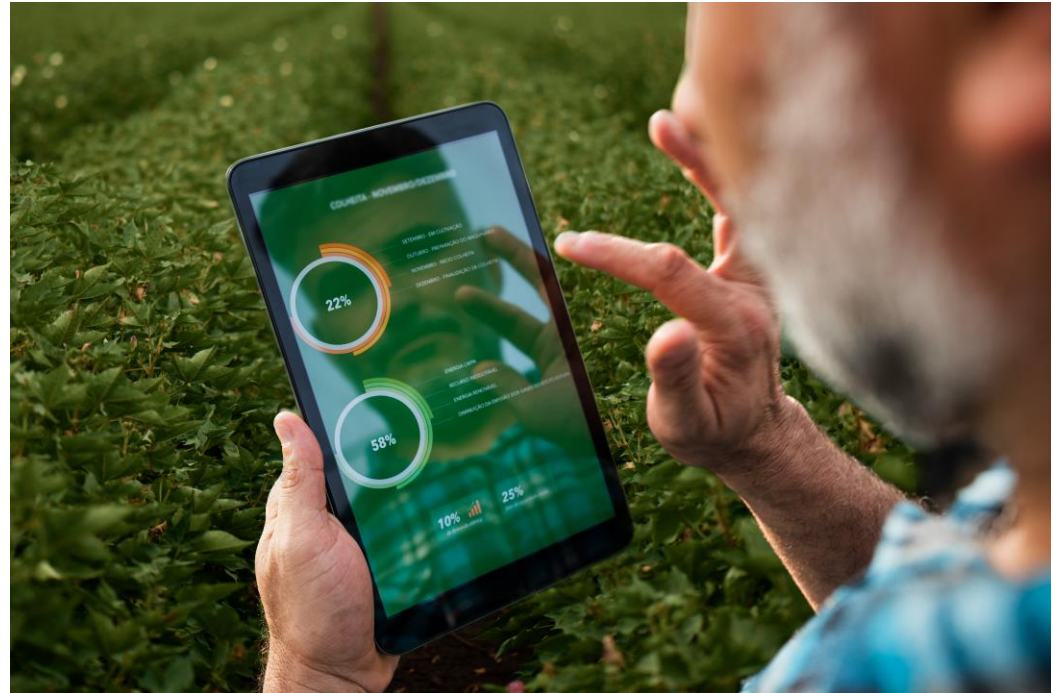




2023 Grower Survey



Background to the 2023 Grower Survey	3
2022-23 season wrap-up	4
Commodity performance indicators	6
How to navigate the report	7
 Snapshot of Key Findings	 8
 Detailed Findings	
Focus Area: Farm Profiles	11
Focus Area: 2022-23 Cotton Crop	14
Focus Area: Water	18
Focus Area: Nutrition and Soil	22
Focus Area: IPM and Crop Protection	25
Focus Area: R&D Impact on Farming Systems	32
Focus Area: Workforce and Training	38
Focus Area: Communications	48
Focus Area: Community and Social Contribution	52
Focus Area: Performance Indicators	55
Focus Area: Industry Sentiment	61
 Appendices	
Grower age, region, role and description of farming business	64
Historical data of land area/distribution	65
Technical notes	66
Research design	67
 Further Information	 68



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 Australian cotton industry's Sustainability Framework and associated reporting, the industry's best practice program myBMP, extension program 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 (RD&E). 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 and researchers. The 2023 Grower Survey has been refined by the working group with reference to Grower Surveys undertaken between 2017-2022 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 2023 Grower Survey included:

- Baseline information about growers and their farm business including respondents' demographics (region, farm area) and season and farm information (yields, area of cotton).
- A number of other focus areas, including:
 - water;
 - crop and soil management;
 - R&D impact on farming systems;
 - workforce and training;
 - communications; and
 - community and social contribution.
- As some questions are specific to cotton growers in the 2022-23 season, these questions will have a slightly lower sample size compared to most other questions.

The results from the 2023 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 2023 Grower Survey was conducted using a CATI (Computer Assisted Telephone Interviewing) data collection methodology. This included:

- Growers being contacted and invited to complete the survey over the phone;
- 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 2022 Grower Survey opened on 1 June 2023 and ran until 13 June 2023. It is noted that there will be a small number of growers who will have not finishing picking at this time.

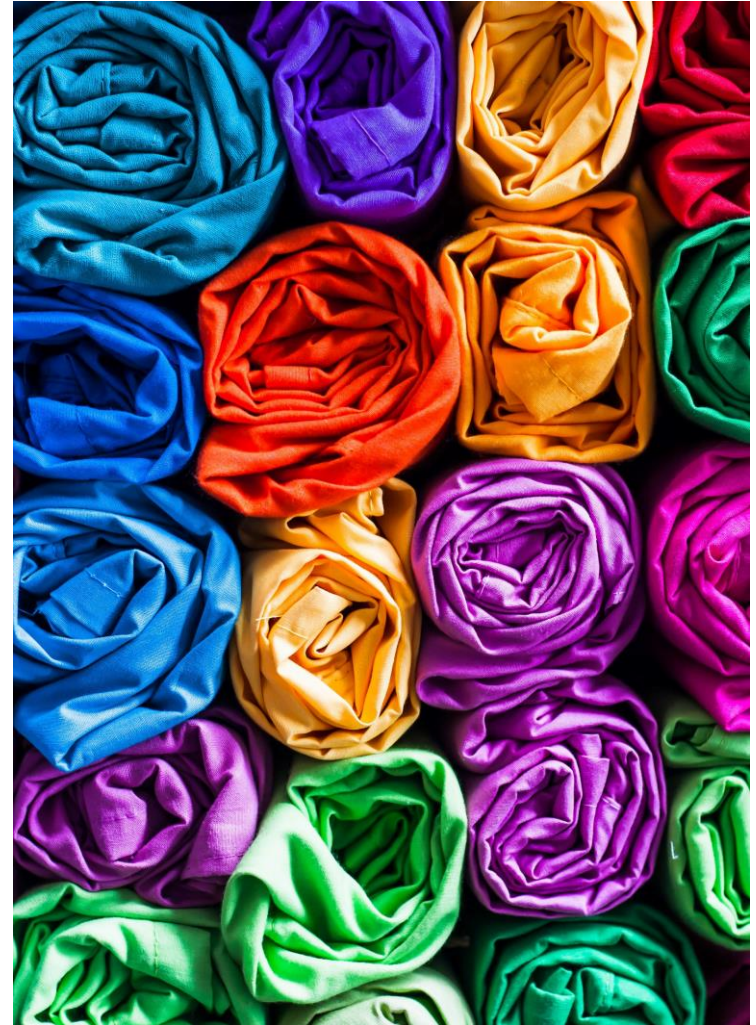
A look at the 2022-23 season

Approximately 584,000 hectares were planted to irrigated and dryland cotton in the 2022-23 season, a slight increase on the 550,000 hectares the season before. The season was marked by climate variability, with widespread flooding across cotton catchments causing farm and crop damage in November 2022. This was followed by a cool, dry summer, then a return to what is considered ideal cotton conditions in March 2023.

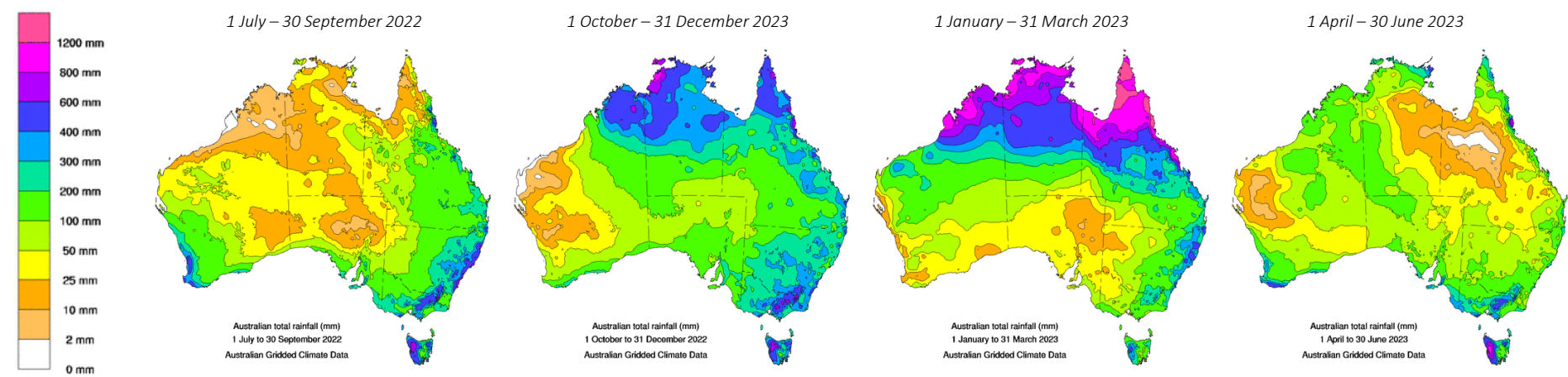
At the time of reporting in October 2023, ginning is still occurring across the industry and so a final production number has not been reached. It is estimated that the total production will be approximately 5.2-5.25 million bales.

CRDC's investment in 2022-23:

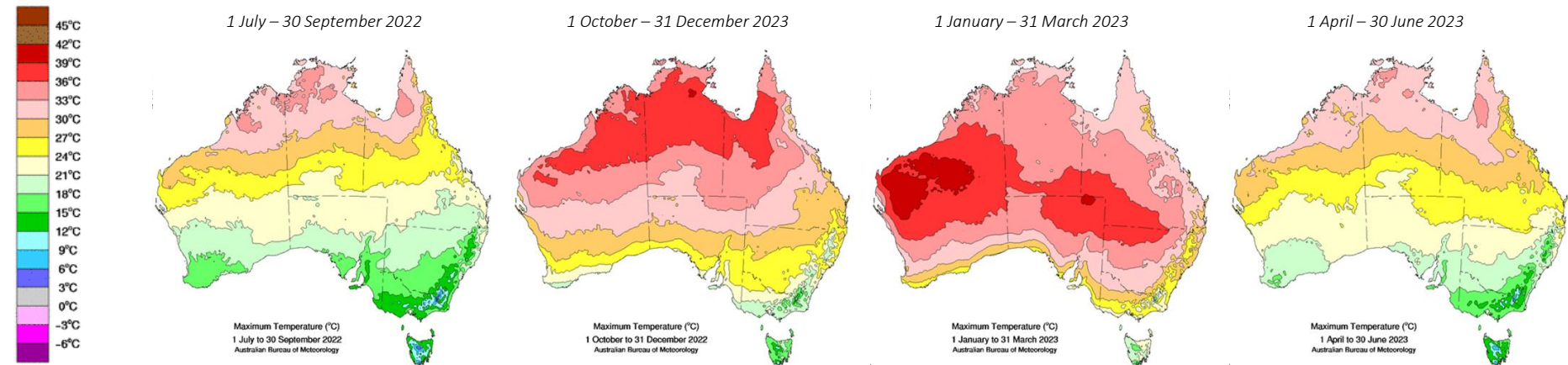
- \$17.7 million – CRDC's investment in cotton RD&E on behalf of cotton growers and the Australian Government
- 189 – RD&E projects
- 86 – research partners
- 5 – key program areas: increasing productivity and profitability on Australian cotton farms; improving cotton farming sustainability and value chain competitiveness; building the adaptive capacity of the Australian cotton industry; strengthening partnerships and adoption; and driving RD&E impact.



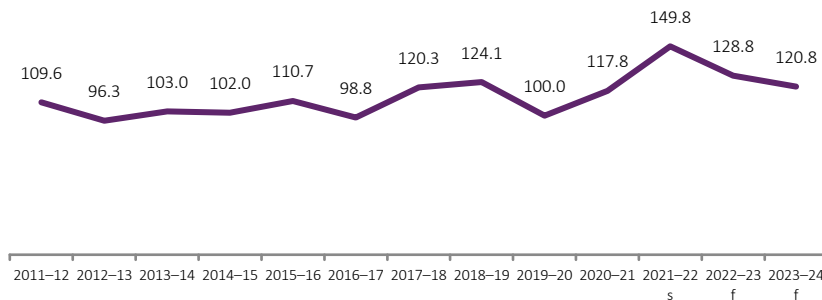
Total rainfall (in mm) by calendar quarter of the 2022-23 season



Mean maximum temperature (in degrees Celsius) by calendar quarter of the 2022-23 season

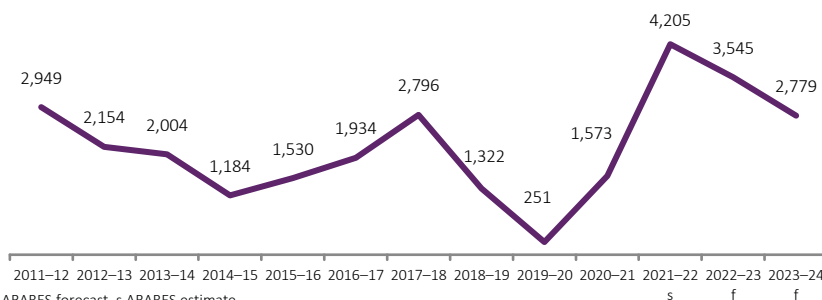


Index of cotton prices received by farmers (Australia)



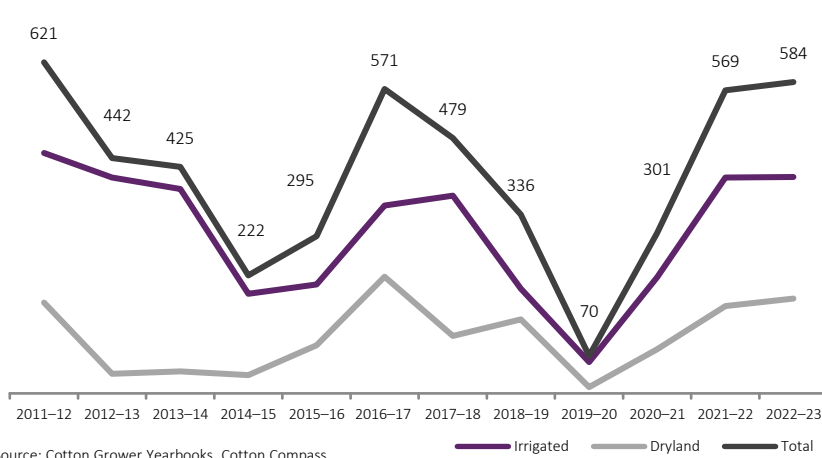
f ABARES forecast. s ABARES estimate.
Notes: The indexes for commodity groups are calculated on a chain-weighted basis using Fisher's ideal index with a reference year of 2019-20 = 100. Indexes for most individual commodities are based on annual gross unit value of production. Prices used in these calculations 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 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 \$40,000 from 2015-16.
Sources: ABARES; Australian Bureau of Statistics

Gross value of cotton lint production (Australia) (\$m)



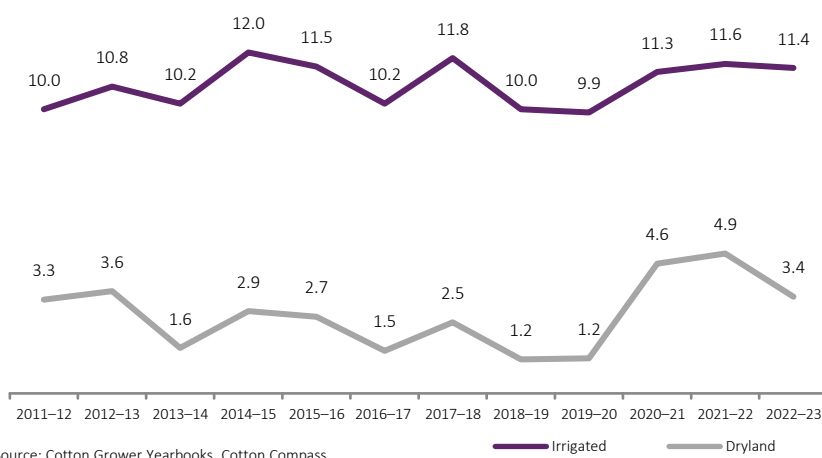
f ABARES forecast. s ABARES estimate.
Notes: The gross value of production is the value placed on recorded production at the wholesale prices realised in the marketplace. The point of measurement can vary between commodities. Generally the marketplace is the metropolitan market in each state and territory. 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)



Source: Cotton Grower Yearbooks, Cotton Compass

Average cotton yields (Australia) (bales/ha)



Source: Cotton Grower Yearbooks, Cotton Compass

New to the Grower Survey in 2023 was a series of questions asking growers about their awareness and usage of enhanced fertilisers. From the survey results:

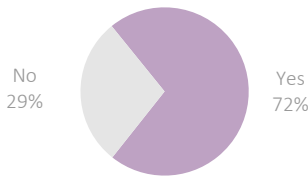
- Almost three in four (72%) growers indicated they had heard of the benefits of using enhanced fertilisers, such as inhibitors. Across regions, awareness was lowest in Central QLD with just over half (53%) of growers indicating they had heard about the benefits.
- However, at this time, the strong awareness of the benefits does not look to have translated to usage – just 4% of n = 8 growers reported using enhanced fertiliser in their 2022-23 cotton growing season. Across farm sizes, no larger farms reporting using enhanced fertilisers.
- Of those n = 8 who did use an enhanced fertiliser in their 2022-23 cotton growing season, on average 55% of their nitrogen fertiliser applied was an enhanced fertiliser.

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 during the 2022-23 season and responded to the survey), and the number that provided an answer to the question (200). 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 Central Queensland 17 respondents answered the question, of which 53% stated they have heard about the benefits of using enhanced fertilisers.

Have you heard about the benefits of using enhanced fertilisers, such as inhibitors?
Base: All growers who grew cotton during the 2022-23 season; n = 200



Have you used enhanced fertiliser in the 2022-23 cotton growing season?
Base: All growers who grew cotton during the 2022-23 season; n = 200



The results above are results of survey measurements reported at an overall level – covering all regions and farm sizes. 55% of nitrogen fertiliser applied was enhanced fertiliser product (n = 8)

Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=37)	Macintyre Balonne (n=23)	Northern NSW (n=66)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=62)	Medium (n=101)	Large (n=37)
% have heard	53%	78%	74%	73%	63%	71%	66%	75%	70%

Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=37)	Macintyre Balonne (n=23)	Northern NSW (n=66)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=62)	Medium (n=101)	Large (n=37)
% have heard	53%	78%	74%	73%	63%	71%	66%	75%	70%

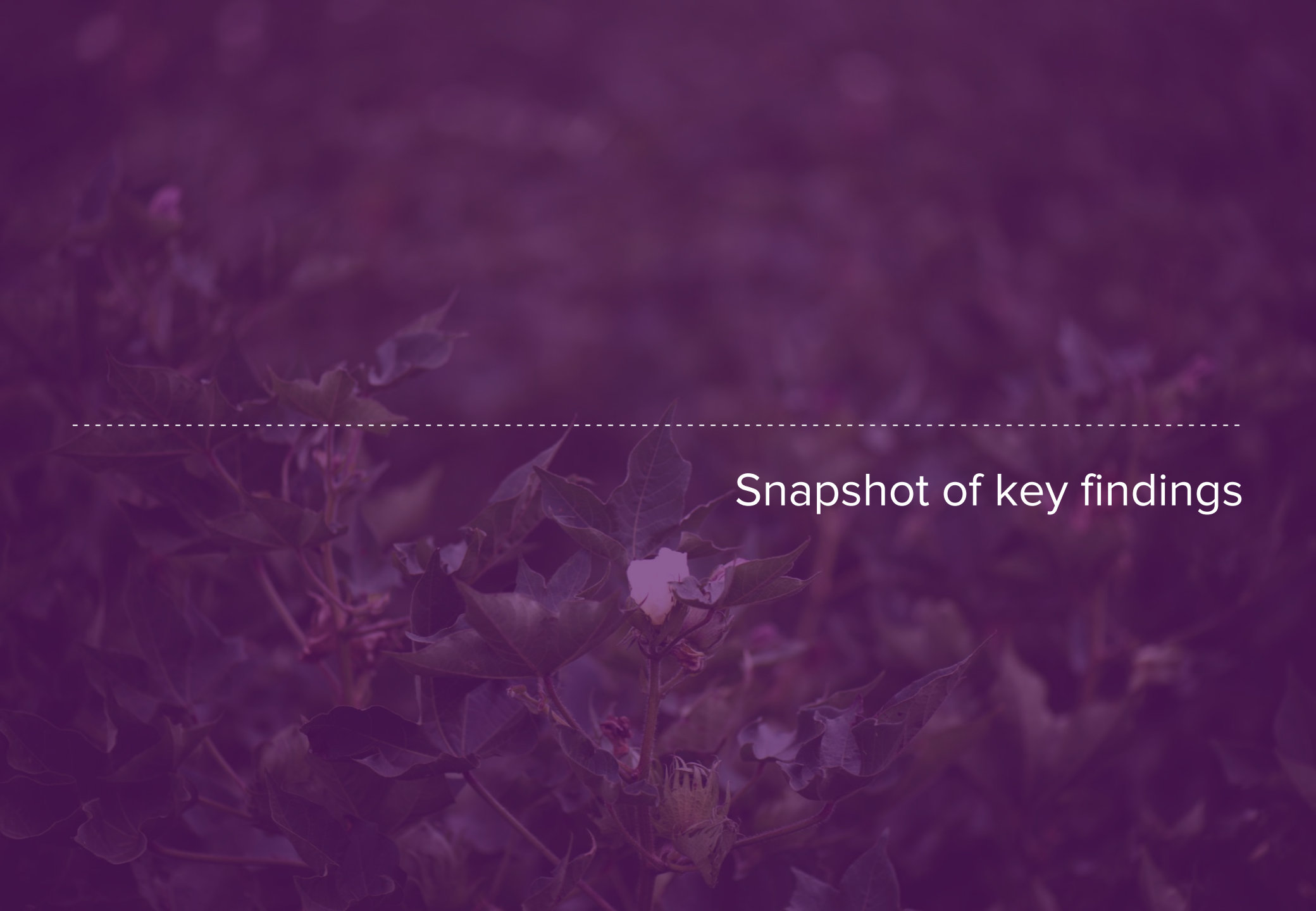
Segments were categorised as follows:

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)



Snapshot of key findings

2022-23 Cotton Crop



14%

Total farm area under cotton
production in 2022-23



792 ha

Grower-reported average
of hectares under cotton



10.19 bales/ha

Grower-reported average yield
on fully irrigated cotton area

Water



6.92 ML/ha

Average irrigation water applied to
cotton on fully irrigated hectares



226.4 mm

In-crop rainfall received between
planting and defoliation in 2022-23



1.23 bales/ML

Gross Production Water Use Index
on fully irrigated cotton area

IPM and Crop Protection



48%

Reported being affected
by spray drift



44%

Have accessed the WAND system
website and/or app



64%

Reported spraying mainly
via a ground rig

R&D impact on Farming Systems



54%

Planted a cover crop on fallow ground at least once over the past five years



52%

Have a farm biosecurity plan (i.e. one that identifies hazards and an action plan)



74%

Carry out on-farm experimentation using their own data

Workforce and Training



4.4 staff per 1,000 ha

Average # of staff across small, medium, and large farms (standardised to # per 1,000 ha)



38%

Reported themselves or their staff completed training over the last 12 months



85%

Reported knowing which safety incidents need to be reported to authorities

Communications



94%

Are confident in accessing info about the cotton industry online



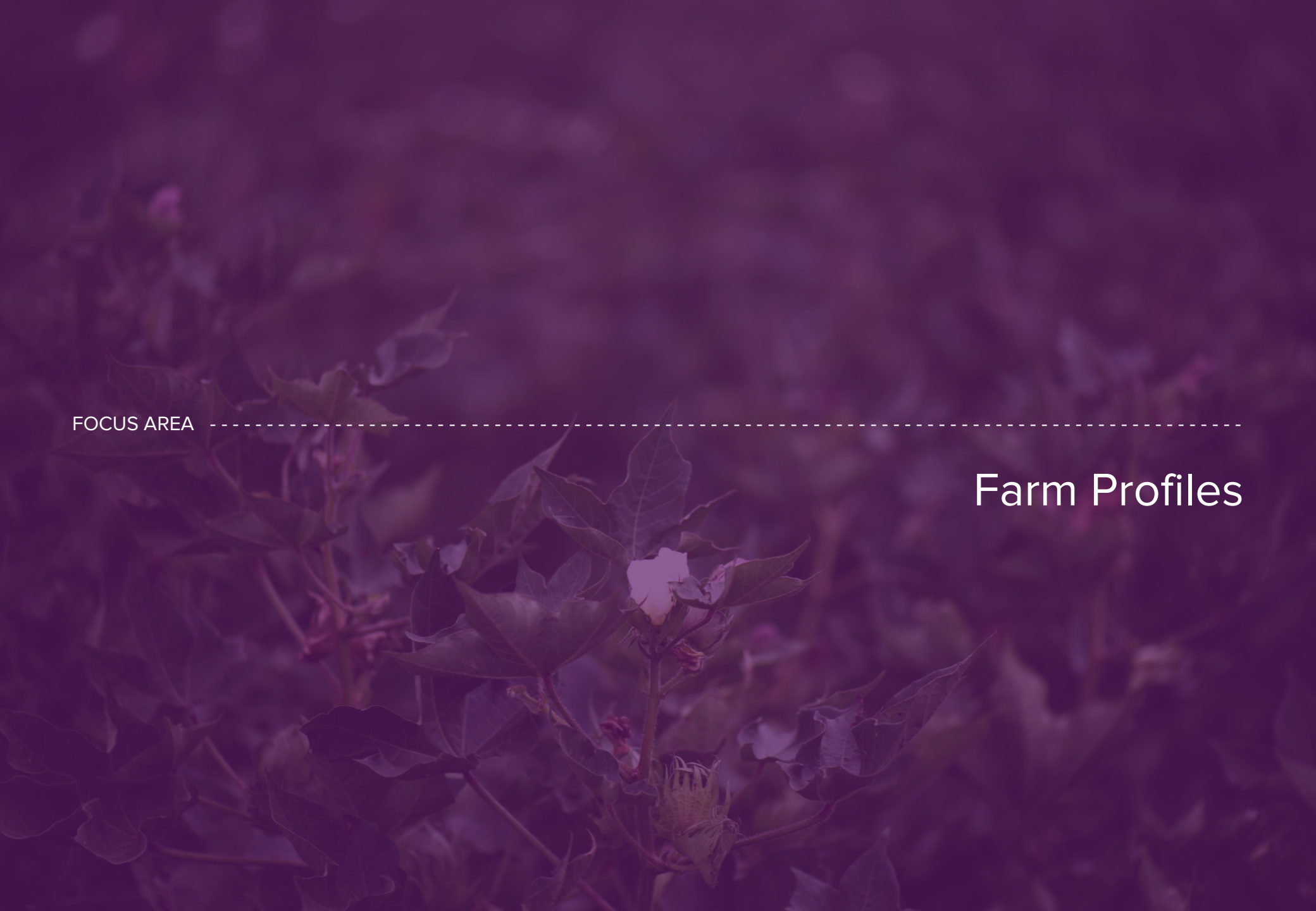
84%

Reported email as their first choice of receiving info from CRDC



49%

Reported they would access or consider accessing info from CRDC / CottonInfo via YouTube



FOCUS AREA

Farm Profiles

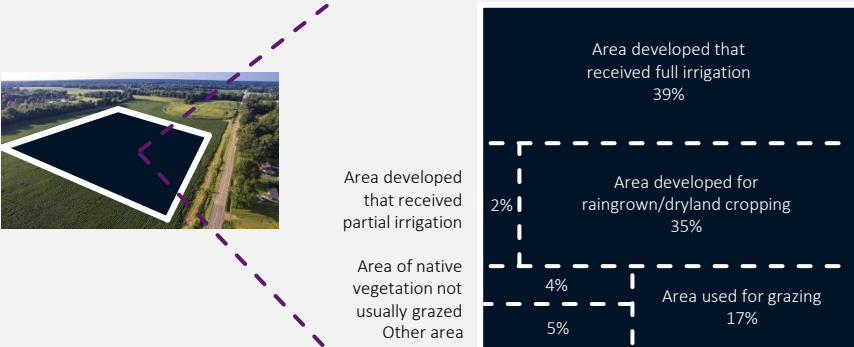
Farm Profiles

Area and distribution of farm land

Based on the information provided by respondents to the 2023 Grower Survey, we have estimated:

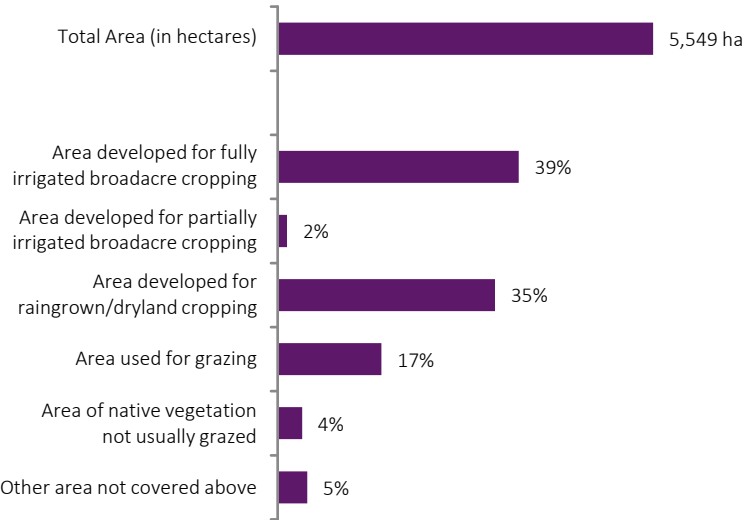
- An average (across all regions and farm sizes) total farm size of 5,549 ha;
- 56% of the land area was developed and available for cropping or other uses including cotton; with
- Growers again this year reporting that the majority of the developed area is either fully irrigated or developed for raingrown/dryland farming; whilst
- 25% 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.



What is the total area of your farm (in hectares), and of the total area of your farm, what is the area attributed to the following?

Base: All growers; n = 217



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Total area (ha)	3,815	1,770	12,305	5,876	6,390	5,619	1,267	4,399	16,019
Full irrigation	24%	39%	24%	27%	26%	69%	51%	37%	24%
Partial irrigation	1%	2%	1%	2%	1%	<1%	1%	1%	3%
Raingrown/Dryland	29%	44%	32%	48%	44%	10%	21%	37%	50%
Grazing	39%	7%	29%	15%	23%	12%	17%	16%	17%
Native vegetation	6%	2%	6%	4%	2%	3%	4%	4%	5%
Other	1%	5%	8%	4%	4%	5%	6%	5%	2%

Farm Profiles

Average riparian length and width

The feedback from the 2023 CRDC Grower Survey indicates:

- More than two in three growers (67%) reported having a riparian area on their property.
- Growers with a riparian area reported an average riparian area of 8.32 km in length, slightly up on the long-term average (since 2017) of 7.33 km.
- The average width of riparian areas is 166 m, similar to the long-term average (since 2017) of 165 m.

As reported in previous Grower Surveys, the analysis indicates the size of these riparian areas varies across the different growing regions. Not surprisingly also, there is considerable variation across the different farm sizes. While the trend information provides some useful insights, it should be noted that the grower respondents vary year on year so some caution should be exercised when interpreting these results.

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)	2021 (n=158)	2022 (n=121)	2023 (n = 146)
Average length (km)	9	7.5	7.65	6.31	7.58	6.93	8.20	7.31	8.32
Average width (m)	Not asked	Not asked	175	169	144	138	178	186	166

Approximately how long and wide is the riparian area on your property?
Base: All growers with a riparian area on their farm*; n = 146 (n = 6 could not provide an answer)



8.32 km

Average length
(in kilometres)



166 m

Average width
(in metres)

65 of 211 growers who answered
(31%) reported no riparian area on
their property.

Key results by Region and Size of Total Farm Area

	Central QLD (n=15)	Darling Downs (n=28)	Macintyre Balonne (n=18)	Northern NSW (n=47)	Macquarie (n=13)	Southern NSW (n=22)	Small (n=40)	Medium (n=78)	Large (n=28)
Average length (km)	5.73	3.36	13.22	7.83	8.15	10.71	3.74	8.14	15.36
Average width (m)	258	137	234	140	189	133	136	173	187

* Results were considered outliers and were removed if reported length was 100km or more (n = 0), or reported width was 1,000m or more (n = 23).

A close-up photograph of a cotton plant with green leaves and a white flower, overlaid with a semi-transparent purple filter. A horizontal dashed line is positioned across the middle of the image.

FOCUS AREA

2022-23 Cotton Crop

2022-23 Cotton Crop

Cotton area and farming systems

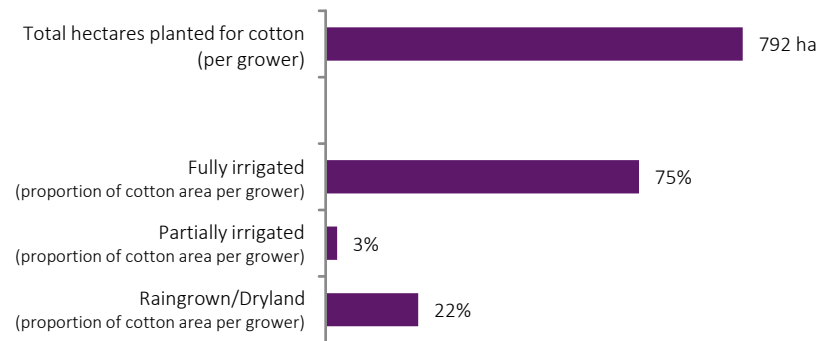
Key information about the growers’ area planted for the 2022-23 season was collected during the survey. Based on the feedback provided by cotton growers responding to the 2023 CRDC Grower Survey we note that:

It has been estimated that the average area of cotton planted was 792 ha:

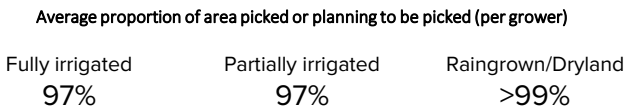
- On average, 75% of cotton area per grower was fully irrigated;
- 3% was partially irrigated; and
- 22% was raingrown/dryland.

Based on the feedback provided by growers, it is estimated that almost three in four (73%) were growing cotton on a single irrigation type, with the majority of these (60%) growing cotton only on fully irrigated hectares.

What was the total number of hectares planted for cotton during the 2022-23 cotton growing season? And of these hectares, how many hectares were fully irrigated, partially irrigated or raingrown/dryland? Base: All growers who grew cotton during the 2022-23 season; n = 200



And of these hectares, how many hectares were picked or are planning to be picked (e.g. not ploughed in due to flooding, spray drift, hail etc.)? Base: All growers who grew cotton during the 2022-23 season; n = 200



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=37)	Macintyre Balonne (n=23)	Northern NSW (n=66)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=62)	Medium (n=101)	Large (n=37)
Total area (ha per grower)	688	524	1,386	1,041	670	468	231	672	2,060
Fully irrigated	66%	64%	90%	59%	100%	100%	82%	75%	63%
Partially irrigated	6%	5%	4%	3%	0%	0%	3%	3%	3%
Raingrown/Dryland	28%	31%	6%	39%	0%	0%	16%	22%	34%

2022-23 Cotton Crop

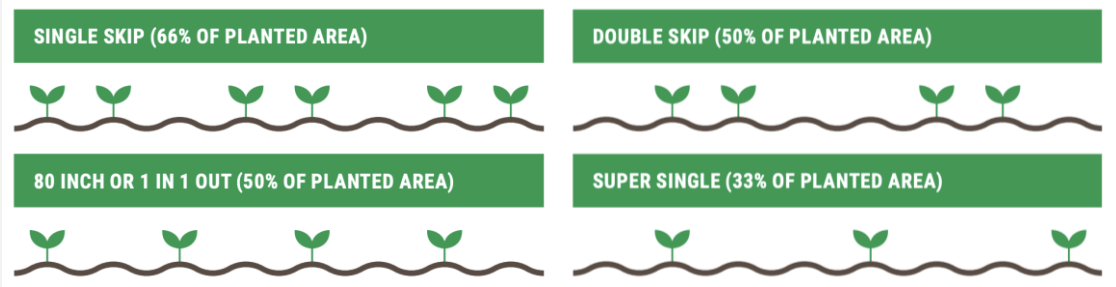
Row configuration for cotton in 2022-23 season

Growers were asked to describe the row configuration used for their fully irrigated, partially irrigated and raingrown/dryland cotton areas for the 2022-23 season. The results show:

- Similar to previous years, for fully irrigated cotton areas, a 1m solid configuration was the overwhelming configuration used (87%). A small number of growers reported using 60 inch cotton, 30 inch solid, 36 inch/90cm, or a single skip configuration.
- For raingrown/dryland areas, growers were less likely to use a 1m solid configuration (16%) and more likely to be using a single skip (27%), double skip (31%), or 60 inch cotton (19%) configuration.

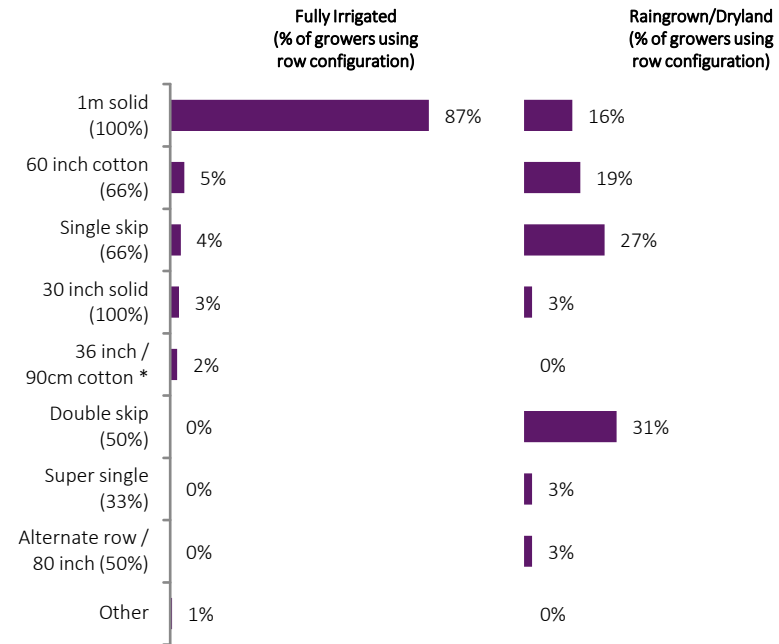
Results for partially irrigated growers were not reported due to the small sample size.

Examples of row configurations:



Of the cotton hectares, what row configuration did you use?

Base: All growers who grew cotton during the 2022-23 season; n varies
(Fully Irrigated, n = 168, Raingrown/Dryland, n = 74). Part irrigation not reported due to low sample size.



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

	Central QLD (n=13)	Darling Downs (n=31)	Macintyre Balonne (n=22)	Northern NSW (n=45)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=56)	Medium (n=85)	Large (n=27)
1m solid (100%)	92%	87%	91%	84%	100%	90%	82%	89%	89%
60 inch cotton (66%)	0%	10%	9%	7%	0%	0%	2%	6%	7%
Single skip (66%)	8%	3%	0%	7%	0%	3%	7%	1%	4%
30 inch solid (100%)	0%	0%	0%	2%	0%	0%	5%	2%	0%
36 inch / 90cm cotton *	8%	0%	0%	2%	0%	6%	4%	2%	0%
Double skip (50%)	0%	0%	0%	0%	0%	0%	0%	0%	0%
Super single (33%)	0%	0%	0%	0%	0%	0%	0%	0%	0%
Alternate row / 80 inch (50%)	0%	0%	0%	0%	0%	0%	0%	0%	0%
Other	0%	0%	0%	0%	0%	0%	2%	0%	0%

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

2022-23 Cotton Crop

Yields for the 2022-23 cotton growing season

Growers were asked to provide estimates of three yield measures they achieved for the 2022-23 growing season. These were average yield across their entire crop, and 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 irrigated, partially irrigated and raingrown/dryland areas.

- For fully irrigated areas, the 2023 survey reported an average yield of 10.19 bales per hectare. This reported result is down on that reported in 2022 (down 1.12).
- For raingrown/dryland areas, the average yield was 3.67, also down slightly on the 2022 yield result.
- Results for partially irrigated growers were not reported due to the small sample size.

What were your yields for the 2022-23 cotton growing season across the cotton areas?

Base: All growers who grew cotton during the 2022-23 season; n varies
(Fully Irrigated, n = 157, Raingrown/Dryland, n = 67)
Part irrigation not reported due to low sample size.

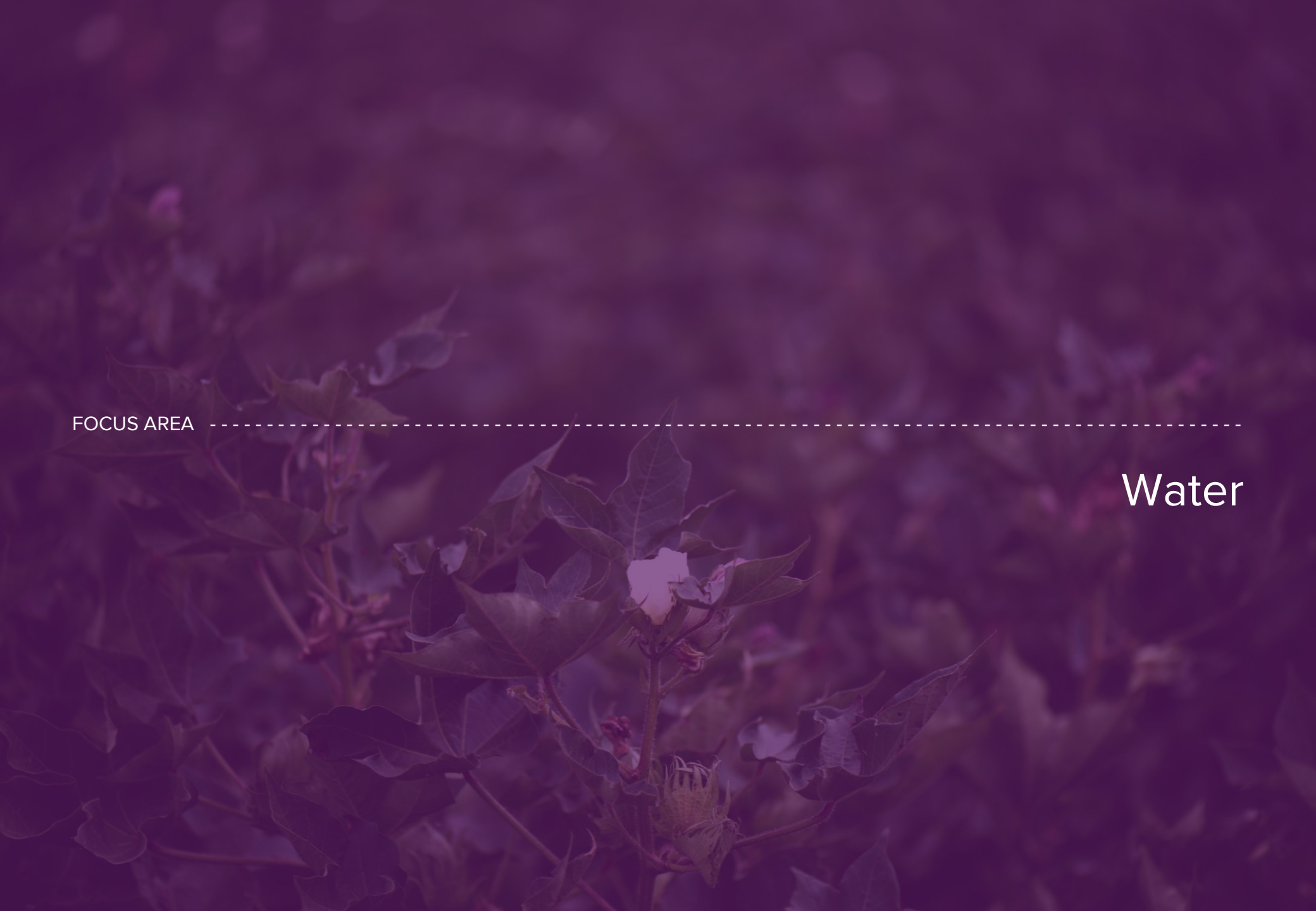
Average yield change by Region and Size of Total Farm Area (fully irrigated results only)

	Central QLD	Darling Downs	Macintyre Balonne	Northern NSW	Macquarie	Southern NSW	Small	Medium	Large
Average yield (2022-23)	10.93	10.36	12.24	11.17	11.11	7.29	9.45	10.30	11.68
Average yield (2021-22)	10.91	9.77	12.55	12.10	11.86	11.01	10.68	11.46	12.07
Difference	+ 0.02	+ 0.59	- 0.31	- 0.93	- 0.75	- 3.72	- 1.23	- 1.16	- 0.39

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

	Central QLD (n=11)	Darling Downs (n=30)	Macintyre Balonne (n=21)	Northern NSW (n=41)	Macquarie (n=16)	Southern NSW (n=29)	Small (n=55)	Medium (n=81)	Large (n=21)
Average yield	10.93	10.36	12.24	11.17	11.11	7.29	9.45	10.30	11.68
Highest yield from one field	14.75	12.36	14.18	12.51	12.89	8.48	11.29	11.93	13.68
Lowest yield from one field	7.68	8.12	10.54	9.45	9.17	5.04	7.33	8.53	9.00
Range of variation from average yield	7.08	4.23	3.64	3.06	3.72	3.43	3.96	3.40	4.69

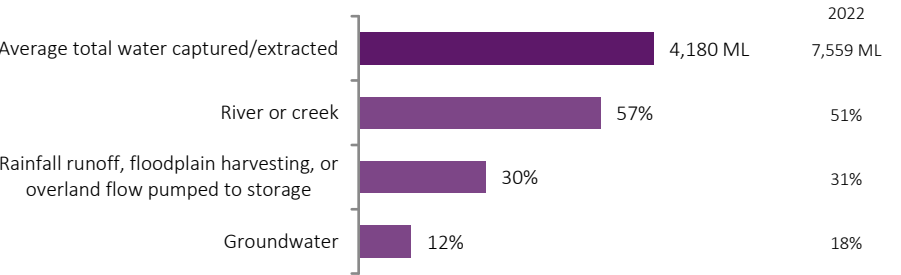
	Fully Irrigated (bales per ha)	Raingrown/Dryland (bales per ha)
Average yield	10.19 2022: 11.31	3.67 2022: 4.73
Yield achieved by your highest-yielding field (average of grower-reported yield)	11.96 2022: 13.03	4.33 2022: 5.97
Yield achieved by your lowest-yielding field (average of grower-reported yield)	8.19 2022: 9.09	2.95 2022: 3.83
Range of variation from average yield	3.77 2022: 3.94	1.38 2022: 2.14



FOCUS AREA

Water

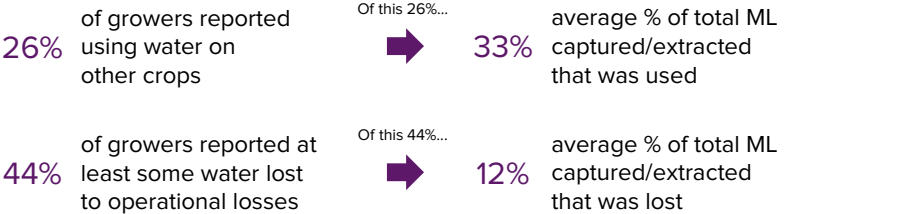
For the 2022-23 cotton growing season, how much water (in megalitres) was captured or extracted from?
Base: All growers who grew cotton during the 2022-23 season and captured/extracted water; n = 144 *



Key results by Region and Size of Total Farm Area

	Central QLD (n=14)	Darling Downs (n=30)	Macintyre Balonne (n=19)	Northern NSW (n=36)	Macquarie (n=13)	Southern NSW (n=26)	Small (n=50)	Medium (n=73)	Large (n=21)
Total water captured/extracted	4,064	1,538	8,785	2,691	6,139	5,747	1,167	4,121	11,418
River or creek	59%	45%	67%	39%	43%	91%	58%	57%	57%
Rainfall runoff, harvesting, etc.	41%	37%	33%	37%	40%	2%	28%	30%	35%
Groundwater	0%	17%	0%	24%	17%	7%	14%	13%	8%

How much of the water captured or extracted ([total ML from above] megalitres) was used on other crops or lost to operational losses (i.e. blow outs)? †
Base: All growers who grew cotton during the 2022-23 season and captured/extracted water; n = 144 **



Key results by Region and Size of Total Farm Area

	Central QLD (n=14)	Darling Downs (n=30)	Macintyre Balonne (n=19)	Northern NSW (n=36)	Macquarie (n=13)	Southern NSW (n=26)	Small (n=50)	Medium (n=73)	Large (n=21)
% of growers using water on other crops	7%	23%	16%	31%	8%	50%	24%	26%	29%
Of these growers...									
Average % of total ML used	24%	22%	13%	32%	30%	47%	30%	36%	31%
% of growers reporting at least some water lost	50%	47%	53%	39%	38%	42%	40%	42%	57%
Of these growers...									
Average % of total ML lost	10%	8%	10%	17%	11%	7%	14%	12%	10%

* For proportion calculations, responses were only considered where figures for all sources were known (n = 12 removed, n = 132 valid for analysis).
** For proportion calculations, responses were only considered where figures for all sources were known (Other crops: n = 0 removed, n = 37 valid for analysis; Operational losses: n = 5 removed, n = 58 valid for analysis;).

How much in-crop rainfall (in mm) did you receive in the 2022-23 cotton growing season between planting and defoliation?

Base: All growers who grew cotton during the 2022-23 season and could provide a response; n = 178

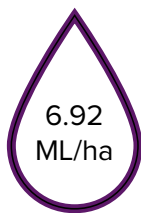


226.4 mm
2022: 430.3 mm

In-crop rainfall
(mm)

How much irrigation water (in megalitres per hectare) was applied to cotton during the 2022-23 cotton growing season?

Base: All growers who grew cotton during the 2022-23 season under full or part irrigation and could provide a response; n varies (Fully Irrigated, n = 160). Part irrigation not reported due to low sample size.



Cotton under
full irrigation

6.92
ML/ha

2022 (n = 158):
5.66 ML/ha

What was your estimated soil moisture deficit (in mm) for:

Base: All growers who grew cotton during the 2022-23 season; n varies

(Sowing: Fully Irrigated (excluding two outliers), n = 122, Raingrown/Dryland, n = 59).

(Defoliation: Fully Irrigated (excluding two outliers), n = 118, Raingrown/Dryland, n = 54)

Part irrigation not reported due to low sample size.

	Fully Irrigated (mm)	Raingrown/Dryland (mm)
Sowing	58.8 2022: 97.1	146.2 2022: 95.1
Defoliation/End of season	114.0 2022: 74.5	110.1 2022: 111.7

Key results by Region and Size of Total Farm Area

	Central QLD (n=16)	Darling Downs (n=35)	Macintyre Balonne (n=21)	Northern NSW (n=55)	Macquarie (n=16)	Southern NSW (n=25)	Small (n=57)	Medium (n=88)	Large (n=33)
In-crop rainfall (mm)	408.3	183.8	122.2	175.0	221.8	228.4	274.0	210.9	185.3

Key results by Region and Size of Total Farm Area

	Central QLD (n=13)	Darling Downs (n=31)	Macintyre Balonne (n=20)	Northern NSW (n=41)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=53)	Medium (n=84)	Large (n=23)
Fully irrigated – Mega litres per ha	5.40	5.44	8.54	6.87	8.48	7.37	6.29	7.03	7.96

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

	Central QLD (n=12)	Darling Downs (n=24)	Macintyre Balonne (n=15)	Northern NSW (n=34)	Macquarie (n=13)	Southern NSW (n=19)	Small (n=42)	Medium (n=61)	Large (n=19)
Sowing	56.7	60.2	179.3	43.2	13.8	32.1	74.9	51.6	46.3
Base:	(n=13)	(n=24)	(n=18)	(n=29)	(n=12)	(n=18)	(n=40)	(n=59)	(n=19)
Defoliation/ End of season	213.1	102.5	126.4	119.0	75.3	55.0	132.2	110.2	87.4

GPWUI: Gross Production Water Use Index

The GPWUI (Gross Production Water Use Index) is an index to benchmark water productivity. This benchmark relates total production (bales) to the total water input (water from all sources: irrigation, effective rainfall and soil moisture).

NSW Department of Primary Industries Benchmarking project team calculated the GPWUI from CRDC Grower survey data. The results reported are from fully irrigated cotton crop only.

Please also note that there was a small change in methodology year on year, with the assumption of an 80% rainfall run-off coefficient updated to 76.61%.

The results from the 2023 Grower Survey indicate that, across growers who provided answers to all questions used in the GPWUI calculations, the average GPWUI was at 1.23 bales/ML. The table below show the variation of this index across the growing regions (ranging from 0.89 in Southern NSW to 1.60 in Darling Downs).

Gross Production Water Use Index (average of grower results)
Base: all growers who provided answers to all questions used within GPWUI calculations; n varies (Fully Irrigated, n = 88). Part irrigation not reported due to low sample size.

How GPWUI is calculated (on fully irrigated land):

The following calculation is performed for each individual farm and then averaged to provide an overall measure of GPWUI.

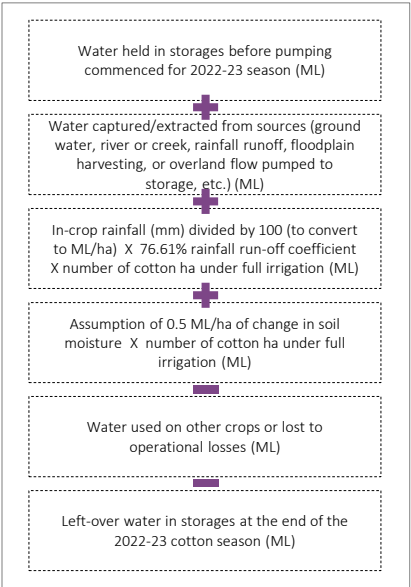
Fully irrigated
farms only

1.23
bales/ML

2022 (n = 107):
1.26 bales/ML

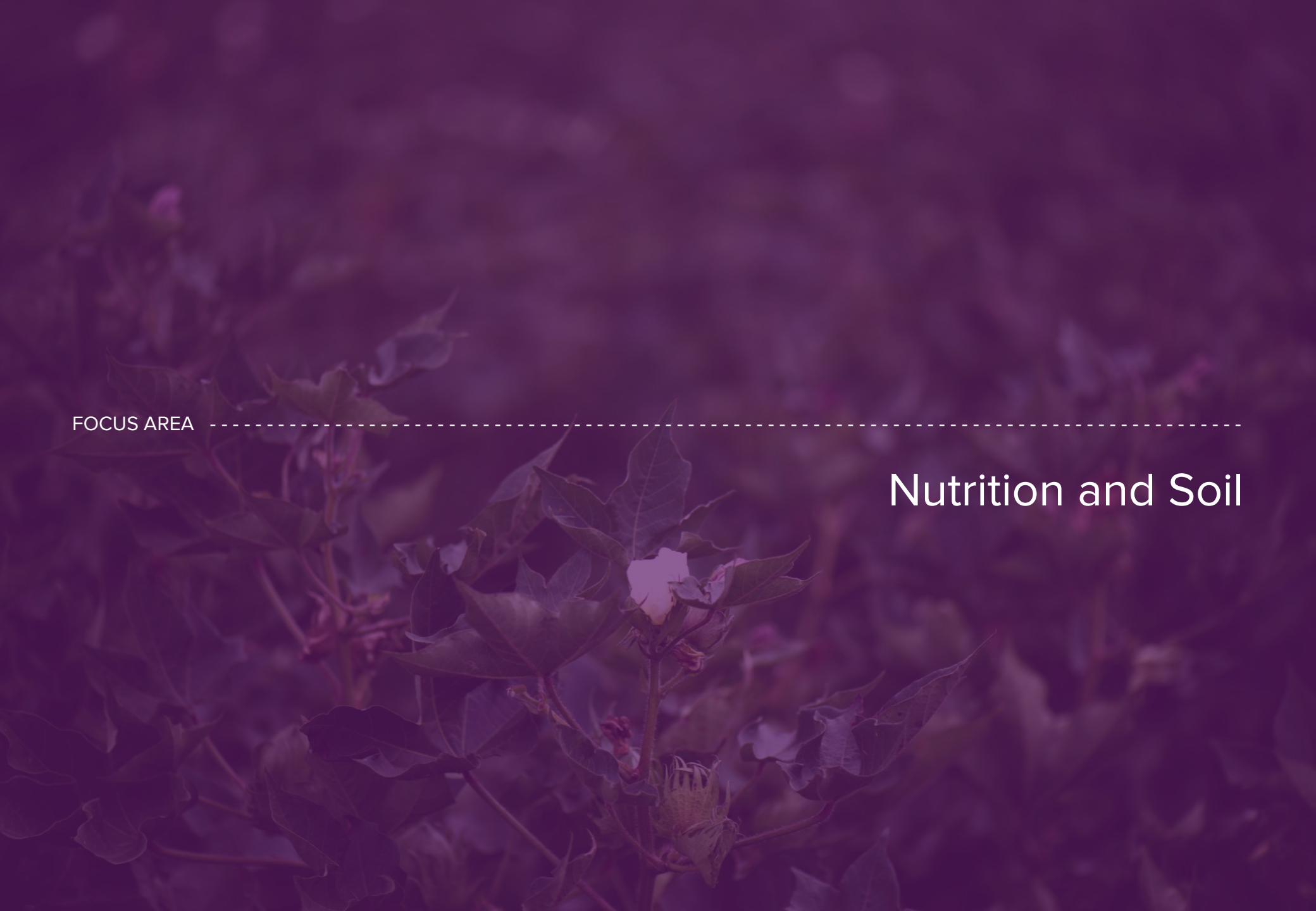
Total yield (bales)

divided by



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

	Central QLD (n=8)	Darling Downs (n=15)	Macintyre Balonne (n=14)	Northern NSW (n=17)	Macquarie (n=9)	Southern NSW (n=21)	Small (n=28)	Medium (n=49)	Large (n=11)
GPWUI (bales/ML)	1.28	1.60	1.18	1.35	1.21	0.89	1.22	1.21	1.36

A close-up photograph of a cotton plant with green leaves and a white flower, overlaid with a semi-transparent purple filter.

FOCUS AREA

Nutrition and Soil

Nutrition and Soil

Nutrient products used and rate of application

Which nutrient products (both nitrogen-based and blended products) did you apply on your cotton field/s in 2022-23? Please select up to three each from the following lists.

Base: All growers who grew cotton during the 2022-23 season; n = 200

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

	% used product	Average application rate (in kg/ha)
Nitrogen-based products		
Urea	86%	361.1
Anhydrous Ammonia	17%	190.4
Easy N	5%	186.5
Other (please specify)	5%	414.3
Blended products		
Cotton Sustain	23%	187.8
Granulock SS	2%	175.0
Granulock Zn	16%	124.5
MAP	17%	130.5
MAP (Zinc)	11%	142.8
DAP	4%	161.3
Compost	6%	4,140.9
Muriate of Potash	12%	106.9
Other (please specify)	29%	626.5
Nutrients applied *		
Nitrogen	n/a	175.7
Phosphorus	n/a	19.9
Potassium	n/a	15.9
Zinc	n/a	0.6
Sulfur	n/a	2.4

	Central QLD (n=17)	Darling Downs (n=37)	Macintyre Balonne (n=23)	Northern NSW (n=66)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=62)	Medium (n=101)	Large (n=37)
N-based products									
Urea	65%	86%	87%	80%	100%	94%	89%	82%	89%
Anhydrous Ammonia	12%	19%	35%	20%	13%	3%	13%	19%	16%
Easy N	6%	11%	9%	3%	0%	0%	5%	6%	0%
Other (please specify)	0%	0%	4%	9%	13%	3%	2%	8%	3%
Blended products									
Cotton Sustain	18%	24%	43%	33%	6%	0%	29%	20%	22%
Granulock SS	0%	0%	0%	3%	0%	3%	2%	1%	3%
Granulock Zn	0%	24%	17%	6%	13%	35%	15%	17%	14%
MAP	12%	5%	0%	12%	44%	45%	11%	22%	11%
MAP (Zinc)	6%	14%	17%	5%	44%	3%	8%	13%	8%
DAP	0%	3%	0%	3%	0%	0%	3%	3%	5%
Compost	0%	3%	4%	6%	0%	16%	2%	8%	5%
Muriate of Potash	12%	30%	17%	3%	13%	0%	11%	15%	3%
Other (please specify)	53%	41%	22%	26%	6%	16%	40%	25%	19%
Average application rate of nutrient across all cotton growers (kg/ha)									
Nitrogen	175.6	156.0	248.9	143.5	278.5	157.8	179.6	178.0	162.8
Phosphorus	10.3	12.9	22.1	12.6	38.7	32.2	18.0	21.5	18.5
Potassium	18.4	25.4	36.3	11.8	10.5	0.0	19.4	16.2	9.0
Zinc	0.3	0.5	1.0	0.4	1.2	0.7	0.6	0.6	0.5
Sulfur	1.1	1.9	3.5	1.8	3.3	4.4	2.7	2.5	1.9

* "Nutrients applied" was calculated by reviewing each product and the proportion of each nutrient within each product per kg. These proportions were then multiplied by each product application rate and added together to provide an application rate of the nutrient. The results displayed above are the averages of these rates across all cotton growers.

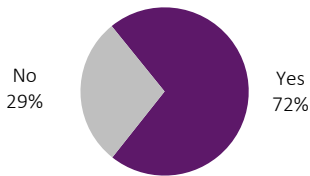
Nutrition and Soil

Awareness and usage of enhanced fertilisers

New to the Grower Survey in 2023 was a series of questions asking growers about their awareness and usage of enhanced fertilisers. From the survey results:

- Almost three in four (72%) growers indicated they had heard of the benefits of using enhanced fertilisers, such as inhibitors. Across regions, awareness was lowest in Central QLD with just over half (53%) of growers indicating they had heard about the benefits.
- However, at this time, the strong awareness of the benefits does not look to have translated to usage – just 4% or n = 8 growers reported using enhanced fertiliser in their 2022-23 cotton growing season. Across farm sizes, no larger farms reporting using enhanced fertilisers.
- Of those n = 8 who did use an enhanced fertiliser in their 2022-23 cotton growing season, on average 55% of their nitrogen fertiliser applied was an enhanced fertiliser.

Have you heard about the benefits of using enhanced fertilisers, such as inhibitors?
Base: All growers who grew cotton during the 2022-23 season; n = 200



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=37)	Macintyre Balonne (n=23)	Northern NSW (n=66)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=62)	Medium (n=101)	Large (n=37)
% have heard	53%	78%	74%	73%	63%	71%	66%	75%	70%

Have you used enhanced fertiliser in the 2022-23 cotton growing season?
Base: All growers who grew cotton during the 2022-23 season; n = 200



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=37)	Macintyre Balonne (n=23)	Northern NSW (n=66)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=62)	Medium (n=101)	Large (n=37)
% have used	6%	3%	9%	2%	6%	3%	2%	7%	0%

A close-up photograph of a cotton plant with green leaves and a white flower, overlaid with a semi-transparent purple filter. A horizontal dashed line spans the width of the image, separating the 'FOCUS AREA' label from the main title.

FOCUS AREA

IPM and Crop Protection

IPM and Crop Protection

Impact of spray drift on cotton crop

Growers were asked about the impact of spray drift on their cotton crop, both from a yield perspective and from a financial perspective. The feedback from growers responding to the 2023 surveys suggests that spray drift is now a more widespread issue for the industry:

- Just under one in two growers (48%) reported being affected by spray drift during the 2022-23 cotton growing season.
- This result represents a substantial uplift on impacted growers compared to the 22% result reported in 2022.

Of the almost one in two growers who reported being impacted, these growers reported that, on average, 48% of their cotton crop area had been impacted. This result is also a significant increase on the 2022 result (23%). Based on this feedback, it is estimated that the total estimated area affected by drift for this cohort was 37,368 ha.

Growers reported different impacts of this spray drift. Of the growers reporting being impacted:

- 65% (n = 62) were able to provide an estimate of the impact on their yield,
- 23% (n = 22) reported no impact on their yield, whilst
- 12% (n = 11) were unable to provide this information during the interview.

Growers who could provide an estimate (both some impact or no impact) reported an average yield cost impact of 1.2 bales/ha (similar to 2022). Based on this feedback, it is estimated that the total estimated production loss from this cohort was 33,354 bales.

For the 2022-23 cotton growing season, what area of your cotton crop was impacted by spray drift, and what do you estimate to be the average yield cost and the total financial cost of this damage?

Base: All growers who grew cotton during the 2022-23 season; n = 198 (n = 2 could not provide an answer)

Of the 48% of cotton growers affected. . .	% of cotton growers affected	48% 2022: 22%
	Average reported % of cotton crop area impacted	48% 2022: 23%
	Average reported yield cost (in bales/ha)	1.2 2022: 1.2
	Average reported financial cost (in \$)	\$254k 2022: n/a
	Average reported cost per hectare (in \$/ha)	\$783 2022: n/a

Range of the reported financial cost (in \$)	Range of the reported cost per hectare (in \$/ha)
\$0 - \$7M	\$0 - \$5k

Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=36)	Macintyre Balonne (n=23)	Northern NSW (n=65)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=61)	Medium (n=101)	Large (n=36)
% of cotton growers affected	18%	47%	61%	58%	69%	39%	25%	57%	61%
Average % of cotton crop area impacted	43%	33%	48%	54%	42%	60%	62%	47%	43%
Average yield cost (in bales/ha)	0.0	0.6	1.1	1.1	1.6	2.2	1.4	1.2	1.0
Average financial cost (in \$)	\$0	\$23k	\$855k	\$188k	\$222k	\$198k	\$130k	\$168k	\$570k
	Central QLD	Darling Downs	Macintyre Balonne	Northern NSW	Macquarie	Southern NSW	Small	Medium	Large
% of cotton growers affected (2022-23)	18%	47%	61%	58%	69%	39%	25%	57%	61%
% of cotton growers affected (2021-22)	20%	19%	37%	33%	0%	10%	13%	22%	41%
Difference	-2%	+ 28%	+ 24%	+ 25%	+ 69%	+ 29%	+ 12%	+ 35%	+ 20%

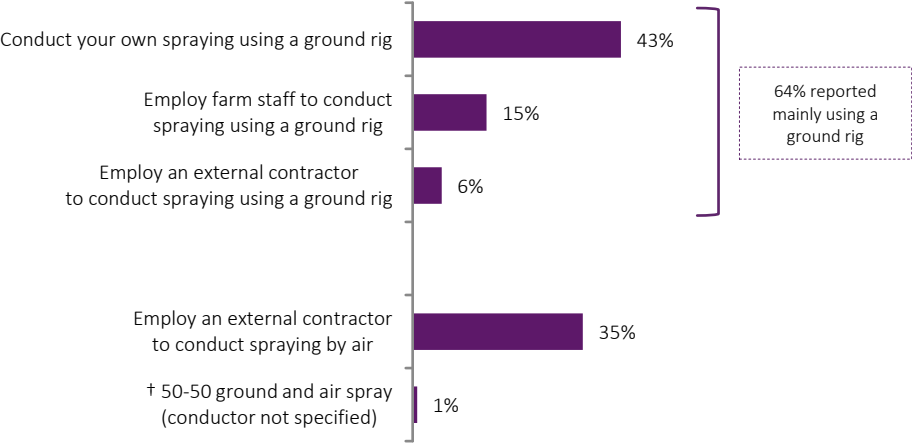
New to the Grower Survey in 2023 was a series of questions asking growers about their method of spraying, passes on the crop area, and level of training required of spray operators working on-farm. From the survey results:

- The majority of growers (64%) reported mainly spraying via a ground rig, including conducting their own spray (43%), employing their farm staff (15%), or employing an external contractor (6%).
- Just over one in three (35%) growers reported employing an external contractor to conduct spraying by air.
- When looking at who conducts the spray, growers reported a split between doing it themselves (43%) and employing an external contractor (41%).

- Growers reported 6.5 passes per year with the most common reported number of passes being 6 passes (24%), 5 passes (16%) or 8 passes (14%).
- On average, growers reported just over half of their spraying (52%) is done using a ground rig. Just under one in five (17%) reported all of their spraying is done using a ground rig, with a further one in four (25%) reporting around 75-99% of their spraying.
- Growers reported a strict adherence to current accredited training to use pesticides, with over nine in ten (91%) always requiring any spray operators on-farm (either themselves, farm staff or external contractors) to have current accreditation (e.g. ChemCert, TAFE, Spray SMART).
- A smaller proportion (74%) reported always requiring spray operators to have on-the-job training, with 13% reporting never to have had this requirement of their spray operators.

Do you mainly...? *

Base: All growers; n = 217

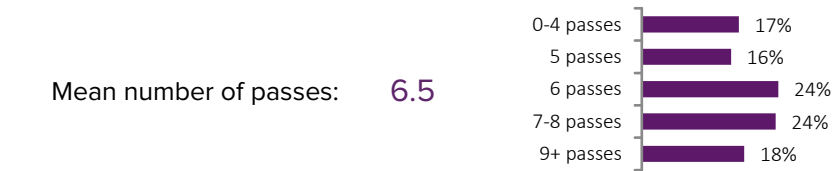


Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Conduct your own spraying – ground-rig	47%	58%	29%	43%	26%	43%	57%	42%	21%
Employ external – spray by air	18%	11%	54%	34%	63%	38%	25%	36%	49%
Employ farm staff – spray by ground-rig	24%	26%	13%	13%	5%	15%	15%	14%	18%
Employ external – spray by ground-rig	6%	3%	4%	10%	5%	5%	3%	5%	13%
† 50-50 ground and air spray	6%	3%	0%	0%	0%	0%	0%	2%	0%

* Please note that the question was not specific to cotton crop area and may include all crop area the respondent has.
† Coded from Other (please specify) answers.

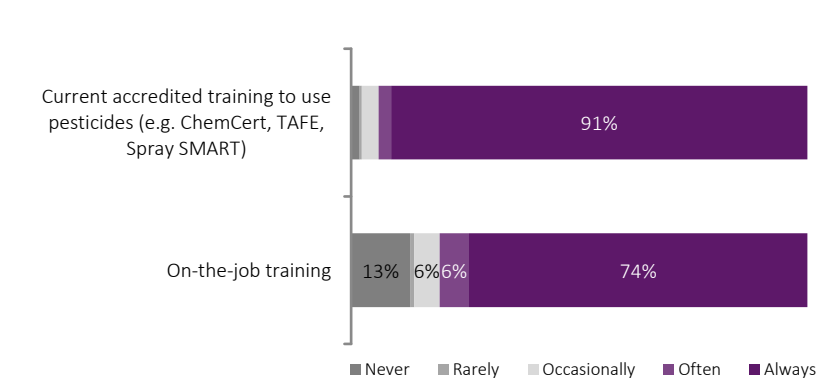
On average, how many passes of this crop area would you need to do per year? *
Base: All growers; n = 214 (n = 3 could not provide an answer)



What proportion of this spraying is done using a ground rig? *
Base: All growers; n = 215 (n = 2 could not provide an answer)



What level of training have you required of spray operators on your property (this may be you, farm staff or contractors)?
Base: All growers; n = 217



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=66)	Macquarie (n=18)	Southern NSW (n=40)	Small (n=65)	Medium (n=112)	Large (n=37)
Mean number of passes	5.7	6.6	6.1	6.5	6.7	7.0	6.7	6.3	6.8

Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=38)	Small (n=65)	Medium (n=112)	Large (n=38)
Average proportion done via ground-rig	49%	67%	33%	52%	41%	56%	57%	50%	48%

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

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Current accredited training	88%	68%	96%	99%	89%	100%	89%	91%	95%
On-the-job training	65%	68%	83%	72%	58%	85%	77%	71%	79%

* Please note that the question was not specific to cotton crop area and may include all crop area the respondent has.
Result labels shown if 5% or greater.

IPM and Crop Protection

Accessing WAND and changes due to WAND

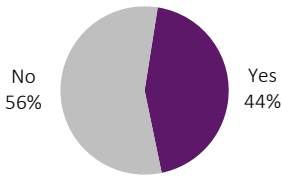
New to the Grower Survey in 2023 was a series of questions asking growers their experience with the WAND spray hazardous inversion system website and/or app. From the survey results:

- Just over two in five (44%) growers have accessed the WAND website (wand.com.au) and/or the WAND app. Access was more prevalent among larger growers, and less prevalent among those located in Central QLD and Southern NSW.
- Of those who have accessed WAND, three in five (60%) reported making a change due to the information within the WAND system. The most common changes reported were to change the timing of planned spraying (45% of growers said this) and also to stop spraying (also 45%).
- When considering all growers, just over one in four (27%) growers reported accessing WAND and have made a change due the WAND spray hazardous inversion information.



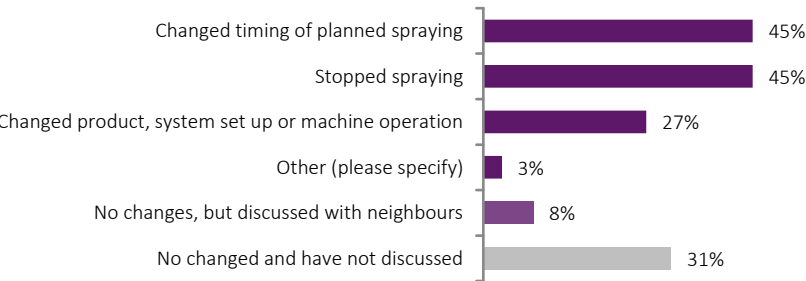
Have you ever accessed the WAND spray hazardous inversion system website and/or app? (www.wand.com.au)

Base: All growers; n = 217



Have you made a change due to the WAND spray hazardous inversion information? Please select all that apply.

Base: All growers who have accessed WAND; n = 96



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
% accessed WAND	29%	42%	67%	56%	53%	25%	26%	49%	62%

	Central QLD (n=5)	Darling Downs (n=16)	Macintyre Balonne (n=16)	Northern NSW (n=38)	Macquarie (n=10)	Southern NSW (n=10)	Small (n=17)	Medium (n=55)	Large (n=24)
Changed timing	40%	25%	50%	58%	30%	30%	35%	51%	38%
Stopped spraying	40%	25%	69%	53%	20%	30%	41%	44%	50%
Changed product ...	0%	13%	38%	37%	10%	20%	6%	38%	17%
Other	0%	6%	0%	3%	0%	10%	0%	4%	4%
No, but discussed	20%	19%	0%	11%	0%	0%	12%	11%	0%
No, not discussed	40%	44%	25%	13%	60%	60%	41%	25%	38%

† Coded from Other (please specify) answers.

Base: All growers; n = 217. Results listed below if n = 2 (1%) or more.

- 1% - Website is a bit clunky



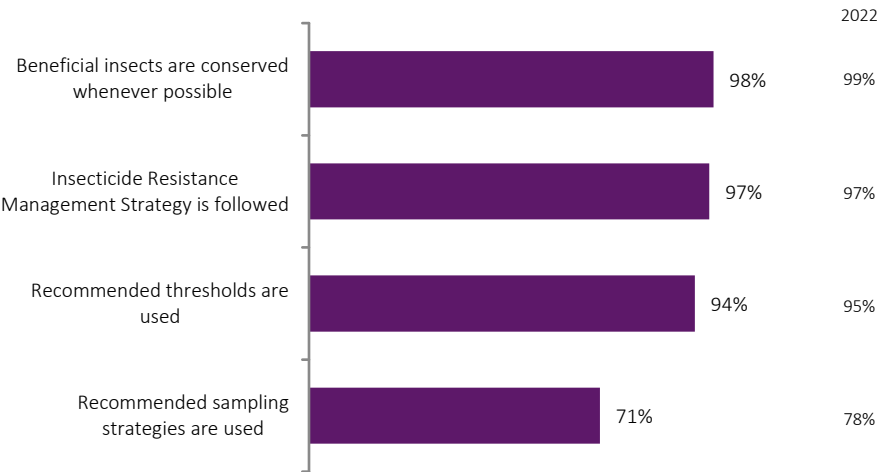
IPM and crop protection practices undertaken

Growers were asked about IPM and crop protection practices. The feedback provided by growers suggests that:

- As in 2019 and 2022, it is evident that the majority of growers are using most of the practices measured in the research.
- There is now a continued widespread reported use of three of the four practices, suggesting strong levels of compliance with these across the industry. n = 197 (98%) cotton growers reported using at least one of three specific practices (conserving beneficial insects, IRMS is followed, recommended thresholds are used), with n = 185 (93%) using all three practices.

With regards to insect pests, disease and weed management in 2022-23 cotton fields, did you use any of the practices listed below?

Base: All growers who grew cotton during the 2022-23 season; n = 200



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=37)	Macintyre Balonne (n=23)	Northern NSW (n=66)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=62)	Medium (n=101)	Large (n=37)
Beneficial insects are conserved whenever possible	100%	100%	100%	95%	100%	100%	97%	100%	95%
Insecticide Resistance Management Strategy is followed	100%	97%	96%	95%	100%	97%	97%	98%	95%
Recommended thresholds are used	88%	89%	96%	95%	100%	94%	94%	93%	95%
Recommended sampling strategies are used	76%	51%	74%	77%	75%	77%	53%	76%	84%

A close-up photograph of a cotton plant with green leaves and a white cotton flower, overlaid with a semi-transparent purple filter.

FOCUS AREA

R&D Impact on Farming Systems

R&D Impact on Farming Systems

Cover cropping

Just over one in two growers (54%) reported that they had planted a cover crop on fallow ground over the last five years, a result consistent to that reported in 2021. This was reportedly more common in the Darling Downs, where three in four (76%) reported this, including almost half (45%) doing this every year.

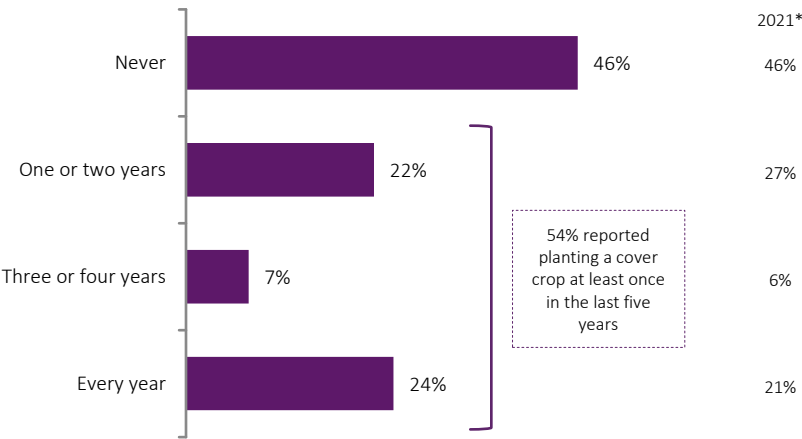
Growers reported three clear purposes for planting the cover crop:

- for soil health (79% reported this),
- for water infiltration and storage (78%), and
- for stubble cover (77%).

While these three purposes dominate growers’ reasons for plating a cover crop, the results also show that a smaller (but not insignificant) proportion of growers reported soil carbon (54%) and soil erosion control (50%) as purposes for planting their cover crop.

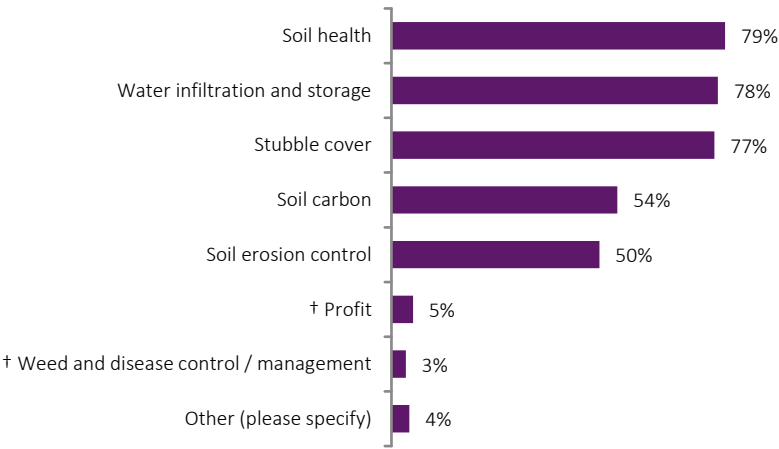
In the last five years, how often have you planted a cover crop on fallow ground?

Base: All growers; n = 217



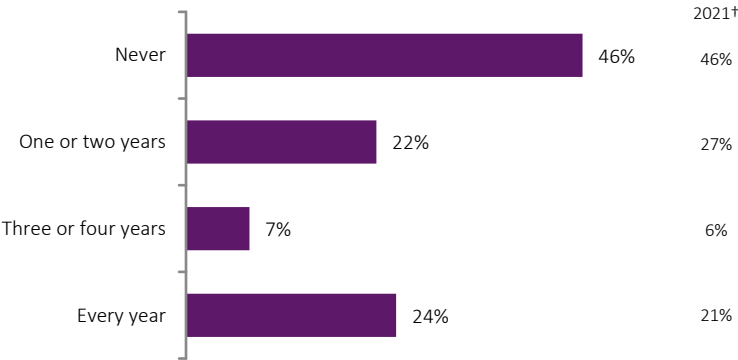
For what purpose did you plant the cover crop? Please select all that apply.

Base: All growers who have planted a cover crop at least once in the last five years; n = 117

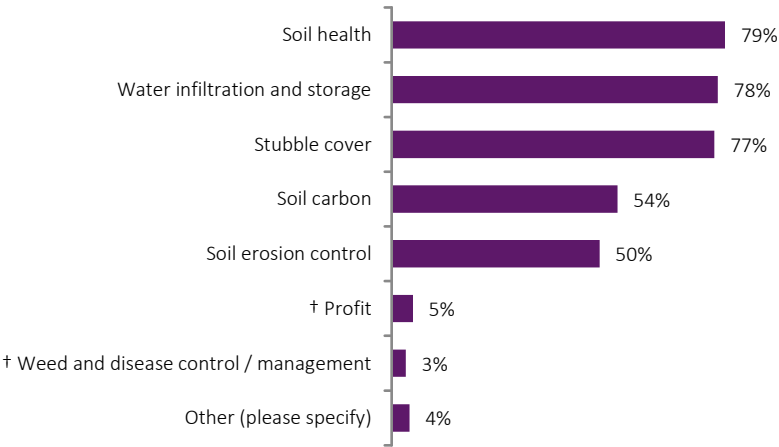


* 2021 question: "In the last five years, how often have you planted a cover crop with the main purpose to provide stubble cover on fallow ground?"
† Coded from Other (please specify) answers.

In the last five years, how often have you planted a cover crop on fallow ground?
Base: All growers; n = 217



For what purpose did you plant the cover crop? Please select all that apply.
Base: All growers who have planted a cover crop at least once in the last five years; n = 117



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Never	65%	24%	50%	47%	37%	60%	46%	48%	41%
One or two years	29%	16%	29%	18%	37%	28%	18%	23%	26%
Three or four years	0%	16%	8%	7%	5%	5%	3%	10%	8%
Every year	6%	45%	13%	28%	21%	8%	32%	19%	26%

Key results by Region and Size of Total Farm Area

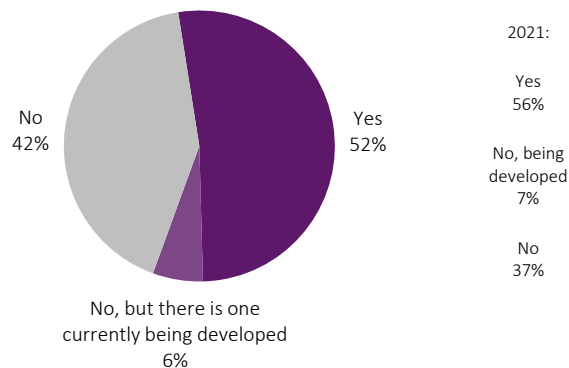
	Central QLD (n=6)	Darling Downs (n=29)	Macintyre Balonne (n=12)	Northern NSW (n=36)	Macquarie (n=12)	Southern NSW (n=16)	Small (n=35)	Medium (n=59)	Large (n=23)
Soil health	83%	83%	67%	81%	75%	81%	86%	78%	74%
Water infiltration and storage	83%	83%	92%	81%	83%	50%	77%	81%	70%
Stubble cover	83%	79%	83%	86%	50%	75%	71%	78%	83%
Soil carbon	67%	48%	67%	67%	33%	31%	54%	56%	48%
Soil erosion control	50%	55%	33%	64%	33%	25%	66%	39%	52%
† Profit	17%	7%	0%	8%	0%	0%	11%	2%	4%
† Weed and disease control/management	0%	0%	8%	0%	8%	6%	3%	2%	9%
Other (please specify)	0%	7%	0%	3%	0%	13%	3%	7%	0%

* 2021 question: "In the last five years, how often have you planted a cover crop with the main purpose to provide stubble cover on fallow ground?"
† Coded from Other (please specify) answers.

The presence of a farm biosecurity plan was measured again in the 2023 survey. We note that:

- Just over one in two (52%) growers reported they have a farm biosecurity plan, slightly down on the 2021 reported result of 56%. Larger farms were much more likely to report having a farm biosecurity plan in place (72%).
- Just over two in five (42%) growers reported they did not have a farm biosecurity plan in place. As per the comment above, this was more common amongst small and medium sized farms, as well as growers in the Darling Downs and Southern NSW regions.

Do you have a farm biosecurity plan (i.e. one that identified hazards and an action plan)?
Base: All growers; n = 217



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Yes	76%	37%	58%	59%	58%	33%	48%	48%	72%
No, but one being developed	12%	3%	0%	7%	0%	13%	3%	6%	10%
No	12%	61%	42%	34%	42%	55%	49%	46%	18%

R&D Impact on Farming Systems

Farm biosecurity practices

Farm biosecurity remains a key issue for the industry. From the feedback provided in the survey, the results show that 99% of growers were using at least one of the nine listed practices to manage their farms' biosecurity, up from a reported 84% in 2021.

Not all growers use the same or same number of practices, with just over one in three (35%) reporting using all nine of the listed practices, and on average, growers reported using just over seven of the nine listed practices.

The most common reported practices by growers were:

- Crops are regularly monitored for pests, weeds and diseases;
- Volunteers and Ratoon cotton is controlled; and
- Consider risk from and inspect farm inputs (e.g. seed, soil amendments, stock feed, organic fertiliser).



7.1

Number of practices used to manage farm biosecurity

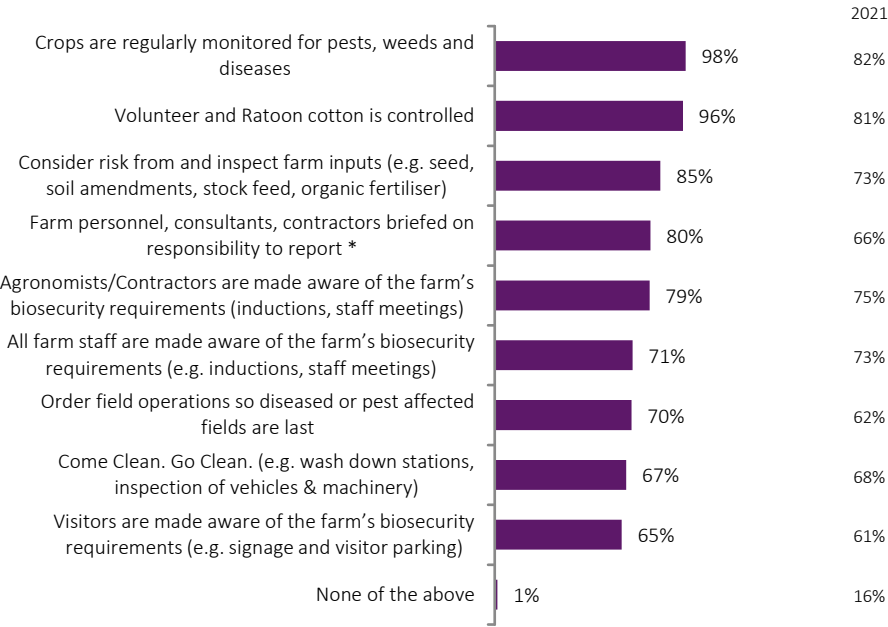
35%

Of growers use all nine listed practices in their management

Analysis of results highlight the impact of a biosecurity plan, with growers who have one in place reported 8.2 of 9 practices implemented (52% implemented all nine) compared to those who do not have one and are not currently developing one (5.6 of 9 practices implemented, 13% implemented all nine).

Which of the following practices are implemented to manage your farm's biosecurity?
Please select all that apply.

Base: All growers; n = 217



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Crops are regularly monitored	100%	92%	100%	100%	95%	98%	98%	96%	100%
Volunteer / ratoon is controlled	100%	95%	100%	97%	95%	93%	97%	96%	97%
Consider risk from and inspect inputs	88%	79%	88%	85%	68%	90%	86%	83%	87%
Briefed on responsibility to report	94%	84%	75%	81%	63%	75%	83%	77%	82%
Agronomists / Contractors aware	82%	71%	79%	84%	74%	75%	75%	78%	90%
All farm staff made aware	76%	58%	67%	81%	63%	65%	65%	69%	85%
Order field operations	59%	68%	58%	76%	68%	68%	69%	70%	72%
Come Clean. Go Clean.	94%	55%	71%	72%	74%	53%	65%	66%	74%
Visitors made aware	76%	42%	71%	72%	53%	68%	55%	64%	85%
None of the above	0%	3%	0%	0%	5%	3%	0%	3%	0%

* Full response provided to respondents: "Farm personal, consultants, contractors briefed that in event of identifying an unusual disease, pests or plant there is a responsibility to report to agronomist, State DPI or Exotic Plant Pest Hotline".

R&D Impact on Farming Systems

On-farm data and experimentation

New to the Grower Survey in 2023 was a series of questions asking growers about any on-farm experimentation they do using their own data, and whether they analyse the data they collect on-farm to improve decision making for next year. From the survey results:

- Just under three in four (74%) growers reported carrying out on-farm experimentation using their own data. This was slightly more prominent across larger farms (79%) and varied across regions with 63% from Macintyre-Balonne and 84% from Macquarie.
- Over four in five (82%) growers reported analysing the data they collect on-farm to improve decision making for next year. As per the results above, this was reported more across larger farms (90%).
- Looking at the cross-over of these results, just over three in four (73%) reporting doing both of these actions.

73%
of growers reported both on-farm
experimentation AND analysing data

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Reported on-farm experimentation AND analysing data	65%	71%	63%	78%	79%	70%	69%	73%	79%

Do you carry out any on-farm experimentation using your own data?
Base: All growers; n = 217



74%
of growers carry out on-farm
experimentation using their own data

Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
% growers carry out experimentation using their own data	65%	74%	63%	78%	84%	70%	72%	73%	79%

Do you analyse the data you collect on-farm to improve decision making for next year?
Base: All growers; n = 217



82%
of growers analyse the data collected
on-farm to improve decision making

Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
% growers analyse data to improve decision making	82%	76%	67%	91%	79%	80%	78%	81%	90%

A close-up photograph of a cotton plant with green leaves and a white flower, overlaid with a semi-transparent purple filter.

FOCUS AREA

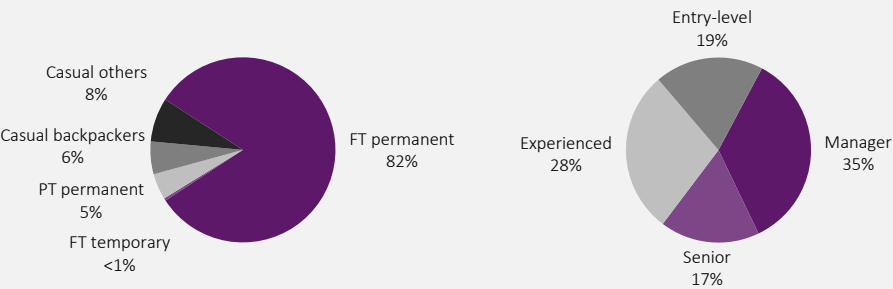
Workforce and Training

Workforce and Training

Number of people in workforce

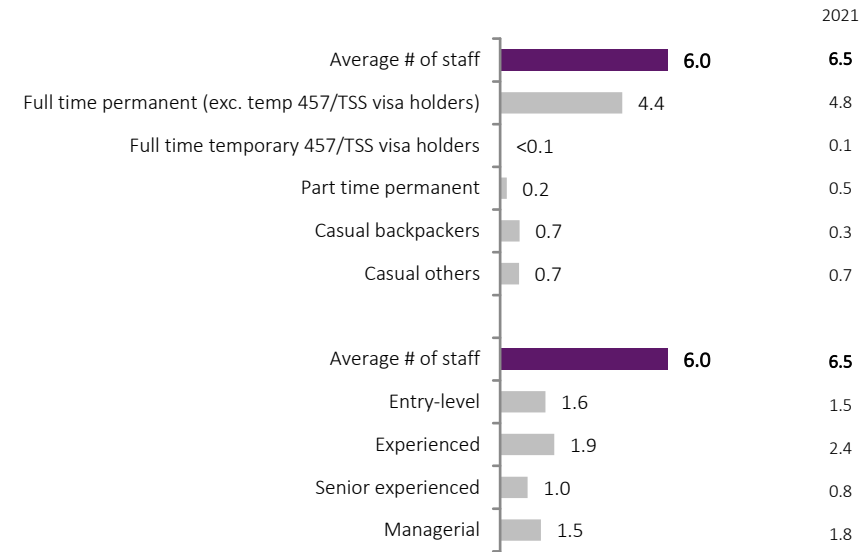
The 2023 CRDC Grower Survey explored several different workforce-related topic areas. Some of the key results of the feedback provided were that:

- Growers reported an average workforce (including grower and family staff) of 3.4 staff (small-sized farms), 5.4 staff (medium-sized farms) and 12.1 staff (large-sized farms).
- The results are largely consistent with the measures reported in 2020 and 2021, although it is noted that there was a small decline in the large-sized farm workforce.
- A standardised estimate across farm size (calculated as the number of staff employed per 1,000 hectares) was 4.4 staff per 1,000 hectares. This compares to 3.9 staff employed per 1,000 hectares in the 2021 Grower Survey, 4.1 staff in the 2020 Grower Survey and 6.7 staff in the 2018 Grower Survey.



Thinking specifically about your cotton-growing business, on the 1st JANUARY 2023, 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 = 213 (n = 4 could not provide an answer)



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=36)	Macintyre Balonne (n=24)	Northern NSW (n=67)	Macquarie (n=19)	Southern NSW (n=39)	Small (n=63)	Medium (n=112)	Large (n=38)
Average # of staff	4.1	4.6	8.3	6.4	6.3	6.4	3.4	5.4	12.1
Full time permanent	3.5	3.5	5.2	4.6	4.2	4.9	2.7	4.0	8.3
Full time temporary	0.0	<0.1	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0
Part time permanent	0.0	0.4	0.5	0.1	0.1	0.3	0.3	0.2	0.2
Casual backpackers	0.4	0.1	1.6	0.5	1.6	0.8	0.1	0.7	1.7
Casual others	0.1	0.4	1.0	1.2	0.3	0.4	0.3	0.5	1.9
Average # of staff	4.1	4.6	8.3	6.4	6.3	6.4	3.4	5.4	12.1
Entry-level	0.8	0.9	3.5	1.6	2.1	1.6	0.7	1.4	3.9
Experienced	1.6	1.4	2.2	2.1	1.5	2.5	1.0	1.7	4.3
Senior experienced	0.6	0.9	1.3	1.0	1.2	1.1	0.5	1.1	1.6
Managerial	1.0	1.3	1.4	1.7	1.5	1.3	1.3	1.3	2.3

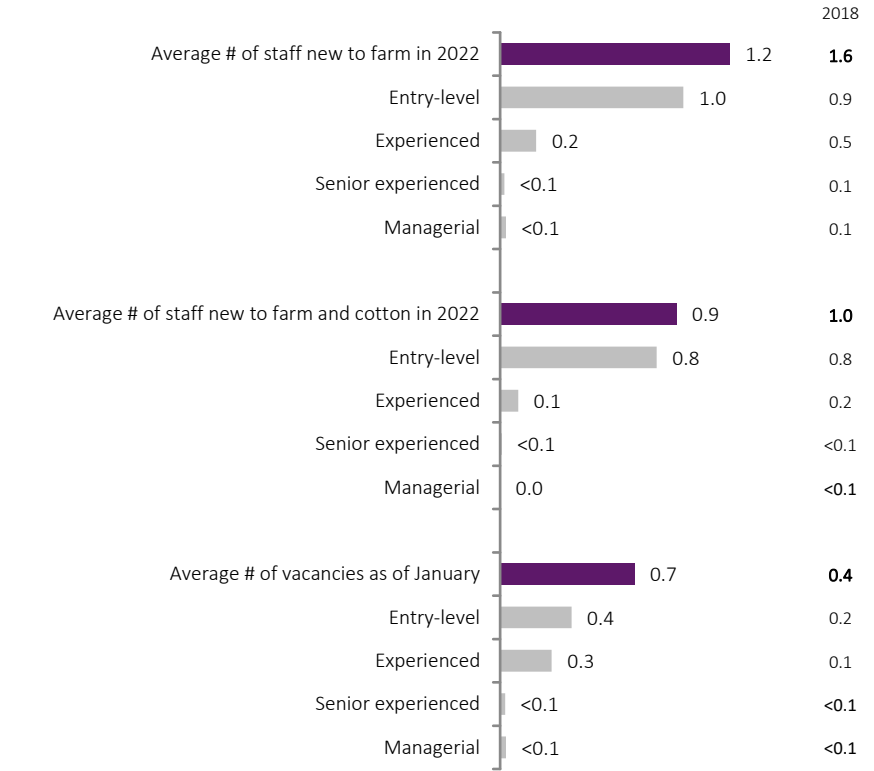
Definitions:
Entry-level e.g. assistant farm hand or driver who requires supervision or is inexperienced
Experienced e.g. experienced farm hand or machinery operator
Senior experienced e.g. a supervisor
Managerial e.g. farm manager, on-farm agronomist

Workforce and Training

New staff and vacancies in workforce

When considering your cotton farm workforce in January 2023, can you please answer the following for each type of position:

Base: All growers; n = 216 (n = 1 could not provide an answer)



Key results by Region and Size of Total Farm Area

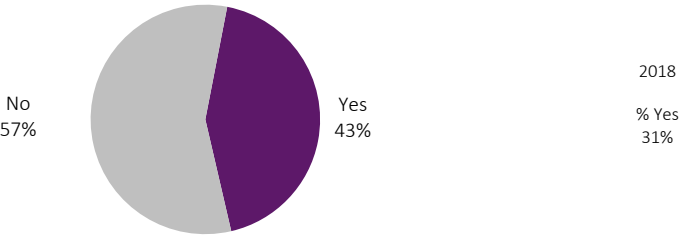
	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=67)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=38)
Average # of staff	1.1	0.6	2.4	1.2	1.8	1.1	0.5	1.0	3.1
Entry-level	0.6	0.4	2.0	1.0	1.6	0.8	0.4	0.8	2.7
Experienced	0.2	0.1	0.3	0.2	0.2	0.3	0.1	0.2	0.4
Senior experienced	0.1	<0.1	<0.1	<0.1	0.0	0.0	<0.1	<0.1	0.0
Managerial	0.1	<0.1	0.0	<0.1	0.0	0.0	<0.1	<0.1	<0.1
Average # of staff	0.4	0.4	2.1	1.0	1.8	0.7	0.3	0.8	2.7
Entry-level	0.4	0.4	1.9	0.8	1.6	0.6	0.3	0.7	2.4
Experienced	0.0	<0.1	0.1	0.1	0.2	0.1	0.0	0.1	0.3
Senior experienced	0.0	0.0	<0.1	0.0	0.0	0.0	<0.1	<0.1	0.0
Managerial	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average # of staff	0.6	0.4	1.3	0.9	0.3	0.7	0.3	0.6	1.8
Entry-level	0.2	0.2	0.9	0.5	0.2	0.2	0.2	0.3	1.0
Experienced	0.2	0.2	0.3	0.4	0.1	0.3	0.1	0.2	0.7
Senior experienced	0.1	0.0	0.0	<0.1	0.0	0.1	0.0	<0.1	0.1
Managerial	0.1	<0.1	0.0	<0.1	0.0	0.1	<0.1	<0.1	0.1

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

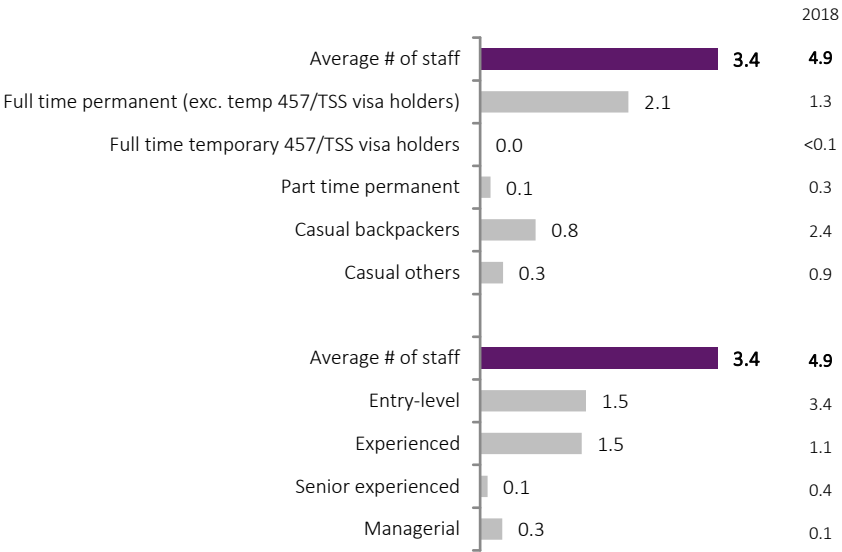
Workforce and Training

Plan to recruit in the next 12 months

Do you plan on recruiting any staff in the next 12 months for your cotton-growing business?
Base: All growers; n = 217



How many staff do you plan to recruit in the next 12 months, in the following positions (including any current vacancies you will try to recruit for)?
Base: All growers who are planning to recruit staff in the next 12 months; n = 94



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
% Yes	59%	16%	38%	47%	58%	58%	28%	45%	64%

Key results by Region and Size of Total Farm Area

	Central QLD (n=10)	Darling Downs (n=6)	Macintyre Balonne (n=9)	Northern NSW (n=32)	Macquarie (n=11)	Southern NSW (n=23)	Small (n=18)	Medium (n=51)	Large (n=25)
Average # of staff	3.0	1.5	4.9	4.4	2.2	2.3	1.2	2.7	6.4
Full time permanent	2.4	1.2	3.1	2.9	0.5	1.8	0.8	1.5	4.4
Full time temporary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Part time permanent	0.1	0.0	0.0	0.2	0.0	<0.1	0.2	<0.1	0.4
Casual backpackers	0.4	0.3	1.7	0.6	1.5	0.4	0.2	0.8	1.2
Casual others	0.1	0.0	0.1	0.8	0.2	0.1	0.1	0.4	0.4
Average # of staff	3.0	1.5	4.9	4.4	2.2	2.3	1.2	2.7	6.4
Entry-level	1.2	0.7	3.8	1.4	1.5	0.9	0.7	1.3	2.6
Experienced	0.3	0.7	0.9	2.8	0.7	0.9	0.4	0.8	3.5
Senior experienced	0.0	0.2	0.0	0.1	0.0	0.3	0.1	0.1	0.1
Managerial	1.5	0.0	0.2	0.2	0.0	0.3	0.1	0.5	0.2

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

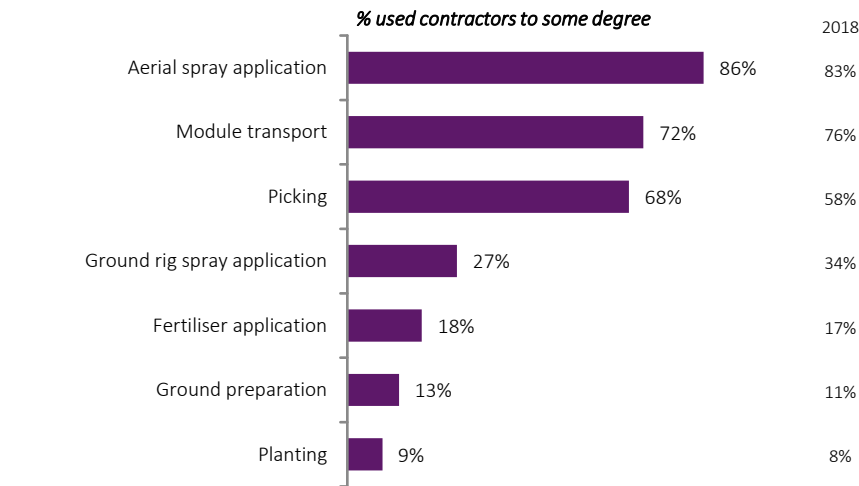
Workforce and Training

Use of contractors for farm operations

Growers were asked about the degree to which they used contractors for seven different on-farm operations for their 2022-23 cotton crop. Growers were asked on a scale of 0% (meaning no contractors were used for this operation), 1-25%, 25-50%, 50-75%, 75-99%, and 100% (meaning only contractors were used for this operation). From the survey results:

- The main tasks for what growers are using contractors for has not change since last measured in 2018, with aerial spray application, module transport and picking the most reported operations that growers source contractors for.
- When compared to 2018, the results suggest that a higher proportion of growers are using contractors for picking (68%, up from 58% in 2018).
- Larger farms were more likely to use contractors to some degree – on average, contractors were used on 3.6 of the seven on-farm operations (compared to 2.7 for small and medium farms).

To what degree did you use contractors for any of these operations for your 2022-23 cotton crop?
Base: All growers who grew cotton during the 2022-23 season; n = 200



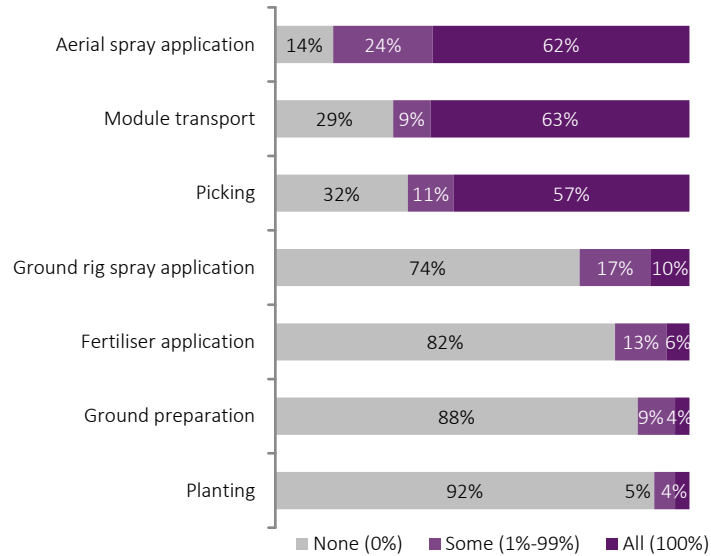
Key results by Region and Size of Total Farm Area (% used contractors to some degree)

	Central QLD (n=17)	Darling Downs (n=37)	Macintyre Balonne (n=23)	Northern NSW (n=66)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=62)	Medium (n=101)	Large (n=37)
Aerial spray application	71%	78%	96%	85%	100%	94%	79%	88%	92%
Module transport	59%	73%	61%	73%	69%	81%	69%	68%	84%
Picking	65%	59%	70%	67%	69%	74%	74%	61%	76%
Ground rig spray application	29%	11%	26%	30%	44%	29%	16%	26%	46%
Fertiliser application	0%	19%	22%	21%	25%	19%	18%	15%	27%
Ground preparation	6%	11%	4%	11%	31%	19%	11%	11%	19%
Planting	0%	8%	4%	18%	0%	3%	8%	4%	22%

Use of contractors for farm operations

To what degree did you use contractors for any of these operations for your 2022-23 cotton crop?

Base: All growers who grew cotton during the 2022-23 season; n = 200



Key results by Region and Size of Total Farm Area

		Central QLD (n=17)	Darling Downs (n=37)	Macintyre Balonne (n=23)	Northern NSW (n=66)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=62)	Medium (n=101)	Large (n=37)
Aerial Spray	All	53%	62%	74%	59%	81%	52%	56%	60%	76%
	Some	18%	16%	22%	26%	19%	42%	23%	28%	16%
	None	29%	22%	4%	15%	0%	6%	21%	12%	8%
Module Transport	All	53%	59%	43%	65%	63%	74%	65%	58%	70%
	Some	6%	14%	17%	8%	6%	6%	5%	10%	14%
	None	41%	27%	39%	27%	31%	19%	31%	32%	16%
Picking	All	59%	43%	43%	56%	63%	71%	71%	49%	57%
	Some	6%	16%	26%	11%	6%	3%	3%	13%	19%
	None	35%	41%	30%	33%	31%	26%	26%	39%	24%
Ground Rig Spray Application	All	6%	3%	4%	9%	31%	16%	3%	10%	19%
	Some	24%	8%	22%	21%	13%	13%	13%	16%	27%
	None	71%	89%	74%	70%	56%	71%	84%	74%	54%
Fertiliser Application	All	0%	3%	4%	9%	6%	6%	6%	2%	14%
	Some	0%	16%	17%	12%	19%	13%	11%	13%	14%
	None	100%	81%	78%	79%	75%	81%	82%	85%	73%
Ground Preparation	All	0%	3%	0%	6%	6%	3%	2%	2%	11%
	Some	6%	8%	4%	5%	25%	16%	10%	9%	8%
	None	94%	89%	96%	89%	69%	81%	89%	89%	81%
Planting	All	0%	3%	0%	9%	0%	0%	2%	3%	8%
	Some	0%	5%	4%	9%	0%	3%	6%	1%	14%
	None	100%	92%	96%	82%	100%	97%	92%	96%	78%

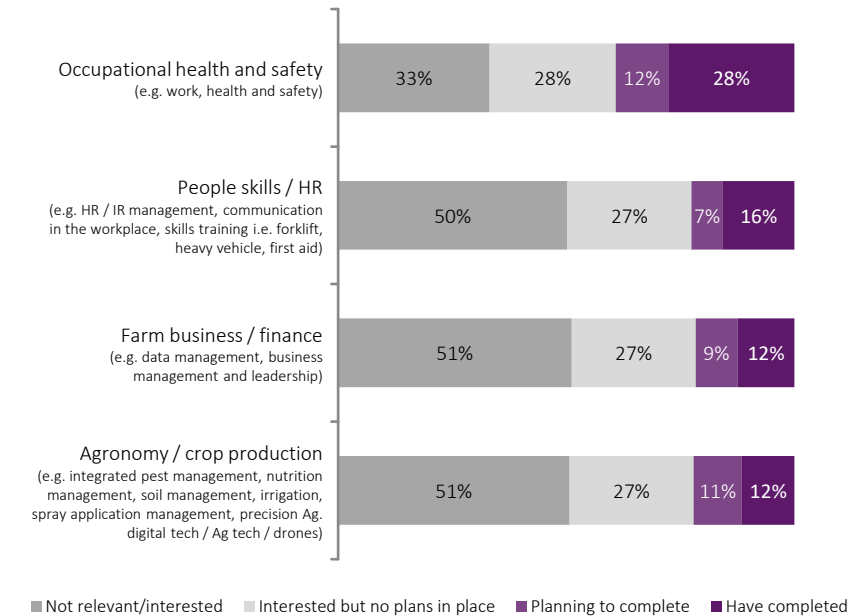
Workforce and Training

Training completed over the last 12 months

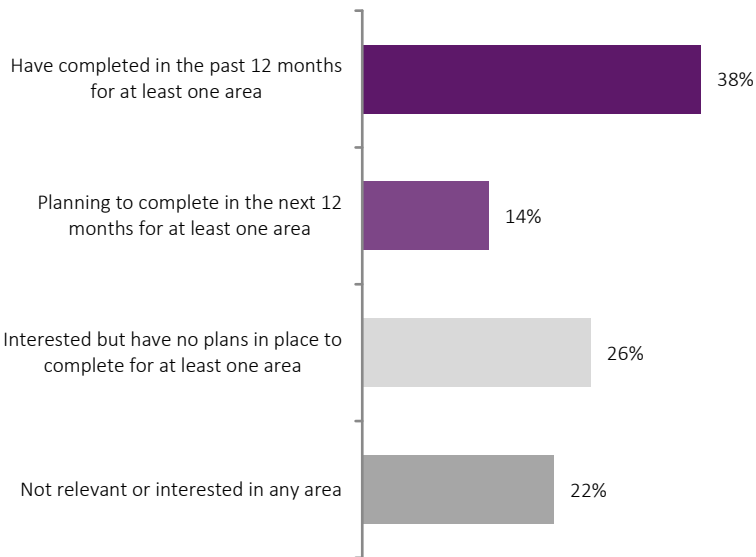
In 2023, growers were asked about their involvement with, and the impact of, education and training in four core training areas. From the feedback provided, we note that:

- Just under two in five (38%) growers reported that there had been involvement at least one of the areas of training over the last 12 months (either themselves or their staff). 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.
- Larger sized farms were more likely to have been involved in training in at least one of the four areas, with just over half (55%) reporting this.
- Conversely, just over one five (22%) growers reported the areas having no relevance, or themselves having no interest, in any of the four listed areas. Smaller sized farms were more likely to report this (34%)

There are many different areas of training that may be relevant for you, your farm manager or farm workers. Which of the following training have you or your staff completed over the last 12 months or would be relevant and of interest to you, your farm manager or farm workers?
Base: All growers; n = 217



Level of involvement

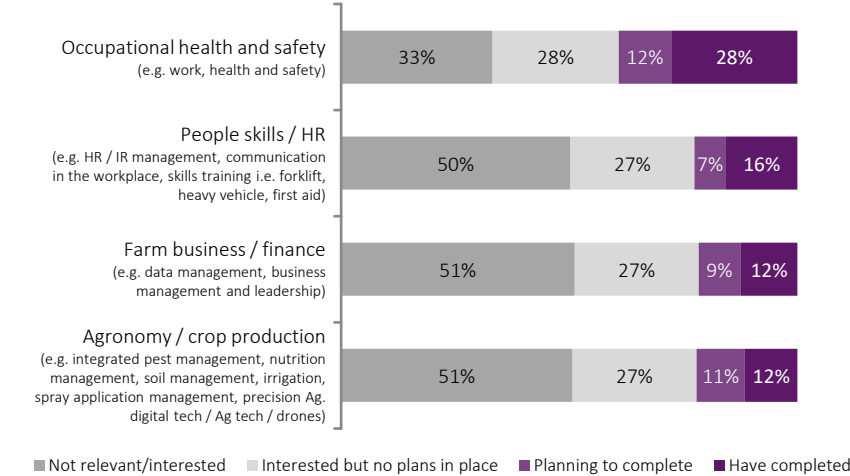


Workforce and Training

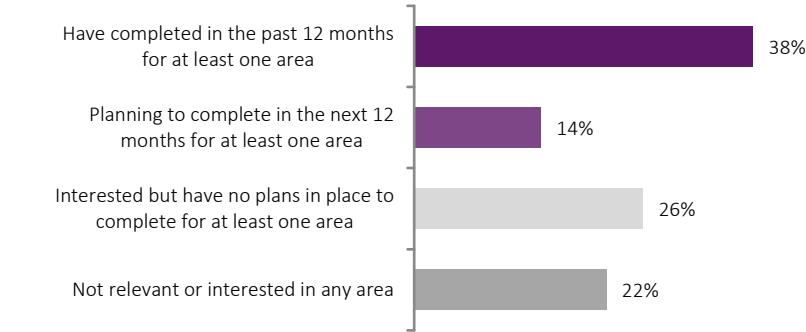
Training completed over the last 12 months

There are many different areas of training that may be relevant for you, your farm manager or farm workers. Which of the following training have you or your staff completed over the last 12 months or would be relevant and of interest to you, your farm manager or farm workers?

Base: All growers; n = 217



Level of involvement



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

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Occupational health and safety	41%	16%	33%	28%	21%	33%	23%	22%	51%
People skills / HR	24%	11%	17%	18%	26%	10%	9%	15%	28%
Farm business / finance	18%	5%	8%	16%	16%	13%	9%	13%	15%
Agronomy / crop production	12%	3%	25%	13%	5%	10%	11%	8%	23%

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Have completed in the past 12 months	47%	21%	50%	46%	32%	38%	37%	32%	59%
Planning to complete in the next 12 months	12%	11%	8%	10%	42%	15%	11%	16%	15%
Interested but have no plans	24%	26%	29%	28%	21%	28%	18%	32%	21%
Not relevant or interested in any area	18%	42%	13%	16%	5%	20%	34%	20%	5%

Workforce and Training

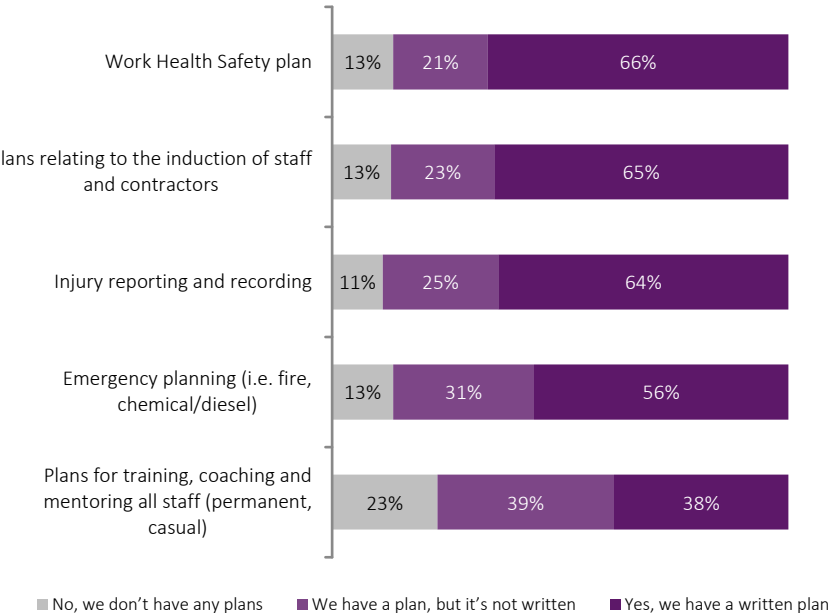
Safe systems of work

A measure of the safe systems of work, including written plans and actions undertaken, were collected during the 2023 Grower Survey. The results show that:

- Growers generally have a plan (written or not) for each of the five on-farm interactions, with growers reporting 4.3 of the five listed plans on average.
- When looking at written plans specifically, growers reported an average of 2.9 written plans out of the five listed. Results were lower in the Darling Downs (3.8 and 1.8 respectively) and higher across larger sized farms (4.9 and 4.4. respectively).
- When asked if they undertake certain actions on-farm, growers overwhelmingly reported “Yes” for three of the four listed actions (81% of more), with 69% reporting they review, at least annually, their Work Health Safety Plan.

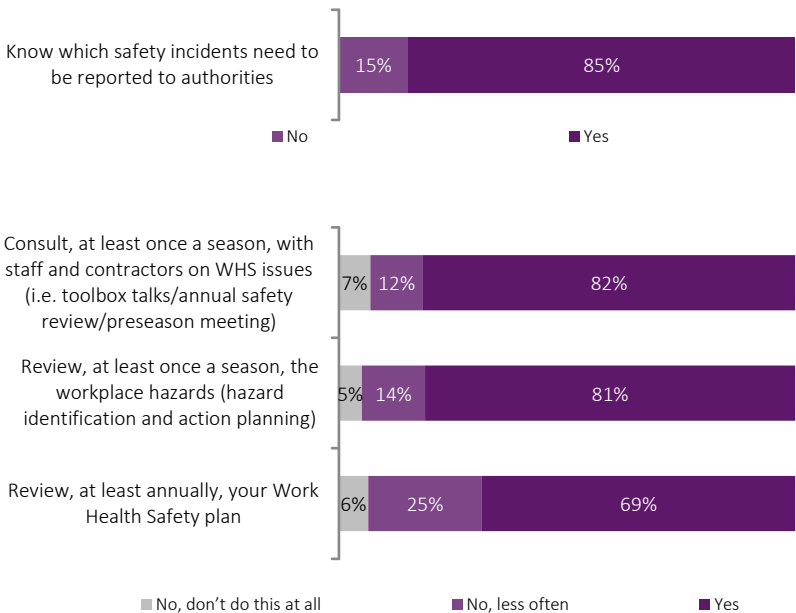
Do you have written plans for the following?

Base: All growers; n = 217

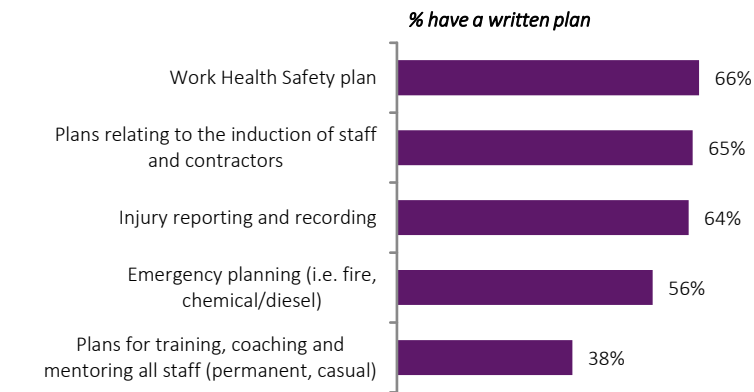


Do you...?

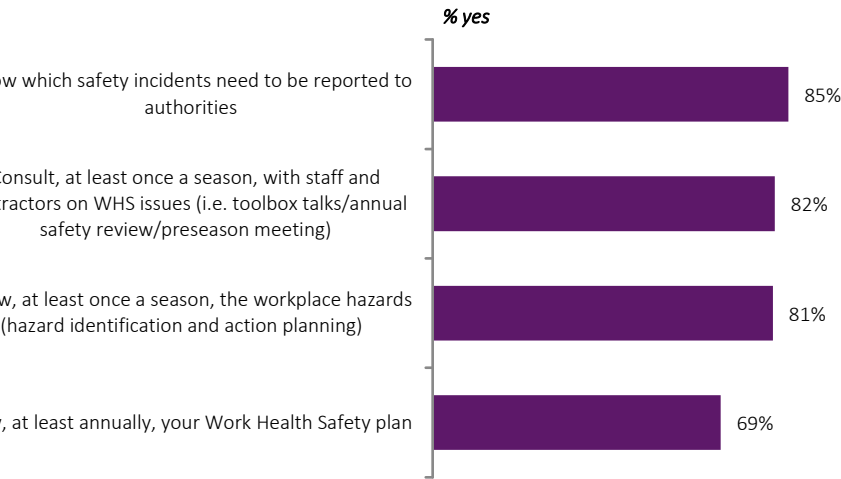
Base: All growers; n = 217



Do you have written plans for the following?
Base: All growers; n = 217



Do you...?
Base: All growers; n = 217

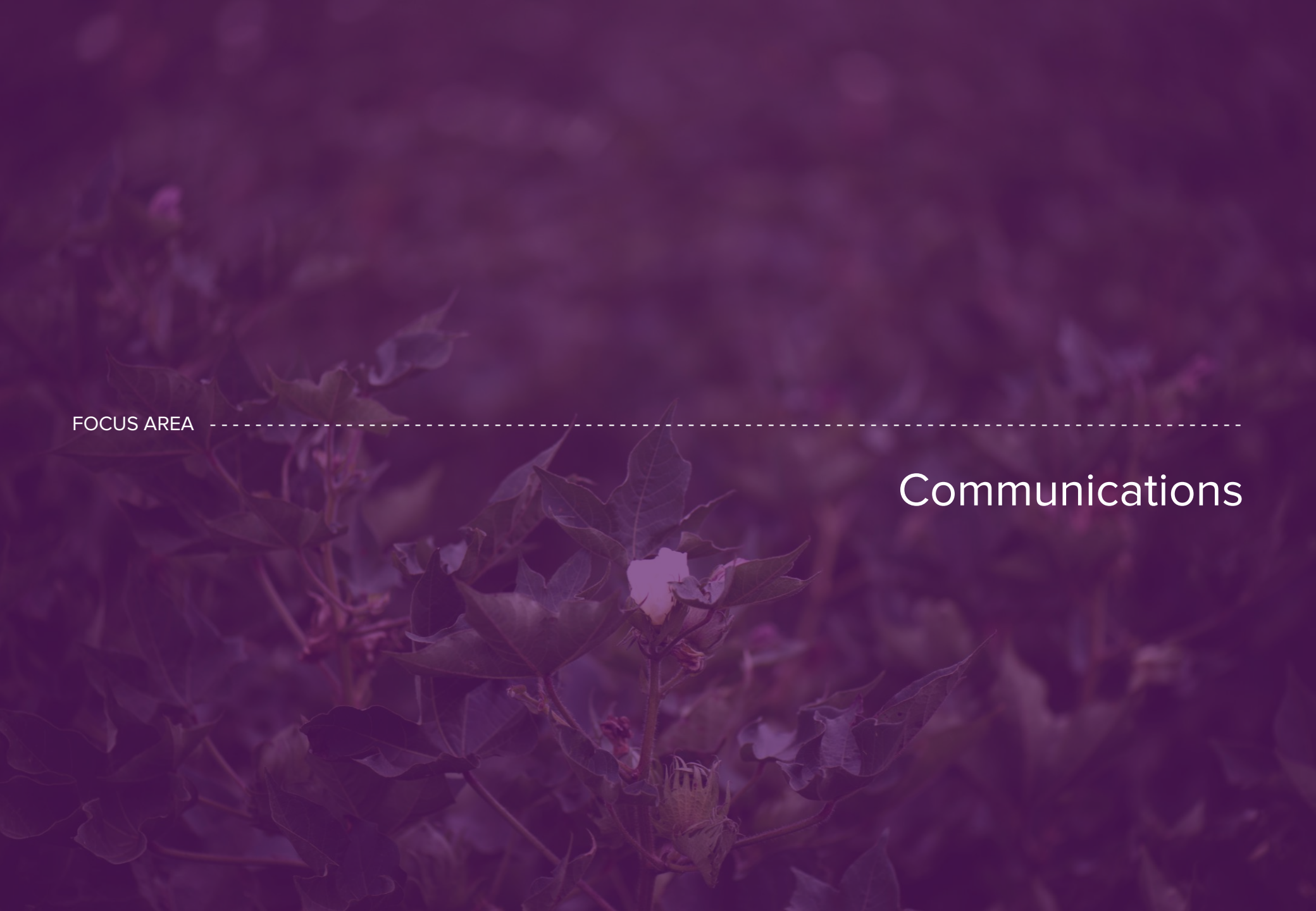


Key results by Region and Size of Total Farm Area (% have a written plan)

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Work Health Safety plan	82%	50%	75%	66%	79%	55%	57%	60%	97%
Plans relating to staff / contractor induction	76%	42%	83%	66%	84%	53%	57%	59%	92%
Injury reporting and recording	76%	37%	75%	75%	68%	48%	54%	58%	95%
Emergency planning	71%	32%	79%	60%	63%	40%	48%	49%	90%
Plans for training, coaching, mentoring	47%	18%	46%	41%	47%	35%	28%	36%	62%

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

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Know which safety incidents need to be reported to authorities	82%	79%	83%	85%	84%	93%	77%	85%	97%
Consult, at least once a season, with staff and contractors on WHS issues	82%	68%	88%	82%	79%	85%	75%	80%	97%
Review, at least once a season, the workplace hazards	82%	68%	79%	85%	89%	80%	77%	80%	92%
Review, at least annually, your Work Health Safety plan	59%	58%	79%	74%	58%	68%	71%	60%	90%



FOCUS AREA

Communications

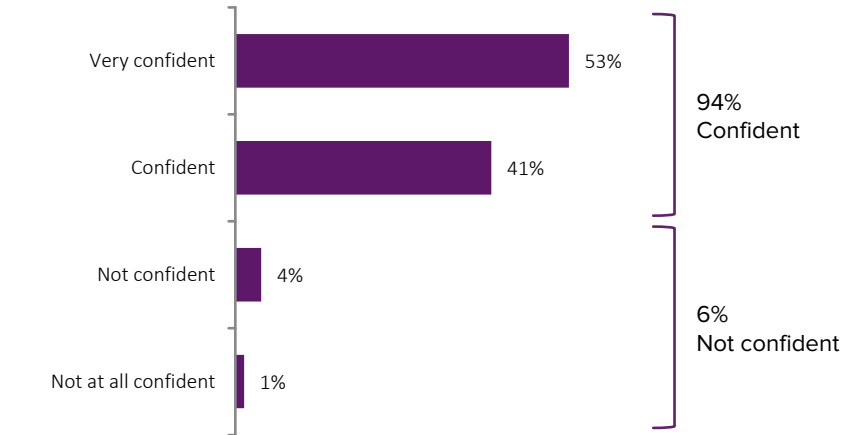
New to the Grower Survey in 2023 was a series of questions around growers’ confidence in accessing information about the cotton industry through online methods (websites, emails, apps), and their first choice in receiving information from CRDC. From the survey results:

- Almost all growers (94%) reported that they were confident in accessing information about the cotton industry (including information from CRDC or CottonInfo) at:
 - websites;
 - via emails; or
 - through apps.

The majority (53%) reported themselves as “Very confident” with a further 41% reporting as “Confident”. There was little change across regions (ranging from 90% to 100%) and also across farm sizes (ranging from 93% to 100%).

- There was some very clear feedback from growers around their preferences for receiving information from CRDC. The results show:
 - A clear and consistent preference for receiving information via email - 84% reporting this via the open-ended question.
 - Lower preferences were reported for other communications channels including:
 - via hard copy (8%),
 - via mail / post (6%),
 - via online such as podcasts, webinars, website, YouTube (4%), and
 - via face to face meetings (3%).

How confident are you in accessing information about the cotton industry (including information from CRDC or CottonInfo) at websites or via emails or through apps?
Base: All growers; n = 217



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Very confident	59%	47%	58%	54%	58%	45%	46%	54%	64%
Confident	41%	45%	38%	41%	37%	45%	48%	39%	36%
Not confident	0%	5%	0%	4%	5%	8%	5%	5%	0%
Not at all confident	0%	3%	4%	0%	0%	3%	2%	2%	0%

CRDC can provide information to growers in several different ways.

If you could only receive information one way, which would be your first choice for the different types of information CRDC shares with growers?

Base: All growers; n = 217

- 84% - Via email
- 8% - Via hard copy
(e.g. booklets, handbooks, magazines, newsletters, production manuals, publications)
- 6% - Via mail / post
- 4% - Via online
(e.g. podcasts, webinars, website, YouTube)
- 3% - Via face to face
(e.g. field days, group meetings, public consultation)



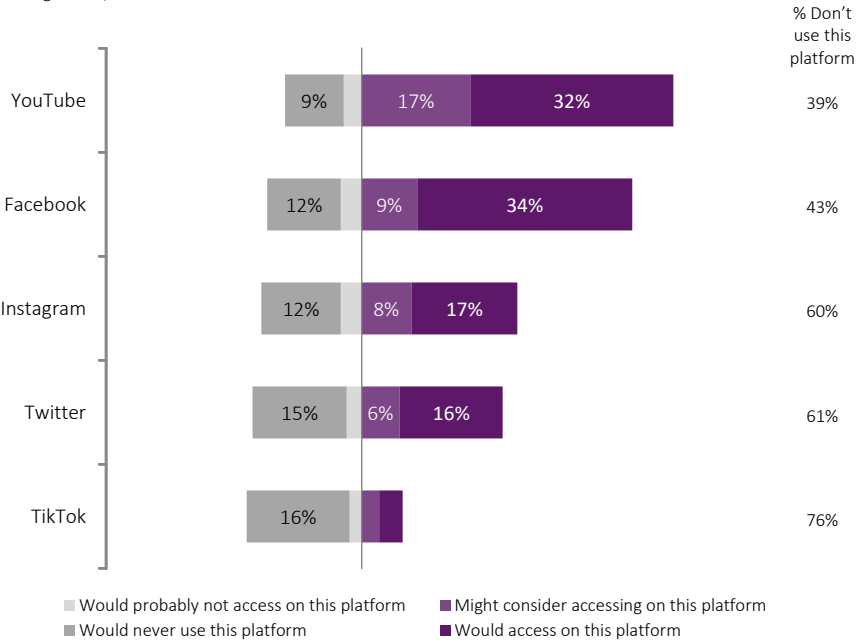
Communications

Accessing info from CRDC/CottonInfo on social media

In 2023 growers were also asked about their propensity to use certain social media channels to access information from CRDC or CottonInfo. From the survey results:

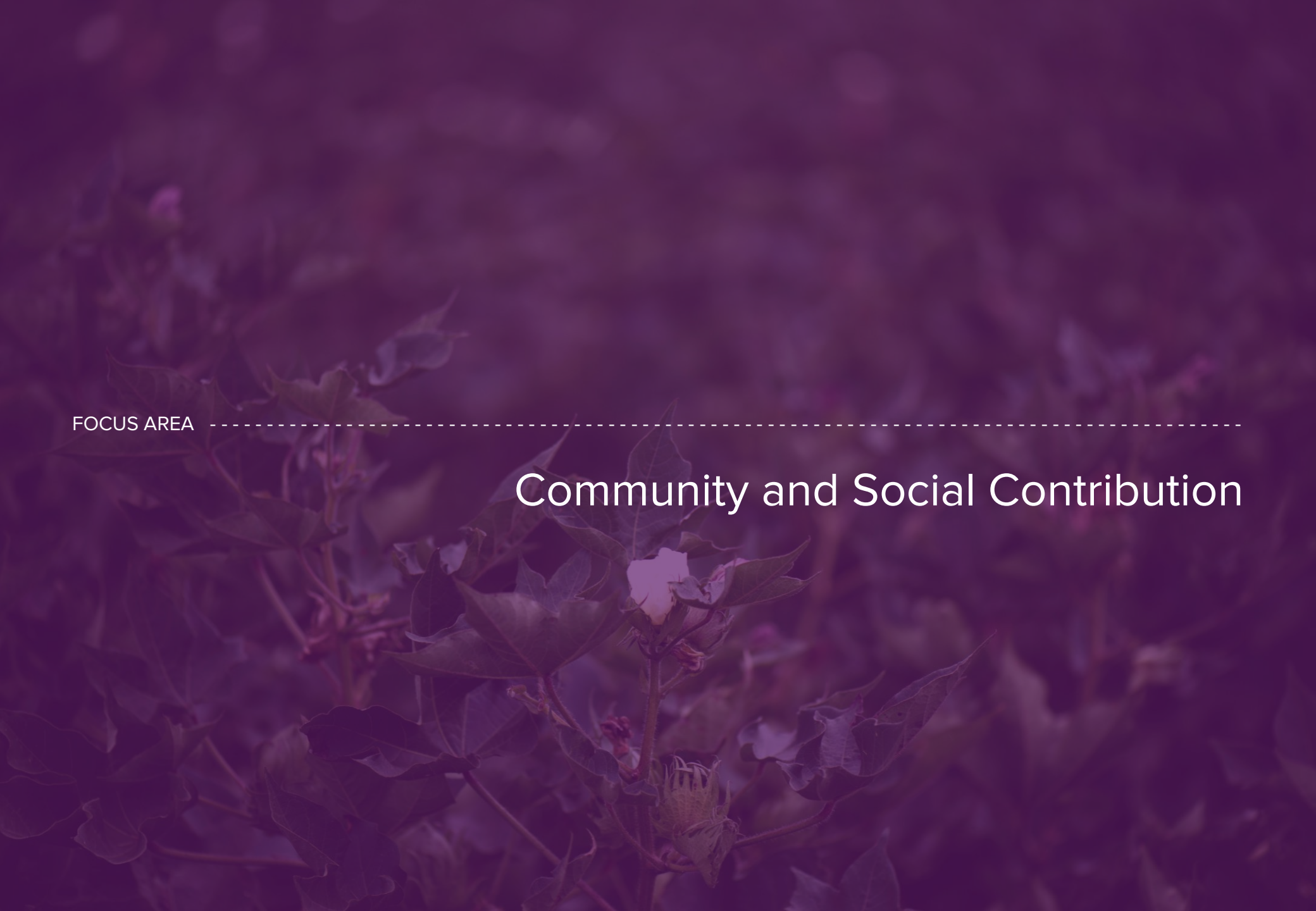
- Two channels (YouTube and Facebook) are used by at least half of growers surveyed, with 49% (YouTube) and 42% (Facebook) indicating they would access or might consider accessing information from CRDC or CottonInfo on these platforms.
- There was a smaller cohort (around 39%-40%) who use Instagram and Twitter (now known as X), of which 24% (Instagram) and 22% (Twitter) indicated they would or might consider accessing for info.
- The final channel (TikTok) was reportedly used by just 24% of growers, of which just 6% said they would access or consider accessing for info.

Social media is increasingly being used across agriculture. There are different social media platforms available – for example Facebook, Twitter and Instagram. Which platforms would you use or consider using to access information from CRDC or CottonInfo?
Base: All growers; n = 217



Key results by Region and Size of Total Farm Area (% would or might consider accessing)

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
YouTube	65%	42%	42%	53%	58%	40%	49%	49%	49%
Facebook	53%	37%	38%	43%	47%	45%	43%	43%	38%
Instagram	24%	24%	17%	28%	21%	28%	22%	27%	23%
Twitter	12%	18%	25%	22%	32%	28%	11%	23%	38%
TikTok	12%	5%	4%	3%	16%	8%	8%	8%	0%



FOCUS AREA

Community and Social Contribution

Community and Social Contribution

Local community activities

The 2023 Grower Survey asked growers around their involvement in local community activities. Similar to the results achieved in 2019 and 2020, results indicated that most growers are involved in a broad range of local community activities.

- Almost all growers (94%, down from 95% in 2020) reported being involved in at least one of the community-based activities measured in the survey.
- Involvement took various forms including making donations or sponsorships (73% reported this), being present at events (72%), or an active involvement in community groups (69%) or sports (53%). Growers reported, on average, being involved in 3.1 of the 5 community activities listed in the survey.
- Involvement was strongest amongst larger sized farms, who reported being involved in 3.7 of the 5 community activities listed in the survey on average.

Which if any of the following local community activities are you involved in?
Please select all that apply.
Base: All growers; n = 217



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Donations or sponsor charities/activities	65%	71%	71%	76%	68%	73%	66%	73%	82%
Attend local events	76%	68%	75%	75%	63%	68%	74%	70%	74%
Involved in local community groups	82%	63%	63%	71%	74%	68%	60%	71%	77%
Involved in local sports	41%	37%	67%	59%	63%	45%	40%	50%	79%
Involved with the local schools	47%	29%	50%	40%	47%	40%	38%	35%	54%
Involved in other ways	0%	8%	13%	9%	11%	5%	12%	6%	3%
Not actively involved with the community	12%	8%	4%	3%	5%	5%	6%	7%	0%

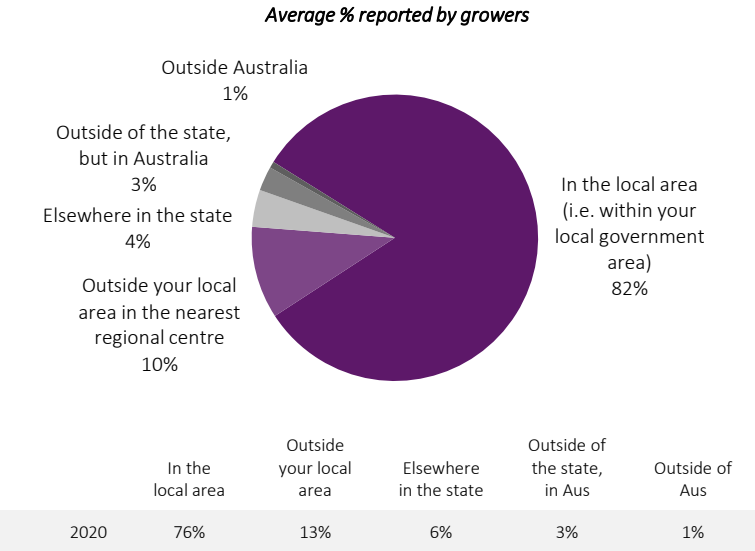
Community and Social Contribution

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, 2019 and 2020 Grower Surveys. The feedback provided by growers suggests that:

- The majority of business expenses are reported to be spent within the immediate local areas of the farm businesses. Growers reported on average 82% of their business expenses are spent locally, up on the 2020 result of 76%.
- Larger growers were more likely to report a smaller proportion of business expenses in the local area (74%) and a larger proportion just outside of their local area (14%) and also in a different state (6%).

Thinking of your total business expenses for the 2022-23 growing season, can you estimate what proportion would be spent...?
Base: All growers; n = 217



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
In the local area (i.e. within your local government area)	80%	84%	81%	83%	74%	82%	82%	84%	74%
Outside your local area in the nearest regional centre	12%	9%	13%	10%	14%	11%	10%	10%	14%
Elsewhere in the state	8%	4%	4%	4%	3%	4%	5%	3%	5%
Outside of the state, but in Australia	1%	2%	2%	2%	5%	3%	3%	2%	6%
Outside Australia	0%	0%	0%	1%	4%	0%	0%	1%	1%



FOCUS AREA

Performance Indicators

Key Performance Indicators summary

New to the Grower Survey in 2023 was a series of questions aligning with the CRDC Strategic RD&E Plan 2023-28*, specifically under the pillar PEOPLE in the Clever Cotton plan.

The 2023 Grower Survey provides a baseline result of these measures, which are to be monitored, evaluated and reported annually in the CRDC Annual Report and Performance Report.

PEOPLE

Design and innovation - Growers acknowledge the utility of solutions and technologies developed through CRDC investment

- Over four in five (83%) of growers agreed or strongly agreed that CRDC’s investments in research and development are creating practical on-farm solutions which growers can adapt into their production system.

PEOPLE

Adoption and impact - Percentage of growers actively contributing to RD&E adaptation through regional trials and data collection

- Just over one in five (21%) growers reported hosting cotton industry research trials on their farm during the 2022-23 cotton growing season.

PEOPLE

Adoption and impact - Percentage of growers actively engaged with RD&E programs

- Two-thirds (68%) of growers reported themselves or their staff having participated or been involved in any CRDC research projects or CottonInfo extension activities over the last 12 months (not including on-farm industry trials or data collection).

PEOPLE

Adoption and impact - Percentage of growers recognise that CRDC and CottonInfo have contributed to improving their productivity and sustainability.

- Growers were largely consistent when reporting on these measures, with over four in five (82%) agreeing that CRDC and CottonInfo have contributed to improving their productivity. A slightly smaller proportion (79%) agreed that CRDC and CottonInfo have contributed to improving their sustainability.



7.5
out of 10

Mean satisfaction that levies covering RD&E are being invested to achieve the outcomes expected



83%

Agree that CRDC’s investments in R&D are creating practical on-farm solutions



82%

Agree that CRDC’s investments in R&D are addressing the challenges growers face



82%

Agree that CRDC & CottonInfo has contributed to improving their productivity



79%

Agree that CRDC & CottonInfo has contributed to improving their sustainability



68%

Have participated in CRDC and/or CottonInfo RD&E over the last 12 months



21%

Have hosted cotton industry research trials on-farm in the 2022-23 cotton growing season



58%

Have implemented changes to their business or on-farm practices over the last five years as a result of RD&E outcomes funded by CRDC

* Source: <https://www.crdc.com.au/publications/crdc-strategic-plan>

Performance Indicators

Overall satisfaction with levy investment

Overall how satisfied are you that levies covering the research, development and extension are being invested to achieve the outcomes you expect?
Base: All growers; n = 217



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Mean Result	7.6	7.7	7.8	7.4	7.6	7.3	7.2	7.7	7.5

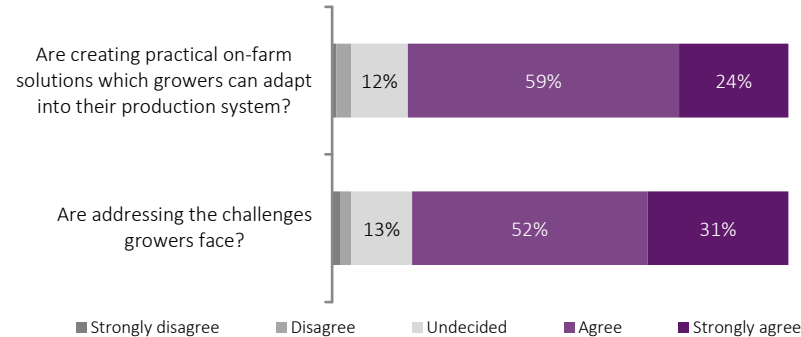
Are growers satisfied?

- A new measure included in the 2023 Grower Survey evaluated grower satisfaction with the outcomes achieved from the grower levies invested by CRDC.
- From the feedback, we note:
- A strong level of overall satisfaction with a rating at 7.5 (out of a possible 10). Given the critical eye that growers usually cast over their funds going to other organisations, this result is strong and encouraging. Contributing to this overall result was that:
 - More than one in ten (14%) rated their satisfaction at 10 out of 10
 - More than one in two growers rated their satisfaction at an 8 or above
 - Only 5% of growers rated their satisfaction below a rating of 5
 - The results were consistent across regions with ratings ranging from just 7.3 to 7.8. Given the diversity of cotton growing regions, and the likely diverse set of needs and expectations across these regions around R&D, the narrow range is a welcome outcome.
 - Ratings across the different farm size operations were also largely consistent (ranging from 7.2 to 7.7).

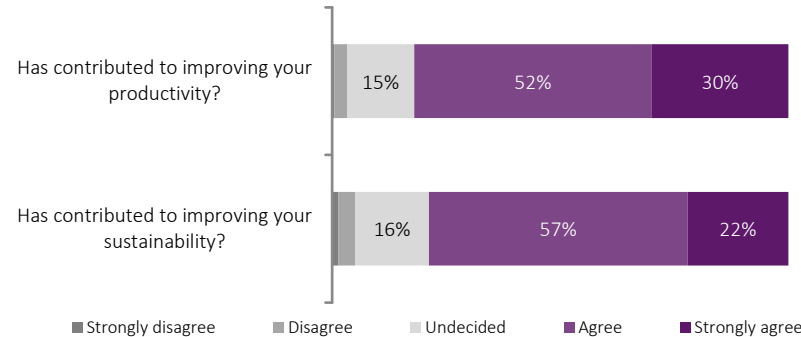
Performance Indicators

CRDC and CottonInfo investments and contribution

How strongly do you agree or disagree that CRDC’s investments in research and development...
Base: All growers; n = 217



How strongly do you agree or disagree that CRDC and CottonInfo...
Base: All growers; n = 217



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

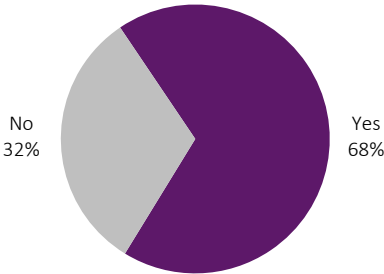
	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Are creating practical on-farm solutions	88%	79%	83%	81%	79%	90%	80%	83%	90%
Are addressing the challenges growers face	88%	82%	79%	82%	74%	93%	77%	84%	87%

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

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Has contributed to improving your productivity	88%	76%	92%	78%	89%	85%	75%	83%	90%
Has contributed to improving your sustainability	71%	71%	88%	81%	79%	80%	72%	81%	85%

Over the last 12 months, have you or any of your staff participated in or been involved with any CRDC research projects or any CottonInfo activities like meetings, webinars, field days, discussions with researchers or other extension type activities? Please do not include any involvement with on-farm industry trials or data collection.

Base: All growers; n = 217

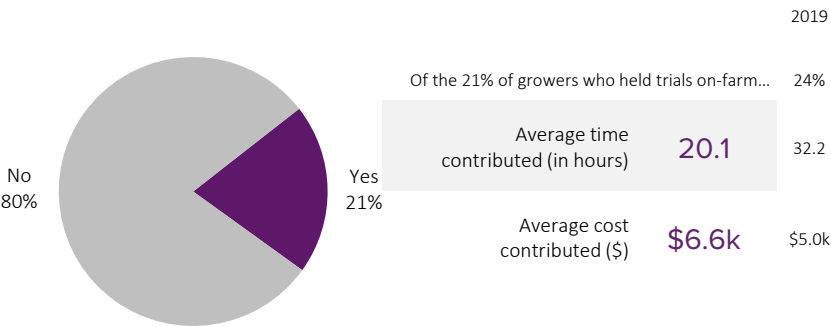


Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
% been involved in CRDC / CottonInfo extension	76%	63%	67%	69%	74%	68%	51%	74%	79%

Did you have any cotton industry research trials on your farm during the 2022-23 cotton growing season? (e.g. CRDC, CSIRO, DPI, DAF, Universities, etc.)

Base: All growers who grew cotton during the 2022-23 season; n = 200



Key results by Region and Size of Total Farm Area

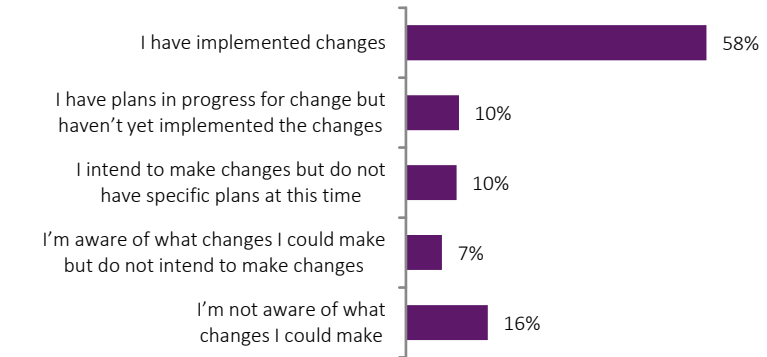
	Central QLD (n=17)	Darling Downs (n=37)	Macintyre Balonne (n=23)	Northern NSW (n=66)	Macquarie (n=16)	Southern NSW (n=31)	Small (n=62)	Medium (n=101)	Large (n=37)
% with trials on-farm	12%	30%	9%	21%	25%	26%	13%	23%	27%
Average time contributed (in hours)	76.0	10.5	10.0	32.2	11.8	8.3	25.5	19.9	15.4
Average cost contributed (\$)	\$70.0k	\$2.1k	\$5.0k	\$3.4k	\$0.8k	\$0.9k	\$2.1k	\$9.6k	\$1.5k

Performance Indicators

Changes made and impact of CRDC-funded RD&E activities

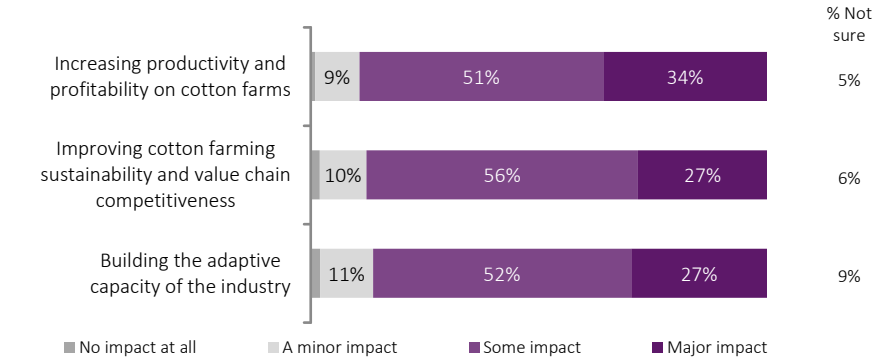
Thinking back over the last 5 years, have you made changes to your business or on-farm practices as a result of the outcomes from any of the research programs or extension activities that have been funded by CRDC?

Base: All growers; n = 217



What impact, if any, do you think CRDC funded RD&E activities have had on the following areas for the Australian cotton industry over the past 5 years?

Base: All growers; n = 217



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
I have implemented changes	47%	61%	79%	51%	74%	63%	49%	58%	72%
I have plans in progress for change	12%	5%	0%	12%	0%	13%	8%	12%	8%
I intend to make changes	18%	3%	8%	12%	16%	8%	8%	10%	13%
I'm aware of what changes I could make	6%	11%	8%	1%	11%	8%	8%	9%	0%
I'm not aware of what changes I could make	18%	21%	4%	24%	0%	10%	28%	12%	8%

Key results by Region and Size of Total Farm Area (% Some impact + % Major impact)

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Increasing productivity and profitability	82%	84%	96%	81%	89%	85%	86%	87%	77%
Improving cotton farming sustainability	76%	84%	92%	82%	89%	83%	82%	83%	85%
Building the adaptive capacity	65%	74%	83%	78%	95%	83%	77%	77%	87%



FOCUS AREA

Industry Sentiment

Industry Sentiment

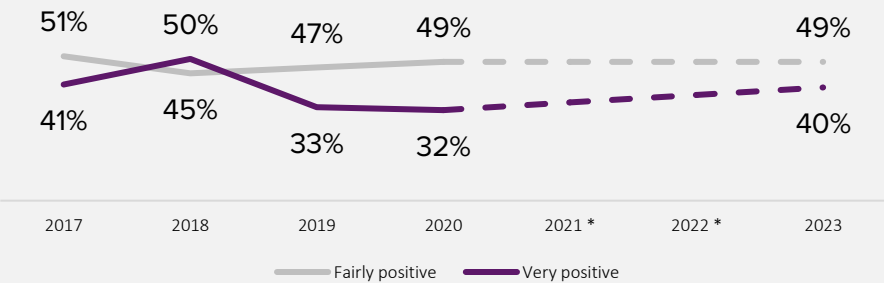
Feelings about the future of the cotton industry

The feedback from the 2023 CRDC Grower Survey indicates a slightly increased level of confidence and optimism about the future of the cotton industry since last reported in 2020, with an increase in nett sentiment (positive minus negative) of 12 points (+76 to +88) reported. We note that:

- The overwhelming majority of growers continue to be positive about the future (89%).
- Almost one in two growers (49%) describe themselves as 'fairly positive', again reflecting perhaps a cautious optimism about the future of the industry.
- This level of optimism remains largely consistent across all geographies and all farm sizes. Growers in the Macquarie and Southern NSW regions are slightly less positive than growers from other regions.

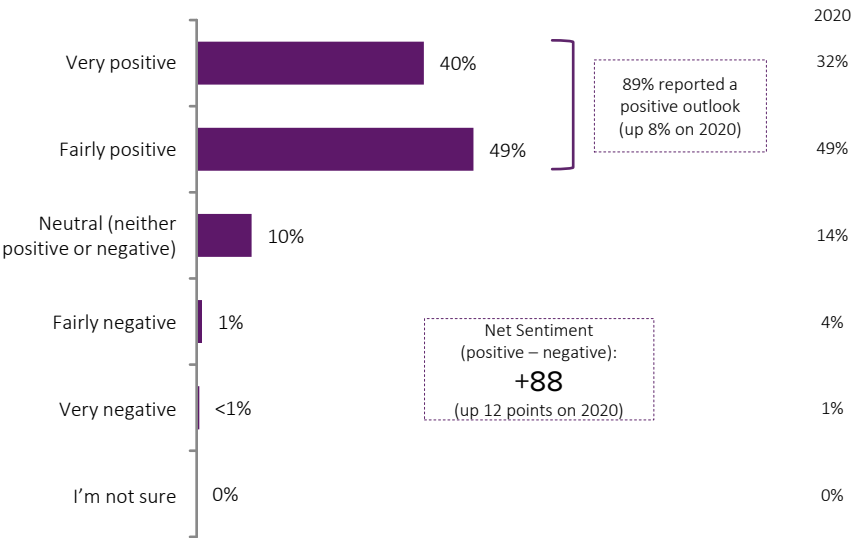
The results from this measure reported since 2017 are shown opposite

% rating positive across recent Grower Surveys



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

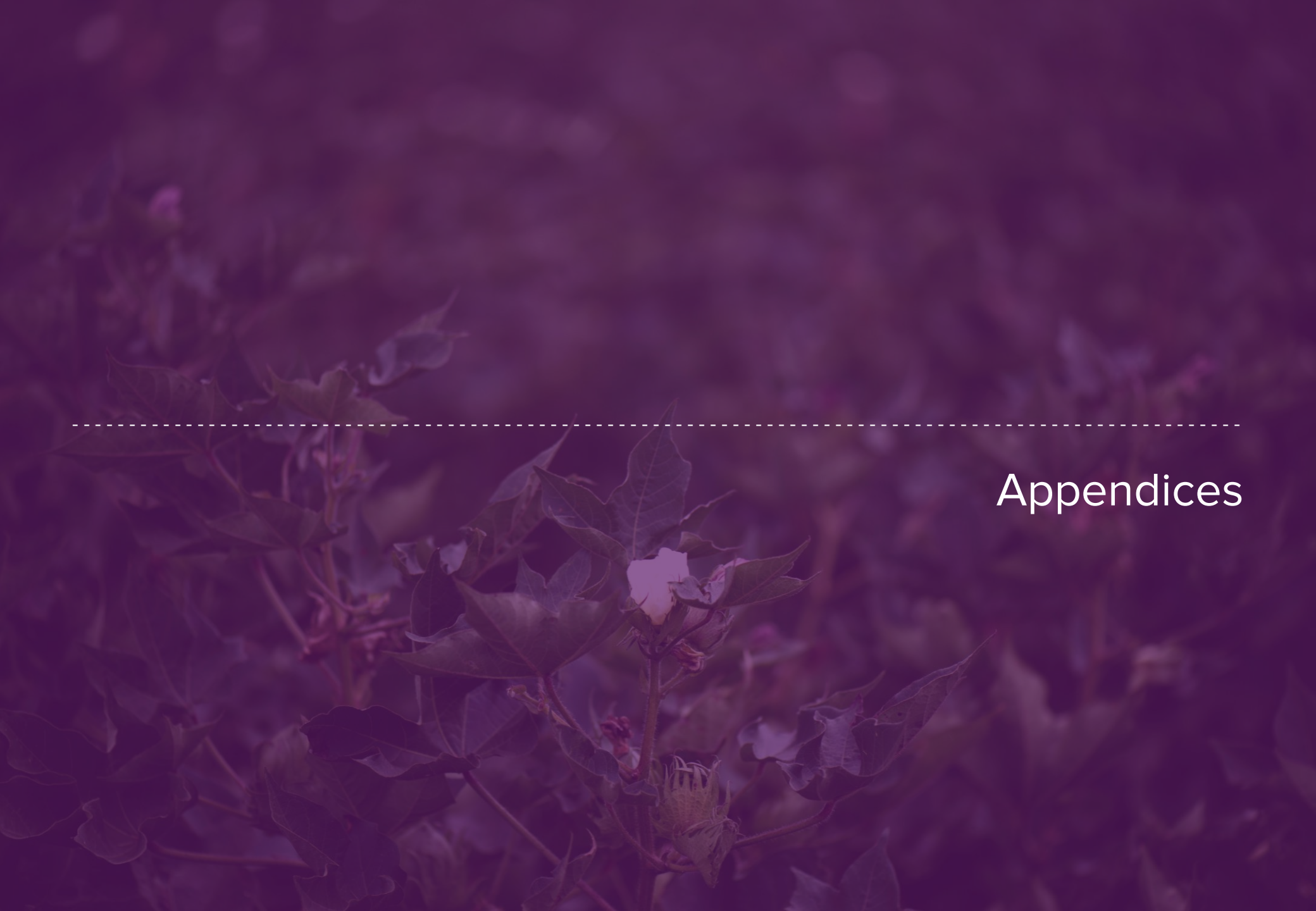
Base: All growers; n = 217



Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=38)	Macintyre Balonne (n=24)	Northern NSW (n=68)	Macquarie (n=19)	Southern NSW (n=40)	Small (n=65)	Medium (n=113)	Large (n=39)
Positive Outlook	88%	92%	100%	93%	79%	78%	89%	88%	90%
Negative Outlook	0%	0%	0%	1%	5%	3%	3%	1%	0%
Net Sentiment	+88	+92	+100	+91	+74	+75	+86	+88	+90

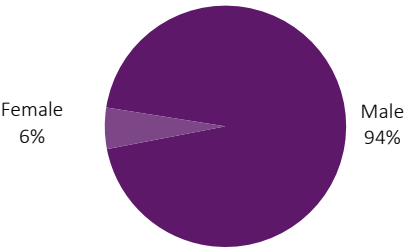
* Question not asked in 2021 or 2022.



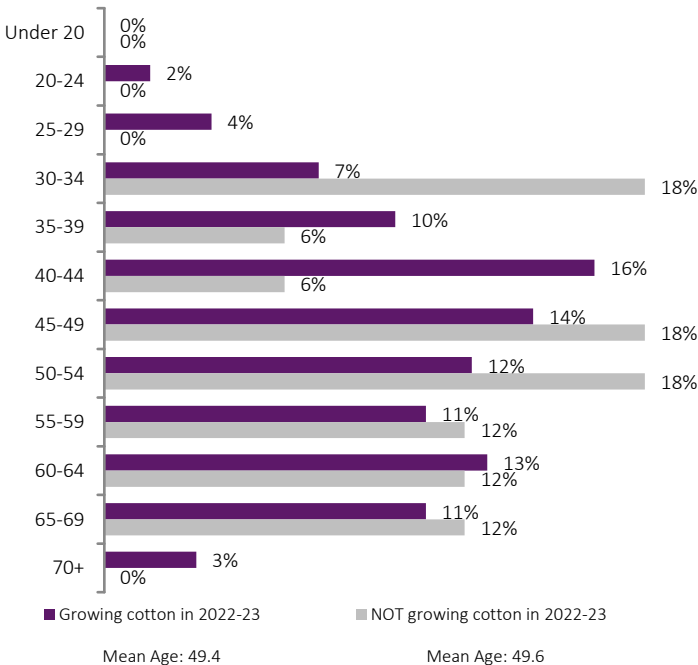
Appendices

Gender, age, region and description of farming business

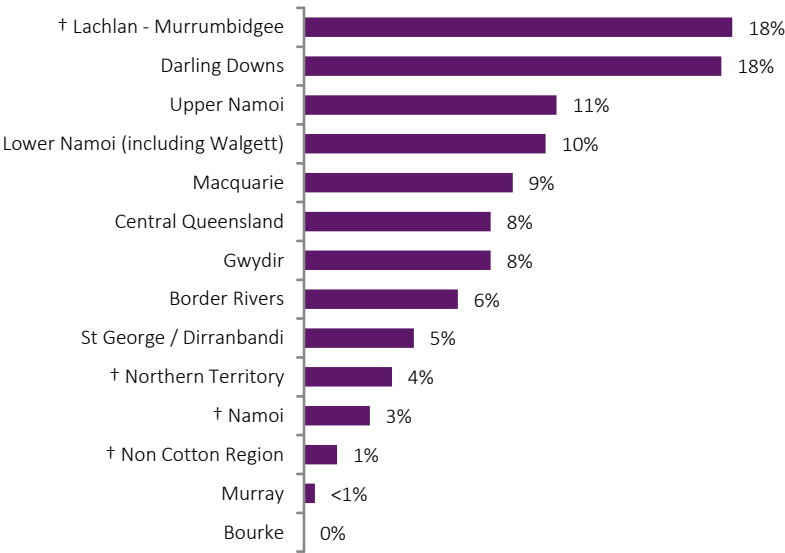
Which gender do you identify with?
Base: All growers; n = 217



Which age category do you belong to?
Base: All growers; n = 217



In which region are you located?
Base: All growers; n = 217



How would you describe your farming business?
Base: All growers; n = 217

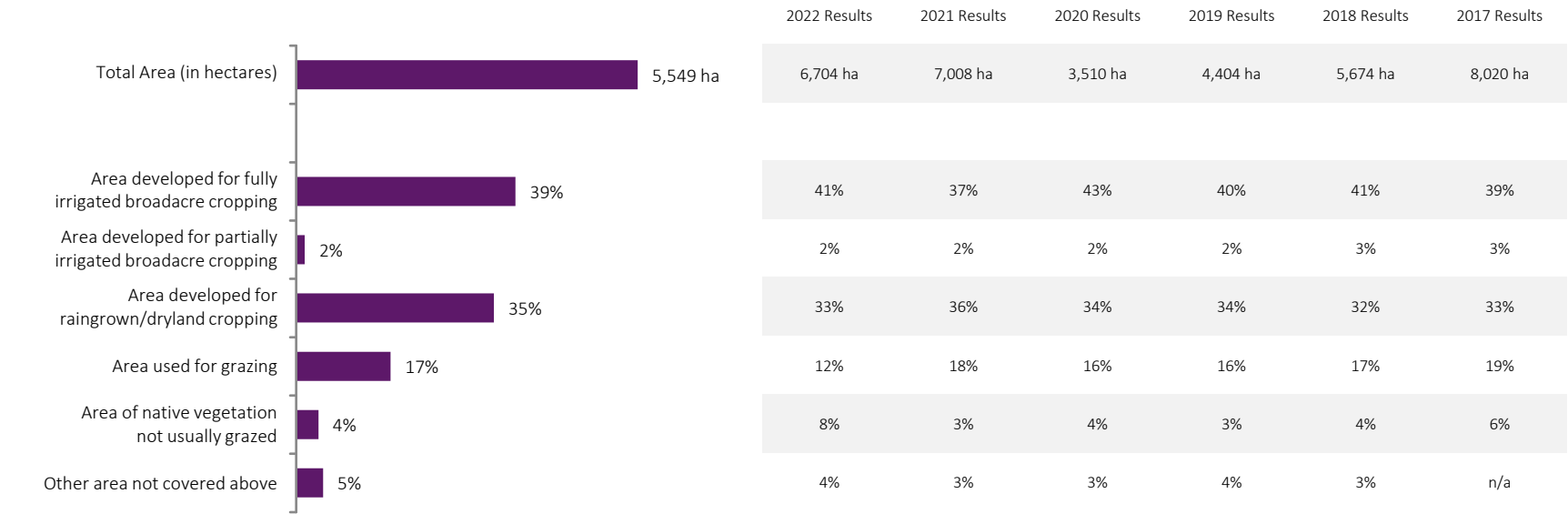


† Coded from Other (please provide postcode) answers.

Appendices

Historical data of land area/distribution

What is the total area of your farm (in hectares), and of the total area of your farm, what is the area attributed to the following?
Base: All growers; n = 217



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 be 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 (# growers completed)	217 (# surveys completed)	250	300	500	1,000	1,500
Survey Estimate	10%	n/a	n/a	n/a	± 5.88%	± 4.80%	± 4.16%	± 3.99%	± 3.72%	± 3.39%	± 2.63%	± 1.86%	± 1.52%
	20%	n/a	± 11.09%	± 9.05%	± 7.84%	± 6.40%	± 5.54%	± 5.32%	± 4.96%	± 4.53%	± 3.51%	± 2.48%	± 2.02%
	30%	n/a	± 12.70%	± 10.37%	± 8.98%	± 7.33%	± 6.35%	± 6.10%	± 5.68%	± 5.19%	± 4.02%	± 2.84%	± 2.32%
	40%	± 17.53%	± 13.58%	± 11.09%	± 9.60%	± 7.84%	± 6.79%	± 6.52%	± 6.07%	± 5.54%	± 4.29%	± 3.04%	± 2.48%
	50%	± 17.89%	± 13.86%	± 11.32%	± 9.80%	± 8.00%	± 6.93%	± 6.65%	± 6.20%	± 5.66%	± 4.38%	± 3.10%	± 2.53%
	60%	± 17.53%	± 13.58%	± 11.09%	± 9.60%	± 7.84%	± 6.79%	± 6.52%	± 6.07%	± 5.54%	± 4.29%	± 3.04%	± 2.48%
	70%	n/a	± 12.70%	± 10.37%	± 8.98%	± 7.33%	± 6.35%	± 6.10%	± 5.68%	± 5.19%	± 4.02%	± 2.84%	± 2.32%
	80%	n/a	± 11.09%	± 9.05%	± 7.84%	± 6.40%	± 5.54%	± 5.32%	± 4.96%	± 4.53%	± 3.51%	± 2.48%	± 2.02%
	90%	n/a	n/a	n/a	± 5.88%	± 4.80%	± 4.16%	± 3.99%	± 3.72%	± 3.39%	± 2.63%	± 1.86%	± 1.52%

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 2023 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 = 873 businesses was provided by CRDC, with n = 217 grower surveys completed (completion rate of 24.9%). A breakdown of the number of surveys completed by Region is located below.

Region	Sample Size	Completed Surveys	Region	Sample Size	Completed Surveys
Overall	873	217	Northern NSW	289	68
Central Queensland	73	17	Macquarie	80	19
Darling Downs	150	38	Southern NSW	131	40
Macintyre – Balonne	93	24	Other	57	11

Questionnaire Growers were asked to complete a 31-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
- 2022-23 cotton crop
- Water
- Nutrition and soil
- IPM and crop protection

- R&D impact on farming systems
- Workforce and training
- Communications
- Community and social contribution
- Performance indicators

Timing The survey was launched on 1 June 2023 and remained open until 13 June 2023.

A close-up photograph of a cotton plant with green leaves and a single white cotton flower in bloom. The image is overlaid with a semi-transparent purple filter.

Want more information?

Contact CRDC

Ruth Redfern
General Manager, Communications & Extension
Cotton Research and Development Corporation
E: ruth.redfern@crdc.com.au

Contact Intuitive Solutions

Michael Sparks
Director
Intuitive Solutions
E: msparks@intuitivesolutions.com.au