health effects of all those chemicals on their children. Moved into growing organics instead to reduced chemical usage. Knows there's been a lot of improvements in the industry, such as roundup ready, that eliminate the need for pesticides and tipping. Also knows that some technology improvements have meant that less labour is needed. Was involved in industry bodies in the past, and intends to be in future. Part of a community group called 'Save Our Darling Downs' - protesting against foreigners buying up farms and turning them into mines. Very passionate about this issue (Queensland Cotton is involved with this group as well) Generally thinks the industry is pretty good and innovative - was a member of IPM when he was growing cotton.
	Mentioned it was inconvenient to rely on contractors
Border Rivers	Lots of issues to stay on top of - cotton not booming like spin - growing cost squeeze. Greens no idea of how rivers work. Credit squeeze - requirement for a rural bank
	Growing cotton is my job and hobby, so I love what I do and find the Cotton Industry is very professional.
St George / Dirranbandi	Industry has gone through some very trying times therefore there is a need, to focus on confidence and communication rebuilding. response from growers will increase Shortage of expertise (agronomists, farm managaers, ginners (a major issue)
Agronomy, water & other issues	
Darling Downs	Very interested in liquid evaporation control and is concerned about stalling of research and development in this area.
Lower Namoi (including Walgett)	more info needed on soils and uniformity in soil testing results. Need an industry standard for cotton. What about soil carbon in cotton. Taking in mind farmers may be taxed in the future
	I think dryland cotton research to be increased specifically: more varieties suited to dryland, Bollgard varieties are not so suited to dryland due to their shorter flowering period. Pupae busting in Bollgard varieties breaks down the No till system.
Bourke	Research needs to catch up with what is happenning in industry with targetting high yielding crops - especially with nutrition and irrigation Research doesn't match with what growers of high yielding crops are doing
Lachlan Murrumbidgee (Southern NSW)	Soil not as fertile in his area Shorter cooler summer + seasonal variability use more irrigation due to less in crop rainfall
Macquarie	Benchmarking across industry

Crop protection issues	
Central Queensland	Need research into alternate rmp , planting window must go , its the largest restriction to productivity in cq.
Border Rivers	Would like to see research on the benefits of Bollgard - price problem - why should they be paying monsanto?
Gwydir	I wish they would allow researchers to develop/release 2,4D ready cotton - very helpful in no till dryland systems
Lower Namoi (including Walgett)	Big opportunities in white fly
Upper Namoi	Like to see more research done on fleabane, don't feel like there's been any progress in the last few years
	Bring back Area wide management.
Flooding	
Lower Namoi (including Walgett)	Flood response - get water off as quickly as possible, need to be quick and act early
Macquarie	Suggestion to record and communicate the responses to flooding - what did growers do? what worked? what didn't?

New growers and those re-entering the industry

The 2010-11 season saw a number of new growers plant cotton and others re-enter the industry after a (generally drought induced) break. The CRDC and Cotton CRC were interested to know how best to engage with these growers and understand their needs.

Eleven respondents returned to cotton production in 2010-11 after a break of 5 or more years. A further ten respondents grew cotton for the first time in 2010-11:

- 1 in Gwydir
- 1 in Upper Namoi
- 2 in Macquarie and
- 6 in Lachlan Murrumbidgee.

Reasons for growing cotton in 2010-11

Almost every grower re-entering the industry indicated that price and/or water were the main reasons that they returned to cotton growing (Table 35). One indicated that, in addition to price, the purchase of a new farm also helped with their decision to grow cotton again.

Growers who were entirely new to the industry had a range of other reasons for deciding to grow cotton as listed in Table 35.

All 21 new and returning growers interviewed for this survey indicated that they would grow cotton again.

Table 35 Reasons for growing cotton in 2010-11 for new growers and those re-entering after a break of 5 or more years

Summary	# of respondents	%
Price of cotton	17	85%
Water availability	9	45%
Local grower success	3	15%
Returns	2	10%
Technology (i.e. Roundup)	3	15%
Advice (from consultants)	2	10%
Weed management tool	1	5%

Industry participation

Approximately half of these growers new to or re-entering the industry have joined their local cotton grower association.

Table 36 Respondents who have joined, or intend to join, the Cotton Growers Associations

	Joined CGA			Joined other association*	
Region	Yes	No	Maybe	Yes	No
Central Queensland	0	0	0	0	0
St George / Dirranbandi	0	0	1	0	1
Darling Downs	1	0	0	0	1
Border Rivers	0	0	0	0	0
Gwydir	0	1	0	1	0
Lower Namoi	0	1	3	0	4
Upper Namoi	1	2	0	1	2
Macquarie	4	0	0	3	1
Bourke	0	0	0	0	0
Lachlan Murrumbidgee	5	1	1	3	4
TOTAL	11 (52%)	5	5	8 (38%)	13

* Other associations include:

Macquarie:	Macquarie River Food and Fibre (MRFF)
Lachlan Murrumbidgee:	Hay Water Users Association, Rice growers association, Murrumbidgee ground pumpers, NSW farmers
Upper Namoi:	Namoi Water
Gwydir:	Gwydir Valley Irrigators

New and returning growers made a number of suggestions of things that could be done to help growers in their situation as presented in Table 37.

Table 37 Suggestions for additional research to help new growers

Region	Comment
Central Queensland	Cotton production manual is good as it addresses lots of questions
	A lot of people have left the industry and come back - some issues exist Lack of understanding on nutrition and soil - would like to know more on it - new growers can face risks with split applications (spend money on chemicals and insects) Regulation in growing with crops (in grains) is difficult. New Dryland growers face a lot of regulation that can be daunting - agreements are strict and thorough (e.g. with Monsanto)
Darling Downs	Got into cotton because of price and return, but is probably not going to grow it again because it has become too expensive (particularly dryland cotton). Last 5 years we have lost money or broken even on their cotton
	It's all there – rely on a good agronomist who has kept up to speed while we've been out growing cotton.
St George / Dirranbandi	I will be better at answering that next year
Gwydir	Priority is to keep whitefly and mealy bugs at bay. For new growers, support depends on individual growers. Industry is fantastic and supportive, but you need to be proactive about it.
	Share knowledge
Lower Namoi	Make information more available
	Have grown cotton for over 40 years, only had a break because of the drought. Kept abreast of what was happening in the industry so it was easy to start again
Upper Namoi	Quicker varieties Pupae busting is expensive
	New people might consider entering in if there's resources and support available Extension needed: - upper Namoi has lots of new dryland growers -historically, extension officers have helped out - these extension officers need more funding to service new growers better
	New growers need to be given a "welcome to Cotton CRC" pack explaining services you can provide
Macquarie	Internet tools very handy and easy to use
	Educating non-cotton growers on the industry - can be hostile
	Encourage to attend meetings, what is available to make informed decisions This is where the cotton industry shines in respect to its openness and fixing problems
Lachlan Murrumbidgee	Cotton industry does a good job with new growers
	Extension officer only part timer - full time extension would be good (relevant to new growers) can be real challenge to grow New techniques etc. going on in area
	Pretty good at supporting growers within Hillston Expansion in last couple of years During earlier part of 5 years time - industry development officer has key
	Lots of information available New people need to be made aware - it's not an easy crop to grow. Lot's of ginning + picking leads to high costs - not fully understood
	Good to see someone from association in the field Getting lots of advice from agronomist (and readings provided by him) so may be biased there. Hence would like someone from industry who's more neutral to come out once or twice a season to visit

	The only thing he wasn't expecting was that after picking he needed more knowledge on the breakdown of crop residue Would like more knowledge and information for after picking e.g. handling crop residue
	New growers need.... - information on machinery to do with cotton - advice on hilling up through to picking - new to row cropping, so unsure what's out there
	Quicker maturing cotton for us Down South
	keep up flow of information
	A lot of new growers coming into the industry, concerned not enough extension staff to inform growers of best practices for cotton growing. Predicted 55,ooo ha next year.