CRDC

2020 Grower Survey

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It is important to note that the responses contained within the CRDC Grower Survey provide a snapshot in time of grower data, but do not tell the full story. The Grower Survey is one of many research projects commissioned by CRDC to gather industry information. The results are not intended to be used in isolation, but rather in consideration of these other projects, such as the CRDC and Cotton Australia 2019 Australian Cotton Sustainability Report, the industry's best practice program, myBMP, extension programs, CottonInfo, and the significant program of R&D that is managed by CRDC. In conjunction with these programs, the Grower Survey helps the industry measure practices and inform continuous improvement. The results are as provided by growers, and have not been independently verified. For any queries regarding the Grower Survey, please contact CRDC.

The Cotton Research and Development Corporation (CRDC) undertakes an annual survey of cotton growers to gather information about farming practices and growers' views on research, development and extension. This information helps inform CRDC about the benefits of the research it invests in and priority areas for future research. Change in industry practice can be quantified by comparing information across the surveys conducted over the past 20 years.

Previous surveys have included a number of core annual questions and then a number of focus areas to investigate specific aspects of the farming system.

In 2017, CRDC undertook a review of the aims, purpose and design for the survey. The 2017 Grower Survey was developed by a working group including CRDC, Cotton Australia, researchers and others. The 2020 Grower Survey has been refined by the working group with reference to both the 2017 - 2019 surveys and CRDC's Monitoring and Evaluation Framework and supplemented by research questions relevant to the seasonal conditions. This survey gathered mid-term assessment of growers' views of CRDC's performance against its Strategic Plan objectives and performance measures.

The 2020 Grower Survey included:

o   Baseline information about growers and their farm business including respondents' demographics (region, farm area) and season and farm information (yields, area of cotton).

o   A number of other focus areas, including:

- water;
- nutrition and soil;
- irrigation;
- IPM and crop protection;
- sustainability;
- workforce;
- community and social contribution;
- feedback on CRDC and CottonInfo; and
- industry sentiment.

o   As some questions are specific to cotton growers in the 2019-20 season, these questions will have a lower sample size compared to most other questions.

The results from the 2020 Grower Survey now follow. Ahead of this, we provide an explanation to assist readers in understanding and interpreting the results in this report.

How the survey was conducted	The 2020 Grower Survey was conducted using a CATI (Computer Assisted Telephone Interviewing) data collection methodology. This included: o Growers being contacted and invited to complete the survey over the phone; o Where this was not possible immediately, an interview appointment time was agreed and the interview completed at the agreed time.
When the survey was conducted	Surveys have usually been conducted in winter, focusing specifically on the preceding crop. CRDC agreed that to ensure consistency over time the Grower Survey should be conducted at the same time each year. The 2020 Grower Survey opened on 2 June 2020 and ran until 18 June 2020.

2019-20 season wrap-up

A look at the 2019-20 season

The 2019-20 cotton season was impacted by the prolonged dry conditions facing most of the cotton growing regions. There was a significant decline in the total area planted to cotton this season, as a result of below average rainfall, very low levels of soil moisture, and a lack of stored irrigation water.

The Australian cotton industry in 2019-20:

o   60,000 hectares – planted into irrigated and dryland cotton, down from 336,000 hectares in 2018-19

o   600,000 bales – produced by the Australian cotton industry, down from 2.1 million in 2018-19

o   10 bales per hectare – the average yield for the 2019-20 crop, compared to 9.5 bales per hectare in 2018-19.

(Source: Cotton Australia)

CRDC's investment in 2019-20:

o $20 million – CRDC's investment in cotton RD&E on behalf of cotton growers and the Australian Government
o   234 – RD&E projects
o   99 – research partners
o   5 – key program areas: increasing productivity and profitability on Australian cotton farms; improving cotton farming sustainability and value chain competitiveness; building the adaptive capacity of the Australian cotton industry; strengthening partnerships and adoption; and driving RD&E impact.

Commodity performance indicators

Index of cotton prices received by farmers (Australia)

78.7 82.3 88.5 77.9 83.3 82.5 89.4 79.8 97.2 100.3 100.0 94.6

2009–10 2010–11 2011–12 2012–13 2013–14 2014–15 2015–16 2016–17 2017–18 2018–19 s 2019–20 f 2020–21 f
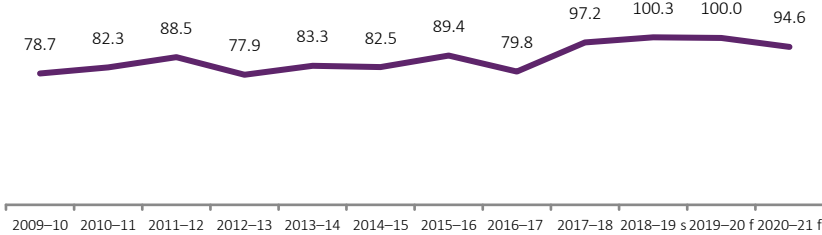
f ABARES forecast. s ABARES estimate.
Note: The indexes for commodity groups are calculated on a chain–weighted basis using Fisher's ideal index with a reference year of 2019–20 = 100. Indexes for most individual commodities are based on annual gross unit value of production. Prices used in these calculations exclude GST. Details for establishments with estimated value of agricultural operations (EVAO) of $1,500 or more until 1980–81; $2,500 or more from 1981–82 t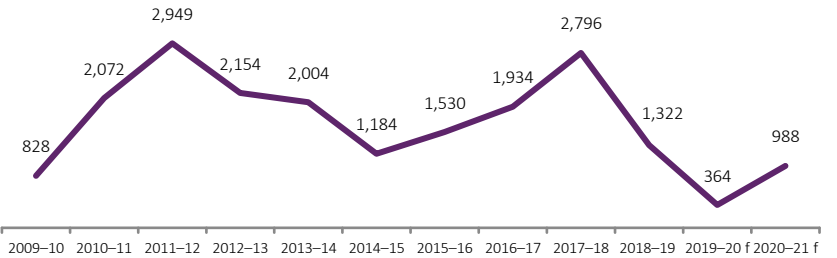o 1985–86; EVAO of $20,000 or more from 1986–87 to 1990–91; EVAO of $22,500 or more from 1991–92 to 1992–93; EVAO of $5,000 or more from 1993–94 to 2014–15; and EVAO of $40,000 from 2015–16..
Sources: ABARES; Australian Bureau of Statistics

Gross value of cotton lint and cottonseed production* (Australia) ($m)

828 2,072 2,949 2,154 2,004 1,184 1,530 1,934 2,796 1,322 364 988

2009–10 2010–11 2011–12 2012–13 2013–14 2014–15 2015–16 2016–17 2017–18 2018–19 2019–20 f 2020–21 f
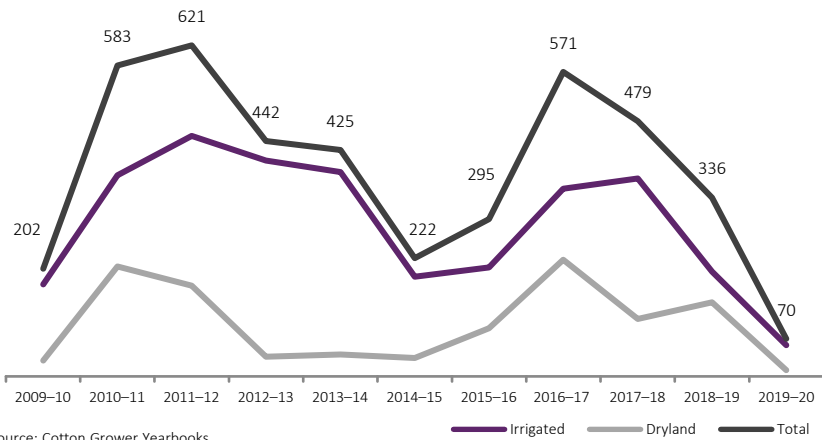
f ABARES forecast. s ABARES estimate. *Value delivered to gin.
Notes: The gross value of production is the value placed on recorded production at the wholesale prices realised in the marketplace. The point of measurement can vary between commodities. Generally the marketplace is the metropolitan market in each state and territory. However, where commodities are consumed locally or where they become raw material for a secondary industry, these points are presumed to be the marketplace. Prices used in these calculations exclude GST. Details for establishments with estimated value of agricultural operations (EVAO) of $1,500 or more until 1980–81; $2,500 or more from 1981–82 to 1985–86; EVAO of $20,000 or more from 1986–87 to 1990–91; EVAO of $22,500 or more from 1991–92 to 1992–93; EVAO of $5,000 or more from 1993–94 to 2014–15; and EVAO of over $40,000 from 2015–16.
Sources: ABARES; Australian Bureau of Statistics

Cotton crop areas (Australia) ('000 ha)

202 583 621 442 425 222 295 571 479 336 70

2009–10 2010–11 2011–12 2012–13 2013–14 2014–15 2015–16 2016–17 2017–18 2018–19 2019–20

Source: Cotton Grower Yearbooks

— Irrigated — Dryland — Total

Average cotton yields (Australia) (bales/ha)

9.4 9.2 10.0 10.8 10.2 12.0 11.5 10.2 11.8 10.0 9.9
3.6 2.8 3.3 3.6 1.6 2.9 2.7 1.5 2.5 1.2 1.2

2009–10 2010–11 2011–12 2012–13 2013–14 2014–15 2015–16 2016–17 2017–18 2018–19 2019–20

Source: Cotton Grower Yearbooks

— Irrigated — Dryland

How to navigate the report

Information around the irrigation systems used by growers for cotton in season 2019-20 was collected in the 2020 Grower Survey.

From the feedback provided:

o   Over three in four growers (77%) reported using a furrow irrigation system;
o   29% used a overhead system (i.e. lateral or centre pivot); and
o   12% used a bankless channel system.

The results are largely consistent between full or partial irrigators although we note the sample size for the partial irrigators is small and so needs to be treated with some caution.

The commentary to the left provides high-level insights into the results at an overall level, and (where applicable) results across two main segments – Region and Size of Total Farm Area

The base represents the cohort of respondents to the question (e.g. all growers who grew cotton under full/part irrigation in 2019-20), and the number that provided an answer to the question (122). Growers did not necessarily answer each question – as a result, the base across questions may vary.

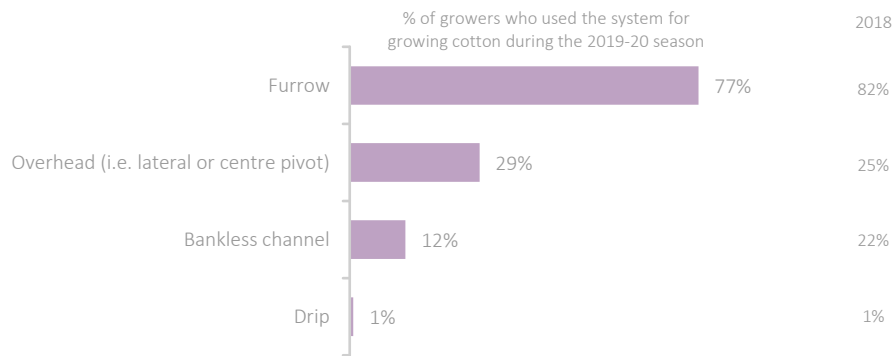The results below are results of survey measurements reported at two key segment levels: Region (six categories) and Size of Total Farm Area (three categories). For example, in Darling Downs 20 respondents answered the question, of which 65% stated they used a furrow irrigation system for growing cotton.

Please list the area of cotton (in green hectares) grown under each of the following irrigation systems:*
Base: All growers who grew cotton during the 2019-20 season under full or part irrigation; n = 122

% of growers who used the system for growing cotton during the 2019-20 season

		2018
Furrow	77%	82%
Overhead (i.e. lateral or centre pivot)	29%	25%
Bankless channel	12%	22%
Drip	1%	1%

Key results by Region and Size of Total Farm Area

	Central QLD (n=14)	Darling Downs (n=20)	Macintyre Balonne (n=11)	Northern NSW (n=50)	Macquarie (n=6)	Southern NSW (n=18)	Small (n=43)	Medium (n=69)	Large (n=10)
Furrow	100%	65%	64%	80%	83%	78%	81%	74%	80%
Overhead (i.e. lateral or centre pivot)	7%	45%	18%	36%	17%	11%	23%	32%	30%
Bankless channel	7%	0%	27%	2%	17%	50%	9%	16%	0%
Drip	0%	0%	0%	0%	17%	0%	0%	1%	0%

The results above are results of survey measurements reported at an overall level – covering all regions and farm sizes.

Segments were categorised as follows:

Region (based on Region at Q4)
- Central QLD
- Darling Downs
- Macintyre – Balonne
  - Border Rivers
  - St George/Dirranbandi
- Northern NSW
  - Gwydir
  - Lower/Upper Namoi
  - Bourke
- Macquarie
- Southern NSW
  - Lachlan
  - Murrumbidgee
  - Murray

**Size of Total Farm Area
(based on cropping area – full irrigation, part irrigation or raingrown/dryland - at Q6)**
- Small   (< 1,000 ha)
- Medium   (1,000 – 5,000 ha)
- Large   (> 5,000 ha)

* Please note that more than one system could be selected by growers.

Snapshot of Key Findings

Snapshot of Key Findings

225 growers responded to the 2020 Grower Survey (18.5% based on 1,216 growers listed)
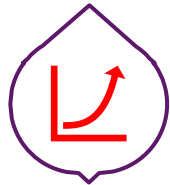
81% of growers are positive about the future of the industry
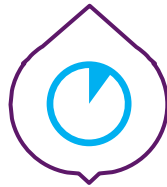
10% of total farm area was under cotton production in 2019-20
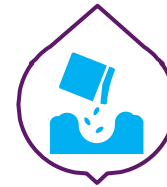
Growers reported an average of 184 hectares under cotton
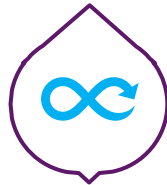
Growers reported an average yield of 10.45 bales per hectare on fully irrigated cotton area
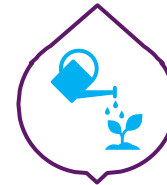
An average of 6.67ML per hectare of irrigation water was used on fully irrigated cotton

CRDC
COTTON RESEARCH AND
DEVELOPMENT CORPORATION

91% of growers said they are supportive of CRDC and their research investments and activities

96% of growers agree that CRDC is a trusted information source

CottonInfo

86% of growers source info from the CottonInfo team or resources

97% of growers agree that CottonInfo is a trusted information source

Snapshot of Key Findings
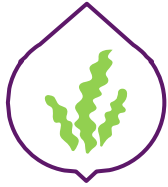
Weeds

74% of growers have cotton fields that are affected by weeds
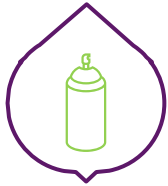
72% of growers have weeds who are resistant to the Group M herbicide

Sustainability

32% of growers are aware of the "PLANET. PEOPLE. PADDOCK." sustainability program
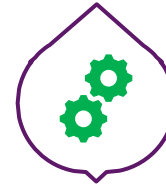
Growers use (on average) 5.3 of 8 listed carbon farming practices on-farm

Workforce and Training

Average # of staff across farm sizes:
Small farms: 3.3
Medium farms: 5.2
Large farms: 12.8

42% of growers or their staff have attended accredited education or training courses over the last 12 months

Individual Wellbeing

39% of growers reported they were spending more or much more time working than they wanted

61% of growers reported spending less or much less time with family/friends than they had wanted to

Industry Sentiment

Feelings about the future of the cotton industry

The feedback from the 2020 CRDC Grower Survey indicates a positive level of confidence and optimism about the future of the industry among cotton growers. There has been little change on grower confidence over the last 12 months (up 2 points). The results remain at the level of confidence reported in 2017 and 2018. We also note that:

o The overwhelming majority of growers continue to be positive about the future (81%).

o Most growers (49%) describe themselves as 'fairly positive', again reflecting perhaps a cautious optimism about the future of the industry.

o This level of optimism remains largely consistent across all geographies and all farm sizes. Growers in the NSW regions are slightly less positive than growers from other regions.

The results from this measure over the past three years are shown opposite and point to small changes in the nature of confidence among growers.

% rating positive across 2017-2020 CRDC Grower Surveys

	2017	2018	2019	2020
Fairly positive	51%	50%	47%	49%
Very positive	41%	45%	33%	32%

── Fairly positive   ── Very positive
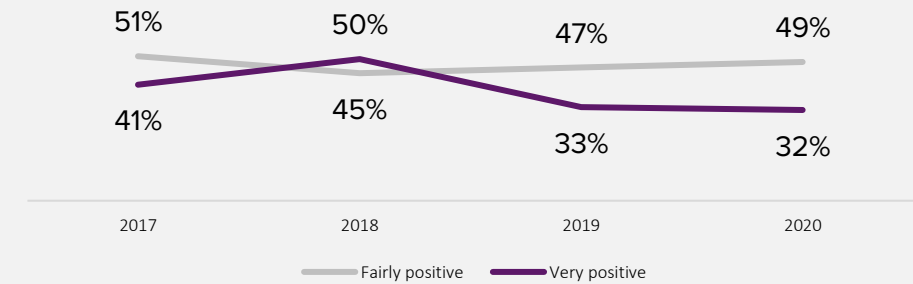
Overall, how do you feel about the future of the cotton industry. Would you say you feel...?
Base: All growers; n = 225
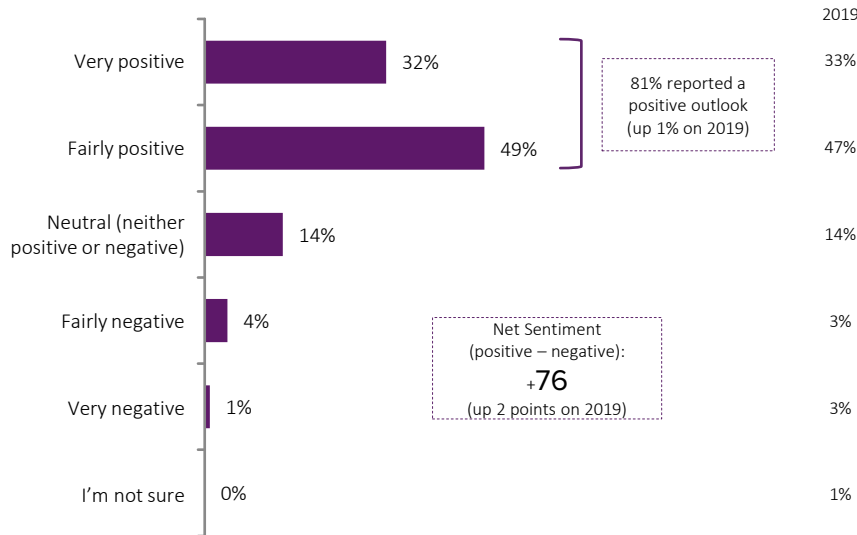
	2020	2019
Very positive	32%	33%
Fairly positive	49%	47%
Neutral (neither positive or negative)	14%	14%
Fairly negative	4%	3%
Very negative	1%	3%
I'm not sure	0%	1%

81% reported a positive outlook (up 1% on 2019)

Net Sentiment (positive – negative): +76 (up 2 points on 2019)

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=54)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=123)	Large (n=21)
Positive Outlook	83%	87%	94%	74%	73%	76%	84%	80%	81%
Negative Outlook	0%	2%	0%	9%	9%	9%	4%	6%	5%
Net Sentiment	+83	+85	+94	+65	+64	+68	+80	+74	+76

Farm Profiles

Area and distribution of farm land

The 2020 CRDC Grower Survey sought to build an understanding of farm use. The feedback from the 2020 CRDC Grower Survey indicates:

o Growers reported (on average) a farm size of 3,510 ha;
o 78% of the available land area was developed and available for cropping or other uses including cotton; with
o Growers again this year reporting that the majority of the developed area is either fully irrigated or developed for raingrown/dryland farming; and
o 22% of their total farm area remains in use for grazing, native vegetation or other.

The nature of cotton farming obviously varies across the different growing regions and farm sizes as illustrated in the results shown below.
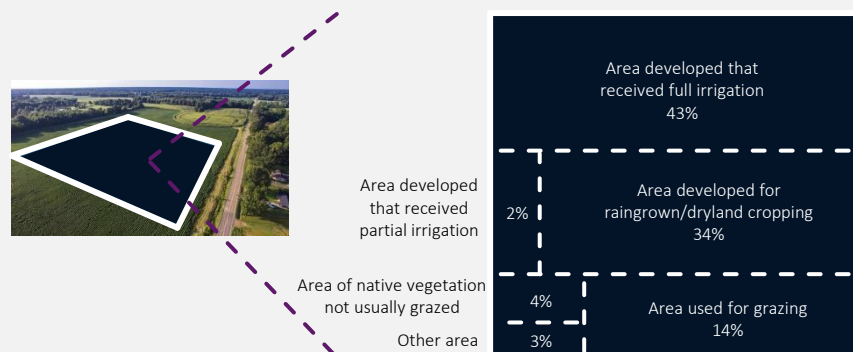
Area developed that received full irrigation 43%

Area developed that received partial irrigation 2%

Area developed for raingrown/dryland cropping 34%

Area of native vegetation not usually grazed 4%

Area used for grazing 14%

Other area 3%

What is the total area of your farm (in hectares), and what is the area attributed to the following?
Base: All growers (excluding two outliers*); n = 223

Total Area (in hectares)	3,510 ha
Area developed for fully irrigated broadacre cropping	43%
Area developed for partially irrigated broadacre cropping	2%
Area developed for raingrown/dryland cropping	34%
Area used for grazing	14%
Area of native vegetation not usually grazed	4%
Other area not covered above	3%
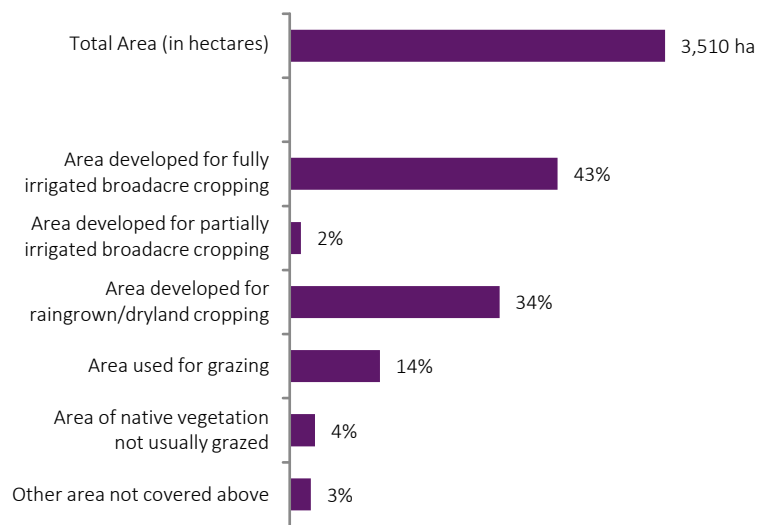
Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=54)	Macintyre Balonne (n=30)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=122)	Large (n=20)
Total area (ha)	3,328	2,224	6,788	3,435	5,637	2,451	1,229	3,370	13,600
Full irrigation	41%	34%	40%	38%	29%	73%	53%	39%	23%
Partial irrigation	<1%	3%	<1%	2%	2%	1%	2%	2%	3%
Raingrown/Dryland	25%	51%	17%	41%	55%	7%	21%	39%	51%
Grazing	26%	7%	28%	13%	11%	11%	13%	15%	16%
Native vegetation	5%	3%	8%	4%	2%	4%	6%	3%	3%
Other	3%	3%	7%	3%	1%	3%	4%	3%	4%

* Two outliers were removed from this analysis for having a significantly different farm size to the rest of the respondent base (over 400,000, next highest is 32,000).

Average riparian length and width

The feedback from the 2020 CRDC Grower Survey indicates:

o Growers report their average riparian area is 6.93 km in length. While there have been some changes over the last three years, the overall size remains largely consistent with the long-term average of this measure over the past 6 survey periods at 7.5 km;

o The average width of riparian areas is 138 m. The results from the 2020 survey indicate a smaller riparian area width (on average down 6 m from 2019 and 25 m from 2018). The long-term average of this measure over the past 6 survey periods is 157 m.

As reported in 2019, the analysis indicates the size of these riparian areas varies considerably across the different growing regions. Not surprisingly also, there is considerable variation across the different farm sizes.

Comparison of reported riparian size across Grower Surveys

	2011 (n=183)	2014 (n=110)	2017 (n=157)	2018 (n=142)	2019 (n=130)	2020 (n=137)
Average length (km)	9	7.5	7.65	6.31	7.58	6.93
Average width (m)	Not asked	Not asked	175	169	144	138

Approximately how long and wide is the riparian area on your property?
Base: All growers with a riparian area on their farm*; n = 137

6.93 km

Average length
(in kilometres)

138 m

Average width
(in metres)

87 of 225 growers (39%) reported no riparian area on their property.

Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=33)	Macintyre Balonne (n=18)	Northern NSW (n=45)	Macquarie (n=8)	Southern NSW (n=15)	Small (n=48)	Medium (n=72)	Large (n=17)
Average length (km)	5.81	4.45	9.79	7.03	7.75	9.80	4.61	7.96	9.25
Average width (m)	167	156	157	109	159	119	137	146	106

* Results were considered outliers and were removed if reported length was 100km or more (n = 1), or reported width was 1,000m or more (n = 8).

2019-20 Cotton Crop

Key information about the growers' area planted for the 2019-20 season was collected during the survey. During the survey process, an estimated 65% of growers indicated they were not growing cotton in the 2019-20 season, but remain in the cotton industry. The feedback from 2019-20 cotton growers indicate that:

o   Growers reported a field area planting of 25% of the developed fully irrigated areas (down 11 points from 2019 and 9 points on the 2018 result);

o   Growers reported 24% of the partially irrigated developed area was allocated and used for their cotton crop (equivalent to the 2018 result); while

o   3% of the dryland area was allocated to cotton. This is down on the 2019 and 2018 result but is a consequence of a very small sample size. Caution should be exercised in interpreting this result.

o   Based on the feedback provided in the 2020 Grower Survey, cotton was grown on an estimated 10% of total farm land. This compares to the estimate of 10% of total farm area reported by Cotton Australia*.

o   On average, growers reported an area of 184 ha allocated to cotton. This compares to the 2019 Grower Survey estimate of 298 ha.

o   Based on the estimates provided by growers, it is estimated that the total cotton crop area for the 2019-20 season was 69,394 ha. This compares to the estimate of 60,000 ha estimated for the 2019-20 season by Cotton Australia.

Source: Cotton Australia, August 2020 (https://cottonaustralia.com.au/industry-overview)

What area was planted for cotton for the 2019-20 cotton growing season?
Base: All growers who grew cotton during the 2019-20 season; n varies
(Fully Irrigated, n = 119, Partially Irrigated, n = 19, Raingrown/Dryland, n = 95)

	Fully Irrigated (proportion of farm area)	Partially Irrigated (proportion of farm area)	Raingrown/Dryland (proportion of farm area)
Field area planted	25%	24%	3%
Green area planted	23%	20%	1%
Area planted but not harvested	1%	3%	<1%

Estimation method to calculate proportion of total land area under cotton

Growers reported total developed area as a proportion of the total farm area	⊗	Growers reported total green area planted and harvested as a proportion of total developed area	⊟	Proportion of total farm area allocation to cotton

Split by

| Full | Part | Rain |

Split by

| Full | Part | Rain |
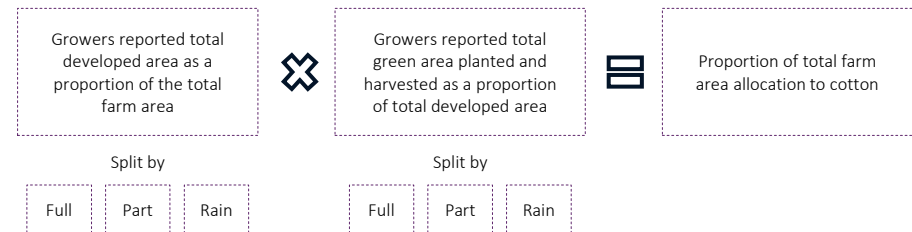
Area under cotton crop within the 2019-20 season

Average area growers reported as area allocated to cotton crop (ha/grower)	184
Total number of growers growing cotton in 2019-20*	377
Total area under cotton crop within 2019-20 (ha)	69,394

* Total number of growers on CRDC-provided list: n = 1,216.
When contacted by phone, 11.6% of contacts stated they were not growing cotton anymore, or not in the farming business anymore.
A further 64.9% when surveyed identified they were not farming cotton in 2019-20. Taking these into account, the effective number of cotton growers is n = 377.

Growers reported three key indicators for the yields they achieved for the 2019-20 growing season.

These were average yield across their entire crop, the highest and then lowest yield from one field for the same crop. This provides a sense of the breadth of performance across their farms.

The results provided by growers indicate the variation across fully, partially and raingrown areas.

For fully irrigated areas, the 2020 survey reported an average yield of 10.45 bales/ha. This reported result is equivalent to the 2019 result (10.23).

Results are provided for partially irrigated (7.59 bales/ha) and raingrown (5.55 bales/ha), but the sample sizes for these two cohorts mean results should be interpreted with caution.

What were your yields for the 2019-20 cotton growing season?
Base: All growers who grew cotton during the 2019-20 season; n varies
(Fully Irrigated, n = 117, Partially Irrigated, n = 10, Raingrown/Dryland, n = 4)

	Fully Irrigated (bales per ha)	Partially Irrigated (bales per ha)	Raingrown/Dryland (bales per ha) *
Average yield	10.45 / 2019: 10.23	7.59	5.55
Yield achieved by your highest-yielding field (average of grower-reported yield)	11.55 / 2019: 11.95	8.22	5.70
Yield achieved by your lowest-yielding field (average of grower-reported yield)	9.24 / 2019: 8.53	6.78	5.50
Range of variation from average yield	2.31 / 2019: 3.42	1.44	0.20

* Based on n = 4 growers – results are indicative only.

Key results by Region and Size of Total Farm Area (fully irrigated results only)

	Central QLD (n=14)	Darling Downs (n=17)	Macintyre Balonne (n=11)	Northern NSW (n=48)	Macquarie (n=6)	Southern NSW (n=18)	Small (n=43)	Medium (n=64)	Large (n=10)
Average yield	10.86	10.66	10.85	10.40	10.25	10.42	10.17	10.80	9.43
Highest yield from one field	12.07	11.96	11.96	11.31	11.37	11.92	11.08	11.84	11.74
Lowest yield from one field	9.78	9.33	9.45	9.46	8.45	8.65	9.24	9.50	7.65
Range of variation from average yield	2.29	2.64	2.51	1.85	2.92	3.27	1.84	2.34	4.09

New in 2020, growers were asked to describe the configuration used for their fully irrigated, partially irrigated and raingrown cotton areas for the 2019-20 season. The results show that for the fully irrigated cotton areas:

o   The majority of growers reported a 1m solid configuration.

o   For larger farms however, 80% reported the 1m solid configuration, while 10% reported using single skip and 20% reported using a double skip configuration.

o   Results vary somewhat across the growing regions.

What row configuration did you use for fully irrigated, partially irrigated cotton and raingrown/dryland cotton area this season?
Base: All growers who grew cotton during the 2019-20 season; n varies
(Fully Irrigated, n = 117, Partially Irrigated, n = 10, Raingrown/Dryland, n = 4)

	Fully Irrigated (% of growers using row configuration)	Partially Irrigated (% of growers using row configuration)	Raingrown/Dryland (% of growers using row configuration) *
1m Solid (100%)	86%	30%	0%
Single skip (66%)	8%	30%	50%
Double Skip (50%)	3%	20%	25%
1.5m 60 inch (50%)	3%	20%	0%
One in one out (50%)	0%	0%	0%
Super Single (33%)	2%	0%	25%
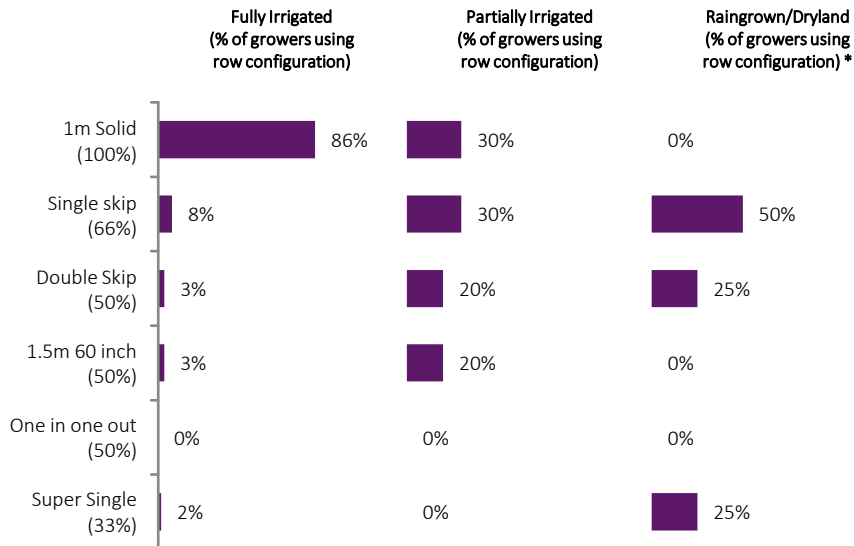
* Based on n = 4 growers – results are indicative only.

Key results by Region and Size of Total Farm Area (fully irrigated results only)

	Central QLD (n=14)	Darling Downs (n=17)	Macintyre Balonne (n=11)	Northern NSW (n=48)	Macquarie (n=6)	Southern NSW (n=18)	Small (n=43)	Medium (n=64)	Large (n=10)
1m Solid (100%)	93%	76%	82%	90%	100%	89%	88%	86%	80%
Single skip (66%)	7%	24%	0%	6%	0%	0%	9%	6%	10%
Double Skip (50%)	7%	0%	9%	2%	0%	0%	2%	2%	20%
1.5m 60 inch (50%)	0%	0%	9%	4%	0%	0%	2%	5%	0%
One in one out (50%)	0%	0%	0%	0%	0%	0%	0%	0%	0%
Super Single (33%)	0%	0%	0%	0%	0%	11%	0%	3%	0%

Nutrition and Soil

Rate of applied nutrients in 2019-20

Please list the rate of applied nutrients for your most typical irrigated, partially irrigated and/or dryland cotton field/s in 2019-20*:
Base: All growers who grew cotton during the 2019-20 season; n varies
(Fully Irrigated, n = 108, Partially Irrigated, n = 10, Raingrown/Dryland, n = 4)

	Fully Irrigated	Partially Irrigated	Raingrown/Dryland *
Preseason Nitrogen (kg N/ha)	161.4 2019: 182.8	143.5	55.0
In-season Nitrogen (kg N/ha)	92.0 2019: 142.3	37.0	25.0
Total Nitrogen (kg N/ha)	253.4 2019: 325.1	180.5	80.0
Nitrogen use efficiency (kg lint/kg of applied N)	14.2 2019: 8.8	12.6	13.6
Total Phosphorus (kg P/ha)	44.2 2019: 71.4	37.8	10.0
Total Potassium (kg K/ha)	33.5 2019: 30.2	18.0	10.0
Total Zinc	3.6 2019: 17.3	2.3	0.4
Total Sulfur	4.7 2019: 9.9	7.5	3.8

* Based on n = 4 growers – results are indicative only.

Key results by Region and Size of Total Farm Area (across fully irrigated cotton area only)

	Central QLD (n=13)	Darling Downs (n=17)	Macintyre Balonne (n=11)	Northern NSW (n=47)	Macquarie (n=2)	Southern NSW (n=15)	Small (n=42)	Medium (n=56)	Large (n=10)
Preseason Nitrogen (kg N/ha)	181.2	128.5	175.5	175.6	100.0	129.5	170.8	150.3	183.5
In-season Nitrogen (kg N/ha)	77.0	62.4	131.4	80.3	180.0	147.4	82.3	96.7	105.0
Total Nitrogen (kg N/ha)	258.2	190.9	306.8	255.9	280.0	277.0	253.1	247.0	288.5
N-use efficiency (kg lint/kg applied N)	9.7	12.7	8.2	19.6	7.7	9.4	9.9	18.6	8.0
Total Phosphorus (kg P/ha)	33.6	55.0	99.4	34.2	35.0	46.2	45.9	36.7	75.1
Total Potassium (kg K/ha)	41.0	74.7	53.6	26.1	5.0	1.7	46.0	27.5	15.5
Total Zinc	2.1	1.4	13.5	3.0	0.0	4.2	4.7	2.9	3.0
Total Sulfur	7.6	2.2	3.3	3.2	0.0	7.6	6.8	3.3	2.6

Breakdown of preseason and in-season Nitrogen use (across fully irrigated cotton area)

Both Pre-season and In-season Nitrogen	In-season Nitrogen only	Pre-season Nitrogen only	Did not apply any Nitrogen
74%	7%	18%	2%
2019: 82%	4%	13%	1%

* A small amount of outliers were removed from this analysis for reporting a product rate of nutrients instead of actual rates.

Soil types where cotton was grown in 2019-20

Growers have different soil types reflective of where they farm their cotton crop. In the 2020 Grower Survey, we note that:

o   The majority of growers (57%) reported growing in heavy soils

o   One in three (33%) reported clay loams; while

o   Just one in ten (9%) reported growing in light sandy loams

The results provide a broad indication only of the type of soils growers experienced for the cotton crop in season 2019-20.

Across the regions:

o   Central QLD: mostly heavy soils but a mix of light sandy loams and clay loams
o   Darling Downs: predominantly heavy soils
o   Macintyre Balonne: predominantly heavy soils
o   Northern NSW: a mix of heavy soils and clay loams
o   Macquarie: a mix of heavy soils and clay loams
o   Southern NSW: mostly heavy soils, with clay loams

What proportion of each of the following best describes the soil types where you grew cotton this season?
Base: All growers who grew cotton during the 2019-20 season; n = 125
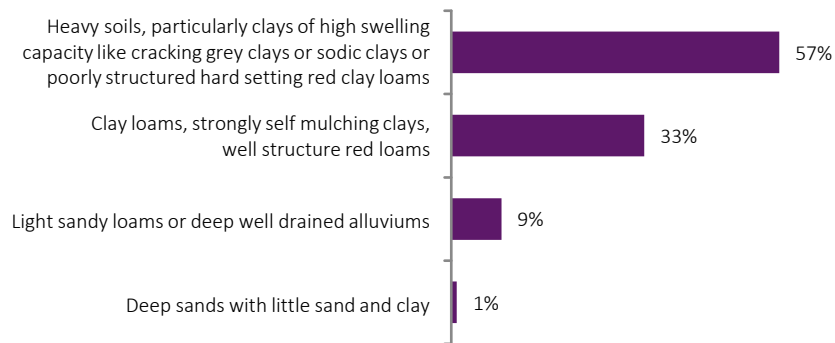
Soil type	Percentage
Heavy soils, particularly clays of high swelling capacity like cracking grey clays or sodic clays or poorly structured hard setting red clay loams	57%
Clay loams, strongly self mulching clays, well structure red loams	33%
Light sandy loams or deep well drained alluviums	9%
Deep sands with little sand and clay	1%

Key results by Region and Size of Total Farm Area

	Central QLD (n=15)	Darling Downs (n=21)	Macintyre Balonne (n=11)	Northern NSW (n=50)	Macquarie (n=7)	Southern NSW (n=18)	Small (n=45)	Medium (n=70)	Large (n=10)
Heavy soils…	49%	81%	81%	46%	43%	65%	51%	61%	52%
Clay loams…	20%	19%	17%	47%	43%	31%	31%	34%	38%
Light sandy loams…	31%	0%	1%	7%	14%	4%	15%	5%	10%
Deep sands…	0%	0%	0%	0%	0%	0%	2%	0%	0%

FOCUS AREA -

Water

† Could you please provide estimates of the moisture profile at planting (or prior to pre-watering if performed), and then again at the end of the season, across the following areas (for the 2019-20 cotton growing season):
Base: All growers who grew cotton during the 2019-20 season; n varies
(Fully Irrigated, n = 117, Partially Irrigated, n = 10, Raingrown/Dryland, n = 4)

	Fully Irrigated	Partially Irrigated	Raingrown/Dryland *
Moisture profile at planting or prior to pre-watering (mm)	137.9 2019: 94.8	120.0	850.0
Moisture profile at season's end (mm)	265.6 2019: 98.1	116.0	80.0

* Based on n = 4 growers – results are indicative only.

Key results by Region and Size of Total Farm Area (fully irrigated results only)

	Central QLD (n=14)	Darling Downs (n=17)	Macintyre Balonne (n=11)	Northern NSW (n=48)	Macquarie (n=6)	Southern NSW (n=18)	Small (n=43)	Medium (n=64)	Large (n=10)
Moisture profile at planting or prior to pre-watering (mm)	155.0	58.2	105.0	119.4	138.3	54.2	111.3	169.3	60.0
Moisture profile at season's end (mm)	193.1	105.9	162.7	325.9	571.7	233.3	237.7	261.5	398.5

How much in-crop rainfall (in mm) did you receive in the 2019-20 cotton growing season between planting and harvesting?
Base: All growers who grew cotton during the 2019-20 season; n = 120

261.3 mm
2019: 114.6 mm

In-crop rainfall
(mm)

Key results by Region and Size of Total Farm Area

	Central QLD (n=14)	Darling Downs (n=20)	Macintyre Balonne (n=10)	Northern NSW (n=50)	Macquarie (n=7)	Southern NSW (n=16)	Small (n=43)	Medium (n=67)	Large (n=10)
In-crop rainfall (mm)	205.0	274.8	145.9	314.2	179.4	179.3	246.9	278.4	208.7

How much irrigation water (in mega litres per hectare) was applied to cotton during the 2019-20 cotton growing season?
Base: All growers who grew cotton during the 2019-20 season under full or part irrigation; n varies
(Fully Irrigated, n = 115, Partially Irrigated, n = 10)

Cotton under full irrigation
6.67 ML/ha
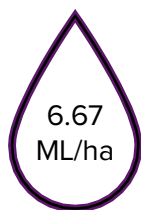
Cotton under part irrigation
3.50 ML/ha

2019:
7.71 ML/ha

Key results by Region and Size of Total Farm Area

	Central QLD (n=14)	Darling Downs (n=17)	Macintyre Balonne (n=10)	Northern NSW (n=47)	Macquarie (n=6)	Southern NSW (n=18)	Small (n=42)	Medium (n=63)	Large (n=10)
Fully irrigated – Mega litres per ha	6.49	4.19	8.03	5.76	9.97	10.32	5.88	7.05	7.62

	Central QLD (n=1)	Darling Downs (n=5)	Macintyre Balonne (n=0)	Northern NSW (n=3)	Macquarie (n=0)	Southern NSW (n=1)	Small (n=1)	Medium (n=9)	Large (n=0)
Partially irrigated – Mega litres per ha	2.50	3.20	.	2.33	.	9.50	2.50	3.61	.

† Results for soil moisture estimates are considered indicative only – a large amount of rainfall late into the season may have affected these estimates.

GPWUI: Gross Production Water Use Index

The GPWUI (Gross Production Water Use Index) is an index to benchmark water use efficiency. This benchmark relates total production (bales) to the total amount of water used, from all sources including irrigation water, rainfall (total or effective) and soil moisture.

For the purposes of calculations for this report, results across fully irrigated land were used.

The results from the 2020 Grower Survey indicate that across all growers responding to the 2020 survey the GPWUI was at 1.30 bales/ML. This compares to 1.32 bales/ML reported in the 2019 CRDC Grower Survey.

The tables below show the variation of this index across the growing regions (ranging from 0.88 in Macquarie to 1.72 in the Darling Downs).

† How GPWUI is calculated (on fully irrigated land):

Average yield (bales/ha)

divided by

Average irrigated water applied (ML/ha)	+	In-crop rainfall received (mm) divided by 100 (to convert to ML/ha)	+	Change in soil moisture between pre-season and season's end (mm) divided by 100 (to convert to ML/ha)
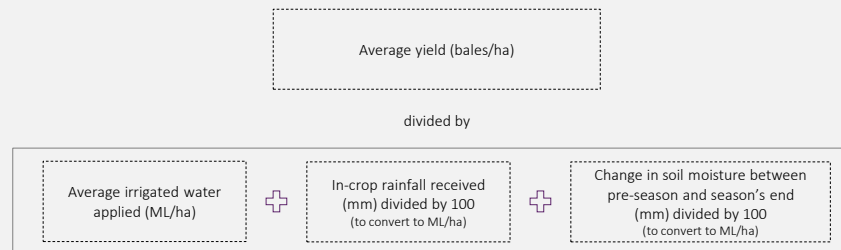
This is calculated for each individual grower and then averaged to provide an overall measure of GPWUI.

Gross Production Water Use Index (average of grower results)
Base: all growers who provided answers to all questions used within GPWUI calculations; n = 102

1.30 bales/ML

2019:
1.32 bales/ML
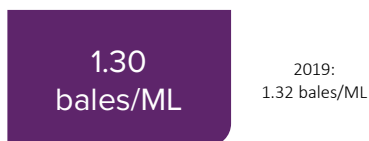
Key results by Region and Size of Total Farm Area

	Central QLD (n=12)	Darling Downs (n=16)	Macintyre Balonne (n=8)	Northern NSW (n=44)	Macquarie (n=6)	Southern NSW (n=15)	Small (n=36)	Medium (n=56)	Large (n=10)
GPWUI (bales/ML)	1.22	1.72	0.99	1.40	0.88	0.97	1.25	1.32	1.35

† Due to inconsistent estimates provided for soil moisture (as detailed on the previous page), this part of the calculation was replaced with a standard estimate of 1ML/ha for change in soil moisture for the 2020 result.
As per previous years, it is assumed that 100% of the rainfall is infiltrated into the cotton crop.

FOCUS AREA

Irrigation

Information around the irrigation systems used by growers for cotton in season 2019-20 was collected in the 2020 Grower Survey.

From the feedback provided:

o   Over three in four growers (77%) reported using a furrow irrigation system;
o   29% used a overhead system (i.e. lateral or centre pivot); and
o   12% used a bankless channel system.

The results are largely consistent between full or partial irrigators although we note the sample size for the partial irrigators is small and so needs to be treated with some caution.

Please list the area of cotton (in green hectares) grown under each of the following irrigation systems:*
Base: All growers who grew cotton during the 2019-20 season under full or part irrigation; n = 122

% of growers who used the system for growing cotton during the 2019-20 season

		2018
Furrow	77%	82%
Overhead (i.e. lateral or centre pivot)	29%	25%
Bankless channel	12%	22%
Drip	1%	1%

Key results by Region and Size of Total Farm Area

	Central QLD (n=14)	Darling Downs (n=20)	Macintyre Balonne (n=11)	Northern NSW (n=50)	Macquarie (n=6)	Southern NSW (n=18)	Small (n=43)	Medium (n=69)	Large (n=10)
Furrow	100%	65%	64%	80%	83%	78%	81%	74%	80%
Overhead (i.e. lateral or centre pivot)	7%	45%	18%	36%	17%	11%	23%	32%	30%
Bankless channel	7%	0%	27%	2%	17%	50%	9%	16%	0%
Drip	0%	0%	0%	0%	17%	0%	0%	1%	0%

* Please note that more than one system could be selected by growers.

Methods for scheduling cotton irrigations

A measure of the current methods used on-farm (in the 2019-20 growing season) was collected in the 2020 Grower Survey. The results show that:

On average growers reported using 3.3 of the 10 listed scheduling methods

Three methods were more often reported by growers including

o   visual monitoring of their crops
o   using weather forecasts; and
o   utilisation of capacitance probes.

The feedback provided is largely consistent with the results reported in 2018.

Which of the following methods, if any, did you use for scheduling cotton irrigations during the 2019-20 cotton growing season?
Base: All growers who grew cotton during the 2019-20 season under full or part irrigation; n = 123

Average # of methods used (out of the 10 listed methods):   3.3

		2018
Visual crop monitoring	85%	92%
Weather forecasts	72%	86%
Capacitance probe	58%	63%
Evapotranspiration (ET)	28%	24%
Remote sensing	27%	20%
Canopy temperatures	23%	17%
Neutron probe	17%	24%
Dynamic deficits	15%	21%
Moisture probe*	3%	n/a
Used my agronomist*	2%	n/a
Other (please specify)	4%	6%
None	1%	n/a
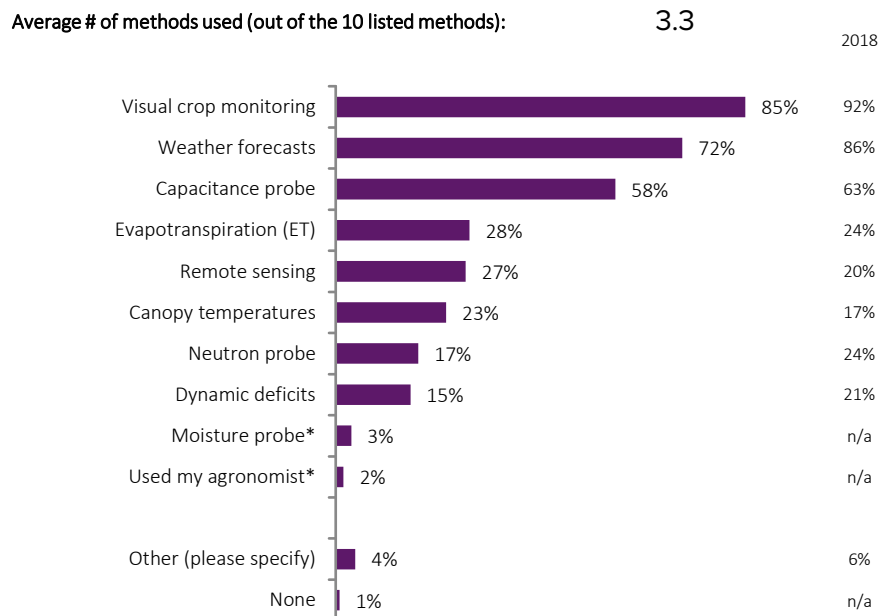
Key results by Region and Size of Total Farm Area

	Central QLD (n=15)	Darling Downs (n=20)	Macintyre Balonne (n=11)	Northern NSW (n=50)	Macquarie (n=6)	Southern NSW (n=18)	Small (n=43)	Medium (n=70)	Large (n=10)
Average # of methods	3.0	2.4	4.2	3.4	2.2	4.0	3.2	3.3	3.2
Visual crop monitoring	93%	80%	73%	90%	67%	78%	86%	87%	60%
Weather forecasts	80%	60%	64%	76%	50%	72%	79%	71%	40%
Capacitance probe	40%	40%	64%	66%	67%	67%	51%	63%	50%
Evapotranspiration (ET)	33%	15%	36%	16%	17%	67%	33%	26%	20%
Remote sensing	27%	5%	36%	26%	0%	56%	19%	31%	30%
Canopy temperatures	7%	5%	64%	28%	0%	22%	19%	23%	40%
Neutron probe	7%	10%	55%	16%	17%	17%	9%	17%	50%
Dynamic deficits	7%	20%	27%	18%	0%	11%	19%	11%	30%
Moisture probe*	7%	0%	0%	4%	0%	6%	7%	1%	0%
Used my agronomist*	0%	5%	0%	0%	0%	6%	2%	1%	0%
Other (please specify)	0%	15%	0%	4%	0%	0%	5%	4%	0%
None	0%	5%	0%	0%	0%	0%	0%	1%	0%

* Response coded back from "Other (please specify)" responses.

When asked about their attitudes to scheduling methods:

o Almost eight in ten growers agreed that most growers think using new methods is a good thing to do (16% strongly agree) and that using new methods will lead to better outcomes (37% strongly agree).

o Slightly fewer growers (72%) agreed that using new methods would be easy (14% strongly agree).

What is clear however is that:

o There was much stronger and consistent agreement from larger growers. This is perhaps unsurprising given arguably their capacity to adopt new methods for on-farm practices than smaller businesses.

o Some variations across regions suggesting some different attitudes in different growing regions.

Please state how much you agree or disagree with the following statements:
Base: All growers who grew cotton during the 2019-20 season under full or part irrigation; n = 123
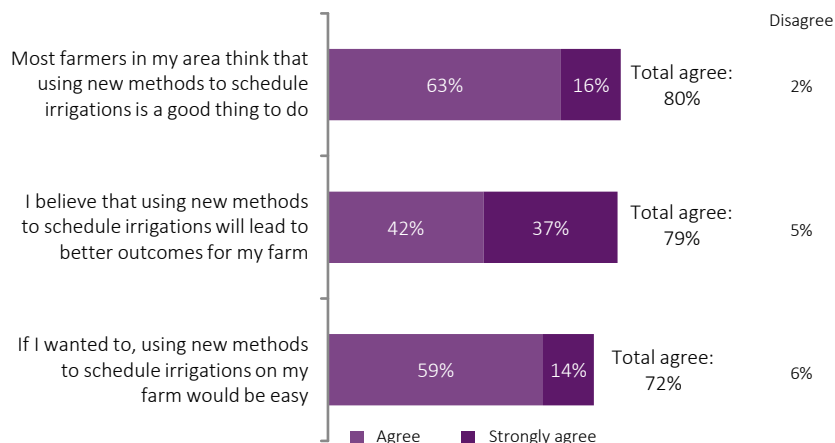
Key results by Region and Size of Total Farm Area (% total agree)

	Central QLD (n=15)	Darling Downs (n=20)	Macintyre Balonne (n=11)	Northern NSW (n=50)	Macquarie (n=6)	Southern NSW (n=18)	Small (n=43)	Medium (n=70)	Large (n=10)
Most farmers in my area think that using new methods to schedule irrigations is a good thing to do	80%	75%	73%	84%	67%	78%	72%	83%	90%
I believe that using new methods to schedule irrigations will lead to better outcomes for my farm	87%	80%	91%	76%	50%	78%	77%	79%	90%
If I wanted to, using new methods to schedule irrigations on my farm would be easy	93%	80%	73%	64%	67%	72%	67%	73%	90%

Chart:

Disagree

Most farmers in my area think that using new methods to schedule irrigations is a good thing to do — 63% | 16% — Total agree: 80% — 2%

I believe that using new methods to schedule irrigations will lead to better outcomes for my farm — 42% | 37% — Total agree: 79% — 5%

If I wanted to, using new methods to schedule irrigations on my farm would be easy — 59% | 14% — Total agree: 72% — 6%

■ Agree   ■ Strongly agree

Importance of using new methods to schedule irrigations

In 2020, growers who grew cotton using full or partial irrigation were asked about the importance of using new methods to schedule irrigations compared to other issues they face on-farm. The results, detailed below show that:

o   one in four (24%) reported that new methods for scheduling irrigations was essential;

o   a further 36% reported this as being important; so in aggregate

o   three in five growers identified finding new methods to schedule irrigations was by comparison to other on-farm issues as being of importance.

Fewer than one in ten (9%) of growers reported this as being not important.

The results vary slightly across the different grower cohorts with:

o   Larger farm businesses placing a higher level of importance on using new methods for scheduling irrigation than their smaller counterparts;

o   Some variation across the different growing regions with the highest reported importance among growers in Southern NSW and Macintyre Balonne.

Compared to other issues you face running your farm, how important is using new methods to schedule irrigations?
Base: All growers who grew cotton during the 2019-20 season under full or part irrigation; n = 123

Essential	24%
Important	36%
Somewhat important	32%
Not important	9%
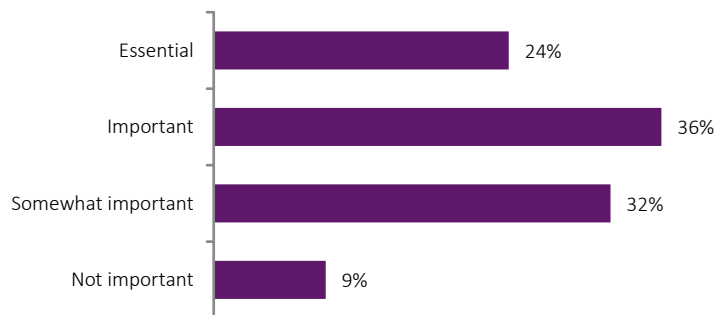
Key results by Region and Size of Total Farm Area

	Central QLD (n=15)	Darling Downs (n=20)	Macintyre Balonne (n=11)	Northern NSW (n=50)	Macquarie (n=6)	Southern NSW (n=18)	Small (n=43)	Medium (n=70)	Large (n=10)
Essential	20%	25%	36%	20%	17%	33%	19%	27%	20%
Important	33%	25%	36%	30%	50%	50%	30%	34%	70%
Somewhat important	40%	45%	18%	36%	33%	11%	37%	31%	10%
Not important	7%	5%	9%	14%	0%	6%	14%	7%	0%

Irrigation
Main reasons for scheduling irrigations

There were likely to be motivations for using new methods as well as barriers to adopting new methods. These motivations and barriers were explored in the 2020 Grower Survey. Growers who grew cotton using full or partial irrigation were asked to select the motivations for and potential barries to using new methods to schedule irrigation from a list of different explanations.

From the feedback provided it is evident that two drivers for take up of new methods are likely to be:

o Improved water use efficiency; and
o Improved yield

More growers selected these motivators than other ones listed in the survey. These results are consistent across farm size and growing region.

When asked to identify potential barriers to using new methods to schedule irrigations the feedback was that:

o For about one in three growers, there were no clear barriers to adopting new methods;

o For the remaining two in three growers, the likely barriers that emerged were:

▪ A call out for more information before they would decide to adopt new methods
▪ A level of comfort in the current practices used suggesting there would need to be a clear value proposition for some growers to adopt any new methods; and
▪ The ever-present concern about the costs associated with changing practices and introducing new methods.

Please select the three main reasons for using new methods to schedule irrigations. Please select up to three reasons from the list below.
Base: All growers who grew cotton during the 2019-20 season under full or part irrigation; n = 123

Reason	%
Improved water use efficiency	82%
Improved yield	78%
Ease of management	33%
Lack of water	23%
To save time and/or money	17%
Address labour challenges	16%
Energy savings	16%
Increase area of irrigation	11%
Other farmers in my area have benefited from adopting this practice	5%
Other (please specify)	2%
None	2%
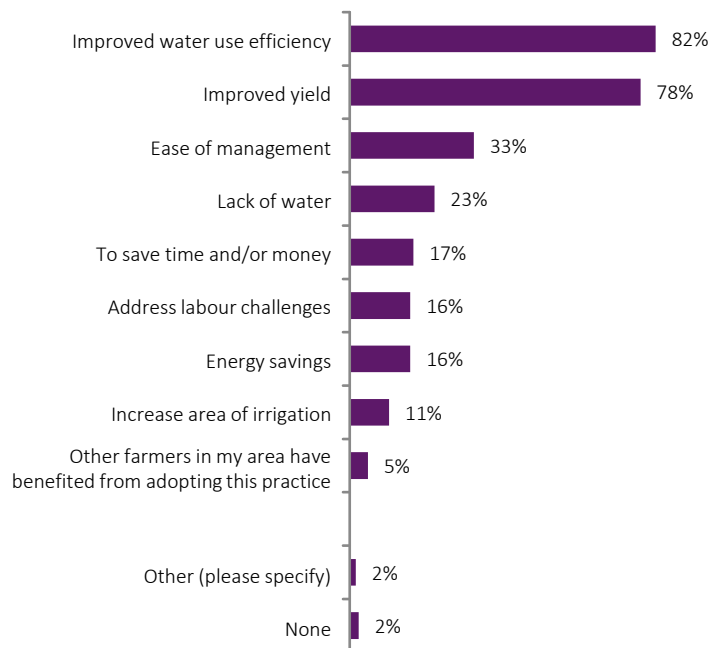
Please select the three main reasons for **not** using new methods to schedule irrigations. Please select up to three reasons from the list below.
Base: All growers who grew cotton during the 2019-20 season under full or part irrigation; n = 123

Reason	%
I need more information before I can make a change	29%
I'm happy with the way I do things now	28%
It costs too much	26%
Weather and seasonal issues	16%
I am worried about a reduction in production and/or profitability	9%
I don't think it will make a positive impact to the environment	5%
I do not have the time	4%
I don't know/I need more information to answer this question	4%
It's not the way I have managed my farm in the past	3%
Other (please specify)	11%
None	33%
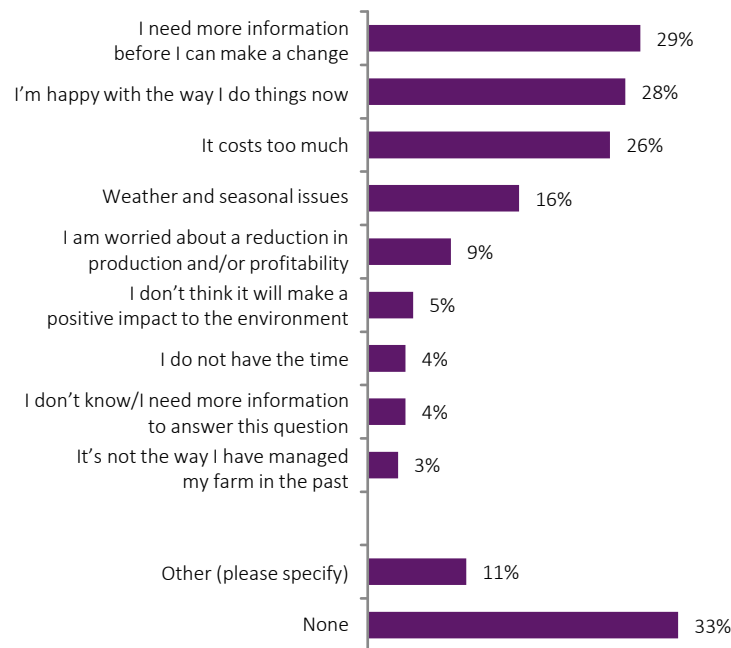
FOCUS AREA --

CRDC

Understanding what CRDC does

The 2020 study collected feedback from growers about their engagement and experience with CRDC. The results from the 2020 Grower Survey show that:

o   The overwhelming majority of growers report being familiar with what CRDC does (75% understand what CRDC does very or fairly well). Importantly, only a small number of growers indicated low levels of familiarity. These results are largely consistent with the 2018 survey results.

o   There remains about one in five (22%) who report they have 'a little' understanding of what CRDC does. This is a salient reminder that while the overall results continue to be positive, there will be a continuing need to keep all growers updated, informed and aware of the roles, responsibilities and outcomes achieved by CRDC.

How well would you say you understand what the Cotton Research and Development Corporation (CRDC) does?
Base: All growers; n = 225
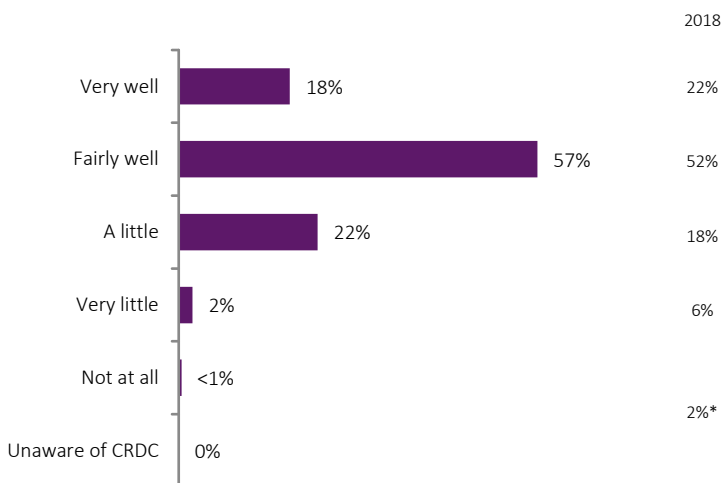
Response	2020	2018
Very well	18%	22%
Fairly well	57%	52%
A little	22%	18%
Very little	2%	6%
Not at all	<1%	2%*
Unaware of CRDC	0%	

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=54)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=123)	Large (n=21)
Very well	26%	17%	19%	22%	0%	12%	19%	16%	24%
Fairly well	65%	61%	58%	50%	73%	50%	59%	58%	48%
A little	9%	17%	23%	26%	9%	38%	22%	23%	19%
Very little	0%	4%	0%	1%	18%	0%	0%	3%	5%
Not at all	0%	2%	0%	0%	0%	0%	0%	0%	5%
Unaware of CRDC	0%	0%	0%	0%	0%	0%	0%	0%	0%

* In 2018, "Not at all" and "Unaware of CRDC" were a part of the same response category.

CRDC's performance

Growers also reported a strong assessment of CRDC in regards to:

o   Providing useful, credible information (up 0.1 to 4.2 out of a maximum rating of 5); and
o   Communicating with growers (up 0.1 to 4.0).

Pleasingly, these results are largely consistent across all regions and across farms of different sizes.

The analysis opposite reflects the value in building growers understanding of what CRDC does – those growers who understand very well what CRDC does reported even stronger ratings on CRDC providing useful, credible information and communicating with growers.

■ Providing useful, credible information   ■ Communicating with growers about R&D investments

How well would you say you understand what CRDC does?
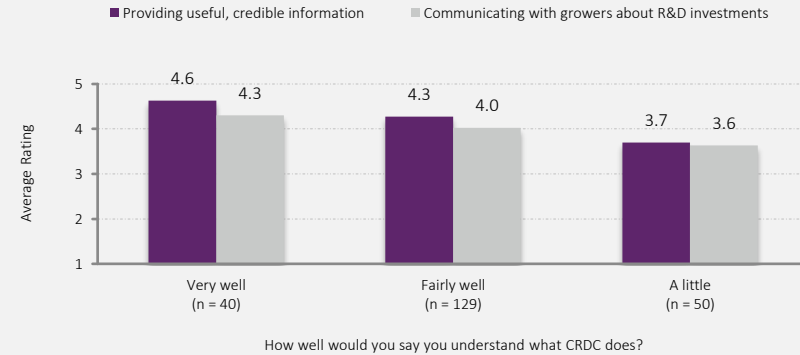
How would you rate CRDC's performance in:
Base: All growers (excluding "Don't know" answers); n varies

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=52)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=122)	Large (n=20)
Providing useful, credible information	4.1	4.3	4.3	4.2	4.2	4.1	4.3	4.2	4.2

	Central QLD (n=23)	Darling Downs (n=52)	Macintyre Balonne (n=30)	Northern NSW (n=66)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=120)	Large (n=19)
Communicating with growers about R&D investments	4.0	4.1	4.0	4.0	4.0	3.9	3.9	4.1	3.9

Support and being a trusted information source

Growers are overwhelmingly supportive of CRDC's research investments and activities with:

o   One in two (50%) of growers reporting they were 'very supportive'; with
o   A further four in ten (41%) describing themselves as 'supportive'

Once again, the results are largely consistent across all regions and across farms of different sizes.

The results indicate an improvement from the same measure collected in 2018.

In 2020, a larger proportion of growers (50% in 2020 compared to 42% in 2018) described themselves as 'very supportive' of CRDC's research investments and activities.

Overall, how supportive are you of CRDC's research investments and activities?
Base: All growers; n = 225

	2018
Very supportive	50%	42%
Supportive	41%	47%
Neutral	8%	9%
Unsupportive	<1%	1%
Very unsupportive	0%	1%
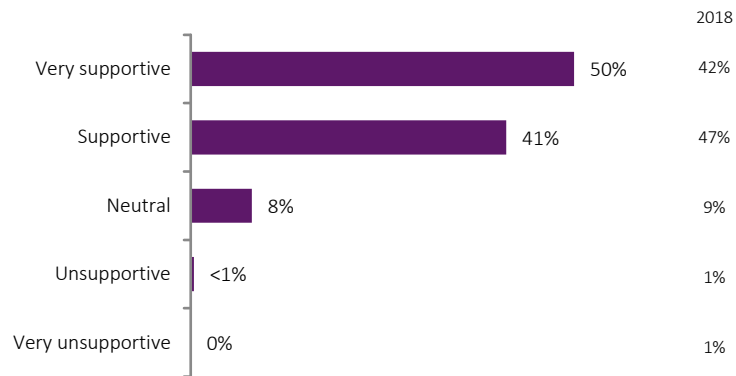
Thinking about CRDC, do you agree or disagree that CRDC is a trusted information source?
Base: All growers; n = 225
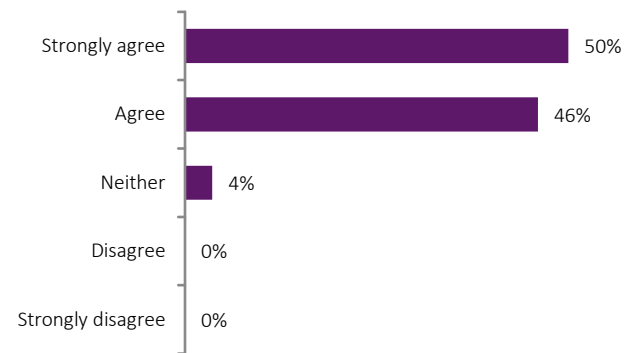
Strongly agree	50%
Agree	46%
Neither	4%
Disagree	0%
Strongly disagree	0%

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=54)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=123)	Large (n=21)
Very supportive	35%	56%	55%	50%	55%	47%	52%	50%	48%
Supportive	57%	33%	39%	40%	45%	47%	41%	40%	52%
Neutral	9%	9%	6%	10%	0%	6%	6%	11%	0%

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=54)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=123)	Large (n=21)
Strongly agree	52%	48%	61%	47%	55%	47%	59%	46%	43%
Agree	39%	48%	35%	51%	45%	47%	37%	50%	57%
Neither	9%	4%	3%	1%	0%	6%	4%	4%	0%

CottonInfo

The 2020 study collected feedback from growers about their engagement and experience with CottonInfo. The results from the 2020 Grower Survey show that:

o   The overwhelming majority of growers are aware of CottonInfo. Based on the feedback provided, CottonInfo is reaching more than nine in ten growers.

o   Awareness of CottonInfo is consistent across all regions and farm sizes.

The results indicate the majority of growers (87%) have had some level of engagement (receiving information or contact) with CottonInfo.

Are you aware of CottonInfo - the cotton industry's joint extension program (consisting of regional extension officers, technical leads and myBMP)?
Base: All growers; n = 225

No
5%

Maybe, not sure
2%

Yes, but have not received information or advice
6%

Yes, I receive CottonInfo information or contact from the team
87%
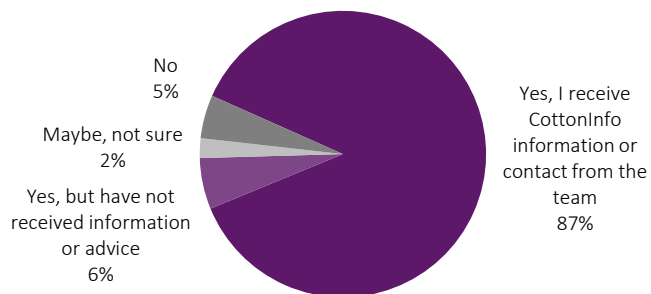
	Yes, I receive info or contact from the team	Yes, but have not received info or advice	Maybe, not sure	No
2018	85%	7%	4%	4%

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=54)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=123)	Large (n=21)
Yes, I receive info or contact from the team	91%	80%	97%	87%	82%	88%	91%	85%	81%
Yes, but have not received info or advice	4%	9%	3%	3%	0%	12%	5%	7%	0%
Maybe, not sure	0%	4%	0%	1%	18%	0%	0%	2%	10%
No	4%	7%	0%	9%	0%	0%	4%	5%	10%

Source information from CottonInfo

Growers were asked to provide an assessment of the frequency with which they sourced information from CottonInfo. Results show that:

o   Just under one in three (27%) reported they accessed these resources 'frequently'. This result was up slightly up from 24% in 2018.

o   Almost six in ten (59%) reported accessing these resources occasionally (up from 54% in 2018).

The results indicate that larger farms were more likely to be accessing resources more frequently than their smaller counterparts.

Do you source information from the CottonInfo team or information resources
(e.g. Cotton Pest Management Guide, Cotton Production Manual, myBMP, etc.)?
Base: All growers; n = 225
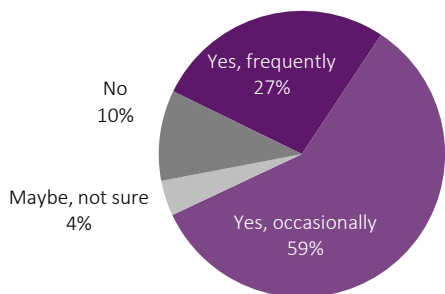
	Yes, frequently	Yes, occasionally	Maybe, not sure	No
2018	24%	54%	4%	17%

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=54)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=123)	Large (n=21)
Yes, frequently	26%	20%	48%	21%	18%	35%	25%	28%	33%
Yes, occasionally	57%	69%	42%	62%	82%	47%	63%	57%	52%
Maybe, not sure	4%	2%	10%	1%	0%	9%	2%	6%	0%
No	13%	9%	0%	16%	0%	9%	10%	10%	14%

Assists on improving practices on-farm

Growers were asked to provide an assessment of the resources and information CottonInfo provides in improving on-farm practices. The results show that:

o A positive assessment of the improvement achieved by the resources provided in three key areas:

- insects, weeds, diseases, resistance & biosecurity;
- water & moisture management, seasonal forecasting & climate; and
- nutrition & soils.

o There were slightly lower ratings on the improvements offered of the resources relating to NRM and energy use. This may be an opportunity for CottonInfo to review the resources provided in these areas to identify any areas where they may be strengthened.

To what degree have the CottonInfo team, information resources and myBMP assisted you to improve practices on your farm in relation to…
Base: All growers (excluding "N/A, not needed" answers); n varies
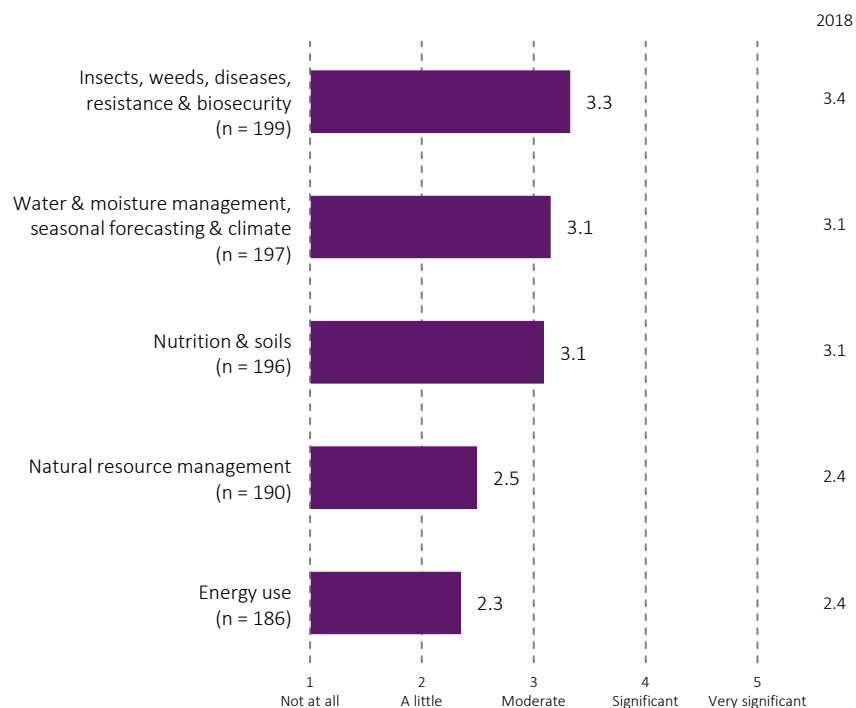
	2018
Insects, weeds, diseases, resistance & biosecurity (n = 199)	3.3 → 3.4
Water & moisture management, seasonal forecasting & climate (n = 197)	3.1 → 3.1
Nutrition & soils (n = 196)	3.1 → 3.1
Natural resource management (n = 190)	2.5 → 2.4
Energy use (n = 186)	2.3 → 2.4

Scale: 1 Not at all, 2 A little, 3 Moderate, 4 Significant, 5 Very significant

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=52)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=122)	Large (n=20)
Insects, weeds, diseases, resistance & biosecurity	3.3	3.3	3.6	3.3	3.2	3.2	3.3	3.3	3.5
	(n=20)	(n=49)	(n=30)	(n=57)	(n=10)	(n=27)	(n=72)	(n=107)	(n=18)
Water & moisture management, seasonal forecasting & climate	3.1	3.3	3.1	3.1	3.4	3.2	3.1	3.2	3.3
	(n=21)	(n=48)	(n=30)	(n=56)	(n=10)	(n=28)	(n=74)	(n=105)	(n=17)
Nutrition & soils	3.0	3.1	3.4	3.0	3.1	3.1	3.1	3.1	3.2
	(n=21)	(n=47)	(n=29)	(n=56)	(n=10)	(n=24)	(n=70)	(n=103)	(n=17)
Natural resource management	2.7	2.4	2.5	2.5	2.3	2.4	2.5	2.5	2.5
	(n=21)	(n=46)	(n=29)	(n=55)	(n=10)	(n=22)	(n=68)	(n=101)	(n=17)
Energy use	2.4	2.3	2.3	2.4	2.6	2.2	2.5	2.2	2.5

CottonInfo
Sentiment about CottonInfo

Growers were asked for a qualitative assessment of CottonInfo and the resources provided to cotton growers. The feedback from the 2020 Grower Survey that overwhelming growers agree that CottonInfo:

o   Is a trusted information source; and
o   Provides useful credible information.

Pleasingly, the results are even stronger among the cohort who frequently access CottonInfo resources.

■ CottonInfo is a trusted information source   ■ CottonInfo provides useful, credible info

	Yes, frequently (n = 61)	Yes, occasionally (n = 132)	No (n = 23)
CottonInfo is a trusted information source	98%	98%	88%
CottonInfo provides useful, credible info	97%	95%	81%

Do you source information from the CottonInfo team or information resources?
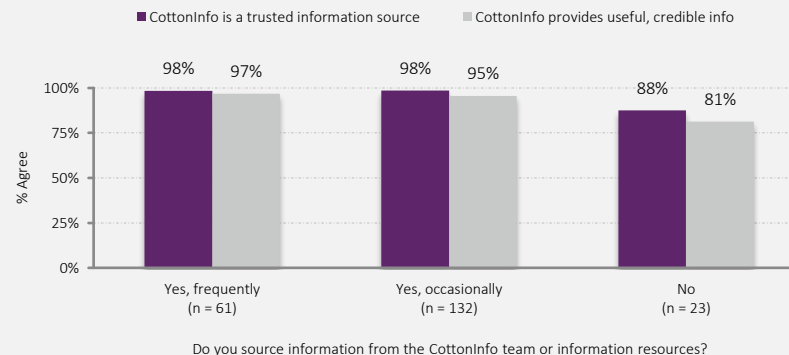
Thinking about CottonInfo, do you agree or disagree that…
Base: All growers (excluding "N/A" answers); n varies

	Agree	2018
CottonInfo is a trusted information source (n = 216)	97%	94%
CottonInfo provides useful, credible info (n = 216)	94%	90%

Key results by Region and Size of Total Farm Area (% agree)

	Central QLD (n=21)	Darling Downs (n=51)	Macintyre Balonne (n=31)	Northern NSW (n=65)	Macquarie (n=11)	Southern NSW (n=33)	Small (n=80)	Medium (n=116)	Large (n=20)
CottonInfo is a trusted info source	90%	100%	100%	94%	100%	100%	100%	96%	95%

	Central QLD (n=21)	Darling Downs (n=51)	Macintyre Balonne (n=31)	Northern NSW (n=65)	Macquarie (n=11)	Southern NSW (n=33)	Small (n=80)	Medium (n=116)	Large (n=20)
CottonInfo provides useful, credible info	86%	94%	100%	92%	100%	97%	94%	95%	95%

FOCUS AREA

IPM and Crop Protection

Bayer is currently preparing to launch the XtendFlex System in Australia including addressing regulatory requirements and talking to industry about the stewardship package. Cotton varieties carrying the XtendFlex trait are tolerant of over-the-top applications of glyphosate, dicamba and glufosin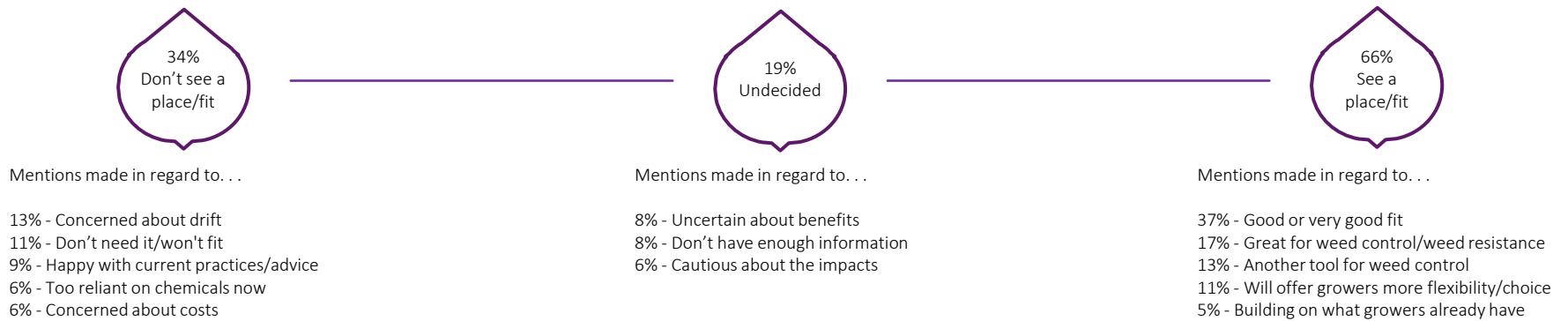ate. Registration of two herbicides; XtendMax, a low volatile Dicamba and Roundup Xtend, a low volatile dicamba and glyphosate mix for use in XtendFlex cotton crops are currently pending.

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?
Base: All growers; n = 225

When asked about the fit for the technology, there were a range of responses to the XtendFlex System in Australia. . . .

**34%
Don't see a place/fit**

**19%
Undecided**

**66%
See a place/fit**

Mentions made in regard to. . .

13% - Concerned about drift
11% - Don't need it/won't fit
9% - Happy with current practices/advice
6% - Too reliant on chemicals now
6% - Concerned about costs

Mentions made in regard to. . .

8% - Uncertain about benefits
8% - Don't have enough information
6% - Cautious about the impacts

Mentions made in regard to. . .

37% - Good or very good fit
17% - Great for weed control/weed resistance
13% - Another tool for weed control
11% - Will offer growers more flexibility/choice
5% - Building on what growers already have

When asked about the most important issues the stewardship guidelines should address

The majority of growers provided little or no feedback. . .

o   don't know enough about the guidelines to comment
o   leave it to others/experts to do this
o   not aware of what's in the guidelines

Where feedback was provided, comments were made in regard to the. . .

o   need to manage and control drift
o   respond to concerns about over spraying
o   ensure other crops/neighbours are not impacted
o   educate the community
o   ensure there is some regulation of use
o   education and governance around the use of the product
o   allow for grower training

A list of all verbatims can be found in the supplementary Verbatim Report. Growers could provide verbatim comments that fall into more than one code/theme.

Cotton Research & Development Corporation – 2020 Grower Survey

Capacity to manage insect pests

When asked about their capacity to manage <u>insect pests</u>, the feedback suggests that:

o About half of growers providing feedback reported being confident in their current practices around managing pests or believed they had no significant problems in pest management.

o Among those growers identifying areas they would like to be able to do something further:

- Most provided reference to be able to better manage specific pests including whitefly, sucking insects, mirids, mealybugs and other insects.

- Some were looking for opportunities to use less chemicals and adopt a more natural management practice; while

- A smaller number were looking for more information on treatment options.

Thinking of your capacity to manage <u>insect pests</u>, what can't you do right now that you'd like to be able to do to better manage insect pests?
Base: All growers; n = 225

52% - Nothing/No large problems with pests
34% - Nothing
18% - We don't have a large problem with pests

29% - Specific mention of pest/s
10% - Whitefly
7% - Wider use of beneficial insects
4% - Better management/control of sucking insects
4% - Resistance to/control of mirids
3% - Better control/management of mealybugs
2% - Control heliothis grub/avoid pupae busting
1% - Resistant aphids

9% - Use of chemicals
7% - Use less chemicals/take a natural approach
3% - New chemicals/treatments

6% - More knowledge
4% - Better monitoring/earlier treatment/better knowledge
1% - Better breeding
1% - Be more cost effective

Some of what they said...

"I think we are going quite well at the moment. Possibly more info on hard and soft insecticides. The reason I say that is because I get conflicting info from agronomists in regard to which chemicals are hard and soft on beneficials."

"Use as soft a chemical as we can, mix up as many different sort of crops as we can on the rotation program, e.g. wheat, barley, chickpea, cotton, sorghum, has a good bearing on beneficials so you don't get into a monoculture."

"I've been trying to go down the biological line, especially with whitefly, there is a wasp you put in there to control the whitefly, I would like to create a natural habitat for them and I'm not sure how to go about that."

"Better ways of controlling sucking insects. I could add that in a perfect world if a plant could be resistant to sucking insects as well, that to me would be an even better advantage than XtendFlex."

"Less chemical use because of the community with the chemicals. I have an organic farm next door to me so I have to be very careful with any chemical or insecticide application."

"Not have them at all would be really good. We probably need some chemical companies to work on some new insecticides. The new insecticides should be specific to certain pests."

"To be able to kill the mealybugs. Maybe we need more information on their life habits and the life cycle. Maybe something about killing whitefly, controlling it."

"Use beneficials. I'm not sure whether I can't do it, the use of beneficials, it would be a thing that I would like to be able to do rather than using chemicals."

"I would like my neighbours to stop using hard chemistry that wipes out the beneficials. a proper integrated pest management to limit the use of hard chemistries."

"More biological control. Keep reducing chemicals in the environment, so anything that is cost effective and reduces chemicals in the environment."

A list of all verbatims can be found in the supplementary Verbatim Report.

Cotton Research & Development Corporation – 2020 Grower Survey

Capacity to manage disease

When asked about their capacity to manage <u>disease</u>, the feedback indicated that:

o   About half of growers providing feedback reported being confident in their current practices around managing disease or believed they had no significant problems in disease management.

o   Among those growers identifying areas they would like to be able to do something further:

   ▪   Most provided reference to be able to better manage specific diseases, including verticillium wilt, fusarium wilt and other diseases.

   ▪   A number identified a number of actions they would like to occur, including more disease management research, ability to be manage crop rotations, comments around soil management and other specific actions.

Thinking of your capacity to manage <u>disease</u>, what can't you do right now that you'd like to be able to do to better manage disease?
Base: All growers; n = 225

51% - Nothing/No large problems with disease
   36% - Nothing
   16% - We don't have a large problem with disease

20% - Specific mention of disease/s
   9% - Verticillium wilt
   8% - Fusarium wilt
   5% - Black root rot
   1% - Alternaria

17% - Specific mention of action
   7% - More research (across range of areas)
   4% - Comments around crop rotations
   2% - Soil comments
   2% - Identify earlier/source
   1% - Cleaning equipment
   1% - Biosecurity comments

5% - Control it
   4% - Control it better/control weather (no further info)
   1% - Better agronomy/leave it to my agronomist

Some of what they said...

"Well our biggest issue and is holding us back in a big way, the biggest threat in growing a crop of cotton is a disease called black root rot. It's costing us around 2-3 bales per hectare and yeah it's become well for us, we now have parts of our farms where we just can't grow cotton profitably anymore. If there's no profit, there is no use doing it. We have just to now start growing other types of crops and long rotations."

"The research is there but when it's applied on your farm - for e.g. with black root rot there are a lot of unanswered questions at this stage. Have we got it on the farm? When we have, what's the best way to attack it? There's all sorts of theories but its a real threat, looming but until you got it you're only managing it and when you've got it its almost too late."

"Detect disease in soil on farm on site. At the moment we have to send samples away to the lab. There's a fair few benefits with that like biosecurity and also the timeliness. If it was able to test like a PH test kit, well then that would be very timely."

"We got to look more closely at managing crop rotation, but the limiting factor is our water use, so there are crop options available for disease management but the return per megalitre needs to stack up."

"We have issues with rhizoctonia, black root rot and pythium as seedling diseases, our primary mid/late season disease is verticillium wilt but cultural practices are probably our best bet for management."

"Probably better survey, the ability to capture more data. Capture more samples. The ability to get more samples and get them processed in a timely manner to make management decisions on the information."

"That's a big one! Come up with some way and what we're looking for is a way of managing some of the fungal diseases. Answers to keep cotton growers growing cotton and more viable."

"Not enough research on verticillium wilt, there are no options out there, CottonInfo stuff is different to what we see in the field, it's a huge problem and is not addressed."

"We have numerous diseases that we need to really manage. Fusarium. That's probably the number 1 disease. We have other stunting issues that we don't have the answer to."

A list of all verbatims can be found in the supplementary Verbatim Report.

Cotton Research & Development Corporation – 2020 Grower Survey

Weeds and their herbicide group resistances

The 2020 Grower Survey sought feedback for growers on which herbicide groups weeds had resistance to on their farm.

The results shown below indicate that 72% of growers identified the Group M herbicides. This was by far the most dominant group herbicides reported.

Just 15% of growers reported no resistances on their farm. This was more prevalent among the smaller farms.

We note that during the survey process, a number (28%) of growers were unfamiliar with the Group (M, A, B and I) labels and referenced specific herbicide names.

Which herbicide groups do weeds have resistance to on your cotton farm?
Base: All growers who grew cotton during the 2019-20 season; n = 125
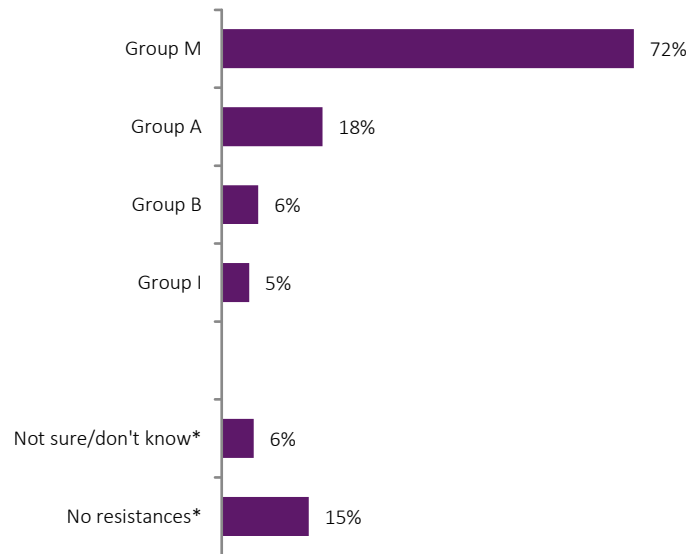
Group	Value
Group M	72%
Group A	18%
Group B	6%
Group I	5%
Not sure/don't know*	6%
No resistances*	15%

Key results by Region and Size of Total Farm Area

	Central QLD (n=15)	Darling Downs (n=21)	Macintyre Balonne (n=11)	Northern NSW (n=50)	Macquarie (n=7)	Southern NSW (n=18)	Small (n=45)	Medium (n=70)	Large (n=10)
Group M	73%	67%	91%	72%	57%	83%	80%	64%	90%
Group A	0%	14%	0%	22%	29%	33%	4%	23%	40%
Group B	7%	5%	0%	6%	29%	6%	2%	10%	0%
Group I	0%	0%	0%	10%	0%	6%	4%	4%	10%
Not sure/don't know*	0%	10%	9%	4%	0%	0%	9%	4%	0%
No resistances*	20%	24%	0%	14%	14%	11%	9%	21%	0%

* Responses coded back from "Other (please specify)" responses.

IPM and Crop Protection
Cotton area affected by weeds

In 2020, growers were asked to report on the incidence of their total cotton area that was affected by weeds. The feedback indicates that:

o About three in four growers (74%) indicated that at least some of their cotton area was affected by weeds. This result is consistent with the result reported in 2018 (75%). Larger growers were more likely (90%) to have at least some part of their cotton area affected by weeds.

o Among growers whose cotton area was affected, they reported 12.5% of their total cotton area was impacted. This is a median result given the large variability in farm sizes responses provided. This is slightly higher than the result reported in 2018.

What percent of your total cotton area is affected by weeds?
Base: All growers who grew cotton during the 2019-20 season; n = 122
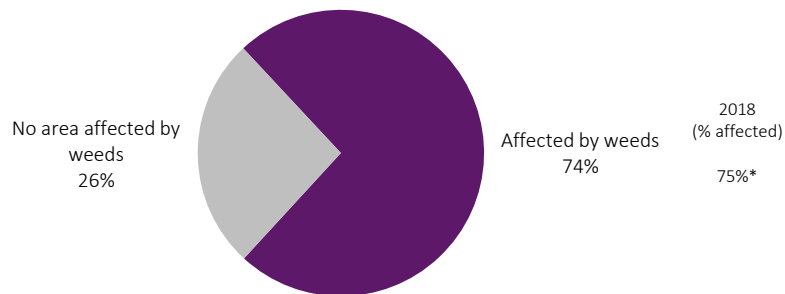
No area affected by weeds 26%

Affected by weeds 74%

2018 (% affected) 75%*

Key results by Region and Size of Total Farm Area

	Central QLD (n=15)	Darling Downs (n=21)	Macintyre Balonne (n=11)	Northern NSW (n=49)	Macquarie (n=7)	Southern NSW (n=18)	Small (n=43)	Medium (n=69)	Large (n=10)
% affected by weeds	60%	62%	91%	78%	71%	83%	79%	68%	90%

	Central QLD (n=9)	Darling Downs (n=13)	Macintyre Balonne (n=10)	Northern NSW (n=38)	Macquarie (n=5)	Southern NSW (n=15)	Small (n=34)	Medium (n=47)	Large (n=9)
Average (median) % of cotton farm area affected	10%	25%	12.5%	15%	10%	40%	20%	15%	10%

Of growers who grew cotton during the 2019-20 season AND were affected by weeds; n = 90

Average (median) % of cotton farm area affected   15%

2018 (median) 4%*
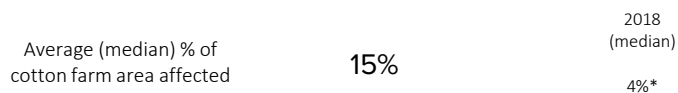
* Questions asked in 2018 were worded slightly differently and were asked to all growers (regardless of growing cotton in the season). Care should be taken when comparing the 2020 results to the 2018 results.

FOCUS AREA

Sustainability

Awareness and importance of PLANET. PEOPLE. PADDOCK.

Growers in the 2020 survey were asked about the importance of the "PLANET. PEOPLE. PADDOCK." sustainability program, which was just launched just prior to this survey. The feedback shows that:

One in three (32%) of growers reported being aware of the program. Awareness was much stronger among the larger growers and varied across different growing regions.

There looks to be an opportunity and need to broaden awareness of the program across growers.

Among growers who were aware of the program, they rated the importance of the program at 3.8 (out of 5), suggesting growers are generally seeing the program as important. Among this cohort of growers:

o Importance ratings ranged from 1 to 5
o 57% of growers rated the importance at 4 or higher
o 8% of growers rated the importance a 1 or 2. Understanding the reasons for these lower ratings might be useful to help ensure there is stronger traction among growers who are aware of the program.

How important is cotton's "PLANET. PEOPLE. PADDOCK." sustainability program to the industry?
Base: All growers; n = 224

Wasn't aware of the program 68%

Aware of the program 32%
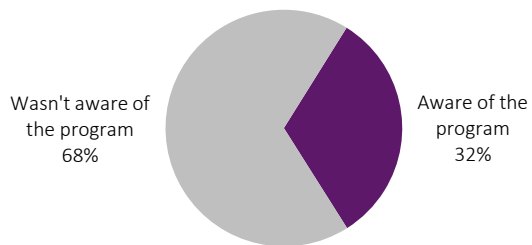
Of those aware of the program...
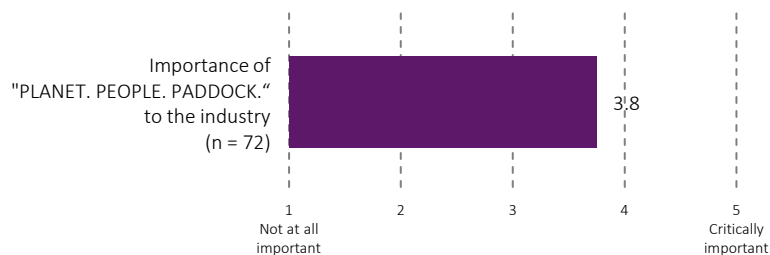
Importance of "PLANET. PEOPLE. PADDOCK." to the industry (n = 72) 3.8

1 Not at all important
2
3
4
5 Critically important

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=53)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=122)	Large (n=21)
Aware of the program	26%	42%	29%	29%	64%	18%	38%	25%	52%

	Central QLD (n=6)	Darling Downs (n=22)	Macintyre Balonne (n=9)	Northern NSW (n=20)	Macquarie (n=7)	Southern NSW (n=6)	Small (n=31)	Medium (n=30)	Large (n=11)
Importance of "PLANET. PEOPLE. PADDOCK." to the industry	3.3	3.8	4.2	3.6	4.0	3.7	3.8	3.7	3.9

Growers were asked to describe the industry's most important environmental, social and economic opportunities and threats between now and 2024.

While a range of issues were identified, two major themes emerged for the feedback provided. They were around:

o   Water – reference was made to a range of different aspects of water including: the efficiency of water use | management of water resources | water shortage and availability to water | growers' access to water | misinformation around water/politicising of water; and

o   Community attitudes and perceptions – growers made reference to the misinformation circulating about the water issues (particularly across social channels) | the poor perception the community has of the industry/growers | the need to keep the community up to date with improvements made by the industry | need for more community education.

The Australian cotton industry's PLANET. PEOPLE. PADDOCK. framework manages the most important environmental, social and economic issues that are 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?
Base: All growers; n = 225

60% - Weather/climate issues
46% - Water
13% - Environmental issues
4% - Irrigation
2% - Climate change

43% - Community attitudes and responses
36% - Community awareness/perceptions
9% - Social licence

22% - On-farm practices
12% - Chemical use
4% - Production costs (energy, labour, other)
2% - Diseases
2% - Farm management practices
2% - Weed resistance
1% - Profitability

8% - Market issues
5% - Export markets
1% - Cotton alternatives/market competition
1% - Biosecurity

Some of what they said…

"Our biggest threat at the moment is irrigation water and public perception. The problem is that there has been a couple of companies that have done the wrong thing, but the perception of the public to a certain degree is that the other 99% of cotton growers are in the same league and its really disheartening. We're only seeing the social media perceptions and also unfortunately the media don't take our side or look at the facts as well as they should. Education is a big, big thing, and I think it starts at like school level. It's more our city cousins that need educating and not the country people because they're in the coalface of it to a certain degree whether they're a cotton grower or not."

"The most important part is to reward the grower that puts significant effort into the behaviour of good management or good stewardship. The farmer should be paid for his story as well as his product, then he will put a lot more effort into management of soil, the environment, resources, including water and energy, as opposed to a pick up recovery of people that fall into hard times. The consumer should make the choice of what things are important that the farmer should address, e.g. if the consumer thinks the farmer should get 20 cents extra for a litre of milk, that 20 cents should go directly to the farmer."

"Obviously water is going to be a massive one, is all of those, we are in a changing climate. Social impact on society, we're in a dry climate and people see irrigators as the enemy, again economic water, it's a harder commodity, less reliable. Labour as well, is going to be an issue, it's always hard to find good labour and have them stay around. Telecommunications is a big threat, poor service ability and phone reception, internet and we're trying to keep up to date with technology and what's holding us up is not being able to use it."

"There is still a huge gap in the city perception of cotton and cotton growing and the truth, anything that can be done to better educate the city population will be of great benefit, there is a section of the community that really does not want to see us farm. I think the whole right to farm long term is the greatest threat to cotton and agriculture in general, we will always have hanging over us that the threat of artificial fibre replacing natural fibre, however that has been around 50 years and has not happened yet."

"The biggest industry threat is water availability being lost to the environment movement. Opportunities, well the sky's the limit there. We've got a lot of opportunity to produce more cotton because of our high quality, Australia's leading quality cotton. There's a public disgust to Australia producing cotton in the general wider public. The SA minister also put a bill to parliament to ban the export of cotton. So if that gets off the ground you won't be needing this survey, it will be all finished."*

A list of all verbatims can be found in the supplementary Verbatim Report.
* Grower mentioned "SA minister", however the bill put to Parliament was from an SA senator.

Sustainability
Carbon farming practices

Growers reported using a variety of different carbon farming practices on-farm:

Of the 8 practices listed in the survey, farmers reported using on average 5.3 of these; larger growers reported using more (6.6) of the listed practices.

There was widespread implementation of four practices in particular, including:

o   Conserve crop residues
o   Adoption of minimum tillage practices
o   Practices to improve fertiliser use efficiency; and
o   Preservation of native vegetation areas.

Which of the following carbon farming practices do you currently implement on-farm?
Base: All growers; n = 224

Average # of practices implemented (out of the 8 listed practices):   5.3
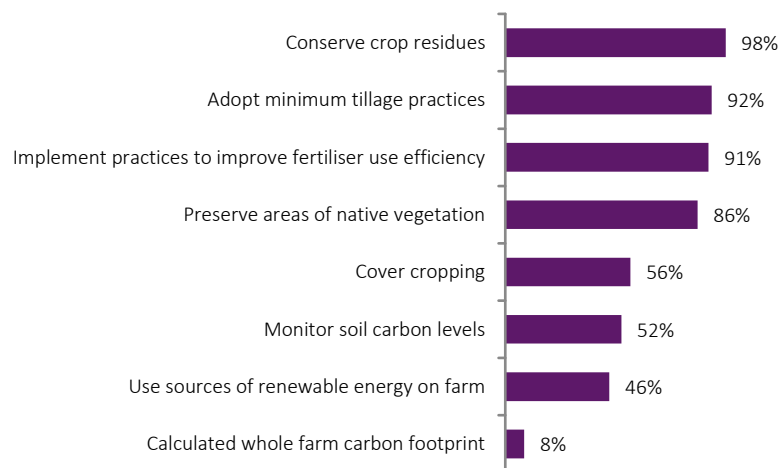
Practice	%
Conserve crop residues	98%
Adopt minimum tillage practices	92%
Implement practices to improve fertiliser use efficiency	91%
Preserve areas of native vegetation	86%
Cover cropping	56%
Monitor soil carbon levels	52%
Use sources of renewable energy on farm	46%
Calculated whole farm carbon footprint	8%

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=53)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=122)	Large (n=21)
Average # of practices implemented	5.0	5.6	5.7	5.3	5.9	4.4	5.0	5.2	6.6
Conserve crop residues	100%	100%	100%	97%	100%	94%	99%	98%	100%
Adopt minimum tillage practices	87%	100%	97%	94%	100%	71%	88%	94%	95%
Practices to improve fertiliser use efficiency	91%	91%	97%	90%	91%	85%	88%	91%	100%
Preserve areas of native vegetation	96%	83%	90%	85%	100%	79%	86%	83%	100%
Cover cropping	52%	72%	55%	50%	73%	35%	46%	57%	86%
Monitor soil carbon levels	43%	58%	65%	54%	45%	32%	54%	46%	76%
Use sources of renewable energy	26%	43%	58%	50%	82%	35%	38%	48%	71%
Calculated whole farm carbon footprint	0%	11%	13%	10%	0%	3%	5%	7%	29%

Workforce and Training

Number of people in workforce

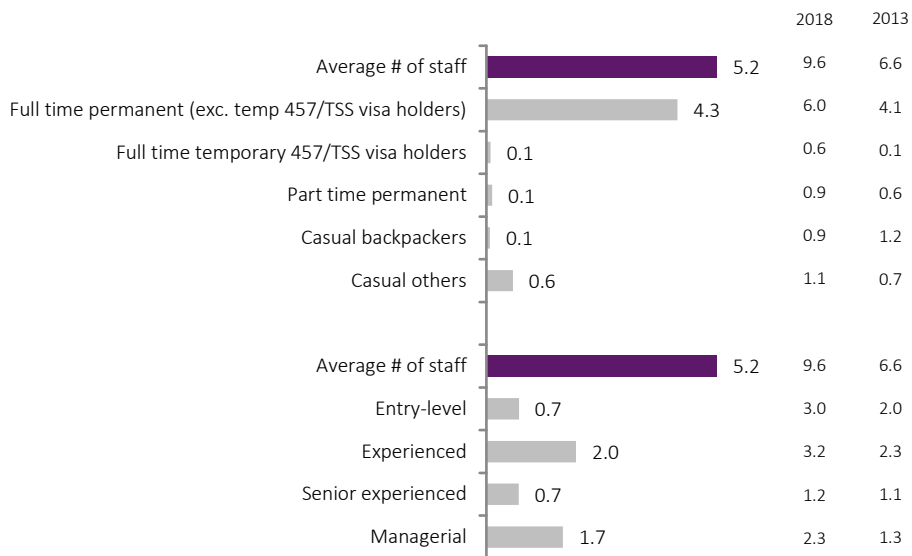The 2020 CRDC Grower Survey explored a range of workforce-related topic areas. Some of the key results of the feedback provided were that:

o Growers reported an average workforce (including grower and family staff) of: 3.3 staff (small-sized farms), 5.2 staff (medium-sized farms) and 12.8 staff (large-sized farms).

o It's likely that the drought in 2019 has had a significant impact on the workforce, specifically part time permanent staff, casual backpackers, and visa holder staff. The 2018 average staffing estimates across all position types ranges from 0.6 to 6.0, whereas 2020 ranges from 0.1 to 4.3.

o The workforce data suggests that growers have reduced entry-level positions on farms (likely due to the impact of drought in 2019 - 2018 entry-level staff: 3.0; 2020 entry-level staff: 0.7). The results suggest that cotton farms looked to have kept a largely experienced workforce, with smaller decreases across the experienced, senior experienced and managerial positions.

o A standardised estimate across farm size (calculated as the number of staff employed per 1,000 hectares) was 4.1 staff per 1,000 hectares. This compares to 6.7 staff employed per 1,000 hectares in the 2018 Grower Survey.

On the 1st January 2020, how many people were employed in each of the following positions on your farm? Include yourself and family but exclude gin staff.
Base: All growers; n = 225

	2020	2018	2013
Average # of staff	5.2	9.6	6.6
Full time permanent (exc. temp 457/TSS visa holders)	4.3	6.0	4.1
Full time temporary 457/TSS visa holders	0.1	0.6	0.1
Part time permanent	0.1	0.9	0.6
Casual backpackers	0.1	0.9	1.2
Casual others	0.6	1.1	0.7
Average # of staff	5.2	9.6	6.6
Entry-level	0.7	3.0	2.0
Experienced	2.0	3.2	2.3
Senior experienced	0.7	1.2	1.1
Managerial	1.7	2.3	1.3

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=54)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=123)	Large (n=21)
Average # of staff	**3.7**	**4.4**	**6.5**	**5.4**	**5.9**	**5.0**	**3.3**	**5.2**	**12.8**
Full time permanent	3.0	3.8	5.7	4.4	4.6	4.2	2.7	4.3	10.8
Full time temporary	0.2	0.0	0.1	0.2	0.2	<0.1	<0.1	0.1	0.1
Part time permanent	<0.1	0.1	0.0	0.3	0.1	0.1	0.1	0.1	0.3
Casual backpackers	<0.1	0.1	0.1	0.1	0.0	0.2	<0.1	0.1	0.0
Casual others	0.4	0.4	0.6	0.5	1.0	0.5	0.4	0.6	1.6
	Central QLD (n=23)	Darling Downs (n=54)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=123)	Large (n=21)
Average # of staff	**3.7**	**4.4**	**6.5**	**5.4**	**5.9**	**5.0**	**3.3**	**5.2**	**12.8**
Entry-level	0.4	0.5	0.9	0.8	1.4	0.9	0.3	0.7	2.7
Experienced	1.3	1.5	2.1	2.4	2.2	1.8	1.0	2.2	5.0
Senior experienced	0.5	0.8	1.7	0.5	0.7	0.4	0.4	0.6	2.6
Managerial	1.5	1.7	1.8	1.7	1.6	2.0	1.5	1.7	2.5

Definitions: Entry-level e.g. assistant farm hand or driver who requires supervision or is inexperienced
Experienced e.g. experienced farm hand or machinery operator
Senior experienced e.g. a supervisor
Managerial e.g. farm manager, on-farm agronomist

Measures of involvement in, and the impact of, education and training were measured in the 2020 CRDC Grower Survey. Similar measures were collected in 2017 and the comparison to these results are shown below. From the feedback provided this year, we note that:

Just over four in ten growers (42%) reported that there had been involvement in education or training courses over the last 12 months. We note this is an incidence measure and not a frequency measure, so some businesses and staff may have been involved in multiple training experiences.

Smaller growers were however less likely (33%) to have been involved than larger businesses (60%). This presents an ongoing challenge to allow smaller business to unlock time and staff to participate in training and education opportunities.

Results vary considerably across the growing regions, a result that warrants consideration to ensure there is equity in access opportunities across all regions.

Among those businesses who had been involved in training and education opportunities over the previous 12 months:

o 59% reported the training had delivered an impact on the efficiency and effectiveness on their farm business.

o By contrast, almost one in five (17%) reported no impact. Exploring the reasons behind this assessment may provide further insights into the format, content and delivery of these training opportunities to ensure the take away delivers a positive impact for growers and their farming businesses.
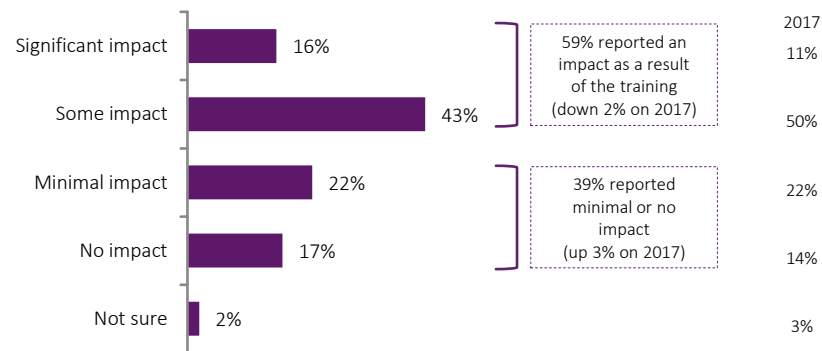
Has anyone in your cotton business (including you) attended accredited education or training courses over the last 12 months?
Base: All growers; n = 225

No 58%
Yes 42%

2017 (% Yes)
61%
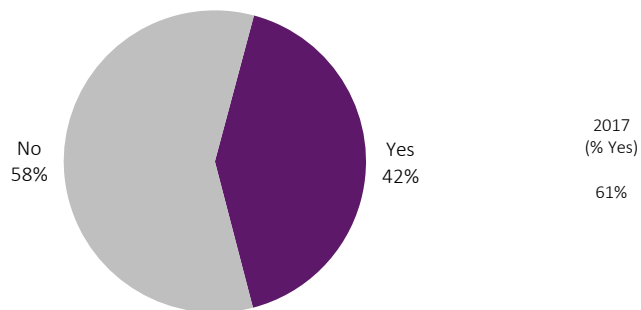
Overall what impact has recent training had on the efficiency and effectiveness of your farm business?
Base: All growers who have had someone in their cotton business (including themselves) attend accredited education or training courses over the last 12 months; n = 94

		2017
Significant impact	16%	11%
Some impact	43%	50%
Minimal impact	22%	22%
No impact	17%	14%
Not sure	2%	3%

59% reported an impact as a result of the training (down 2% on 2017)

39% reported minimal or no impact (up 3% on 2017)

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=54)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=123)	Large (n=21)
Yes	30%	28%	52%	54%	55%	38%	33%	43%	67%

Key results by Region and Size of Total Farm Area

	Central QLD (n=7)	Darling Downs (n=15)	Macintyre Balonne (n=16)	Northern NSW (n=37)	Macquarie (n=6)	Southern NSW (n=13)	Small (n=27)	Medium (n=53)	Large (n=14)
Significant + Some impact	43%	73%	56%	54%	67%	62%	56%	58%	64%
Minimal + No impact	57%	27%	38%	46%	33%	31%	44%	40%	29%

FOCUS AREA
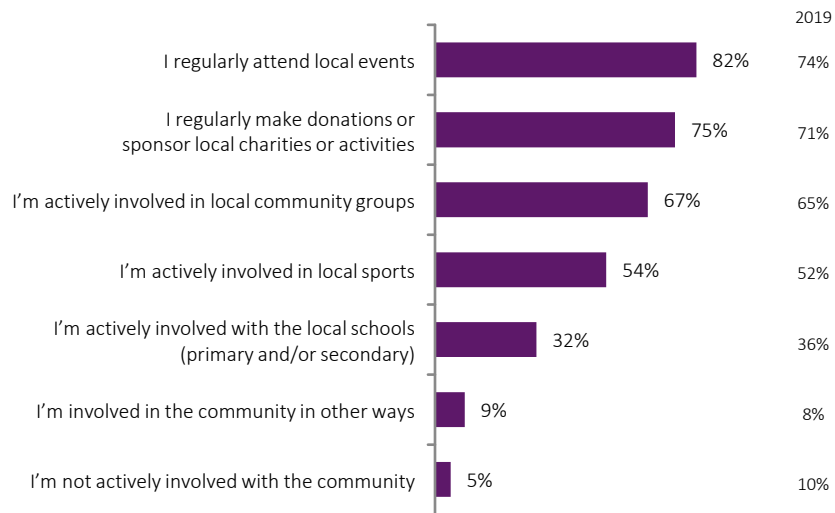
Community and Social Contribution

Local community activities

Similar to the results achieved in 2019, the 2020 survey indicated that the majority of growers are involved in a broad range of local community activities.

o Almost all growers (95%, up from 90% in 2019) reported being involved in at least one of the community-based activities measured in the survey.

o Involvement was strongest among the larger growers and consistent across most growing regions.

o Involvement took various forms including being present at events, making donations or sponsorships, or an active involvement in local community groups or sports. Growers responding to the 2020 survey reported being involved in, on average, 3.1 of the 5 community activities listed in the survey.

Which if any of the following local community activities are you involved in?
Please select all that apply.
Base: All growers; n = 224

Activity	2020	2019
I regularly attend local events	82%	74%
I regularly make donations or sponsor local charities or activities	75%	71%
I'm actively involved in local community groups	67%	65%
I'm actively involved in local sports	54%	52%
I'm actively involved with the local schools (primary and/or secondary)	32%	36%
I'm involved in the community in other ways	9%	8%
I'm not actively involved with the community	5%	10%

Key results by Region and Size of Total Farm Area

	Central QLD (n=23)	Darling Downs (n=53)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=122)	Large (n=21)
Attend local events	83%	74%	87%	84%	73%	88%	74%	85%	90%
Make donations or sponsor local charities or activities	61%	83%	87%	69%	82%	71%	67%	80%	81%
Involved in local community groups	74%	64%	74%	65%	64%	65%	59%	67%	90%
Involved in local sports	48%	38%	52%	59%	64%	65%	53%	50%	76%
Involved with the local schools	35%	21%	35%	38%	36%	26%	30%	30%	48%
Involved in the community in other ways	4%	13%	0%	9%	0%	18%	12%	8%	5%
Not actively involved with the community	0%	8%	6%	3%	9%	6%	6%	4%	5%

Frequency of participating in local community activities

Growers who reported being involved in the community in someway (95% of growers) were asked how often they would usually volunteer or participate in these activities.
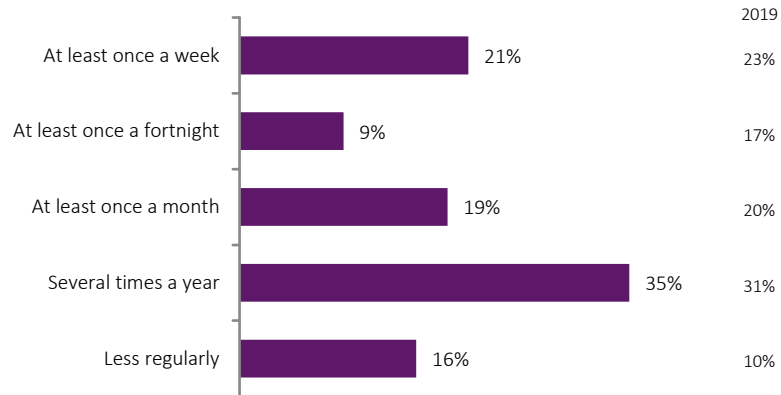
49% of those involved in some way do so on at least a monthly basis. This result is down on the result reported in 2019 (60% at least monthly in 2019) suggesting while involvement continues to be strong, the frequency of involvement from growers in community activities may be under some pressure from the drought conditions and reduced part time workforce on farms.

This data is also captured in the perception of time spent across activities, where growers reported spending less time than wanted for 'volunteering, or informally helping out local groups' (49% reported this) and more time than wanted for 'Time spent working' (39% reported this).

The following question seek to understand a bit more about your community commitments and volunteering (e.g. for groups like fire brigades, sports clubs, school canteen, meals on wheels, festivals, CWA, Landcare, local government).

Considering these, over the last 12 months how often would you usually volunteer or participate in activities in your local community?
Base: All growers who are involved in the community; n = 213

	2020	2019
At least once a week	21%	23%
At least once a fortnight	9%	17%
At least once a month	19%	20%
Several times a year	35%	31%
Less regularly	16%	10%

Key results by Region and Size of Total Farm Area

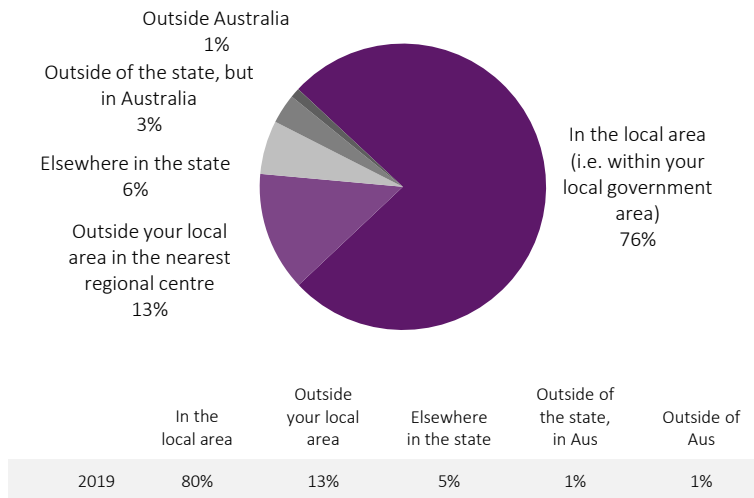|	Central QLD (n=23)	Darling Downs (n=49)	Macintyre Balonne (n=29)	Northern NSW (n=66)	Macquarie (n=10)	Southern NSW (n=32)	Small (n=76)	Medium (n=117)	Large (n=20)
At least once a week	22%	20%	17%	21%	30%	19%	21%	21%	15%
At least once a fortnight	4%	4%	10%	14%	0%	9%	11%	10%	0%
At least once a month	13%	14%	28%	20%	40%	16%	14%	19%	35%
Several times a year	48%	33%	34%	38%	10%	38%	34%	34%	45%
Less regularly	13%	29%	10%	8%	20%	19%	20%	15%	5%

Destination of business expenses

Growers were asked about the location/area where their business expenses are spent. This measure was also collected in the 2017 and 2019 Grower Surveys. The feedback provided by growers suggests that:

o   The majority of business expenses are reported to be spent within the immediate local areas of the farm businesses. Growers reported on average 76% of their business expenses are spent locally. This result is down slightly on the 2019 (80%) and 2017 (79%) results.

o   Consistent with previous results is the smaller growers who are more likely to spend more of their business expenses in their local area (78% of total business expenses).

o   A further 13% of total business expenses are spent in adjacent regional centres. This result has remained unchanged from 2019.

Thinking of your total business expenses for the 2019-20 growing season, can you estimate what proportion would be spent…?
Base: All growers; n = 224

Outside Australia
1%
Outside of the state, but
in Australia
3%
Elsewhere in the state
6%
Outside your local
area in the nearest
regional centre
13%

In the local area
(i.e. within your
local government
area)
76%

	In the local area	Outside your local area	Elsewhere in the state	Outside of the state, in Aus	Outside of Aus
2019	80%	13%	5%	1%	1%

Key results by Region and Size of Total Farm Area

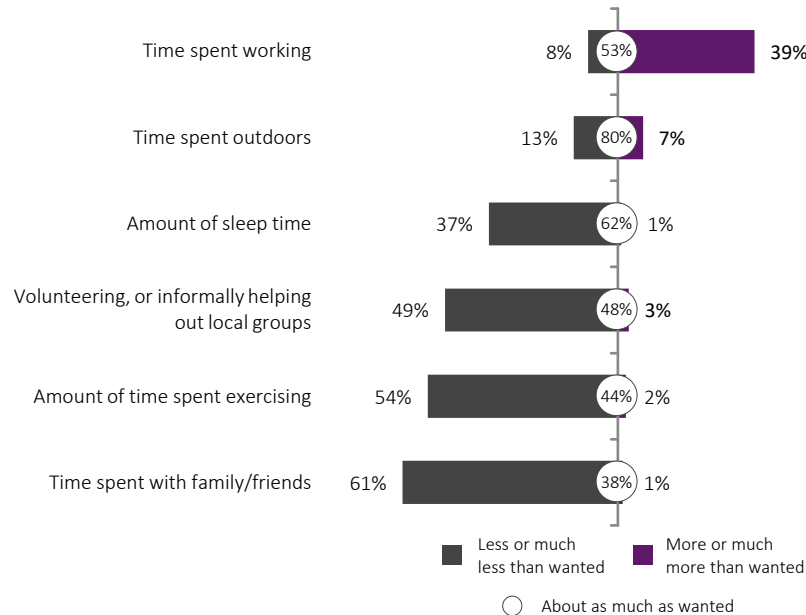|	Central QLD (n=23)	Darling Downs (n=53)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=122)	Large (n=21)
In the local area (i.e. within your local government area)	70%	79%	72%	73%	85%	84%	78%	76%	69%
Outside your local area in the nearest regional centre	23%	12%	15%	13%	8%	10%	12%	14%	15%
Elsewhere in the state	5%	6%	5%	7%	5%	4%	6%	6%	7%
Outside of the state, but in Australia	1%	3%	7%	4%	1%	2%	3%	3%	5%
Outside Australia	0%	1%	0%	3%	1%	0%	1%	1%	4%

Perception of time spent across activities

New questions about growers' perceptions of the appropriateness of time spent across a number of activities were included in the 2020 survey.

The results shown below indicate that

o   Almost four in ten growers reported they were spending more or much more time working than they wanted; while

o   There are clear deficits on some other personal activities including that:

 ▪   One in three or more reported spending less or much less time than they had wanted on sleep, volunteering, and exercising.
 ▪   Three in five (61%) reported spending less or much less time with family/friends than they had wanted to.

In the last month, did you do more, less or about the right amount of...?
Base: All growers; n = 224

	Time spent working	8%	(53%)	39%
	Time spent outdoors	13%	(80%)	7%
	Amount of sleep time	37%	(62%)	1%
	Volunteering, or informally helping out local groups	49%	(48%)	3%
	Amount of time spent exercising	54%	(44%)	2%
	Time spent with family/friends	61%	(38%)	1%

▪ Less or much less than wanted   ▪ More or much more than wanted

◯ About as much as wanted

Key results by Region and Size of Total Farm Area (% less or much less)

	Central QLD (n=23)	Darling Downs (n=53)	Macintyre Balonne (n=31)	Northern NSW (n=68)	Macquarie (n=11)	Southern NSW (n=34)	Small (n=81)	Medium (n=122)	Large (n=21)
Time working	9%	17%	6%	6%	9%	3%	11%	8%	0%
Time outdoors	13%	17%	6%	7%	0%	18%	11%	15%	5%
Sleep time	35%	28%	32%	43%	27%	41%	35%	37%	43%
Volunteering, etc.	70%	40%	52%	47%	64%	50%	43%	48%	76%
Time exercising	48%	57%	45%	56%	45%	59%	53%	54%	57%
Time w/ family/friends	52%	53%	61%	69%	64%	62%	58%	63%	62%

Key results by Region and Size of Total Farm Area (% more or much more)

	Central QLD	Darling Downs	Macintyre Balonne	Northern NSW	Macquarie	Southern NSW	Small	Medium	Large
Time working	39%	28%	29%	44%	55%	44%	32%	44%	33%
Time outdoors	13%	6%	10%	6%	18%	3%	5%	9%	5%
Sleep time	0%	2%	0%	1%	0%	0%	0%	1%	5%
Volunteering, etc.	0%	6%	6%	3%	0%	0%	4%	3%	0%
Time exercising	4%	0%	0%	3%	9%	3%	1%	2%	5%
Time w/ family/friends	0%	0%	0%	0%	0%	9%	0%	2%	0%

Appendices

Which age category do you belong to?
Base: All growers; n = 225

Age	Growing cotton in 2019-20	NOT growing cotton in 2019-20
20-24	<1%	0%
25-29	4%	3%
30-34	10%	5%
35-39	13%	9%
40-44	13%	15%
45-49	12%	15%
50-54	13%	18%
55-59	14%	9%
60-64	15%	10%
65-69	4%	9%
70+	2%	7%

■ Growing cotton in 2019-20   ■ NOT growing cotton in 2019-20
Mean Age: 48.0   Mean Age: 50.7
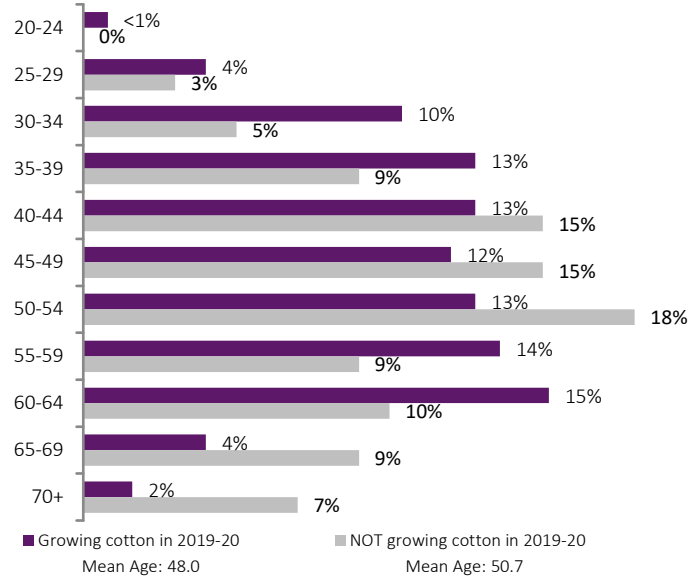
In which region are you located?
Base: All growers; n = 225

Region	%
Darling Downs	24%
Upper Namoi	15%
Murrumbidgee	12%
Central Queensland	10%
Gwydir	8%
Lower Namoi (including Walgett)	8%
St George / Dirranbandi	7%
Border Rivers	7%
Macquarie	5%
Lachlan	2%
Murray	<1%
Other region	2%
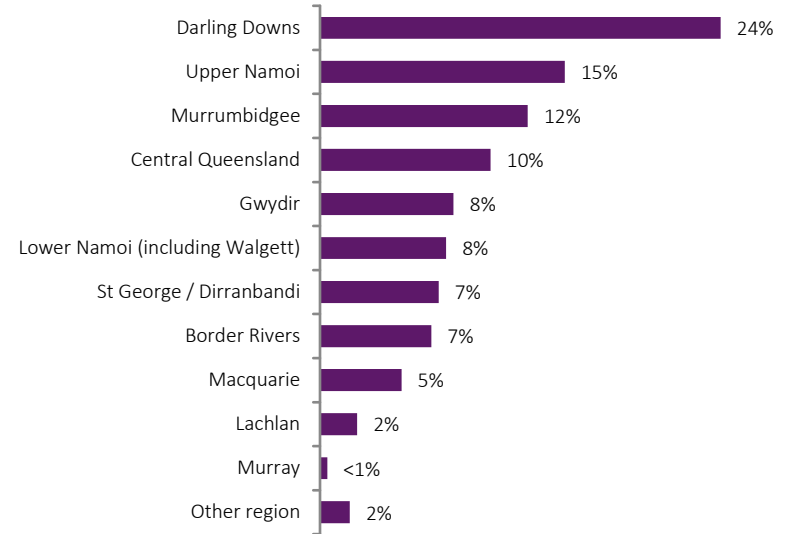
What is your role on your farm?
Base: All growers; n = 225

Role	%
Family member or farm business owner (operational)	80%
Farm manager	19%
Farm business investor (non-operational)	1%
Share farmer*	<1%
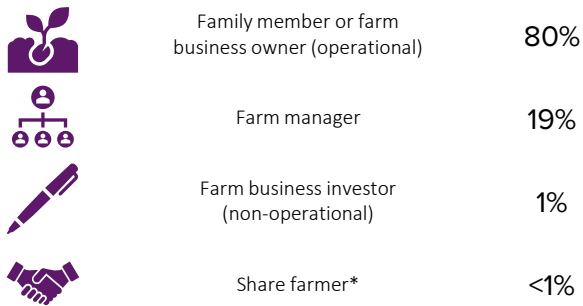
How would you describe your farming business?
Base: All growers; n = 225

Description	%
Family farm	91%
Australian-owned corporate	3%
Foreign-owned corporate	2%
Mixed family/corporate	4%

* Response coded back from "Other (please specify)" responses.

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Historical data of land area/distribution and total area of cotton

What is the total area of your farm (in hectares), and what is the area attributed to the following?
Base: All growers (excluding two outliers*); n = 223

	2019 Results	2018 Results	2017 Results
Total Area (in hectares) — 3,510 ha	4,404 ha	5,674 ha	8,020 ha
Area developed for fully irrigated broadacre cropping — 43%	40%	41%	39%
Area developed for partially irrigated broadacre cropping — 2%	2%	3%	3%
Area developed for raingrown/dryland cropping — 34%	34%	32%	33%
Area used for grazing — 14%	16%	17%	19%
Area of native vegetation not usually grazed — 4%	3%	4%	6%
Other area not covered above — 3%	4%	3%	n/a

Area under cotton crop within the 2019-20 season

		2019 Results (2018-19 Season)	2018 Results (2017-18 Season)	2017 Results (2016-17 Season)
Average area growers reported as area allocated to cotton crop (ha/grower)	184	298	576	624
Total number of growers growing cotton in 2019-20*	377	692	871	817
Total area under cotton crop within 2019-20 (ha)	69,394	205,859	501,811	509,876

* Two outliers were removed from this analysis for having a significantly different farm size to the rest of the respondent base (over 400,000, next highest is 32,000).

Reliability of the Estimates

The estimates in this report are based on information obtained from a sample survey. Any data collection may encounter factors, known as non-sampling error, which can impact on the reliability of the resulting statistics. In addition, the reliability of estimates based on sample surveys are also subject to sampling variability. That is, the estimates may differ from those that would have been produced had all persons in the population been included in the survey.

Non-sampling error

Non-sampling error may occur in any collection, whether it is based on a sample or a full count such as a census. Sources of non-sampling error include non-response, errors in reporting by respondents or recording of answers by interviewers and errors in coding and processing data. Every effort is made to reduce non-sampling error by careful design of survey questionnaires and quality control procedures at all stages of data processing.

Sampling error

One measure of the likely difference is given by the standard error (SE), which indicates the extent to which an estimate might have varied by chance because only a sample of persons was included. There are about two chances in three (67%) that a sample estimate will differ by less than one SE from the number that would have been obtained if all persons had been surveyed, and about 19 chances in 20 (95%) that the difference will be less than two SEs.

Calculation of Confidence Interval

If 50% of all the people in a population of 20,000 people drink coffee in the morning, and if you were repeat the survey of 377 people ("Did you drink coffee this morning?") many times, then 95% of the time, your survey would find that between 45% and 55% of the people in your sample answered "Yes".

The remaining 5% of the time, or for 1 in 20 survey questions, you would expect the survey response to more than the margin of error away from the true answer.

When you survey a sample of the population, you don't know that you've found the correct answer, but you do know that there's a 95% chance that you're within the margin of error of the correct answer.

In terms of the numbers selected above, the margin of error MoE is given by:

$$MoE = z * \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

where n is the sample size, $\hat{p}$ is the fraction of responses that you are interested in, and z is the critical value for the 95% confidence level (in this case, 1.96).

This calculation is based on the Normal distribution and assumes you have more than about 30 samples.

Margin of Error for a given sample size and survey estimate		Sample Size											
	30	50	75	100	150	200	225 (# surveys completed)	250	300	500	1,000	1,500	2,000
10%	n/a	n/a	n/a	± 5.88%	± 4.80%	± 4.16%	**± 3.92%**	± 3.72%	± 3.39%	± 2.63%	± 1.86%	± 1.52%	± 1.31%
20%	n/a	± 11.09%	± 9.05%	± 7.84%	± 6.40%	± 5.54%	**± 5.23%**	± 4.96%	± 4.53%	± 3.51%	± 2.48%	± 2.02%	± 1.75%
30%	n/a	± 12.70%	± 10.37%	± 8.98%	± 7.33%	± 6.35%	**± 5.99%**	± 5.68%	± 5.19%	± 4.02%	± 2.84%	± 2.32%	± 2.01%
40%	± 17.53%	± 13.58%	± 11.09%	± 9.60%	± 7.84%	± 6.79%	**± 6.40%**	± 6.07%	± 5.54%	± 4.29%	± 3.04%	± 2.48%	± 2.15%
50%	± 17.89%	± 13.86%	± 11.32%	± 9.80%	± 8.00%	± 6.93%	**± 6.53%**	± 6.20%	± 5.66%	± 4.38%	± 3.10%	± 2.53%	± 2.19%
60%	± 17.53%	± 13.58%	± 11.09%	± 9.60%	± 7.84%	± 6.79%	**± 6.40%**	± 6.07%	± 5.54%	± 4.29%	± 3.04%	± 2.48%	± 2.15%
70%	n/a	± 12.70%	± 10.37%	± 8.98%	± 7.33%	± 6.35%	**± 5.99%**	± 5.68%	± 5.19%	± 4.02%	± 2.84%	± 2.32%	± 2.01%
80%	n/a	± 11.09%	± 9.05%	± 7.84%	± 6.40%	± 5.54%	**± 5.23%**	± 4.96%	± 4.53%	± 3.51%	± 2.48%	± 2.02%	± 1.75%
90%	n/a	n/a	n/a	± 5.88%	± 4.80%	± 4.16%	**± 3.92%**	± 3.72%	± 3.39%	± 2.63%	± 1.86%	± 1.52%	± 1.31%

Survey Estimate (row axis label)

Note. Margin of Errors are provided at the 95% confidence level on the assumption of a large population size (non-finite) and normally distributed.
Results labelled "n/a" are due to the assumption of the normal distribution not being upheld ($n\hat{p} < 10$ or $n(1-\hat{p}) < 10$).

Objective

The purpose of the CRDC Cotton Grower Survey is to capture valuable information about cotton farming practices to give a greater understanding of the industry's current practices and performance – so that trends can be monitored over time, practice change can be accurately measured, and areas for improvement and further RD&E investment identified. The annual Survey also aims to capture important information about growers' understanding and perception of cotton RD&E, led by CRDC.

Methodology

The 2020 Grower Survey was conducted using a CATI (Computer Assisted Telephone Interviewing) data collection methodology. This included:

o   Growers being contacted and invited to complete the survey over the phone;

o   Where this was not possible immediately, an interview appointment time was agreed and the interview completed at the agreed time.

Sample

In total, a sample of n = 1,216 unique growers was provided by CRDC, with n = 225 surveys completed (completion rate of 18.5%). A breakdown of the number of surveys completed by Region is located below.

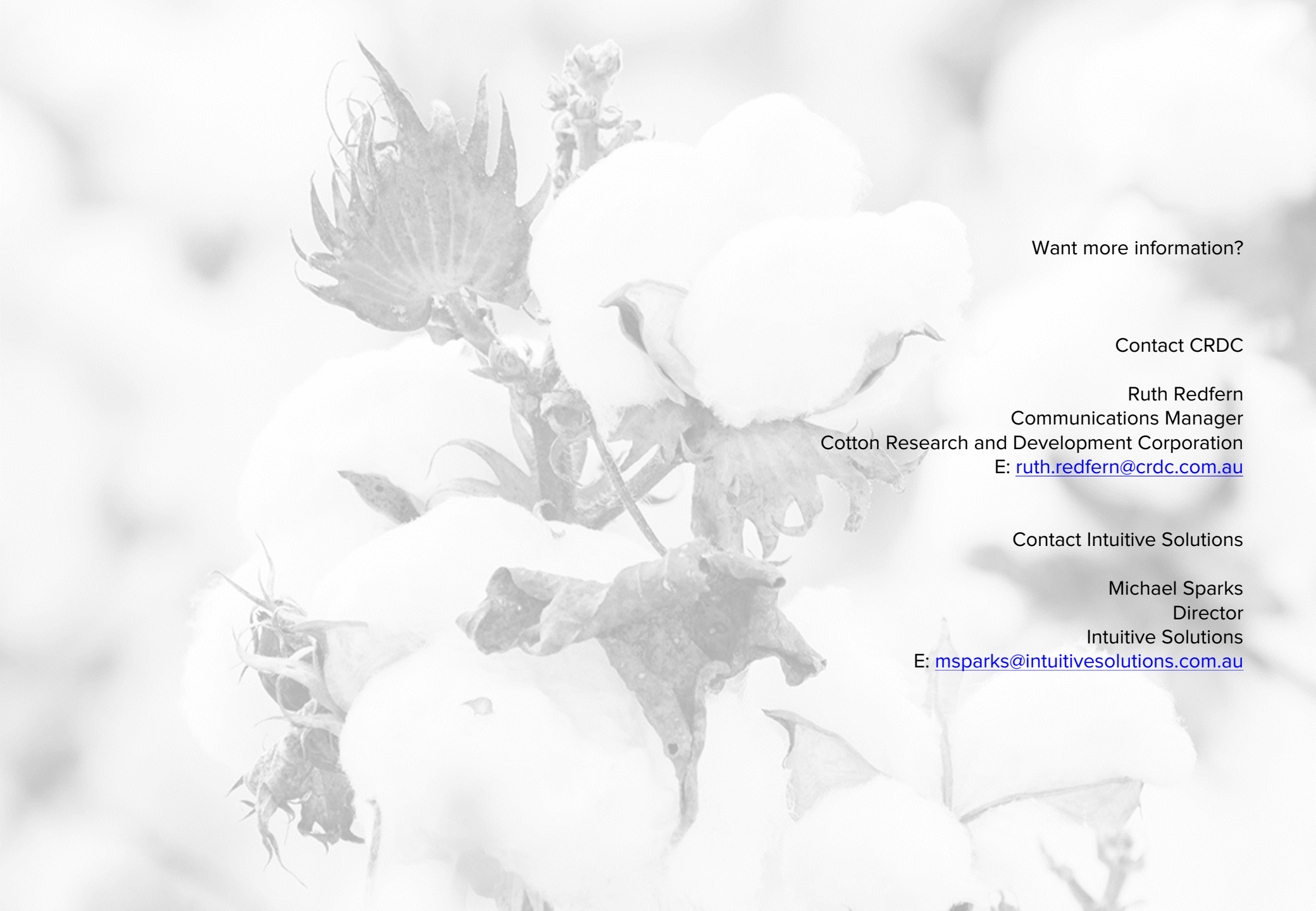| Region	Sample Size	Completed Surveys	Region	Sample Size	Completed Surveys
Overall	1,216	225	Northern NSW	433	68
Central Queensland	82	23	Macquarie	91	11
Darling Downs	208	54	Southern NSW	160	34
Macintyre – Balonne	136	31	Other	106	4

Questionnaire

Growers were asked to complete a 20 minute survey which covered a range of topics related to their cotton growing experience both on and off-farm.
Key areas of interest included:

- Farm Profiles
- Your 2019-20 Cotton Crop
- Water
- Nutrition and Soil
- Irrigation
- CRDC
- CottonInfo

- IPM and Crop Protection
- Sustainability
- Workforce and Training
- Community and Social Contribution
- Industry Sentiment
- Voice of the Grower

Timing

The survey was launched on 2 June 2020 and remained open until 18 June 2020.

Want more information?

Contact CRDC

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