CRDC

2021 Grower Survey

intuitive solutions

November 2021

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It is important to note that the responses contained within the CRDC Grower Survey provide a snapshot in time of grower data, but do not tell the full story. The Grower Survey is one of many research projects commissioned by CRDC to gather industry information. The results are not intended to be used in isolation, but rather in consideration of these other projects, such as the CRDC and Cotton Australia 2019 Australian Cotton Sustainability Report, the industry's best practice program myBMP, extension 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.

Background to the 2021 Grower Survey

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

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

In 2017, CRDC undertook a review of the aims, purpose and design for the survey. The 2017 Grower Survey was developed by a working group including CRDC, Cotton Australia and researchers. The 2021 Grower Survey has been refined by the working group with reference to Grower Surveys undertaken between 2017 - 2020 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 2021 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:
  - R&D impact on farming systems;
  - water;
  - diseases;
  - sustainability;
  - workforce and training;
  - digital technologies; and
  - communications.
- As some questions are specific to cotton growers in the 2020-21 season, these questions will have a lower sample size compared to most other questions.

The results from the 2021 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 2021 Grower Survey was conducted using a CATI (Computer Assisted Telephone Interviewing) data collection methodology. This included: o Growers being contacted and invited to complete the survey over the phone; o Where this was not possible immediately, an interview appointment time was agreed and the interview completed at the agreed time.
When the survey was conducted	Surveys have usually been conducted in winter, focusing specifically on the preceding crop. CRDC agreed that to ensure consistency over time the Grower Survey should be conducted at the same time each year. The 2021 Grower Survey opened on 3 June 2021 and ran until 25 June 2021.

2020-21 season wrap-up

A look at the 2020-21 season

Australian cotton production partially recovered in 2020-21, following a period of prolonged dry weather and low irrigation water availability levels in 2019-20. The 2020-21 season saw an increase in rainfall, stored moisture levels and optimism, along with an increase in the total area planted to cotton and resulting production.

The Australian cotton industry in 2020-21:

- 272,000 hectares – planted into irrigated and dryland cotton, up from 60,000 hectares in 2019-20
- 2,809,000 bales – produced by the Australian cotton industry, up from 600,000 in 2019-20
- 10.3 bales per hectare – the average yield for the 2020-21 crop, compared to 10.0 bales per hectare in 2019-20.

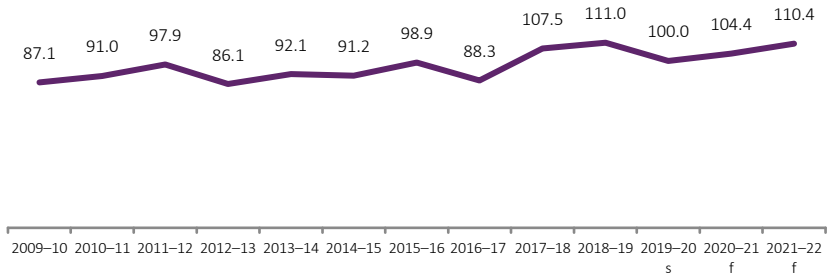
(Source: Cotton Australia)

CRDC's investment in 2020-21:

- $16.9 million – CRDC's investment in cotton RD&E on behalf of cotton growers and the Australian Government
- 188 – RD&E projects
- 85 – 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.

Commodity performance indicators

Index of cotton prices received by farmers (Australia)

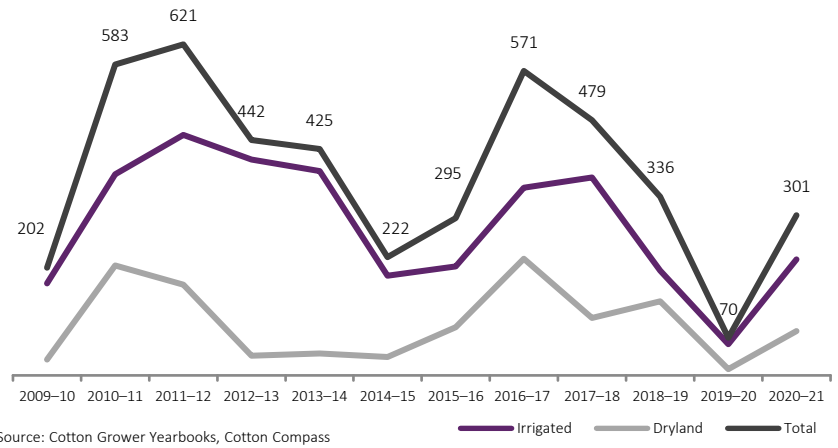


f ABARES forecast. s ABARES estimate.
Note: The indexes for commodity groups are calculated on a chain–weighted basis using Fisher's ideal index with a reference year of 2019–20 = 100. Indexes for most individual commodities are based on annual gross unit value of production. Prices used in these calculations exclude GST. Details for establishments with estimated value of agricultural operations (EVAO) of $1,500 or more until 1980–81; $2,500 or more from 1981–82 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 and cottonseed production* (Australia) ($m)

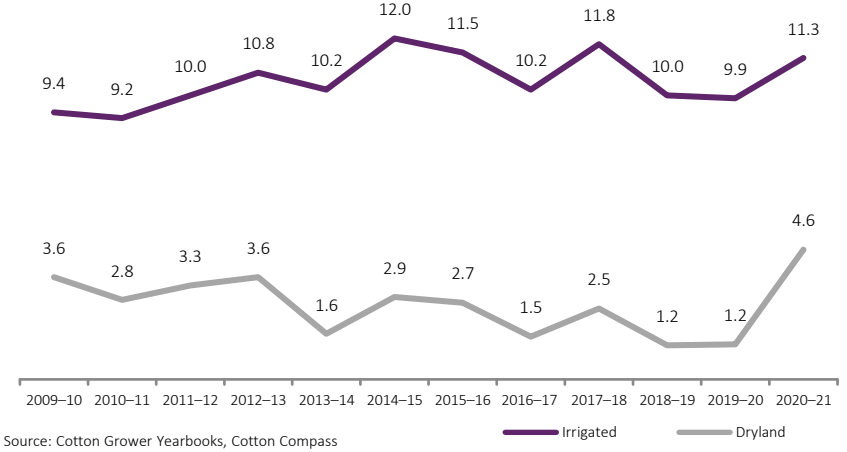
f ABARES forecast. s ABARES estimate. *Value delivered to gin.
Notes: The gross value of production is the value placed on recorded production at the wholesale prices realised in the marketplace. The point of measurement can vary between commodities. Generally the marketplace is the metropolitan market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

Cotton crop areas (Australia) ('000 ha)



Source: Cotton Grower Yearbooks, Cotton Compass

Average cotton yields (Australia) (bales/ha)



Source: Cotton Grower Yearbooks, Cotton Compass

How to navigate the report

The 2021 Grower Survey sought an indication from growers on whether the wheel spacing on their pickers had been modified for controlled traffic.

The results detailed below indicated that almost one in four (23%) of growers had modified their wheel spacing – either by doing this themselves (18%) or by their contractor (5%).

The modifications were much more prevalent among larger farm businesses (36% modified) than small farm business (15%).

There was also a variation across the regions (25% amongst growers in the Macquarie region while just 15% in the Southern NSW region).

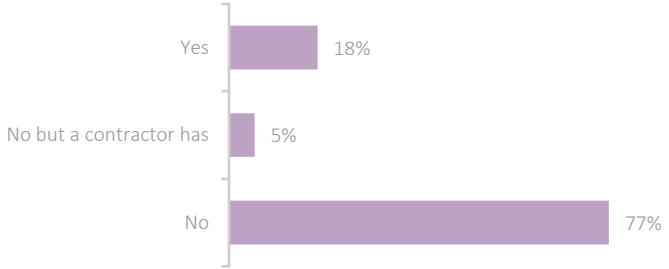
The commentary to the left provides high-level insights into the results at an overall level, and (where applicable) results across two main segments – Region and Size of Total Farm Area

The base represents the cohort of respondents to the question (e.g. all growers who grew cotton during the 2020-21 season), and the number that provided an answer to the question (173). Growers did not necessarily answer each question – as a result, the base across questions may vary.

The results below are results of survey measurements reported at two key segment levels: Region (six categories) and Size of Total Farm Area (three categories). For example, in Darling Downs 41 respondents answered the question, of which 22% stated they modified the wheel spacing on their picker for controlled traffic.

Have you modified the wheel spacing on your picker for controlled traffic?

Base: All growers who grew cotton during the 2020-21 season; n = 173



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

Key results by Region and Size of Total Farm Area

	Central QLD (n=13)	Darling Downs (n=41)	Macintyre Balonne (n=19)	Northern NSW (n=58)	Macquarie (n=12)	Southern NSW (n=20)	Small (n=59)	Medium (n=81)	Large (n=33)
Yes	15%	22%	11%	22%	8%	10%	8%	19%	33%
No, but a contractor has	8%	2%	5%	3%	17%	5%	7%	5%	3%
No	77%	76%	84%	74%	75%	85%	85%	77%	64%

Segments were categorised as follows:

Region (based on Region at Q3)

- 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 Q5)

- Small (< 1,000 ha)
- Medium (1,000 – 5,000 ha)
- Large (> 5,000 ha)

Snapshot of Key Findings

CRDC We spoke to 233 growers for the 2021 Grower Survey (19.6% based on 1,187 growers listed). Some of the key results from the 2021 Grower Survey were...

2020-21 cotton crop

10%

Total farm area under cotton production in 2020-21

589 ha

Grower-reported average of hectares under cotton
(taking into account row configuration)

11.88 bales/ha

Grower-reported average yield on fully irrigated cotton area

R&D impact on farming systems

85%

Reported using furrow irrigation on their fully irrigated cotton

23%

Modified the wheel spacing on their picker for controlled traffic

54%

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

Water

6.28 ML/ha

Average irrigation water applied to cotton on fully irrigated hectares

283.4 mm

In-crop rainfall received between planting and harvesting in 2020-21

82%

Employ practices to minimise losses to evaporation and drainage

CRDC We spoke to 233 growers for the 2021 Grower Survey (19.6% based on 1,187 growers listed). Some of the key results from the 2021 Grower Survey were...

Diseases

55%

Reported having at least one of five nominated diseases on-farm

47%

Of those with disease on-farm reported some yield loss

47%

Of those with disease on-farm use crop rotation to combat disease

Sustainability

46%

Aware of the “PLANET. PEOPLE. PADDOCK.” sustainability program

39%

Actively making changes to reduce cotton production carbon footprint

51%

Think changes in regional climate patterns will mean adapting their production system in 10 years time

Workforce and training

3.9 staff per 1,000 ha

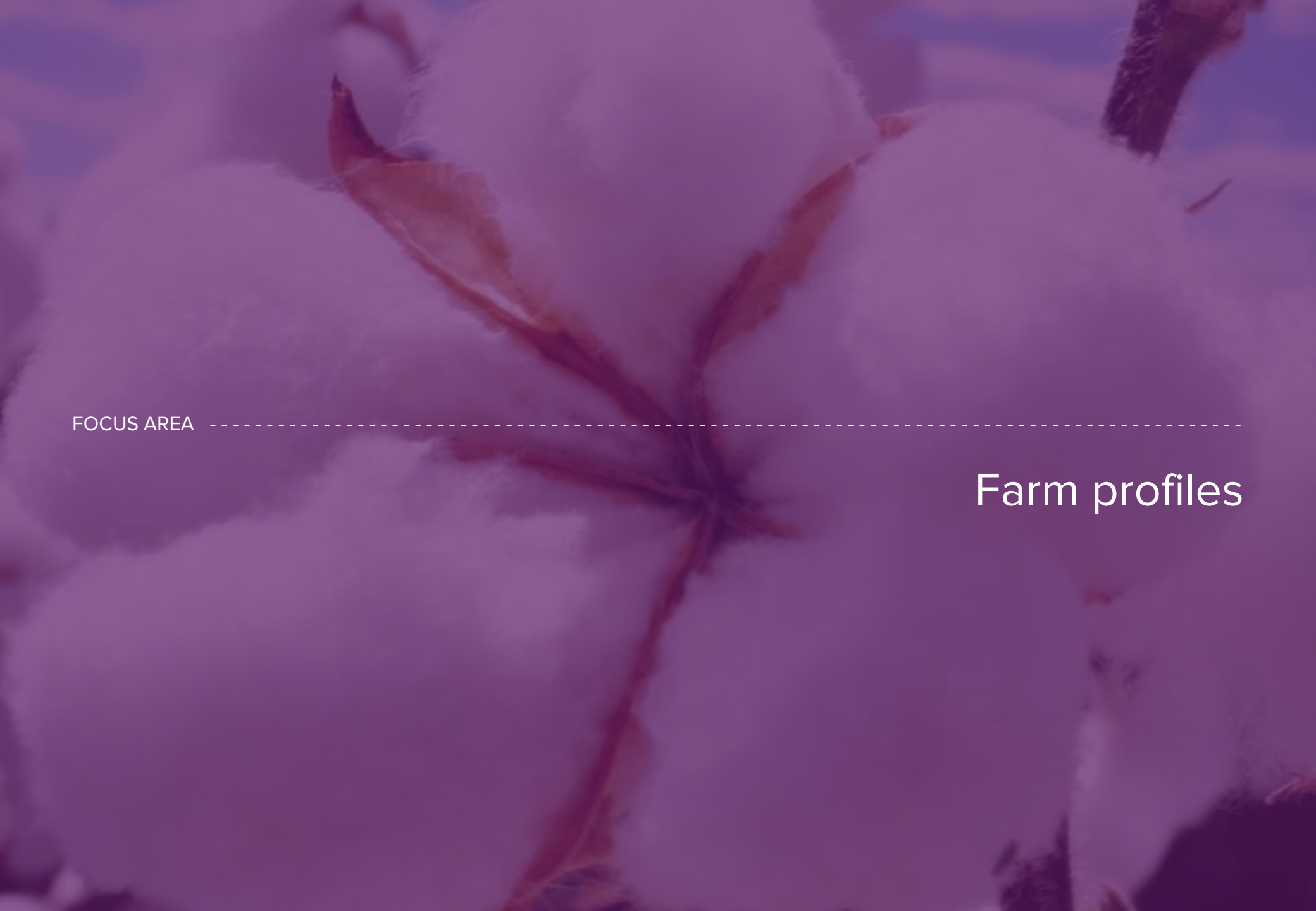
Average # of staff across small, medium, and large farms
(standardised to # per 1,000 ha)

66%

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

86%

Experienced a workforce issue that impacted their farm business over the last 12 months



FOCUS AREA

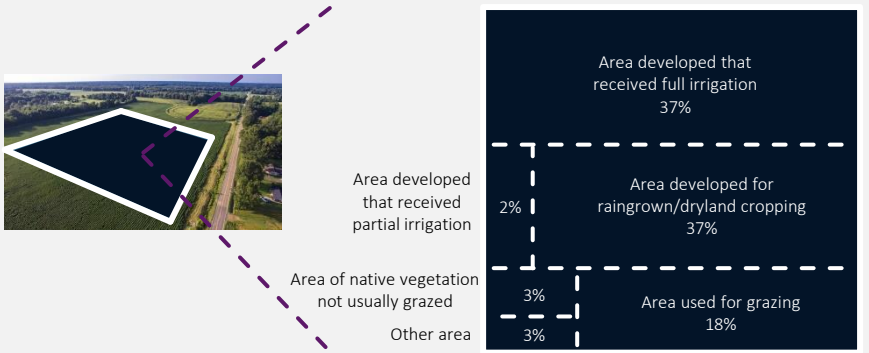
Farm profiles

Area and distribution of farm land

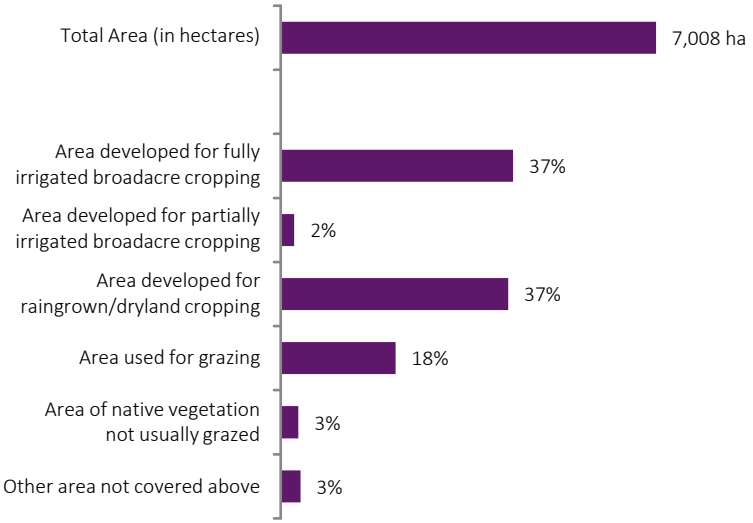
The 2021 CRDC Grower Survey sought to build an understanding of farm use. The feedback from the 2021 CRDC Grower Survey indicates:

- Growers reported (on average) a total farm size of 7,008 ha;
- 76% 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
- 24% 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 what is the area attributed to the following?
Base: All growers (excluding one outlier*); n = 232



Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=41)
Total area (ha)	4,927	2,130	20,278	7,170	5,156	7,522	1,796	4,125	25,099
Full irrigation	44%	37%	25%	30%	23%	62%	51%	32%	23%
Partial irrigation	1%	4%	1%	2%	3%	3%	1%	3%	2%
Raingrown/Dryland	15%	48%	25%	46%	48%	12%	22%	42%	50%
Grazing	35%	7%	41%	15%	22%	16%	18%	19%	17%
Native vegetation	2%	2%	3%	4%	3%	2%	4%	2%	3%
Other	3%	2%	5%	3%	1%	6%	4%	2%	5%

* One outlier was removed from this analysis for having a significantly different farm size to the rest of the respondent base (550,000, next highest reported figures were 167,000, 110,000, 90,000).

Average riparian length and width

The feedback from the 2021 CRDC Grower Survey indicates:

- More than two in three growers (69%) reported having a riparian area on their property.
- Growers with a riparian area reported an average riparian area of 8.20 km in length. While there have been some changes over the last three years, the overall size remains largely consistent with the long-term average of this measure over the past five survey periods at 7.33 km;
- The average width of riparian areas is 178 m. The long-term average of this measure over the past five survey periods is 161 m.

As reported in 2020, 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.

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)
Average length (km)	9	7.5	7.65	6.31	7.58	6.93	8.20
Average width (m)	Not asked	Not asked	175	169	144	138	178

Approximately how long and wide is the riparian area on your property?
Base: All growers with a riparian area on their farm*; n = 158

Average length (in kilometres)

8.20 km

Average width (in metres)

178 m

71 of 229 growers who answered (31%) reported no riparian area on their property.

Key results by Region and Size of Total Farm Area

	Central QLD (n=17)	Darling Downs (n=30)	Macintyre Balonne (n=19)	Northern NSW (n=57)	Macquarie (n=14)	Southern NSW (n=17)	Small (n=50)	Medium (n=73)	Large (n=35)
Average length (km)	8.75	7.15	9.25	7.81	7.43	9.82	4.81	7.95	14.09
Average width (m)	173	255	149	164	201	98	192	171	172

* Results were considered outliers and were removed if reported length was 100km or more (n = 3), or reported width was 1,000m or more (n = 21).

FOCUS AREA

2020-21 cotton crop

Cotton area and farming systems

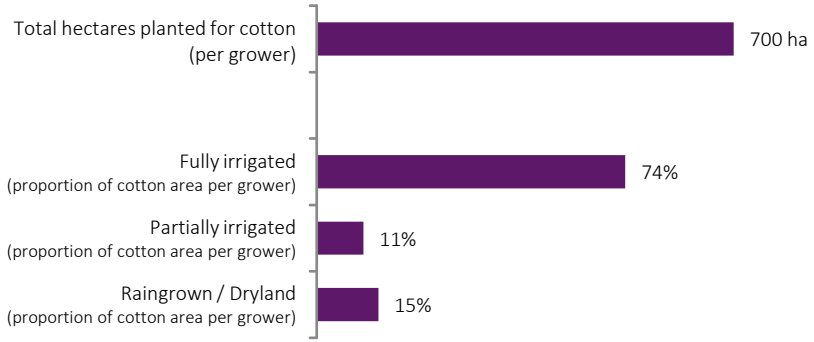
Key information about the growers' area planted for the 2020-21 season was collected during the survey. In previous Grower surveys, a proportion of growers listed on the CRDC database did not grow cotton in that season. For the current survey, the proportion of growers on the CRDC database growing cotton increased to 74%, a substantively higher proportion than in 2020. The feedback from 2020-21 cotton growers indicate that:

Growers' reported average area of cotton planted was 700 ha:

- On average, 74% of cotton area per grower was fully irrigated;
- 11% was partially irrigated; and
- 15% was raingrown/dryland.

Almost four in five (78%) were growing cotton on a single irrigation type, with just under two in three (63%) growing cotton only on fully irrigated hectares.

What was the total number of hectares planted for cotton during the 2020-21 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 2020-21 season; n = 173



Key results by Region and Size of Total Farm Area

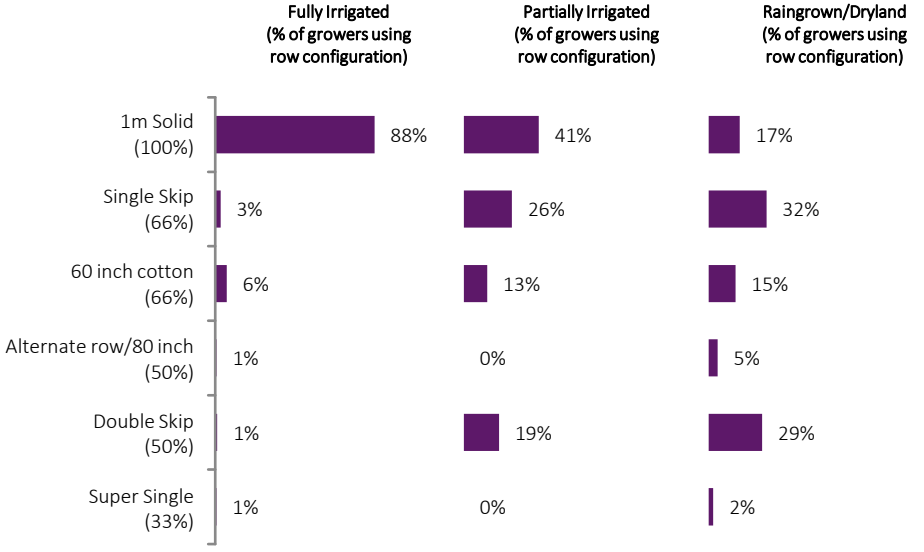
	Central QLD (n=13)	Darling Downs (n=41)	Macintyre Balonne (n=19)	Northern NSW (n=58)	Macquarie (n=12)	Southern NSW (n=20)	Small (n=59)	Medium (n=81)	Large (n=33)
Total area (ha per grower)	457	323	1,412	781	596	562	176	450	2,253
Fully irrigated	67%	61%	79%	69%	98%	100%	76%	71%	78%
Partially irrigated	20%	16%	13%	12%	2%	0%	10%	13%	9%
Raingrown / Dryland	13%	23%	8%	19%	0%	0%	14%	16%	13%

Row configuration for cotton in 2020-21 season

Growers were asked to describe the row configuration used for their fully irrigated, partially irrigated and raingrown/dryland cotton areas for the 2020-21 season. The results show:

- For fully irrigated areas, a 1m solid configuration was the overwhelming configuration used. A small number of growers reported using a single skip or 60-inch cotton configuration.
- For partially irrigated areas, there were a mix of configuration used – 41% using a 1m solid, 26% using a single skip and 19% using a double skip configuration.
- For raingrown/dryland areas, growers were less likely to use a 1m solid configuration (17%) and more likely to be using a single skip (32%) or double skip (29%) configuration.

Of the cotton hectares, what row configuration did you use?
Base: All growers who grew cotton during the 2020-21 season; n varies
(Fully Irrigated, n = 139, Partially Irrigated, n = 31, Raingrown/Dryland, n = 41)



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

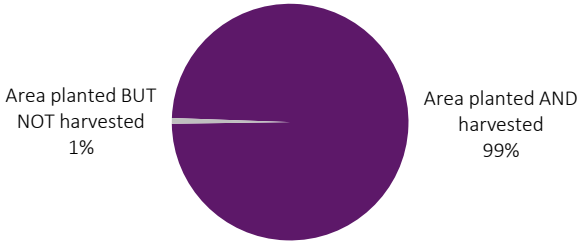
	Central QLD (n=10)	Darling Downs (n=28)	Macintyre Balonne (n=16)	Northern NSW (n=46)	Macquarie (n=12)	Southern NSW (n=19)	Small (n=46)	Medium (n=66)	Large (n=27)
1m Solid (100%)	100%	64%	88%	93%	92%	100%	83%	91%	89%
Single skip (66%)	0%	12%	6%	0%	0%	0%	6%	2%	0%
Double Skip (50%)	0%	18%	6%	5%	7%	0%	7%	6%	7%
1.5m 60 inch (50%)	0%	0%	0%	2%	2%	0%	0%	0%	4%
One in one out (50%)	0%	6%	0%	0%	0%	0%	2%	1%	0%
Super Single (33%)	0%	0%	0%	0%	0%	0%	2%	0%	0%

Cotton area harvested

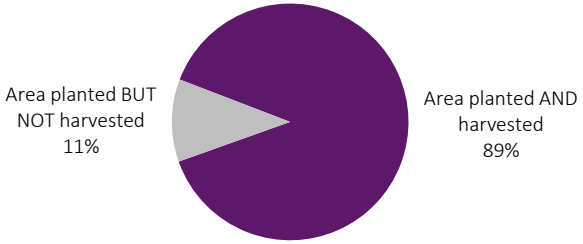
Of the cotton hectares under each production system, how many hectares were planted and harvested and how many hectares were planted but not harvested?

Base: All growers who grew cotton during the 2020-21 season; n varies
(Fully Irrigated, n = 140, Partially Irrigated, n = 30, Raingrown/Dryland, n = 41)

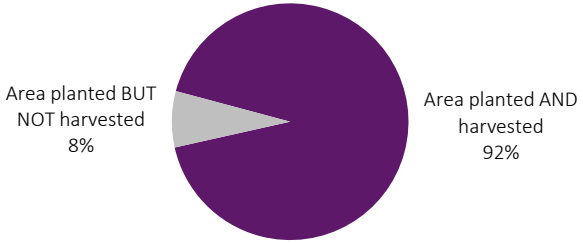
Fully irrigated



Partially irrigated



Raingrown/dryland



Key results by Region and Size of Total Farm Area (% of area planted and harvested)

	Central QLD (n=10)	Darling Downs (n=29)	Macintyre Balonne (n=15)	Northern NSW (n=47)	Macquarie (n=11)	Southern NSW (n=20)	Small (n=48)	Medium (n=65)	Large (n=27)
Fully irrigated	96%	100%	97%	100%	100%	100%	99%	99%	100%

	Central QLD (n=3)	Darling Downs (n=8)	Macintyre Balonne (n=4)	Northern NSW (n=12)	Macquarie (n=1)	Southern NSW (n=1)	Small (n=8)	Medium (n=16)	Large (n=6)
Partially irrigated	67%	100%	93%	91%	100%	0%	88%	91%	83%

	Central QLD (n=2)	Darling Downs (n=16)	Macintyre Balonne (n=2)	Northern NSW (n=18)	Macquarie (n=0)	Southern NSW (n=0)	Small (n=14)	Medium (n=22)	Large (n=5)
Raingrown / Dryland	2%	98%	100%	95%	-	-	93%	94%	83%

Yields for the 2020-21 cotton growing season

Growers reported three key indicators for the yields they achieved for the 2020-21 growing season.

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

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

For fully irrigated areas, the 2021 survey reported an average yield of 11.88 bales per hectare. This reported result is up from the 2020 result (10.45).

Results are provided for partially irrigated (8.35 bales/ha, also up from 2020) and raingrown/dryland (4.09 bales/ha, down on the 2020 yield result), but the sample sizes for these two cohorts mean results should be interpreted with caution.

What were your yields for the 2020-21 cotton growing season across the cotton areas?
Base: All growers who grew cotton during the 2020-21 season; n varies
(Fully Irrigated, n = 141, Partially Irrigated, n = 29, Raingrown/Dryland, n = 40)

	Fully Irrigated (bales per ha)	Partially Irrigated (bales per ha)	Raingrown/Dryland (bales per ha)
Average yield	11.88 2020: 10.45	8.35	4.09
Yield achieved by your highest-yielding field (average of grower-reported yield)	13.13 2020: 11.55	9.36	4.86
Yield achieved by your lowest-yielding field (average of grower-reported yield)	10.38 2020: 9.24	7.21	3.46
Range of variation from average yield	2.74 2020: 2.31	2.15	1.40

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

	Central QLD (n=10)	Darling Downs (n=29)	Macintyre Balonne (n=16)	Northern NSW (n=46)	Macquarie (n=12)	Southern NSW (n=20)	Small (n=48)	Medium (n=65)	Large (n=28)
Average yield	12.76	11.27	13.27	11.81	13.92	10.66	11.44	11.99	12.36
Highest yield from one field	15.32	12.38	14.52	12.78	15.07	12.29	12.82	13.19	13.52
Lowest yield from one field	11.59	10.00	11.39	10.19	12.24	9.09	9.90	10.62	10.66
Range of variation from average yield	3.73	2.38	3.13	2.59	2.83	3.20	2.92	2.57	2.86

FOCUS AREA

R&D impact on farming systems

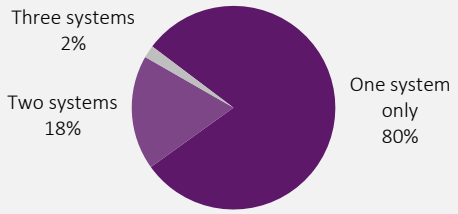
Full irrigation systems in use

This section of results from the 2021 Grower Survey related to measures included (for the first time) to determine progress against some of the CRDC Strategic Plan objectives. The measures looked at the R&D impact on farming systems across a range of different measures.

The first metric included in the 2021 survey measured the penetration of the various irrigation systems and resultant yields. The results are shown below with results across the various segments (Region and Farm Size) shown next.

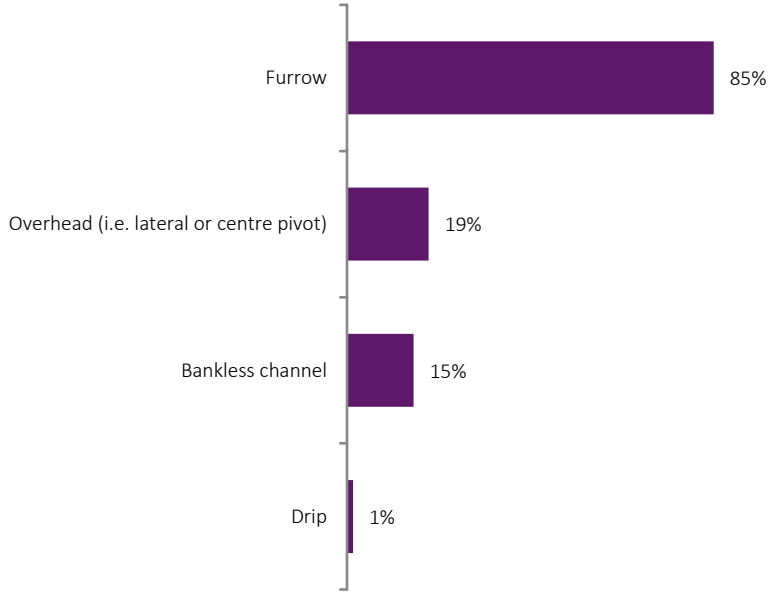
- Furrow is the predominant system in use (85% of growers used this system) and looks to have achieved the highest yields for irrigated areas (just over 12 bales per hectare).
- Overhead systems were in use by around one in five growers with bankless channels in use by just 15% of growers. Growers using overhead systems reported the lowest yields.

Number of full irrigation systems in use



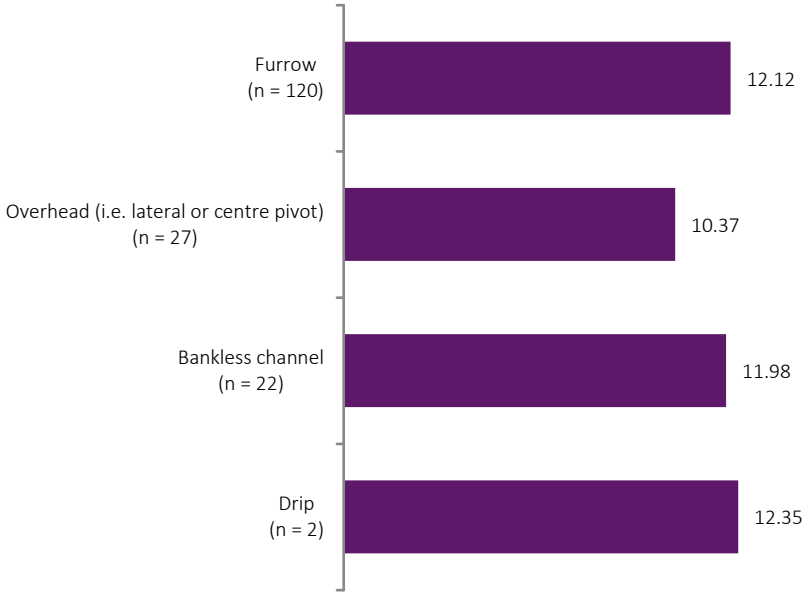
Proportion of growers who reported using each system for growing cotton during the 2020-21 season

Base: All growers who grew cotton during the 2020-21 season on fully irrigated hectares; n = 142



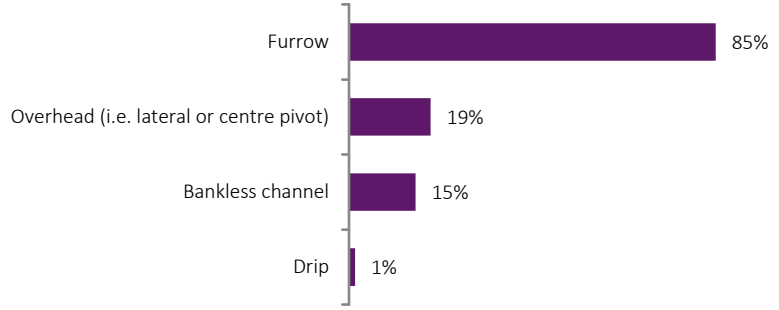
What was the approximate yield for areas grown under these irrigation systems?

Base: All growers who grew cotton during the 2020-21 season on fully irrigated hectares; n = 142



Full irrigation systems and yield

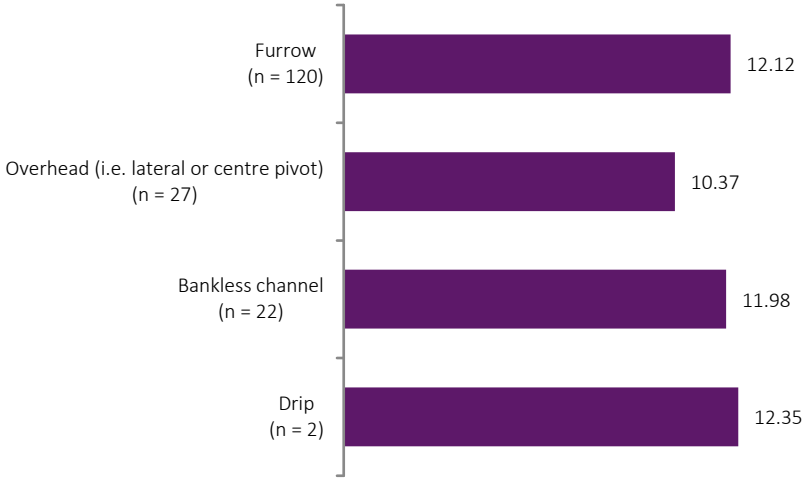
Proportion of growers who reported using each system for growing cotton during the 2020-21 season
Base: All growers who grew cotton during the 2020-21 season on fully irrigated hectares; n = 142



Key results by Region and Size of Total Farm Area

	Central QLD (n=10)	Darling Downs (n=29)	Macintyre Balonne (n=16)	Northern NSW (n=47)	Macquarie (n=12)	Southern NSW (n=20)	Small (n=48)	Medium (n=66)	Large (n=28)
Furrow	100%	86%	88%	87%	92%	70%	90%	80%	89%
Overhead (i.e. lateral or centre pivot)	10%	24%	19%	26%	17%	5%	27%	18%	7%
Bankless channel	20%	0%	19%	6%	25%	50%	2%	24%	18%
Drip	0%	3%	0%	0%	8%	0%	2%	2%	0%

What was the approximate yield for areas grown under these irrigation systems?
Base: All growers who grew cotton during the 2020-21 season on fully irrigated hectares; n = 142



Key results by Region and Size of Total Farm Area

	Central QLD (n=10)	Darling Downs (n=25)	Macintyre Balonne (n=14)	Northern NSW (n=40)	Macquarie (n=11)	Southern NSW (n=14)	Small (n=43)	Medium (n=52)	Large (n=25)
Furrow	12.21	11.64	13.80	11.97	14.02	10.89	11.83	12.15	12.54
Base:	(n=1)	(n=7)	(n=3)	(n=12)	(n=2)	(n=1)	(n=13)	(n=12)	(n=2)
Overhead	12.50	10.31	9.67	10.35	10.75	10.00	10.11	10.68	10.25
Base:	(n=2)	(n=0)	(n=3)	(n=3)	(n=3)	(n=10)	(n=1)	(n=16)	(n=5)
Bankless channel	11.35	-	14.42	13.73	13.57	10.36	9.60	11.81	12.97
Base:	(n=0)	(n=1)	(n=0)	(n=0)	(n=1)	(n=0)	(n=1)	(n=1)	(n=0)
Drip	-	11.00	-	-	13.70	-	11.00	13.70	-

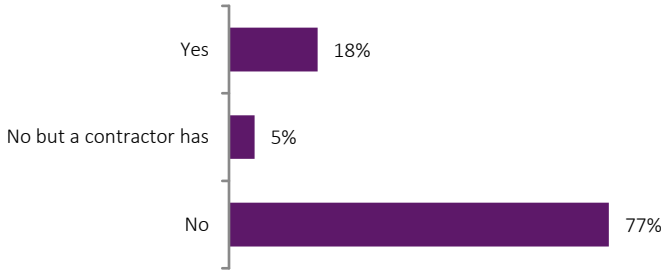
Wheel spacing on picker for controlled traffic

The 2021 Grower Survey sought an indication from growers on whether the wheel spacing on their pickers had been modified for controlled traffic.

The results detailed below indicated that almost one in four (23%) of growers had modified their wheel spacing – either by doing this themselves (18%) or by their contractor (5%). This result was higher than expected and may be a result of sampling variation as well as respondents possibly including modified picker head spacing as well as wheel spacing in their response. Further clarification will be required when this question is asked again in 2022.

The modifications were much more prevalent among larger farm businesses (36% modified) than small farm business (15%). There was also a variation across the regions (25% amongst growers in the Macquarie region while just 15% in the Southern NSW region).

Have you modified the wheel spacing on your picker for controlled traffic?
Base: All growers who grew cotton during the 2020-21 season; n = 173



Key results by Region and Size of Total Farm Area

	Central QLD (n=13)	Darling Downs (n=41)	Macintyre Balonne (n=19)	Northern NSW (n=58)	Macquarie (n=12)	Southern NSW (n=20)	Small (n=59)	Medium (n=81)	Large (n=33)
Yes	15%	22%	11%	22%	8%	10%	8%	19%	33%
No, but a contractor has	8%	2%	5%	3%	17%	5%	7%	5%	3%
No	77%	76%	84%	74%	75%	85%	85%	77%	64%

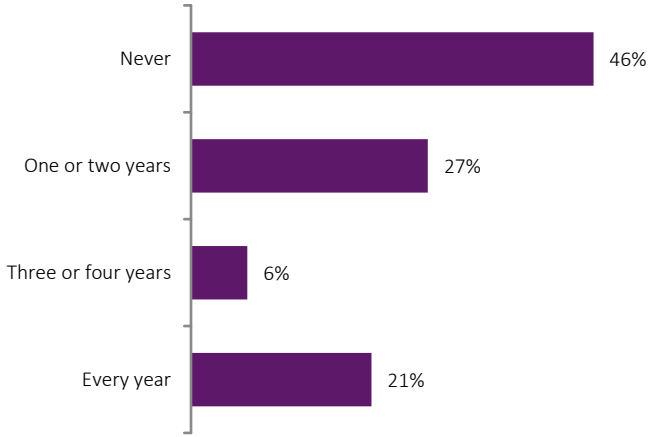
Cover cropping

Just over one in two growers (54%) reported that they had planted a cover crop with the main purpose to provide stubble cover on fallow ground over the last five years. Interestingly, just over one in five growers (21%) reported (more prominent among the small – 21% and medium farm sizes – 23%) using a cover crop for this purpose each year over the past five years.

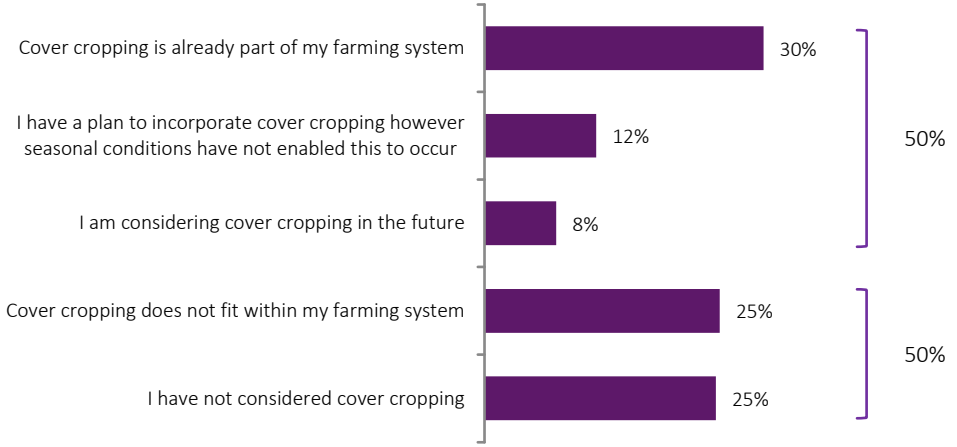
When asked about their current use on cover crops more generally:

- 30% indicated they were currently using a cover crop with a further 20% indicating they had a plan to incorporate a cover crop or are considering a cover crop in the future.
- Collectively, this then represents some 50% of growers who are or who plan to use a cover crop to provide stubble cover on fallow ground.
- The remaining 50% of growers have indicated cover crops do not fit their farming system or have not considered using a cover crop.

In the last five years, how often have you planted a cover crop with the main purpose to provide stubble cover on fallow ground?
Base: All growers; n = 233

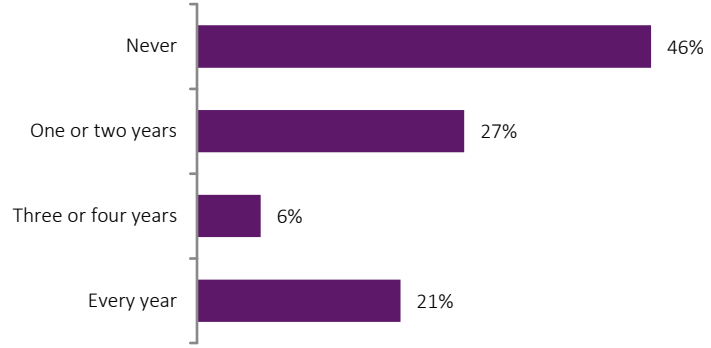


Are you using or are you considering growing a cover crop, that is, a crop planted and sprayed out or not harvested?
Base: All growers; n = 233



Cover cropping

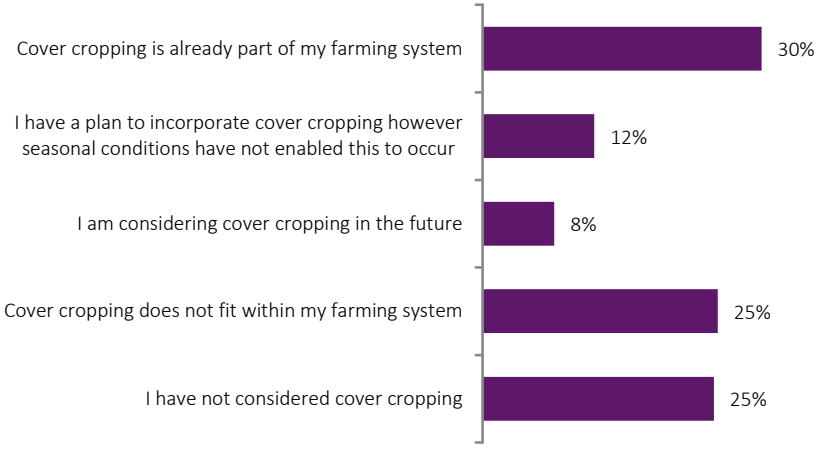
In the last five years, how often have you planted a cover crop with the main purpose to provide stubble cover on fallow ground?
Base: All growers; n = 233



Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Never	64%	17%	43%	51%	63%	57%	44%	41%	62%
One or two years	27%	40%	22%	28%	5%	23%	30%	28%	17%
Three or four years	0%	10%	13%	4%	16%	3%	5%	7%	7%
Every year	9%	33%	22%	17%	16%	17%	21%	23%	14%

Are you using or are you considering growing a cover crop, that is, a crop planted and sprayed out or not harvested?
Base: All growers; n = 233



Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Cover cropping is already part of my farming system	14%	46%	39%	26%	26%	20%	29%	30%	31%
I have a plan to incorporate cover cropping	18%	17%	17%	7%	5%	17%	13%	14%	5%
I am considering cover cropping in the future	5%	10%	9%	7%	16%	0%	6%	6%	14%
Cover cropping does not fit within my farming system	41%	13%	26%	26%	26%	30%	29%	22%	26%
I have not considered cover cropping	23%	15%	9%	33%	26%	33%	22%	28%	24%

Irrigated cotton field history

Thinking about your cotton field history, of the IRRIGATED cotton hectares in 2020-21, how many were...

Base: All growers who grew cotton during the 2020-21 season on irrigated hectares; n = 155

	% of growers with at least one hectare of this history *	2019:
Back-to-back cotton, i.e. cotton grown in the same field in the 2019-20 and 2020-21 seasons	15%	50%
Following Summer fallow, i.e. no crop in the 2019-20 Summer or 2020 Winter, but cropped in 2018-19 Summer or 2019 Winter	41%	47%
Following long fallow, i.e. no crop in the 2020 Winter, 2019-20 Summer, 2019 Winter or 2018-19 Summer	46%	39%
'Double cropped', i.e. following crop in Winter 2020 that was harvested	5%	7%
Following a cover crop, i.e. crop planted and sprayed out/not harvested	7%	2%
New fields, i.e. never had cotton grown there previously	5%	12%

Key results by Region and Size of Total Farm Area *

	Central QLD (n=11)	Darling Downs (n=36)	Macintyre Balonne (n=17)	Northern NSW (n=52)	Macquarie (n=11)	Southern NSW (n=20)	Small (n=53)	Medium (n=72)	Large (n=30)
Back-to-back cotton	82%	6%	12%	12%	27%	0%	19%	17%	7%
Following Summer fallow	27%	44%	18%	48%	36%	50%	42%	43%	33%
Following long fallow	0%	53%	71%	54%	45%	40%	40%	47%	57%
'Double cropped'	27%	3%	6%	2%	0%	5%	9%	3%	3%
Following a cover crop	0%	14%	12%	4%	9%	5%	9%	7%	3%
New fields	0%	0%	0%	2%	0%	10%	4%	4%	7%

	Average proportion of cotton area with this history	2019:
Back-to-back cotton, i.e. cotton grown in the same field in the 2019-20 and 2020-21 seasons	8%	26%
Following Summer fallow, i.e. no crop in the 2019-20 Summer or 2020 Winter, but cropped in 2018-19 Summer or 2019 Winter	37%	34%
Following long fallow, i.e. no crop in the 2020 Winter, 2019-20 Summer, 2019 Winter or 2018-19 Summer	43%	31%
'Double cropped', i.e. following crop in Winter 2020 that was harvested	3%	4%
Following a cover crop, i.e. crop planted and sprayed out/not harvested	4%	1%
New fields, i.e. never had cotton grown there previously	4%	7%

Key results by Region and Size of Total Farm Area

	Central QLD (n=11)	Darling Downs (n=36)	Macintyre Balonne (n=17)	Northern NSW (n=52)	Macquarie (n=11)	Southern NSW (n=20)	Small (n=53)	Medium (n=72)	Large (n=30)
Back-to-back cotton	55%	3%	2%	2%	22%	0%	12%	9%	<1%
Following Summer fallow	18%	40%	18%	44%	36%	47%	37%	39%	33%
Following long fallow	0%	49%	66%	48%	39%	40%	36%	43%	55%
'Double cropped'	26%	<1%	6%	1%	0%	2%	6%	2%	3%
Following a cover crop	0%	8%	9%	2%	3%	5%	5%	5%	2%
New fields	0%	0%	0%	2%	0%	6%	3%	3%	7%

* Multiple field histories could be reported – results may not add to 100%.

Raingrown / Dryland cotton field history

Thinking about your cotton field history, of the RAINGROWN | DRYLAND cotton hectares in 2020-21, how many were.....

Base: All growers who grew cotton during the 2020-21 season on raingrown/dryland hectares; n = 39

	% of growers with at least one hectare of this history *	2019:
Back-to-back cotton, i.e. cotton grown in the same field in the 2019-20 and 2020-21 seasons	5%	5%
Following Summer fallow, i.e. no crop in the 2019-20 Summer or 2020 Winter, but cropped in 2018-19 Summer or 2019 Winter	23%	23%
Following long fallow, i.e. no crop in the 2020 Winter, 2019-20 Summer, 2019 Winter or 2018-19 Summer	56%	72%
'Double cropped', i.e. following crop in Winter 2020 that was harvested	5%	2%
Following a cover crop, i.e. crop planted and sprayed out/not harvested	5%	14%
New fields, i.e. never had cotton grown there previously	5%	2%

Key results by Region and Size of Total Farm Area *

	Central QLD (n=1)	Darling Downs (n=16)	Macintyre Balonne (n=2)	Northern NSW (n=17)	Macquarie (n=0)	Southern NSW (n=0)	Small (n=12)	Medium (n=22)	Large (n=5)
Back-to-back cotton	100%	0%	0%	0%	-	-	0%	5%	20%
Following Summer fallow	0%	19%	0%	29%	-	-	25%	18%	40%
Following long fallow	0%	75%	0%	53%	-	-	67%	55%	40%
'Double cropped'	0%	0%	50%	6%	-	-	8%	5%	0%
Following a cover crop	0%	6%	50%	0%	-	-	0%	9%	0%
New fields	0%	0%	0%	12%	-	-	0%	9%	0%

	Average proportion of cotton area with this history	2019:
Back-to-back cotton, i.e. cotton grown in the same field in the 2019-20 and 2020-21 seasons	5%	3%
Following Summer fallow, i.e. no crop in the 2019-20 Summer or 2020 Winter, but cropped in 2018-19 Summer or 2019 Winter	23%	19%
Following long fallow, i.e. no crop in the 2020 Winter, 2019-20 Summer, 2019 Winter or 2018-19 Summer	56%	70%
'Double cropped', i.e. following crop in Winter 2020 that was harvested	5%	1%
Following a cover crop, i.e. crop planted and sprayed out/not harvested	5%	10%
New fields, i.e. never had cotton grown there previously	5%	<1%

Key results by Region and Size of Total Farm Area

	Central QLD (n=1)	Darling Downs (n=16)	Macintyre Balonne (n=2)	Northern NSW (n=17)	Macquarie (n=0)	Southern NSW (n=0)	Small (n=12)	Medium (n=22)	Large (n=5)
Back-to-back cotton	100%	0%	0%	0%	-	-	0%	5%	20%
Following Summer fallow	0%	19%	0%	29%	-	-	25%	18%	40%
Following long fallow	0%	75%	0%	53%	-	-	67%	55%	40%
'Double cropped'	0%	0%	50%	6%	-	-	8%	5%	0%
Following a cover crop	0%	6%	50%	0%	-	-	0%	9%	0%
New fields	0%	0%	0%	12%	-	-	0%	9%	0%

* Multiple field histories could be reported – results may not add to 100%.
Results above for 2021 are the same between % of grower with at least one hectare of history and the average proportion of cotton area with this history because all n = 39 Raingrown / Dryland growers reported only one type of field history each.

Significant changes made to cotton farming system

During the 2021 survey, growers were asked (without prompt) to describe what, if any, significant changes had been made to their farming system. The feedback provided showed that:

- Almost one in two (48%) indicated no significant changes had been made. Some caution may need to be made interpreting this result as growers may not be able to easily 'stand back' and assess the inevitable changes that are made from time to time and determine these as significant (perhaps more likely to describe these as a continuous program of change).
- Of those that did identify a significant change, the most frequently cited response related to irrigation system changes.
- A variety of other changes were mentioned during the survey responses.

An illustration of some of the feedback provided is shown below.

In the last five years can you please describe any significant changes made to your cotton farming system? (For example: cover cropping, changed irrigation system to bankless or overhead, converted picker to controlled traffic, moved to no tillage cotton system)
Base: All growers; n = 233

48% - No / Nothing / N/A

21% - Irrigation related changes

7% - Planting system related changes

6% - Cover cropping

4% - Controlled traffic

4% - Fertiliser related changes

4% - No / minimum tillage practices

3% - Technology / machinery related changes

2% - Land prep changes

1% - Managing drought / no rain

1% - Crop rotation changes

Some of what they said…

"A greater focus on nutrition and delaying planting date to end of October compensating for reduced seedling vigour in the newer varieties, later planted crops seem to do better in the district, the Bollgard 3 does seem to seem to have a quicker crop set allowing a later planting date."

"Converted from siphon to bankless irrigation. Exclusion fenced the entire operation. Upgraded planters to precision seeding products. Using biochemical fertilizer catalysts to give stronger root systems. Added telemetry to water storages, channels & drains."

"Improvement on irrigation efficiency, upgraded channel size and use gravity more than pumping, better cover on storage, improvement on bores and solar electric pumps rather than diesel. Constantly monitoring changes in technology."

"This year we planted our crop without any upfront fertilisers and when the cotton grew we side dressed the majority of our fertilisers into the sides of the hills and water run some of the nitrogen."

"We've changed the way we grow our cotton from an irrigation point of view. We plant it with no water then we leave it there until we get enough water, previously we would abandon that cotton."

"We are now planting cotton in February in the wet season and we've only been able to grow cotton since we've had Bollgard 3 because it helps to control the Spodoptera caterpillar."

"Changing irrigation system on 96 Ha to lateral overhead for the coming 21/22 season. Changed crop rotation added in more sorghum to benefit from different chemical usage."

"We're moving to no tillage, it will be partially irrigated for the first time and use of the stubble as a cover crop and we have put in overhead irrigation instead of furrow."

"Changed my farm via eliminated siphons and changed it to which use a padman stop. And then you changed out the planting configuration from one meter to what we do now."

"Moved to no tillage, changed irrigation from flood to lateral overhead, trying to incorporate cover crops but that is dependent on season and associated risks."

"Land levelling to ensure no low spots. Added extra irrigation to overhead pivot. Cover cropping on the overhead irrigation pivot which is a new field."

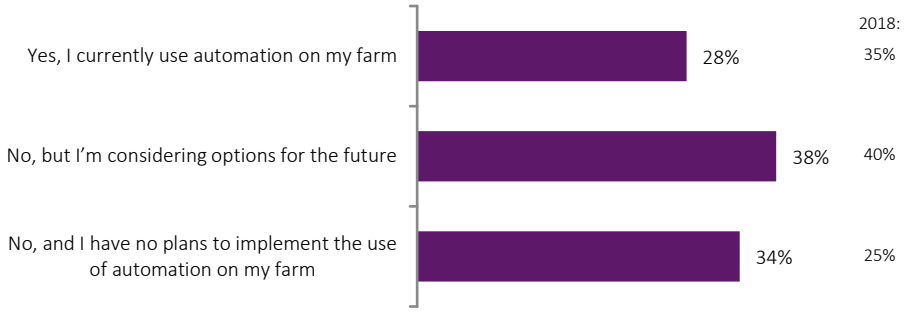
Results above are a subjective coding of verbatim answers from respondents. A list of all verbatims can be found in the supplementary Verbatim Report.

Digital connectivity

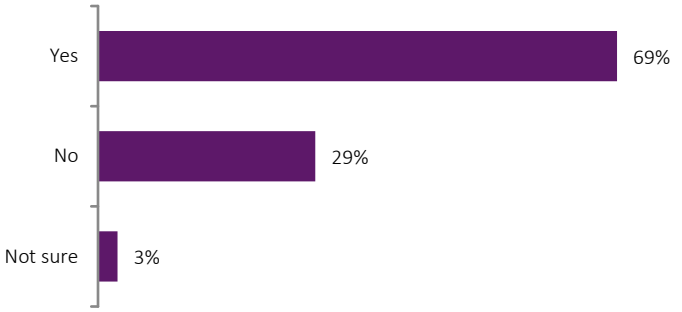
A measure of digital connectivity was included in the 2021 question set around the R&D impact on farming systems. The results show that:

- Fewer than one in three (28%) of growers reported they use some form of automation on farm, with a further 38% considering their options for the future. There is little variation of this result across region or farm size.
- Almost seven in ten growers (69%) reported utilising sensors or automation requiring digital connectivity. On this measure, there was more variation across the regions and a higher result among the larger farm businesses.

Are you currently using any automation (including automation for irrigation) on your farm?
Base: All growers; n = 233



Do you utilise sensors or automation that requires digital connectivity to monitor or manage your farm?
Base: All growers; n = 233



Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Yes	27%	29%	39%	27%	26%	27%	28%	27%	33%
No, considering	36%	40%	26%	27%	53%	63%	34%	40%	38%
No, no plans	36%	31%	35%	46%	21%	10%	38%	33%	29%

Key results by Region and Size of Total Farm Area

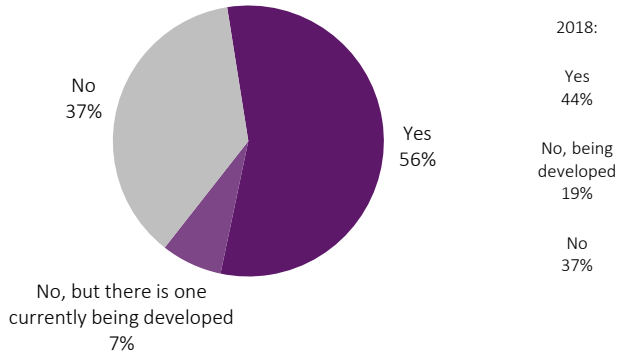
	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Yes	77%	56%	74%	65%	79%	73%	60%	72%	76%
No	18%	44%	17%	33%	21%	20%	37%	25%	24%
Not sure	5%	0%	9%	1%	0%	7%	4%	3%	0%

Farm biosecurity plan

The presence of a farm biosecurity plan was measured again in the 2021 survey. We note that:

- More than one in two growers reported they do have a farm biosecurity plan. This is up from the 44% reported in 2020.
- An unchanged 37% of growers reported they did not have a farm biosecurity plan in place. This was more evident among growers in the Darling Downs, Macquarie and Southern NSW regions and among the smaller farm businesses.
- That being said, almost one in four of the larger farm businesses reported not having a farm biosecurity plan in place.

Do you have a farm biosecurity plan (i.e. one that identified hazards and an action plan)?
Base: All growers; n = 233



Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Yes	68%	42%	83%	59%	42%	40%	54%	50%	74%
No, but one being developed	14%	10%	0%	4%	11%	10%	6%	10%	2%
No	18%	48%	17%	37%	47%	50%	40%	39%	24%

Farm biosecurity practices

Farm biosecurity remains a key issue for the industry. From the feedback provided in the survey, the results show that 84% of growers were using at least one of the nine listed practices to manage their farms' biosecurity. Reducing the proportion of growers not using practices to manage their farm biosecurity (16%) remains an area for future focus and effort.

Not all growers use the same or same number of practices. Four in ten reported using all nine of the listed practices, and on average, growers reported using just over six of the nine listed practices.

The analysis (shown on the following page) illustrates a relationship between practice implementation and the presence of a farm biosecurity plan:

- Growers with a plan use on average 8.2 of the 9 listed practices to manage their farms biosecurity;
- Growers developing a plan use 7.1 practices on average; while
- Growers without a plan use just 3.6 of the nine practices.

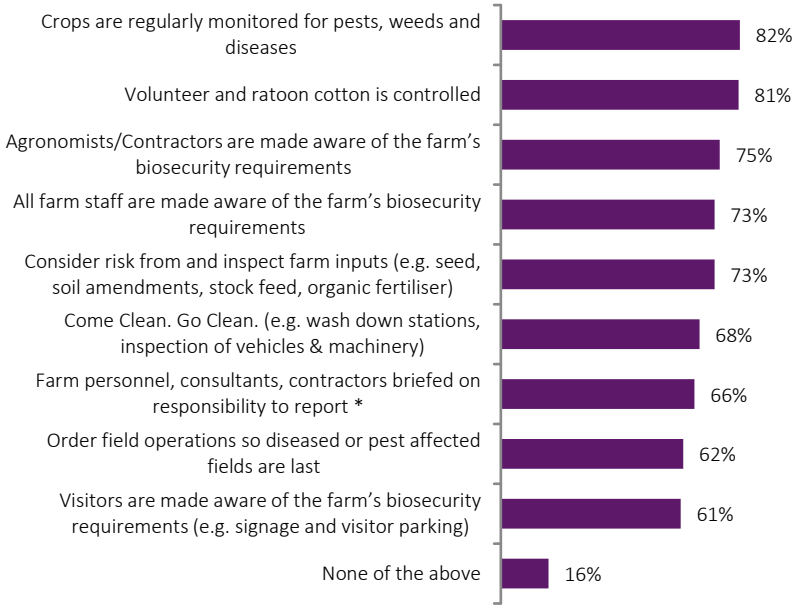
6.4

Number of practices used to manage farm biosecurity

40%

Of growers use all nine listed practices in their management

Which of the following practices are implemented to manage your farm's biosecurity? Please select all that apply.
Base: All growers; n = 233



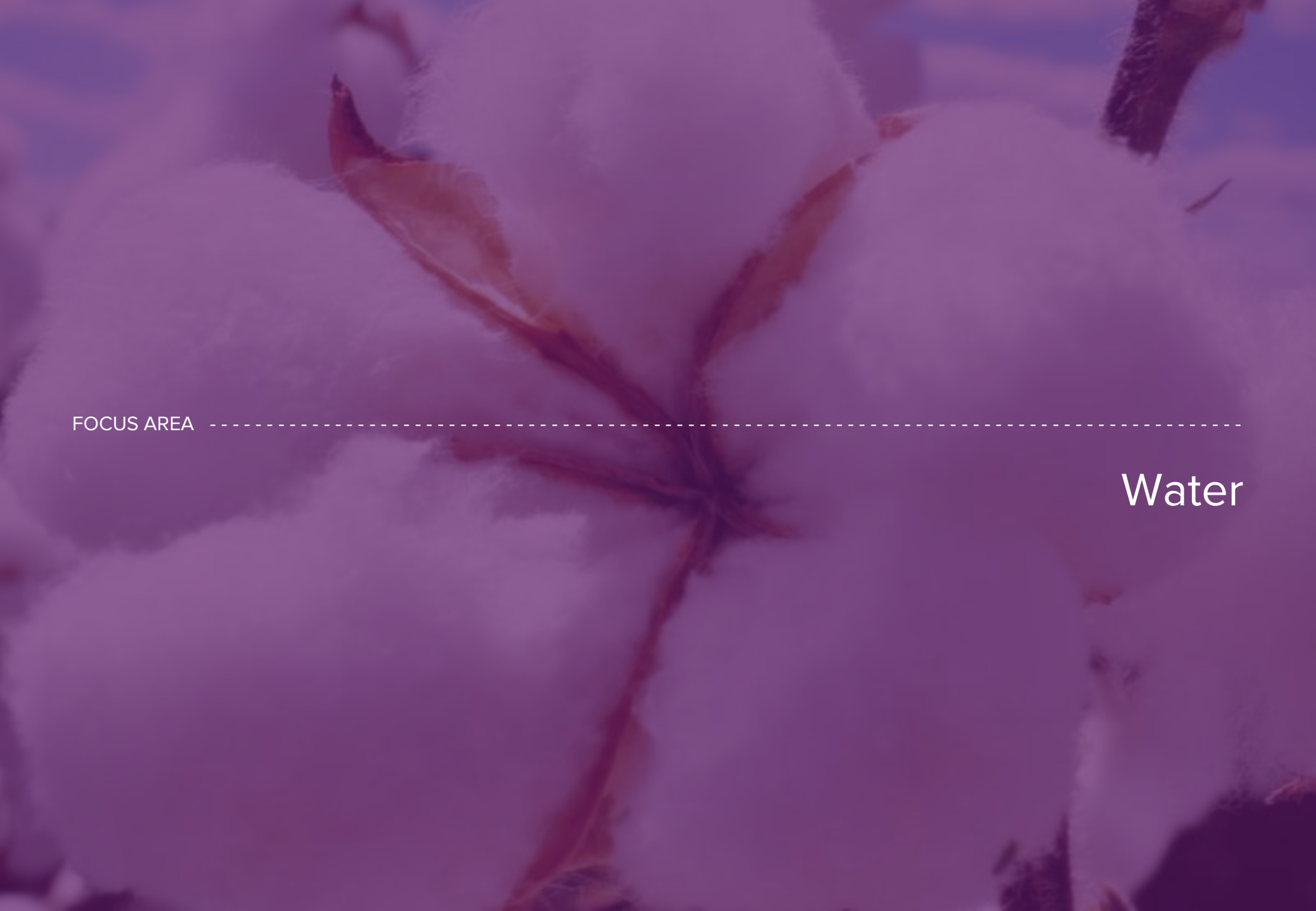
Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Crops are regularly monitored	73%	83%	91%	81%	84%	73%	79%	80%	90%
Volunteer / ratoon is controlled	73%	83%	91%	80%	84%	73%	79%	79%	90%
Agronomists / Contractors aware	73%	73%	83%	75%	68%	70%	74%	71%	86%
All farm staff made aware	77%	69%	83%	74%	58%	70%	76%	66%	86%
Consider risk from and inspect inputs	68%	73%	78%	70%	74%	73%	71%	69%	88%
Come Clean. Go Clean.	73%	56%	78%	72%	68%	63%	65%	64%	83%
Briefed on responsibility to report	68%	65%	74%	72%	42%	60%	68%	59%	81%
Order field operations	59%	56%	83%	59%	53%	70%	60%	57%	81%
Visitors made aware	64%	60%	70%	60%	58%	57%	65%	53%	76%
None of the above	23%	13%	9%	17%	11%	27%	18%	17%	10%

* 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".

Farm biosecurity practices

	Have a farm biosecurity plan		
	Yes (n = 130)	No, but one being developed (n = 17)	No (n = 86)
Crops are regularly monitored for pests, weeds and diseases	99%	88%	53%
Volunteer and ratoon cotton is controlled	98%	88%	53%
Agronomists/Contractors are made aware of the farm's biosecurity requirements (e.g. inductions, staff meetings)	98%	76%	40%
All farm staff are made aware of the farm's biosecurity requirements (e.g. inductions, staff meetings)	96%	82%	36%
Consider risk from and inspect farm inputs (e.g. seed, soil amendments, stock feed, organic fertiliser)	88%	82%	48%
Come Clean. Go Clean. (e.g. wash down stations, inspection of vehicles & machinery)	92%	82%	29%
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	84%	76%	37%
Order field operations so diseased or pest affected fields are last	78%	71%	36%
Visitors are made aware of the farm's biosecurity requirements (e.g. signage and visitor parking)	84%	65%	27%
Average number of practices used to manage farm biosecurity:	8.2	7.1	3.6



FOCUS AREA

Water

Water captured/extracted

For the 2020-21 cotton growing season, how much water (regulated and unregulated) was captured or extracted from the following sources?

Base: All growers who grew cotton during the 2020-21 season; n = 173

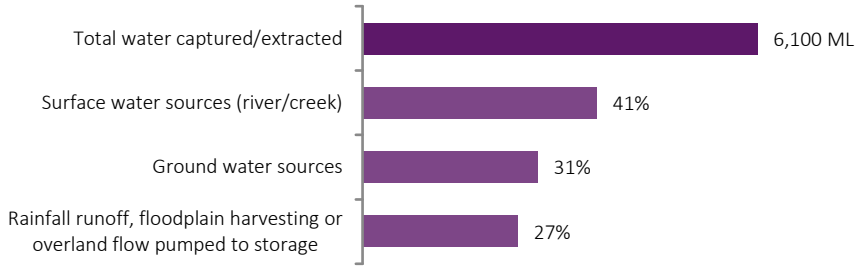
88% reported capturing/extracting water from at least one of the three sources

Key results by Region and Size of Total Farm Area

	Central QLD (n=13)	Darling Downs (n=41)	Macintyre Balonne (n=19)	Northern NSW (n=58)	Macquarie (n=12)	Southern NSW (n=20)	Small (n=59)	Medium (n=81)	Large (n=33)
% captured/extracted	85%	88%	95%	84%	100%	100%	86%	91%	85%

For the 2020-21 cotton growing season, how much water (regulated and unregulated) was captured or extracted from the following sources?

Base: All growers who grew cotton during the 2020-21 season and captured/extracted water; n = 152 (n = 1 outlier removed) *



Key results by Region and Size of Total Farm Area

	Central QLD (n=11)	Darling Downs (n=36)	Macintyre Balonne (n=18)	Northern NSW (n=49)	Macquarie (n=12)	Southern NSW (n=20)	Small (n=51)	Medium (n=74)	Large (n=27)
Total water captured/extracted	4,896	1,478	19,437	4,746	3,614	7,059	1,294	3,925	21,060
Surface water sources (river/creek)	64%	28%	53%	33%	25%	63%	43%	39%	46%
Ground water sources	1%	31%	6%	45%	39%	36%	35%	32%	21%
Rainfall runoff, harvesting, etc.	35%	41%	42%	23%	36%	1%	22%	29%	33%

Was any of this [total ML from above] used on other crops or lost to operational losses (blow outs etc.) during the 2020-21 cotton growing season? †

Base: All growers who grew cotton during the 2020-21 season and captured/extracted water and could provide a response; n = 152 (n = 1 outlier removed) **

46% reported using water on other crops or reporting operational losses

Of this 46%...

25% average % of total ML captured/extracted that was used/lost

Key results by Region and Size of Total Farm Area

	Central QLD (n=11)	Darling Downs (n=36)	Macintyre Balonne (n=18)	Northern NSW (n=49)	Macquarie (n=12)	Southern NSW (n=20)	Small (n=51)	Medium (n=74)	Large (n=27)
% reported using water on other crops or reporting losses	73%	53%	44%	39%	42%	40%	41%	51%	43%
Base:	(n=8)	(n=18)	(n=8)	(n=19)	(n=5)	(n=8)	(n=21)	(n=37)	(n=11)
% of total ML captured / extracted that was used/lost	33%	23%	21%	22%	15%	38%	25%	22%	33%

† This question was asked as reported, asking for water lost on other crops or lost to operational losses together. It is acknowledged that operational losses is quite rare and that the reported results will most likely be related to water used on other crops.

* For proportion calculations, responses were only considered where figures for all sources were known (n = 2 removed, n = 150 valid for analysis).

** For proportion calculations, responses were only considered where figures for all sources were known (n = 1 removed, n = 69 valid for analysis).

In-crop rainfall and irrigation water

How much in-crop rainfall (in mm) did you receive in the 2020-21 cotton growing season between planting and harvesting?

Base: All growers who grew cotton during the 2020-21 season and could provide a response; n = 167

In-crop rainfall (mm)

283.4 mm
2020: 261.3 mm
2019: 114.6 mm
2018: 139.7 mm

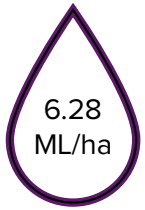
Key results by Region and Size of Total Farm Area

	Central QLD (n=13)	Darling Downs (n=41)	Macintyre Balonne (n=19)	Northern NSW (n=55)	Macquarie (n=10)	Southern NSW (n=19)	Small (n=59)	Medium (n=78)	Large (n=30)
In-crop rainfall (mm)	247.5	251.8	240.8	370.7	361.8	144.8	251.8	297.6	308.4

How much irrigation water (ML/ha) was applied to cotton during the 2020-21 cotton growing season?

Base: All growers who grew cotton during the 2020-21 season under full or part irrigation and could provide a response; n varies (Fully Irrigated, n = 133, Partially Irrigated, n = 30)

Cotton under full irrigation

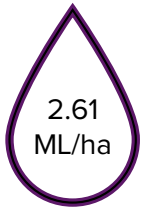


2020 (n = 115): 6.67 ML/ha

2019 (n = 125): 7.71 ML/ha

2018 (n = 149): 7.72 ML/ha

Cotton under part irrigation



2020 (n = 10): 3.50 ML/ha

2019 (n = 3): 5.33 ML/ha

2018 (n = 27): 1.10 ML/ha

Key results by Region and Size of Total Farm Area

	Central QLD (n=10)	Darling Downs (n=27)	Macintyre Balonne (n=15)	Northern NSW (n=43)	Macquarie (n=11)	Southern NSW (n=19)	Small (n=46)	Medium (n=62)	Large (n=25)
Fully irrigated – Mega litres per ha	6.51	4.45	7.49	5.19	7.57	8.82	5.65	6.45	7.02
	Central QLD (n=3)	Darling Downs (n=9)	Macintyre Balonne (n=4)	Northern NSW (n=11)	Macquarie (n=1)	Southern NSW (n=1)	Small (n=9)	Medium (n=16)	Large (n=5)
Partially irrigated – Mega litres per ha	3.43	1.89	3.25	2.64	3.00	2.40	2.73	2.39	3.08

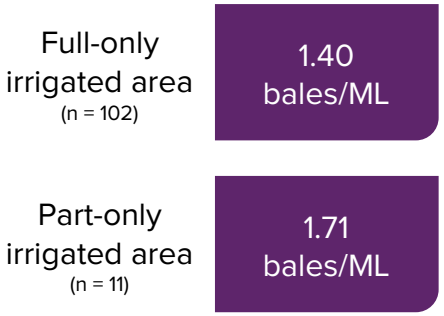
GPWUI: Gross Production Water Use Index

The GPWUI (Gross Production Water Use Index) is an index to benchmark water productivity. This benchmark relates total production (bales) to the total amount of water used, from all sources including irrigation water, rainfall (total or effective) and soil moisture. In the 2021 Grower Survey, an extended section of questions related to water use and the GPWUI was used to provide a more accurate measure. Due to this and a more complex methodology, trend data is not reported.

Calculations were undertaken with help from the Water R&D team at the NSW Department of Primary Industries. For the purposes of calculations for this report, results across fully irrigated only land and partially irrigated only land were used.

The results from the 2021 Grower Survey indicate that across all growers responding to the 2021 survey, the GPWUI was at 1.40 bales/ML. The table below show the variation of this index across the growing regions (ranging from 1.04 in Southern NSW to 1.58 in Northern NSW).

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

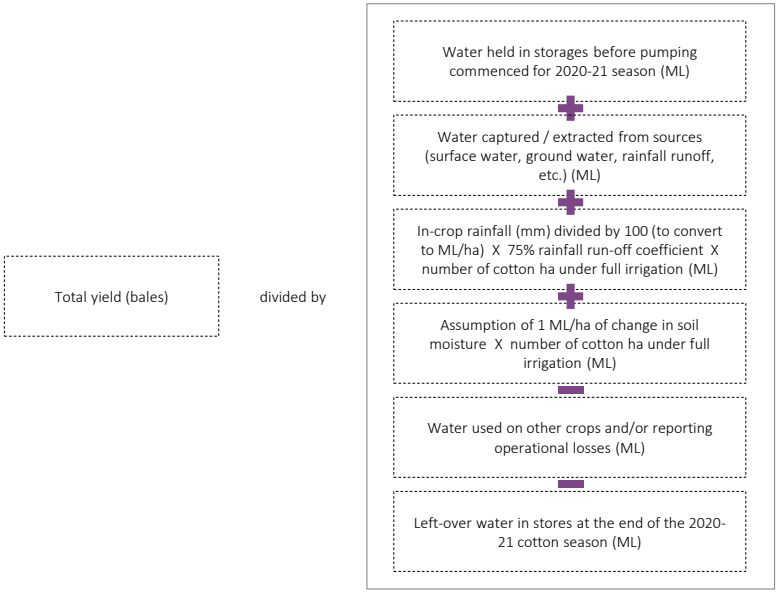


Key results by Region and Size of Total Farm Area (Full-only irrigated area)

	Central QLD (n=9)	Darling Downs (n=24)	Macintyre Balonne (n=10)	Northern NSW (n=29)	Macquarie (n=8)	Southern NSW (n=18)	Small (n=38)	Medium (n=50)	Large (n=14)
GPWUI (bales/ML)	1.27	1.53	1.49	1.58	1.23	1.04	1.55	1.28	1.43

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

The following calculation is performed for each individual grower and then averaged to provide an overall measure of GPWUI.
Please note that some of these measures were asked to respondents, but are not provided in this report as they are specifically for use in the GPWUI calculation.



† Due to inconsistent estimates provided for soil moisture, this part of the calculation was replaced with a standard estimate of 1ML/ha for change in soil moisture for the 2021 result.
In 2021, it was introduced into the calculation that 25% of in-crop rainfall did not infiltrate the cotton crop, and so 75% of the in-crop rainfall result was used in the calculation.

Practices to minimise losses

A measure of the practices to minimise water loss was collected again in the 2021 Grower Survey.

- 82% of growers reported employing at least some practices to minimise loss.
- On average, growers use almost 2 practices (1.7)

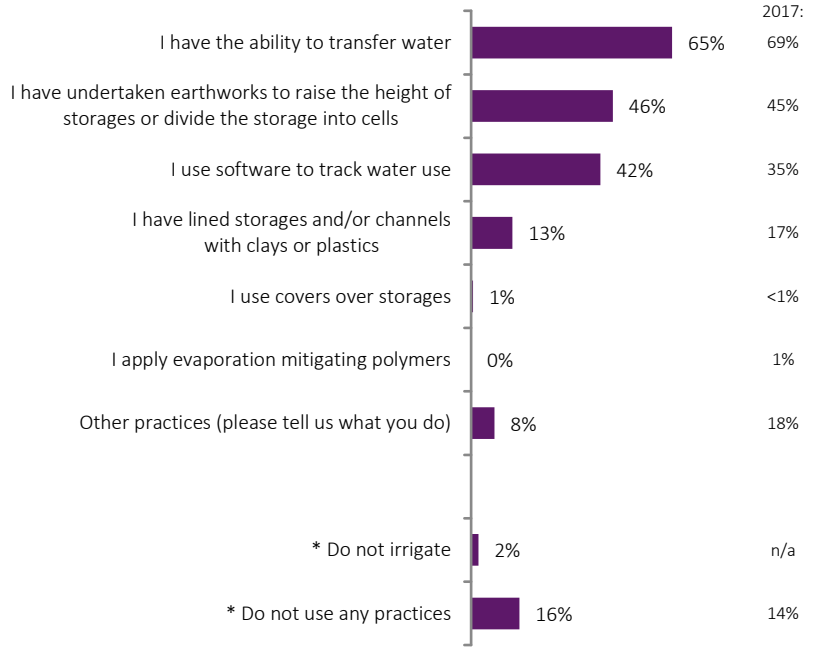
The ability to transfer water, use of earthworks to raise the height of storage area or use of software to track water use were the main practices used.

82% (2017: 86%) Of growers employ some practices to minimise losses

25% Used one practice only
28% Used two practices
29% Used three or more practices

1.7 (2017: 1.9) Number of practices used on average to minimise losses

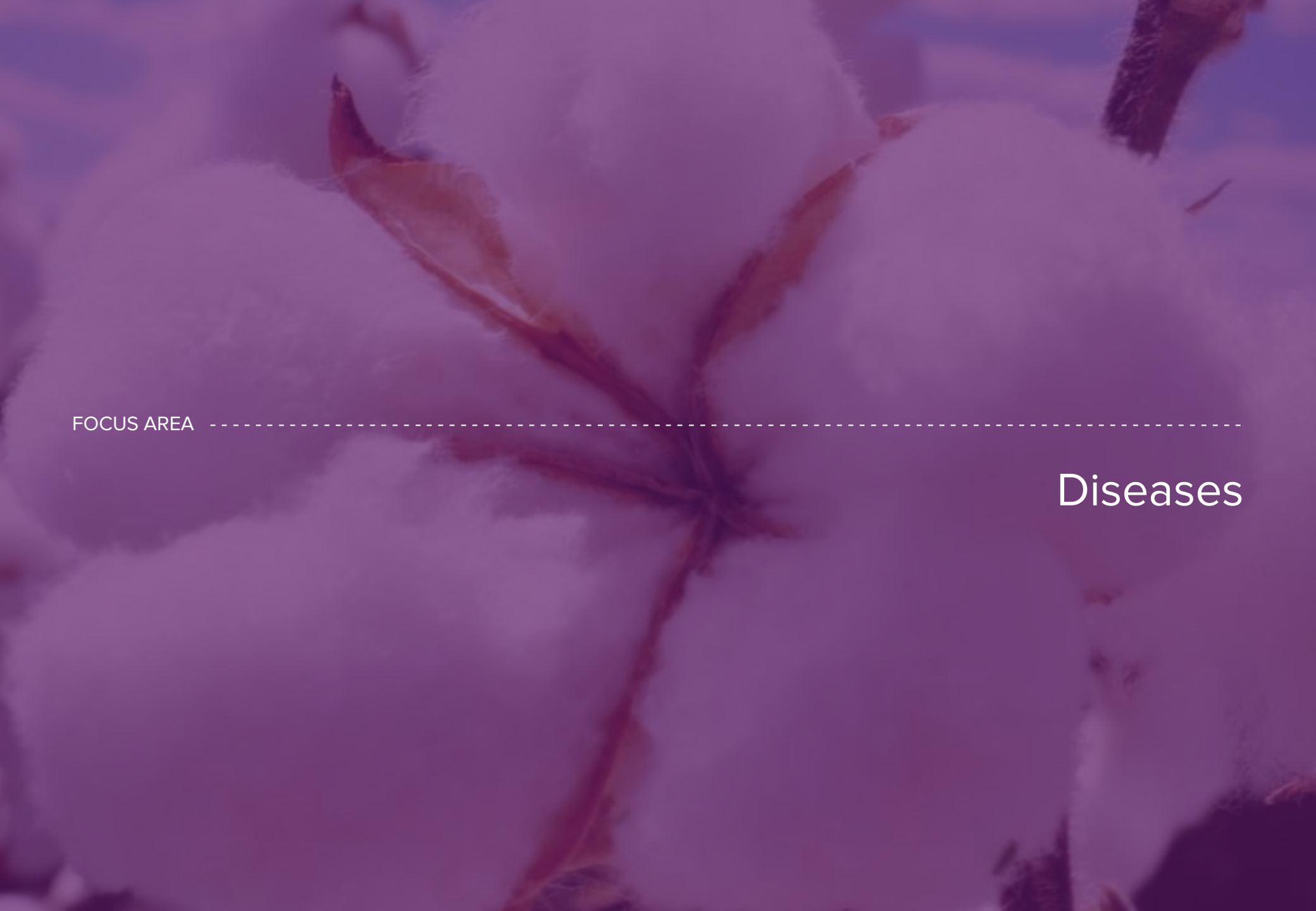
Do you currently use any of the following practices to minimise losses to evaporation & drainage? Please select all that apply.
Base: All growers who grew cotton during the 2020-21 season; n = 173



Key results by Region and Size of Total Farm Area

	Central QLD (n=13)	Darling Downs (n=41)	Macintyre Balonne (n=19)	Northern NSW (n=58)	Macquarie (n=12)	Southern NSW (n=20)	Small (n=59)	Medium (n=81)	Large (n=33)
I have the ability to transfer water	69%	63%	84%	64%	33%	85%	54%	69%	73%
I have undertaken earthworks	31%	41%	63%	53%	42%	40%	31%	54%	52%
I use software to track water use	46%	32%	53%	43%	33%	55%	31%	41%	64%
I have lined storages and/or channels	15%	12%	5%	9%	25%	25%	10%	15%	15%
I use covers over storages	0%	0%	0%	2%	0%	0%	0%	0%	3%
I apply evaporation mitigating polymers	0%	0%	0%	0%	0%	0%	0%	0%	0%
Other practices	0%	2%	16%	10%	25%	0%	5%	6%	15%
Do not irrigate	8%	2%	0%	2%	0%	0%	3%	2%	0%
Do not use any practices	15%	20%	5%	14%	17%	10%	19%	14%	15%

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



FOCUS AREA

Diseases

Diseases on-farm

During the 2021 Grower Survey, growers were asked about the presence of five different diseases on their farm:

- Just over one in two growers (55%) reported having at least one of the five nominated diseases on-farm. This included:
  - 22% reporting having just one of the five diseases;
  - 20% reporting having two of the five; and
  - 13% reporting having three or more.

The incidence of the various diseases was largely consistent (23% - 29%) other than for Reoccurring Wilt where just 5% of growers indicated they had this disease on-farm.

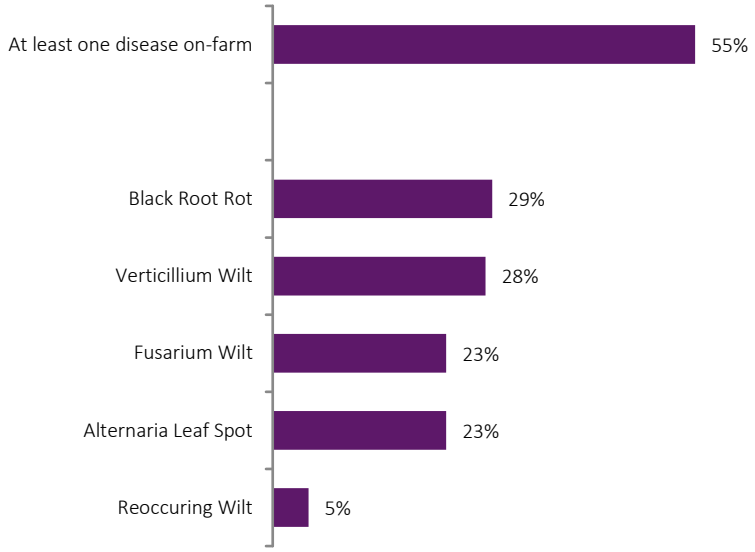
1.1
diseases on-farm on average

22%
Reported having just one disease on-farm

20%
Reported having two diseases on-farm

13%
Reported having three or more diseases on-farm

Which of the following diseases do you have on your farm?
Base: All growers; n = 233



Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
At least one disease on-farm	45%	65%	61%	60%	42%	47%	55%	58%	50%
Black Root Rot	27%	21%	26%	35%	37%	30%	23%	34%	26%
Verticillium Wilt	0%	29%	35%	44%	21%	7%	28%	26%	33%
Fusarium Wilt	9%	48%	43%	15%	16%	7%	20%	27%	19%
Alternaria Leaf Spot	32%	21%	17%	19%	26%	37%	24%	23%	19%
Reoccuring Wilt	5%	4%	26%	1%	5%	0%	1%	6%	7%

Diseases and yield loss

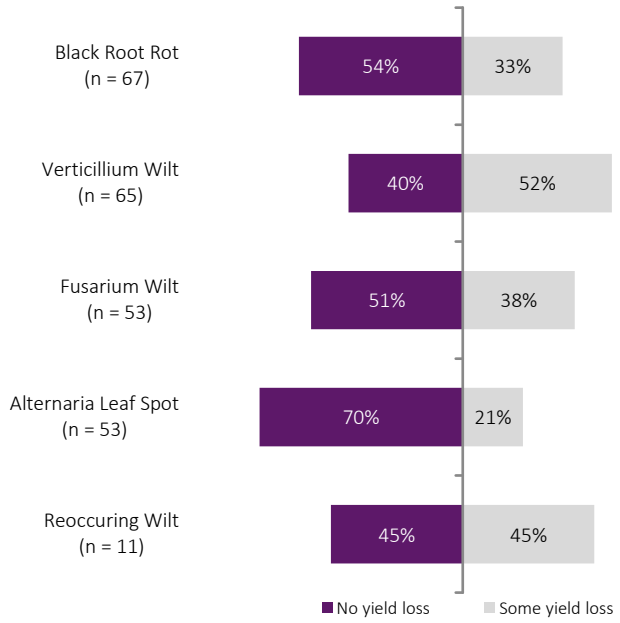
The follow up question around the five nominated disease present on-farm was a measure of the yield loss as a result of areas affected by the diseases.

Based on the feedback provided by growers experiencing these various diseases, we see that yield loss was different across the various diseases present on farm:

- 52% of growers experiencing Verticillium Wilt reported at least some yield loss;
- 45% of growers reporting Reoccurring Wilt;
- 38% of growers reporting Fusarium Wilt;
- 33% of growers reporting Black Root Rot; and
- 21% of growers reporting Alternaria Leaf Spot.

47%
of those with disease on-farm reported some yield loss

How much yield loss, if any, had resulted from the areas affected?
Base: All growers who reported having at least one of the five listed diseases on-farm; n = 129



Key results by Region and Size of Total Farm Area (% some yield loss)

	Central QLD (n=6)	Darling Downs (n=10)	Macintyre Balonne (n=6)	Northern NSW (n=28)	Macquarie (n=7)	Southern NSW (n=9)	Small (n=19)	Medium (n=37)	Large (n=11)
Black Root Rot	0%	40%	0%	36%	43%	56%	42%	27%	36%
Base:	(n=0)	(n=14)	(n=8)	(n=36)	(n=4)	(n=2)	(n=23)	(n=28)	(n=14)
Verticillium Wilt	-	21%	63%	64%	75%	0%	39%	61%	57%
Base:	(n=2)	(n=23)	(n=10)	(n=12)	(n=3)	(n=2)	(n=16)	(n=29)	(n=8)
Fusarium Wilt	100%	39%	40%	33%	0%	50%	38%	38%	38%
Base:	(n=7)	(n=10)	(n=4)	(n=15)	(n=5)	(n=11)	(n=20)	(n=25)	(n=8)
Alternaria Leaf Spot	14%	10%	0%	20%	40%	36%	10%	32%	13%
Base:	(n=1)	(n=2)	(n=6)	(n=1)	(n=1)	(n=0)	(n=1)	(n=7)	(n=3)
Reoccuring Wilt	0%	50%	50%	0%	100%	-	0%	43%	67%

Tactics used to combat disease

Growers reporting one or more of these five nominated diseases on-farm were then asked to describe the tactics they used to combat these diseases. The question was included in the 2021 survey to look for alternative tactics being used by growers outside of the usual industry tactics.

The responses from these growers was provided in an open-ended format. Several growers reported using more than one approach and often described their approach in different ways, but the general thematic approaches and tactics used are as below.

Rotation of crops was the most often mentioned tactic used by this grower cohort. Other tactics like later planting, minimisation of back-to-back cotton, varietal selection and general farm hygiene were also cited.

A full set of responses to this question are provided in the accompanying dataset from this research.

Can you describe what tactics you use to combat these diseases? We're interested in the specific tactics and approaches you use particularly anything outside the current industry recommendations or tactics that you believe are anecdotally assisting reduce disease incidence

Base: All growers who reported having at least of the five listed diseases on-farm; n = 129

47% - Crop rotation

12% - Varietal selection

10% - Minimise back-to-back cotton

9% - Good farm hygiene

7% - Later planting

5% - Don't over water

4% - Use of fungicides

4% - Long fallow

4% - Follow industry recommendations

3% - Planting other crops

9% - No / Nothing / N/A

Some of what they said…

"Come clean go clean. Minimise the use of the lateral full growing cotton because it gives the environment to reduce the risk of the disease, growing anything that is a grass in between takes it away from broadleaf. Good monitoring by the agronomy team."

"Left the paddocks untouched & fallow for several years because of the seasonal conditions, it was originally going to be for 18 months but that has increased because of the drought, basically keep it bare of all vegetation."

"Having control of machinery and cleaning down, moving from one part of the farm to another, being careful with contractors, we have been putting lots of manure on, that doesn't seem to be a problem in importing disease."

"Crop rotation, varietal selection, nutritional management - ensure crop is not stressed, keep crop as healthy as possible, with water - ensuring crop is not stressed, keep moisture levels consistent."

"Black root rot - grow rice in the rotation, flooding the field for an extended period of time seems to help. We rotate with winter cereals, grass crops instead of broadleaf crops."

"We're planting later and we've made our bays smaller to get the water on and off faster and we create a big hill so the plant is out of the wet zone and grow corn in the off-season."

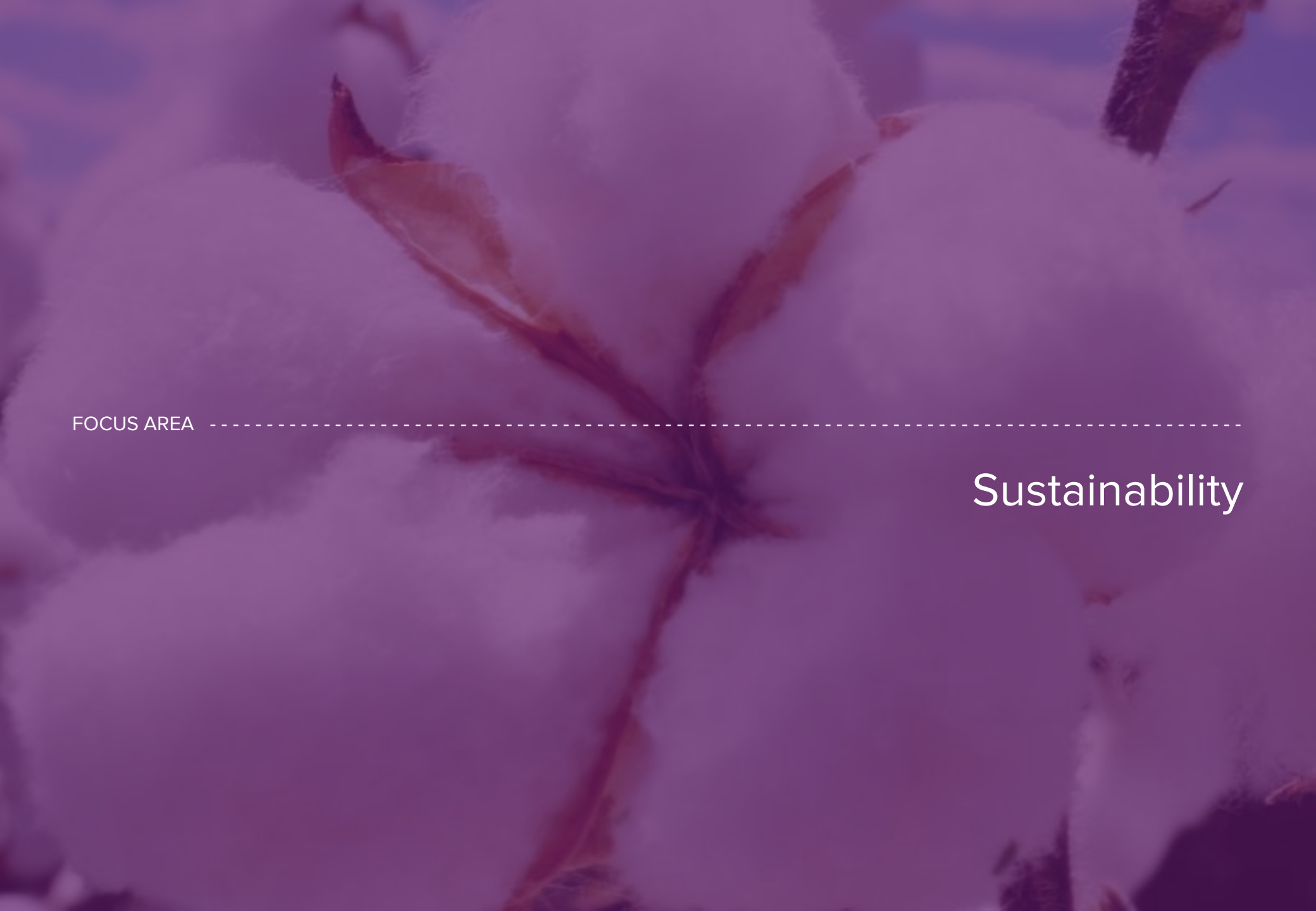
"More about good luck and planning. We think cover cropping has increased our Fusarium Wilt, we need to choose a more resistant variety next year and avoid in-crop cultivation."

"Mostly we're rotating fields. We don't grow back-to-back cotton. So we have on in half out. So we have more area now. We use cereals in the rotation as well."

"Flood fields to create anaerobic conditions to suppress fusarium & verticillium. Otherwise use good agronomy & farming practices and disease resistant varieties."

"We manage our nutrients so we have a full suite of nutrients available to the plant to avoid stressing the plant. We try not to grow back-to-back cotton."

Results above are a subjective coding of verbatim answers from respondents. A list of all verbatims can be found in the supplementary Verbatim Report.



FOCUS AREA

Sustainability

Awareness and importance of PLANET. PEOPLE. PADDOCK.

PLANET. PEOPLE. PADDOCK. is the Australian cotton industry's sustainability framework introduced in 2020. Through a process of stakeholder consultation and review, eight environmental, economic and social sustainability topics have been assessed as being most important to cotton growers and stakeholders inside and outside the industry.

Growers in the 2021 survey were asked about the importance of the "PLANET. PEOPLE. PADDOCK." sustainability program. This measure was also included in the 2020 survey.

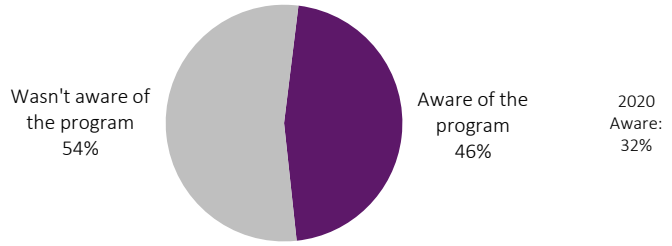
The feedback shows that almost one in two (46%) of growers reported being aware of the program. This was an increase on the result reported in 2020 (32%).

Pleasingly, there was little difference in awareness of the program across farm size. There continues to be some variation across the regions as noted in 2020.

Amongst growers who were aware of the program, they rated the importance of the program at 3.9 (out of 5), a result consistent with the 2020 result (3.8) confirming that growers are seeing the program as important. Among this cohort of growers:

- Importance ratings ranged from 1 to 5;
- 67% of growers rated the importance at 4 or higher;
- 7% of growers rated the importance a 1 or 2. Understanding the reasons for these lower ratings might be useful to help ensure there is stronger traction among growers who are aware of the program.

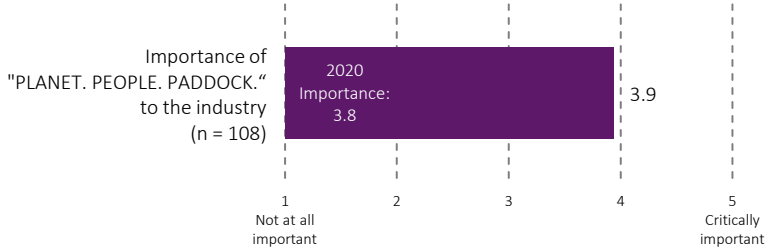
How important is cotton's "PLANET. PEOPLE. PADDOCK." sustainability program to the industry?
Base: All growers; n = 233



Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Aware of the program	68%	50%	39%	40%	68%	33%	46%	47%	45%

Of those aware of the program…



Key results by Region and Size of Total Farm Area

	Central QLD (n=15)	Darling Downs (n=24)	Macintyre Balonne (n=9)	Northern NSW (n=32)	Macquarie (n=13)	Southern NSW (n=10)	Small (n=38)	Medium (n=51)	Large (n=19)
Importance of "PLANET. PEOPLE. PADDOCK." to the industry	4.1	3.9	4.2	3.5	4.0	4.5	4.1	3.8	3.9

Carbon footprint assessment and changes

Growers in the 2021 survey were asked about their understanding of their carbon footprint and to identify changes that had been made to reduce their carbon footprint.

Fewer than three in ten growers (29%) reported they were actively assessing their carbon footprint of their production system. Larger farms were more actively assessing their carbon footprint compared to small and medium-sized farms. There were variations across the regions in the measure.

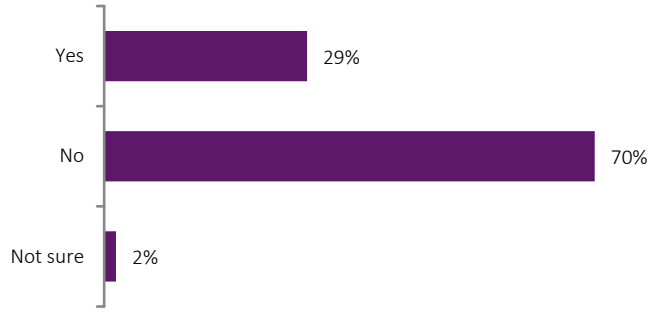
That said, almost six in ten growers were making or planning to make changes to reduce their carbon footprint.

Growers who were actively assessing their carbon footprint were much more likely to also be making changes. There looks to be then a relationship between measurement and action in regards to a farm's carbon footprint.

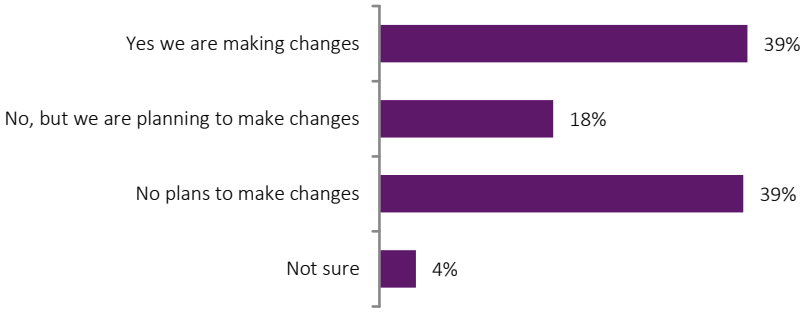
Reducing carbon footprint by assessment of footprint on their production system

	Yes, actively assessing (n = 67)	No, not assessing (n = 162)
Yes we are making changes	70%	27%
No but we are planning to make changes	18%	18%
No plans to make changes	12%	51%
Not sure	0%	4%

Are you actively assessing the carbon footprint of your production system?
Base: All growers; n = 233



Are you making changes to reduce your cotton production carbon footprint?
Base: All growers; n = 233



Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Yes	23%	29%	30%	35%	16%	17%	24%	26%	45%
No	68%	71%	70%	65%	79%	80%	72%	73%	55%
Not sure	9%	0%	0%	0%	5%	3%	4%	1%	0%

Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Yes	27%	46%	39%	44%	37%	20%	45%	33%	43%
No, planning to	18%	19%	17%	17%	16%	17%	13%	24%	14%
No plans	45%	33%	39%	36%	47%	53%	35%	40%	40%
Not sure	9%	2%	4%	2%	0%	10%	6%	3%	2%

Climate change and production systems

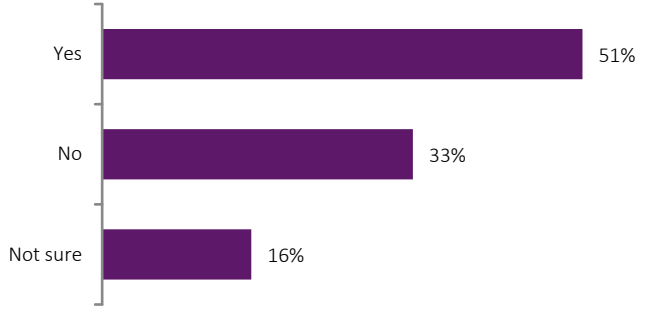
More than one in two growers (51%) reported that they believed their regional climate patterns will result in a change to their production systems over the next 10 years.

Larger farms (62%) were more likely to believe this proposition than medium (54%) or smaller farms (41%).

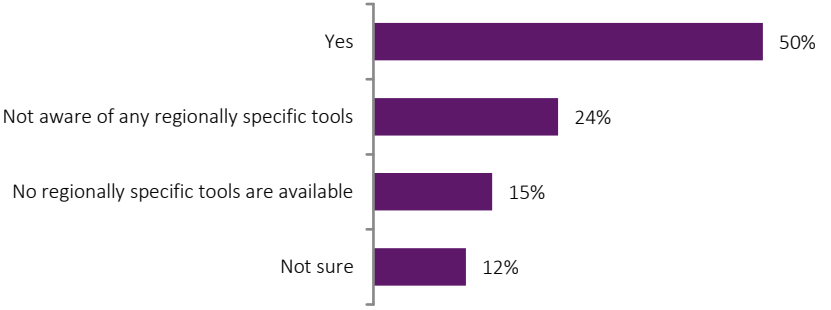
Of this cohort, one in two indicated they had regionally specific information and forecasting tools to support any plan to change their production systems. The remaining indicated they were unaware of any tools or did not believe the tools were available. There is then some further effort required to provide visibility of and connect these growers to the available regionally specific resources.

There remains one in three growers who don't believe they will need to adapt their production systems to accommodate changing regional climate patterns.

Do you think changes in your regional climate patterns will mean you will have to adapt your production system significantly in 10 years time?
Base: All growers; n = 233



Do you have regionally specific information and forecasting tools to support your plan to change?
Base: All growers who think they will have to adapt their production system significantly in 10 years time; n = 119



Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Yes	41%	54%	48%	58%	47%	43%	41%	54%	62%
No	23%	35%	39%	31%	32%	37%	38%	32%	26%
Not sure	36%	10%	13%	11%	21%	20%	21%	14%	12%

Key results by Region and Size of Total Farm Area

	Central QLD (n=9)	Darling Downs (n=26)	Macintyre Balonne (n=11)	Northern NSW (n=47)	Macquarie (n=9)	Southern NSW (n=13)	Small (n=34)	Medium (n=59)	Large (n=26)
Yes	44%	46%	64%	47%	56%	54%	47%	47%	58%
Not aware of any	33%	23%	18%	23%	22%	23%	38%	20%	12%
None available	0%	19%	18%	17%	11%	8%	6%	22%	12%
Not sure	22%	12%	0%	13%	11%	15%	9%	10%	19%

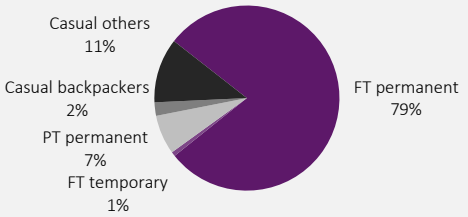
FOCUS AREA

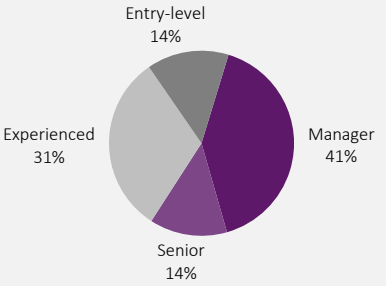
Workforce and training

Number of people in workforce

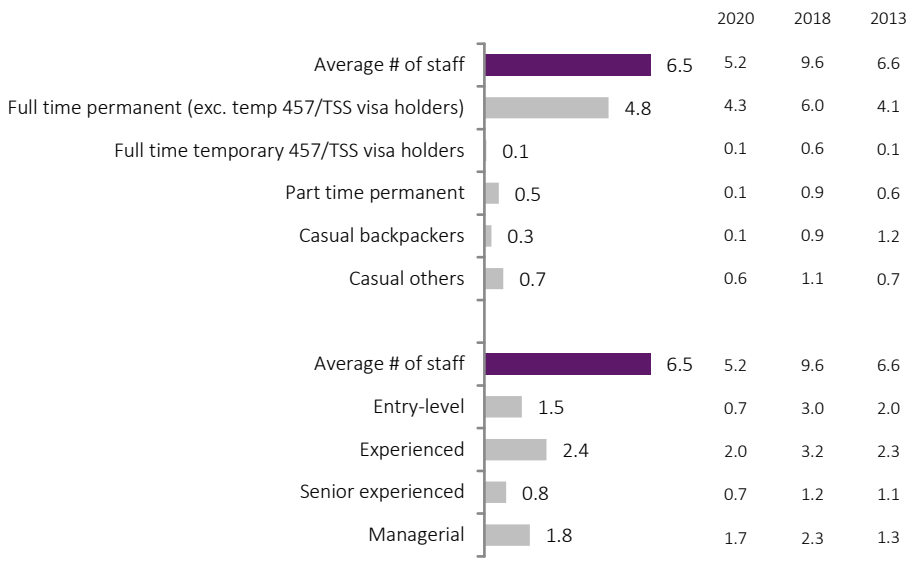
The 2021 CRDC Grower Survey explored several different workforce-related topic areas. Some of the key results of the feedback provided were that:

- Growers reported an average workforce (including grower and family staff) of: 3.2 staff (small-sized farms), 5.4 staff (medium-sized farms) and 15.6 staff (large-sized farms).
- The results are largely consistent with those reported in 2020.
- There appears to have been a rebound in the number of part time permanent and casual staff on farms in the 2021 season:
  - Entry level now representing 14% of the employee mix; and
  - Casual staff representing 14% of the employee mix.
- A standardised estimate across farm size (calculated as the number of staff employed per 1,000 hectares) was 3.9 staff per 1,000 hectares. This compares to 4.1 staff employed per 1,000 hectares in the 2020 Grower Survey and 6.7 staff employed per 1,000 hectares in the 2018 Grower Survey.





On the 1st January 2021, 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 = 233



Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Average # of staff	**5.0**	**4.1**	**9.7**	**7.2**	**5.6**	**6.5**	**3.2**	**5.4**	**15.6**
Full time permanent	3.8	3.3	7.8	5.3	3.3	5.0	2.3	4.2	11.4
Full time temporary	0.1	<0.1	<0.1	0.1	0.0	0.1	<0.1	<0.1	0.3
Part time permanent	0.3	0.4	0.6	0.7	0.6	0.4	0.3	0.4	1.4
Casual backpackers	0.2	0.1	0.6	0.3	0.1	0.1	0.1	0.1	0.9
Casual others	0.6	0.3	0.7	0.8	1.7	0.9	0.5	0.6	1.6

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Average # of staff	**5.0**	**4.1**	**9.7**	**7.2**	**5.6**	**6.5**	**3.2**	**5.4**	**15.6**
Entry-level	0.8	0.4	2.1	2.0	1.9	1.3	0.4	1.0	4.6
Experienced	1.9	1.6	3.9	2.6	1.3	2.5	0.9	2.1	6.1
Senior experienced	0.6	0.7	1.5	0.8	1.1	0.6	0.4	0.7	2.0
Managerial	1.7	1.4	2.2	1.8	1.4	2.2	1.5	1.6	2.9

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

Training completed over the last 12 months

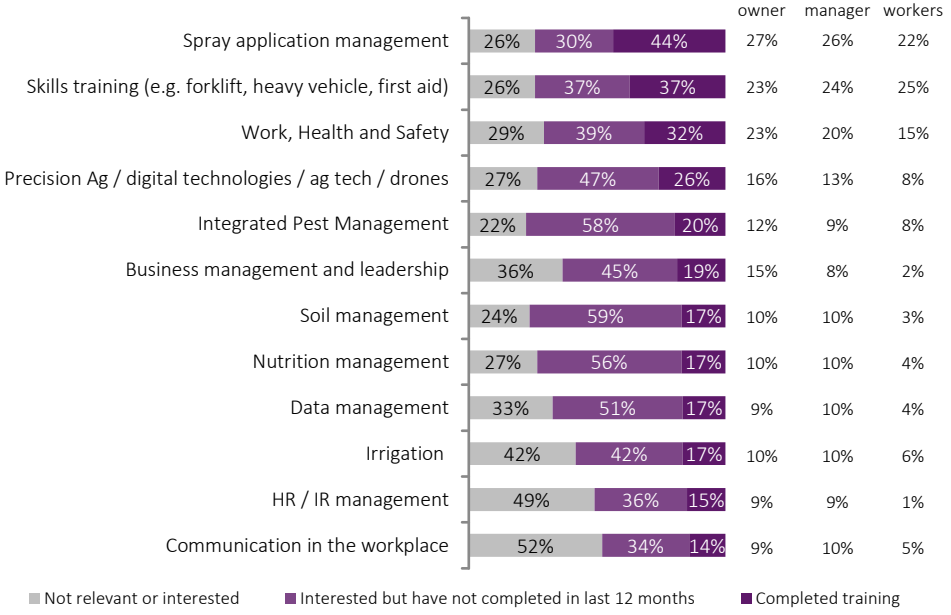
Measures of involvement in, and the impact of, education and training were measured in the 2021 CRDC Grower Survey. From the feedback provided this year, we note that:

- About two in three growers (66%) reported that there had been involvement at least one of the education or training courses over the last 12 months. We note this is an incidence measure and not a frequency measure, so some businesses and staff may have been involved in multiple training experiences.
- Smaller growers were however less likely (59%) to have been involved than larger businesses (86%). There may be challenges to overcome to ensure smaller business have the capacity unlock time and staff to participate in training and education opportunities.

2.7
areas of training completed on average

1.7	1.6	1.0
Completed by farm owner	Completed by farm manager	Completed by farm workers

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 = 233



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

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Spray application	36%	33%	61%	47%	42%	43%	39%	39%	64%
Skills training	36%	31%	57%	38%	21%	33%	29%	33%	64%
WH&S	23%	25%	43%	33%	32%	33%	18%	31%	60%
Precision Ag etc.	27%	23%	26%	28%	16%	27%	21%	25%	40%
Integrated Pest Mgmt.	18%	15%	22%	22%	16%	17%	15%	16%	40%
Business mgmt. etc.	9%	21%	26%	14%	26%	23%	13%	14%	43%
Soil mgmt.	0%	19%	22%	17%	11%	23%	11%	16%	33%
Nutrition mgmt.	9%	17%	17%	15%	16%	27%	15%	14%	31%
Data mgmt.	18%	15%	30%	16%	5%	17%	12%	15%	31%
Irrigation	14%	15%	35%	12%	11%	27%	16%	13%	29%
HR / IR mgmt.	5%	17%	13%	14%	11%	23%	12%	13%	26%
Comms in workplace	0%	17%	9%	17%	0%	20%	11%	8%	36%

Workforce issues over the last 12 months

The 2021 Grower Survey looked to identify some of the current workforce-related issues impacting growers. A list of possible issues were presented, and growers were asked to identify if they had experienced the issue in the last 12 months and if this issue was COVID-19 related, drought related or an on-going issue. From the feedback provided, we note that:

- Almost all growers (86%) reported that they had experienced at least one of the issues listed in the survey.
- Growers reported experiencing on average 4.3 of the issues listed in the survey. Not surprisingly larger farms appear to be confronted with more of the issues than smaller farms (Small: 3.6; Medium: 4.2; Large: 5.7)
- For the most part, growers identified these issues as on-going. Clearly the drought and COVID-19 has amplified some issues - attracting staff and access to casual and skilled labour were more often identified as drought and/or COVID-19 related.

4.3
workforce issues experienced on average

0.9	1.3	3.3
Issues drought contributed to	Issues COVID-19 contributed to	Issues that were on-going

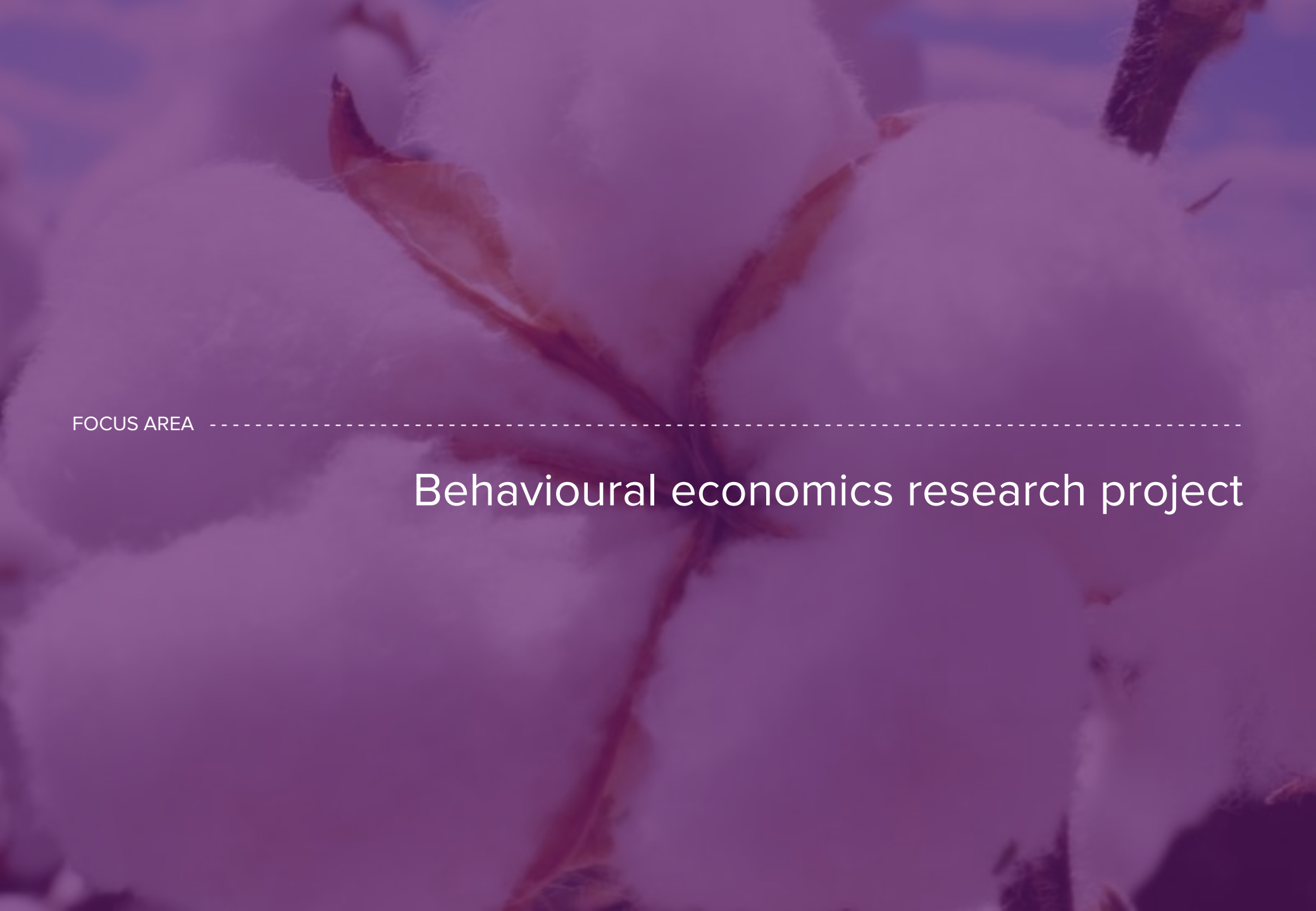
Note: an issue can be identified as having a contribution from one or more than one of these factors.

What workforce issues have impacted your farm business over the last 12 months? And if the issue were experienced, do you believe the drought or COVID-19 contributed to these workforce issues?
Base: All growers; n = 233

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

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
Input costs	59%	60%	70%	57%	74%	63%	59%	58%	79%
Skilled labour shortage	45%	38%	70%	62%	79%	67%	43%	60%	86%
Attracting staff	55%	40%	74%	60%	79%	53%	49%	52%	90%
Access to casual labour	50%	29%	70%	62%	74%	60%	43%	54%	83%
On farm complexity	36%	42%	35%	37%	79%	43%	37%	43%	55%
Envir. pressures	50%	25%	30%	30%	42%	40%	34%	31%	36%
Access to services	32%	35%	35%	30%	42%	33%	26%	34%	45%
Retaining staff	32%	19%	13%	37%	26%	37%	23%	32%	36%
Training staff	32%	15%	22%	33%	32%	20%	21%	29%	33%
Regional diversity	14%	17%	9%	14%	37%	10%	12%	18%	10%
Access to contractors	5%	4%	17%	14%	26%	23%	13%	11%	17%

* Full description of workforce issues provided to respondents:
On farm complexity (need to manage the business in more volatile operating environment)
Environmental pressures - farmers having to adapt quickly to intensifying their enterprise
Access to professional, technical and trade services in your regional community
Regional diversity (changes to farm size or development / relationships with service providers)



FOCUS AREA

Behavioural economics research project

Adopting digital technologies and their impact

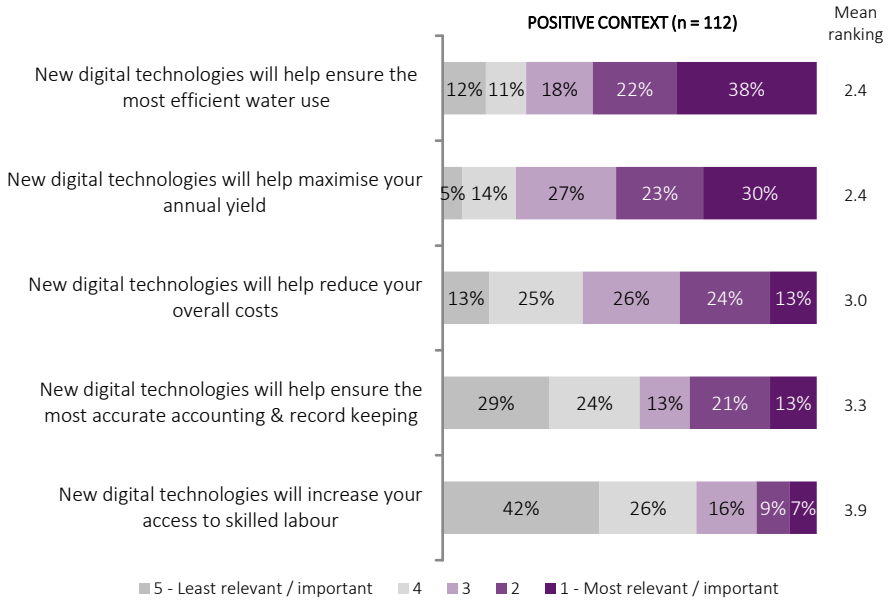
Growers were asked to rank statements about adoption of new technology based on relative importance. Approximately half of respondents were asked the question framed in a positive context, with the remaining respondents asked the same question however with a negative context.

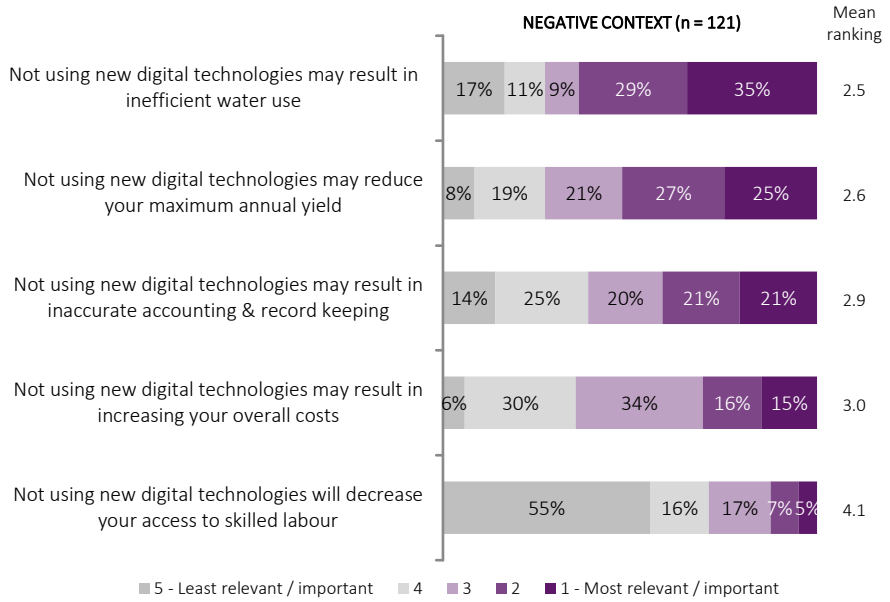
The results for this questions are being used as part of a larger study on grower adoption of new digital technologies. While the analysis of this data will be undertaken by the researchers managing this research, we do note that regardless of the positive or negative framing of the question, the two statements attracting the highest ranking were:

- the positive impact of new digital technologies on helping with efficient water use; and
- the positive impact of new digital technologies on maximizing annual yield.

There was some consistency in the ranking order of the five items regardless of the positive or negative context for the statements.

Adopting new digital technologies can have a significant impact on cotton farming. If you had to recommend a new digital technology for use in cotton farming, what order would you place the following points in relation to their importance.
Base: All growers; n = 233





Importance ranking provided to respondents:
1 = most relevant/important at the top;
5 = least relevant/important at the bottom.

FOCUS AREA

CottonInfo videos

Audience reach and reasons for watching

CottonInfo regularly produces videos to share information and updates with grower and agronomists.

The 2021 Grower Survey sought to measure grower uptake of CottonInfo videos:

- 56% of growers reported watching at least one CottonInfo video over the last two years.
- Interestingly, smaller farm businesses (62%) were more likely to watch the videos than their larger counterparts (48%).
- While general searching for information shaped consumption, almost three in four (72%) reported watching the videos to gain a better understanding on a particular topic.
- Almost two in three (63%) clicked on a link in a newsletter or tweet to access a video.

56% reported watching a CottonInfo video over the last 2 years

Key results by Region and Size of Total Farm Area

	Central QLD (n=22)	Darling Downs (n=48)	Macintyre Balonne (n=23)	Northern NSW (n=81)	Macquarie (n=19)	Southern NSW (n=30)	Small (n=82)	Medium (n=109)	Large (n=42)
% watched	55%	48%	70%	57%	63%	47%	62%	54%	48%

What are the reasons you watch Cottoninfo videos? Please select all that apply.
Base: All growers who have watched any CottonInfo video over the last 2 years; n = 130

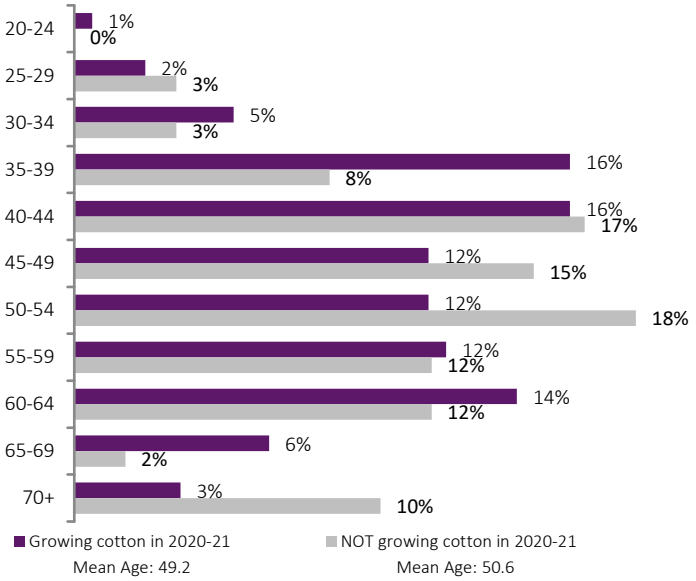
Key results by Region and Size of Total Farm Area

	Central QLD (n=12)	Darling Downs (n=23)	Macintyre Balonne (n=16)	Northern NSW (n=46)	Macquarie (n=12)	Southern NSW (n=14)	Small (n=51)	Medium (n=59)	Large (n=20)
General browsing for interesting content	75%	83%	75%	74%	67%	86%	73%	76%	80%
Better understanding on a particular topic	58%	57%	75%	72%	75%	86%	63%	75%	85%
Clicked a link in a newsletter or tweet	58%	74%	75%	63%	42%	57%	63%	63%	65%
To learn how to do something specific	33%	30%	56%	48%	50%	50%	35%	51%	55%
Video was recommended	8%	4%	44%	28%	33%	50%	14%	29%	50%
Looking for induction or training content	8%	4%	19%	24%	25%	14%	8%	19%	30%
Other	0%	0%	0%	2%	17%	7%	4%	3%	0%

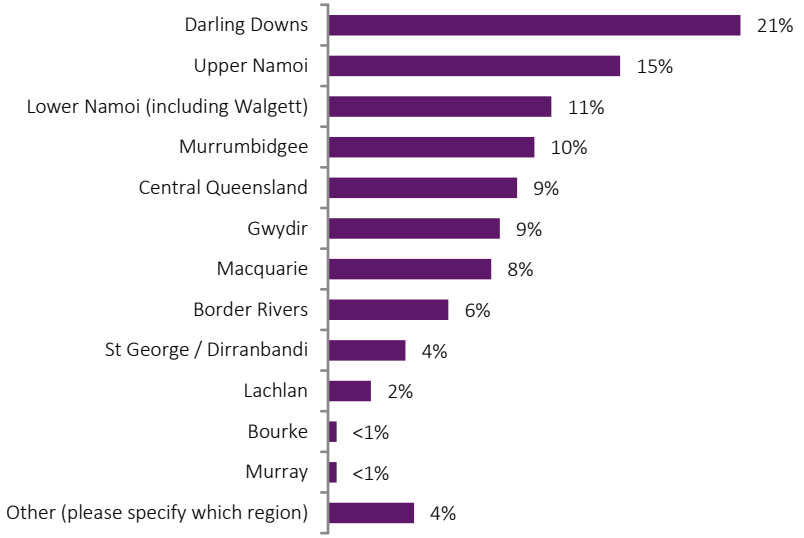
Appendices

Grower age, region and description of farming business

Which age category do you belong to?
Base: All growers; n = 233



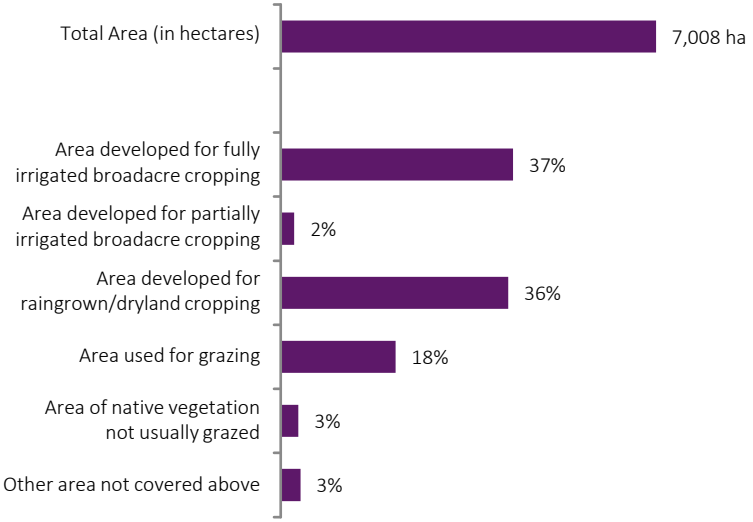
In which region are you located?
Base: All growers; n = 233



How would you describe your farming business?
Base: All growers; n = 233

Historical data of land area/distribution

What is the total area of your farm (in hectares), and what is the area attributed to the following?
Base: All growers (excluding one outlier*); n = 232



	2020 Results	2019 Results	2018 Results	2017 Results
Total Area (in hectares)	3,510 ha	4,404 ha	5,674 ha	8,020 ha
Area developed for fully irrigated broadacre cropping	43%	40%	41%	39%
Area developed for partially irrigated broadacre cropping	2%	2%	3%	3%
Area developed for raingrown/dryland cropping	34%	34%	32%	33%
Area used for grazing	16%	16%	17%	19%
Area of native vegetation not usually grazed	4%	3%	4%	6%
Other area not covered above	3%	4%	3%	n/a

* One outlier was removed from this analysis for having a significantly different farm size to the rest of the respondent base (550,000, next highest reported figures were 167,000, 110,000, 90,000).

Reliability of the Estimates

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

Non-sampling error

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

Sampling error

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

Calculation of Confidence Interval

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

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

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

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

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

where *n* is the sample size, p̂ 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												
Survey Estimate	30	50	75	100	150	200	233 (# surveys completed)	250	300	500	1,000	1,500	2,000
10%	n/a	n/a	n/a	± 5.88%	± 4.80%	± 4.16%	**± 3.85%**	± 3.72%	± 3.39%	± 2.63%	± 1.86%	± 1.52%	± 1.31%
20%	n/a	± 11.09%	± 9.05%	± 7.84%	± 6.40%	± 5.54%	**± 5.14%**	± 4.96%	± 4.53%	± 3.51%	± 2.48%	± 2.02%	± 1.75%
30%	n/a	± 12.70%	± 10.37%	± 8.98%	± 7.33%	± 6.35%	**± 5.88%**	± 5.68%	± 5.19%	± 4.02%	± 2.84%	± 2.32%	± 2.01%
40%	± 17.53%	± 13.58%	± 11.09%	± 9.60%	± 7.84%	± 6.79%	**± 6.29%**	± 6.07%	± 5.54%	± 4.29%	± 3.04%	± 2.48%	± 2.15%
50%	± 17.89%	± 13.86%	± 11.32%	± 9.80%	± 8.00%	± 6.93%	**± 6.42%**	± 6.20%	± 5.66%	± 4.38%	± 3.10%	± 2.53%	± 2.19%
60%	± 17.53%	± 13.58%	± 11.09%	± 9.60%	± 7.84%	± 6.79%	**± 6.29%**	± 6.07%	± 5.54%	± 4.29%	± 3.04%	± 2.48%	± 2.15%
70%	n/a	± 12.70%	± 10.37%	± 8.98%	± 7.33%	± 6.35%	**± 5.88%**	± 5.68%	± 5.19%	± 4.02%	± 2.84%	± 2.32%	± 2.01%
80%	n/a	± 11.09%	± 9.05%	± 7.84%	± 6.40%	± 5.54%	**± 5.14%**	± 4.96%	± 4.53%	± 3.51%	± 2.48%	± 2.02%	± 1.75%
90%	n/a	n/a	n/a	± 5.88%	± 4.80%	± 4.16%	**± 3.85%**	± 3.72%	± 3.39%	± 2.63%	± 1.86%	± 1.52%	± 1.31%

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 (np̂ < 10 or n(1-p̂) < 10).

Research design

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 2021 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.

Sample

In total, a sample of n = 1,187 unique growers was provided by CRDC, with n = 233 surveys completed (completion rate of 19.6%). A breakdown of the number of surveys completed by Region is located below.

Region	Sample Size	Completed Surveys
Overall	**1,187**	**233**
Central Queensland	90	22
Darling Downs	212	48
Macintyre – Balonne	123	23

Region	Sample Size	Completed Surveys
Northern NSW	438	81
Macquarie	104	19
Southern NSW	177	30
Other	43	10

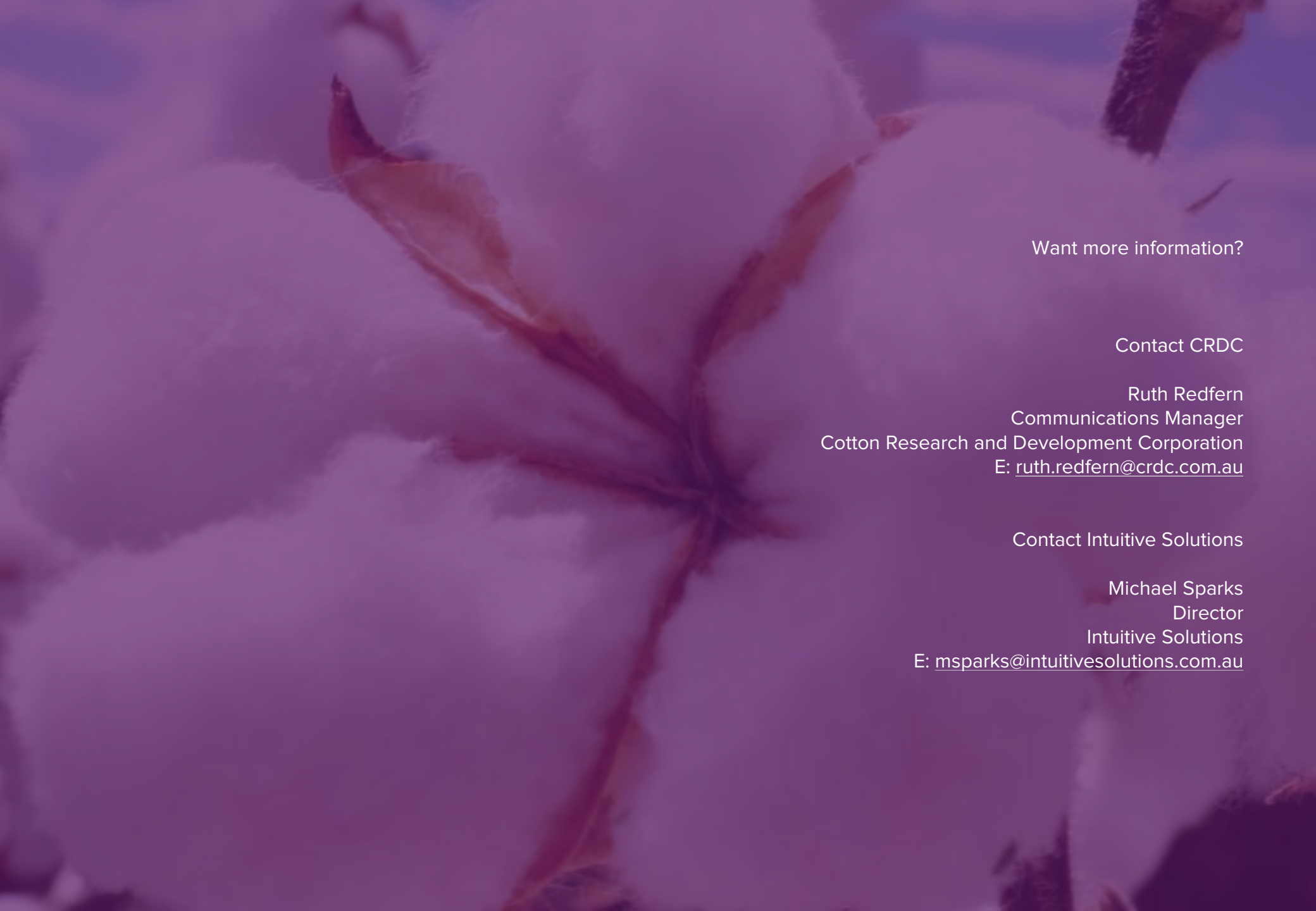
Questionnaire

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

- Farm profiles
- 2020-21 cotton crop
- R&D impact on farming systems
- Water
- Diseases
- Sustainability
- Workforce and training
- Behavioural economics research project
- Cottoninfo videos

Timing

The survey was launched on 3 June 2021 and remained open until 25 June 2021.



Want more information?

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