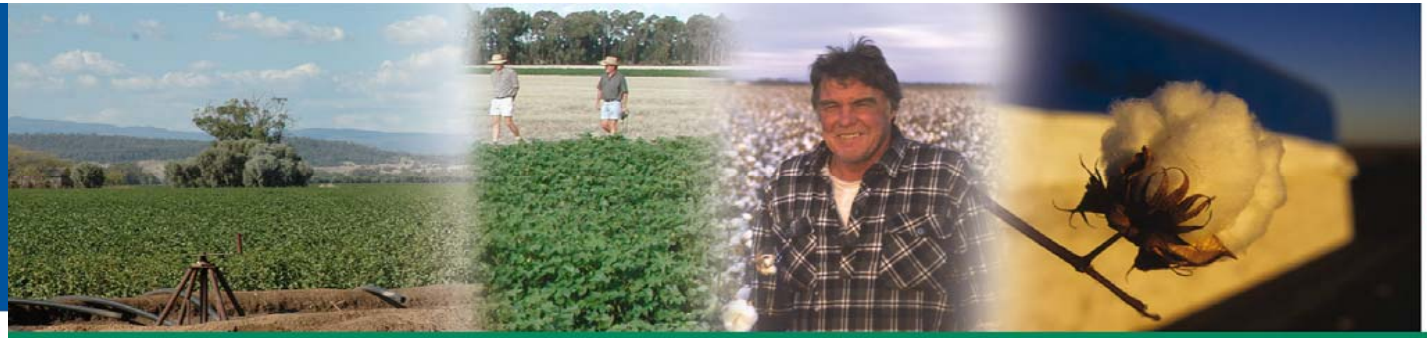

The 2006 Cotton Grower Survey Benchmarking/BMP Land & Water Report

Information from the 2005-2006 Season

A Report Prepared for

The Cotton Catchment Communities CRC

and

The Cotton Research & Development Corporation

On Behalf of

Cotton Consultants Australia Inc

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January, 2007

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Acknowledgements

The authors would like to thank the members of Cotton Consultants Australia Inc. for their assistance in providing information for this report. IRF Cotton Research would like to acknowledge and thank Jon-Maree Baker in the CCA executive office along with the CCA survey committee. The time and effort of Australian cotton growers returning surveys and contributing their thoughts have given this report a strong foundation from which to report on the practices undertaken in the industry, their assistance is gratefully acknowledged..

It is stated here and must be understood by any reader that 'users of the information contained in this report do so at their own discretion'. While every care has been taken to verify the accuracy of figures and associated claims, the data is supplied by respondents across all cotton growing regions, and their individual assessments and interpretations are 'best estimates' from sampled survey data and must be used in that light.

Finally while all care has been taken in the preparation of this report, users of the compiled information do so at their own risk and discretion.

Copyright notice

Abstract

This report outlines the results of the Cotton Consultants Australia Grower Feedback Survey. The survey was sent to cotton growers across the industry with a response rate of approximately 17 per cent or slightly less than 19 per cent of the area of cotton planted in the 2005-2006 season.

The 2006 survey included a series of questions specifically for collecting information from growers on water monitoring and Water Use Efficiency (WUE), soil monitoring and management, grower interaction with Catchment Management Authorities (CMAs) and equivalent bodies, fertiliser use, management of native vegetation and riparian zones, and monitoring of native and feral animal species.

Growers were segmented by production context, producing four 'grower types', Professionals, Traditionals, Stalwarts and Opportunists. This segmentation was used to present data on demographic characteristics, the location of each grower type by region, their preferred methods for receiving industry information, and their methods of accessing the internet. This analysis showed a range of differences between the groupings that reflected the variation in the farm types. Data were also presented on a geographic basis, using four aggregated regions, Northern, Border Rivers, Namoi and Southern.

The report highlights a raft of individual results and findings associated with the production process and how growers approach the management of commercial farming operations while balancing environmental values associated with the farm area and the wider catchment landscape. A summary of significant results is included at the commencement of each section in the report.

The intrinsic value of the information outlined in this report lies in its ability to represent the thoughts and opinions of growers, and the practices they undertake in managing their enterprises at this particular point in time. Over time, there will be change in the opinions of growers and the farming practices they undertake in the management of their land, the information contained in this report will be a valuable benchmark from which to measure these changes.

Table of Contents

Table of Contents (Continued)

Introduction

Report objective

The aim of this report is to provide an understanding of Best Management Practices (BMP) within the Australian cotton industry, and to benchmark projects being undertaken by the Cotton Catchment Communities CRC (CCC CRC), by presenting quantitative and qualitative information collected from cotton growers at the end of the 2005/06 season.

Methods

Data for this report is drawn from the 2006 Cotton Grower Feedback Survey, which was commissioned by Cotton Consultants Australia (CCA) in response to a need for detailed information about the production base in the Cotton Industry. Qualitative and quantitative information was collected in this survey including demographic, situational (context) and attitudinal data.

The 2006 survey included a series of questions at the request of the CCC CRC, collecting information from growers on water monitoring and Water Use Efficiency (WUE), soil monitoring and management, grower interaction with Catchment Management Authorities (CMAs) and equivalent bodies, fertiliser use, management of native vegetation and riparian zones, and monitoring of native and feral animal species. A copy of the survey is included as an appendix to this report.

The 2006 Cotton Grower Feedback Survey achieved a response rate of 14.6 per cent, or 122 survey responses out of an initial mailing list of 834 cotton growers and on-farm agronomists. Telephone reminders to growers revealed that approximately 15 per cent of growers on the database had ceased cotton production, hence the effective survey response rate is estimated to be slightly more than 17 per cent. Survey respondents were responsible for **56087.1 Hectares** of cotton in the 2005/06 season, representing 18.8 per cent of the total cotton area for the season (2005/06 season industry estimate of 297,817 Hectares).

For the purposes of analysing the data in this report, survey responses have been aggregated into four cotton growing regions:

1. Northern (36 respondents): Includes the Darling Downs and regions further north, including Emerald and the Dawson Valley.

2. Border Rivers/Gwydir/St George (35 respondents): Includes St George/Dirranbandi, Mungundi, Moree, and the Macquarie valley.

3. Namoi (34 respondents): Includes Gunnedah, Narrabri and Wee Waa and surrounding districts.

4. Southern (17 respondents): Includes the Darling River and Macquarie valleys; Bourke, Warren, Hillston and Hay and surrounds.

Report structure

Section 1 of the report presents results from a segmentation of growers by production context, producing four 'grower types' (described in more detail in Section 1). This segmentation is used to present data on demographic characteristics, the location of each grower type by region, their preferred methods for receiving industry information, and their methods of accessing the internet.

Sections 2, 3, 4, and 5 present data on a regional basis, using the four aggregated regions described above. Results from the entire data set are also presented where appropriate.

Section 2 presents a summary of farm characteristics and grower practices, data on the frequency of cotton production, and shows significant differences between growers who have had contact with their local CMA, compared to those who have not. Data on grower attitudes towards various farming practices, and their preferred methods for obtaining information, is also presented.

Section 3 deals with water and soil management issues, including irrigation water sources, WUE, soil structure monitoring, testing, and management, soil health issues, and changes over time in soil health.

Section 4 summarises strategies used by growers to manage native vegetation and riparian zones, and presents data on native and feral animal species monitoring.

Section 5 deals with fertiliser use, including fertiliser trends over the last four or five seasons, differences between testing methods and application rates, and testing methods used to determine the amount of fertiliser required.

Finally, Section 6 presents differences in farm practices and characteristics based on whether or not growers are BMP accredited, building a picture of differences between those who have accreditation with those who do not.

An appendix, with the 2006 Cotton Grower Feedback Survey, is also included.

Section 1: Grower Types

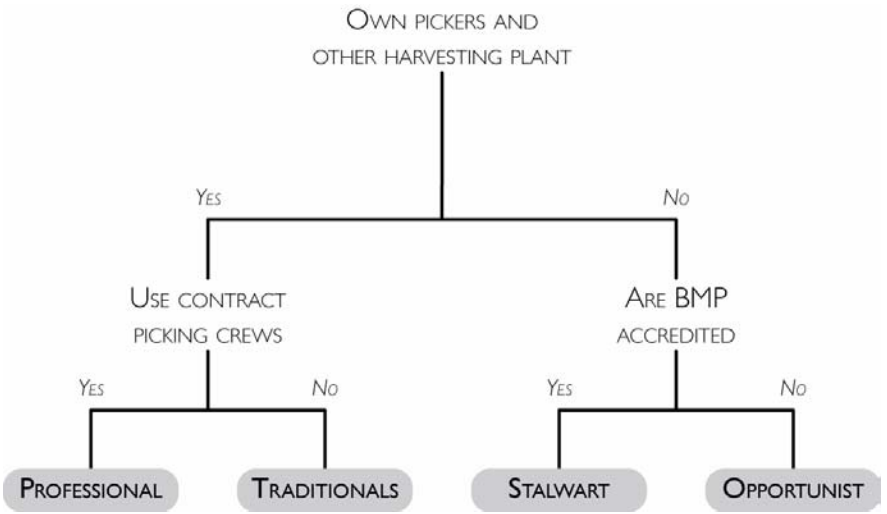
This section of the report outlines the analysis of data using groups defined by a clustering of farms with similar farming contexts. This divisive clustering process that set out to find a collection of farms within the sample such that the members of each group were as similar as possible to one another and each of the groups developed were as dissimilar to one another as possible. The result is discrete groups of farmers who have differing production contexts.

The farm context data used to build groups
On farm water storage
Follow BMP guidelines
Are BMP Accredited
Eight-row equipment
Twelve-row equipment
Measure water use efficiency
Monitor ground water levels
Measure soil salinity on your farm
Measure soil sodicity on your farm
Measure soil organic content quality
Have soil erosion risks assessed
Some overhead irrigation systems
Some drip irrigation systems
Your own pickers and other harvesting plant
Use contract picking crews

The clustering procedure considered binary responses as to whether growers surveyed were undertaking the practices presented in the farm context table above. The clustering process first split the sample into two groups based on whether they had their own pickers and harvesting plant. For the group that did have their own pickers and harvesting plant, a further split was made into two groups, on the basis of whether they used contract picking crews of not. The group that did not have their own pickers and other harvesting plant were split into two groups on the basis of whether they were BMP accredited or not. Therefore the analysis delivers four distinct groups of growers:

1. The Professionals – 25 responses
2. The Traditionals – 45 responses
3. The Stalwarts – 22 responses
4. The Opportunists – 30 responses

Cluster Dendrogram: Grower Types



Demographic Characteristics by Grower Type					
Mean of Scores	**Professional**	**Traditionals**	**Stalwart**	**Opportunist**	**Total**
Year of birth	1957.58	1958.18	1961.38	1960.03	**1959.08**
Year first involved in cotton	1986.42	1983.33	1985.33	1990.96	**1986.16**
Total hectares	5989.96	1645.23	9199.00	4516.15	**4630.96**
Green hectares	1859.14	608.30	1791.32	1216.67	**1233.07**
Dryland cropping/grazing	1035.80	729.80	9214.29	2757.67	**2840.49**
Cotton Hectares 05/06	639.88	301.14	636.64	351.32	**446.14**
Cotton Hectares 06/07	425.64	255.50	442.09	449.75	**371.45**
Cotton Yield 05/06	7.83	7.39	8.35	7.65	**7.73**
Conventional % 05/06	9.41	14.41	7.09	5.44	**10.03**
Conventional RR % 05/06	5.91	6.74	5.91	3.96	**5.82**
Bollgard % 05/06	21.51	27.00	12.00	32.48	**24.02**
Bollgard RR % 05/06	63.18	53.05	75.00	58.13	**60.60**
Full Time Staff	6.04	3.02	5.77	3.25	**4.21**
Part Time Staff	0.52	0.40	2.95	0.82	**0.99**
Casual Staff	3.04	2.84	6.80	0.50	**3.06**

1. The Professionals: On average the oldest of the four groups, they have the largest amount of green hectares on their property, and planted the largest area of cotton in the 2005/06 season. Professionals have on average the second highest yield, and employed the most full time staff.

2. The Traditionals: While the second oldest group on average, they have also been involved in the cotton industry for longer than the other groups. They have the smallest total property area, the smallest cotton area planted, but planted the highest percentage of Conventional cotton varieties. Traditionals also employ the least full time staff.

3. The Stalwarts: On average the youngest group, the Stalwarts have by a significant margin the largest total property area, as well as the highest cotton yield for the 2005/06 season. They planted the highest percentage of Bollgard RR varieties, and employed the most casual staff.

4. The Opportunists: Have been involved in the cotton industry for the least time, and were projected to plant on average the most cotton area for the 2006/07 season. They planted the highest percentage of Bollgard varieties in 2005/06, and employed the lowest number of casual staff on average.

1.1 Summary of Section 1

The clustering process mentioned above has been used to present the break-up of grower types amongst the four cotton growing regions presented in this report, the preferred information sources for each of the grower types, and how each grower type accesses the internet. Significant results from the data presented in sections 1.2, 1.3, and 1.4 below include:

Location of grower types by region

The regional break-up of grower types in the Border Rivers/Gwydir/St George and Namoi regions follows quite closely the overall break-up of grower types for the survey. However, Traditionals made up 50 per cent of all respondents from the Northern region, while Opportunists made up 41.2 per cent of respondents in the Southern region.

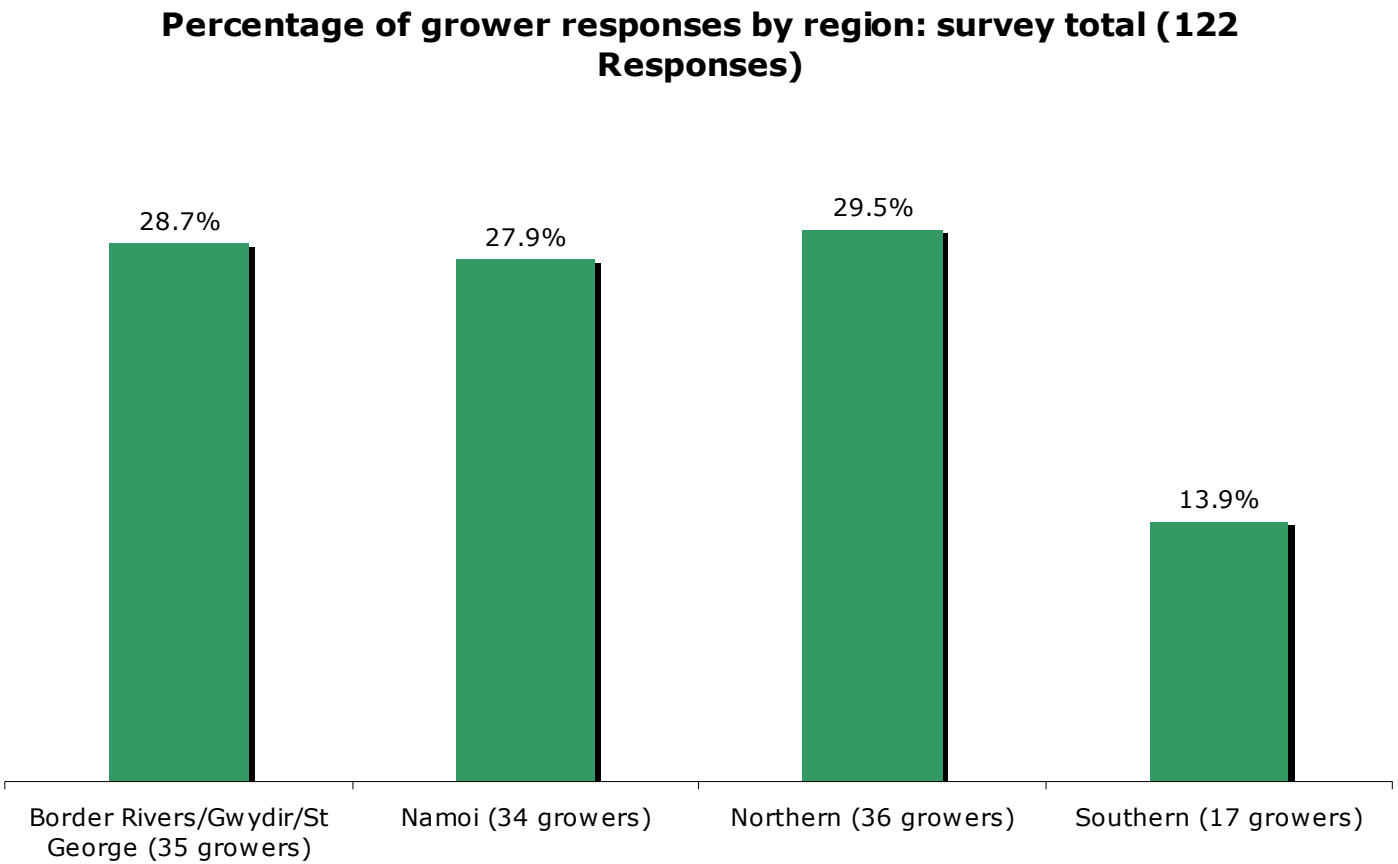
Preferred format for receiving further information

Each of the grower types, with the exception of Stalwarts, showed significant differences in the ways they prefer to receive industry information, compared to the total survey response for each information source. Opportunists showed a preference for email, industry websites, industry newsletters and workshops/field days, with their interest in workshops/field days, at 70.83 per cent of Opportunist respondents, well above the overall response of 55.75 per cent. Professionals showed a preference for face to face information sources, in the form of workshops/field days and conferences/courses, their interest in conferences/course, at 41.67 per cent, being well above the overall response of 34.51 per cent. Finally, the Traditionals showed a stronger preference for postal information and visits from company reps. While visits from company reps was one of the least preferred information sources overall (at 10.62 per cent), Traditionals indicated an interest rate of 17.78 per cent for this information source.

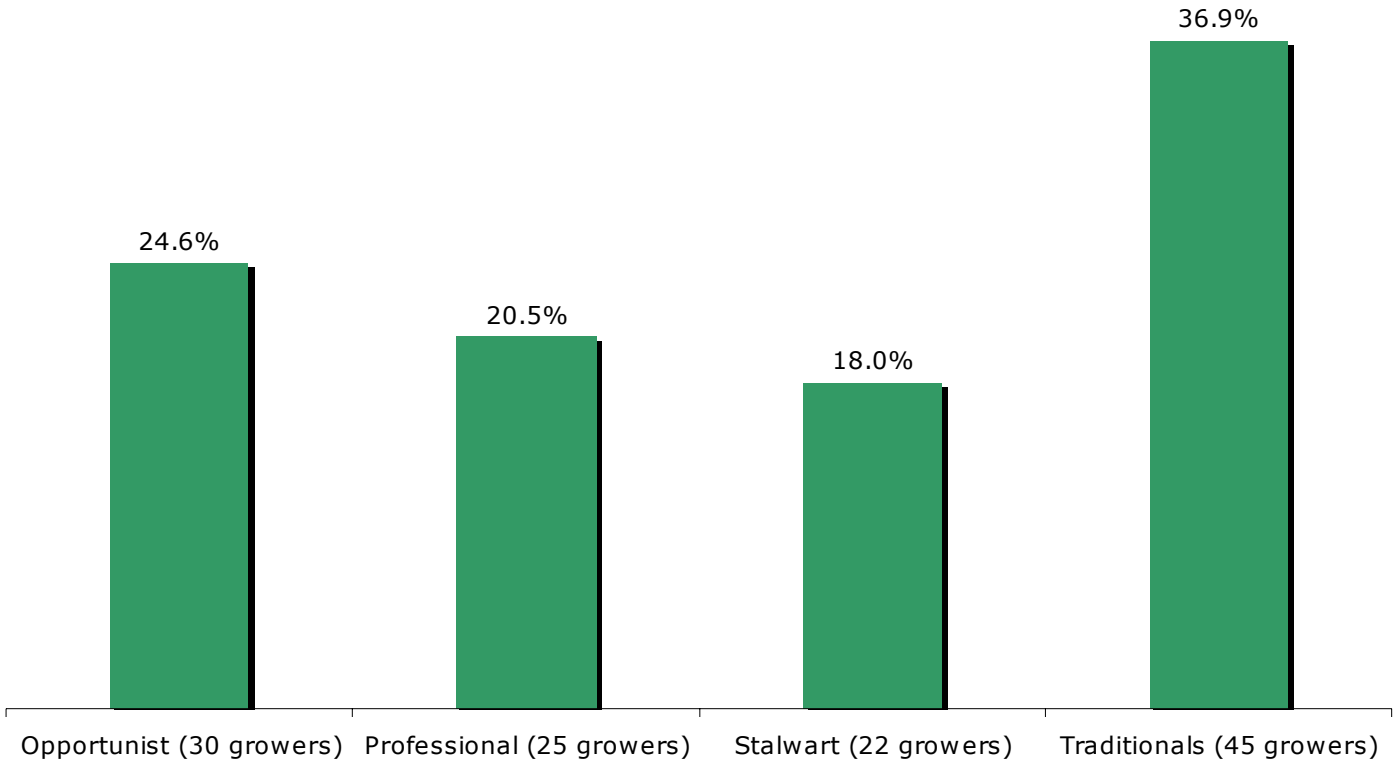
Internet access

Analysis of responses to this question showed that most growers (60.6 per cent) have broadband or ISDN internet access, while 33.9 per cent access the internet using a dial-up connection. The Opportunist, Stalwart and Professional grower groups followed this pattern relatively closely, though each group had a higher incidence of broadband/ISDN usage than the overall response. However, Traditionals indicated broadband/ISDN usage at only 50 per cent, while their use of dial-up internet access was much higher than the overall response, at 45.2 per cent.

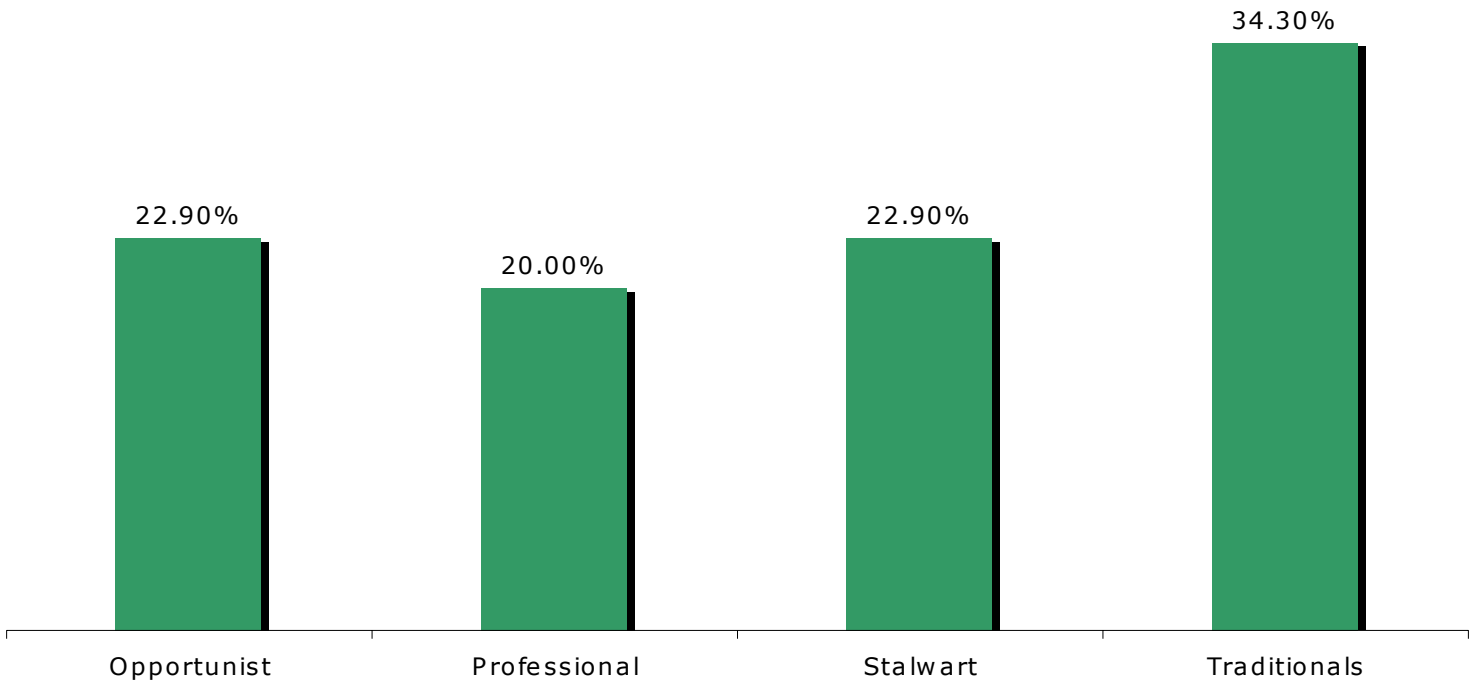
1.2 Location of grower types by region

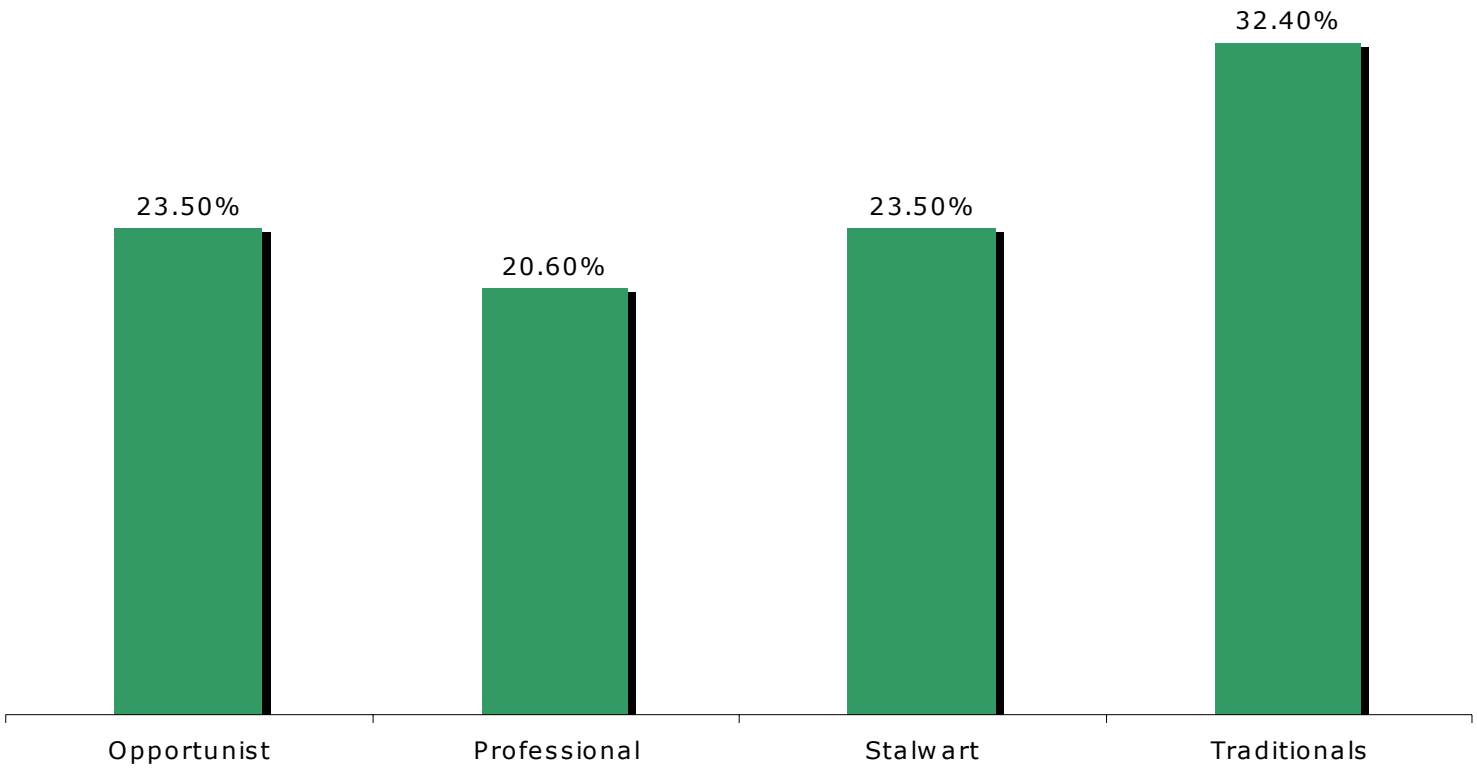


Percentage of each grower type: survey total (122 Responses)

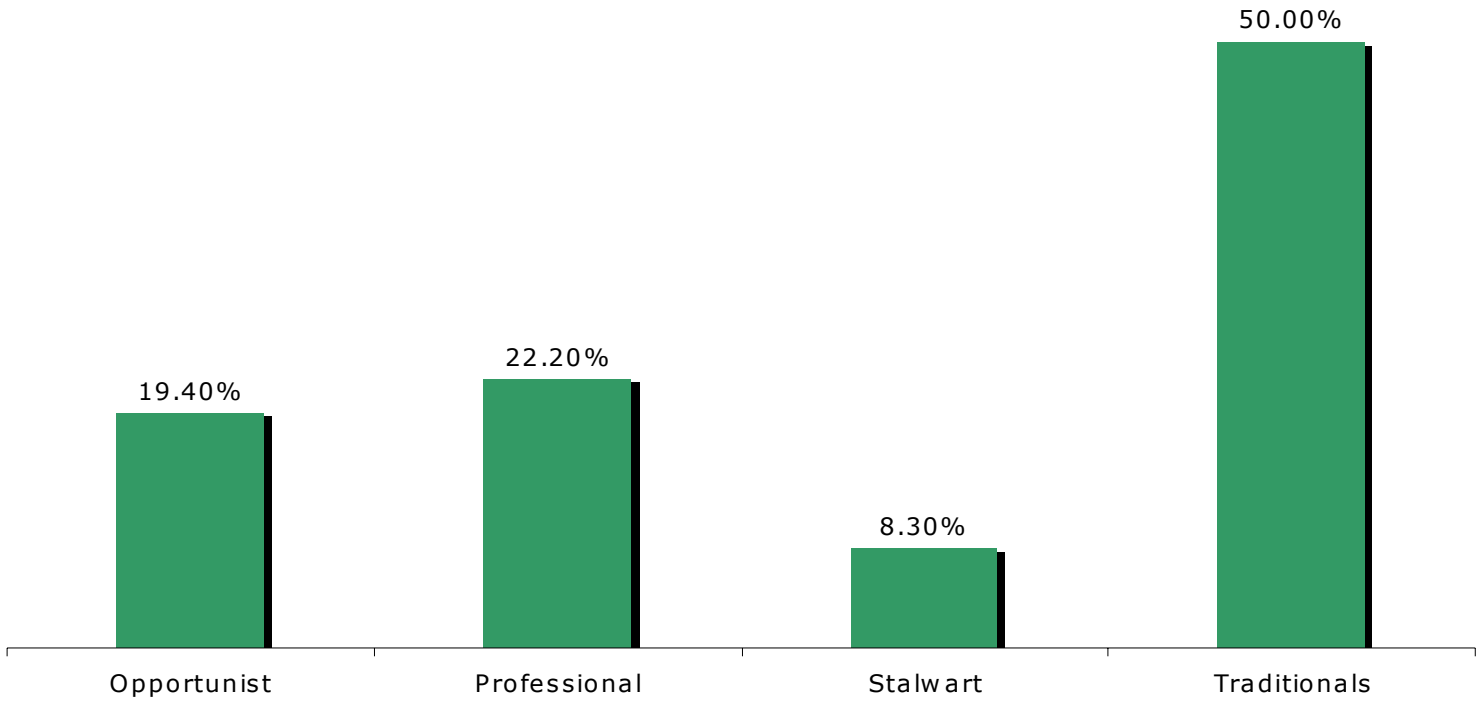


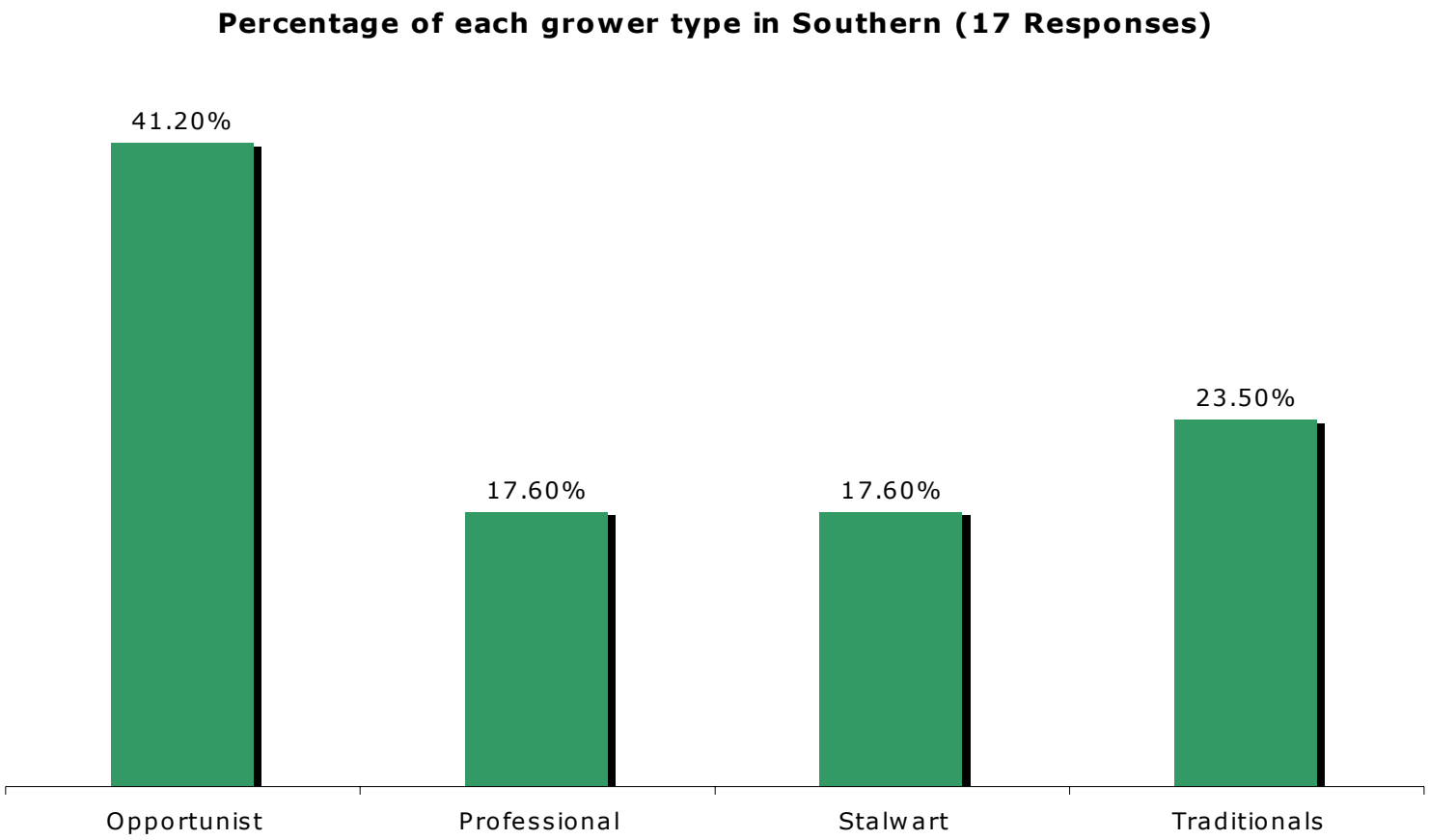
Percentage of each grower type in Border Rivers/Gwydir/St George (35 Responses)



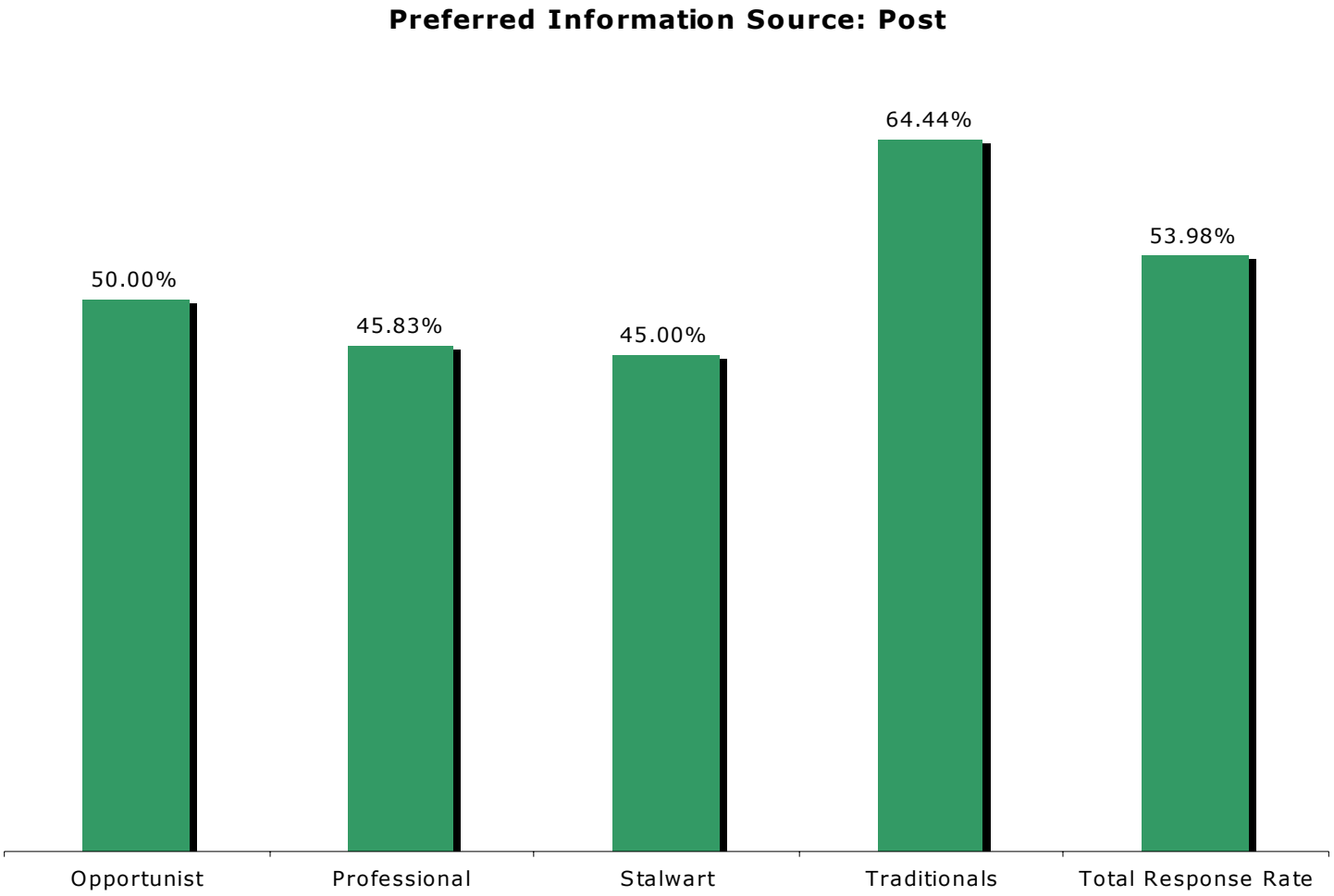

Percentage of each grower type in Namoi (34 Responses)
23.50%
20.60%
23.50%
32.40%
Opportunist
Professional
Stalwart
Traditionals

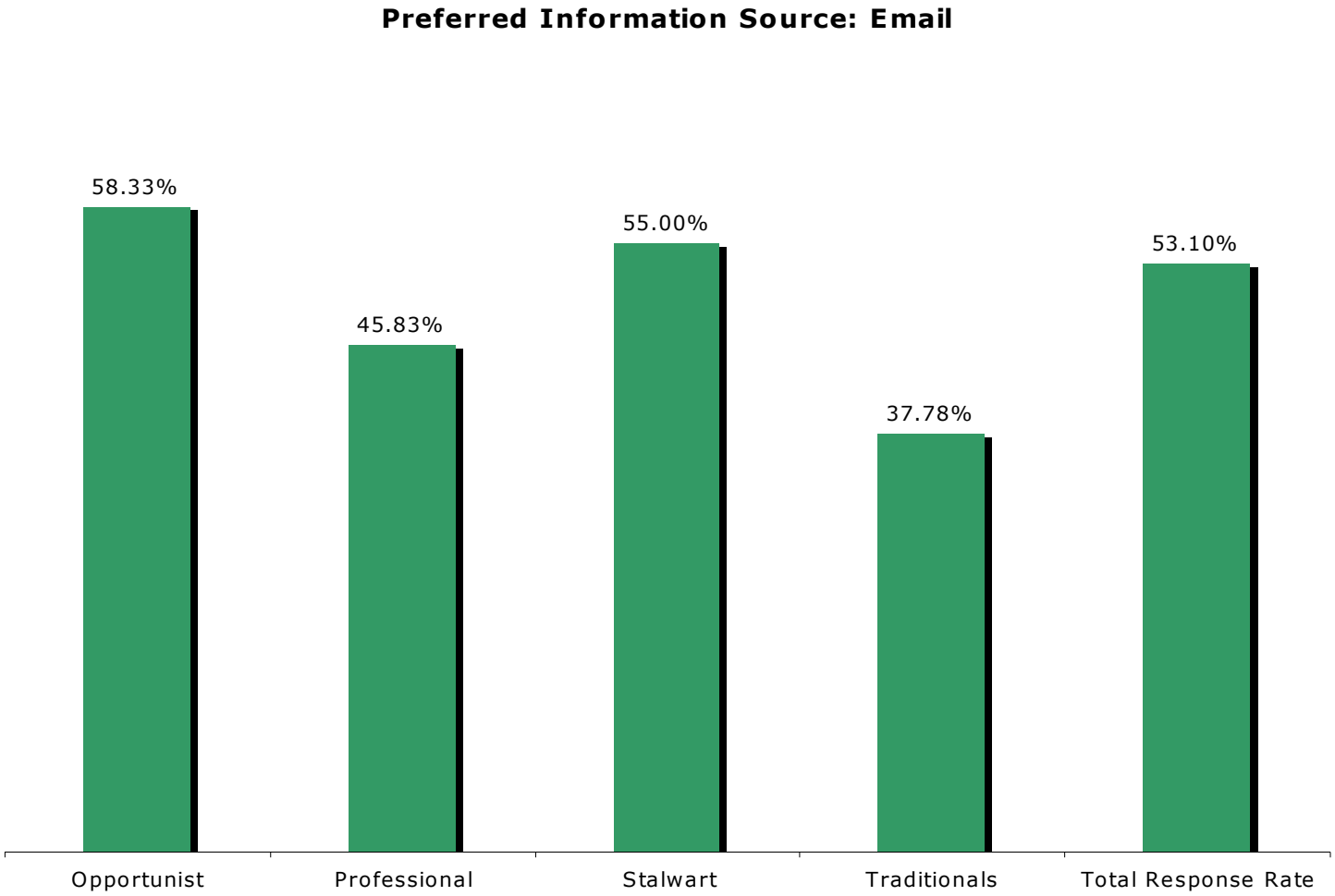
Percentage of each grower type in Northern (36 Responses)

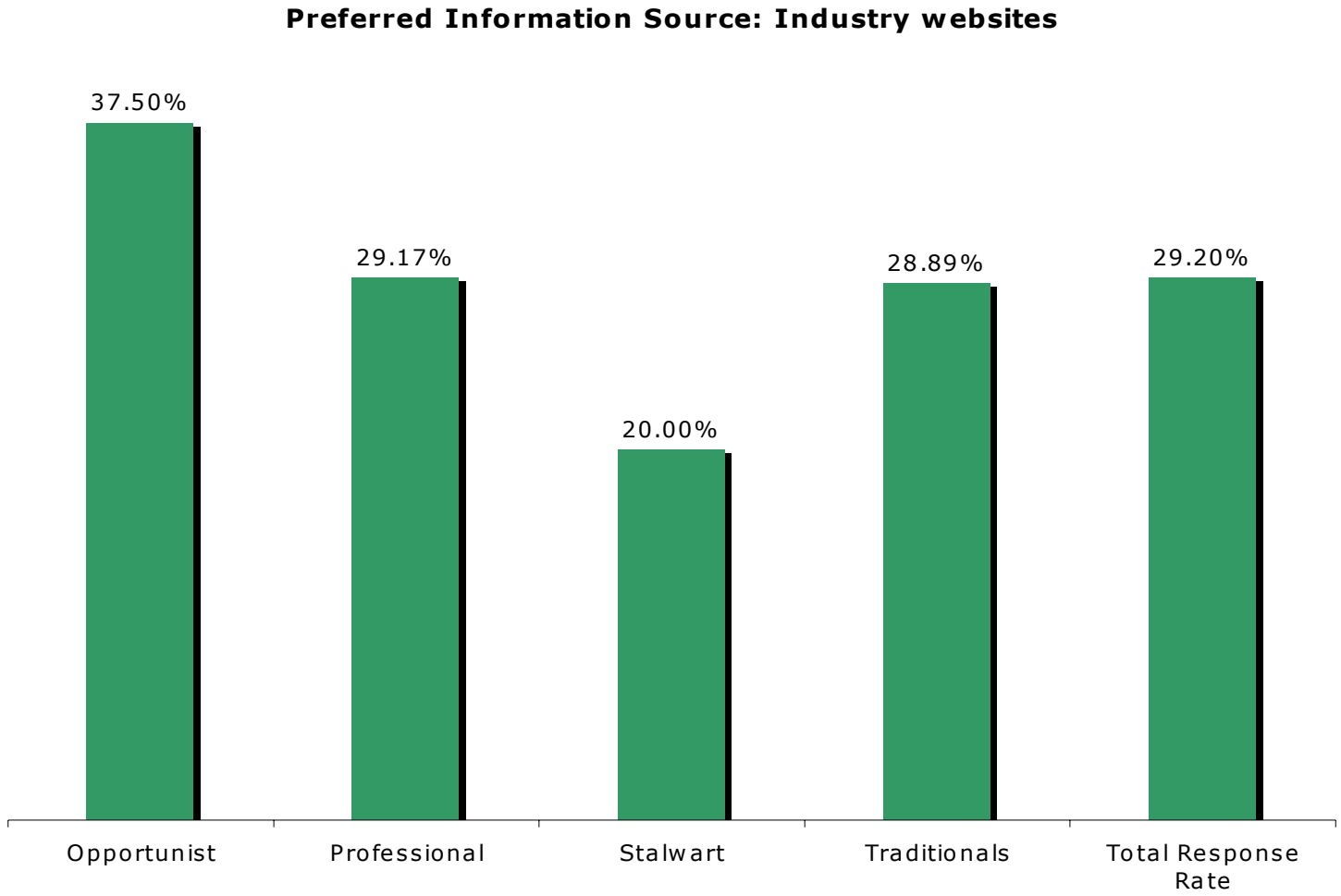



Percentage of each grower type in Southern (17 Responses)
41.20%
17.60%
17.60%
23.50%
Opportunist
Professional
Stalwart
Traditionals

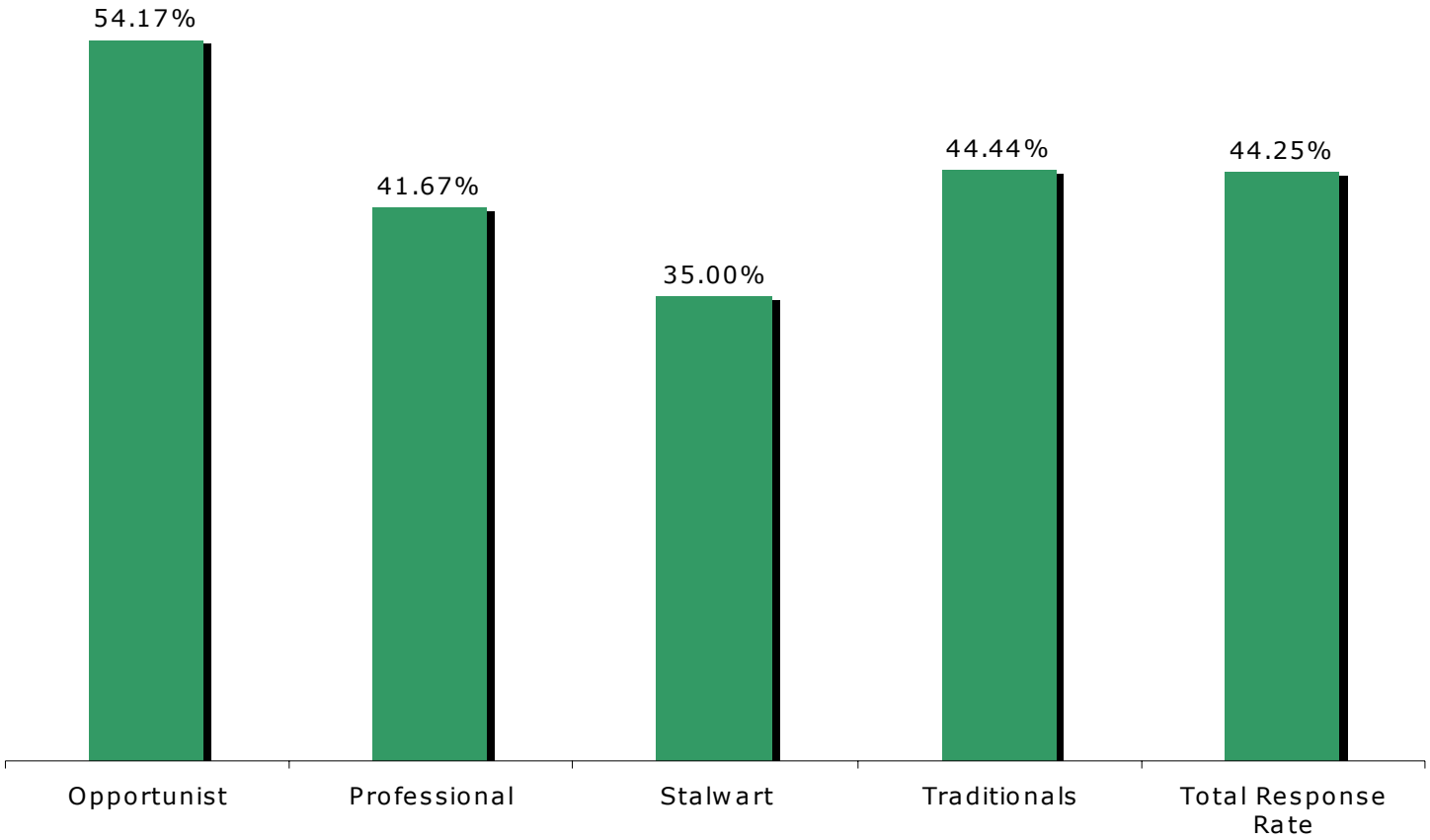
1.3 Preferred format for receiving further information: by grower type



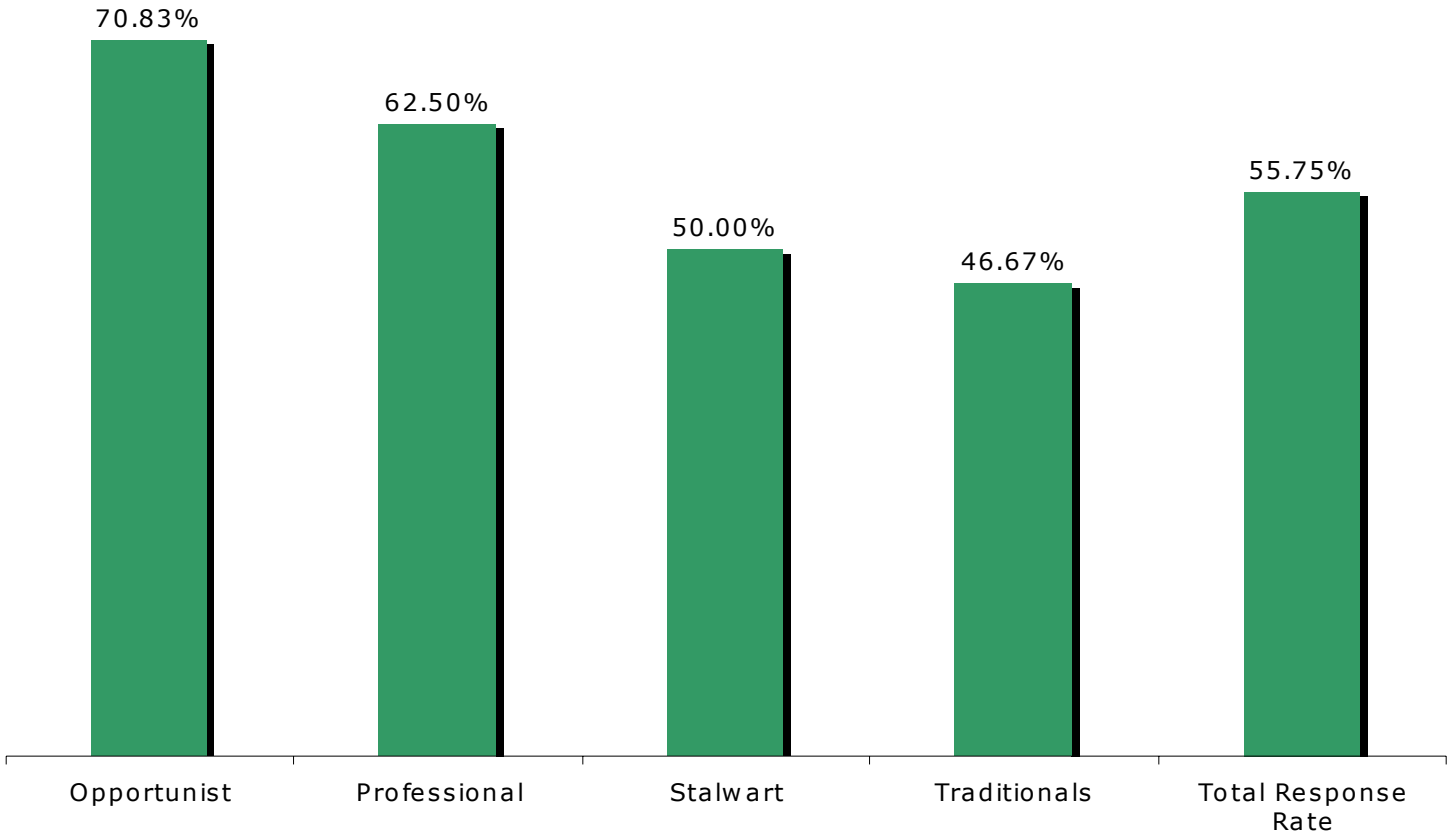

Preferred Information Source: Email
58.33%
45.83%
55.00%
37.78%
53.10%
Opportunist
Professional
Stalwart
Traditionals
Total Response Rate


Preferred Information Source: Industry websites
37.50%
29.17%
20.00%
28.89%
29.20%
Opportunist
Professional
Stalwart
Traditionals
Total Response Rate

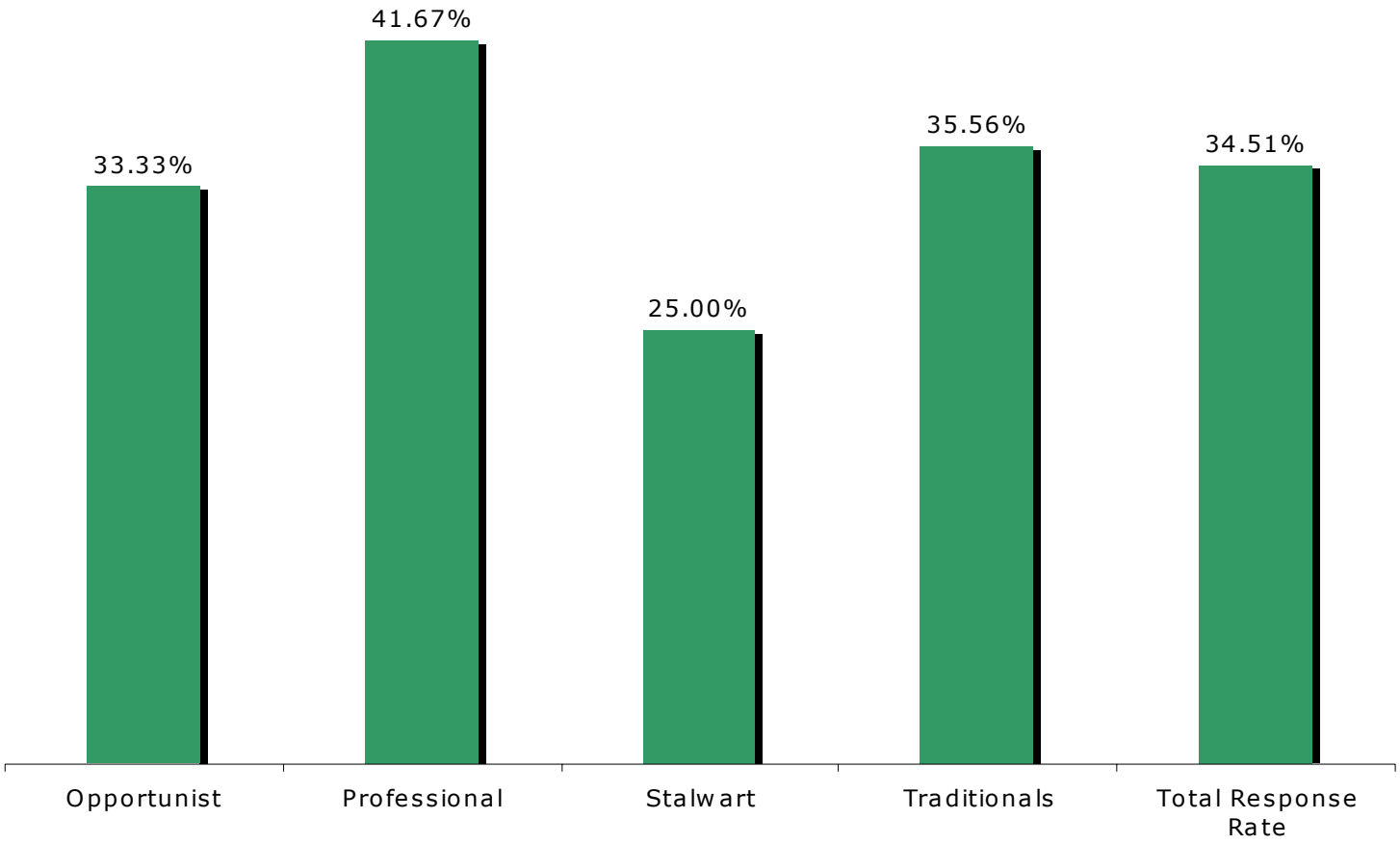
Preferred Information Source: Industry newsletters/magazines



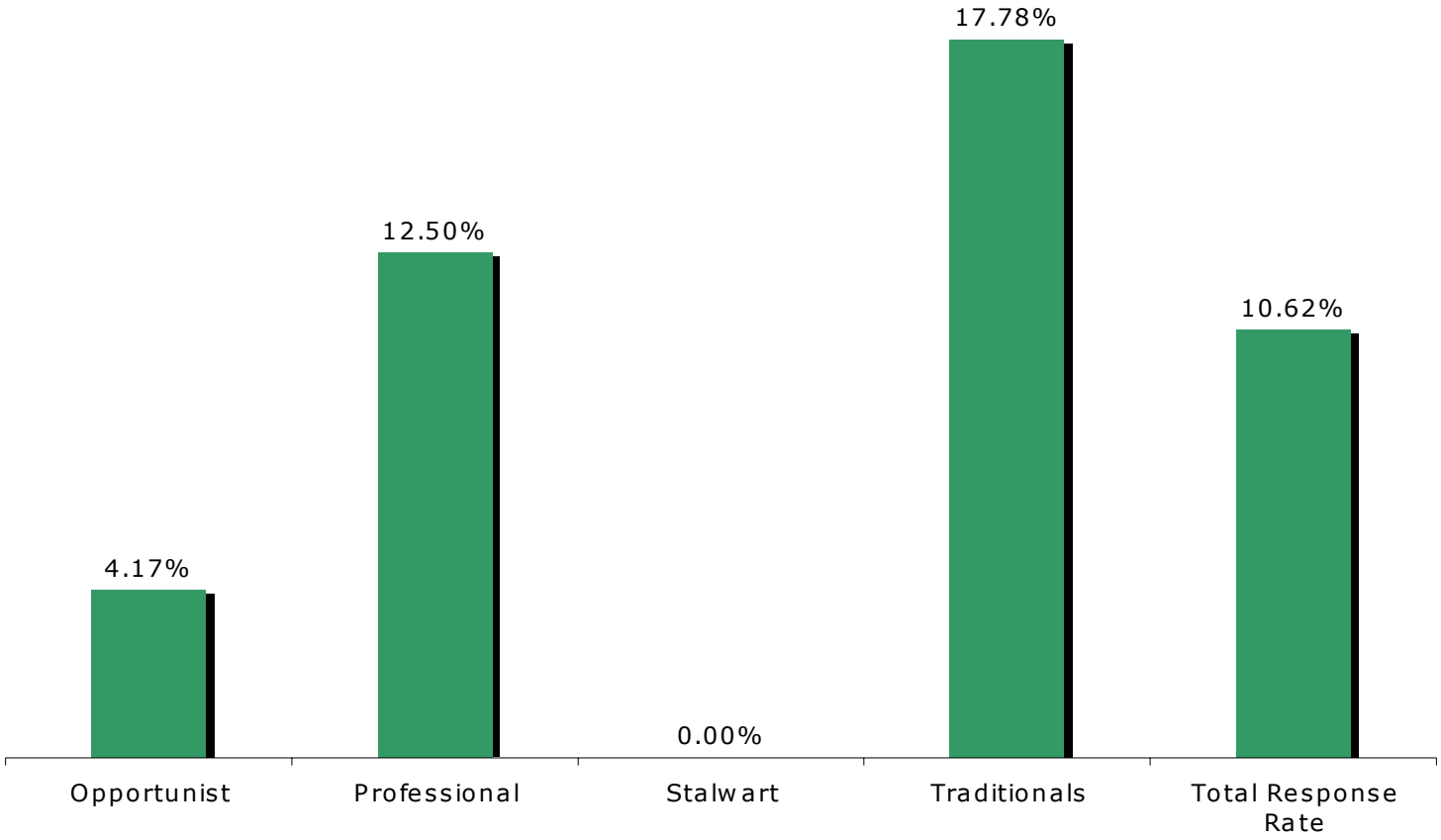
Preferred Information Source: Workshop/field days



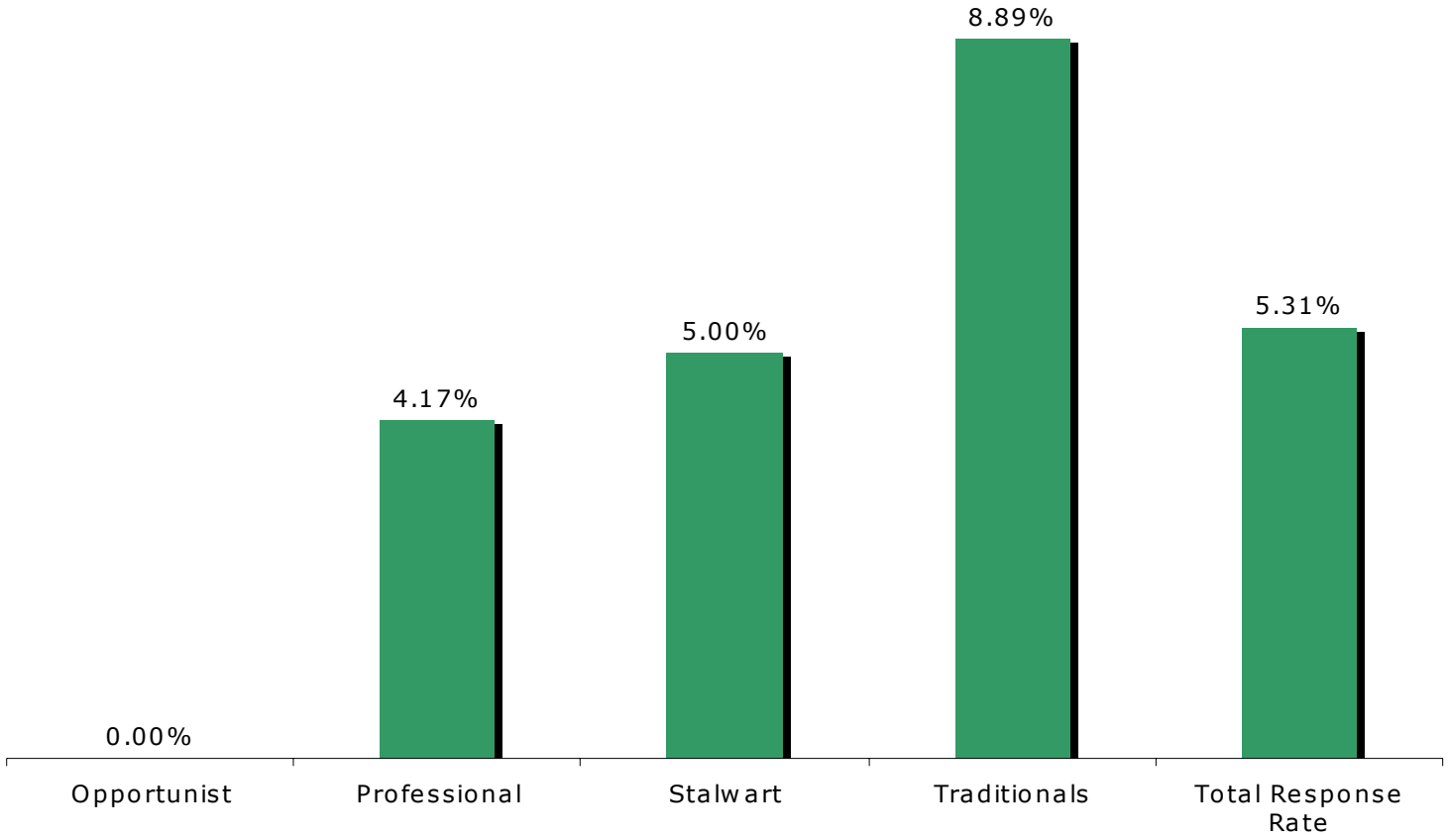
Preferred Information Source: Conferences and courses

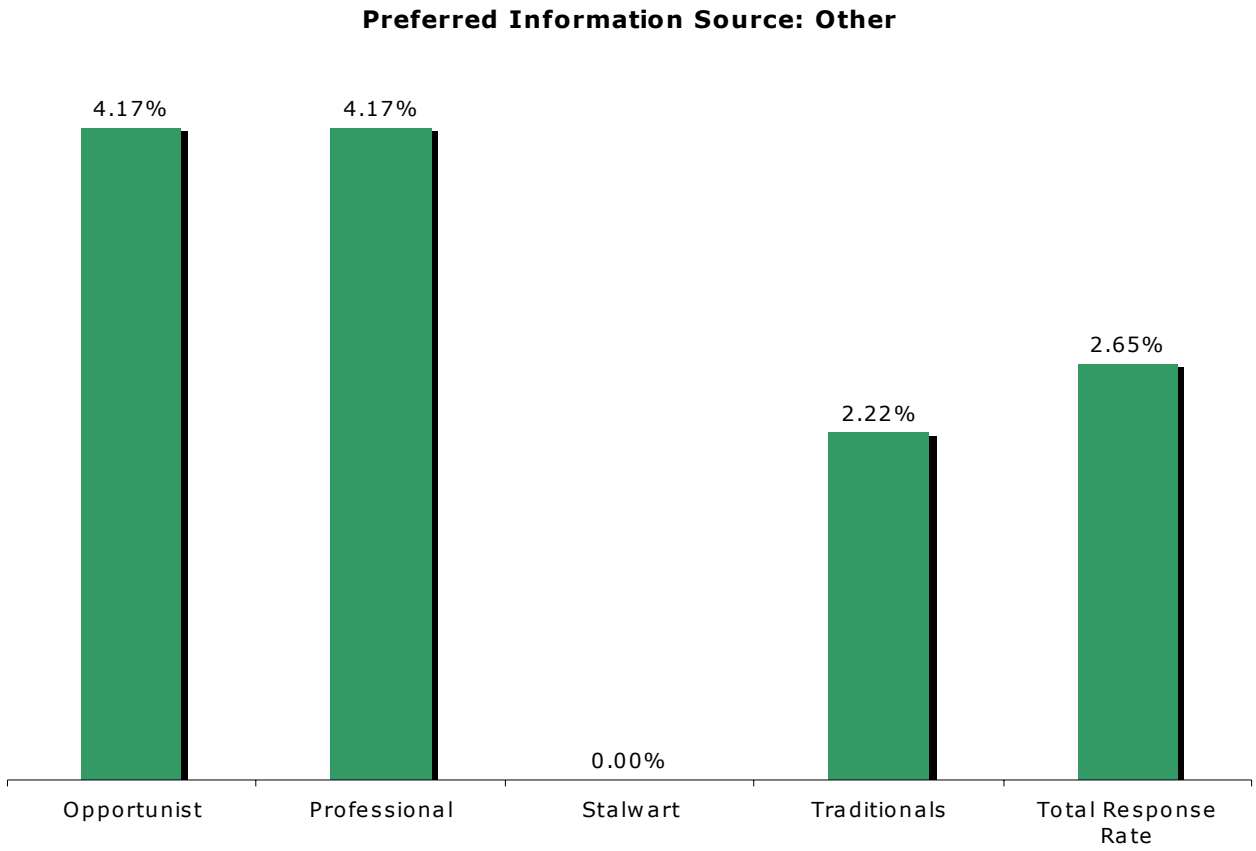


Preferred Information Source: Visits from company reps



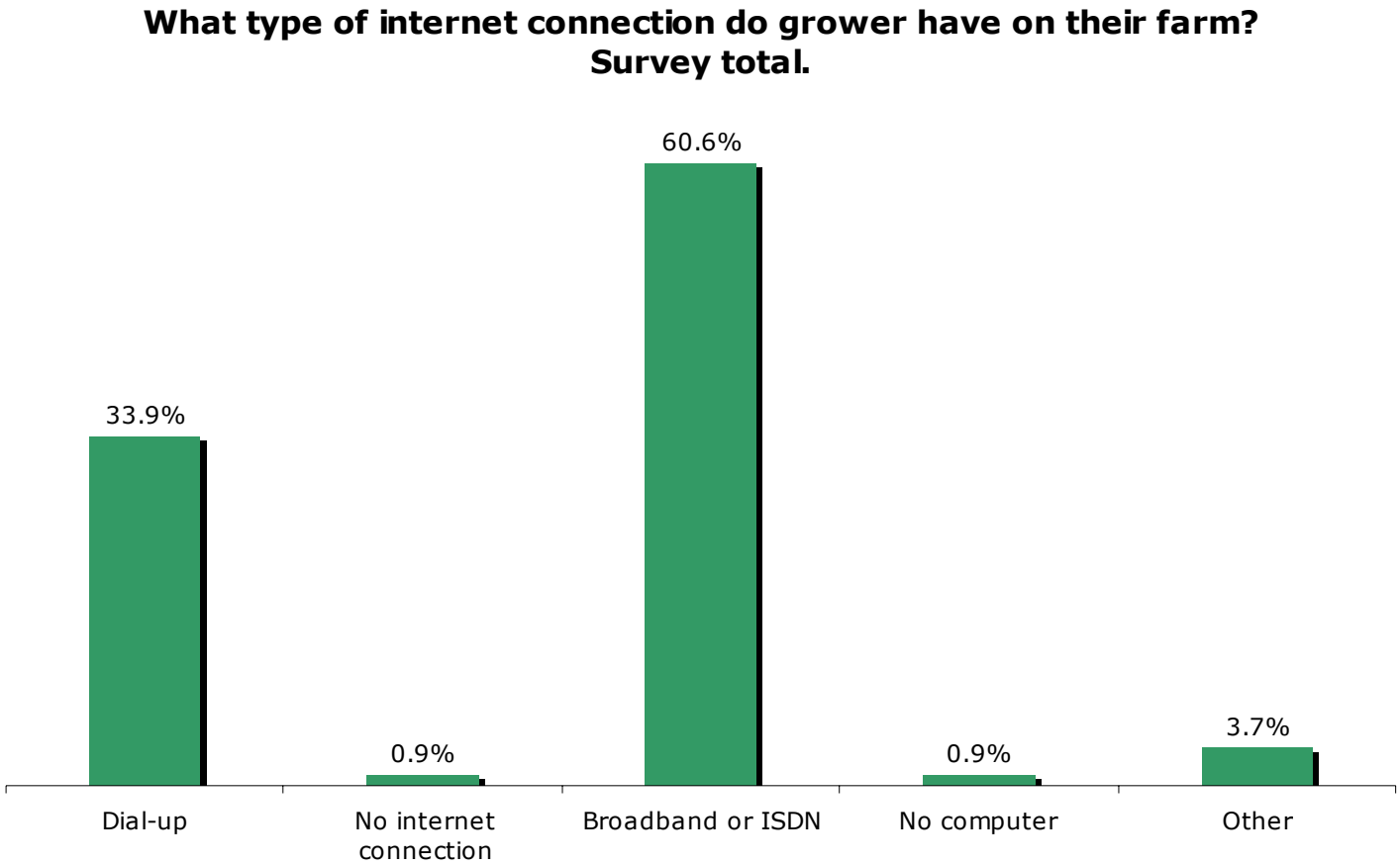
Preferred Information Source: Advertisements in the media

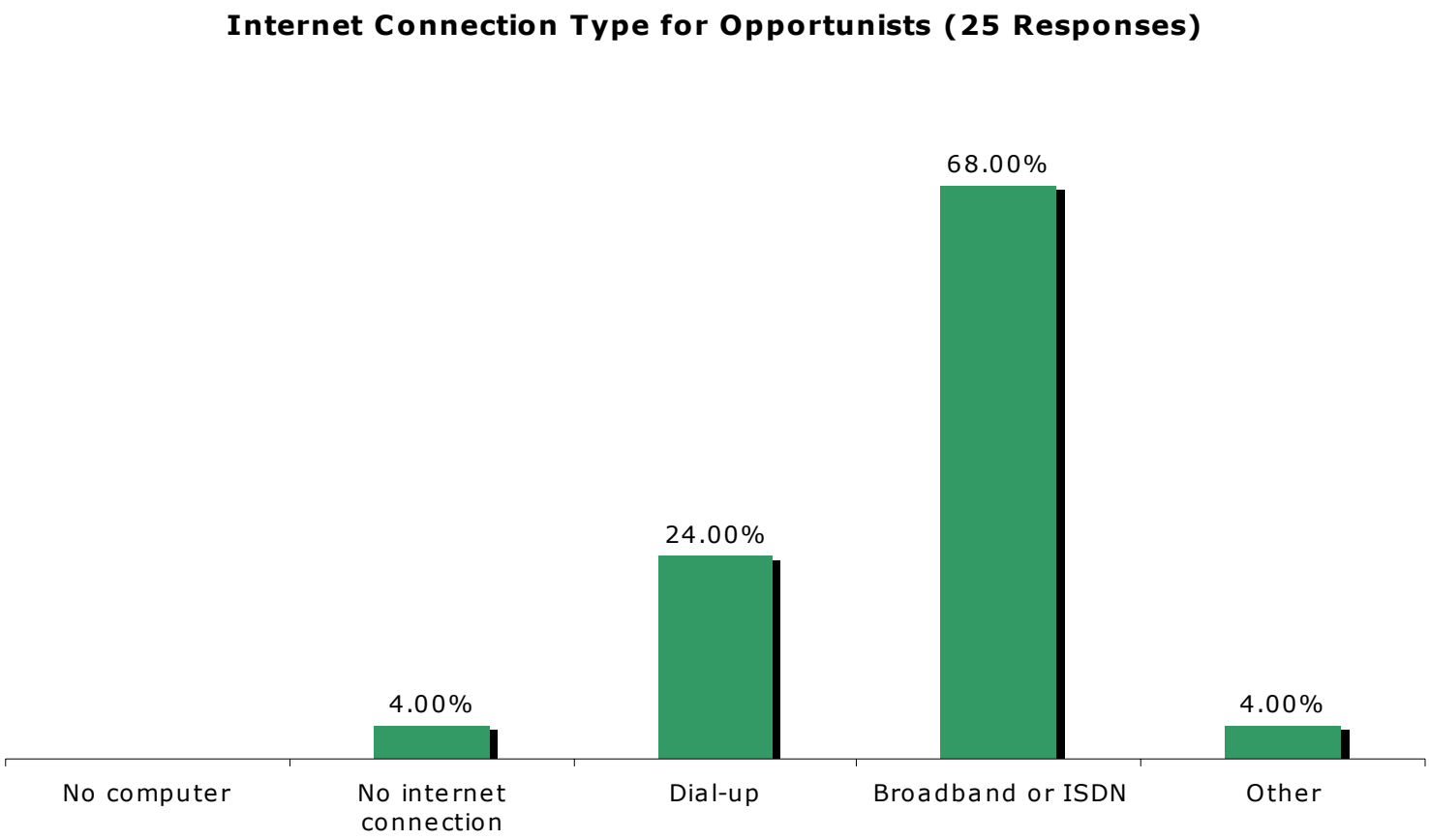


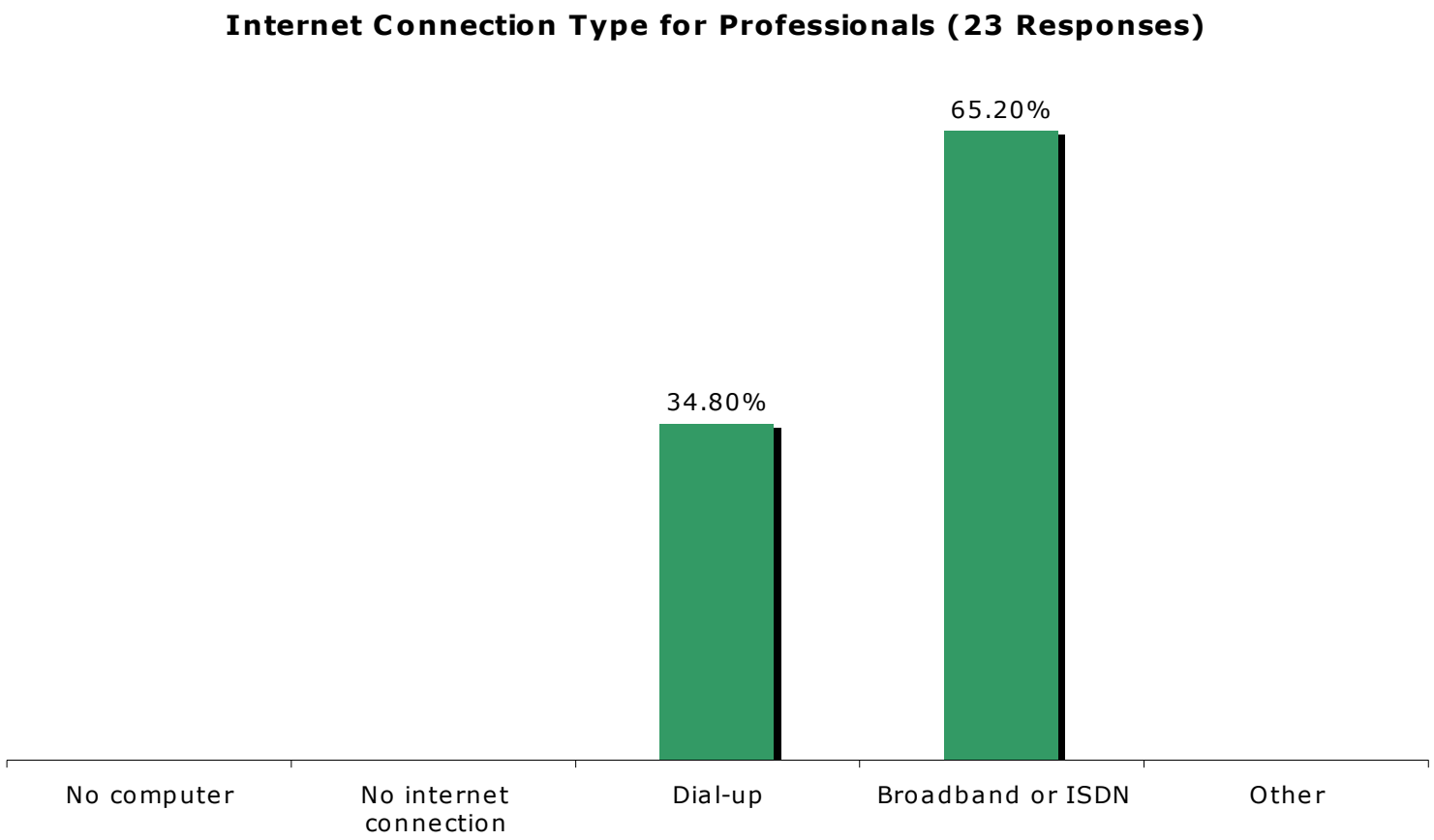


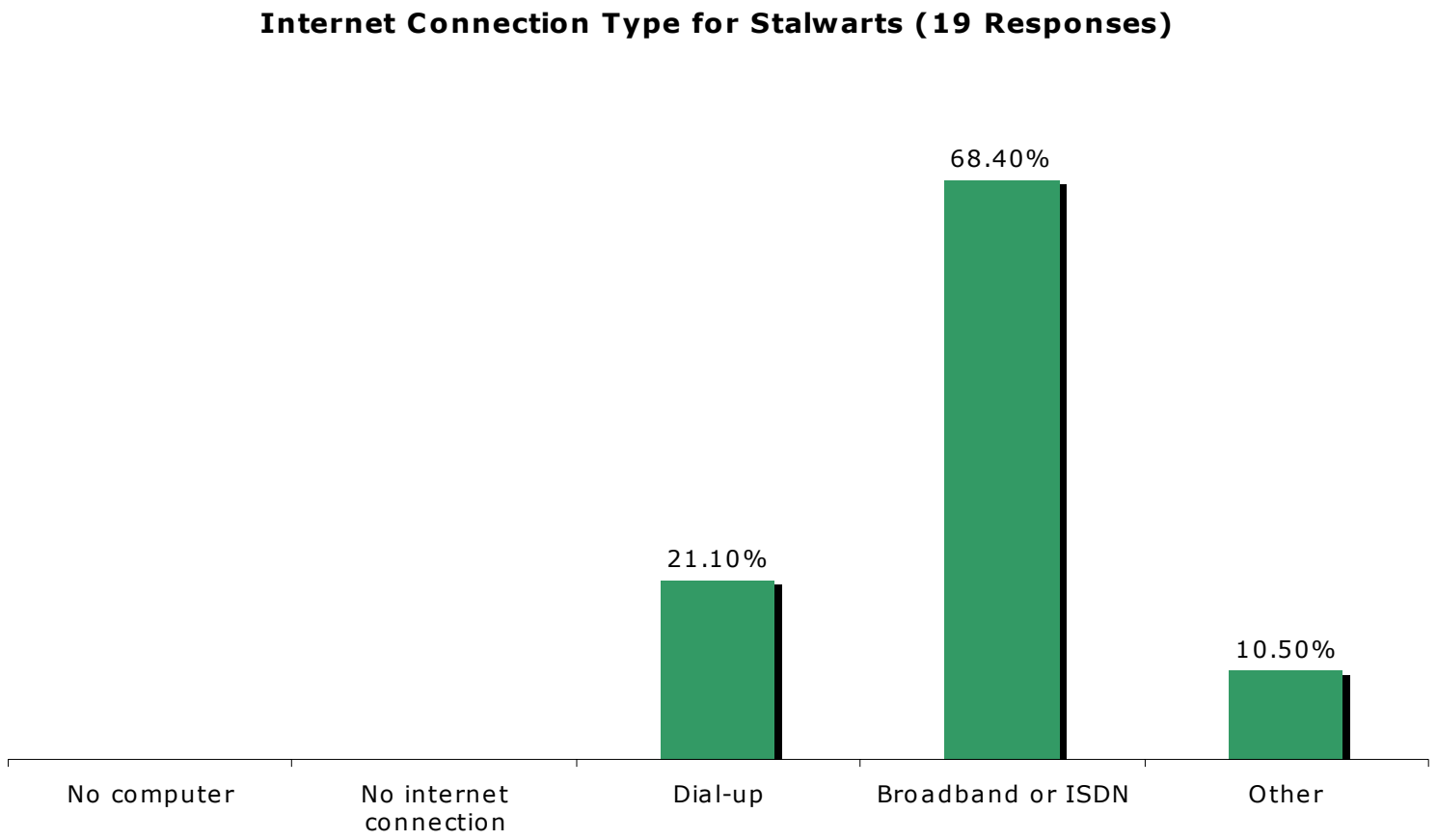
Grower Type	Would you please indicate your preferred method/s for obtaining more information about current trends within the industry? Other Method.
Opportunist	Government
Opportunist	C.G.A.
Professional	Own consultant
Traditional	Via consultant
Professional	Our own consultant.
Stalwart	All are important

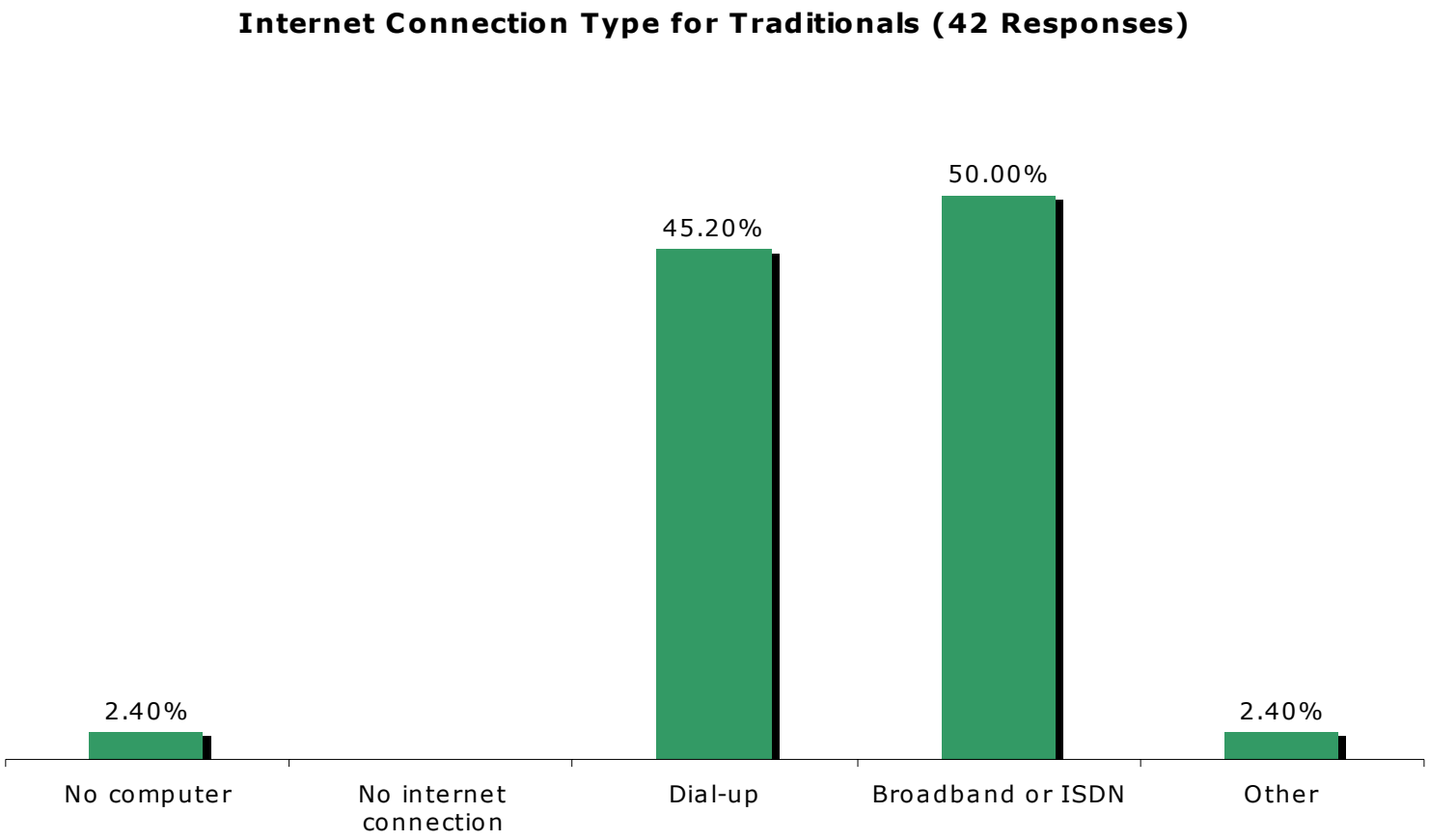
1.4 Internet access: by grower type




Internet Connection Type for Opportunists (25 Responses)
68.00%
24.00%
4.00%
4.00%
No computer
No internet connection
Dial-up
Broadband or ISDN
Other


Internet Connection Type for Professionals (23 Responses)
65.20%
34.80%
No computer
No internet connection
Dial-up
Broadband or ISDN
Other


Internet Connection Type for Stalwarts (19 Responses)
68.40%
21.10%
10.50%
No computer
No internet connection
Dial-up
Broadband or ISDN
Other


Internet Connection Type for Traditionals (42 Responses)
2.40%
45.20%
50.00%
2.40%
No computer
No internet connection
Dial-up
Broadband or ISDN
Other

Grower Type	What kind of Internet connection do you have on your farm? Other.
Opportunist	Don t use it
Stalwart	Satellite broadband
Traditional	CDMA mobile wireless connection
Traditional	Cannot obtain a faster service.
Opportunist	Satellite
Professional	As well as a standard dial- up using a normal phone line
Stalwart	Satellite broadband
Stalwart	Satellite
Stalwart	Satellite 2-way
Traditional	Satellite
Professional	Satellite
Stalwart	Satellite

Section 2: Farmer Characteristics and Farm Practices

This section reports responses to the survey with regard to cotton grower farm practices, farm characteristics, the frequency of cotton production, and the differences between growers who have had contact with their Catchment Management Authority (CMA), as compared to those who have not. Responses have been reported on a regional basis, while aggregated figures are also presented where appropriate.

2.1 Summary of Section 2

Grower farm practices

This section reports data on BMP accreditation, water use and storage, soil quality and soil monitoring, and CMA interaction.

• BMP: 46.6 per cent of survey respondents indicated that they were BMP accredited, and this percentage was slightly higher for the Border Rivers/Gwydir/St George region, at 48.6 per cent.

• WUE: Respondents from the Southern region showed a greater interest in Water Use Efficiency, with 75 per cent measuring WUE (total response rate 58.1 per cent), while 80 per cent monitor ground water levels (total response rate 49.1 per cent).

• Soil quality/monitoring: 66.7 per cent of Southern respondents measure soil salinity (total response rate 47.8 per cent). 71.4 per cent of Northern respondents measure soil organic content (total response rate 64.7 per cent).

• 91.2 per cent of Border Rivers/Gwydir/St George respondents have stream or river frontage, while this figure drops to 50 per cent for Northern respondents (total response rate 68.9 per cent). Border Rivers/Gwydir/St George and Namoi respondents had higher than average rates of interaction with their local CMA (59.4 per cent and 64.5 per cent respectively, the total response rate being 53.1 per cent). Only 38.2 per cent of Northern respondents had interacted with their CMA.

Grower farm characteristics

This section reports mean values by region of farm characteristics such as hectares (total, green, dryland, native vegetation, and cotton hectares), cotton yield, percentage of gene stacks used (Conventional, Conventional RR, Bollgard, Bollgard RR), staff rates, and chemical application methods used.

• Hectares: Border Rivers/Gwydir/St George respondents had, by a large margin, the largest average property size, at 9804.8 hectares (total response rate 4630.9 hectares), while Southern respondents had the largest area of green hectares (2499 hectares; total response rate 1233 hectares). In proportion to their overall property size, Border Rivers/Gwydir/St George respondents also had the largest area of dryland cropping/grazing area and native vegetation. 2005/06 cotton hectares were highest in the Border Rivers/Gwydir/St George group at 552.2 hectares, and lowest for Northern respondents at 272.7 hectares (total response rate 446.1 hectares).

• Yield: Average cotton yield for all respondents for the 2005/06 season was reported at 7.73 bales/hectare. Yield was highest in the Southern group at 10.15 bales/hectare, and lowest in the Northern group at 5.92 bales/hectare.

•Gene stack: Gene stack percentage break-down for the 2005/06 season indicates that Conventional and Conventional RR varieties, when combined, are used much less in the Namoi than the other three reported regions, therefore making the Namoi the largest user of Bollgard and Bollgard RR cotton varieties. Northern growers use 49.4 per cent Bollgard and 38.3 Bollgard RR varieties, while Southern growers indicated no use of Bollgard varieties, but planted 84.6 per cent of their cotton crop using Bollgard RR varieties.
•Staff: Respondents had, on average, 4.2 full time staff. This figure was highest in the Southern region at 6.1, and lowest in the Northern region at 2.2.
•Chemical application: Total chemical application break-up included 45.35 per cent for ground application using own equipment, 21.6 per cent for ground application using a contractor, and 33.05 per cent for aerial application. Northern respondents indicated that 70.97 per cent of chemicals were applied using their own ground-based equipment. Southern respondents were the most likely to use a contractor for ground application, making up 35 per cent of their chemical application. In the Border Rivers/Gwydir/St George region, aerial application made up 43.54 per cent of all chemical application.

Frequency of cotton production

This section shows that 'One cotton' is the most common frequency of production, used by 36.3 per cent of all survey respondents, followed by 'Two cotton', at 20.4 per cent, and 'Less than one cotton', at 18.6 per cent. 'One cotton' is most used in the Namoi and Southern regions (both at 56.3 per cent), while 33.3 per cent of Northern respondents indicated that they used the 'Less than one cotton' production frequency.

Grower contact with a CMA

Data for this section was arrived at by splitting survey respondents based on their answer to the question "Have you had any interaction with your Catchment Management Authority or Regional Body?". Significant cross tabulations (with a chi-square test result of approximately 0.05 or less) have been reported for each of the four regions, while aggregated means for all survey respondents have also been provided, where a significant difference based on contact with a CMA is indicated.
• Differences in Characteristics (Border Rivers/Gwydir/St George): those who had interaction with their CMA were more likely to: use contract picking crews; see the importance of measuring WUE; monitor soil structure; develop a storm water management plan; calculate WUE in terms of bales/megalitre; selectively graze creeks and river frontage; and monitor several types of native species.
• Differences in Characteristics (Namoi): those who had interaction with their CMA were more likely to: be BMP accredited; measure WUE; have soil erosion risks assessed; have stream or river frontage; see WUE as important in farm management; use several soil management techniques; and selectively graze creeks and river frontage. They were, however, less likely to control erosion in native vegetation areas.
• Differences in Characteristics (Northern): those who had interaction with their CMA were more likely to: have on-farm water storage; use overhead irrigation systems; have stream or river frontage; recognise the benefits of Roundup Ready compared to over the top chemicals; monitor soil structure; use several soil management techniques; monitor native species; and believe that their soil health has improved over the last 10 years. They were, however, less likely to leave native vegetation areas undisturbed.

• Differences in Characteristics (Southern): those who had interaction with their CMA were more likely to: measure soil sodicity and organic quality; assess soil erosion risks; and welcome the opportunity to extend payment terms for chemical purchases. However, they were less likely to be BMP accredited; to recognise the importance of over the top herbicides; and to control pests and weeds in native vegetation areas.
• All Regions (means): an analysis of mean data of all regions with regard to CMA interaction, shows that those who have had interaction with a CMA had: a larger total property area in hectares; more green hectares; more dryland cropping/grazing hectares; more native vegetation areas; and almost twice as much cotton area in hectares.

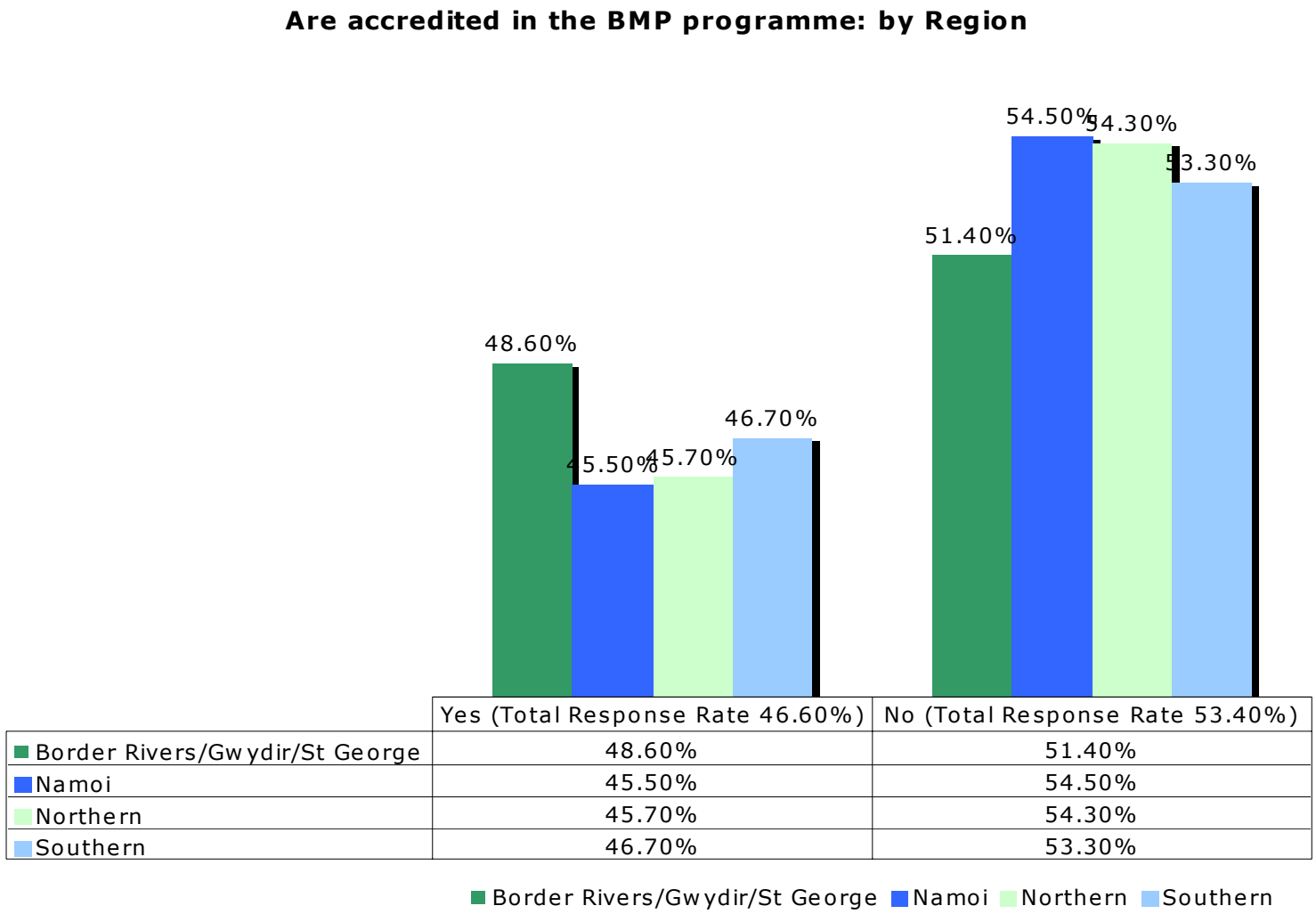
Grower attitudes towards farming practices

Data showing responses to the attitudinal questions of the survey are presented. The data shows regional difference in grower attitudes towards water quality and WUE issues, nitrogen efficiency information, and the viability of current farming practices into the future.

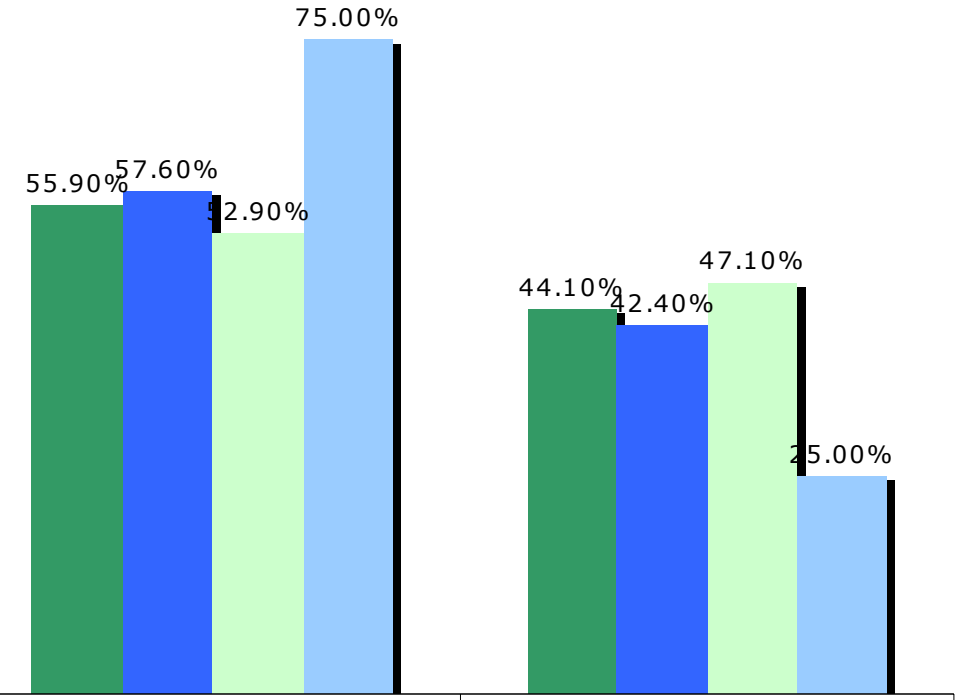
Preferred methods of obtaining further information

Regional differences in the preferred methods for receiving industry information are presented. Some significant results include: the interest shown by Border Rivers/Gwydir/St George growers for workshops/field days and industry websites; the preference of those in the Northern region for postal and web-based information sources; and the preference of Southern growers for email and conference/course information. Growers in the Namoi tended to conform to the overall response to these questions in most cases.

2.2 Grower farm practices: percentages by region



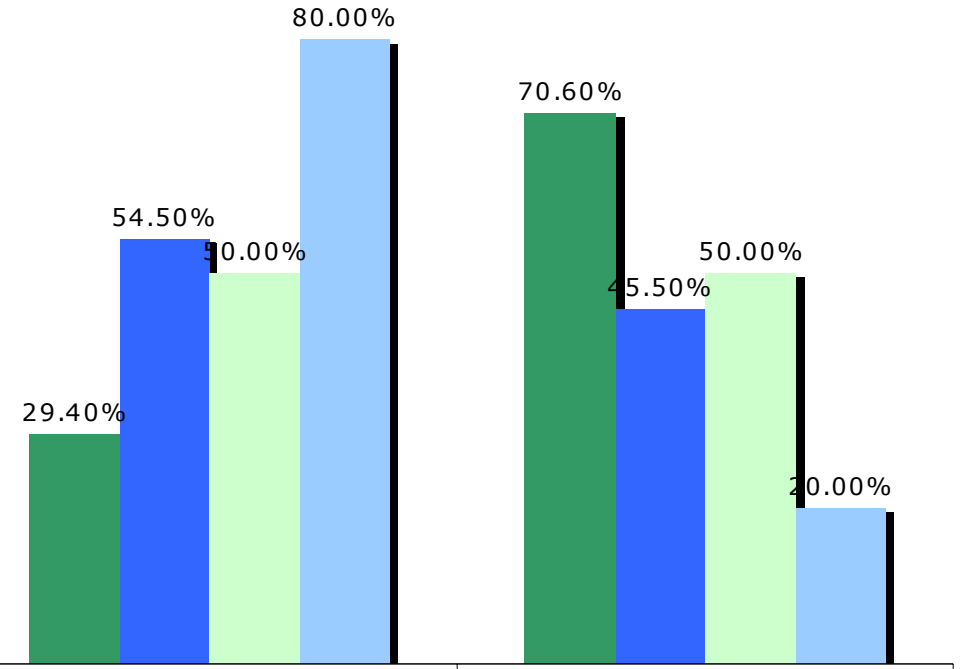
Measure water use efficiency: by Region



	Yes (Total Response Rate 58.10%)	No (Total Response Rate 41.90%)
Border Rivers/Gwydir/St George	55.90%	44.10%
Namoi	57.60%	42.40%
Northern	52.90%	47.10%
Southern	75.00%	25.00%

Border Rivers/Gwydir/St George Namoi Northern Southern

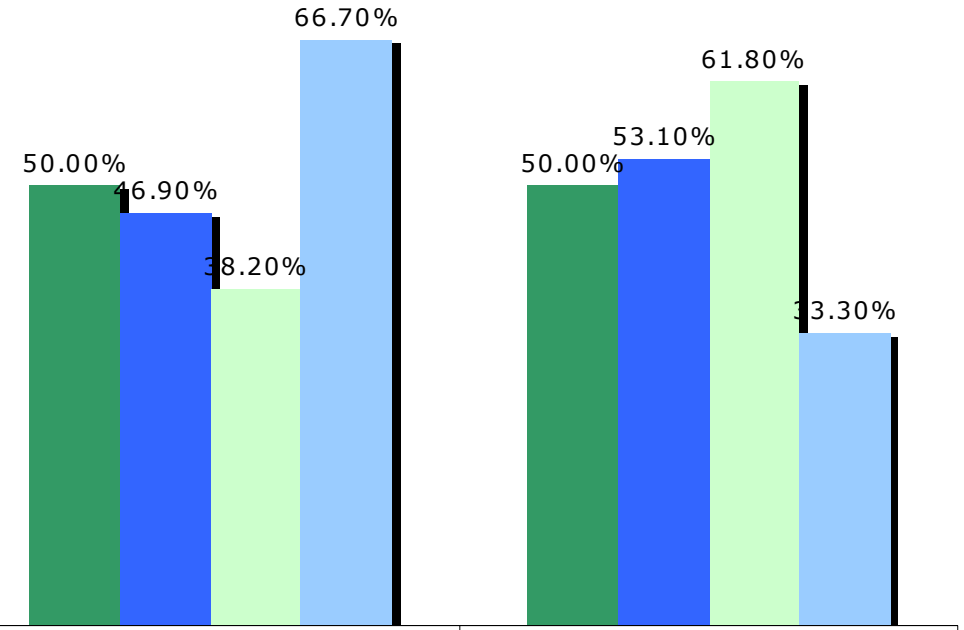
Monitor ground water levels: by Region



	Yes (Total Response Rate 49.10%)	No (Total Response Rate 50.90%)
Border Rivers/Gwydir/St George	29.40%	70.60%
Namoi	54.50%	45.50%
Northern	50.00%	50.00%
Southern	80.00%	20.00%

Border Rivers/Gwydir/St George Namoi Northern Southern

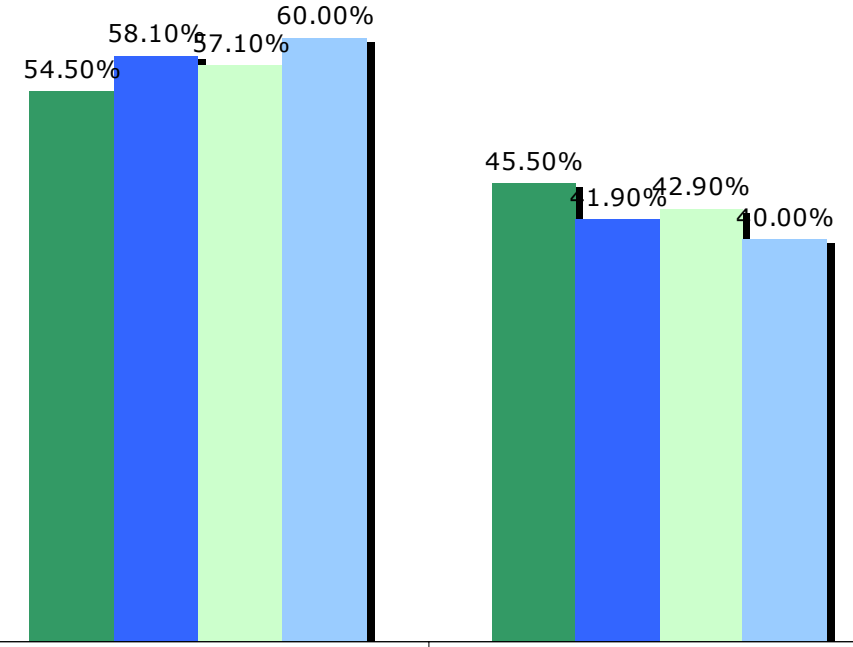
Measure soil salinity: by Region



	Yes (Total Response Rate 47.80%)	No (Total Response Rate 52.20%)
Border Rivers/Gwydir/St George	50.00%	50.00%
Namoi	46.90%	53.10%
Northern	38.20%	61.80%
Southern	66.70%	33.30%

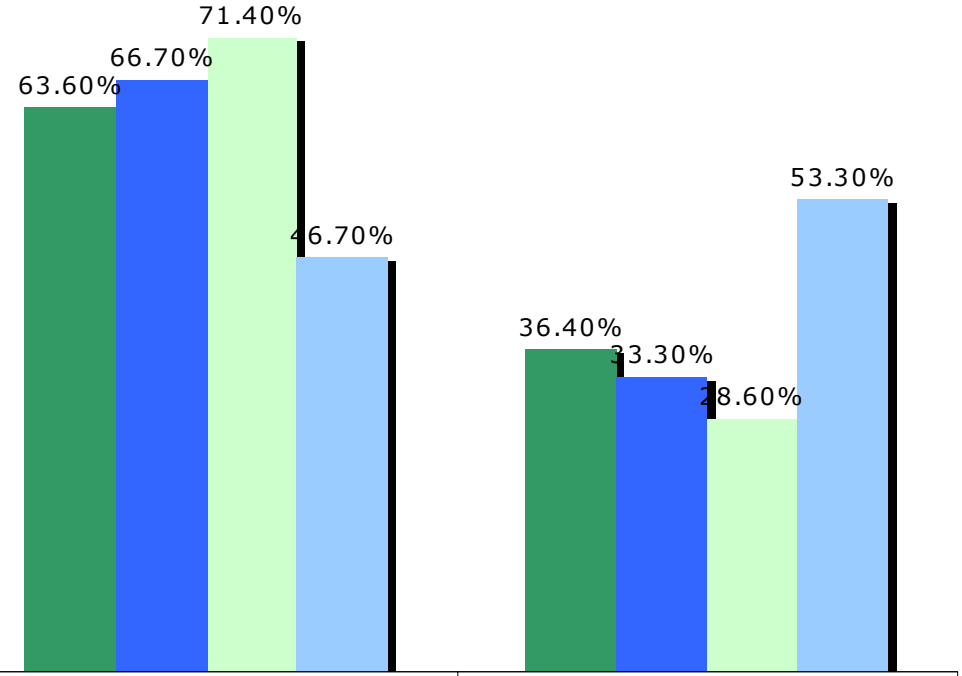
Border Rivers/Gwydir/St George Namoi Northern Southern

Measure soil sodicity: by Region



	Yes (Total Response Rate 57.00%)	No (Total Response Rate 43.00%)
Border Rivers/Gwydir/St George	54.50%	45.50%
Namoi	58.10%	41.90%
Northern	57.10%	42.90%
Southern	60.00%	40.00%

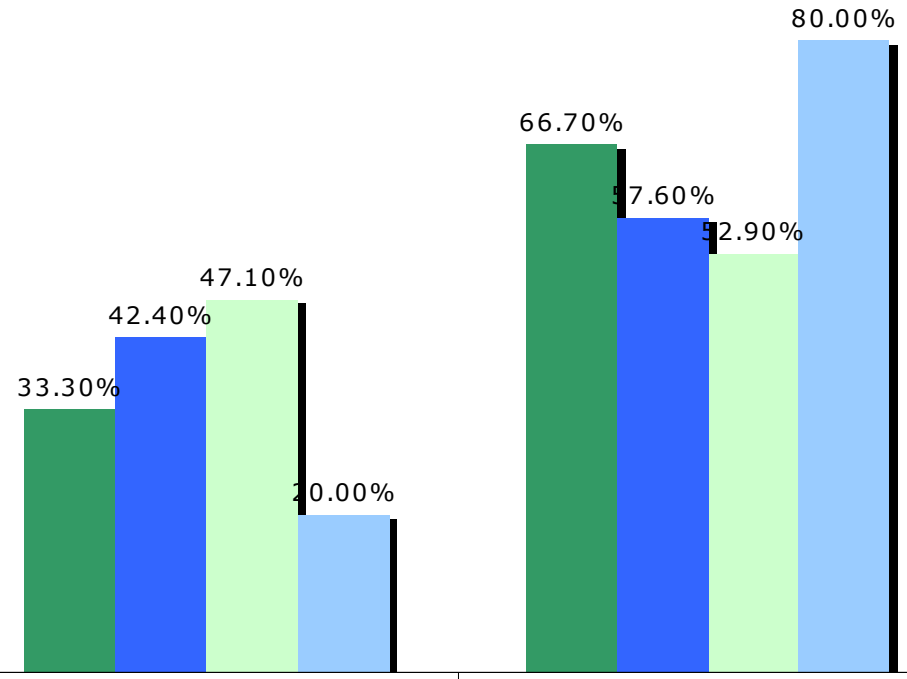
Measure soil organic content: by Region



	Yes (Total Response Rate 64.70%)	No (Total Response Rate 35.30%)
Border Rivers/Gwydir/St George	63.60%	36.40%
Namoi	66.70%	33.30%
Northern	71.40%	28.60%
Southern	46.70%	53.30%

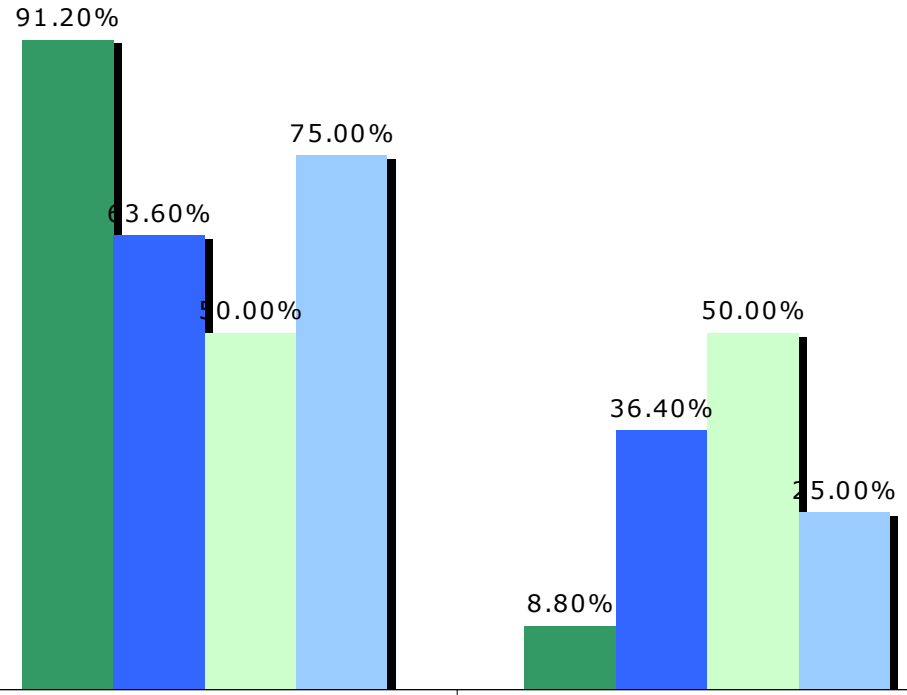
Border Rivers/Gwydir/St George Namoi Northern Southern

Have soil erosion risks assessed: by Region



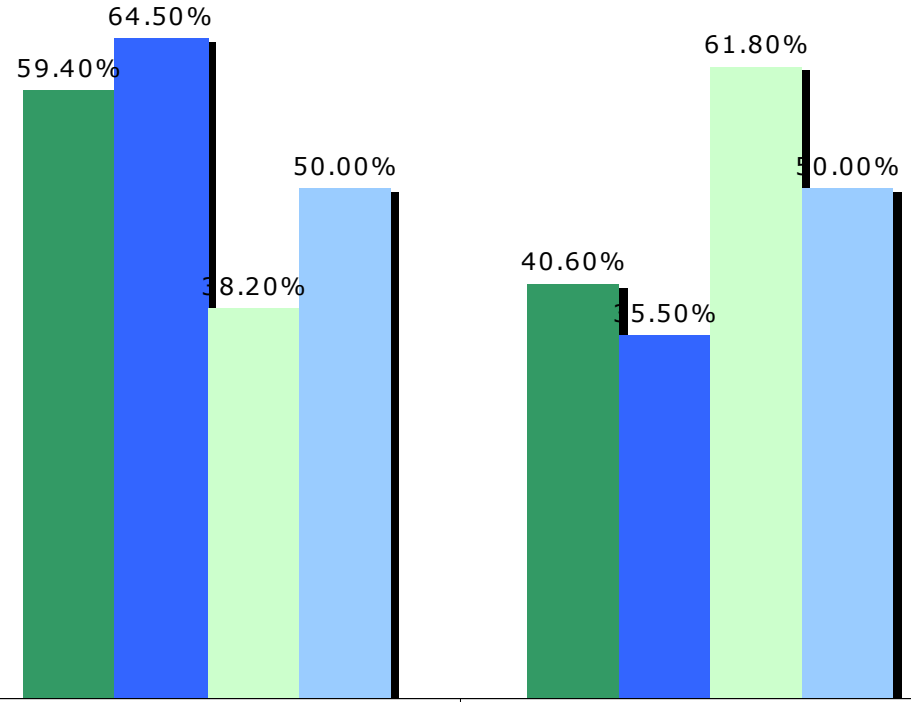
	Yes (Total Response Rate 38.30%)	No (Total Response Rate 61.70%)
Border Rivers/Gwydir/St George	33.30%	66.70%
Namoi	42.40%	57.60%
Northern	47.10%	52.90%
Southern	20.00%	80.00%

Have stream or river frontage: by Region



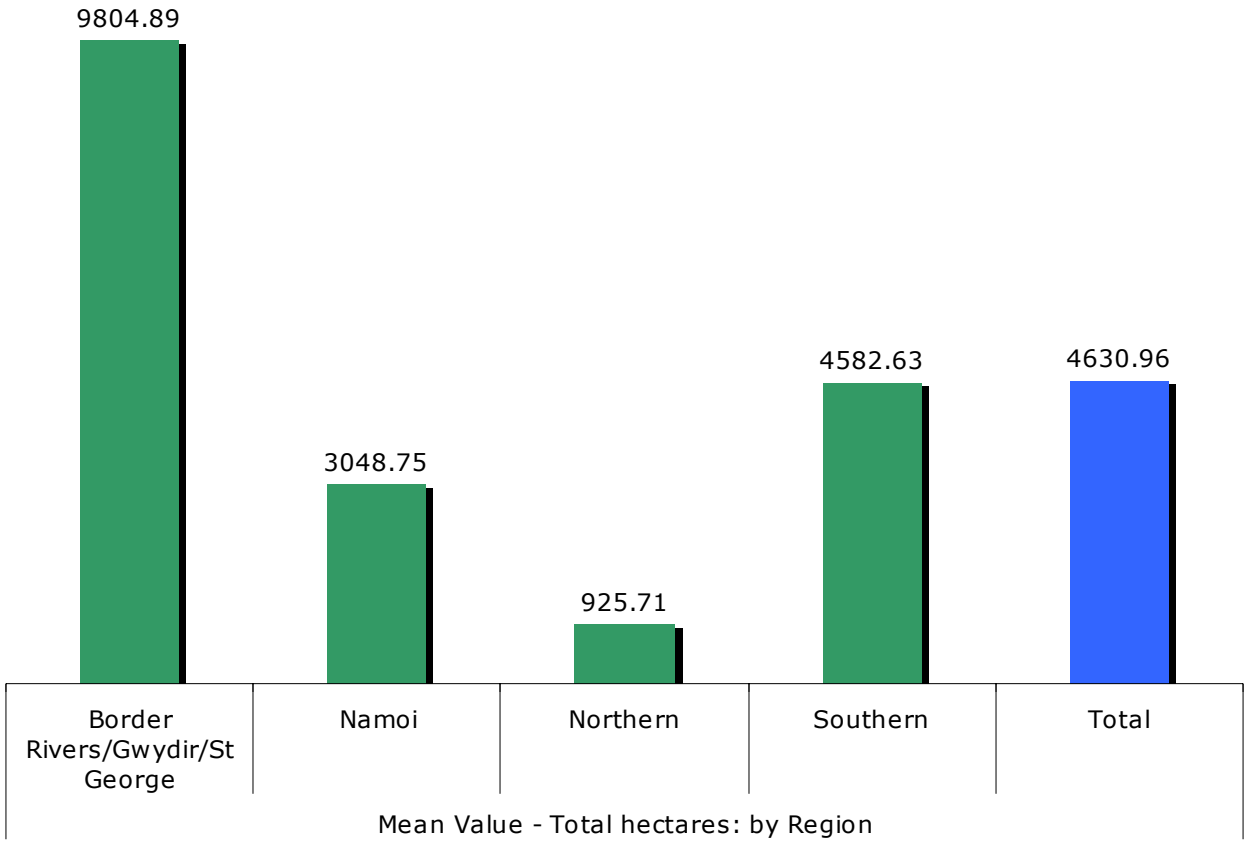
	Yes (Total Response Rate 68.90%)	No (Total Response Rate 31.10%)
Border Rivers/Gwydir/St George	91.20%	8.80%
Namoi	63.60%	36.40%
Northern	50.00%	50.00%
Southern	75.00%	25.00%

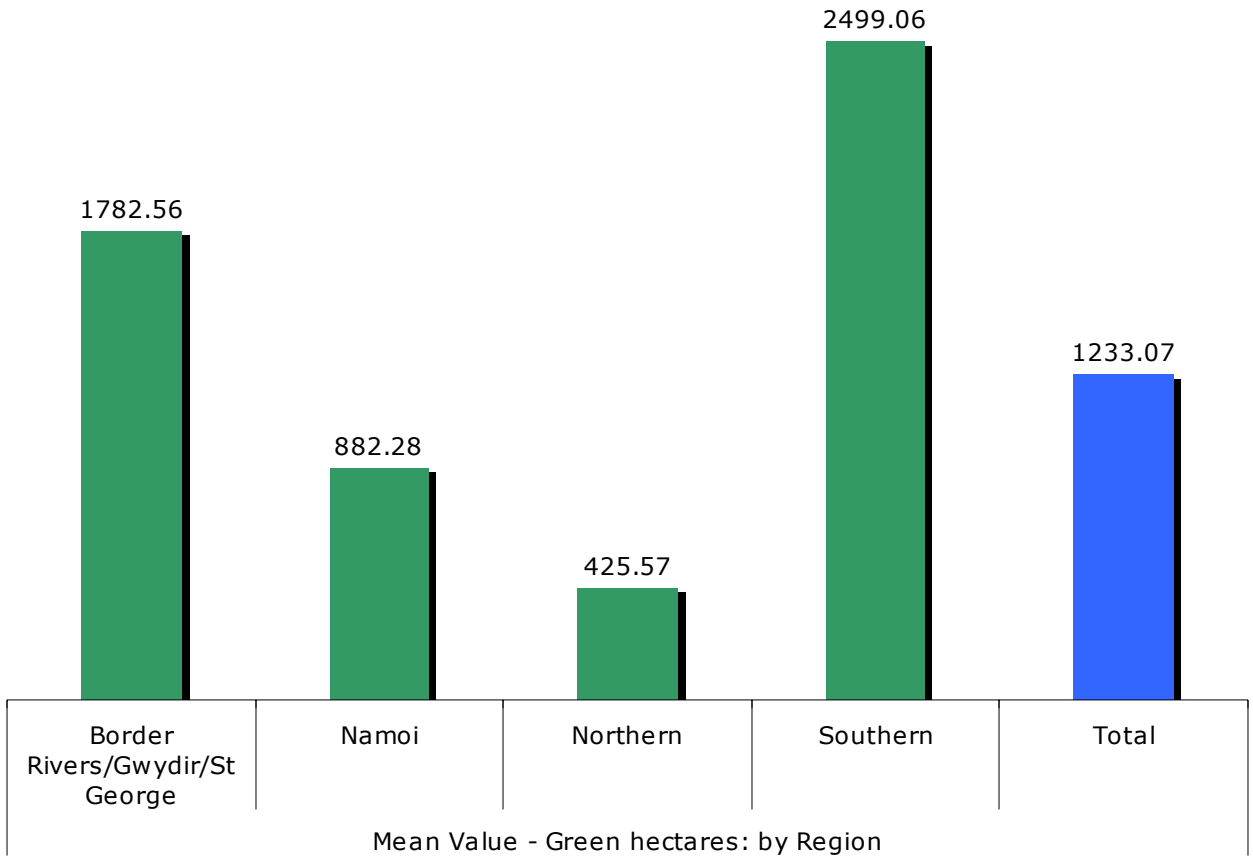
Have had interaction with CMA: by Region

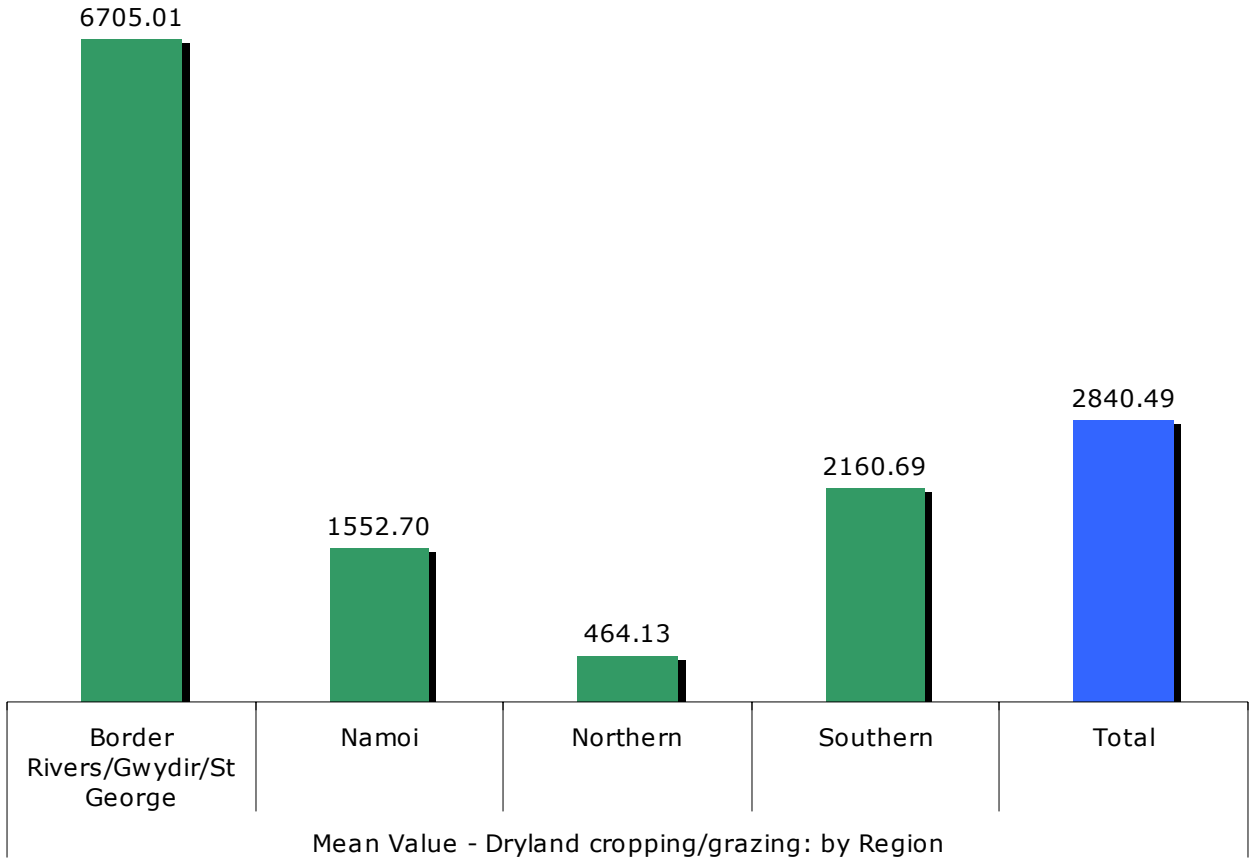


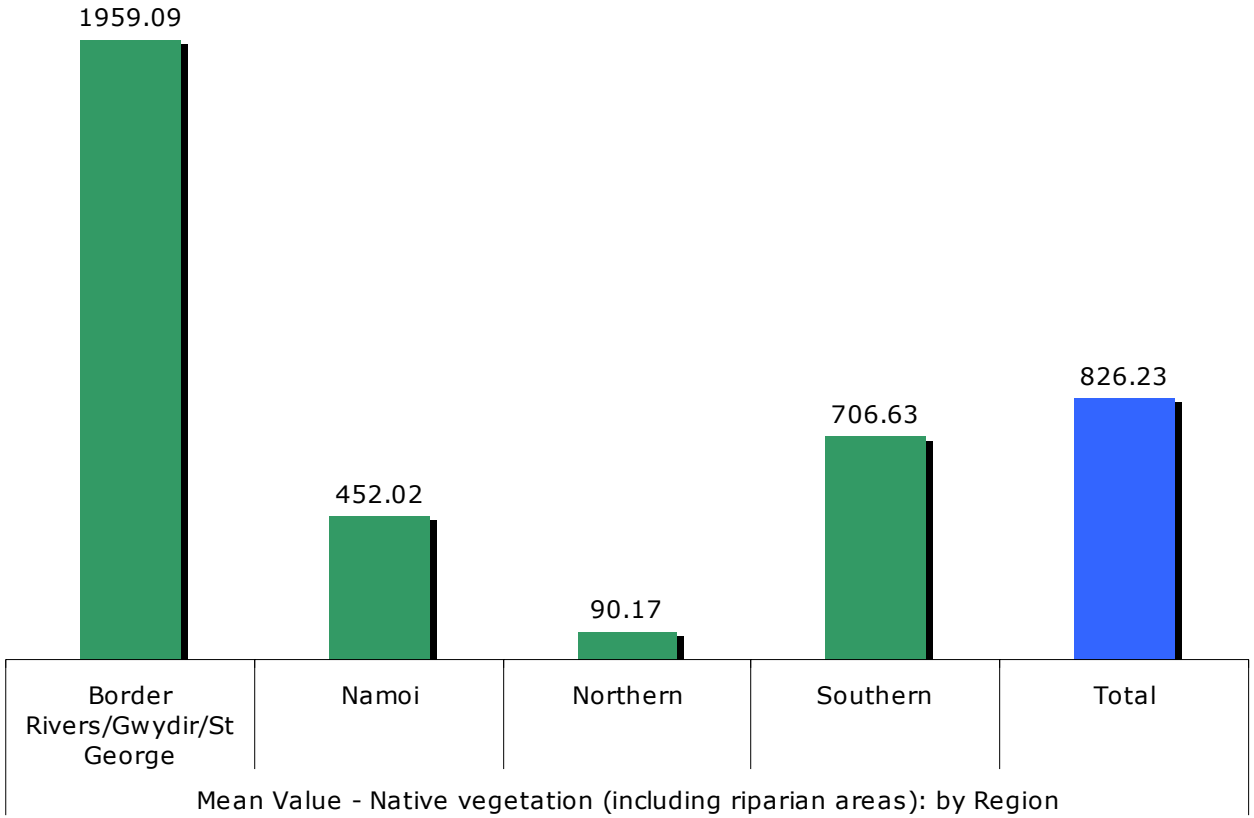
	Yes (Total Response Rate 53.10%)	No (Total Response Rate 46.90%)
Border Rivers/Gwydir/St George	59.40%	40.60%
Namoi	64.50%	35.50%
Northern	38.20%	61.80%
Southern	50.00%	50.00%

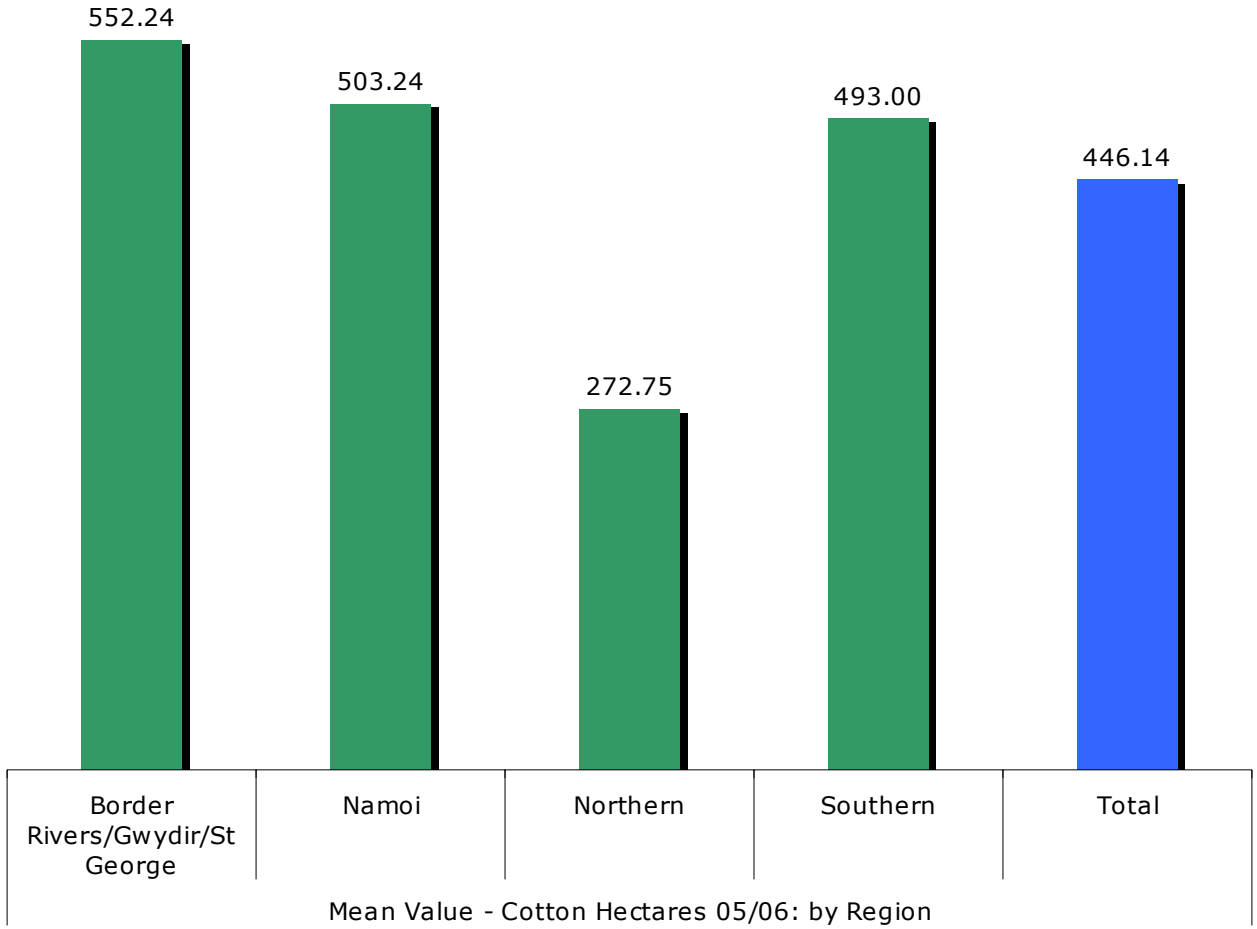
2.3 Grower farm characteristics: mean values by region

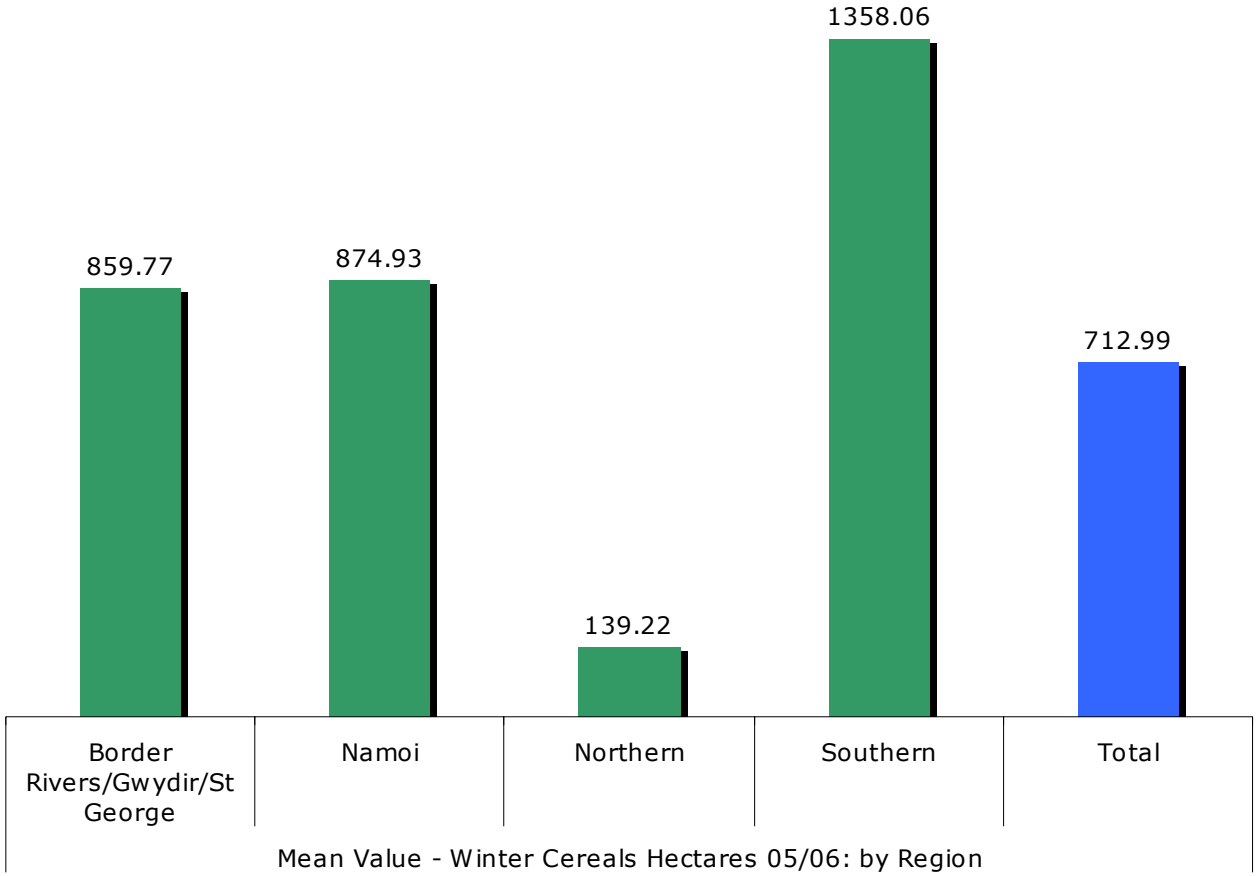


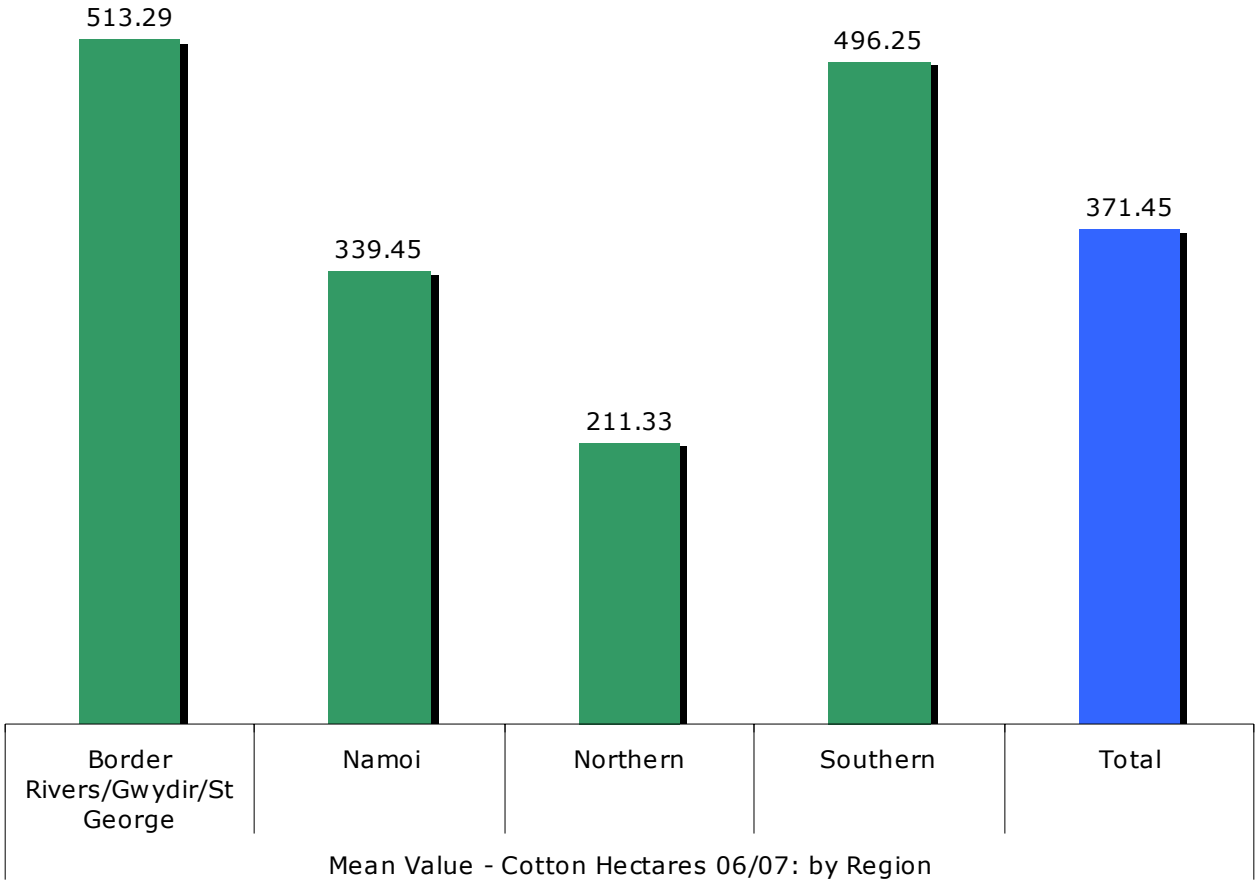

2499.06
1782.56
1233.07
882.28
425.57
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Green hectares: by Region

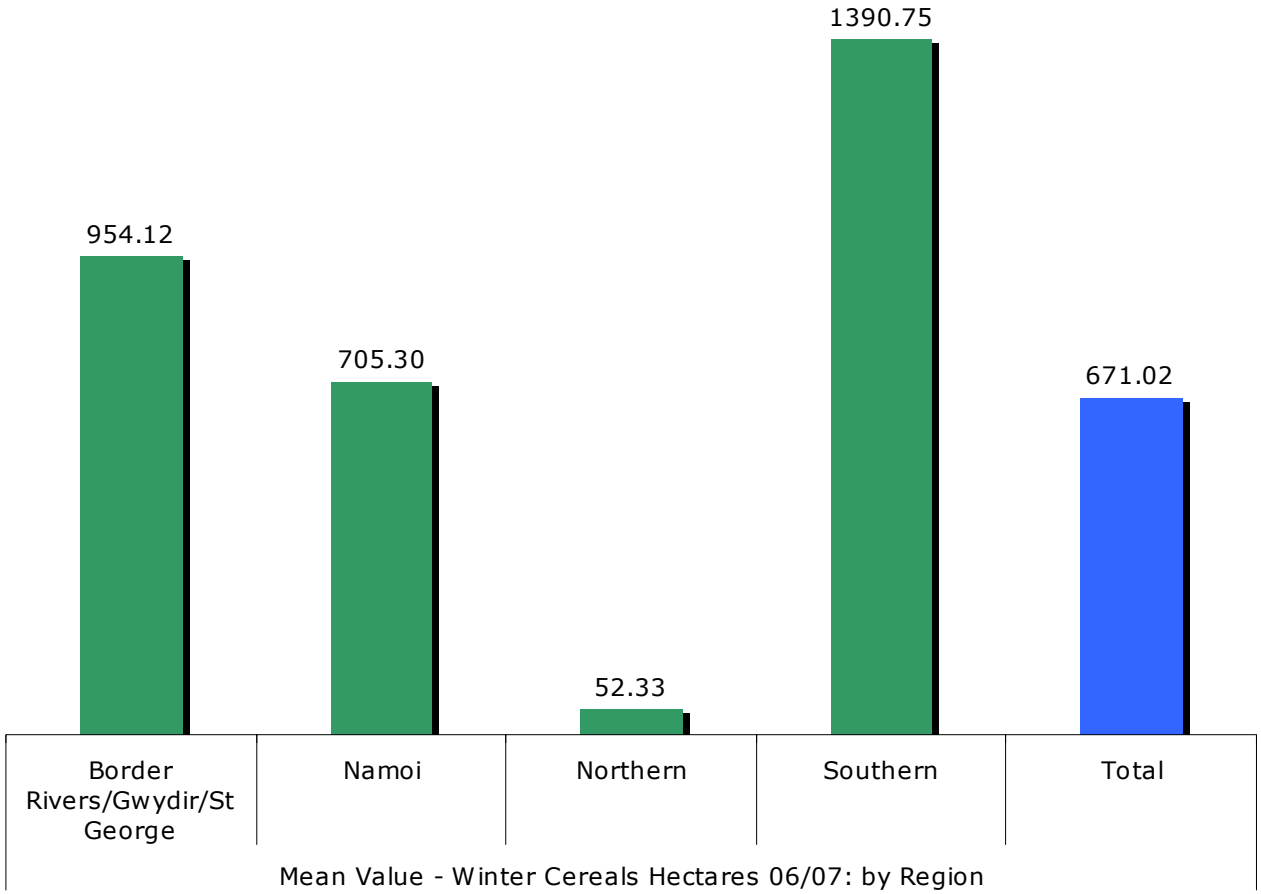

6705.01
1552.70
464.13
2160.69
2840.49
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Dryland cropping/grazing: by Region

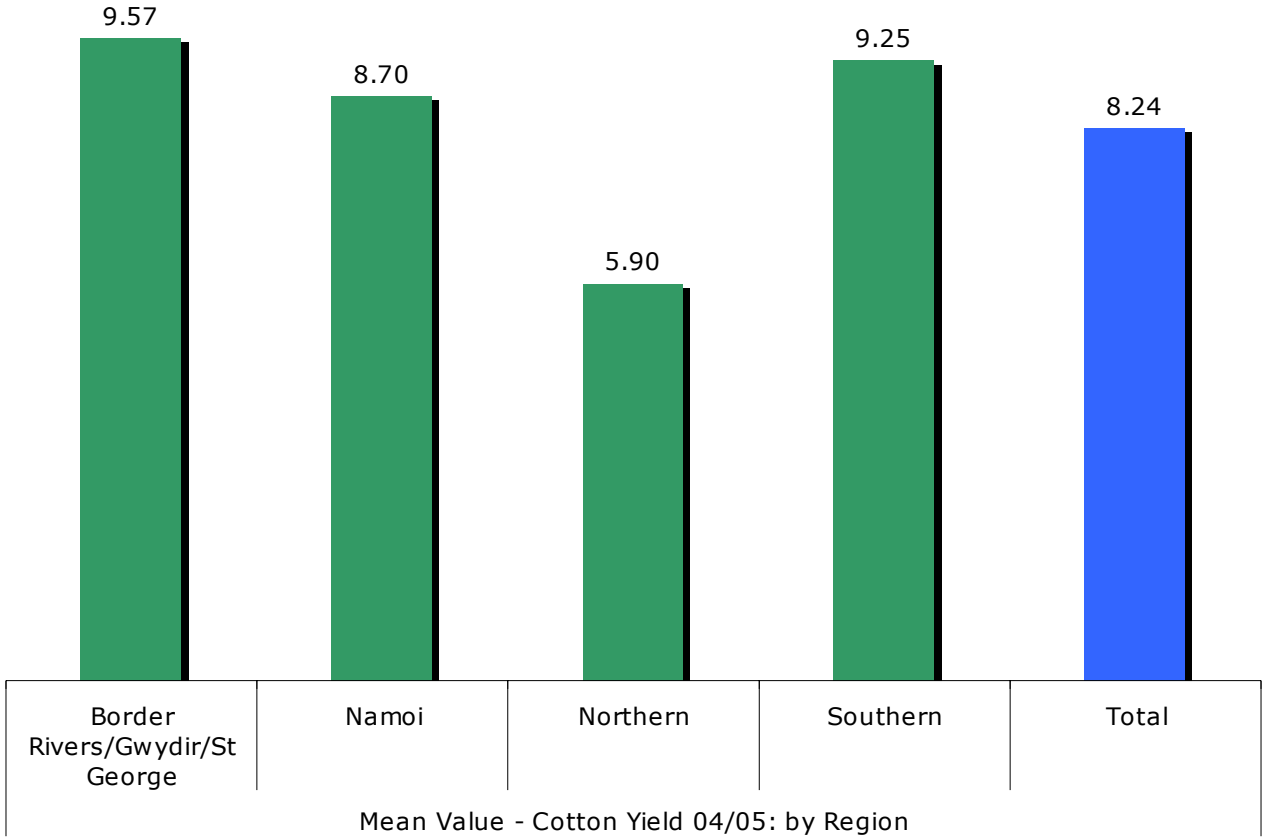

1959.09
452.02
90.17
706.63
826.23
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Native vegetation (including riparian areas): by Region

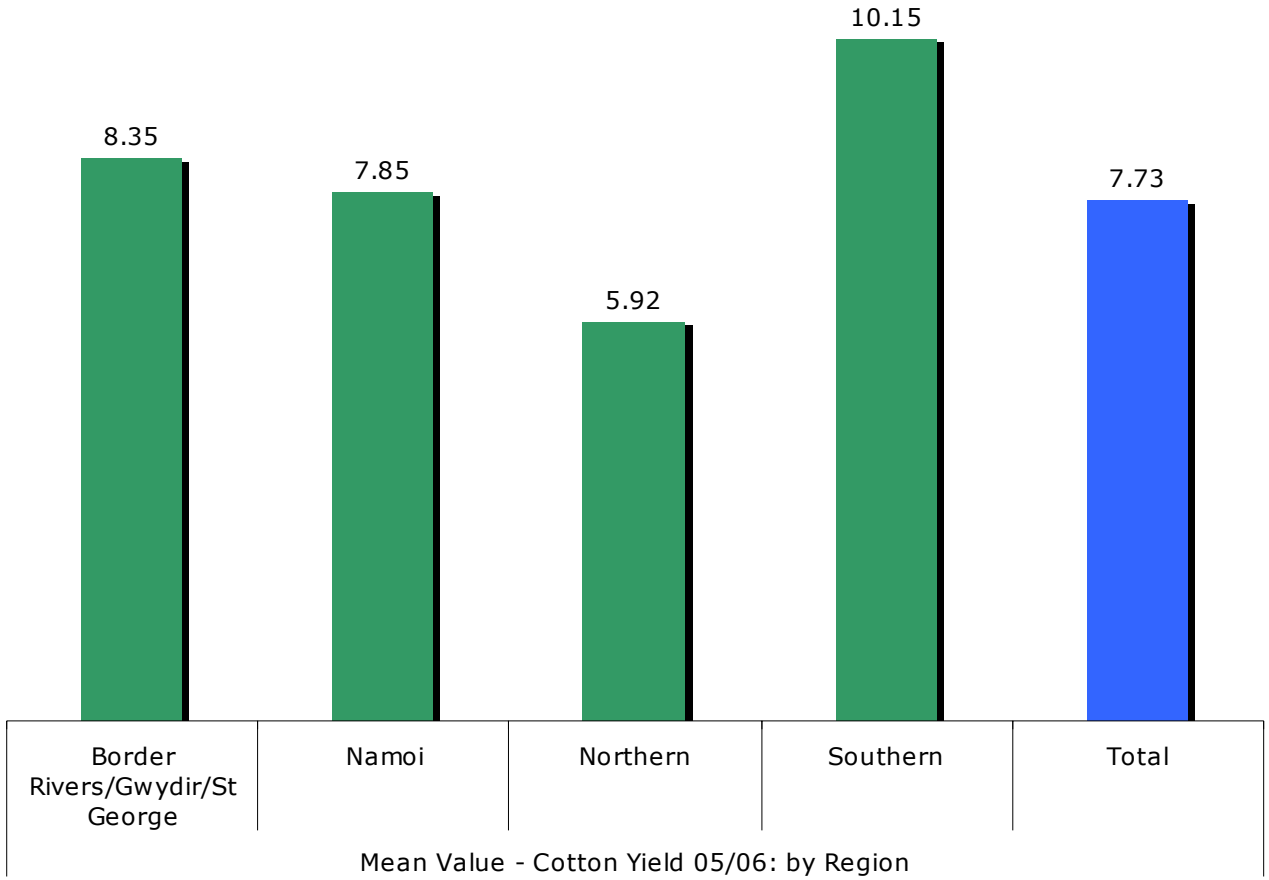

552.24
503.24
272.75
493.00
446.14
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Cotton Hectares 05/06: by Region


1358.06
859.77
874.93
712.99
139.22
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Winter Cereals Hectares 05/06: by Region


513.29
339.45
211.33
496.25
371.45
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Cotton Hectares 06/07: by Region

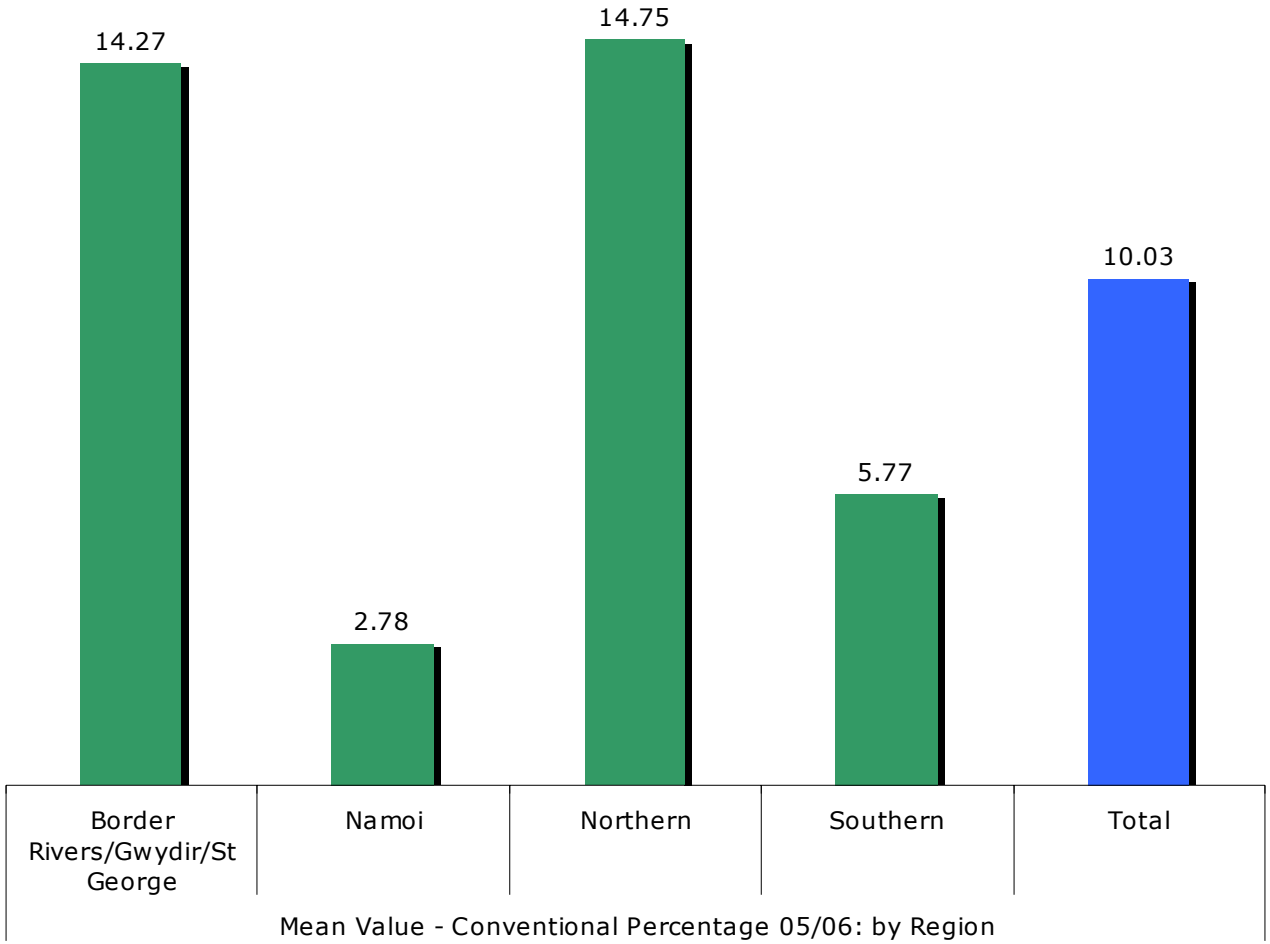

954.12
705.30
52.33
1390.75
671.02
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Winter Cereals Hectares 06/07: by Region

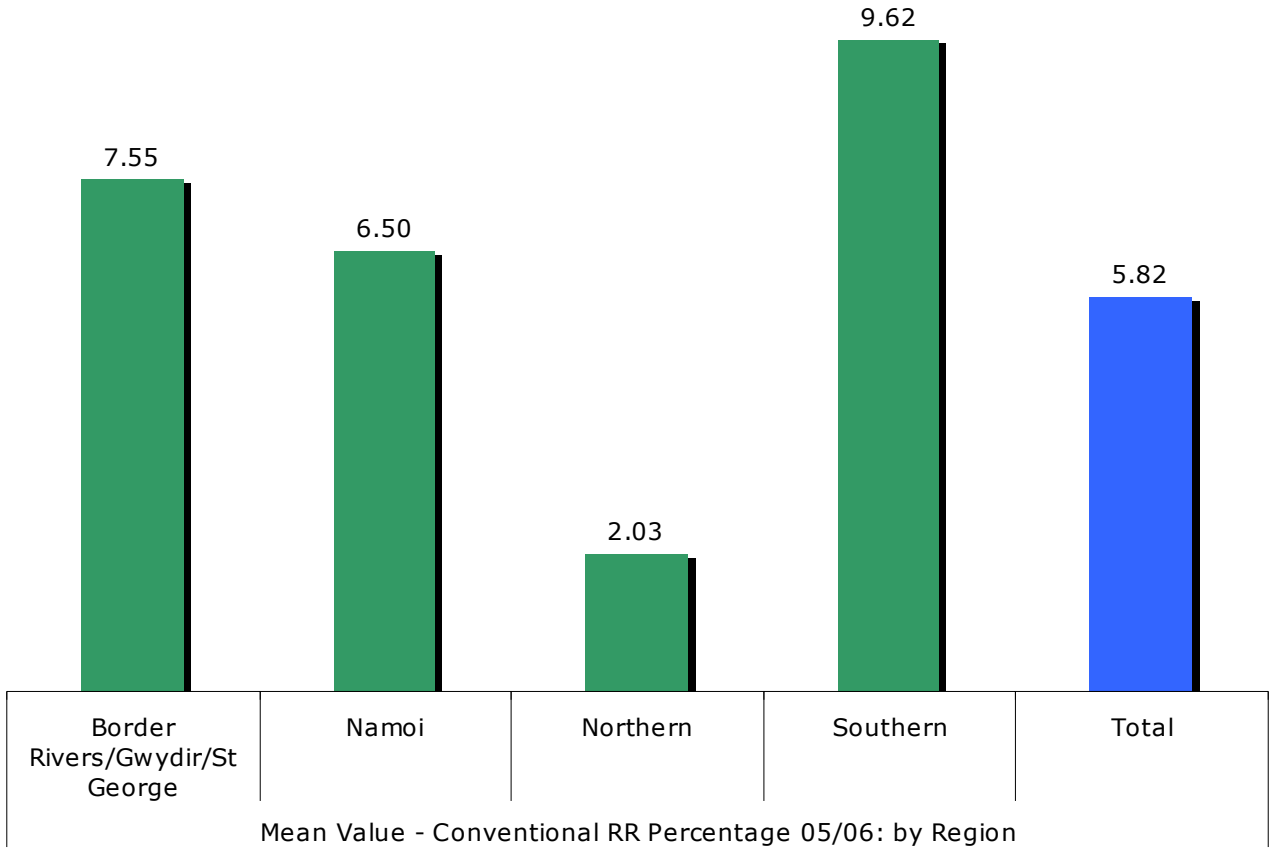

9.57
8.70
5.90
9.25
8.24
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Cotton Yield 04/05: by Region

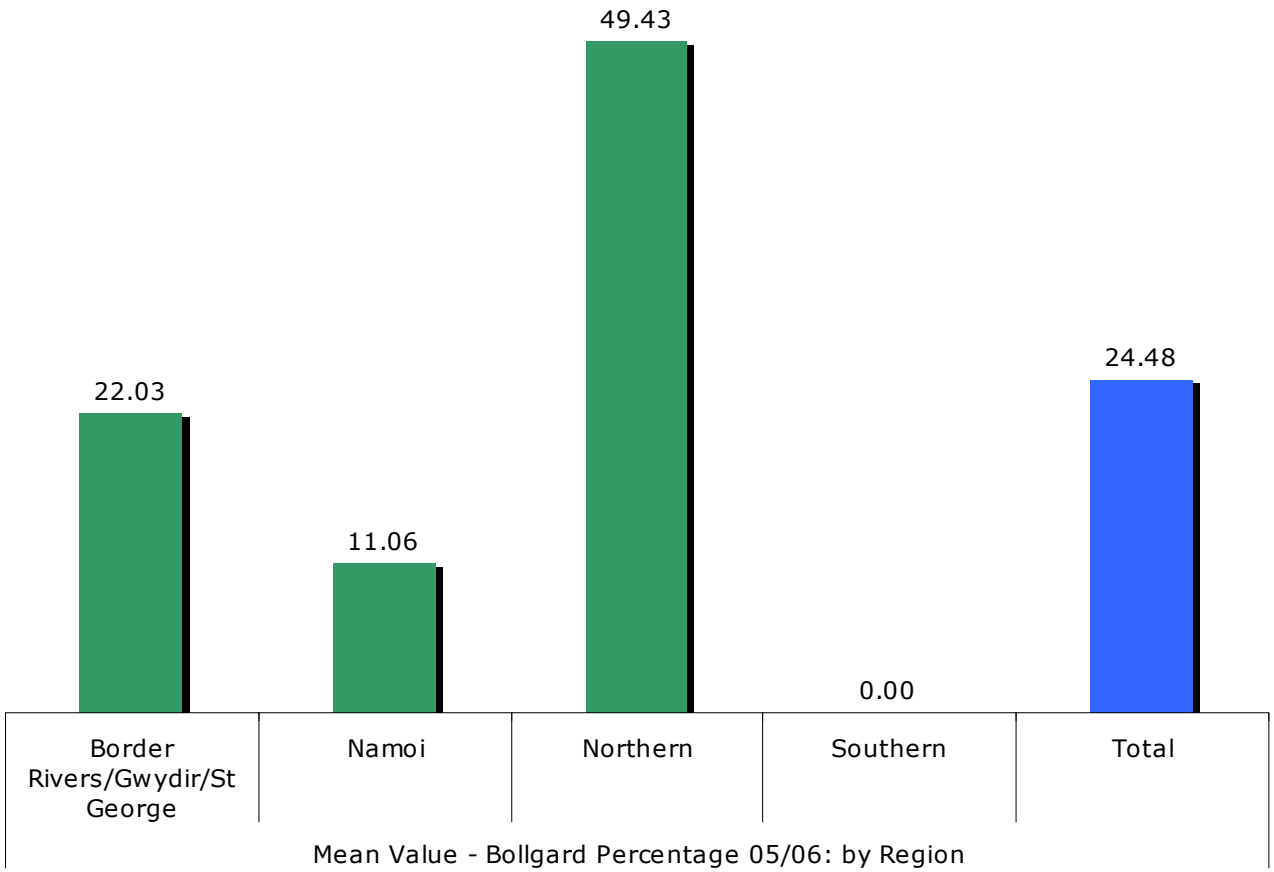

8.35
7.85
5.92
10.15
7.73
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Cotton Yield 05/06: by Region

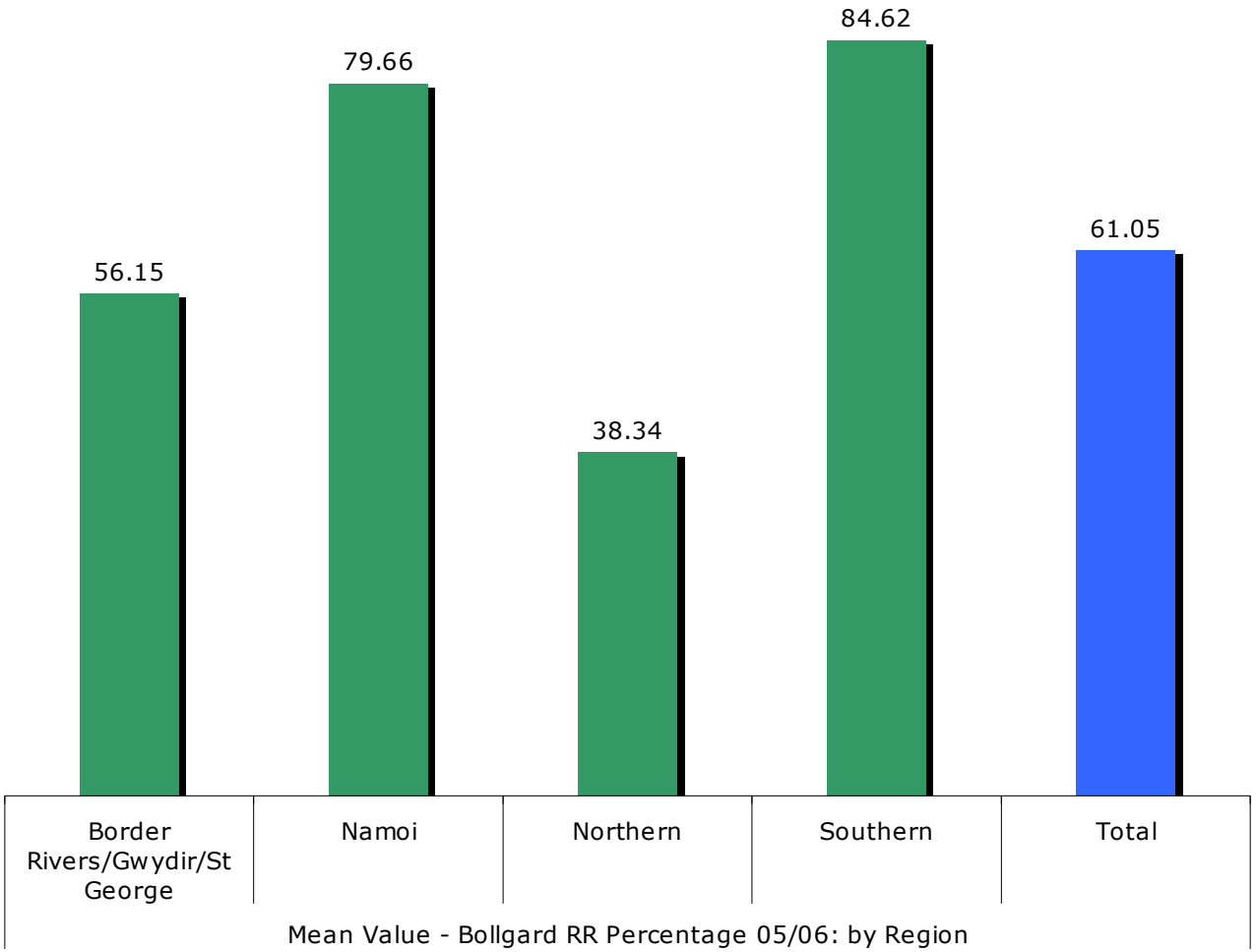
Gene Stack break-down by region (percentages)

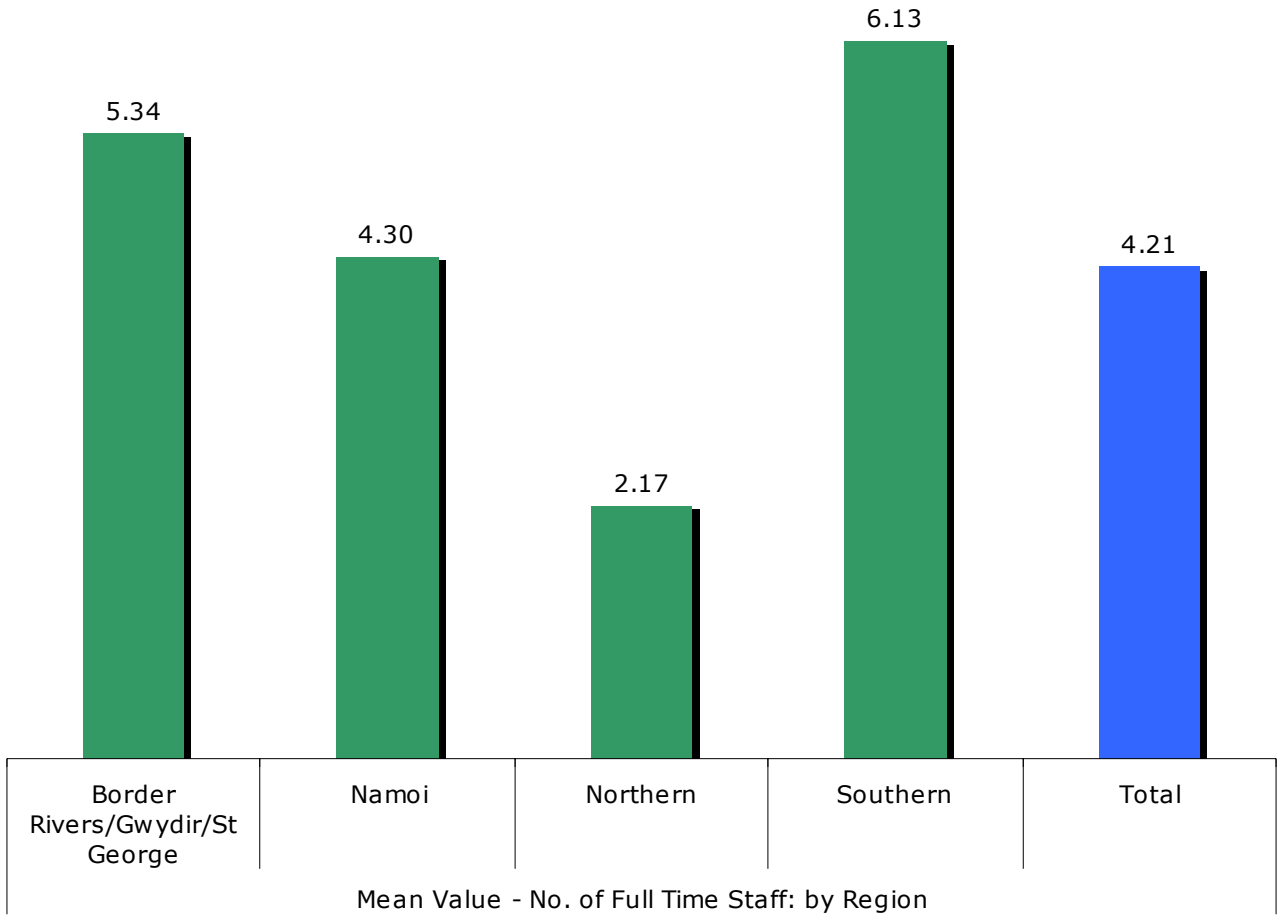
	Border Rivers/Gwydir/ St George	Namoi	Northern	Southern	**TOTAL**
Conventional	14.27	2.78	14.75	5.77	**10.03**
Conventional RR	7.55	6.50	2.03	9.62	**5.82**
Bollgard	22.03	11.06	49.43	0.00	**24.48**
Bollgard RR	56.15	79.66	38.34	84.62	**61.05**

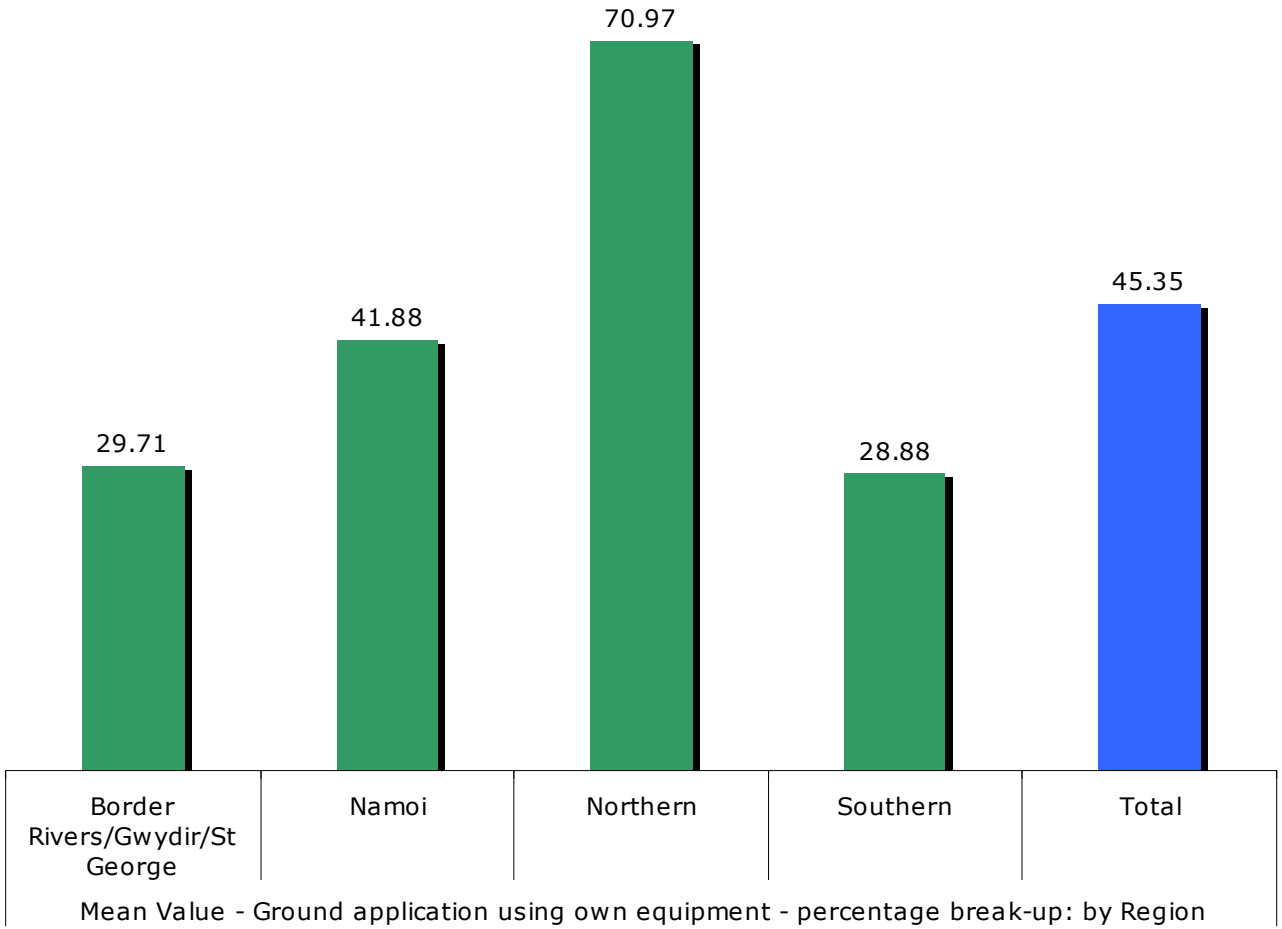


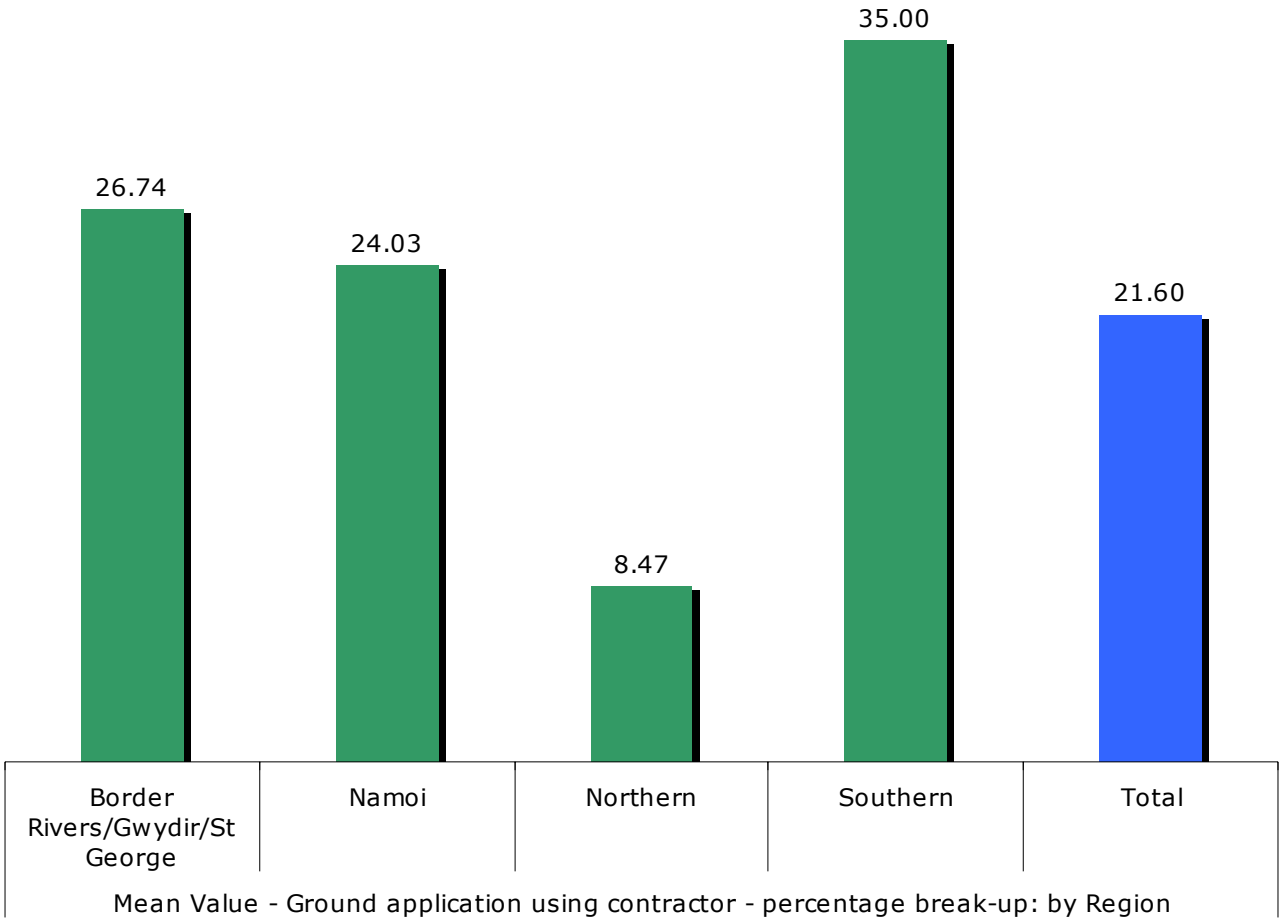

9.62
7.55
6.50
5.82
2.03
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Conventional RR Percentage 05/06: by Region

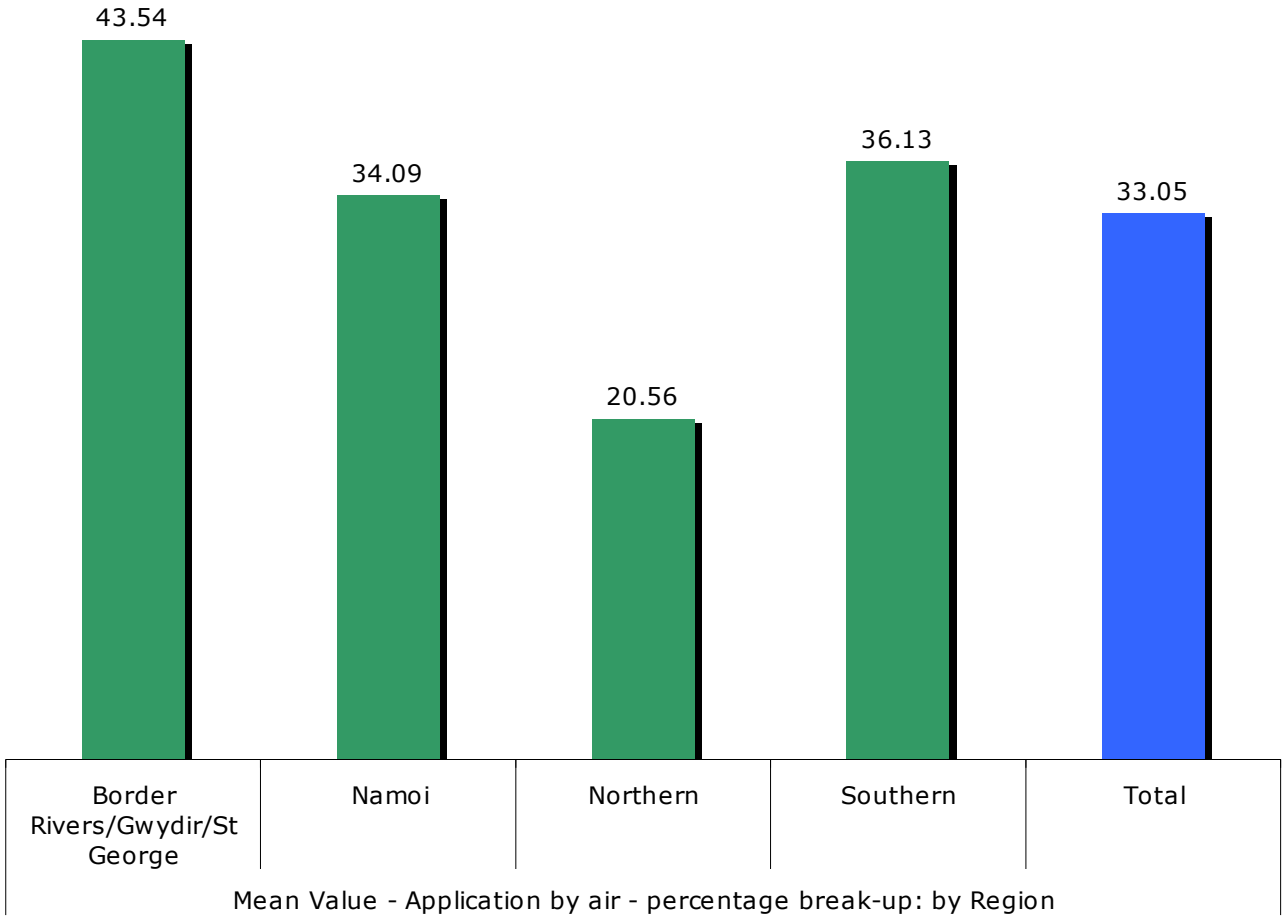

49.43
22.03
24.48
11.06
0.00
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Bollgard Percentage 05/06: by Region


84.62
79.66
61.05
56.15
38.34
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Bollgard RR Percentage 05/06: by Region

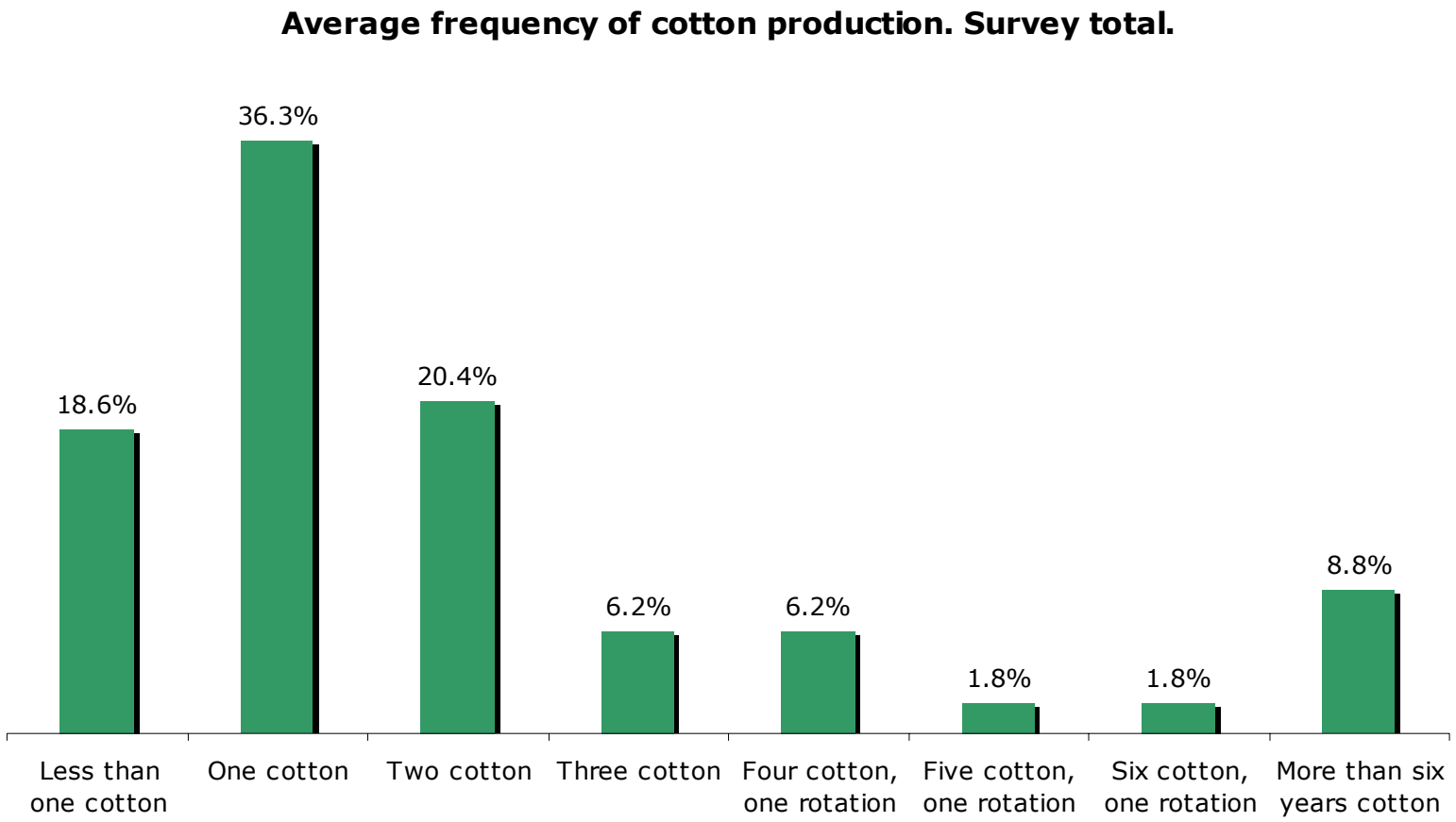

5.34
4.30
2.17
6.13
4.21
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - No. of Full Time Staff: by Region


70.97
45.35
41.88
29.71
28.88
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Ground application using own equipment - percentage break-up: by Region

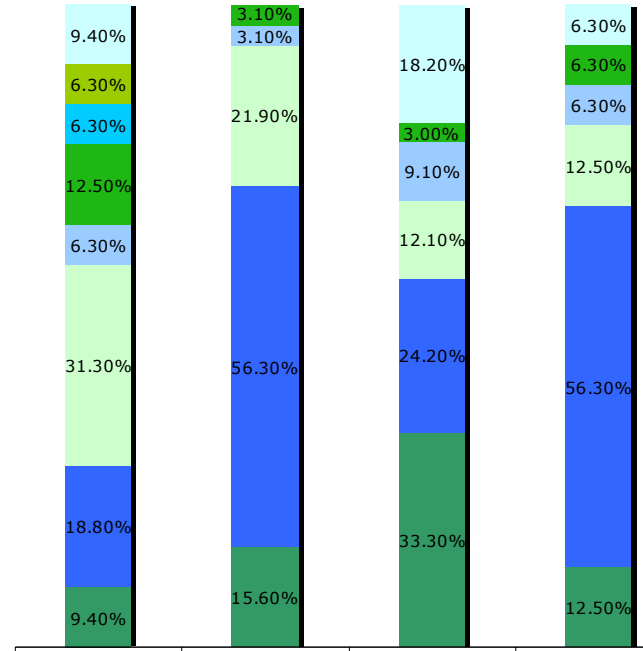

26.74
24.03
8.47
35.00
21.60
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Ground application using contractor - percentage break-up: by Region


43.54
34.09
20.56
36.13
33.05
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Application by air - percentage break-up: by Region

2.4 Frequency of cotton production: by region



On average, what is your frequency of cotton production?: by Region



	Border Rivers/Gwydir/St George	Namoi	Northern	Southern
More than six years cotton	9.40%		18.20%	6.30%
Six cotton, one rotation	6.30%			
Five cotton, one rotation	6.30%			
Four cotton, one rotation	12.50%	3.10%	3.00%	6.30%
Three cotton	6.30%	3.10%	9.10%	6.30%
Two cotton	31.30%	21.90%	12.10%	12.50%
One cotton	18.80%	56.30%	24.20%	56.30%
Less than one cotton	9.40%	15.60%	33.30%	12.50%

Less than one cotton, One cotton, Two cotton, Three cotton, Four cotton, one rotation, Five cotton, one rotation, Six cotton, one rotation, More than six years cotton

2.5 Significant differences in farm characteristics based on grower contact with a CMA

Of the complete data set of 122 responses, Sixty growers indicated that they had interacted with their local CMA, and fifty three indicated that they had not had any interaction. Nine growers did not answer the question, and were therefore removed from the data set for the analysis included below.

2.5.1 Differences in Characteristics (percentages): Border Districts/Gwydir/St George

Have you had any interaction with your Catchment Management Authority or Regional Body?	Use contract picking crews	
	Yes	No
Yes	77.8	22.2
No	41.7	58.3

Have you had any interaction with your Catchment Management Authority or Regional Body?	Measuring Water Use Efficiency is important in the management of our operation.		
	Totally Agree	Somewhat Agree	Neither Agree nor Disagree
Yes	78.9	15.8	5.3
No	23.1	53.8	23.1

Have you had any interaction with your Catchment Management Authority or Regional Body?	Using new technology on the farm can be risky, but I will generally trial something new early on to decide if it is right for our farm.				
	Totally Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Totally Disagree
Yes	21.1	36.8	36.8	5.3	0.0
No	0.0	84.6	7.7	0.0	7.7

Have you had any interaction with your Catchment Management Authority or Regional Body?	The opportunity to extend payment terms for chemical purchases would be welcome in our situation.				
	Totally Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Totally Disagree
Yes	57.9	21.1	21.1	0.0	0.0
No	7.7	38.5	38.5	7.7	7.7

Have you had any interaction with your Catchment Management Authority or Regional Body?	Do you monitor soil structure?	
	Yes	No
Yes	73.7	26.3
No	46.2	53.8

Have you had any interaction with your Catchment Management Authority or Regional Body?	Develop a storm water management plan	
	Yes	No
Yes	63.2	36.8
No	38.5	61.5

Have you had any interaction with your Catchment Management Authority or Regional Body?	Do you calculate water use efficiency in terms of bales/megalitre?	
	Yes	No
Yes	68.8	31.3
No	41.7	58.3

Have you had any interaction with your Catchment Management Authority or Regional Body?	Creek and river management - Fenced (selectively grazed)	
	Yes	No
Yes	68.8	31.3
No	38.5	61.5

Have you had any interaction with your Catchment Management Authority or Regional Body?	Creek and river management - Provide alternative watering points for stock	
	Yes	No
Yes	31.3	68.8
No	7.7	92.3

Have you had any interaction with your Catchment Management Authority or Regional Body?	Native species monitoring - Monitor water birds	
	Yes	No
Yes	37.5	62.5
No	15.4	84.6

Have you had any interaction with your Catchment Management Authority or Regional Body?	Native species monitoring - Monitor open woodland birds	
	Yes	No
Yes	31.3	68.8
No	7.7	92.3

Have you had any interaction with your Catchment Management Authority or Regional Body?	Native species monitoring - Monitor native fish	
	Yes	No
Yes	31.3	68.8
No	0.0	100.0

2.5.2 Differences in Characteristics (percentages): Namoi

Have you had any interaction with your Catchment Management Authority or Regional Body?	Are BMP Accredited	
	Yes	No
Yes	65.0	35.0
No	18.2	81.8

Have you had any interaction with your Catchment Management Authority or Regional Body?	Measure water use efficiency	
	Yes	No
Yes	75.0	25.0
No	27.3	72.7

Have you had any interaction with your Catchment Management Authority or Regional Body?	Have soil erosion risks assessed	
	Yes	No
Yes	50.0	50.0
No	27.3	72.7

Have you had any interaction with your Catchment Management Authority or Regional Body?	Do you have any stream or river frontage on your farm?	
	Yes	No
Yes	85.0	15.0
No	36.4	63.6

Have you had any interaction with your Catchment Management Authority or Regional Body?	Measuring Water Use Efficiency is important in the management of our operation.		
	Totally Agree	Somewhat Agree	Neither Agree nor Disagree
Yes	68.4	26.3	5.3
No	27.3	63.6	9.1

Have you had any interaction with your Catchment Management Authority or Regional Body?	It is rare that any other crop can deliver a higher gross margin per megalitre than cotton.			
	Totally Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree
Yes	20.0	35.0	35.0	10.0
No	27.3	72.7	0.0	0.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Reduce irrigation run-off	
	Yes	No
Yes	85.0	15.0
No	20.0	80.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Use buffer zones, vegetative strips or silt traps	
	Yes	No
Yes	45.0	55.0
No	0.0	100.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Limit furrow lengths	
	Yes	No
Yes	50.0	50.0
No	20.0	80.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Native vegetation management - Control erosion	
	Yes	No
Yes	10.0	90.0
No	40.0	60.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Creek and river management - Farm does not have a creek or river frontage	
	Yes	No
Yes	10.5	89.5
No	55.6	44.4

Have you had any interaction with your Catchment Management Authority or Regional Body?	Creek and river management - Fenced (selectively grazed)	
	Yes	No
Yes	57.9	42.1
No	11.1	88.9

Have you had any interaction with your Catchment Management Authority or Regional Body?	Native species monitoring - Monitor native fish	
	Yes	No
Yes	26.3	73.7
No	0.0	100.0

2.5.3 Differences in Characteristics (percentages): Northern

Have you had any interaction with your Catchment Management Authority or Regional Body?	On farm water storage	
	Yes	No
Yes	100.0	0.0
No	75.0	25.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Some overhead irrigation systems	
	Yes	No
Yes	46.2	53.8
No	15.0	85.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Do you have any stream or river frontage on your farm?	
	Yes	No
Yes	69.2	30.8
No	42.9	57.1

Have you had any interaction with your Catchment Management Authority or Regional Body?	Considering everything, Roundup Ready varieties are better in our situation than over the top products like Staple or Envoke.			
	Totally Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree
Yes	50.0	25.0	25.0	0.0
No	9.5	33.3	33.3	23.8

Have you had any interaction with your Catchment Management Authority or Regional Body?	Do you monitor soil structure?	
	Yes	No
Yes	84.6	15.4
No	50.0	50.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Use buffer zones, vegetative strips or silt traps	
	Yes	No
Yes	46.2	53.8
No	10.0	90.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Laser level fields	
	Yes	No
Yes	84.6	15.4
No	60.0	40.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Design drains to minimise water velocities	
	Yes	No
Yes	69.2	30.8
No	40.0	60.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Native vegetation management - Leave undisturbed	
	Yes	No
Yes	30.0	70.0
No	75.0	25.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Creek and river management - Provide alternative watering points for stock	
	Yes	No
Yes	33.3	66.7
No	5.6	94.4

Have you had any interaction with your Catchment Management Authority or Regional Body?	Native species monitoring - Monitor frogs	
	Yes	No
Yes	27.3	72.7
No	0.0	100.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Native species monitoring - Monitor native fish	
	Yes	No
Yes	18.2	81.8
No	0.0	100.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Over the last 10 years, do you think your soil health has:		
	Improved	Remained steady	Unsure
Yes	81.8	9.1	9.1
No	50.0	45.0	5.0

2.5.4 Differences in Characteristics (percentages): Southern

Have you had any interaction with your Catchment Management Authority or Regional Body?	Are BMP Accredited	
	Yes	No
Yes	28.6	71.4
No	62.5	37.5

Have you had any interaction with your Catchment Management Authority or Regional Body?	Measure soil sodicity on your farm	
	Yes	No
Yes	85.7	14.3
No	37.5	62.5

Have you had any interaction with your Catchment Management Authority or Regional Body?	Measure soil organic content quality	
	Yes	No
Yes	71.4	28.6
No	25.0	75.0

Have you had any interaction with your Catchment Management Authority or Regional Body?	Have soil erosion risks assessed	
	Yes	No
Yes	42.9	57.1
No	0.0	100.0

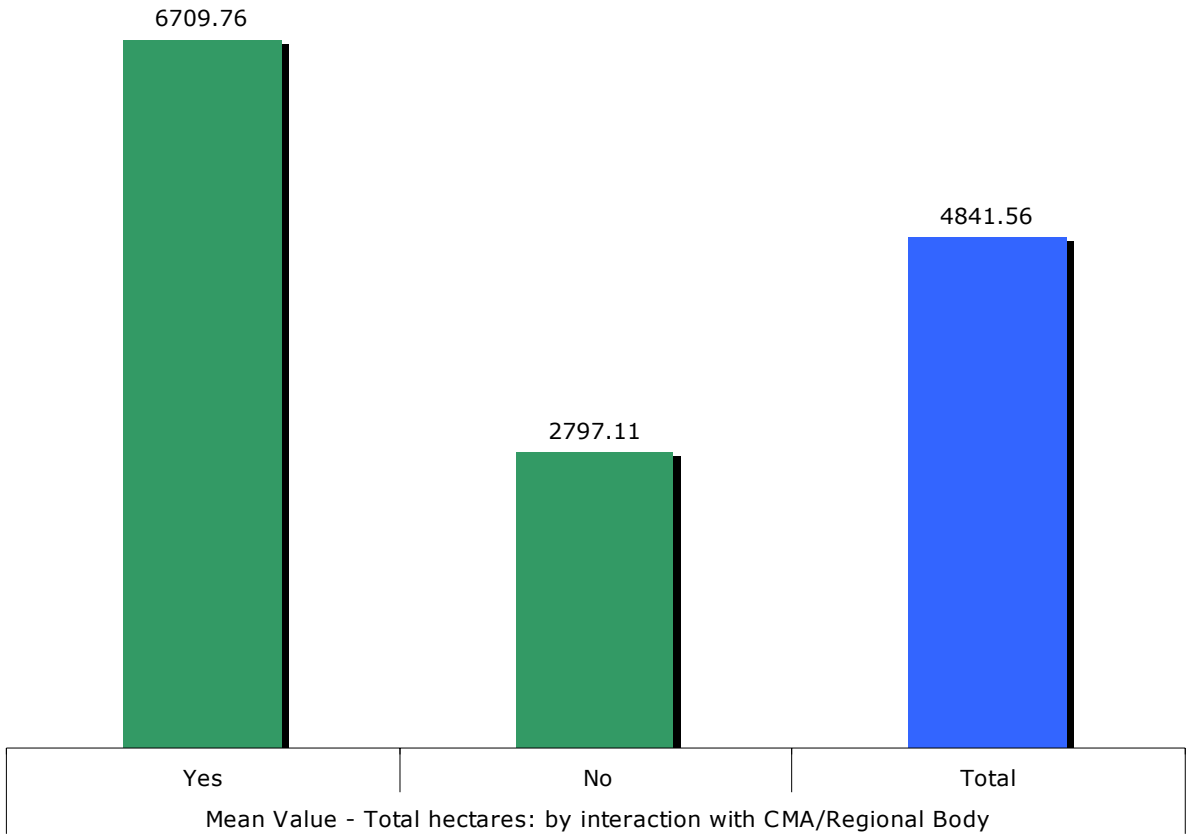
Have you had any interaction with your Catchment Management Authority or Regional Body?	Over the top herbicides will be an important tool for managing weed problems in our situation.		
	Totally Agree	Somewhat Agree	Neither Agree nor Disagree
Yes	12.5	75.0	12.5
No	87.5	12.5	0.0

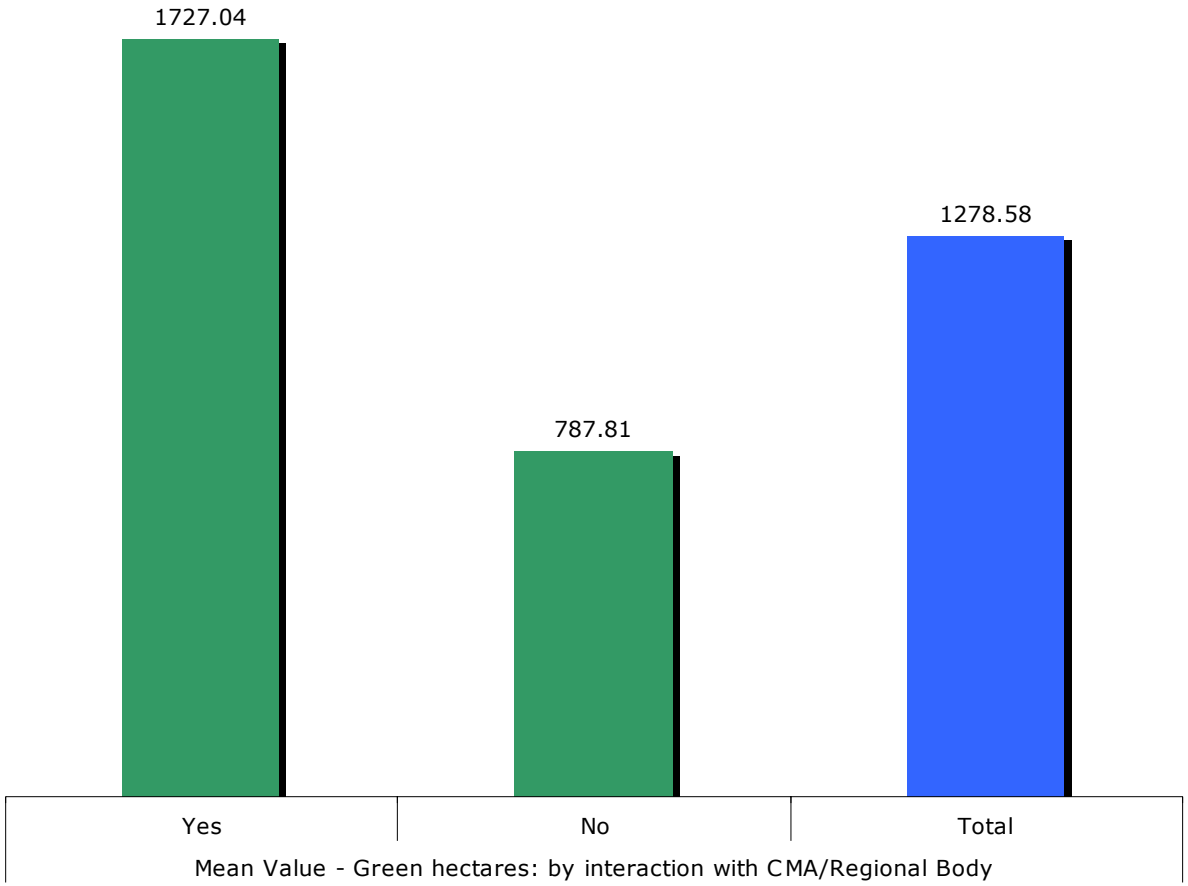
Have you had any interaction with your Catchment Management Authority or Regional Body?	The opportunity to extend payment terms for chemical purchases would be welcome in our situation.			
	Totally Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree
Yes	87.5	0.0	0.0	12.5
No	37.5	50.0	12.5	0.0

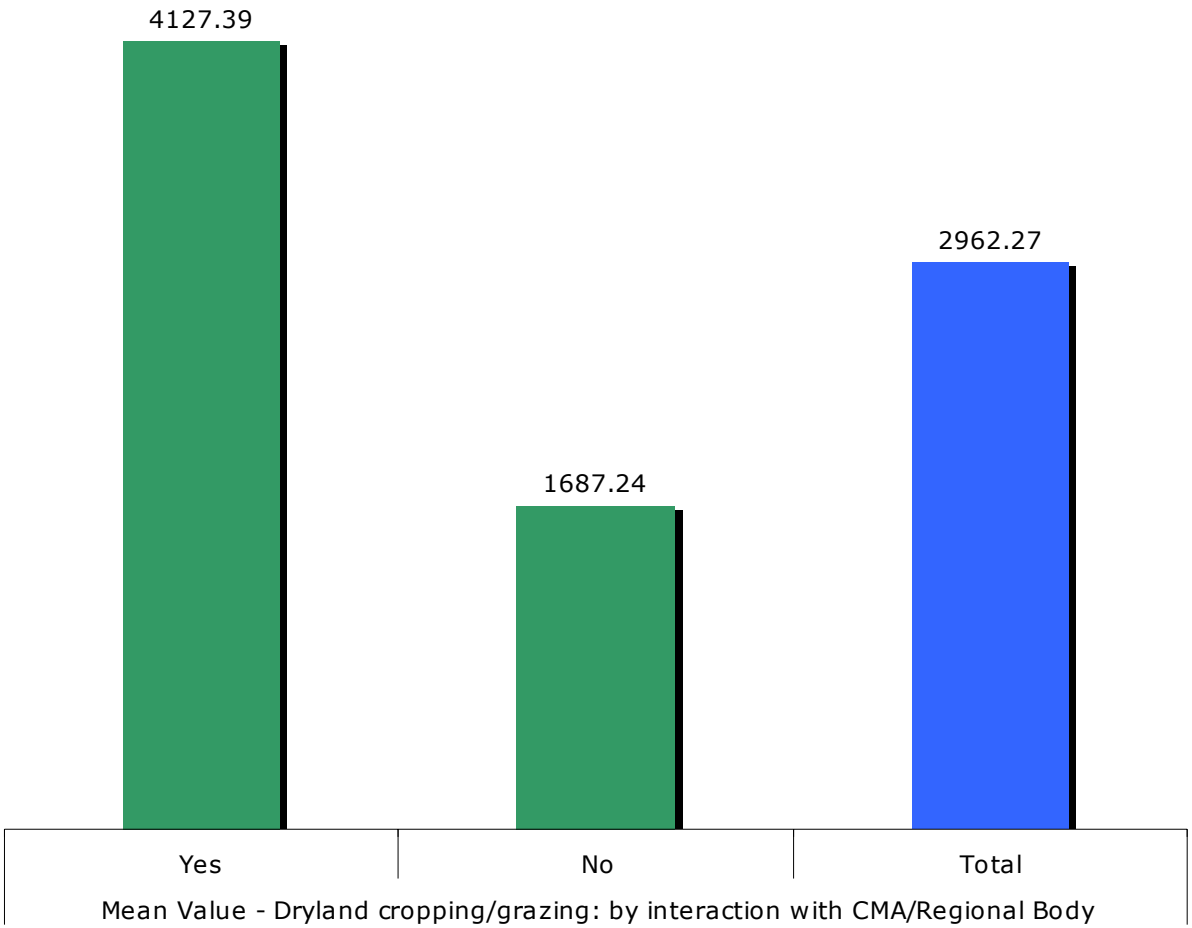
Have you had any interaction with your Catchment Management Authority or Regional Body?	Native vegetation management - Control pest/weeds	
	Yes	No
Yes	0.0	100.0
No	57.1	42.9

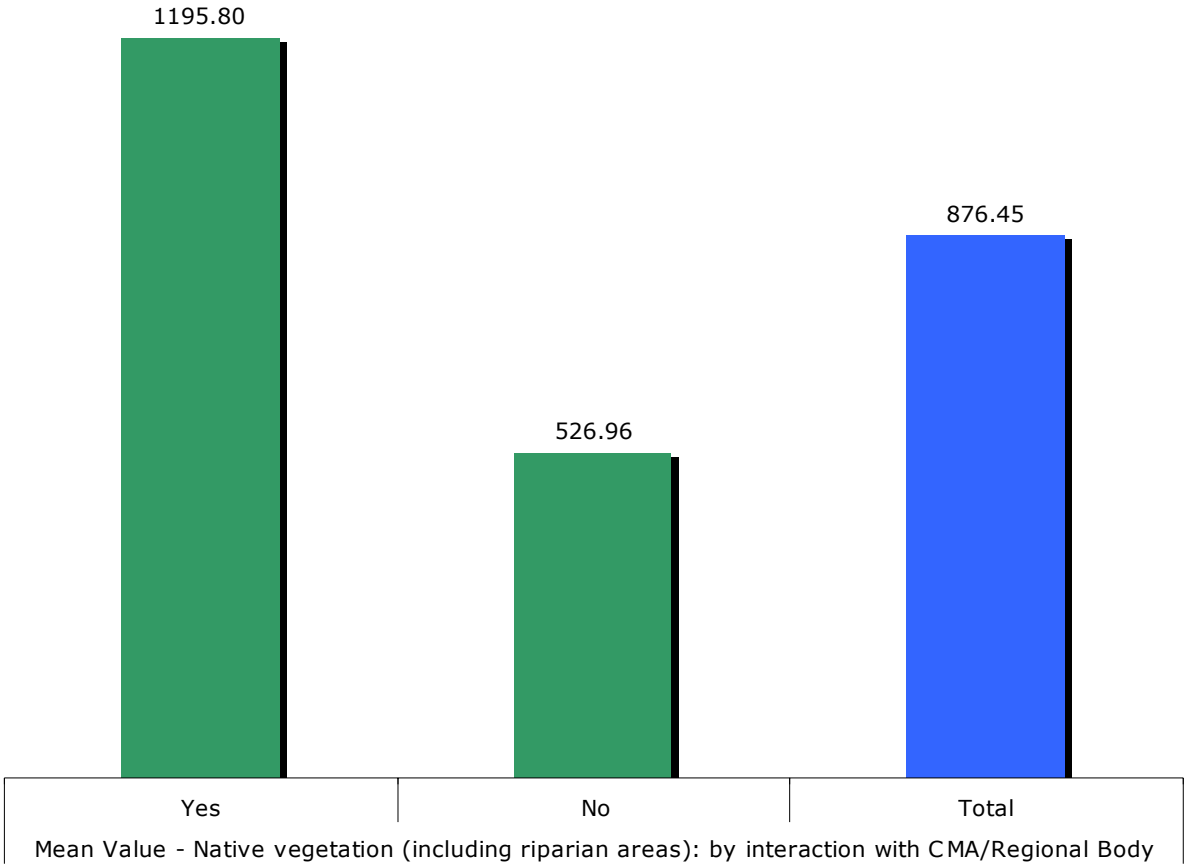
Have you had any interaction with your Catchment Management Authority or Regional Body?	Over the last 10 years, do you think your soil health has:	
	Improved	Remained steady
Yes	62.5	37.5
No	100.0	0.0

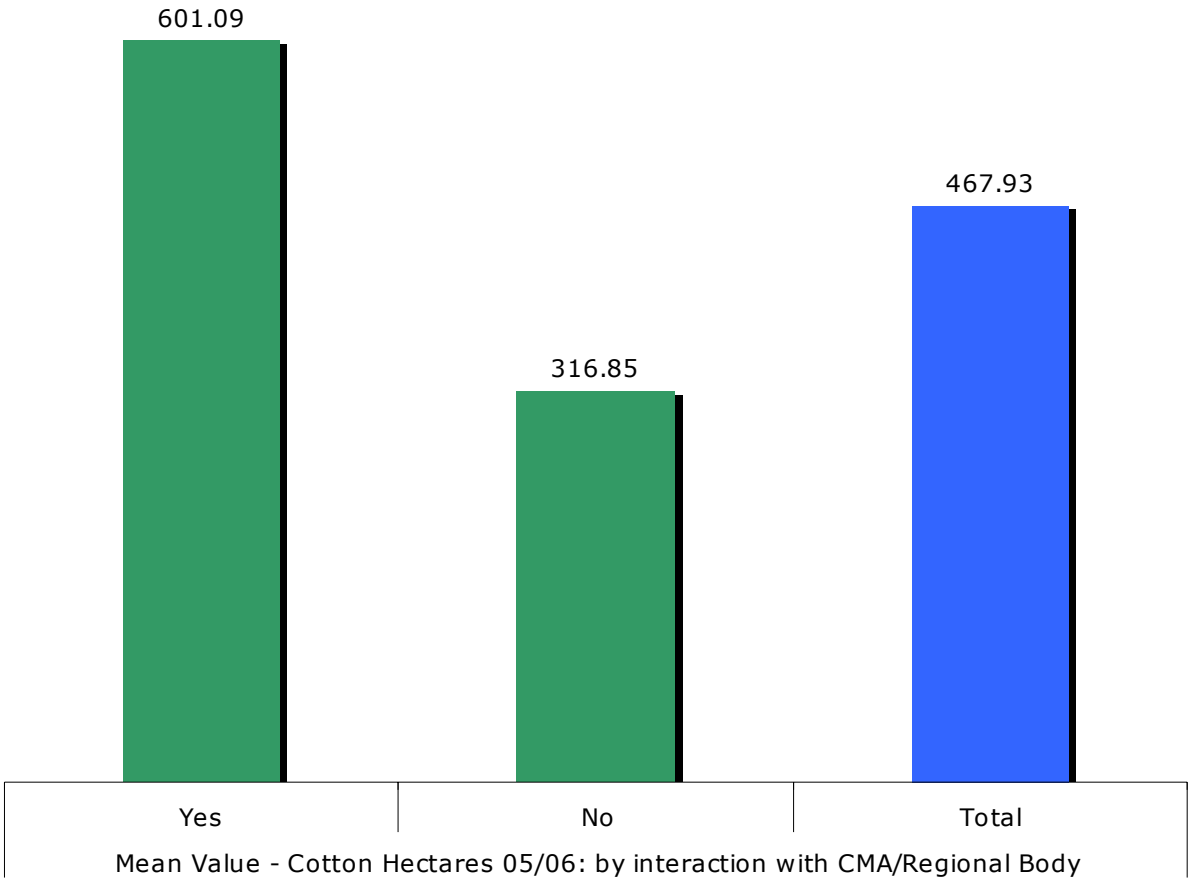
2.5.5 Significant Means – CMA Contact: All Regions




1727.04
787.81
1278.58
Yes
No
Total
Mean Value - Green hectares: by interaction with CMA/Regional Body

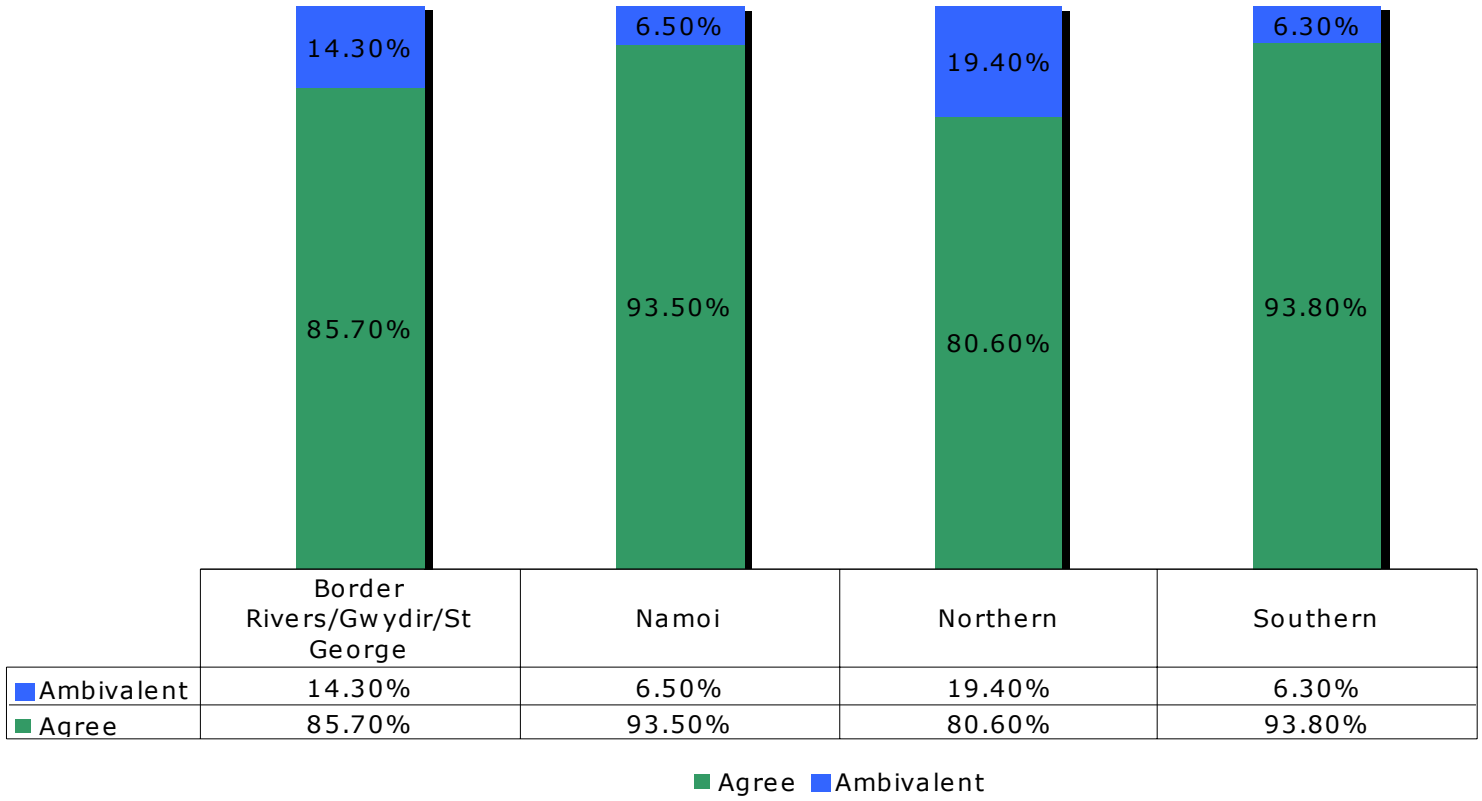

4127.39
1687.24
2962.27
Yes
No
Total
Mean Value - Dryland cropping/grazing: by interaction with CMA/Regional Body


1195.80
526.96
876.45
Yes
No
Total
Mean Value - Native vegetation (including riparian areas): by interaction with CMA/Regional Body


601.09
316.85
467.93
Yes
No
Total
Mean Value - Cotton Hectares 05/06: by interaction with CMA/Regional Body

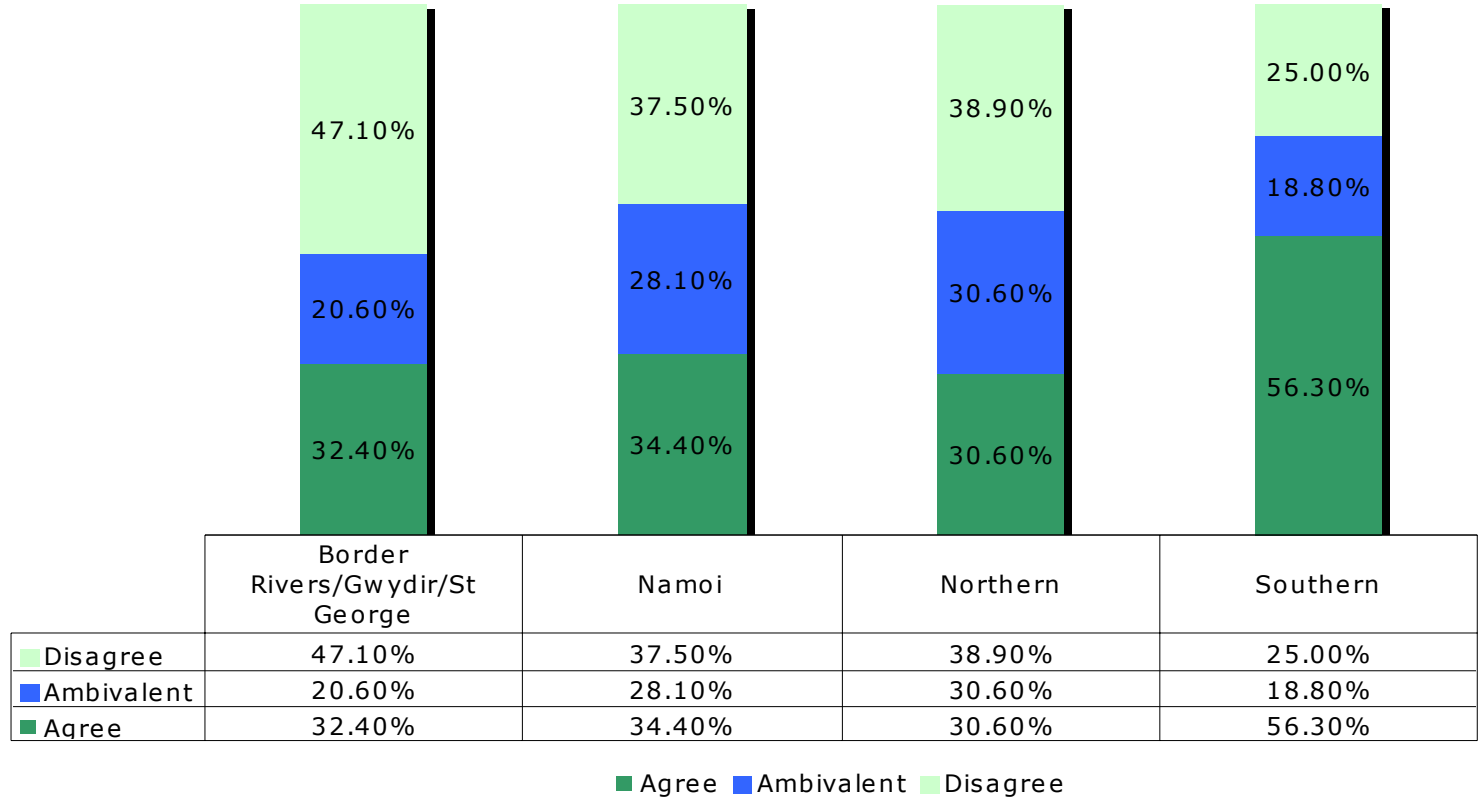
2.6 Grower attitudes towards farming practices

Measuring Water Use Efficiency is important in the management of our operation: by Region



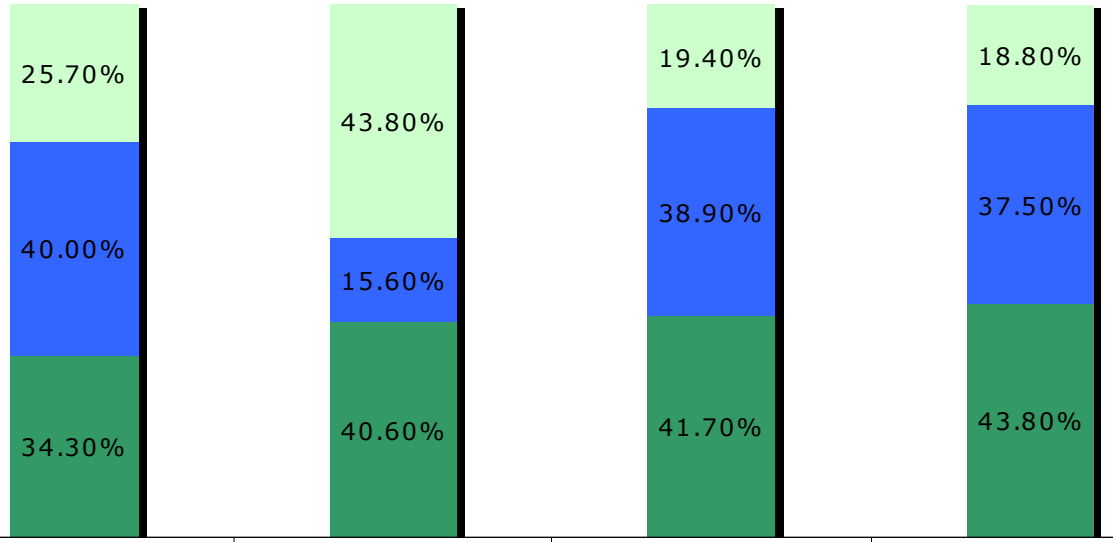
	Border Rivers/Gwydir/St George	Namoi	Northern	Southern
Ambivalent	14.30%	6.50%	19.40%	6.30%
Agree	85.70%	93.50%	80.60%	93.80%

I find that in our situation, calculating a Water Use Efficiency figure is a relatively easy thing to do: by Region



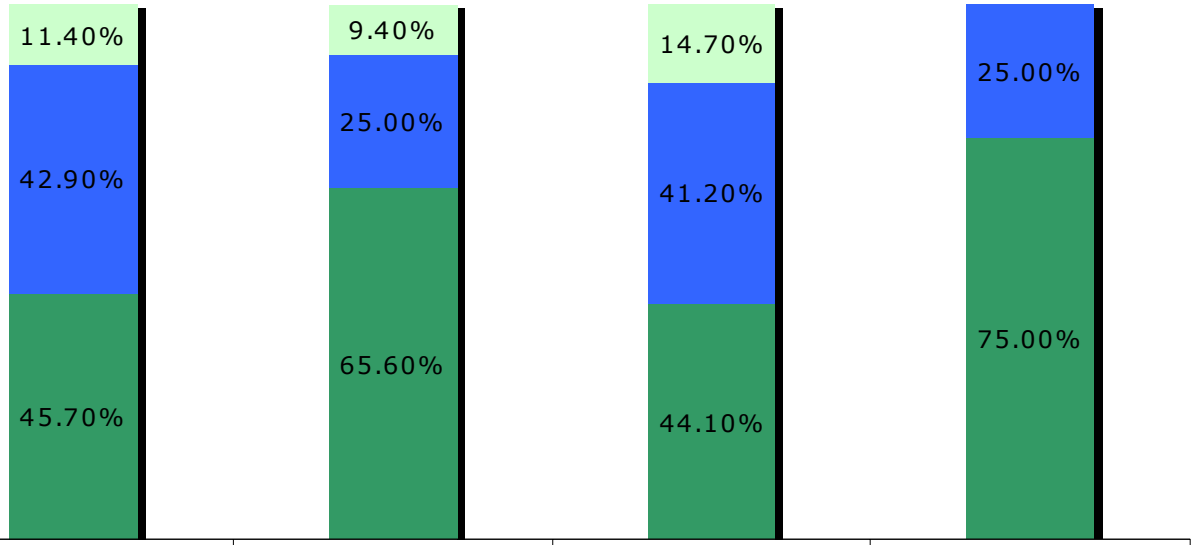
	Border Rivers/Gwydir/St George	Namoi	Northern	Southern
Disagree	47.10%	37.50%	38.90%	25.00%
Ambivalent	20.60%	28.10%	30.60%	18.80%
Agree	32.40%	34.40%	30.60%	56.30%

There is adequate information available for me to calculate nitrogen efficiency on my farm: by Region



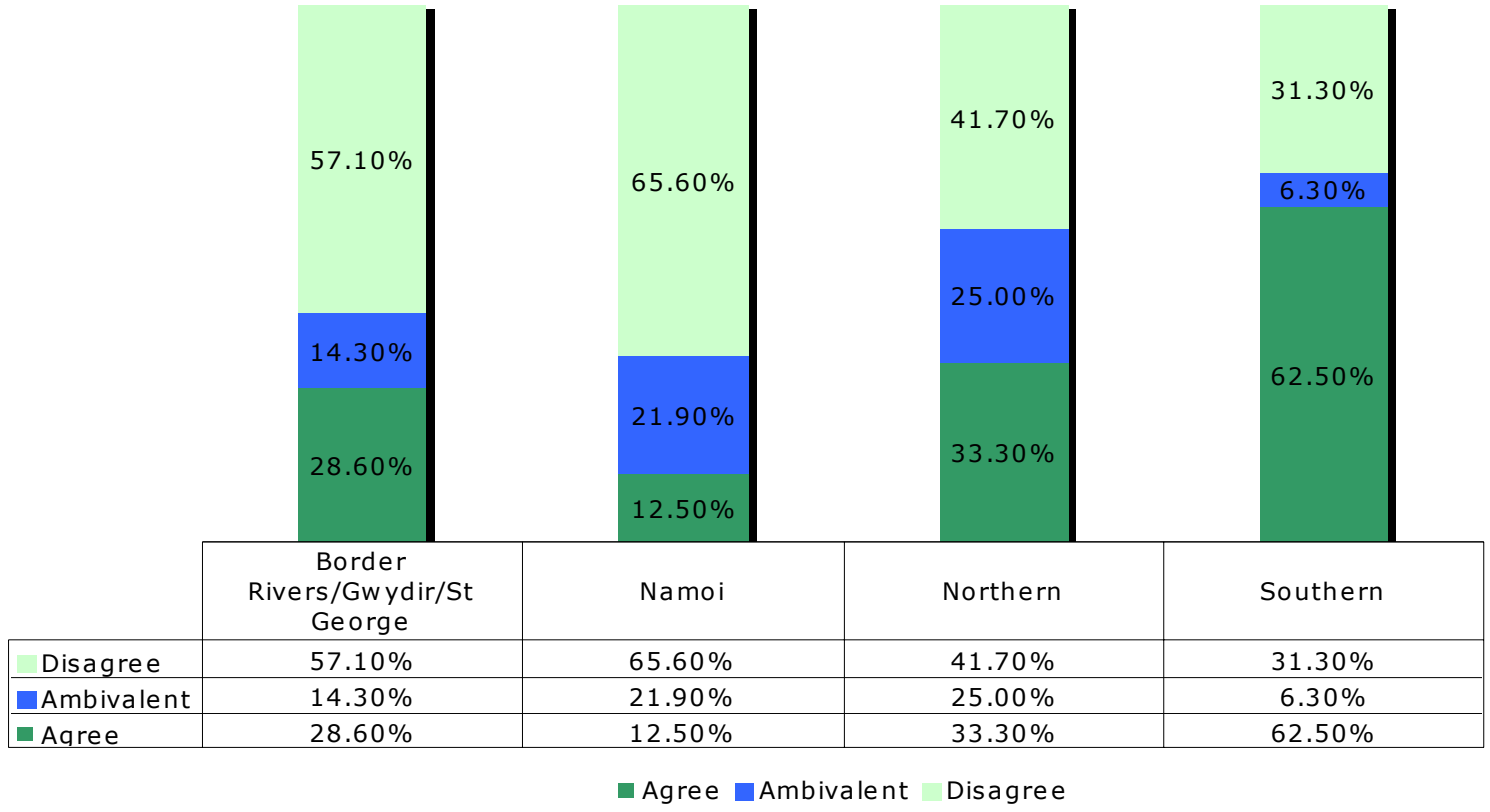
	Border Rivers/Gwydir/St George	Namoi	Northern	Southern
Disagree	25.70%	43.80%	19.40%	18.80%
Ambivalent	40.00%	15.60%	38.90%	37.50%
Agree	34.30%	40.60%	41.70%	43.80%

Water quality monitoring is very important for our operation: by Region



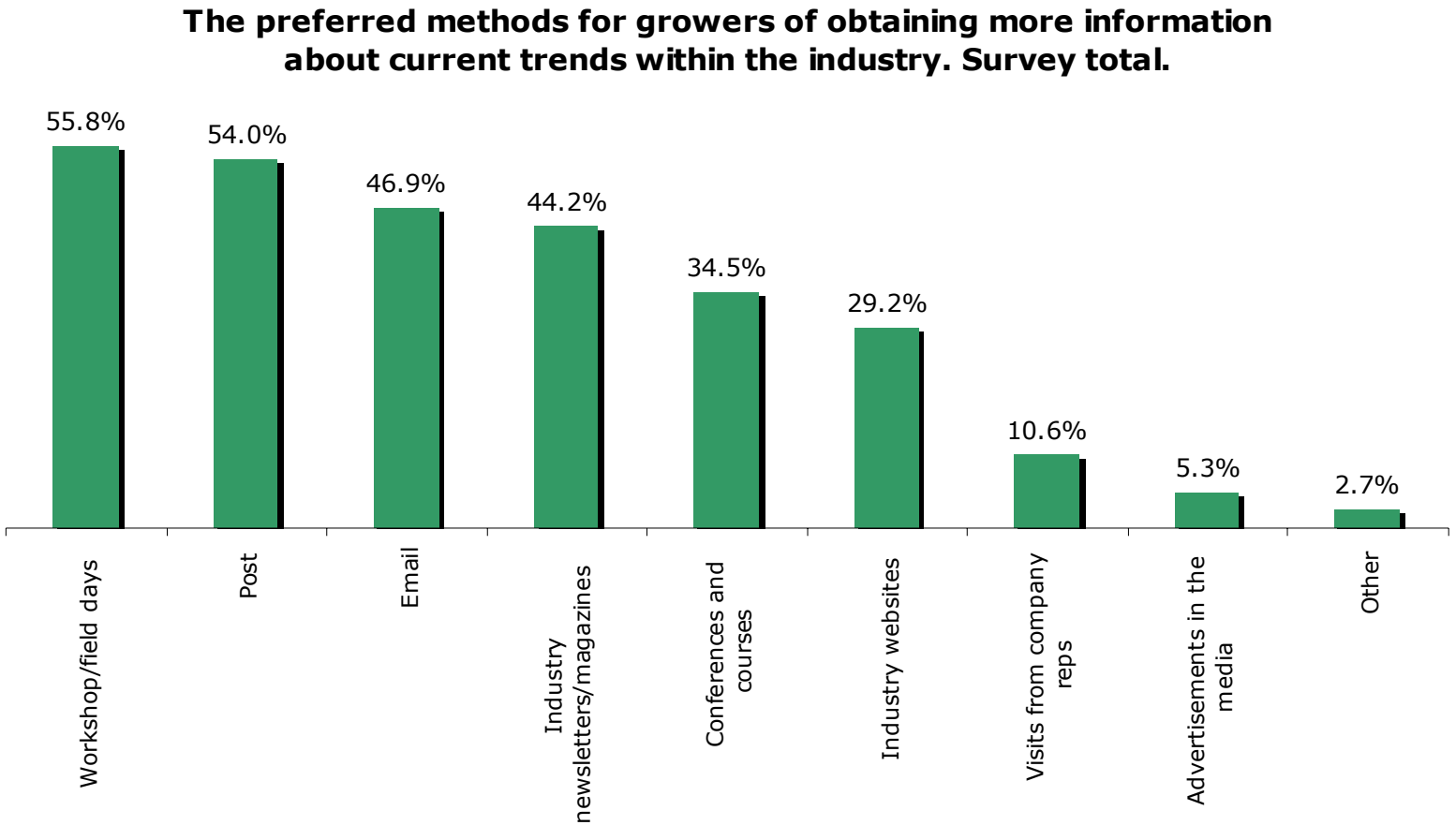
	Border Rivers/Gwydir/St George	Namoi	Northern	Southern
Disagree	11.40%	9.40%	14.70%	
Ambivalent	42.90%	25.00%	41.20%	25.00%
Agree	45.70%	65.60%	44.10%	75.00%

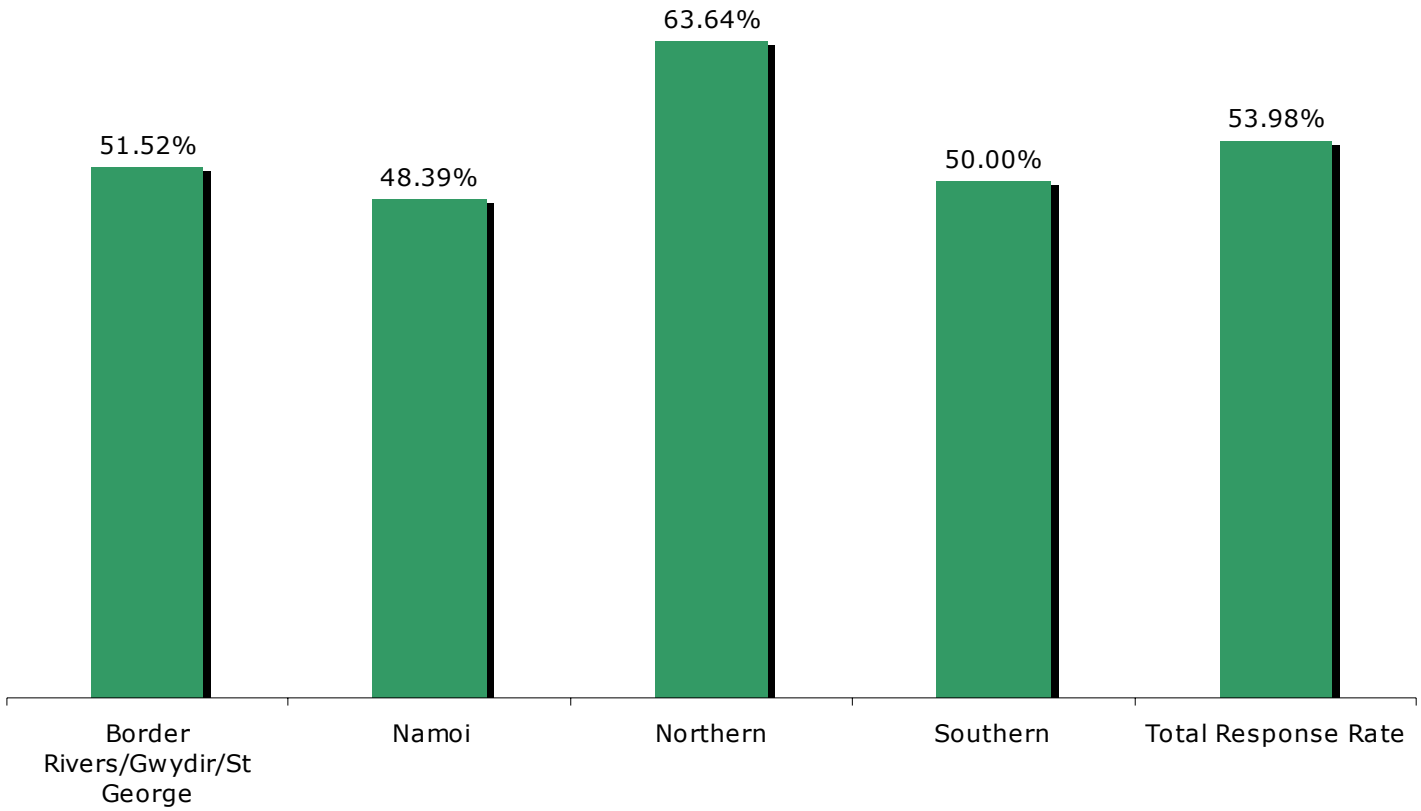
I can continue to farm productively using my current farming practices for the next 50 years: by Region

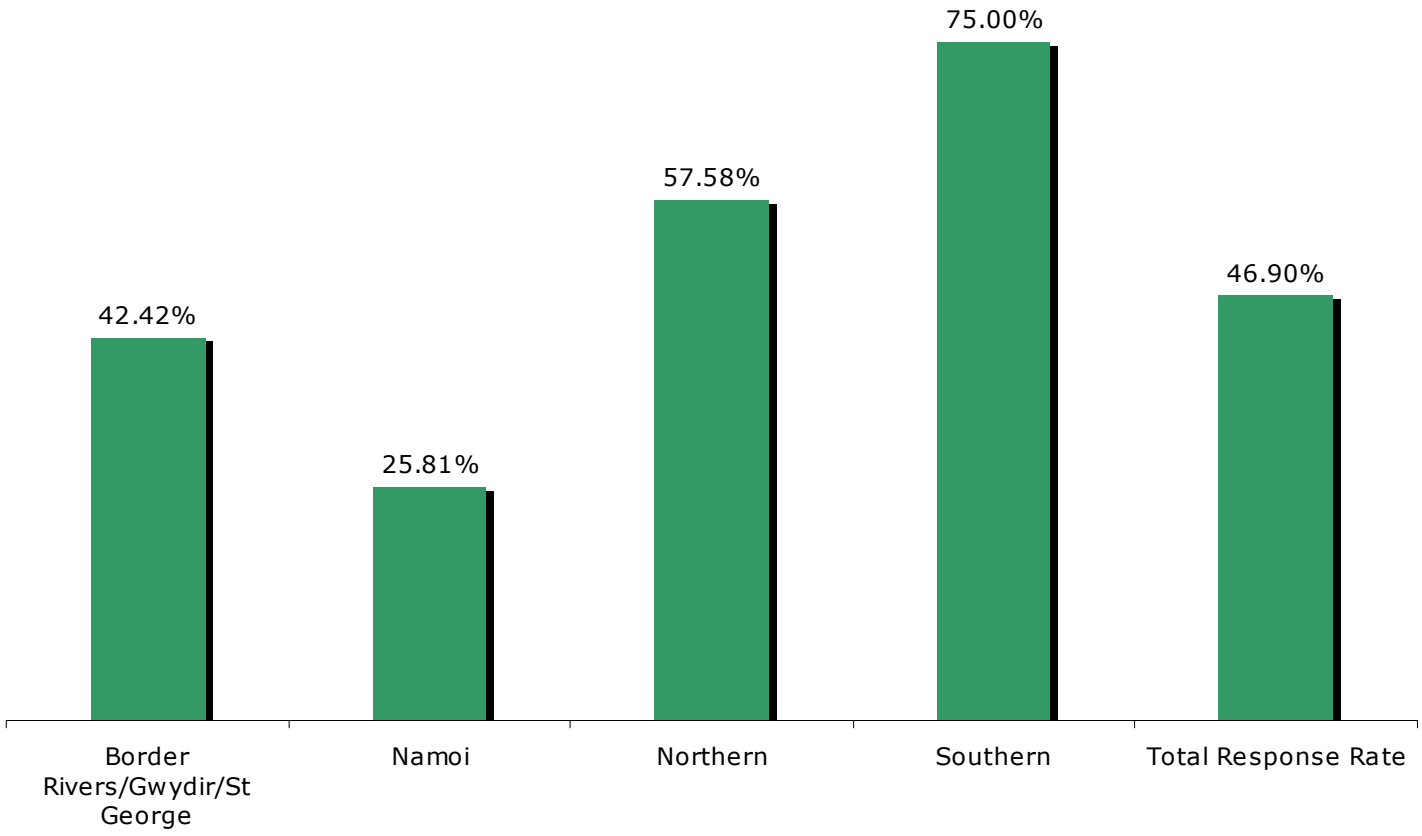


	Border Rivers/Gwydir/St George	Namoi	Northern	Southern
Disagree	57.10%	65.60%	41.70%	31.30%
Ambivalent	14.30%	21.90%	25.00%	6.30%
Agree	28.60%	12.50%	33.30%	62.50%

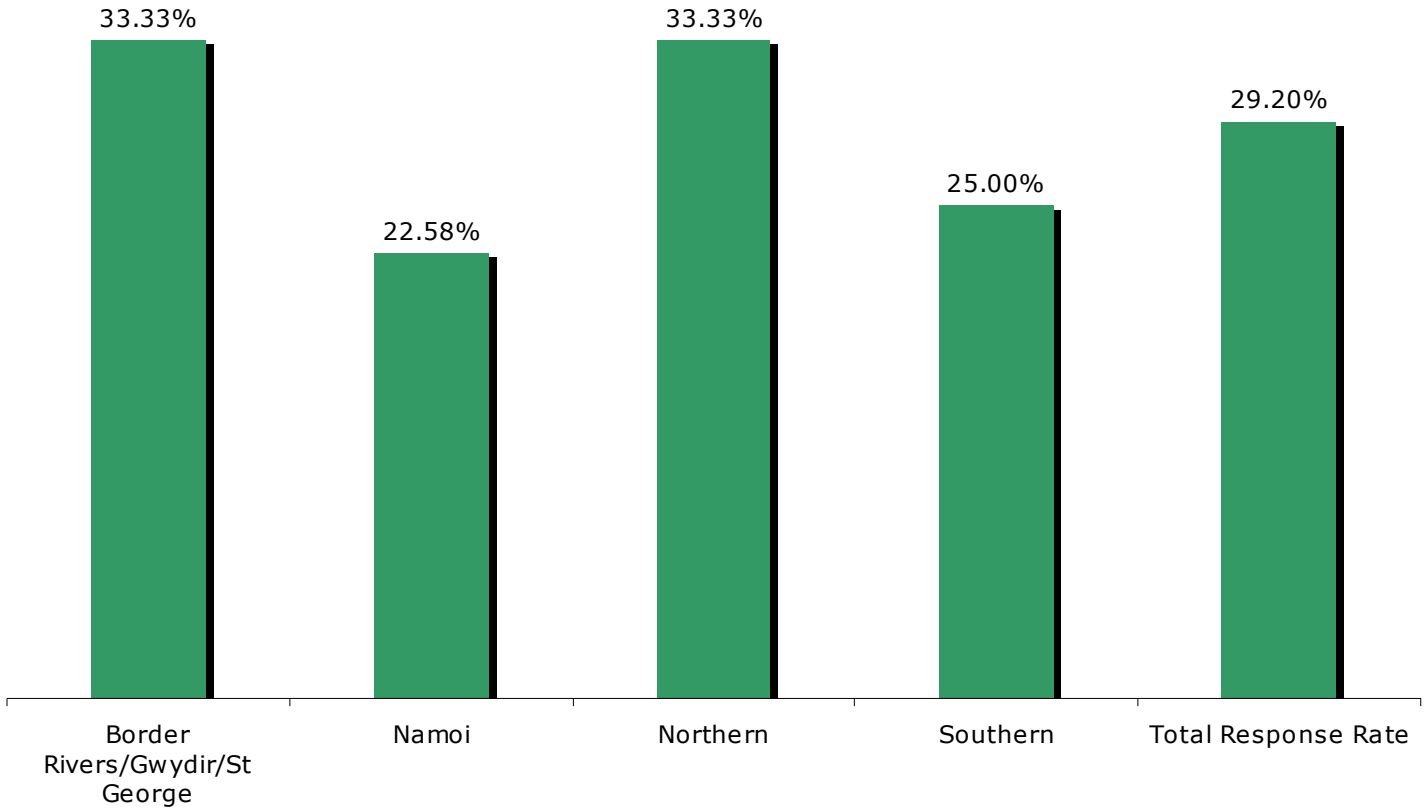
2.7 Preferred methods of obtaining further information: by region



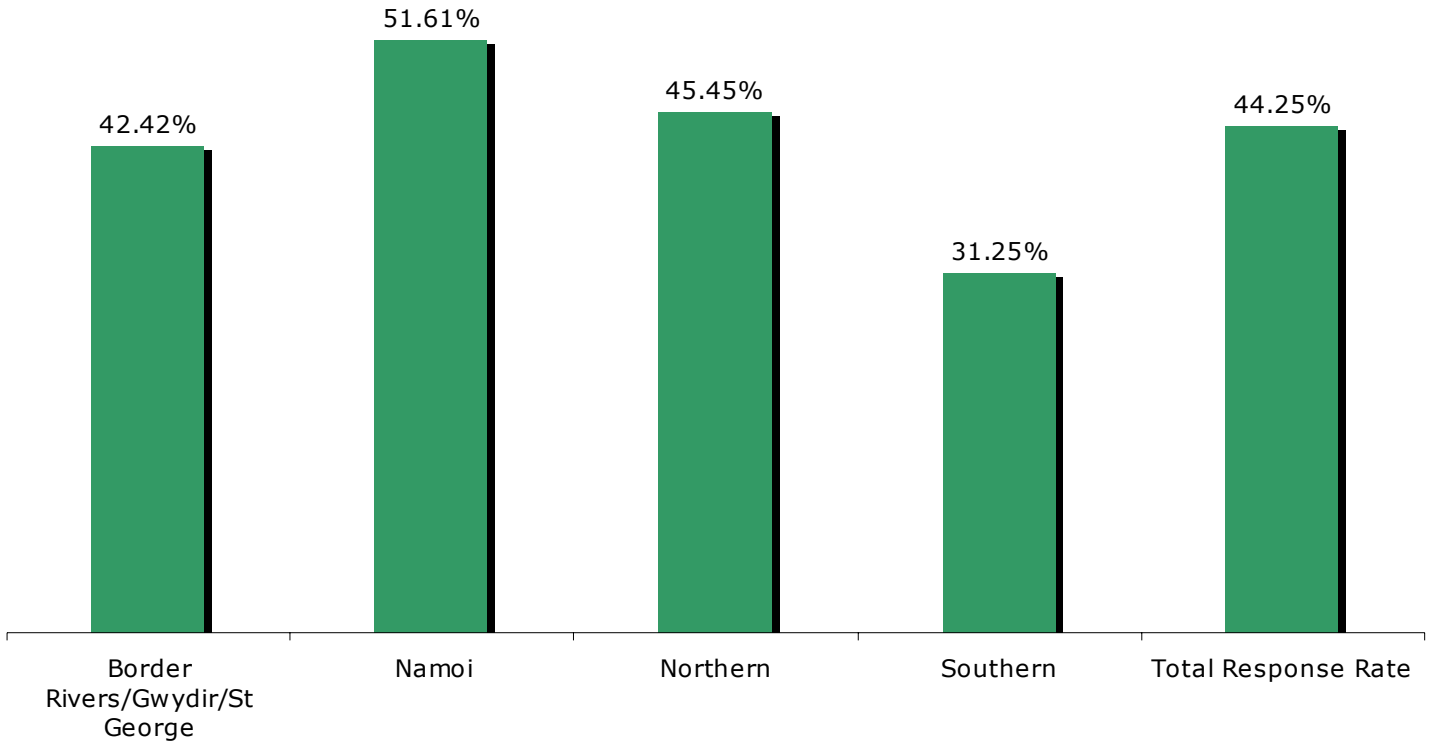

Preferred method for obtaining information - Post: by Region
51.52%
48.39%
63.64%
50.00%
53.98%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate


Preferred method for obtaining information - Email: by Region
42.42%
25.81%
57.58%
75.00%
46.90%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate

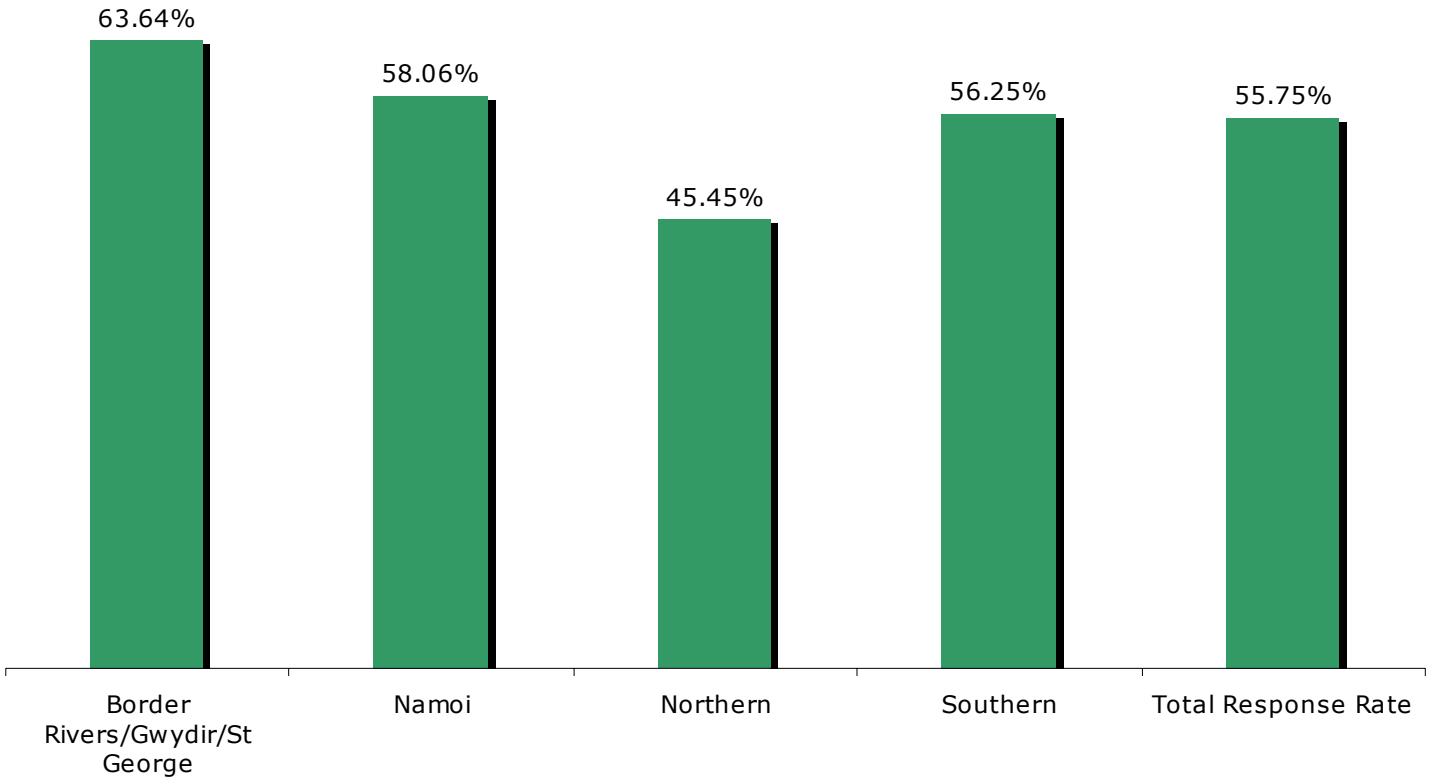
Preferred method for obtaining information - Industry websites: by Region



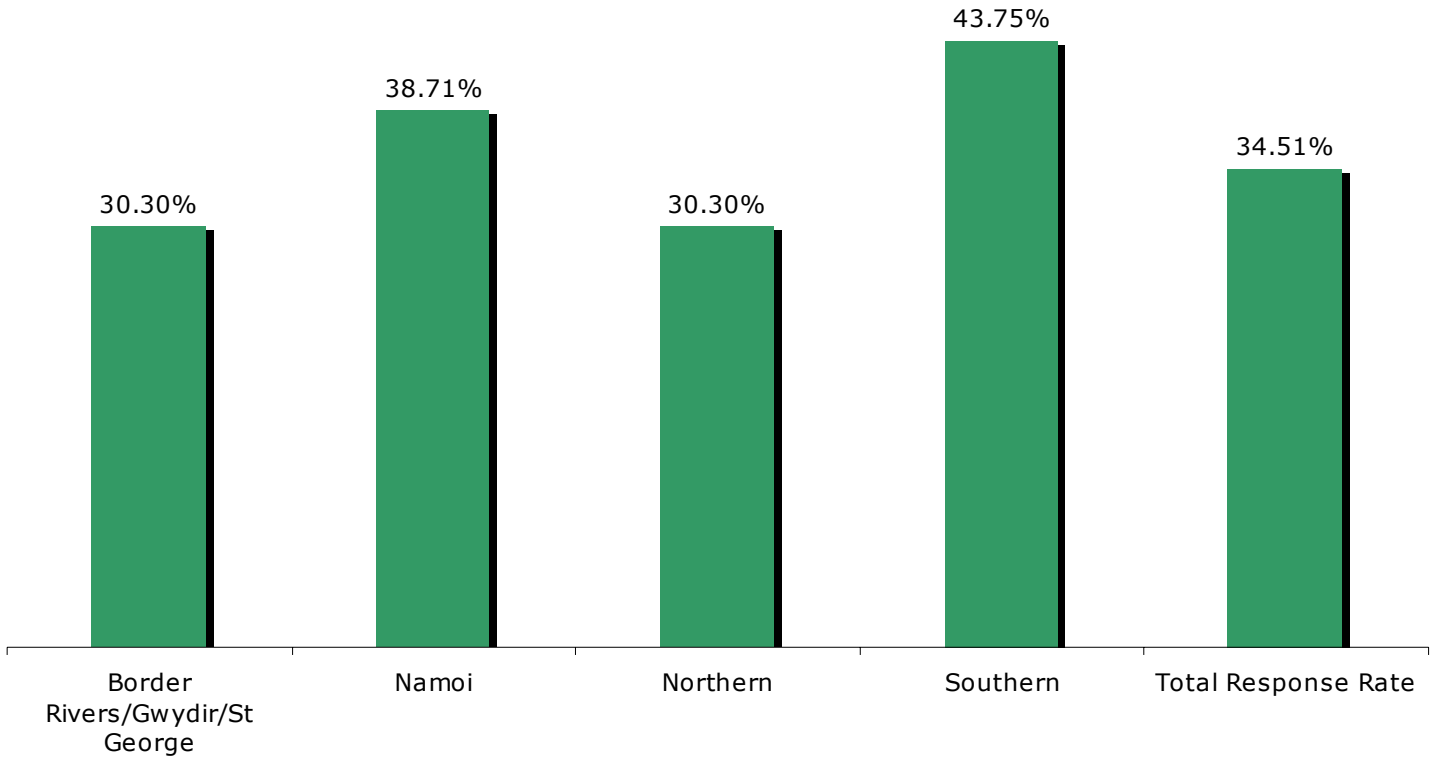
Preferred method for obtaining information - Industry newsletters/magazines: by Region



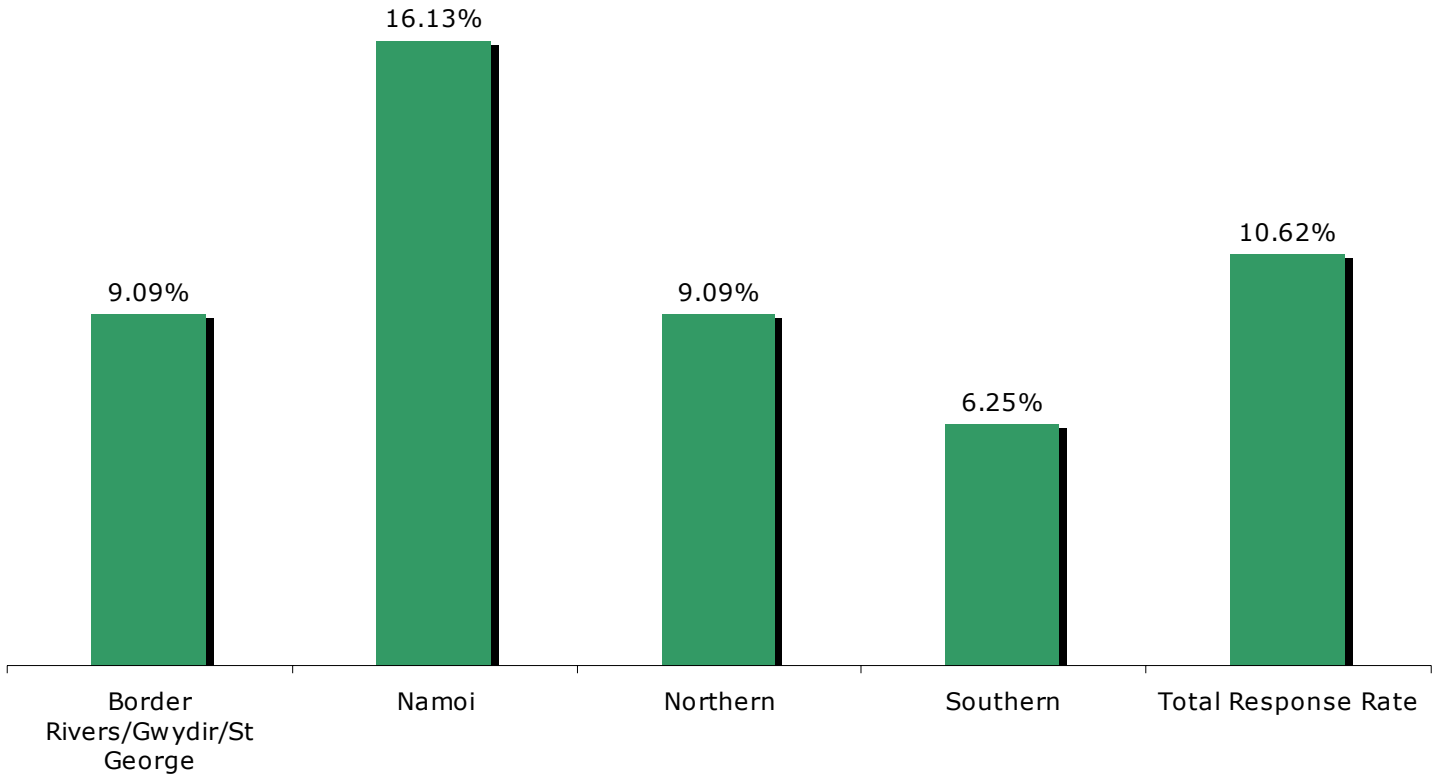
Preferred method for obtaining information - Workshop/field days: by Region



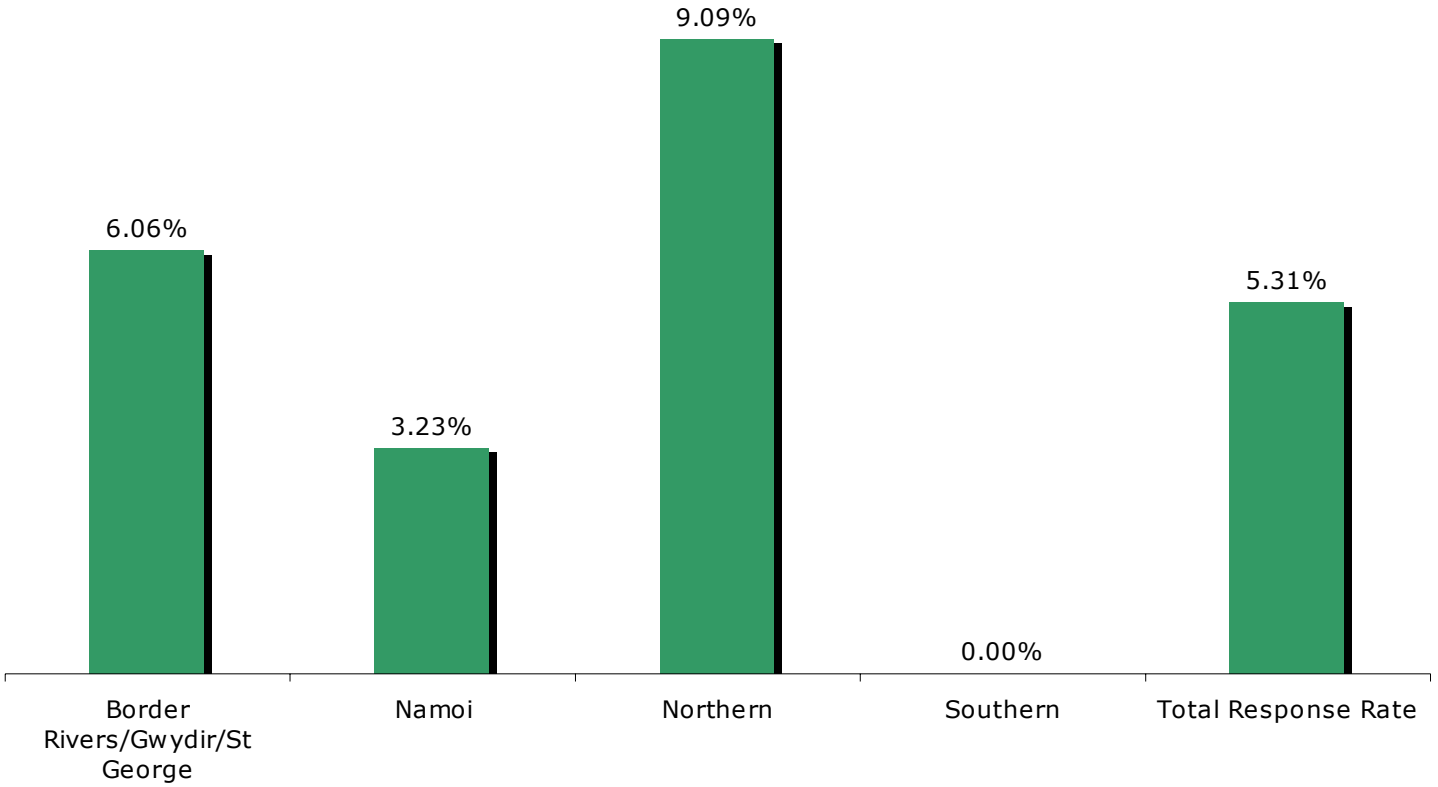
Preferred method for obtaining information - Conferences and courses: by Region



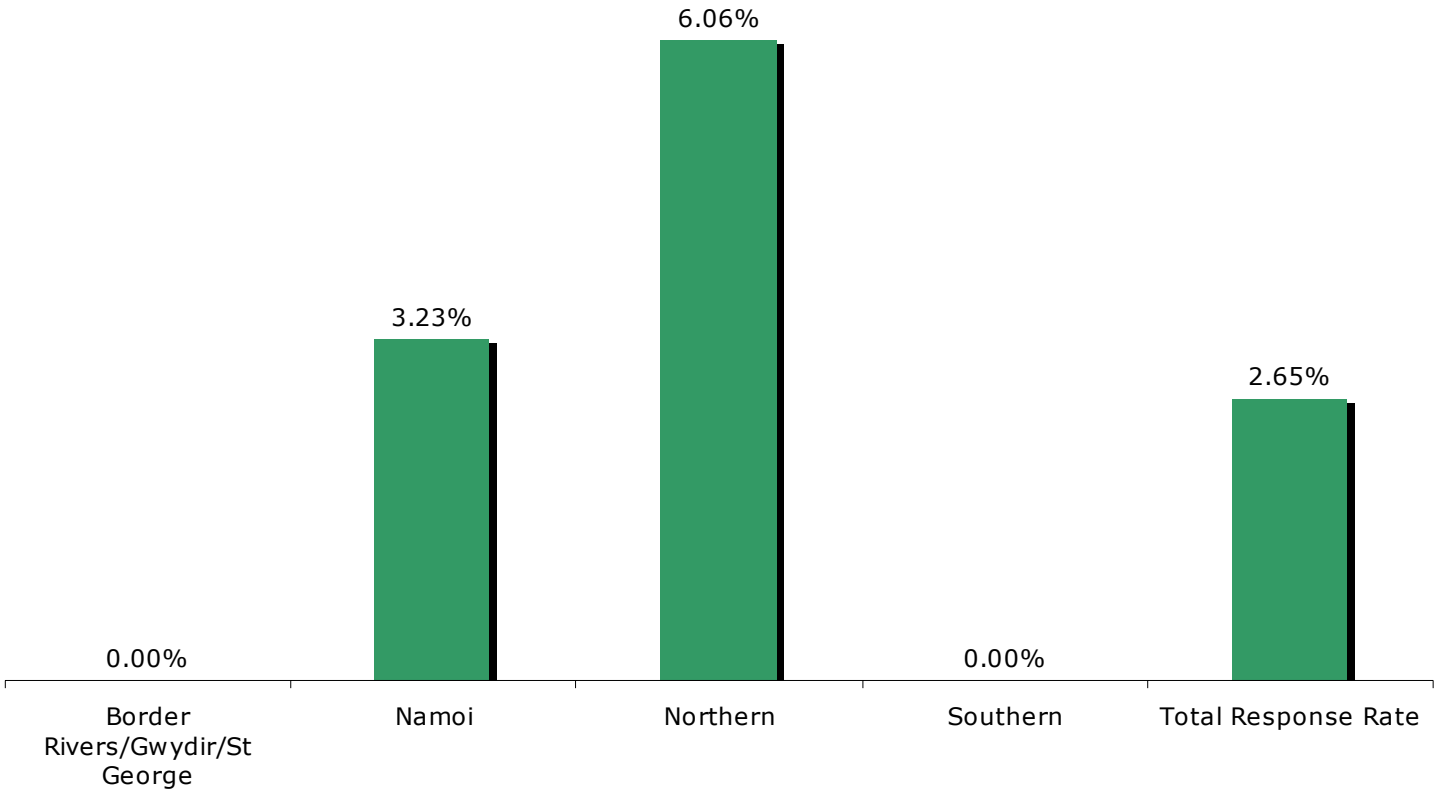
Preferred method for obtaining information - Visits from company reps: by Region



Preferred method for obtaining information - Advertisements in the media: by Region



Preferred method for obtaining information - Other: by Region



Section 3: Water and Soil Management

This section includes analysis of questions in the survey relating to irrigation water sources, water quality and WUE, soil structure monitoring and management, the importance of various soil health issues, changes in soil health over the past ten years, and the frequency of soil testing. Analysis is presented by region, with aggregated data for all responders included where appropriate.

3.1 Summary of Section 3

Irrigation water sources

This section reports data on irrigation water sources, where growers were asked to nominate the percentage of water they source from ground water, and regulated and unregulated streams or rivers. Both the Border Rivers/Gwydir/St George (69.65 per cent) and Southern (64.25 per cent) regions have a higher percentage of regulated streams or rivers as a water source than the overall response (54.46 per cent). The Northern region, at 30.88 per cent, has a higher percentage of unregulated streams or rivers as a water source than the overall response of 19.64 per cent, while the Namoi, at 44.58 per cent, has the highest percentage of ground water, compared to the overall response rate of 25.89 per cent.

Water quality and water use efficiency

Includes the methods used by growers to collect water quality information, the percentage of growers who measure WUE in bales/megalitre, and what this figure is, and whether the WUE figure includes rainfall.

• Water quality: the question on water quality revealed that the majority of growers (54.3 per cent) do not collect water quality information either pre-season or during the season (24.2 per cent did not answer this question, and may therefore also be considered as not collecting water quality information, increasing the total to 78.5 per cent of grower who do not collect this information. This was therefore not a well subscribed question, however, of those who did provide answers, the most popular water quality information methods included 'Monitor on farm water quality and measure for EC' (22.9 per cent at any stage of the year), and 'Monitor on farm water quality and test for pH' (18.7 per cent at any stage).

• Measuring WUE: 57.3 per cent of growers responding to the survey measure WUE in bales/megalitre. In the Southern region, this figure increases to 85.7 per cent, falling to 43.3 per cent in the Northern region.

• WUE values (bales/megalitre): the total value for the survey was 1.73. This figure was highest in the Northern region at 2.29, falling to 1.73 in the Namoi, 1.59 in Border Rivers/Gwydir/St George, and 1.29 in the Southern region.

• Rainfall: 46 per cent of all respondents include rainfall in WUE figures . By region, this figure ranges from 76.5 per cent in Border Rivers/Gwydir/St George, to 61.5 per cent in Southern, 38.5 per cent in Northern, and 15 per cent in the Namoi. The amount of rainfall included has also been presented as mean figures by region, as have grower comments as to when rainfall figures are taken into account.

• Measuring water: growers have also been asked to comment on how they measure water delivered to the paddock. These comments have been included on a regional basis.

Soil structure monitoring

Growers were asked if they monitor soil structure on their farm. 66.4 per cent of all respondents did monitor soil structure. By region, this figure ranged from the Southern (81.3 per cent), to the Northern (61.8 per cent). Growers also commented on the frequency of soil structure monitoring. Of the indicators used to monitor soil structure, the most prevalent was 'Visual inspection of field' (used by 82.8 per cent of growers), down to 'Field and boundary tests', at 16.1 per cent. There was an 8 per cent response to 'Other', and the other methods used are listed in a table.

Soil structure management techniques

Growers were asked which of a range of techniques they used to minimise soil movement on their farm. The most commonly used technique (at 80.2 per cent) was 'Laser level fields', while the least common (at 11.2 per cent) was 'Use temporary ponds to hold runoff waters'. Generally, each region held fairly closely to the percentage of each technique for the total survey data set. However:

- Only 18.75 per cent of respondents from the Southern region used the technique 'Monitor high risk areas for signs of erosion', in contrast to the overall response of 44.83 per cent.
- For 'Use buffer zones, vegetative strips or silt traps', only 6.25 per cent of Southern respondents used this technique, as compared to the total response rate of 23.28 per cent.
- With a couple of exceptions, responses from those in the Northern region were less than the overall rate, perhaps indicating the reduced importance of this issue in Northern areas.

The most important soil health issues

Growers were asked to rank the importance of a series of soil health issues. The overall ranking order for these issues was as follows:

1. Nutrition and fertility
2. Crop yield
3. Compaction
4. Stubble management/retention
5. Organic carbon
6. VAM
7. Sodicity
8. Plant pathogens
9. Pesticide residues

This data has also been presented on a regional basis, and shows the variations within each region as to the ranking order of these issues.

Improvement in soil health over the last 10 years

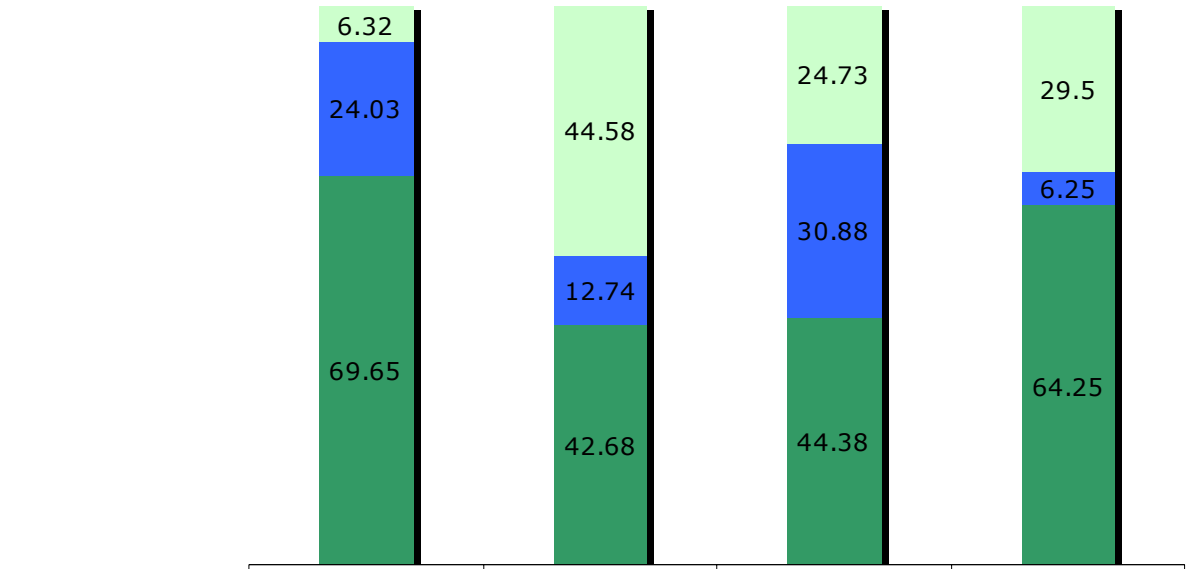
Growers were asked whether they think their soil health has improved. Overall, 67 per cent believed that it had improved, 27.8 per cent believed it had remained unsteady, and 5.2 per cent were unsure. These figures have also been provided on a regional basis.

Frequency of soil testing in any one field

Growers were asked how often they conducted soil testing in any one field. Overall, the response was 35.4 per cent for ‘Every year’, 40.7 per cent for ‘No set strategy’, and 23.9 per cent for ‘Before every cotton crop’. These figures have also been provided on a regional basis.

3.2 Sources of irrigation water for growers

Sources of water for growers: percentages by Region

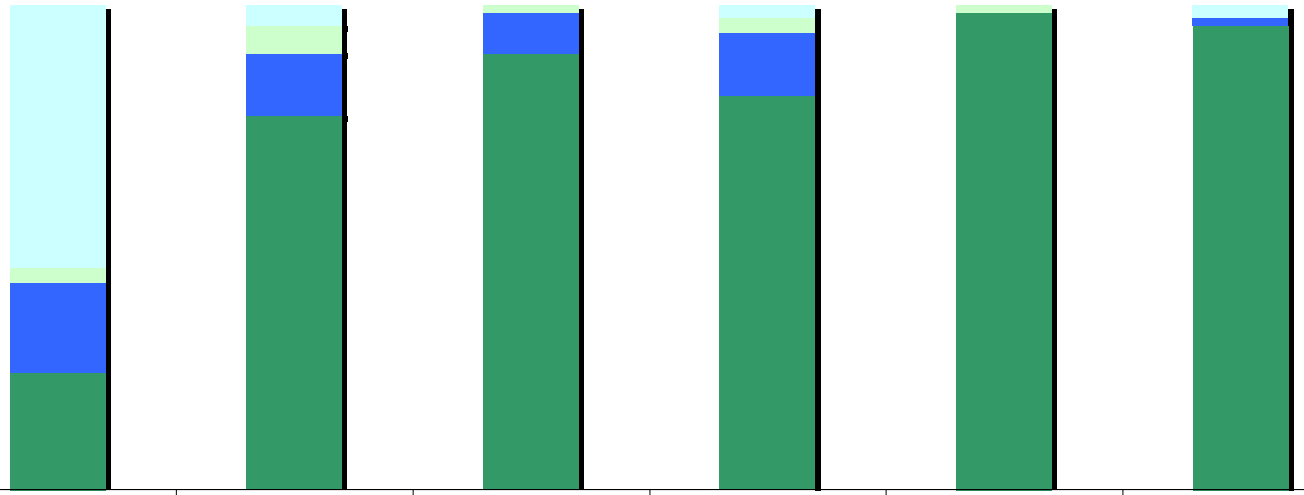


	Border Rivers/Gwydir/St George	Namoi	Northern	Southern
Ground water	6.32	44.58	24.73	29.5
Unregulated streams or rivers	24.03	12.74	30.88	6.25
Regulated streams or rivers	69.65	42.68	44.38	64.25

Regulated streams or rivers Unregulated streams or rivers Ground water

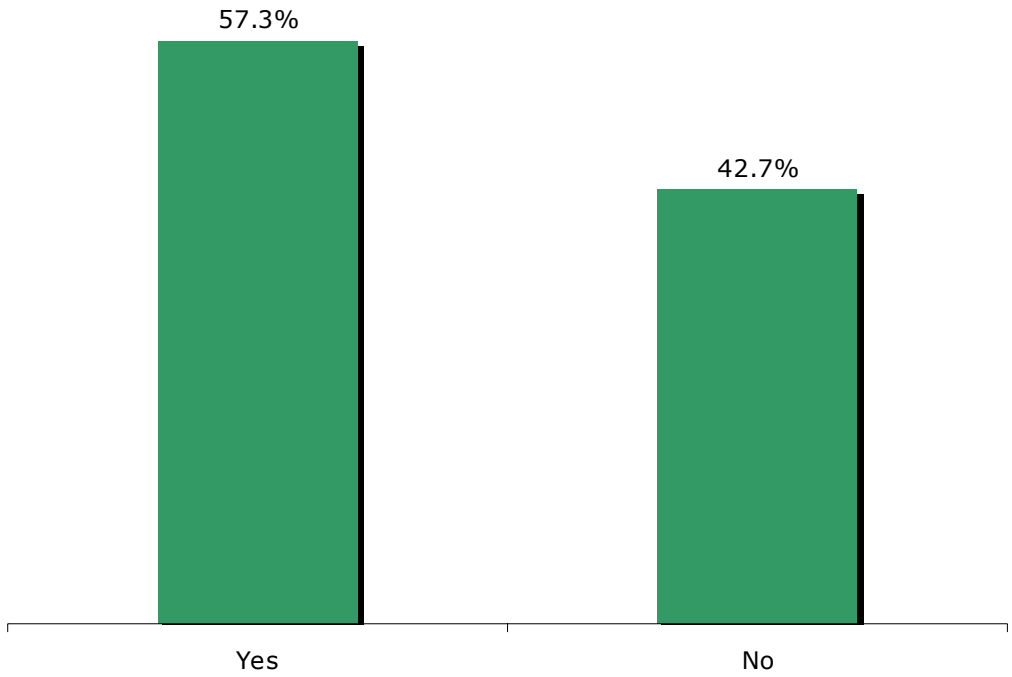
3.3 Water quality and water use efficiency

Methods used by growers to collect water quality information: survey total.

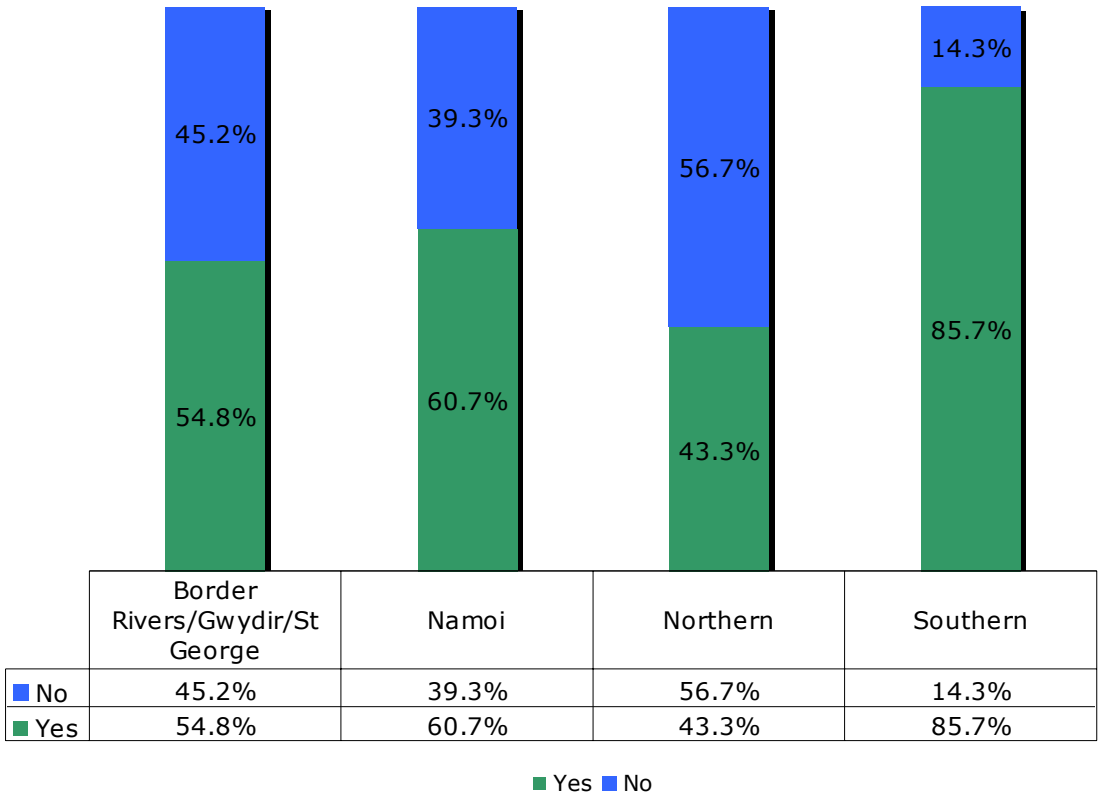


	Don't collect water quality information	Monitor on farm water quality and measure for EC	Monitor on farm water quality and measure for SAR	Monitor on farm water quality and measure for pH	Monitor on farm water quality and measure for Other	Use other off farm data sources
Both Pre-Season and During Season	54.3%	4.3%	0.0%	2.9%	0.0%	2.9%
During Season	2.9%	5.7%	1.4%	2.9%	1.4%	0.0%
Pre-Season	18.6%	12.9%	8.6%	12.9%	0.0%	1.4%
No Answer Given	24.2%	77.1%	90.0%	81.3%	98.6%	95.7%

Do growers calculate water use efficiency in terms of bales/megalitre? Survey total.

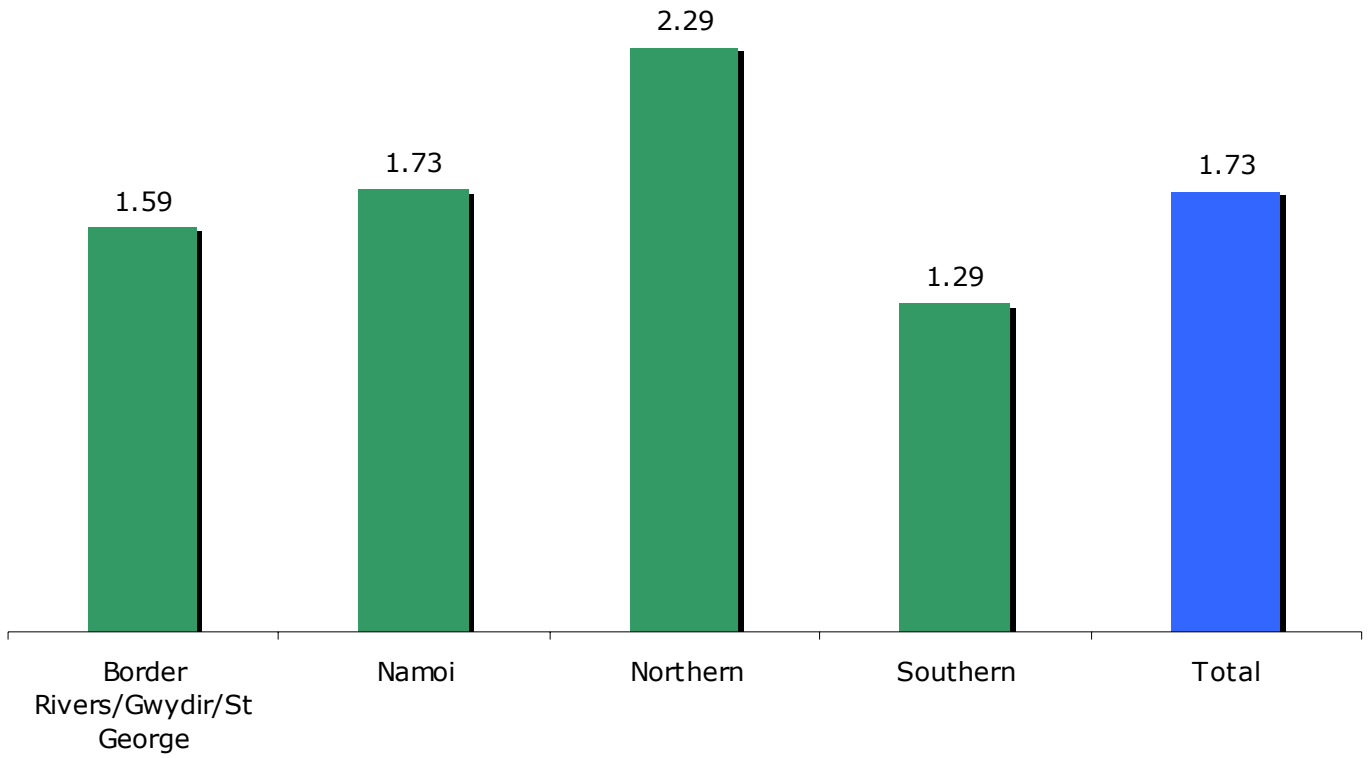


Do growers calculate water use efficiency in terms of bales/megalitre? By region.

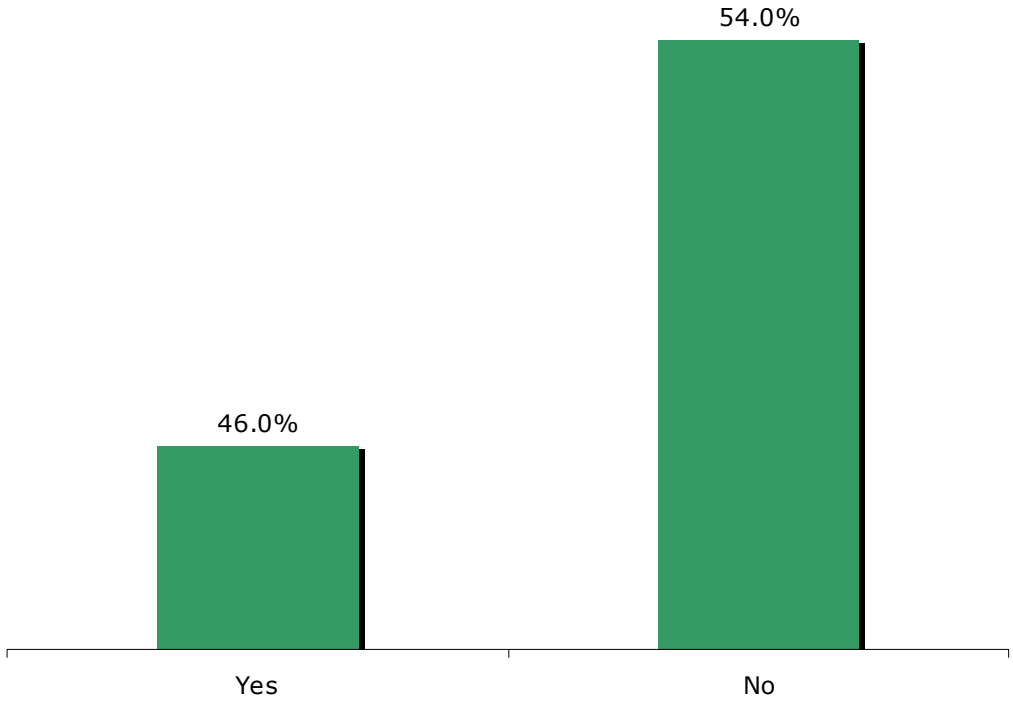


	Border Rivers/Gwydir/St George	Namoi	Northern	Southern
No	45.2%	39.3%	56.7%	14.3%
Yes	54.8%	60.7%	43.3%	85.7%

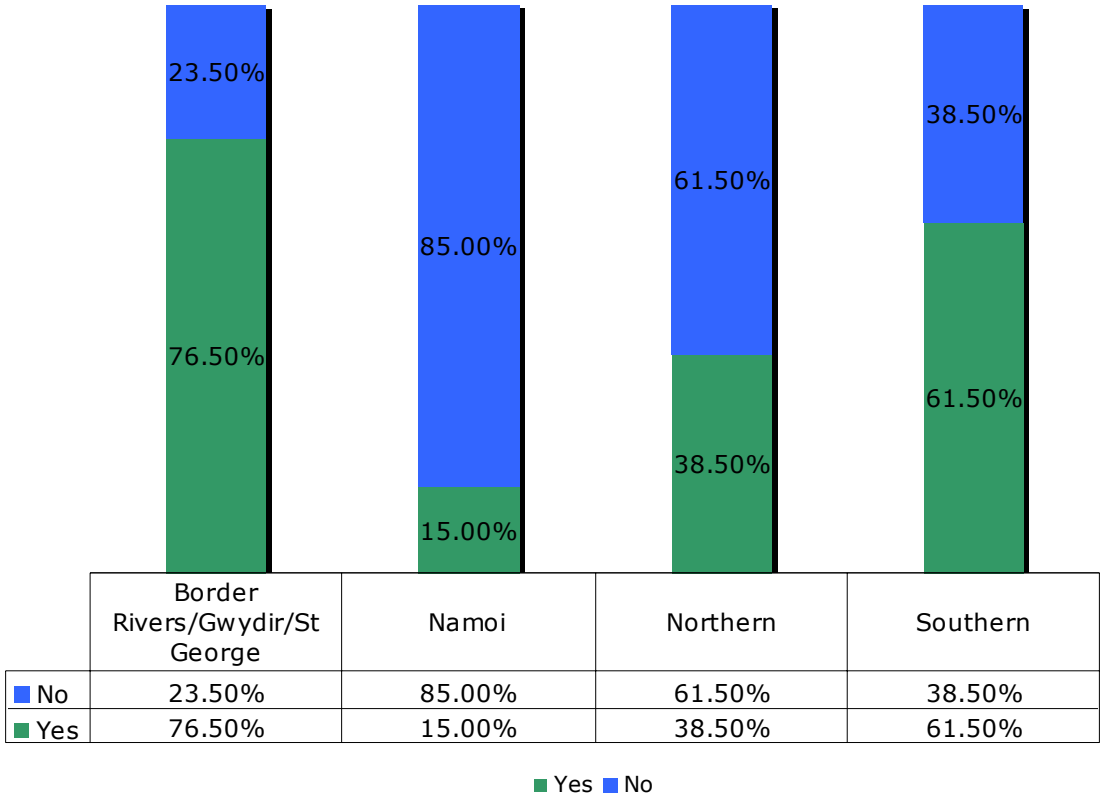
Last year's water use efficiency value (bales/megalitre).
Means by region.



Does the water use efficiency figure include rainfall? Survey total.

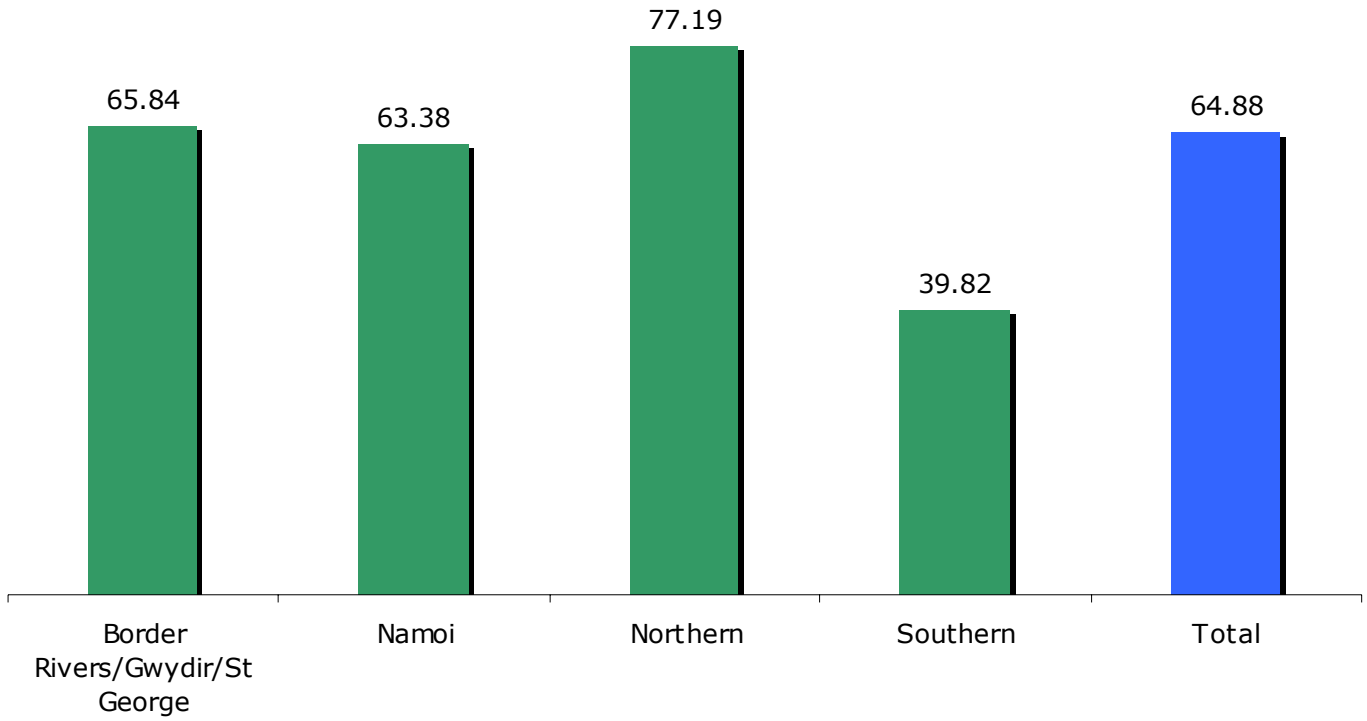


Does the water use efficiency figure include rainfall? By region.



	Border Rivers/Gwydir/St George	Namoi	Northern	Southern
No	23.50%	85.00%	61.50%	38.50%
Yes	76.50%	15.00%	38.50%	61.50%

Amount of rainfall (mm) included in last year's water use efficiency figure. Means by region.

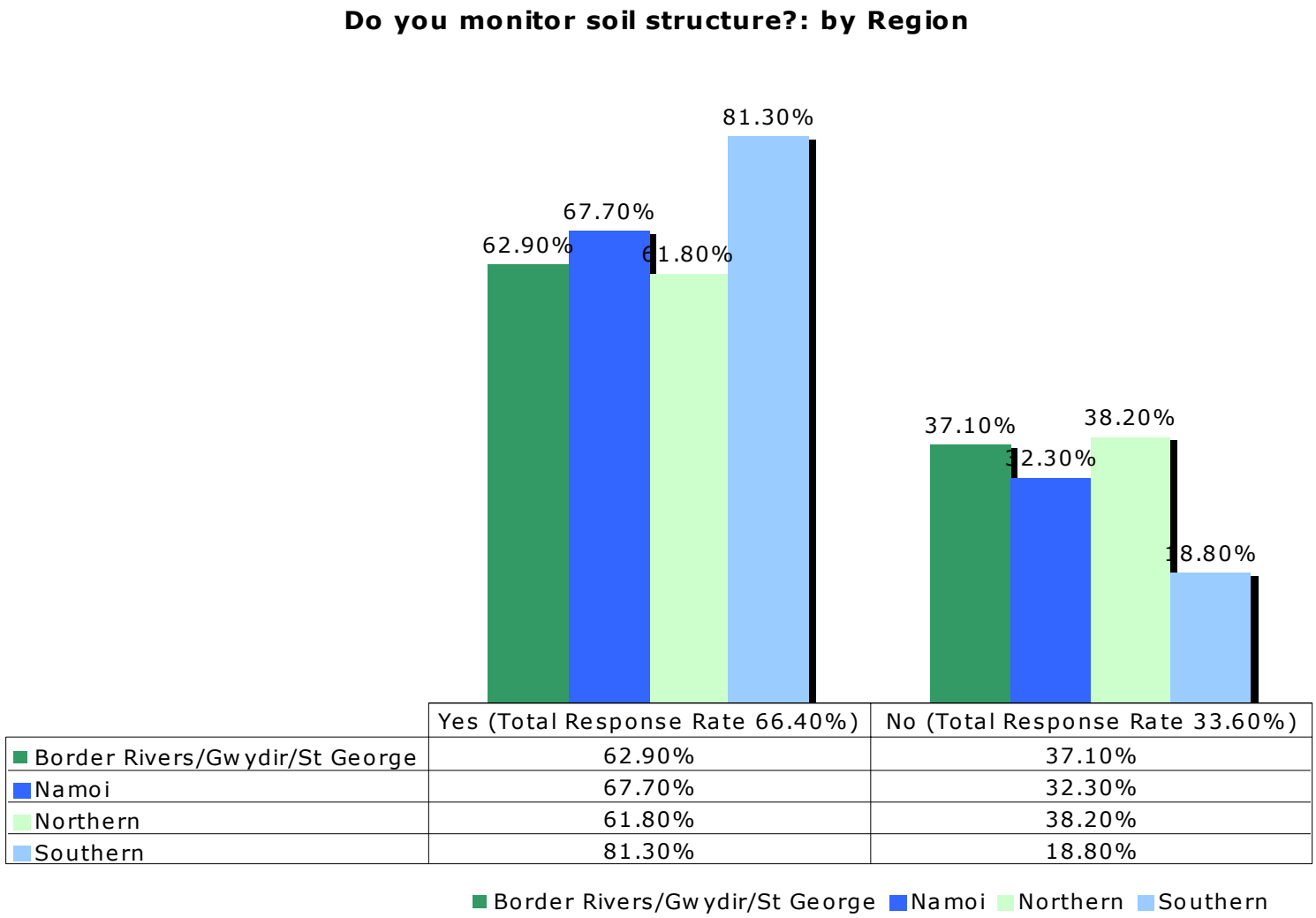


Regions	When is rainfall taken into account in WUE measurements?
Border Rivers/Gwydir/St George	End of season
Border Rivers/Gwydir/St George	Before/ during crop
Border Rivers/Gwydir/St George	Rainfall added to irrigation water quantities of end of season.
Border Rivers/Gwydir/St George	In probe predicted water date using probe software.
Border Rivers/Gwydir/St George	This last year so minimal did not count.
Border Rivers/Gwydir/St George	As we go.
Border Rivers/Gwydir/St George	In crop
Border Rivers/Gwydir/St George	I don't, I only calculate water I apply.
Border Rivers/Gwydir/St George	All rain fall September to end of march,
Border Rivers/Gwydir/St George	Don t know.
Northern	Dryland farm - all of it
Northern	Only when it reduces irrigations.
Northern	When it Rains
Northern	During crop growth,
Northern	Effective rainfall during growing period.
Northern	9mc/ha - .91 bales/mc.
Northern	Over an inch or close proximity to irrigation
Northern	Totally - rain growth system.
Northern	During crops soil moisture monitoring
Northern	As required
Namoi	It isn't
Namoi	Constantly, depending on rainfall frequency in conjunction with irrigation and intensity and timing of rainfall.
Namoi	No
Namoi	Per event
Namoi	Not currently
Namoi	Not really practicing good WUE methods although we gave done a short course.
Namoi	Effective rainfall is taken into account to get irrigation water use index and crop water use index.
Namoi	Runoff is measured against rainfall recorded
Namoi	It isn't. The public only want to know what we did with the water diverted from the environment.
Namoi	Always
Namoi	Rainfall is separate to this. We don t pay for rainfall.
Namoi	Nil
Namoi	Only in months when cotton is grown
Namoi	In crop
Namoi	Doesn't
Namoi	Sub soil, soil water content.
Southern	In crop
Southern	In crop
Southern	At the start.
Southern	At the end of season.
Southern	In the unlikely event that it even rains
Southern	Rarely due to low in crop rainfall.
Southern	When water is cut or delayed C-Probe
Southern	When it is effective.

Regions	Method(s) used to measure water delivered to the paddock, and moisture levels
Border Rivers/Gwydir/St George	Meters and probes
Border Rivers/Gwydir/St George	Probes.
Border Rivers/Gwydir/St George	Watering/ Hard to measure irrigation due to water recirculation.
Border Rivers/Gwydir/St George	Simply 100 63 mm syphons = 1ml/lt. C probe for moisture in soil
Border Rivers/Gwydir/St George	Moisture Probe (Newton)
Border Rivers/Gwydir/St George	Neutron Probe, storage measurement and more recently some Sarah Hood stuff
Border Rivers/Gwydir/St George	Water delivered is calculated via variations in reservoir levels and measuring water pumped onto farm etc. Neutron probe is used to measure water use.
Border Rivers/Gwydir/St George	Neutron Probe, C probes, Hand Probes.
Border Rivers/Gwydir/St George	Water use out of dams.
Moisture probe connected to home	computer.
Border Rivers/Gwydir/St George	Water meters. C probes.
Border Rivers/Gwydir/St George	Syphon meters. Tail drain meters.
Border Rivers/Gwydir/St George	Moisture probe
Border Rivers/Gwydir/St George	C-probes advance meters mini Lysimeter flow meters
Border Rivers/Gwydir/St George	Water meters and C probes
Border Rivers/Gwydir/St George	Meters from channels, gauges in dams, C-probes.
Border Rivers/Gwydir/St George	C Probes
Border Rivers/Gwydir/St George	1. When metered into property, then returned into fields. 2. T.D. and storm run off metered. 3.Soil moisture diviner 2000
Border Rivers/Gwydir/St George	Water meters, moisture probes, crop stress.
Northern	Hand probe and soil probes (cores) for subsoil and accumulated rainfall.
Northern	Can sample for depth of moisture levels.
Northern	Probes
Northern	Syphon meter. Probes set in soil.
Northern	Wheels, probes
Northern	Water delivered, where water meter is used, and capacity of pump.
Northern	Enviroscan
Northern	Diviner moisture probe.
Northern	Dam level changes/best estimate/in-field Enviroscan.
Northern	Water wheels
Northern	Just meters at river
Northern	C Probes and meters in & out
Northern	Dam dipstick, diviner probes.
Northern	Moisture probe
Northern	Probes
Northern	Water meter - neutron probes
Northern	Probes in soil
Northern	Calculate water flows through irrigators. Nutrition probes.
Northern	Probe
Northern	MGL/ Day per pumpSteel Probe
Northern	Moisture probe
Namoi	Water to the paddock is measured using formula for syphon flow with measured weed

Regions	Method(s) used to measure water delivered to the paddock, and moisture levels
Namoi	Meter, head height in channels, C-Probes, Pumping time at certain head heights
Namoi	Probe
Namoi	Meter at pump site. C probe in field
Namoi	Probe
Namoi	Shovel or probe.
Namoi	From neutron probe readings, rainfall records
Namoi	Look at crop.
Namoi	Meters on pumps, moisture probes (C-probes)
Namoi	C Probe. Only measure water pumped
Namoi	Shovel and steel probe.
Namoi	Hydraulic - all required inputs are put in to get determination.
Namoi	C Probe. Pre and post storage measurement - meters of supply
Namoi	Storage depth gauge. River pump meter. C Probe. Bore pump meter.
Namoi	Levels in storages, crop - visual appraisal, irrigation timings.
Namoi	C- Probes in conjunction with soil profile analysis and using mac pump
Namoi	Engines pump capacity and speed and water meters.
Namoi	Measure storage levels before and after irrigation. Hand probe in field
Namoi	Measure water to channel
Namoi	Moisture spear
Namoi	Monitor storage levels and hectares watered. Not metered, no probes.
Namoi	Moisture probes in field. No meters on storage outlets or tail return to monitor on.
Namoi	Water meter
Namoi	Bore water
Namoi	Push Probes, water metering
Namoi	Storage gauges, bore metered.
Namoi	Metered water pumped
Namoi	Visual - crop
Southern	C probes
Southern	Water measured into channels, C probes.
Southern	Head loss, Ml pumped on farm
Southern	Moisture probes
Southern	Metered water from pump
Southern	Meters from pumps and syphon flow meters. C-Probes.
Southern	C Probes and neutron probes. Water meters on and off fields
Southern	In field C probes only
Southern	Poppler meter in irrigation pipes and structures.
Southern	C Probes for water profile. Meters going in syphons and metered off.
Southern	C-Probe
Southern	N/Probes
Southern	Measure water and calculate water left over at the end of the season.
Southern	No measure
Southern	C-probe, water in less evaporate and see page

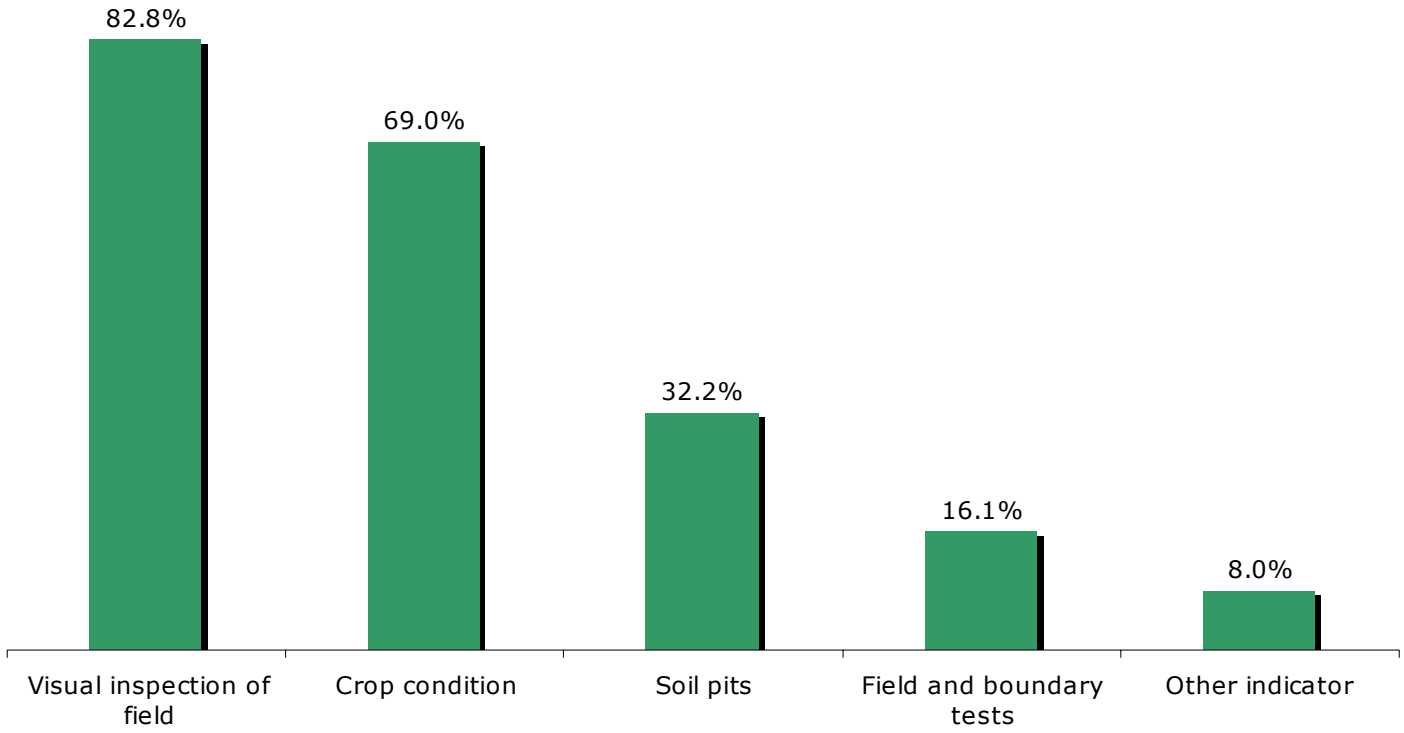
3.4 Soil structure monitoring completion and indicators used



	Yes (Total Response Rate 66.40%)	No (Total Response Rate 33.60%)
Border Rivers/Gwydir/St George	62.90%	37.10%
Namoi	67.70%	32.30%
Northern	61.80%	38.20%
Southern	81.30%	18.80%

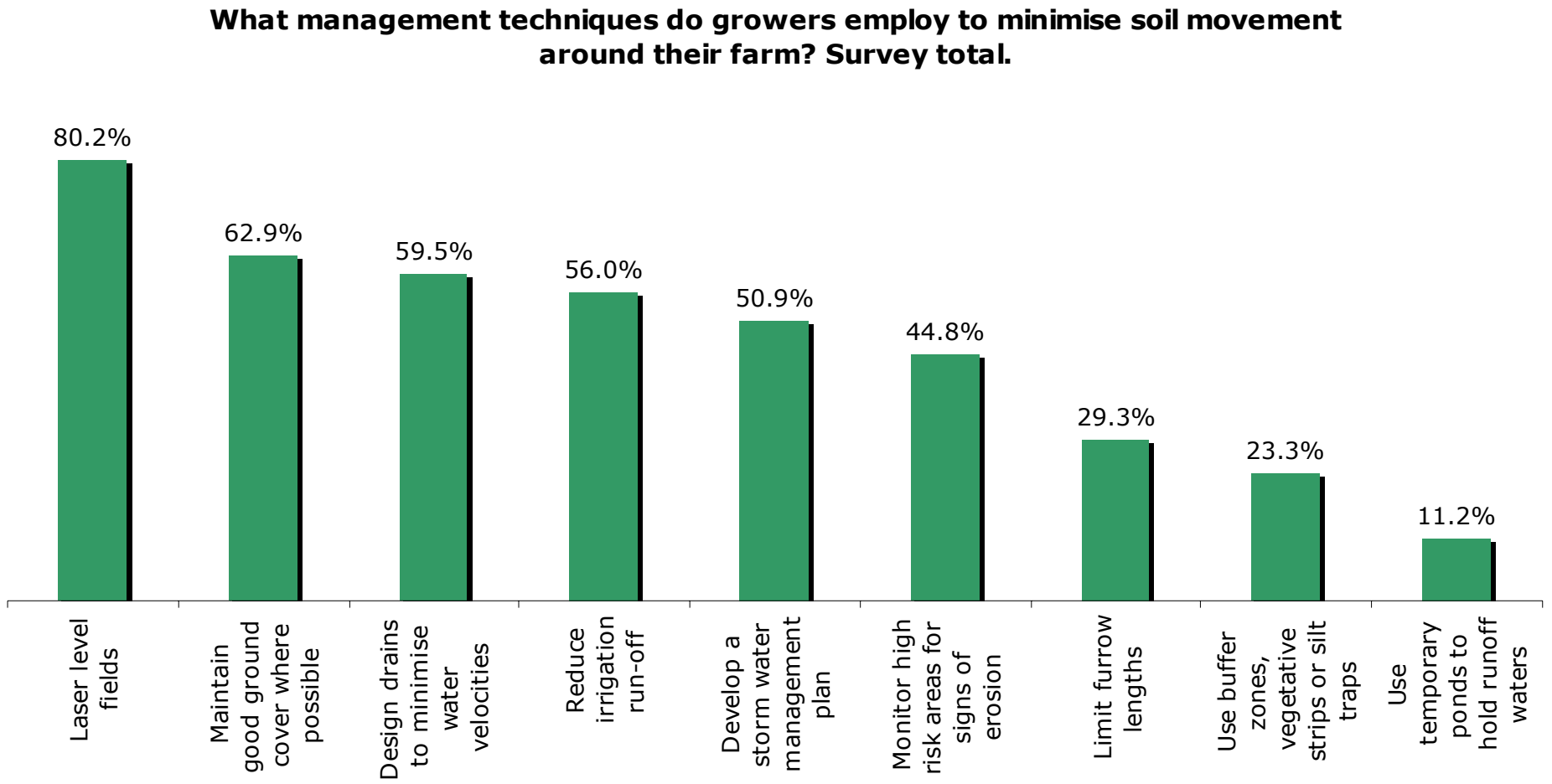
Regions	Frequency of Soil Structure Monitoring
Border Rivers/Gwydir/St George	Per Annum
Border Rivers/Gwydir/St George	3 times per week
Border Rivers/Gwydir/St George	At soil testing.
Border Rivers/Gwydir/St George	throughout season
Border Rivers/Gwydir/St George	4 times per year
Border Rivers/Gwydir/St George	before each crop plant
Border Rivers/Gwydir/St George	yearly
Border Rivers/Gwydir/St George	Every two years
Border Rivers/Gwydir/St George	all the time
Border Rivers/Gwydir/St George	Once a week.
Border Rivers/Gwydir/St George	constantly
Border Rivers/Gwydir/St George	4 years
Namoi	Everytime I step onto field.
Namoi	yearly
Namoi	2 years
Namoi	2-3 years
Namoi	Not with soil pit
Namoi	after relevelling
Namoi	regularly
Namoi	Yearly
Namoi	Annually
Namoi	all the time
Namoi	If something is showing up on a soil test and the previous crop was poor
Namoi	Regularly
Namoi	Periodic
Namoi	Seasonally
Namoi	as needed/after wet pick
Namoi	5 year int.
Namoi	Instinct
Northern	Annual
Northern	every year
Northern	monthly
Northern	CA/mg ratios
Northern	Yearly
Northern	1-2 years
Northern	Infrequent
Northern	On going, no set period
Northern	Yearly
Northern	Seasonally
Northern	with a shovel
Northern	Every 3 years
Northern	1 per year
Northern	Annual
Northern	Annually
Northern	Once a year
Southern	Once a year
Southern	Yearly
Southern	all the time
Southern	Annually
Southern	annually
Southern	Annual
Southern	all the time
Southern	Yearly
Southern	yearly
Southern	irregularly
Southern	Annually

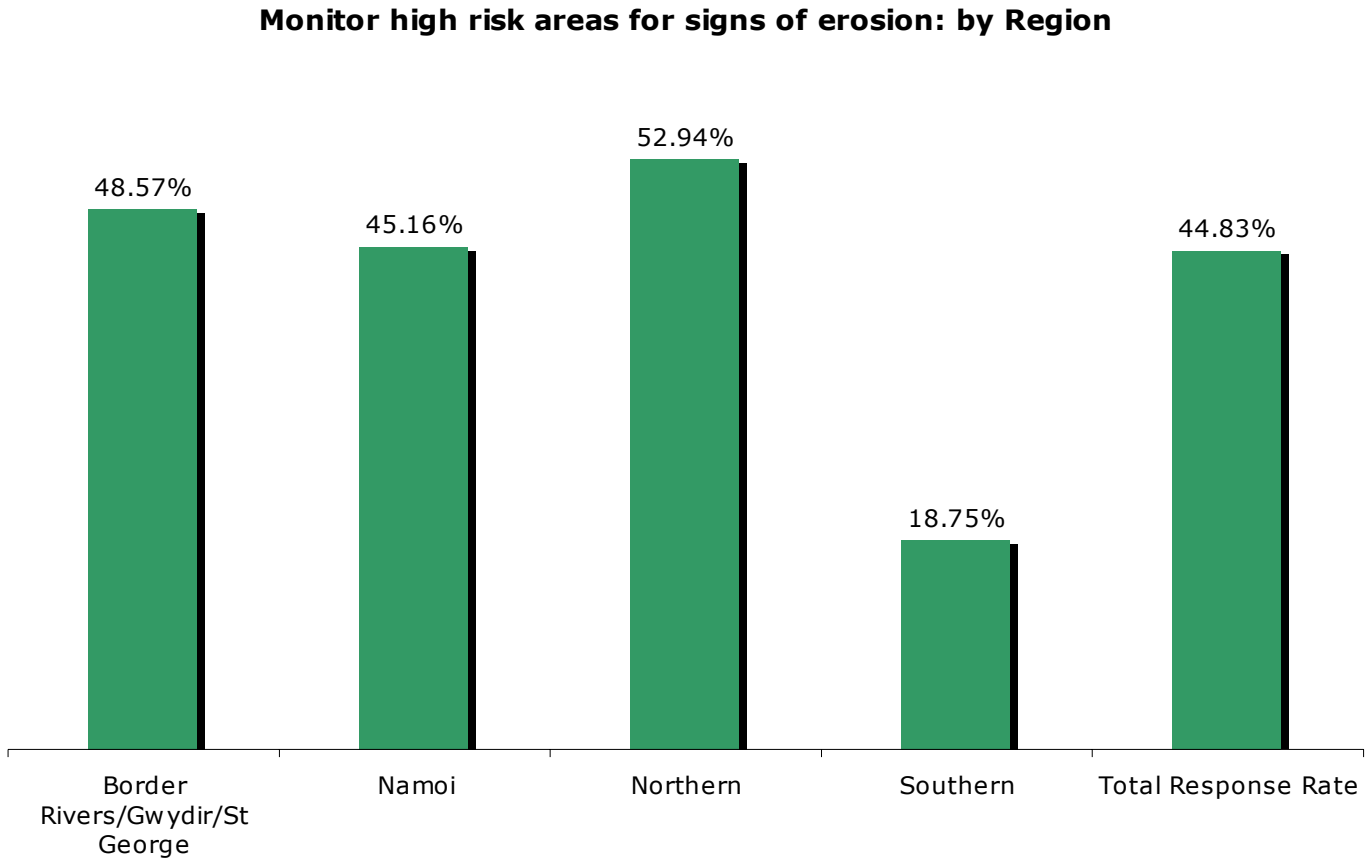
What indicators do growers use to monitor soil structure?
Survey total.



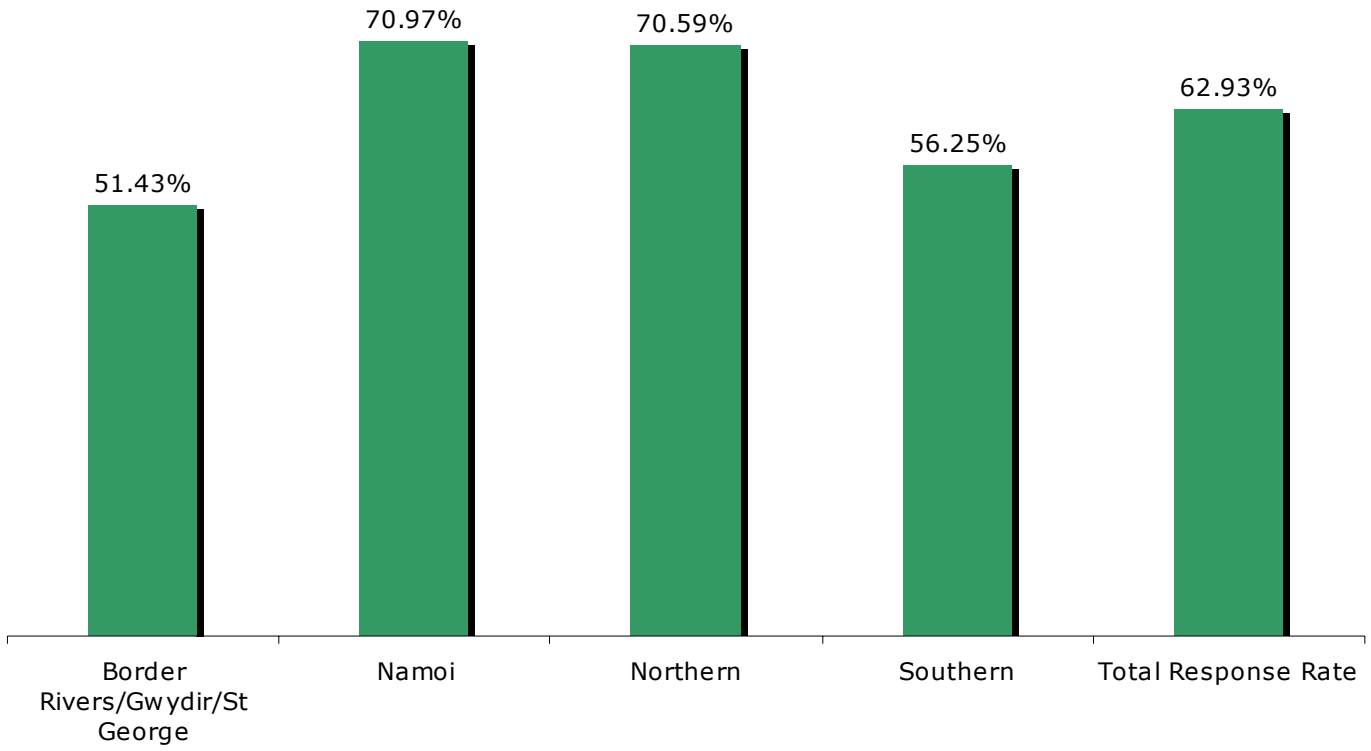
Grower Type	What indicators do you use to monitor soil structure? Other.
Stalwart	Slaving test
Professional	Soil test
Stalwart	Cores
Traditional	Deep coring every season.
Traditional	Soil coring
Opportunist	Probe
Opportunist	Auger Core Samples
Opportunist	Field crop history
Stalwart	Plant roots, C- probes
Stalwart	Probe readings.
Stalwart	Water infiltration, timing
Traditional	Soil lab tests

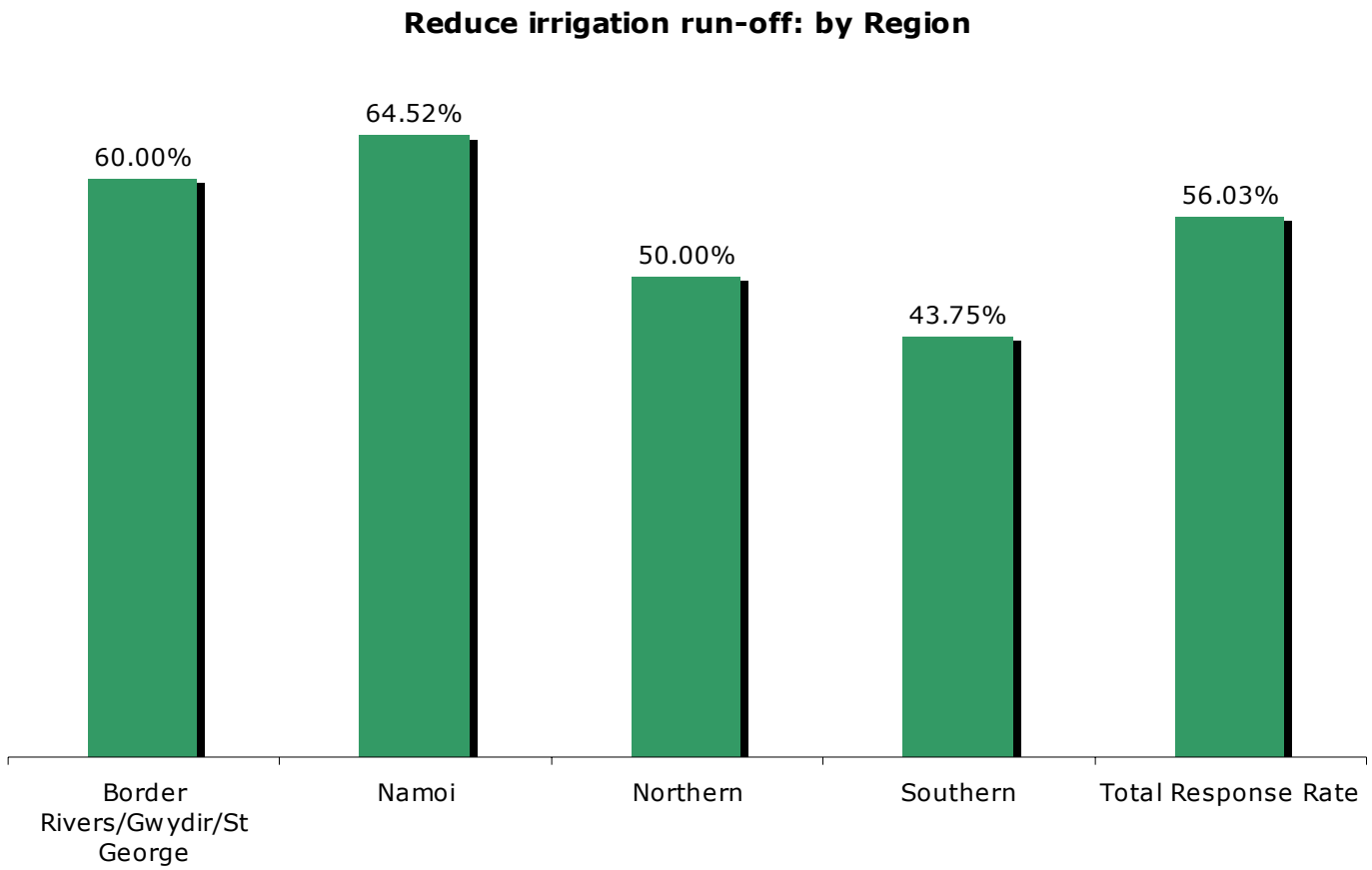
3.5 Soil structure management techniques



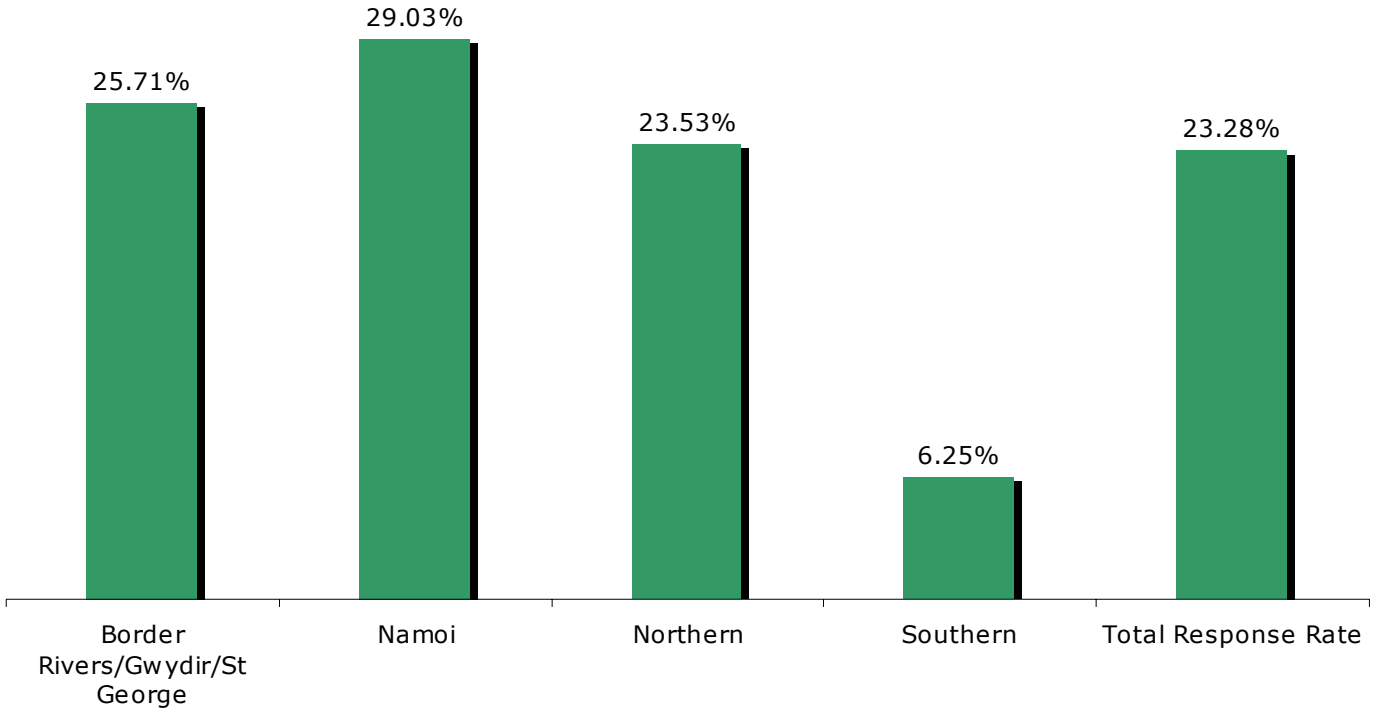

Monitor high risk areas for signs of erosion: by Region
48.57%
45.16%
52.94%
18.75%
44.83%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate

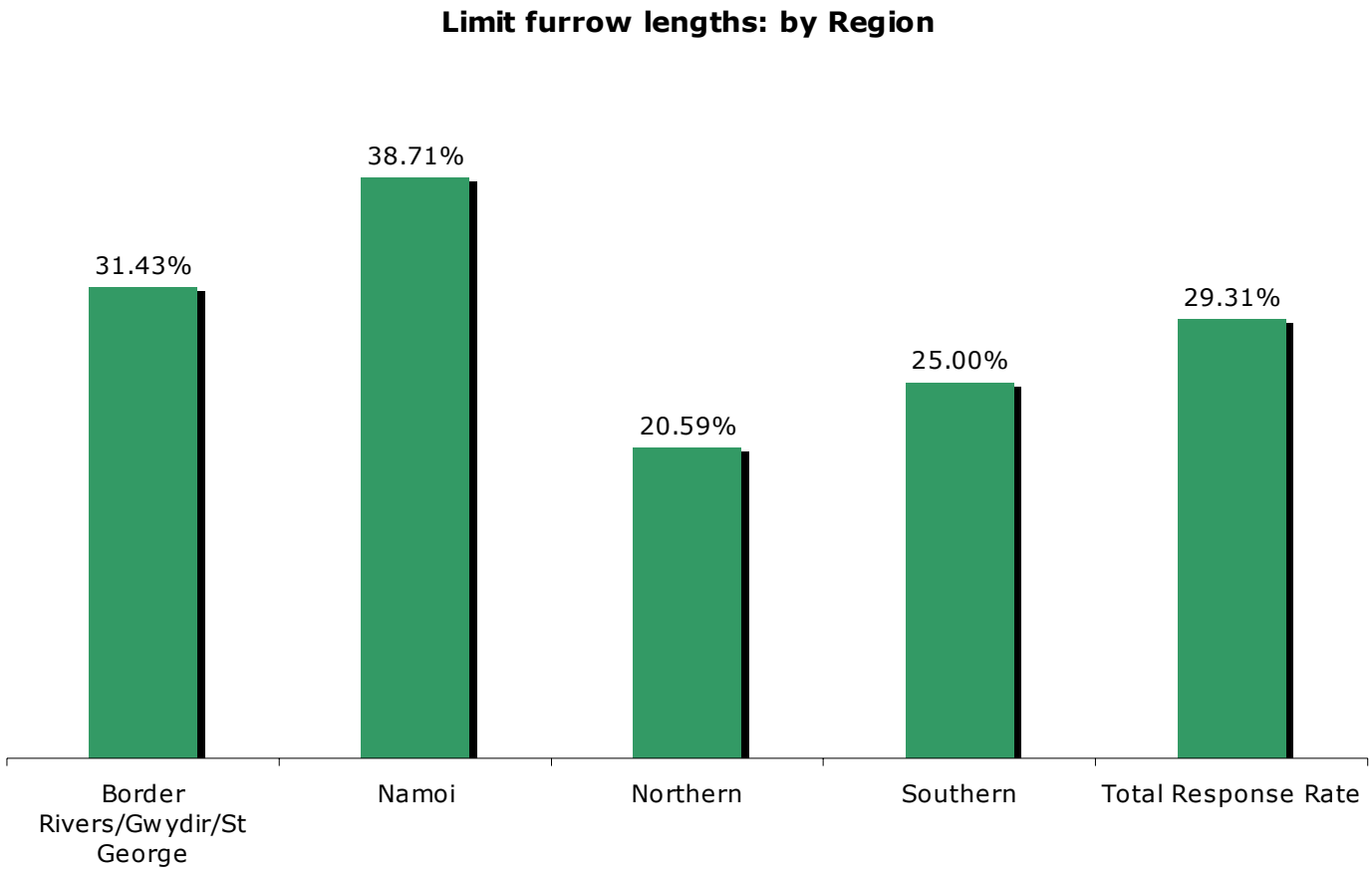
Maintain good ground cover where possible: by Region

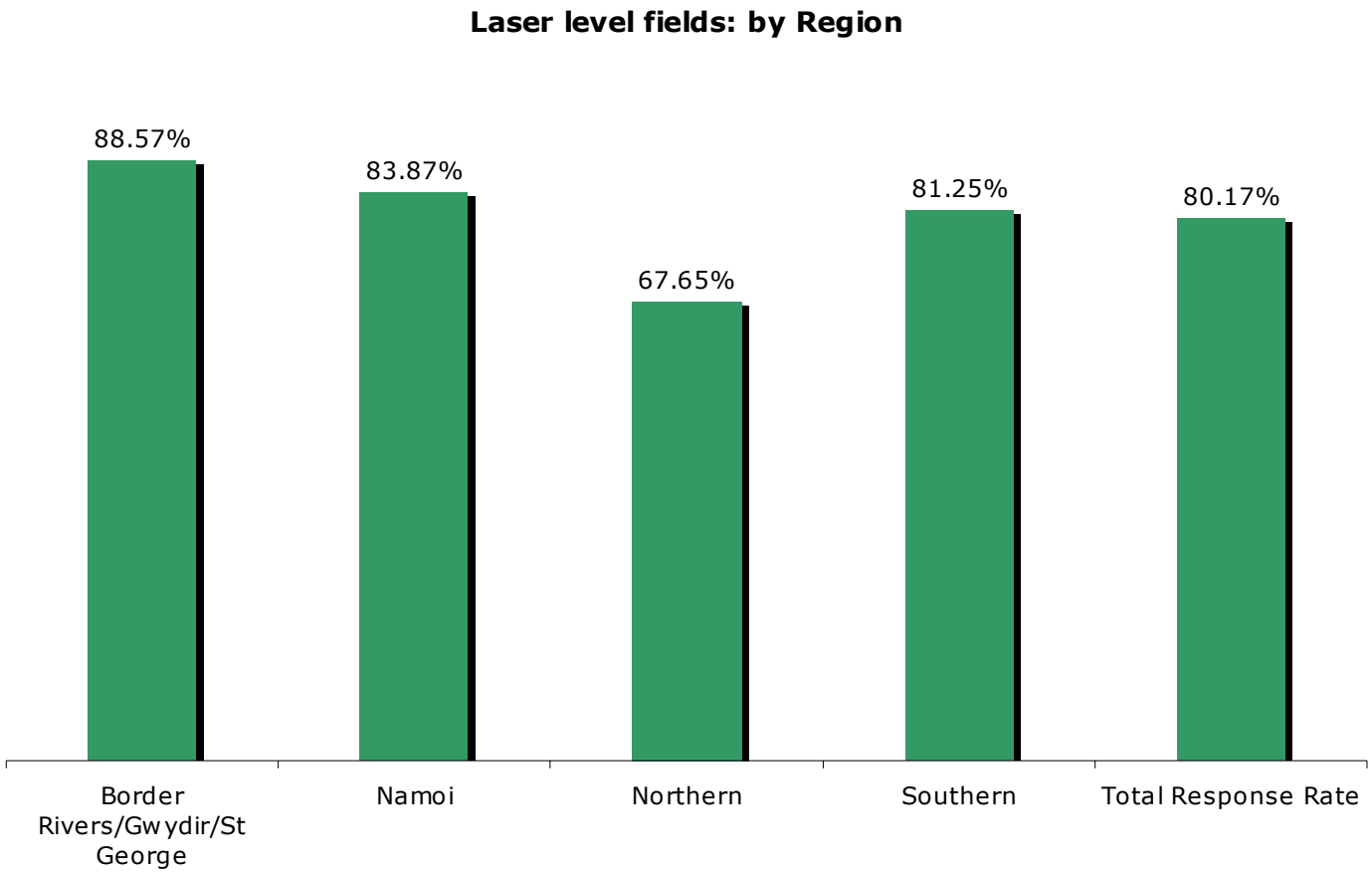



Reduce irrigation run-off: by Region
60.00%
64.52%
50.00%
43.75%
56.03%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate

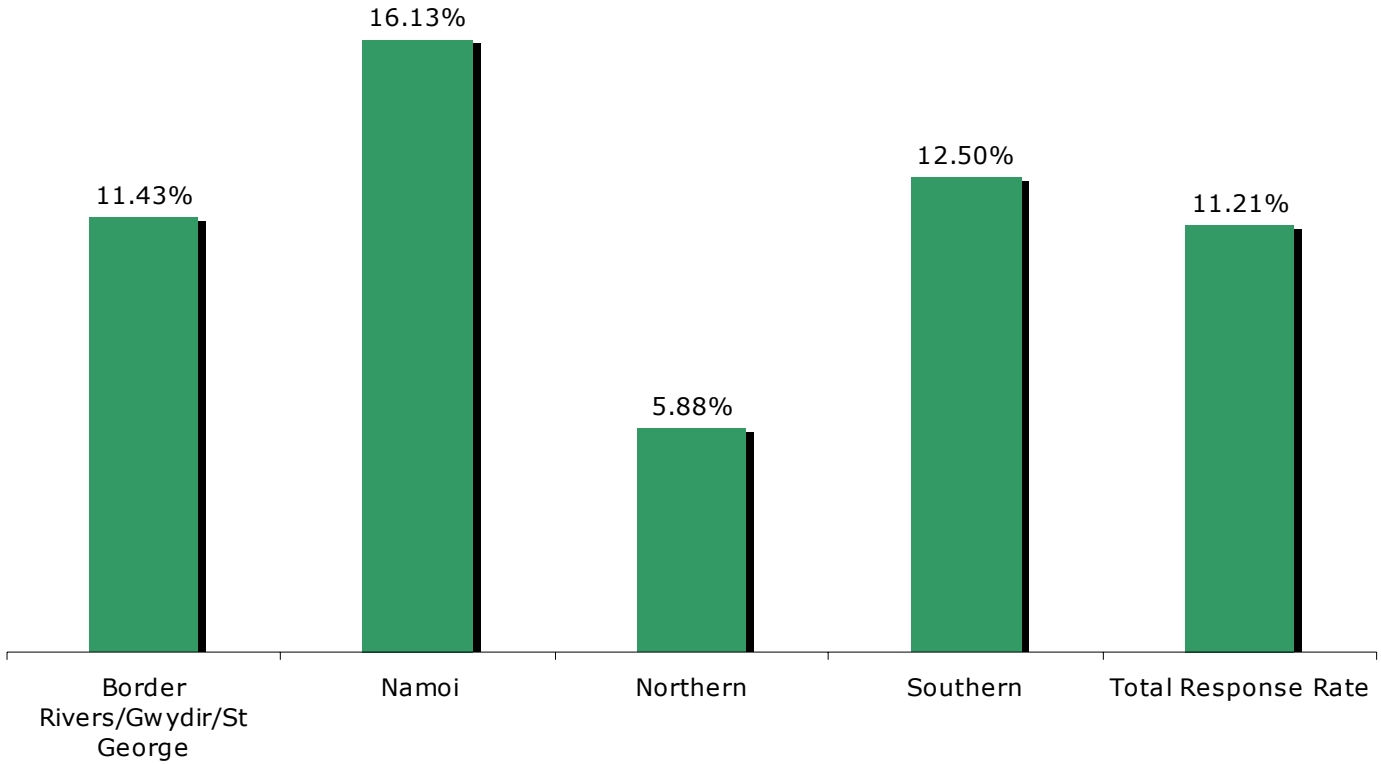
Use buffer zones, vegetative strips or silt traps: by Region

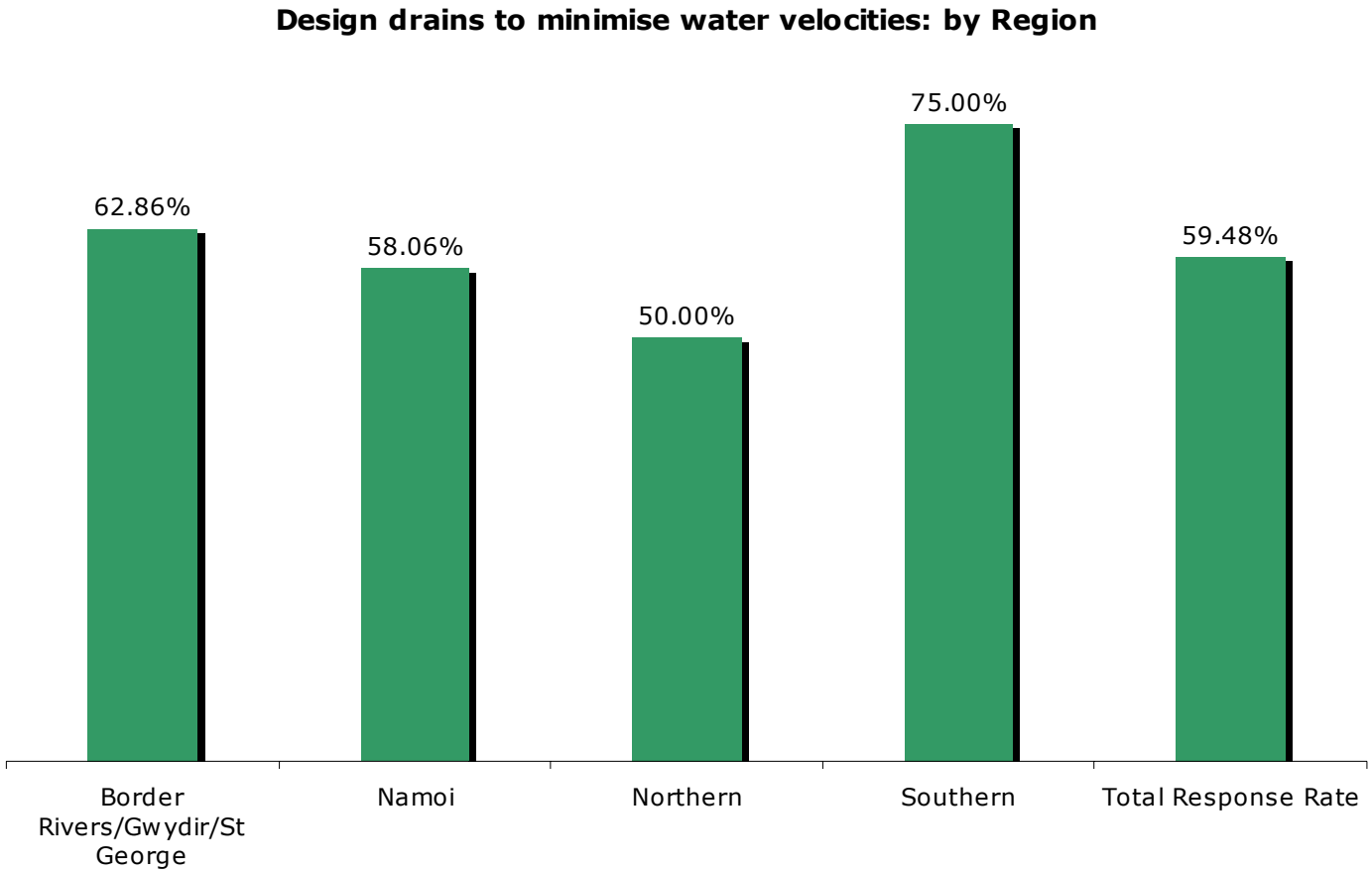



Limit furrow lengths: by Region
31.43%
38.71%
20.59%
25.00%
29.31%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate

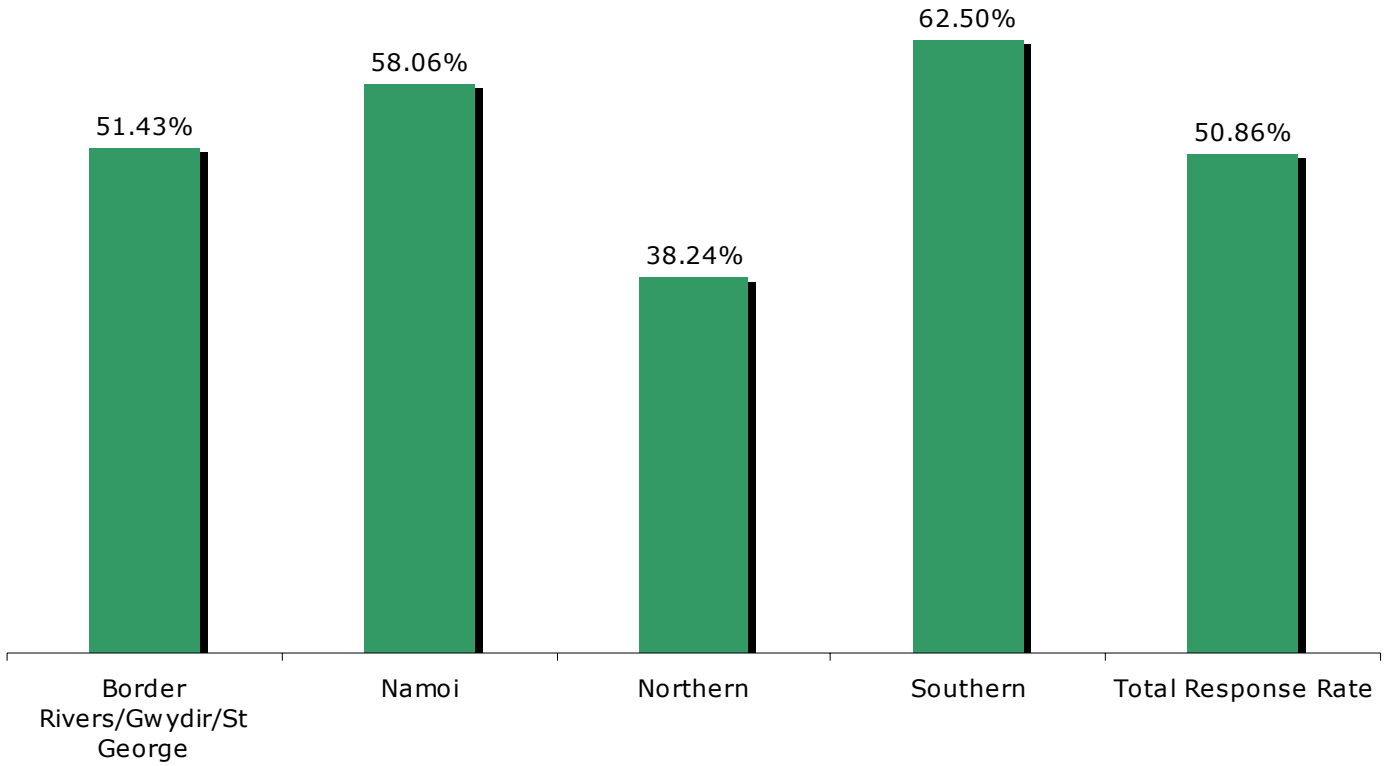

Laser level fields: by Region
88.57%
83.87%
67.65%
81.25%
80.17%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate

Use temporary ponds to hold runoff waters: by Region

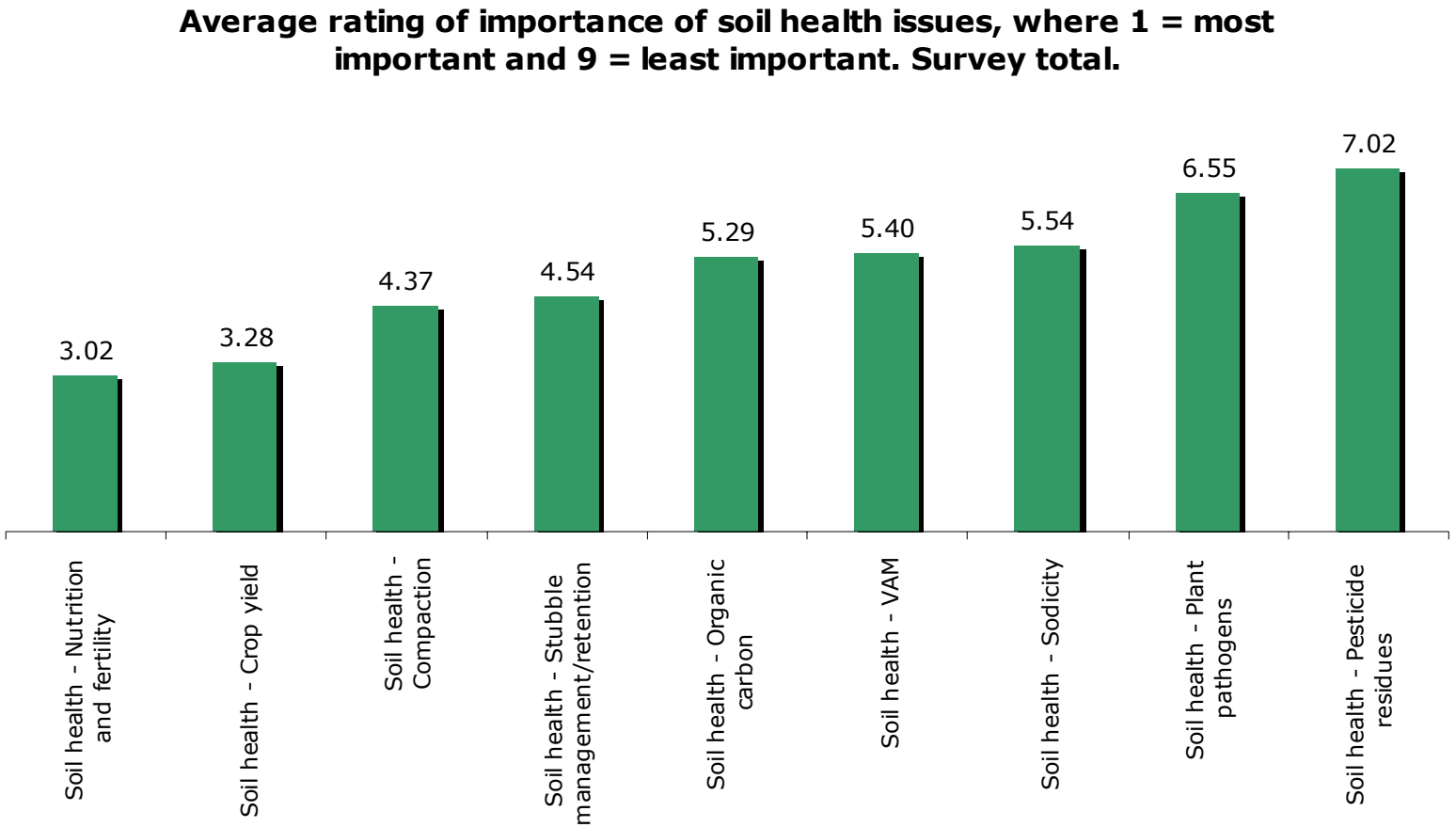



Design drains to minimise water velocities: by Region
62.86%
58.06%
50.00%
75.00%
59.48%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate

Develop a storm water management plan: by Region



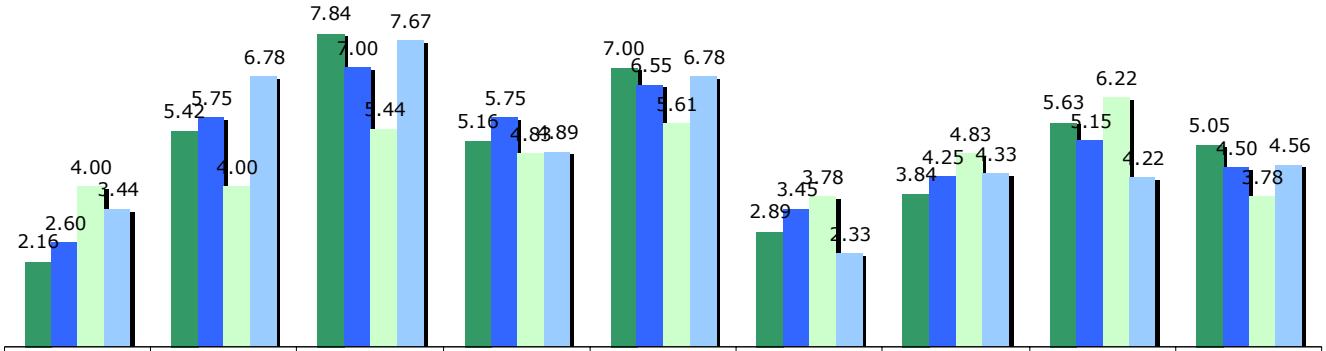
3.6 The most important soil health issues: by region



Average rating of importance of soil health issues, by region. Where 1 = Most Important, and 9 = Least Important.

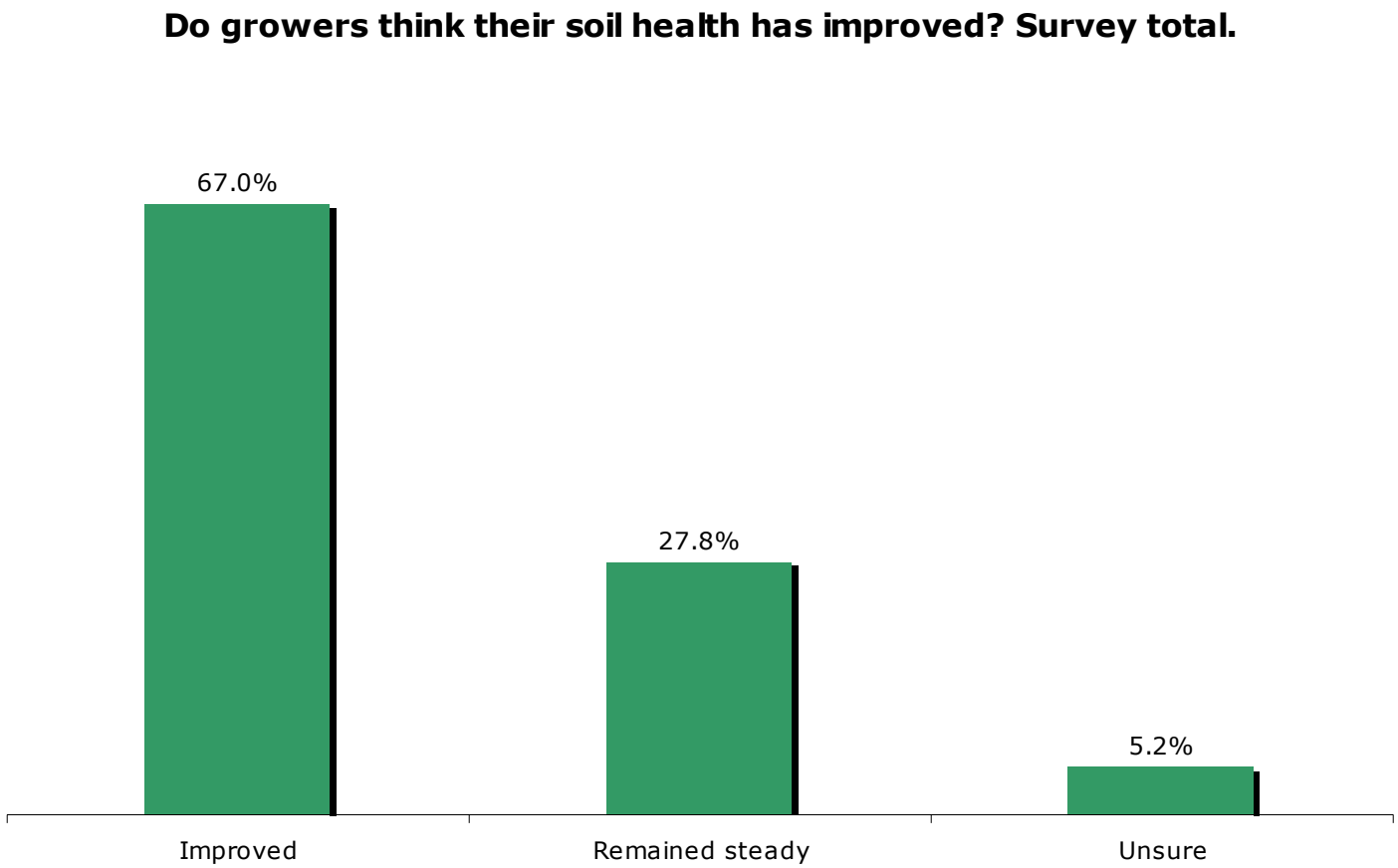
	Border Rivers/ Gwydir/St George	Namoi	Northern	Southern
Soil health - Nutrition and fertility	2.16	2.60	4.00	3.44
Soil health - VAM	5.42	5.75	4.00	6.78
Soil health - Pesticide residues	7.84	7.00	5.44	7.67
Soil health - Organic carbon	5.16	5.75	4.83	4.89
Soil health - Plant pathogens	7.00	6.55	5.61	6.78
Soil health - Crop yield	2.89	3.45	3.78	2.33
Soil health - Compaction	3.84	4.25	4.83	4.33
Soil health - Sodicity	5.63	5.15	6.22	4.22
Soil health - Stubble management/retention	5.05	4.50	3.78	4.56

Average rating of importance of soil health issues, by region. Where 1 = Most Important, and 9 = Least Important.

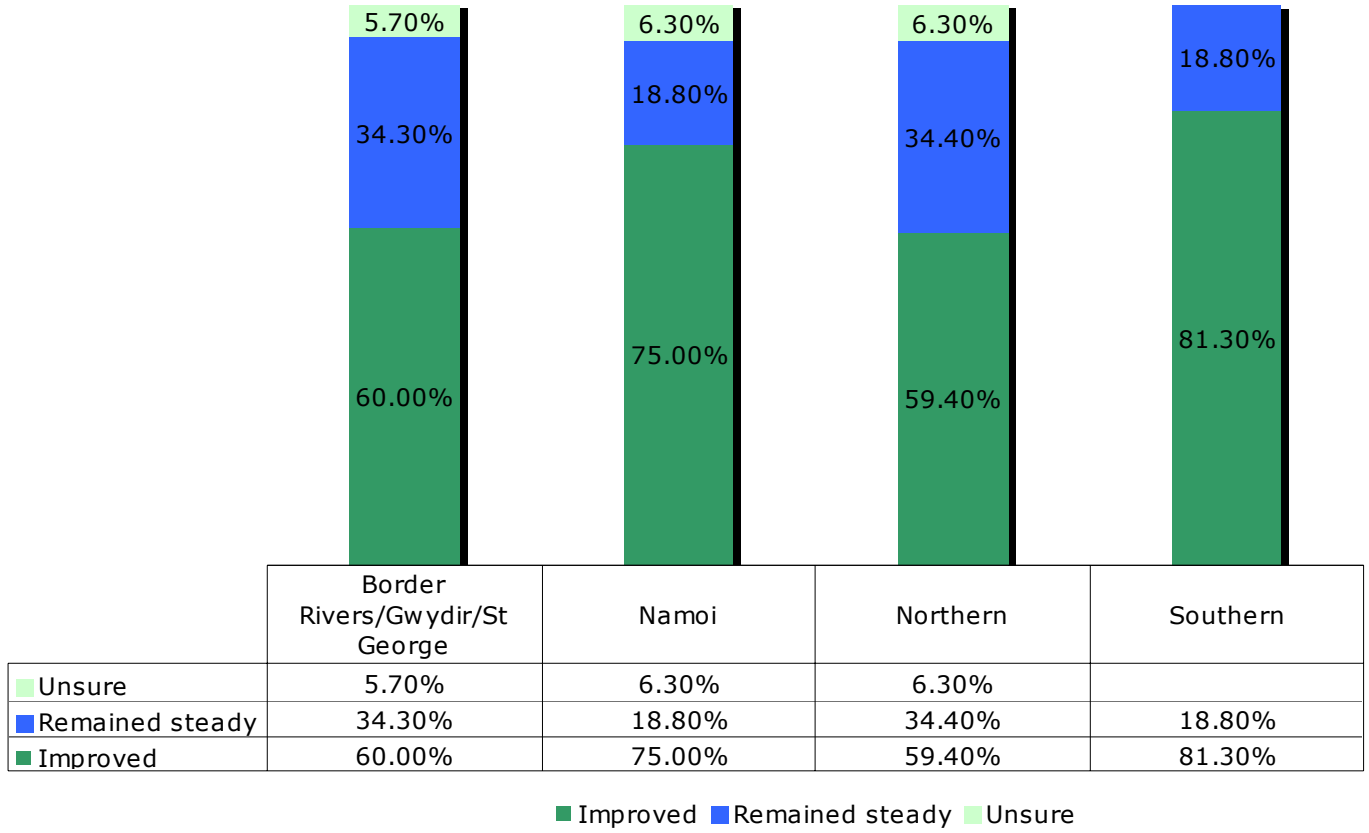


	Soil health - Nutrition and fertility	Soil health - VAM	Soil health - Pesticide residues	Soil health - Organic carbon	Soil health - Plant pathogens	Soil health - Crop yield	Soil health - Compaction	Soil health - Sodicity	Soil health - Stubble management/r
Border Rivers/ Gwydir/St George	2.16	5.42	7.84	5.16	7.00	2.89	3.84	5.63	5.05
Namoi	2.60	5.75	7.00	5.75	6.55	3.45	4.25	5.15	4.50
Northern	4.00	4.00	5.44	4.83	5.61	3.78	4.83	6.22	3.78
Southern	3.44	6.78	7.67	4.89	6.78	2.33	4.33	4.22	4.56

3.7 Improvement in soil health over the last 10 years

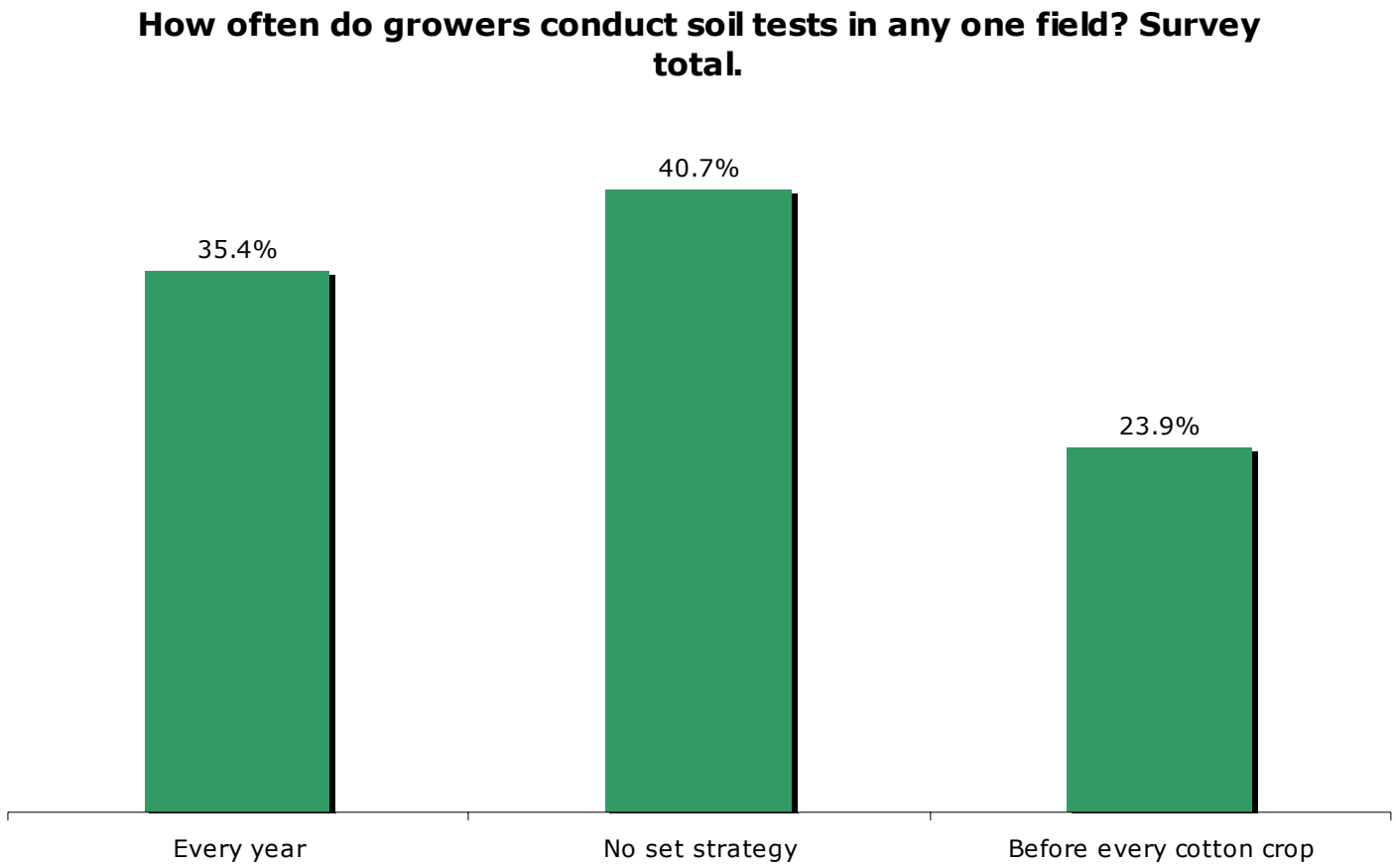


Do growers think their soil health has improved?: by Region

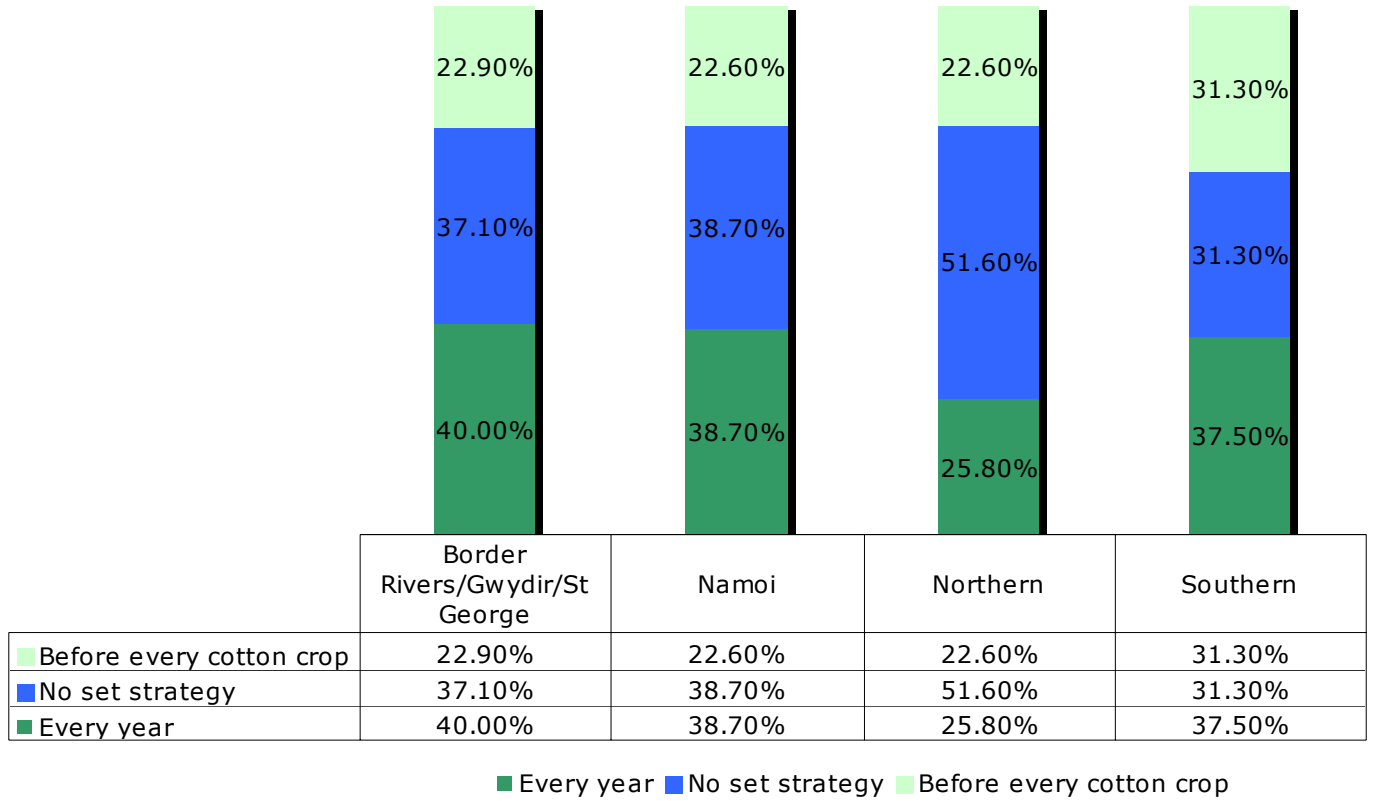


	Border Rivers/Gwydir/St George	Namoi	Northern	Southern
Unsure	5.70%	6.30%	6.30%	
Remained steady	34.30%	18.80%	34.40%	18.80%
Improved	60.00%	75.00%	59.40%	81.30%

3.8 Frequency of soil testing in any one field



How often do growers conduct soil tests in any one field?: by Region



	Border Rivers/Gwydir/St George	Namoi	Northern	Southern
Before every cotton crop	22.90%	22.60%	22.60%	31.30%
No set strategy	37.10%	38.70%	51.60%	31.30%
Every year	40.00%	38.70%	25.80%	37.50%

Section 4: Native Flora, Fauna and Riparian Zone Management

This section includes analysis of questions in the survey relating to strategies used by growers to manage areas of native vegetation and riparian zones on their property, as well as which native and feral animal species are monitored. Analysis is presented by region, with aggregated data for all responders included where appropriate.

4.1 Summary of Section 4

Dominant strategies used by growers to manage areas of native vegetation

This section reports grower responses to a question regarding which management techniques they employ to manage native vegetation areas on their farm. Responses are reported for the complete data set, on a regional basis for all management technique, and as a chart showing each management technique broken up into regional responses.

• Aggregate response rates ranged from a 43 per cent response to 'Fenced (selectively grazed)', through to 10 per cent for 'Control vehicle access'. There was a 4 per cent response to 'Other native vegetation management', and a list of other techniques noted by growers has been included in table form.

• Notable differences by region include the Northern region, where the prevalent techniques were to 'Leave undisturbed' (56.52 per cent), and 'Not grazed' (52.17 per cent). 'Planting native vegetation/trees' was popular in the Southern region, drawing a 42.86 per cent response, as compared to the overall response of 23 per cent.

Dominant strategies used by growers to manage creeks and riparian areas

This section reports grower responses to a question regarding which management techniques they employ to manage creek and river frontage on their farm. Responses are reported for the complete data set, on a regional basis for all management technique, and as a chart showing each management technique broken up into regional responses.

• There were large differences on a regional basis with regard to the percentage of respondents who did not have creek or river frontage, ranging from 53.57 per cent of Northern respondents, through to 12.5 per cent of Border Rivers/Gwdir/Namoi respondents (the overall response was 29.41 per cent of growers not having creek or river frontage). Responses to the remainder of the question, dealing with management techniques, have been filtered based on whether each respondent has creek or river frontage.

• Aggregate response rates ranged from a 51.4 per cent response to 'Fenced (selectively grazed)', through to 12.5 per cent for 'Control vehicle access'.

• Notable differences by region include the Northern region, where, as with native vegetation management, the prevalent techniques were to 'Leave undisturbed' (61.54 per cent), and 'Not grazed' (53.85 per cent). 'Planting native vegetation/trees' was popular in the Namoi region, with a 38.1 per cent response, as compared to the overall response of 15.3 per cent. In the Southern region, 'Fenced (selectively grazed)' was by far the most popular management technique, drawing a 60 per cent response, while all other techniques were significantly lower, many reaching only a 20 per cent response rate.

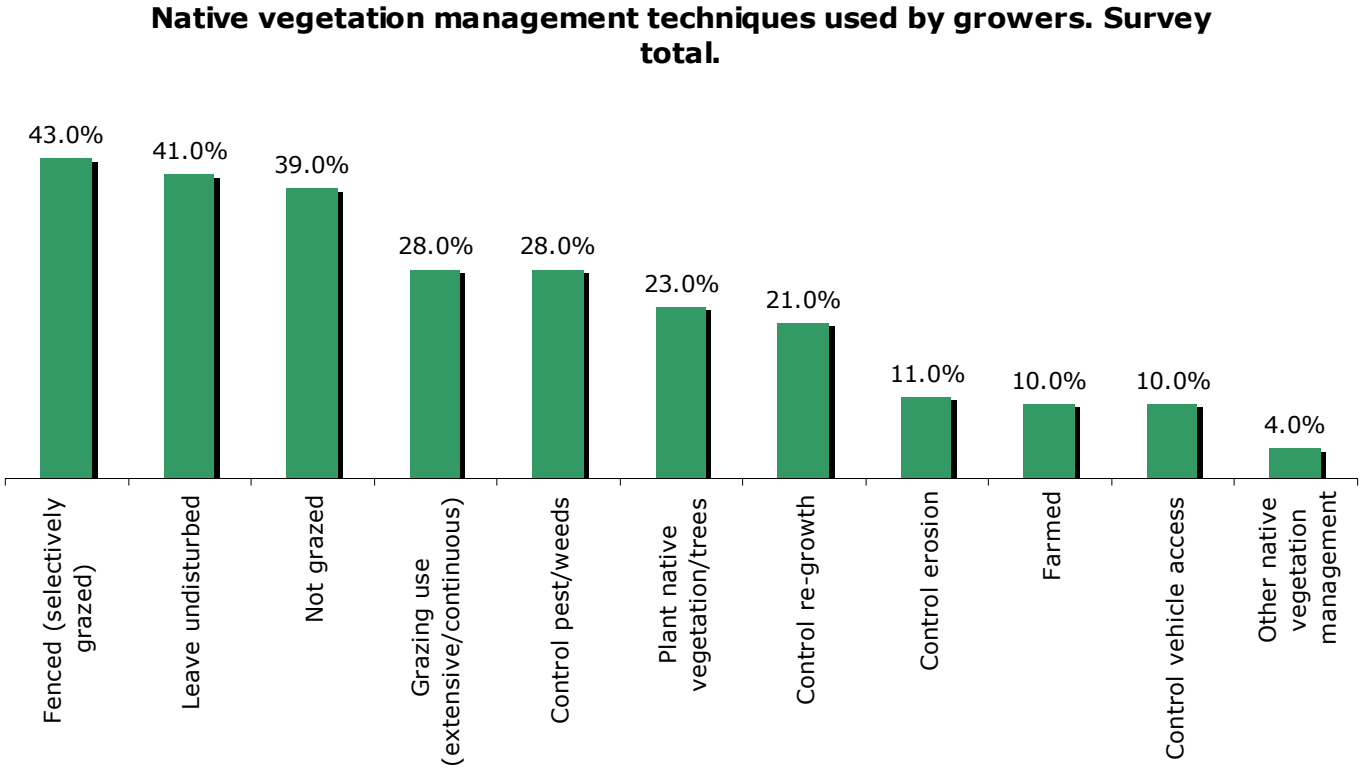
Fauna species monitoring

Growers were asked which, of a range of native and feral species, were monitored on their farm, or if any fauna species monitoring was undertaken. The data was filtered based on whether any monitoring occurred. Responses are reported for all survey respondents, and on a regional basis.

• Aggregate responses for the entire data set shows the importance to growers of monitoring feral animals (71.6 per cent), and beneficial insects (46.3 per cent), both of which have a more direct impact on the productivity of their operation. Of the remaining species, response rates ranged from 28.4 per cent for monitoring water birds, through to 6 per cent for monitoring bats.

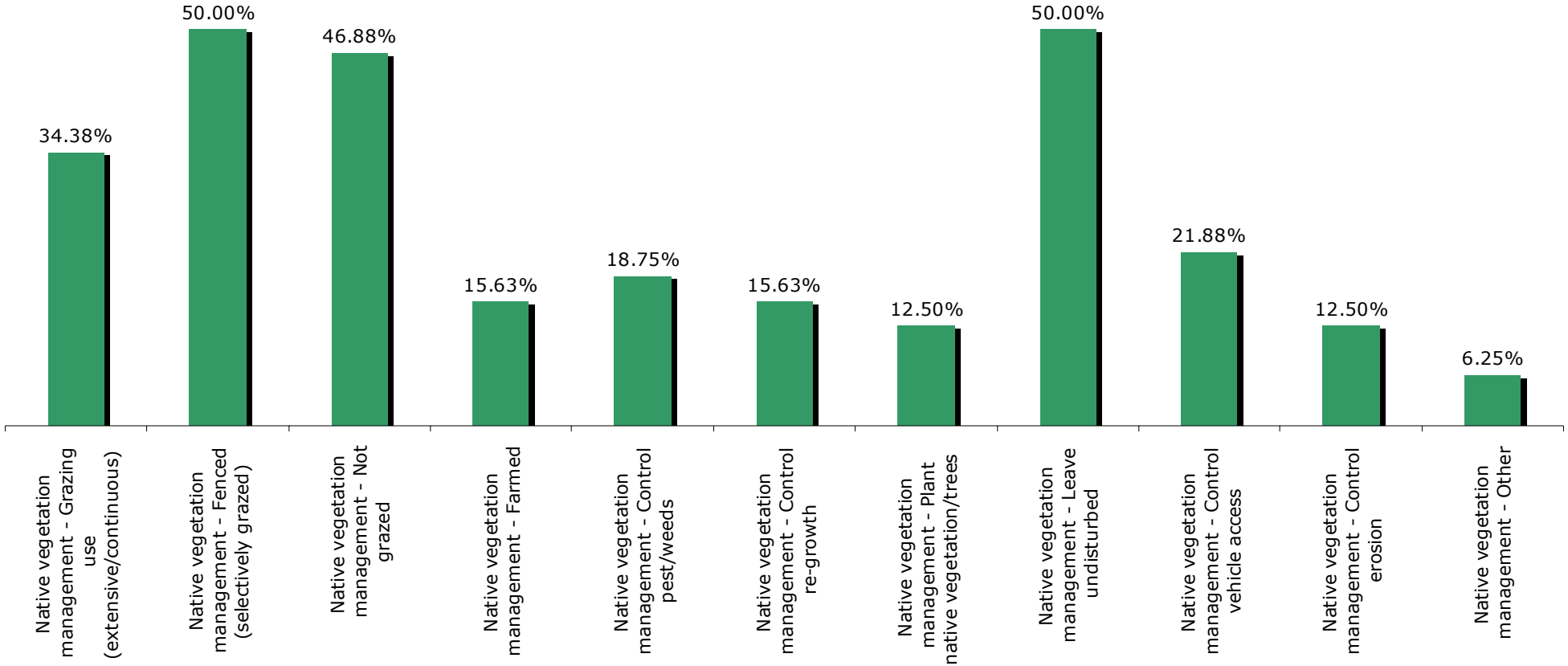
• On a regional basis, the response rates are similar to the overall response with the exception of the Southern region, where the bulk of fauna species are not monitored by the nine respondents who undertake some form of monitoring.

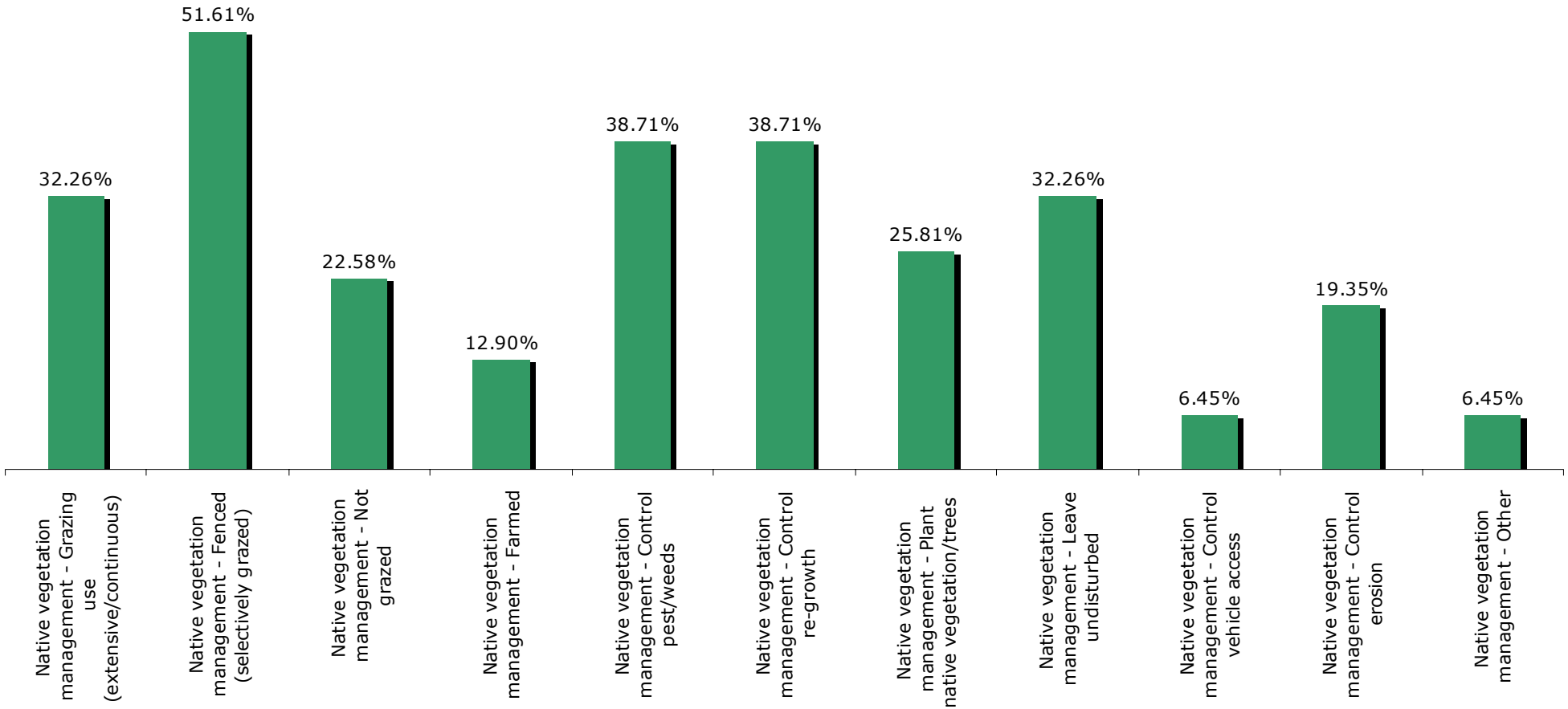
4.2 Dominant strategies used by growers to manage areas of native vegetation: by region

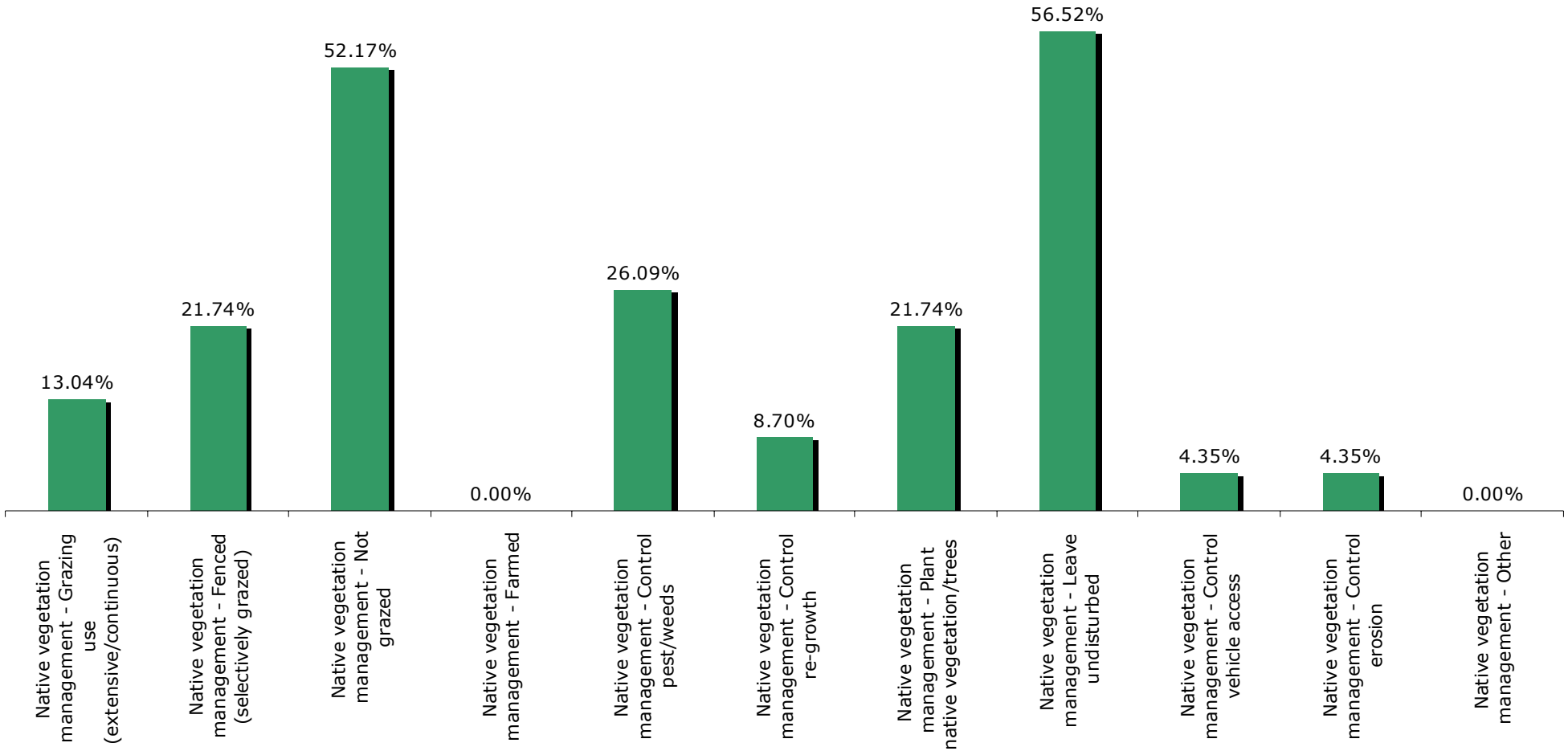


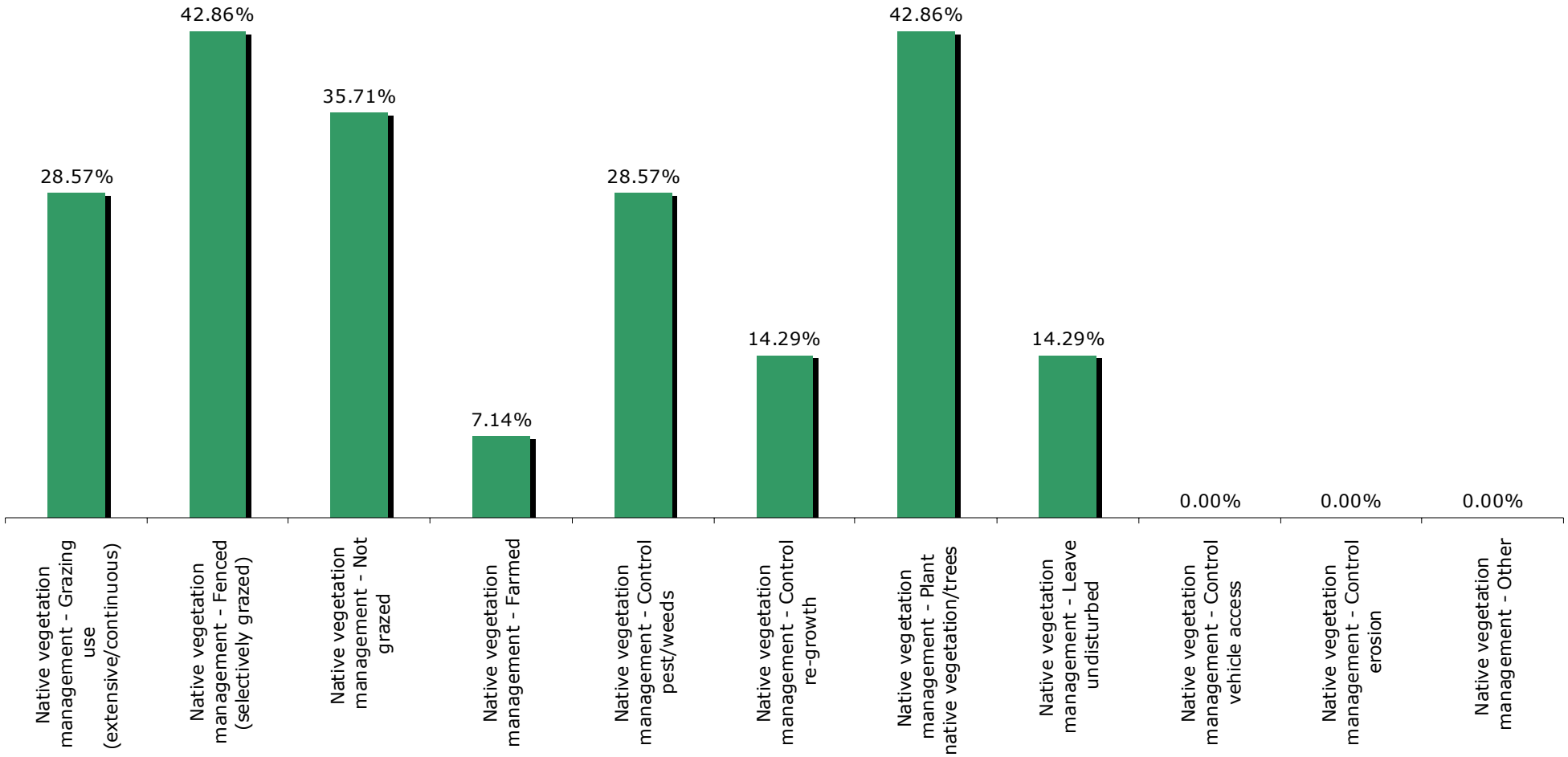
Grower Type	Some growers have areas on the farm that contain native vegetation and yet are still an important resource to the farm. How do you manage these areas on your farm? Other Method.
Professional	Allow regeneration
Opportunist	All cultivation
Professional	Don t have any
Stalwart	Cell grazed.
Stalwart	Legislation
Traditional	Cattle

Use of native vegetation management strategies: Border Rivers/Gwydir/St George (32 Reponses)

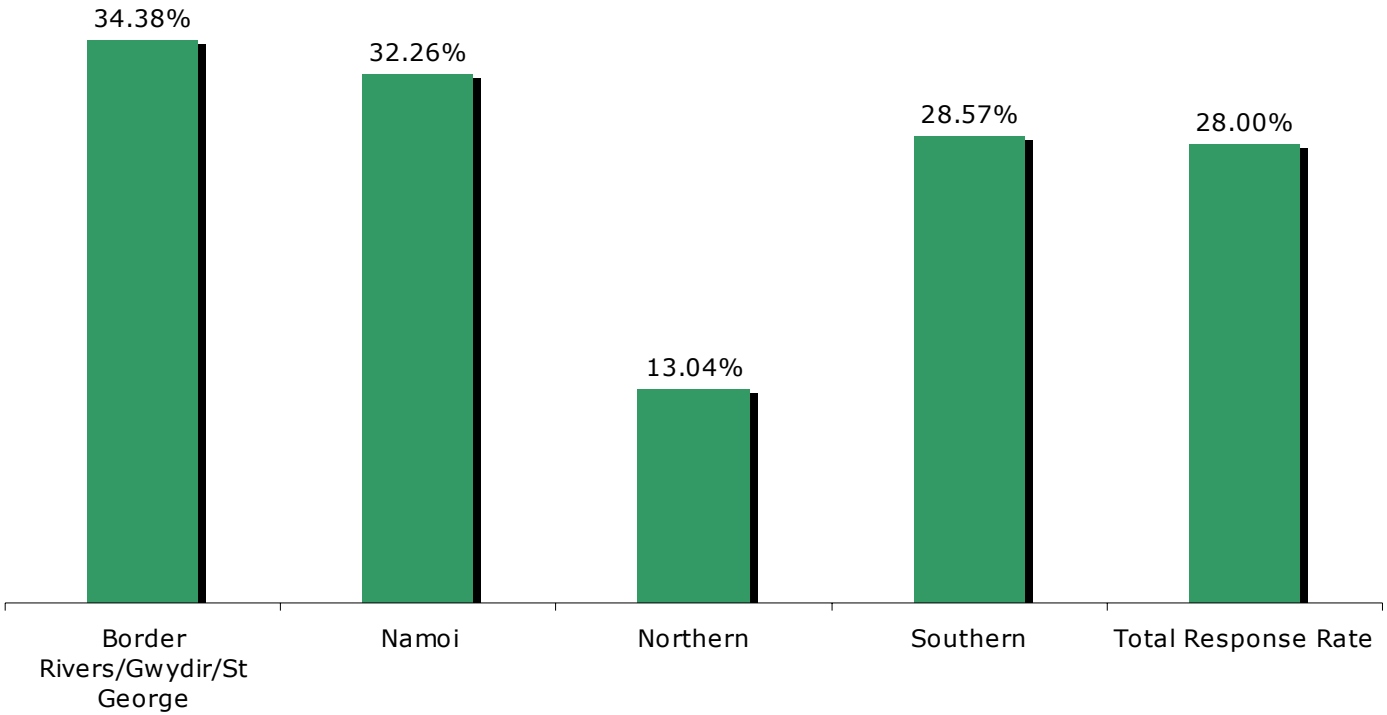



Use of native vegetation management strategies: Namoi (31 Reponses)
32.26%
51.61%
22.58%
12.90%
38.71%
38.71%
25.81%
32.26%
6.45%
19.35%
6.45%
Native vegetation management - Grazing use (extensive/continuous)
Native vegetation management - Fenced (selectively grazed)
Native vegetation management - Not grazed
Native vegetation management - Farmed
Native vegetation management - Control pest/weeds
Native vegetation management - Control re-growth
Native vegetation management - Plant native vegetation/trees
Native vegetation management - Leave undisturbed
Native vegetation management - Control vehicle access
Native vegetation management - Control erosion
Native vegetation management - Other

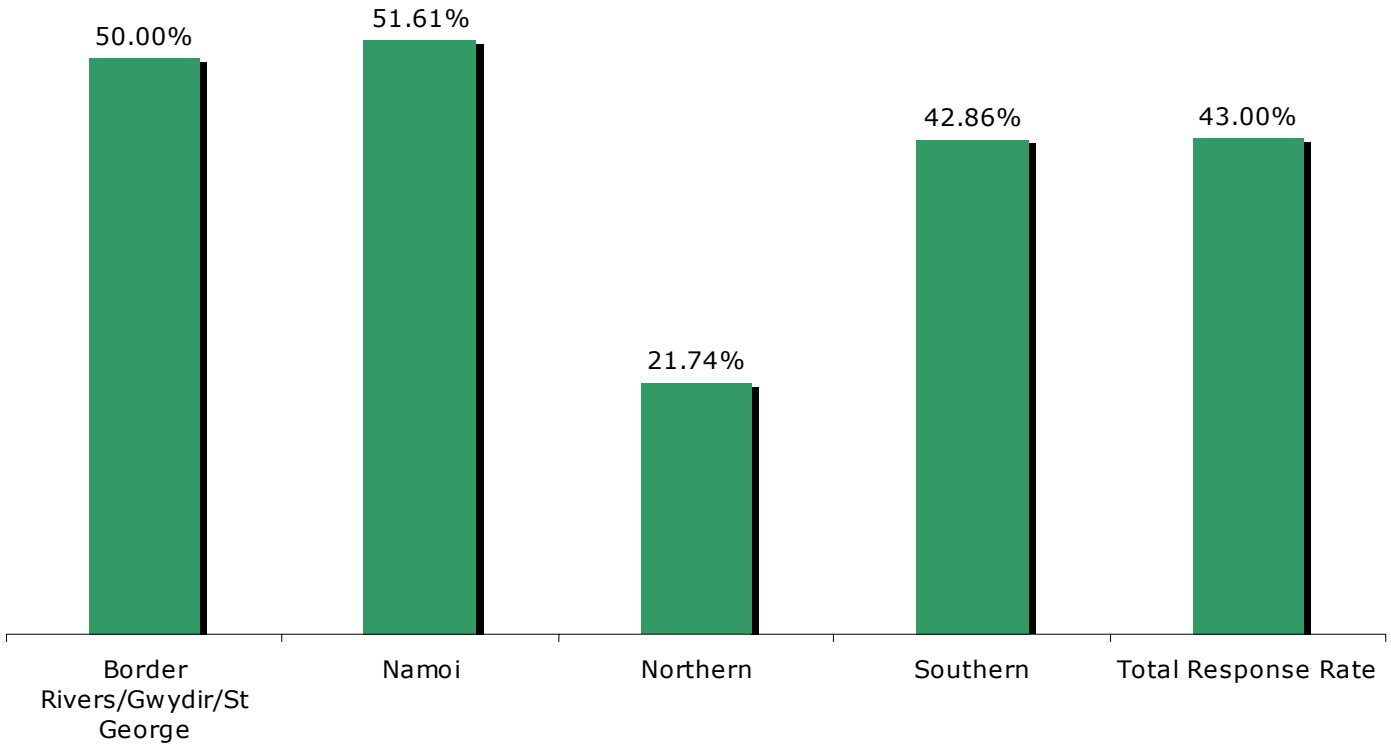

Use of native vegetation management strategies: Northern (23 Reponses)
13.04%
21.74%
52.17%
0.00%
26.09%
8.70%
21.74%
56.52%
4.35%
4.35%
0.00%
Native vegetation management - Grazing use (extensive/continuous)
Native vegetation management - Fenced (selectively grazed)
Native vegetation management - Not grazed
Native vegetation management - Farmed
Native vegetation management - Control pest/weeds
Native vegetation management - Control re-growth
Native vegetation management - Plant native vegetation/trees
Native vegetation management - Leave undisturbed
Native vegetation management - Control vehicle access
Native vegetation management - Control erosion
Native vegetation management - Other


Use of native vegetation management strategies: Southern (14 Reponses)
28.57%
42.86%
35.71%
7.14%
28.57%
14.29%
42.86%
14.29%
0.00%
0.00%
0.00%
Native vegetation management - Grazing use (extensive/continuous)
Native vegetation management - Fenced (selectively grazed)
Native vegetation management - Not grazed
Native vegetation management - Farmed
Native vegetation management - Control pest/weeds
Native vegetation management - Control re-growth
Native vegetation management - Plant native vegetation/trees
Native vegetation management - Leave undisturbed
Native vegetation management - Control vehicle access
Native vegetation management - Control erosion
Native vegetation management - Other

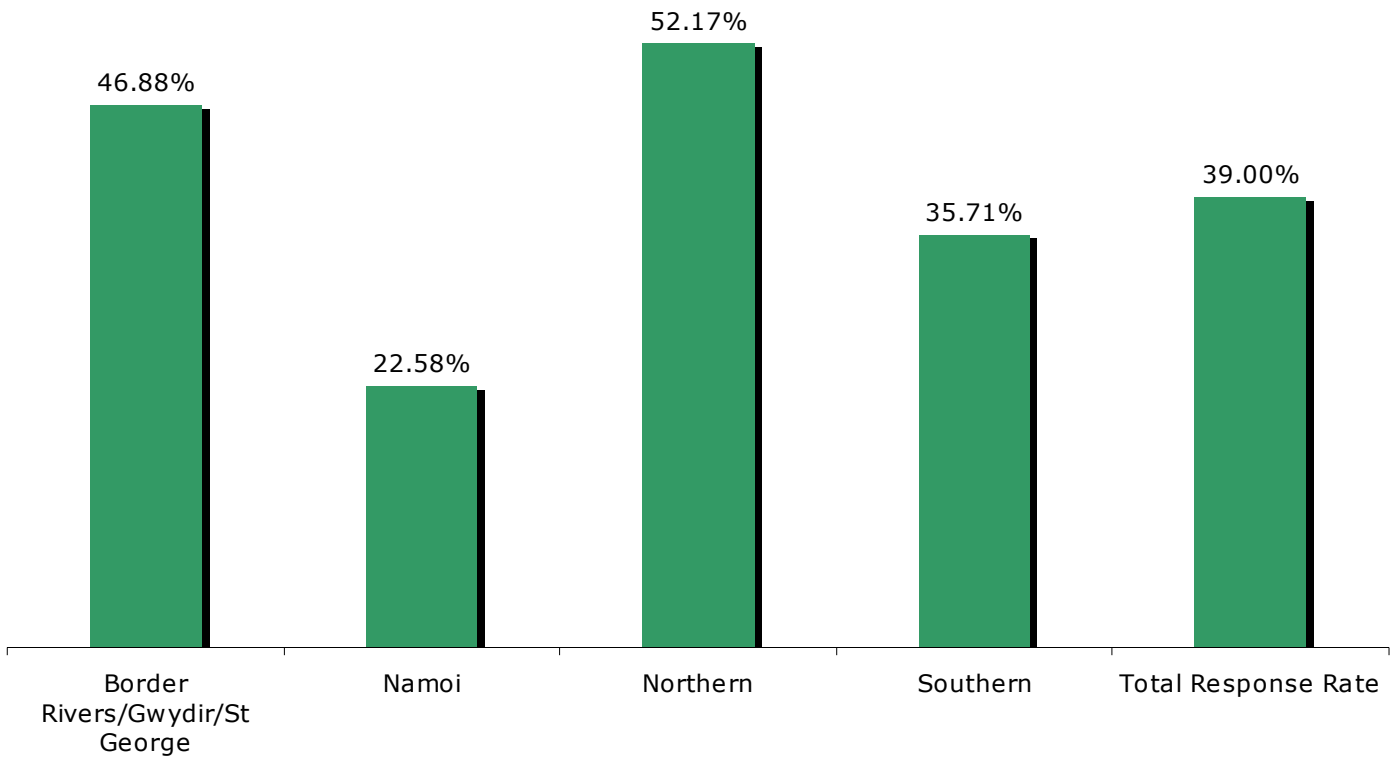
Native vegetation management - Grazing use (extensive/continuous): by Region

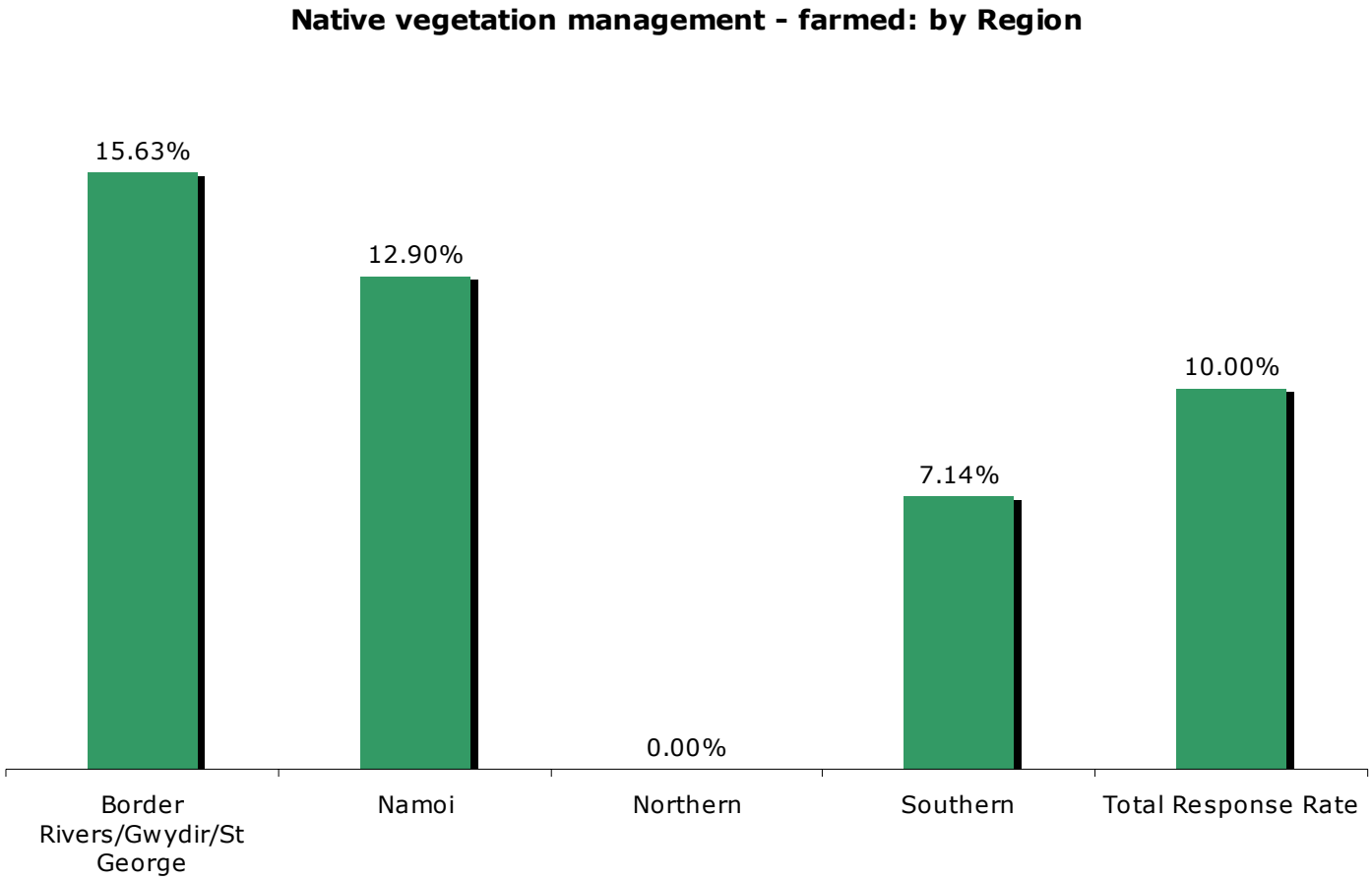


Native vegetation management - Fenced (selectively grazed): by Region

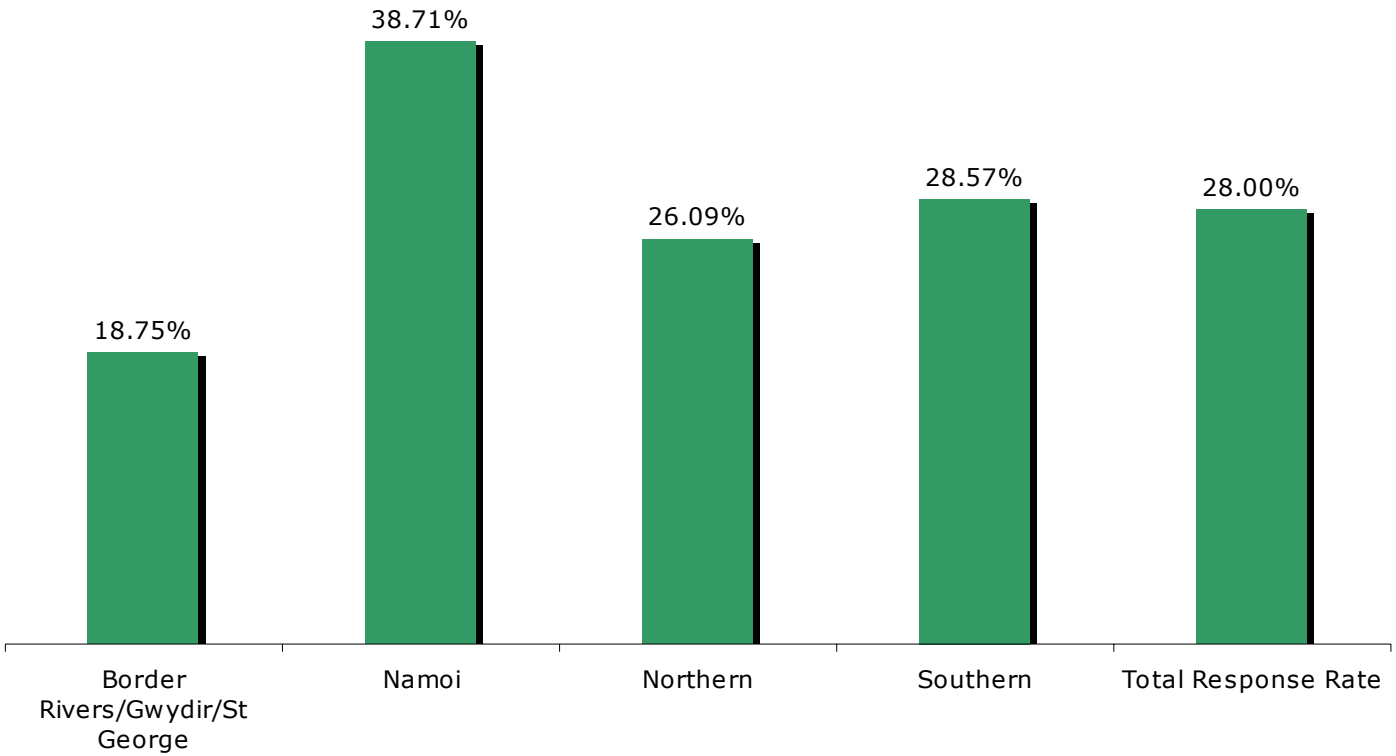


Native vegetation management - Not grazed: by Region

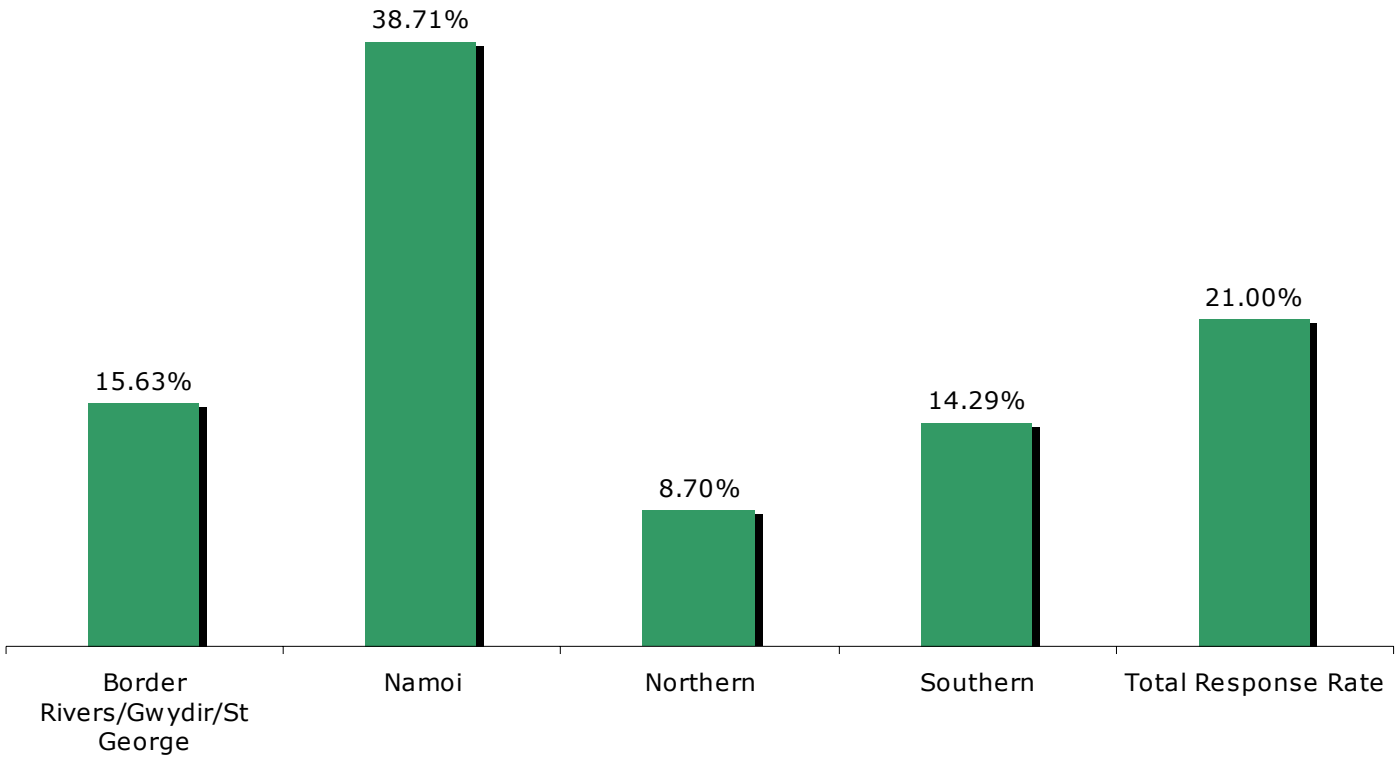



Native vegetation management - farmed: by Region
15.63%
12.90%
0.00%
7.14%
10.00%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate

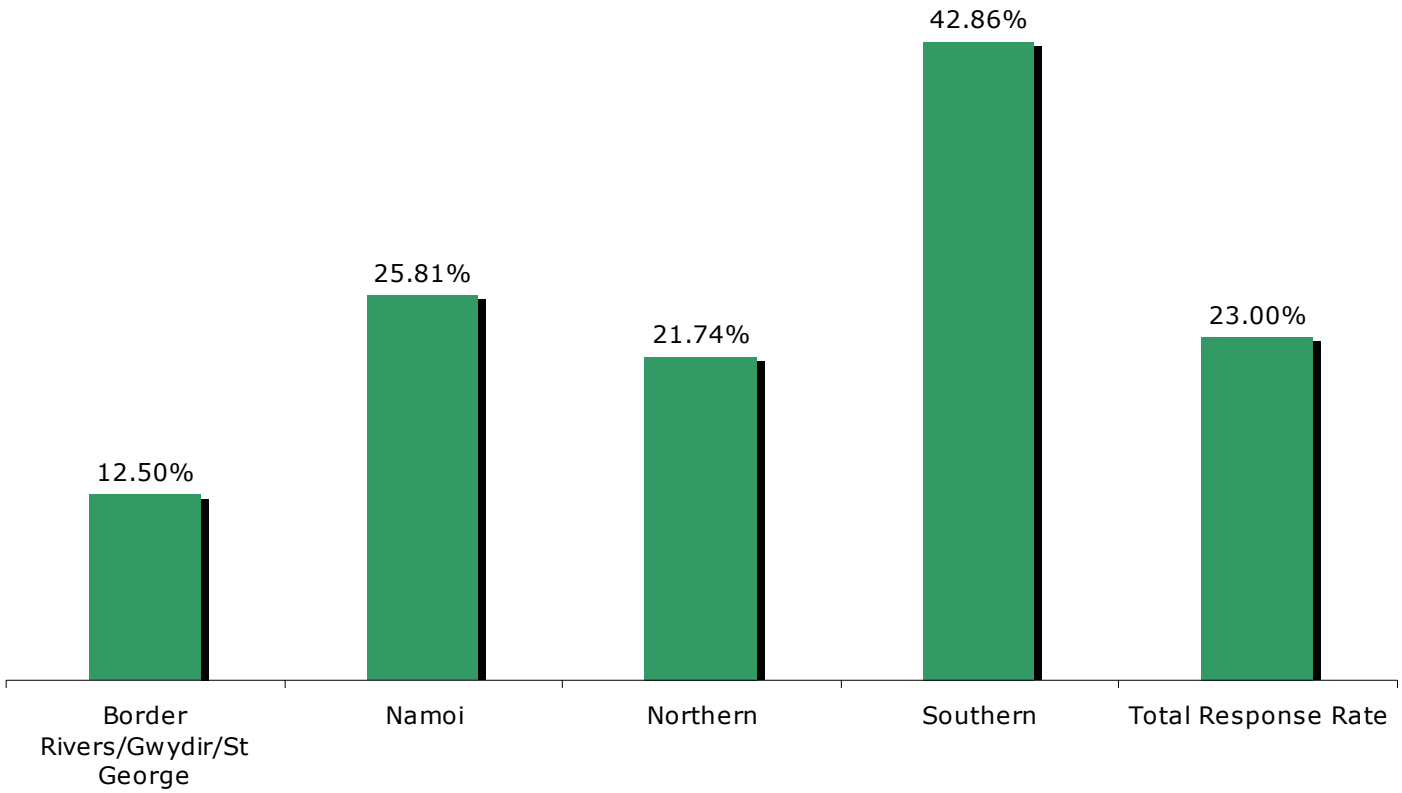
Native vegetation management - Control pest/weeds: by Region

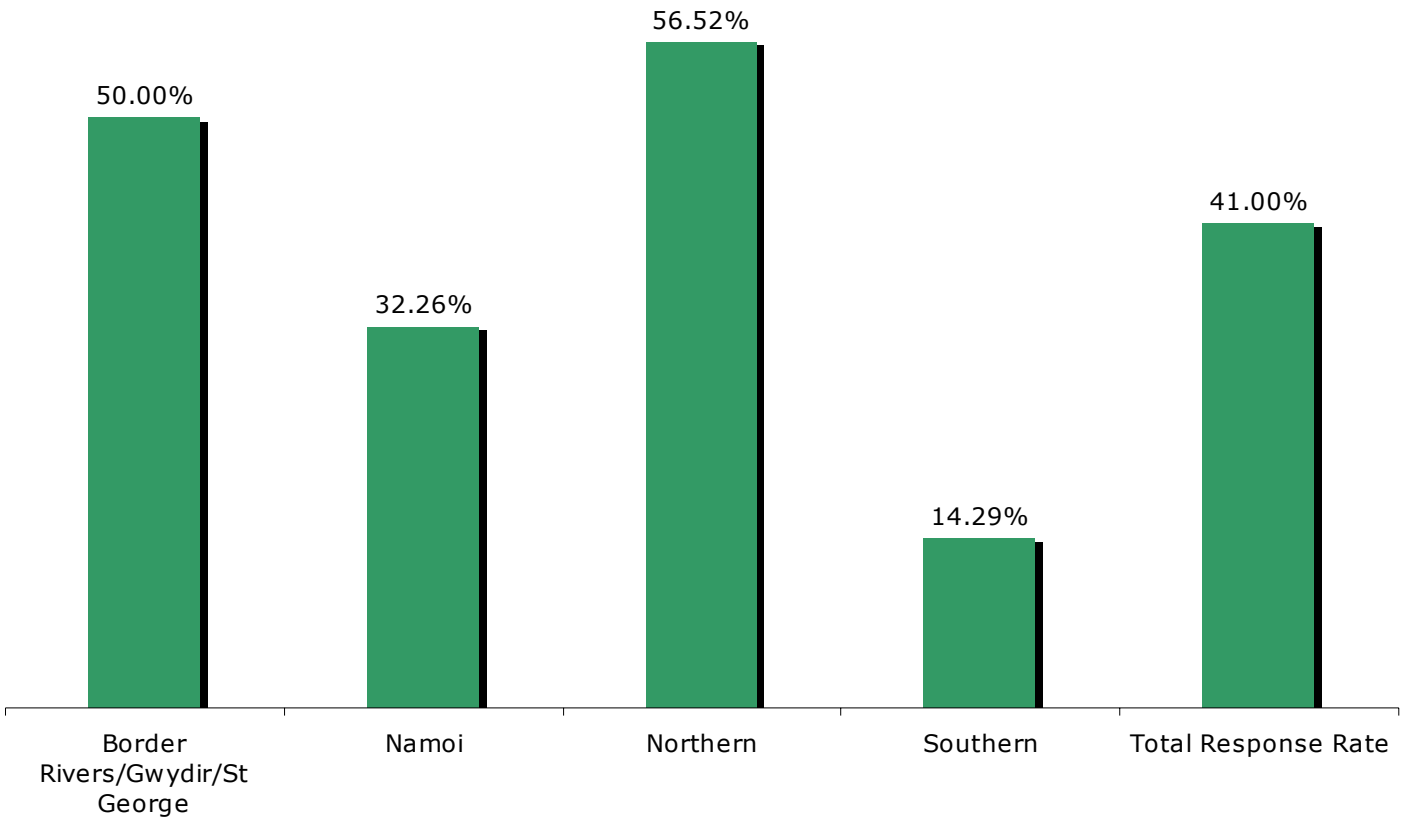


Native vegetation management - Control re-growth: by Region

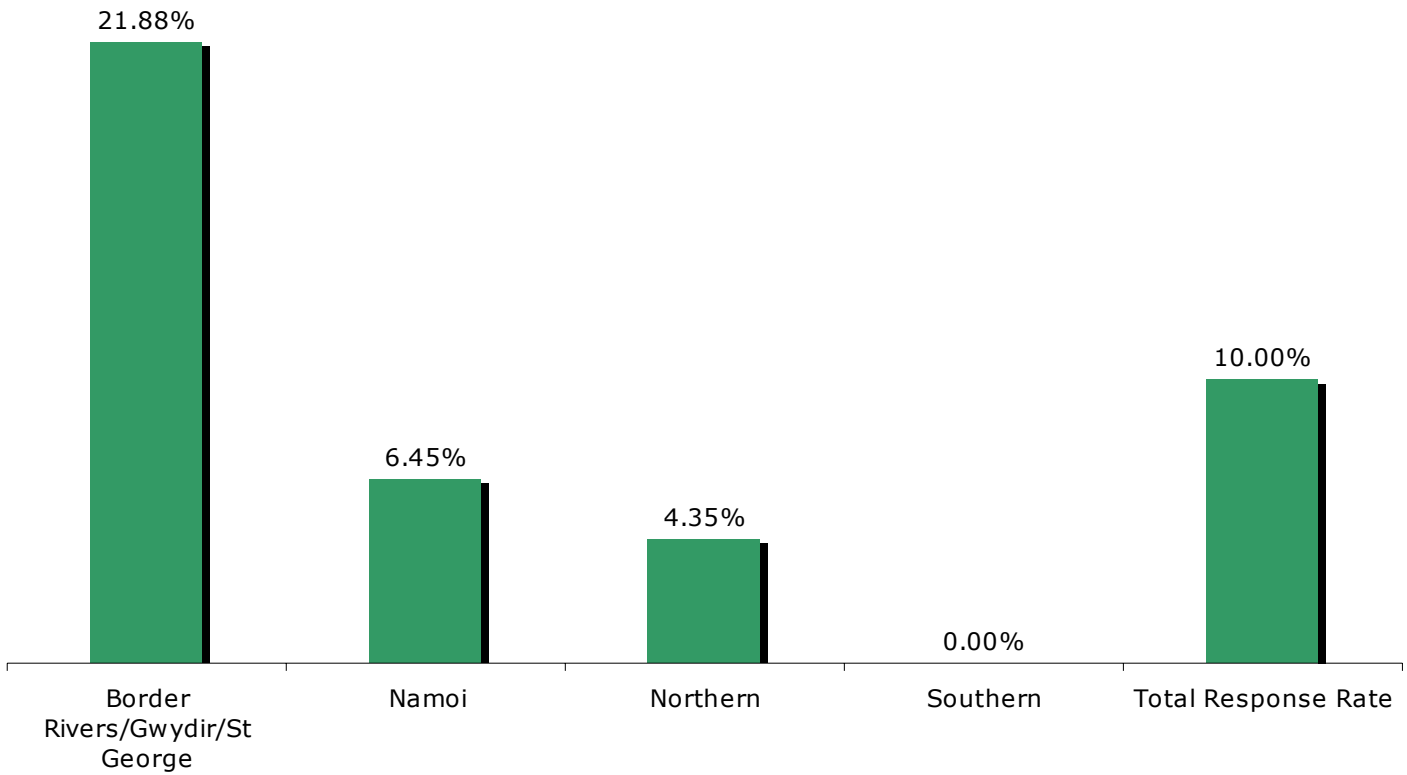


Native vegetation management - Plant native vegetation/trees: by Region

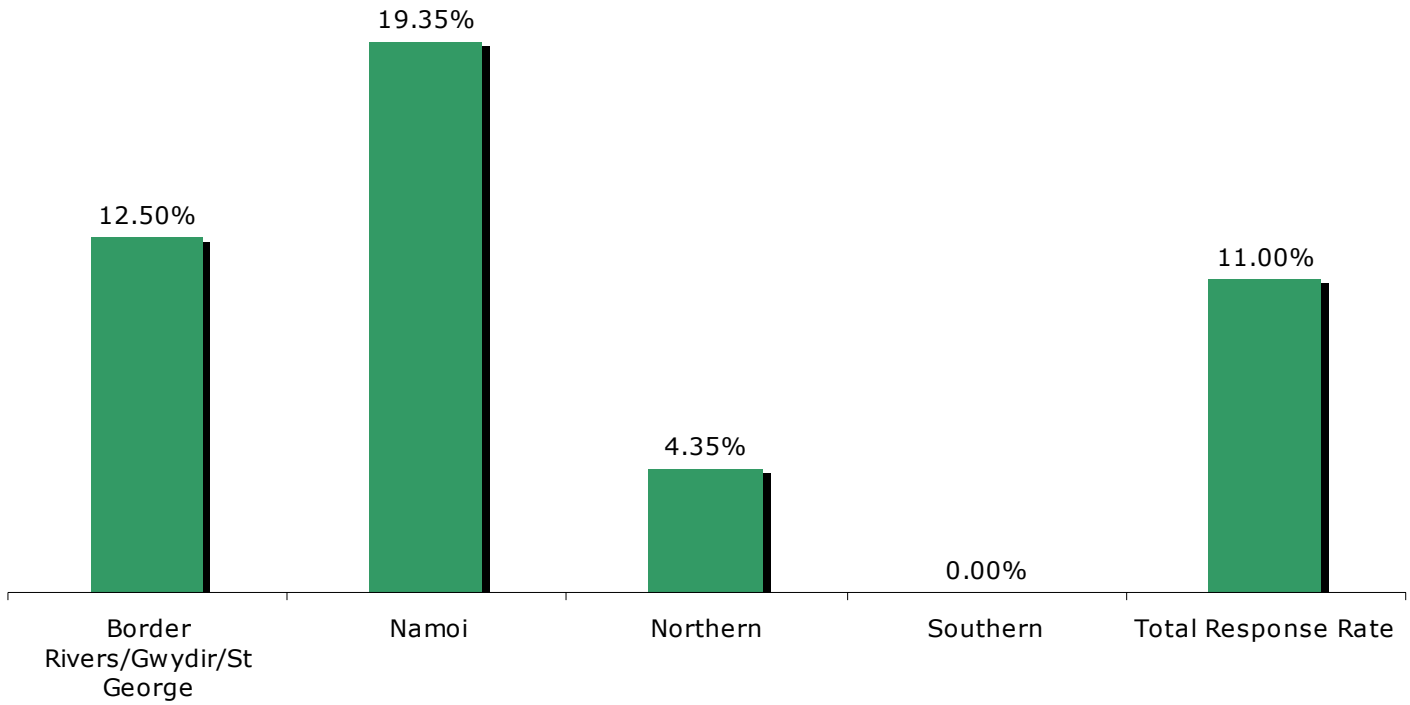


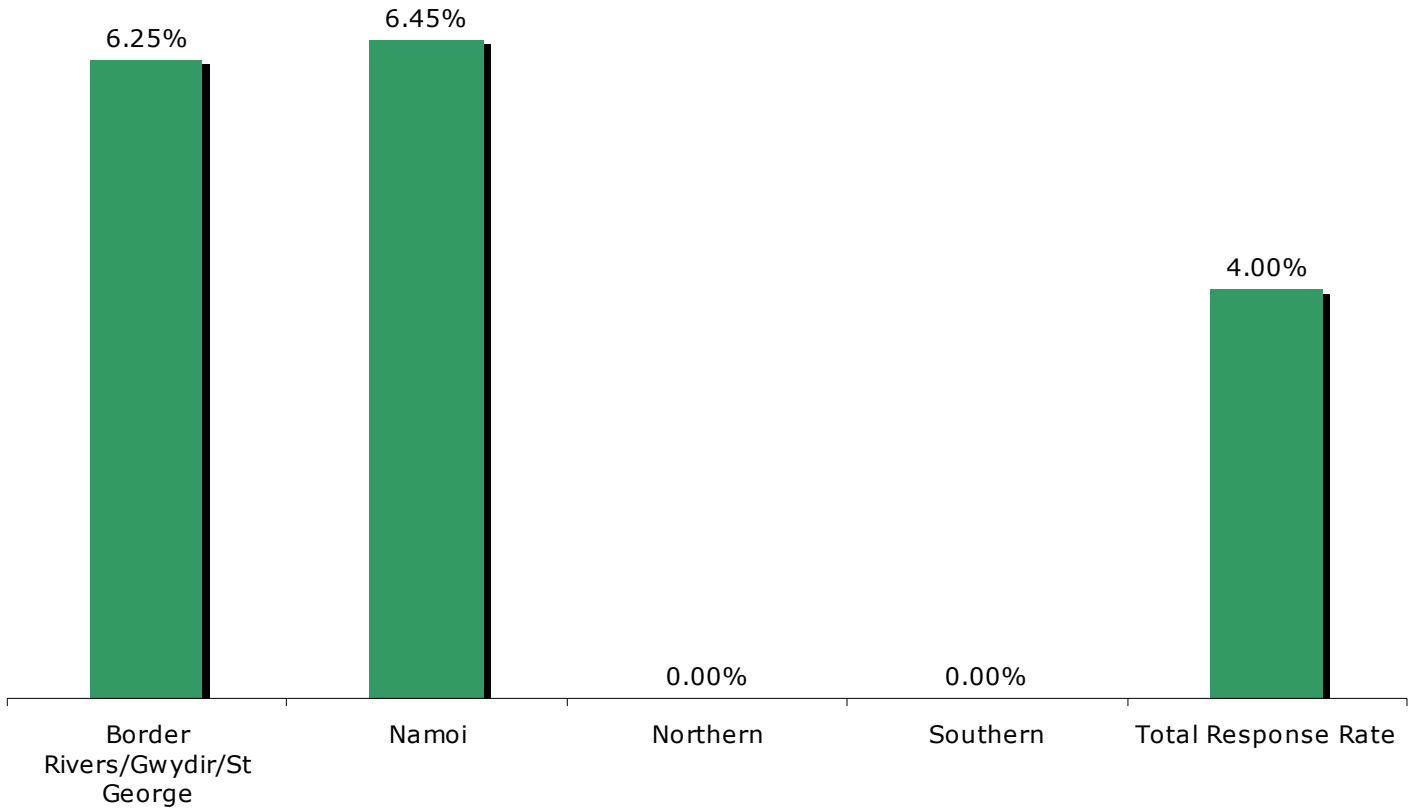

Native vegetation management - Leave undisturbed: by Region
50.00%
32.26%
56.52%
14.29%
41.00%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate

Native vegetation management - Control vehicle access: by Region

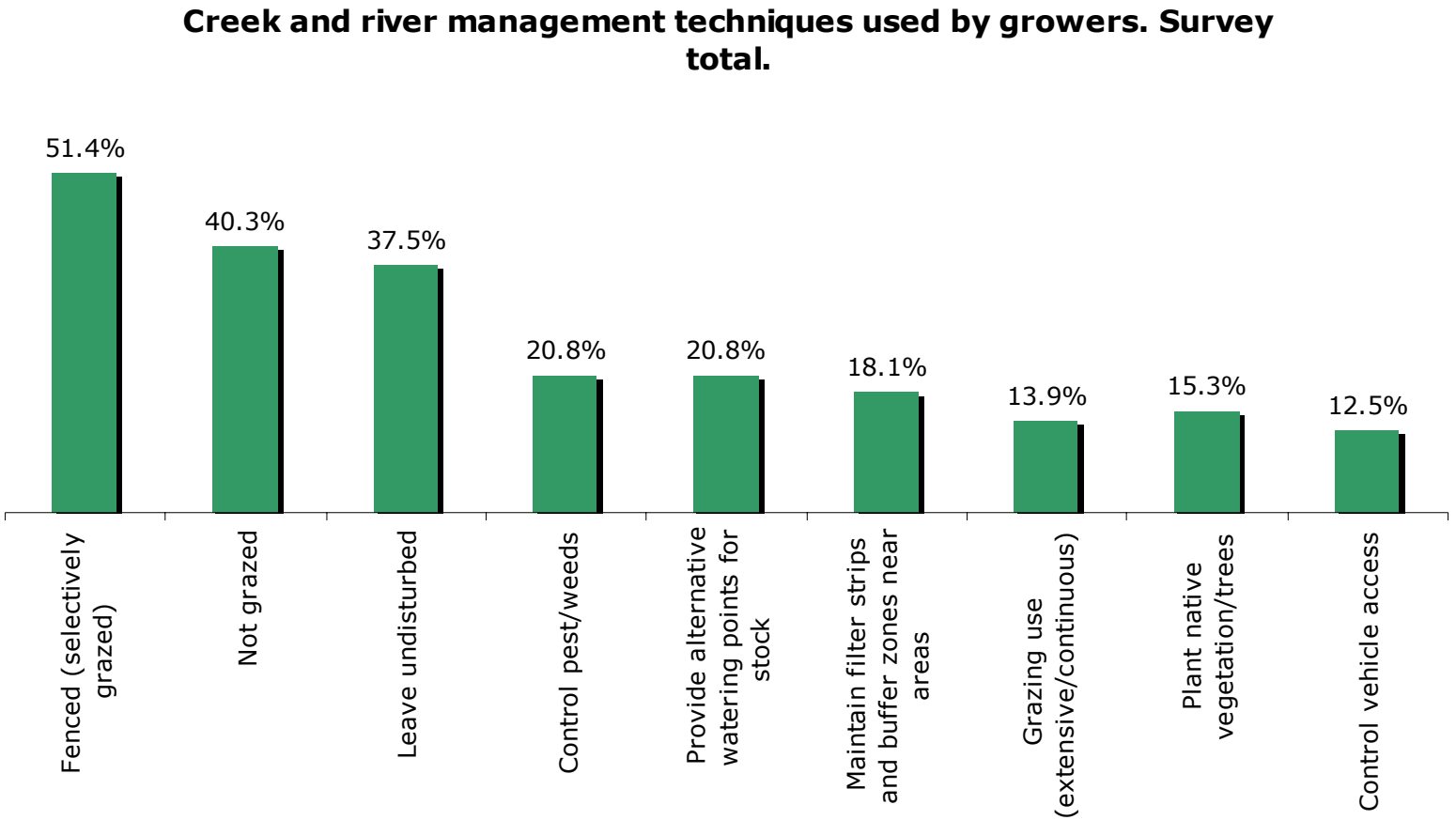


Native vegetation management - Control erosion: by Region

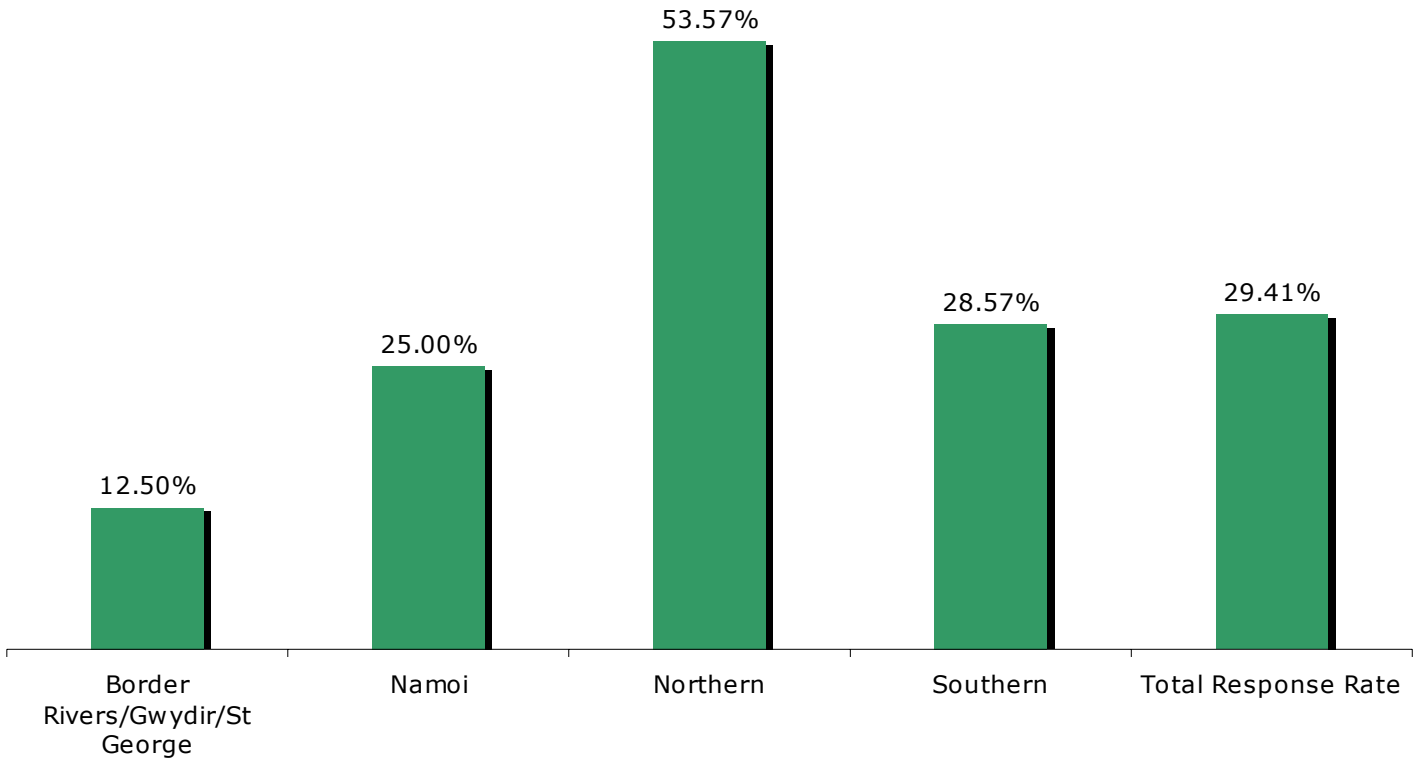



Native vegetation management - Other: by Region
6.25%
6.45%
0.00%
0.00%
4.00%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate

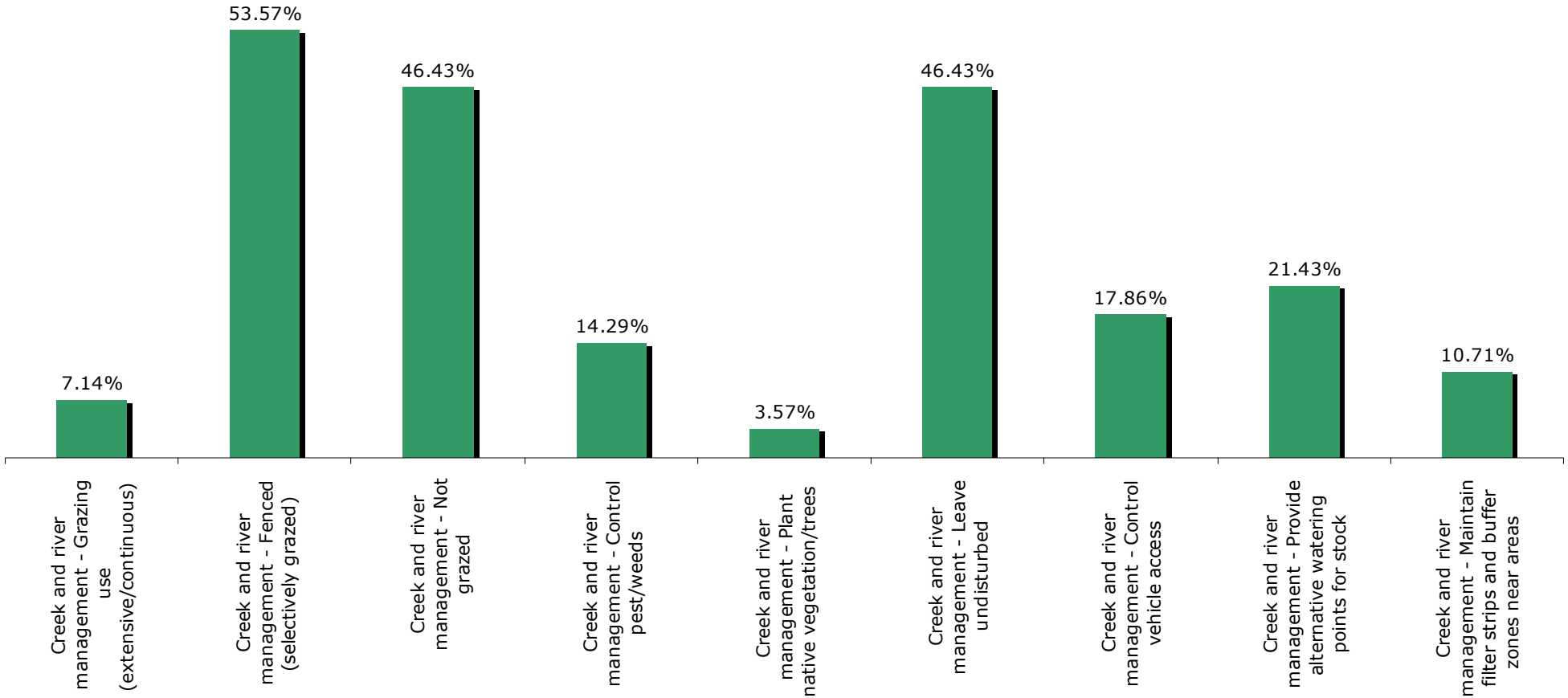
4.3 Dominant strategies used by growers to manage creeks and riparian areas: by region



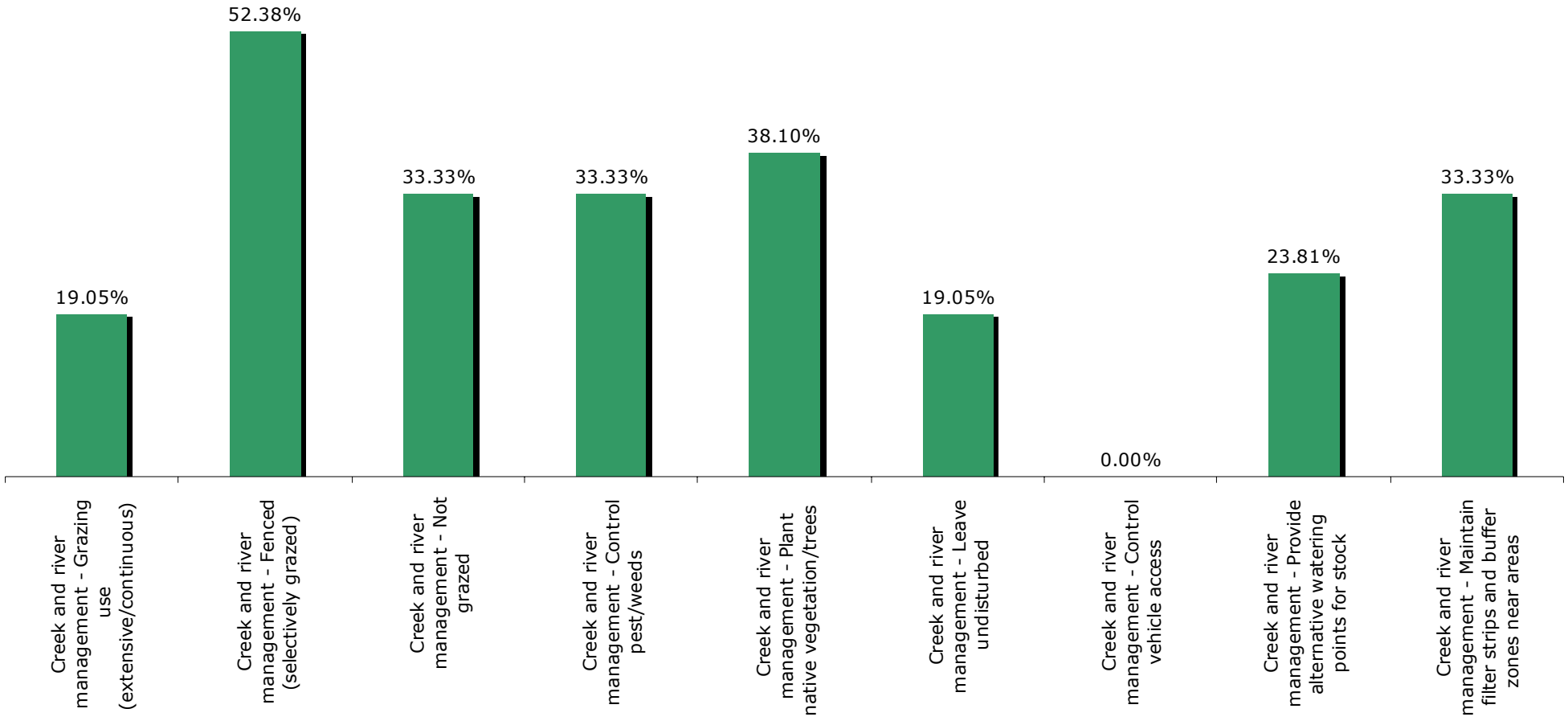
Creek and river management - Farm does not have a creek or river frontage: by Region



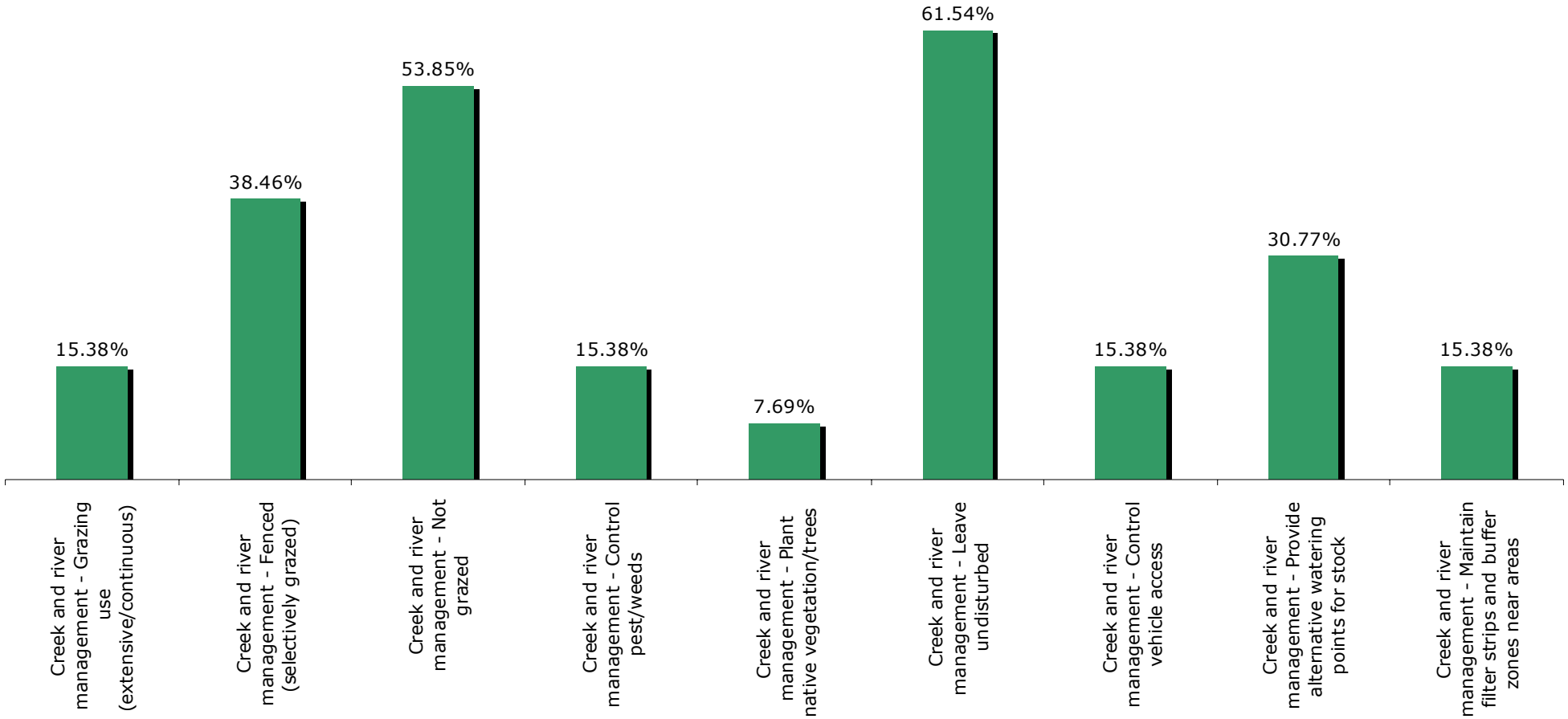
Use of creek and riparian area management strategies: Border Rivers/Gwydir/St George (28 Responses)



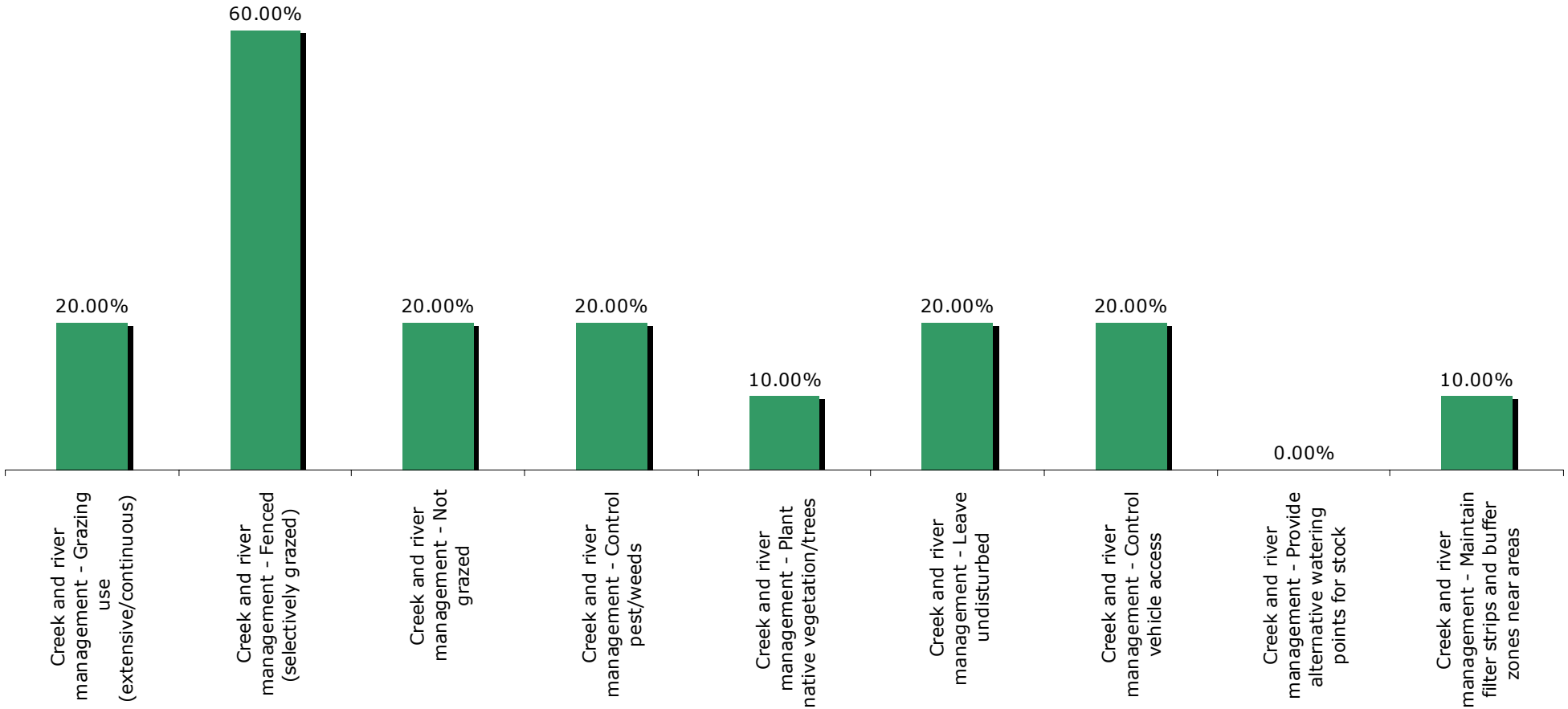
Use of creek and riparian area management strategies: Namoi (21 Responses)



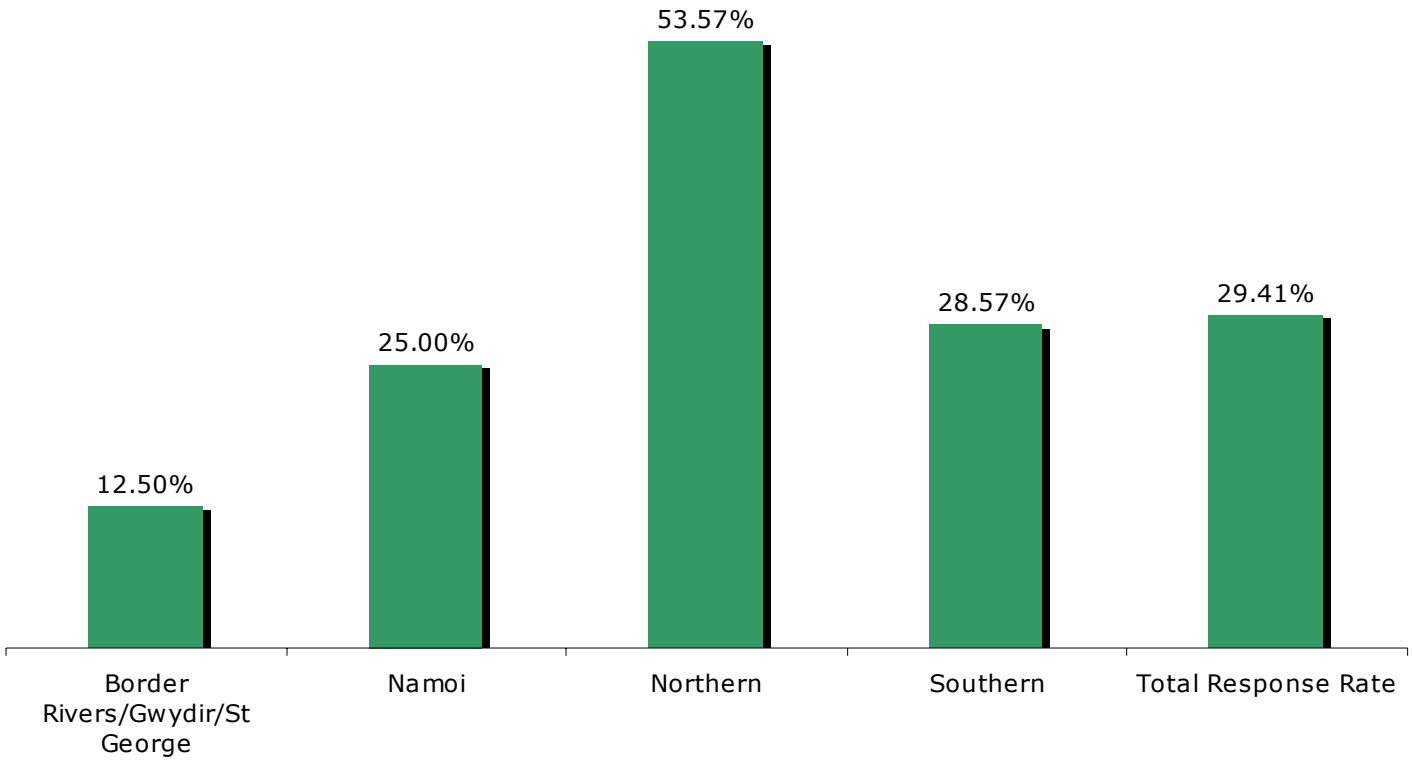
Use of creek and riparian area management strategies: Northern (13 Responses)



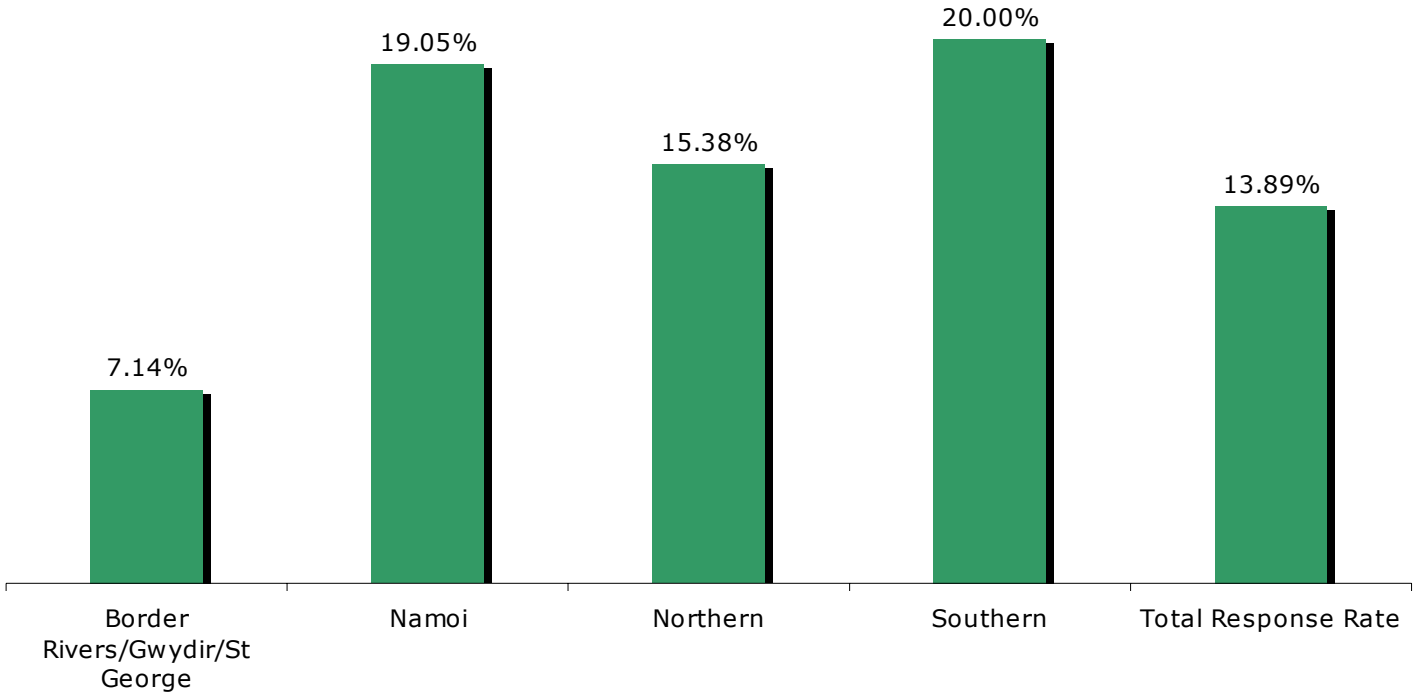
Use of creek and riparian area management strategies: Southern (10 Responses)



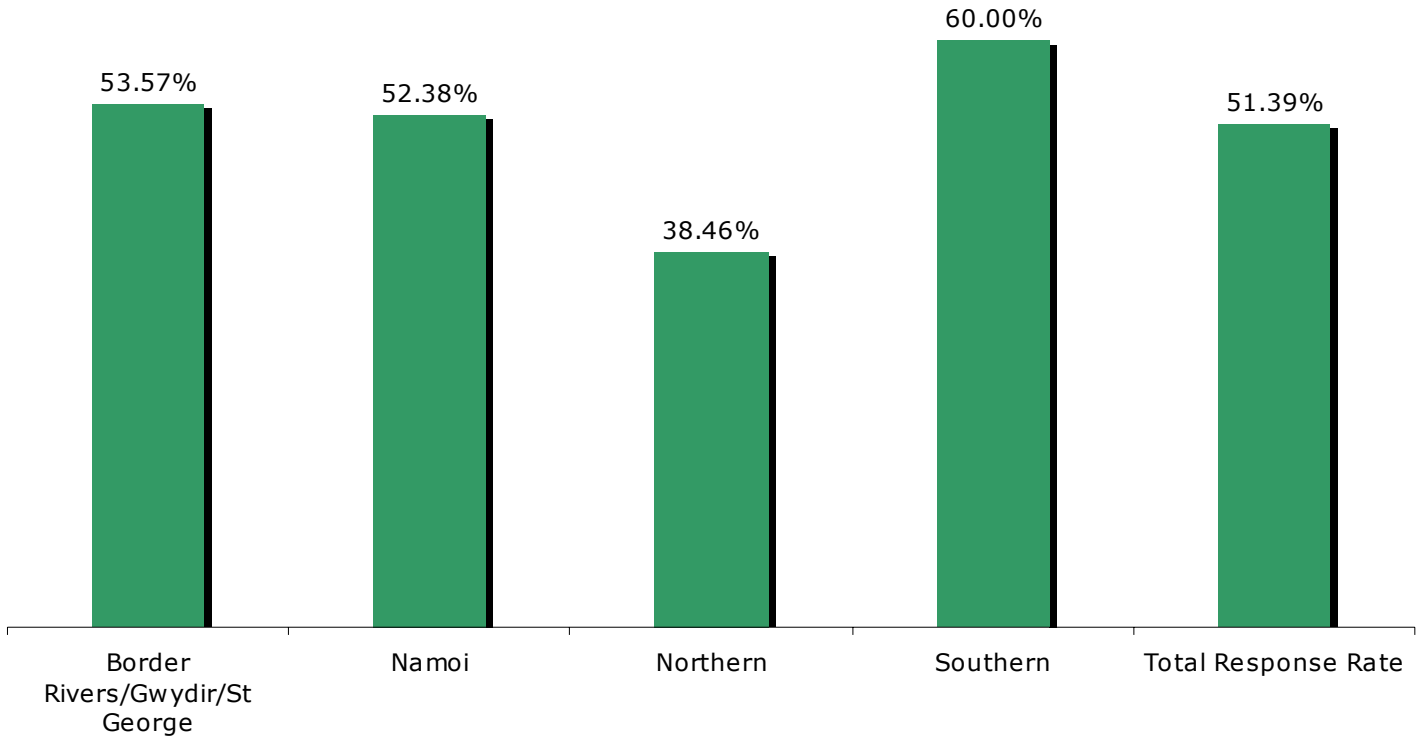
Creek and river management - Farm does not have a creek or river frontage: by Region

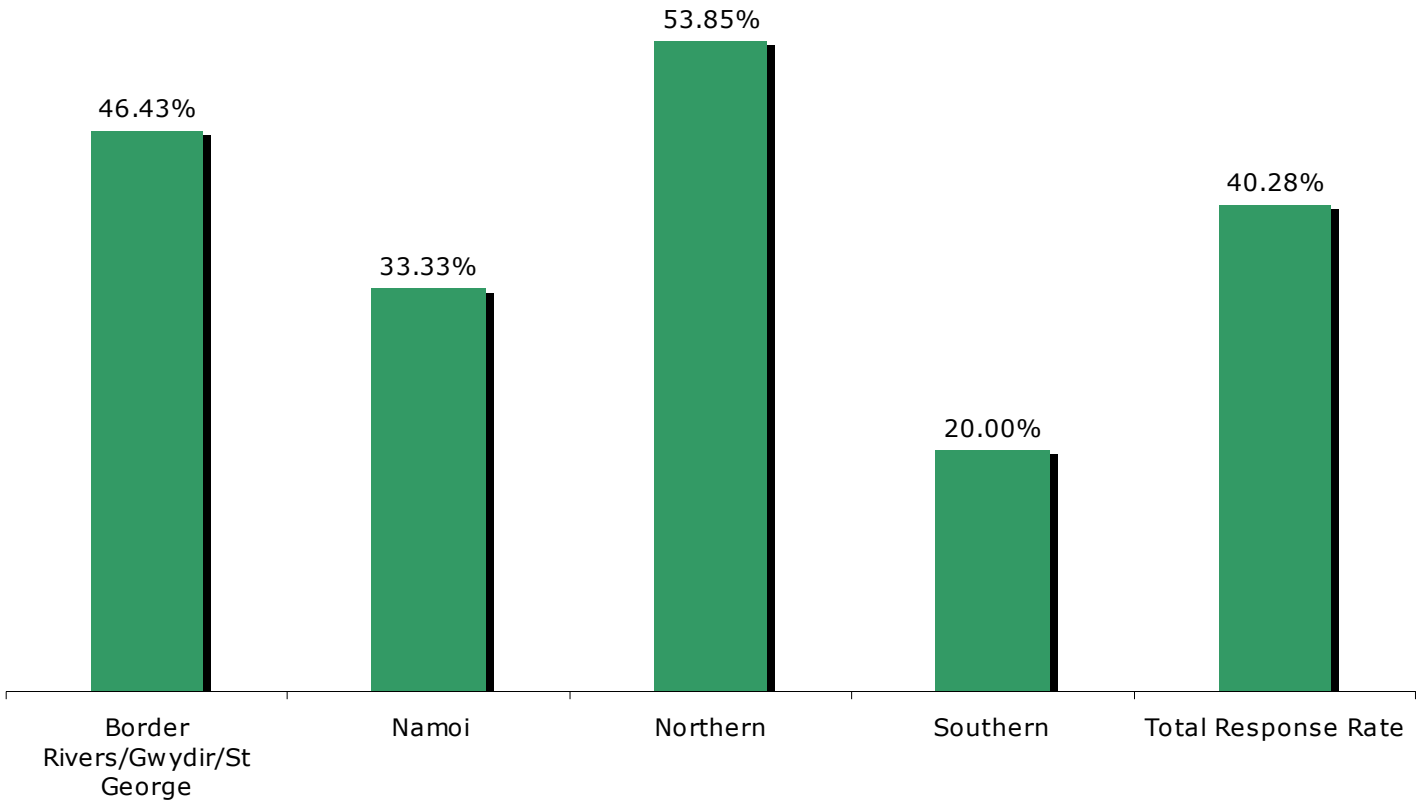


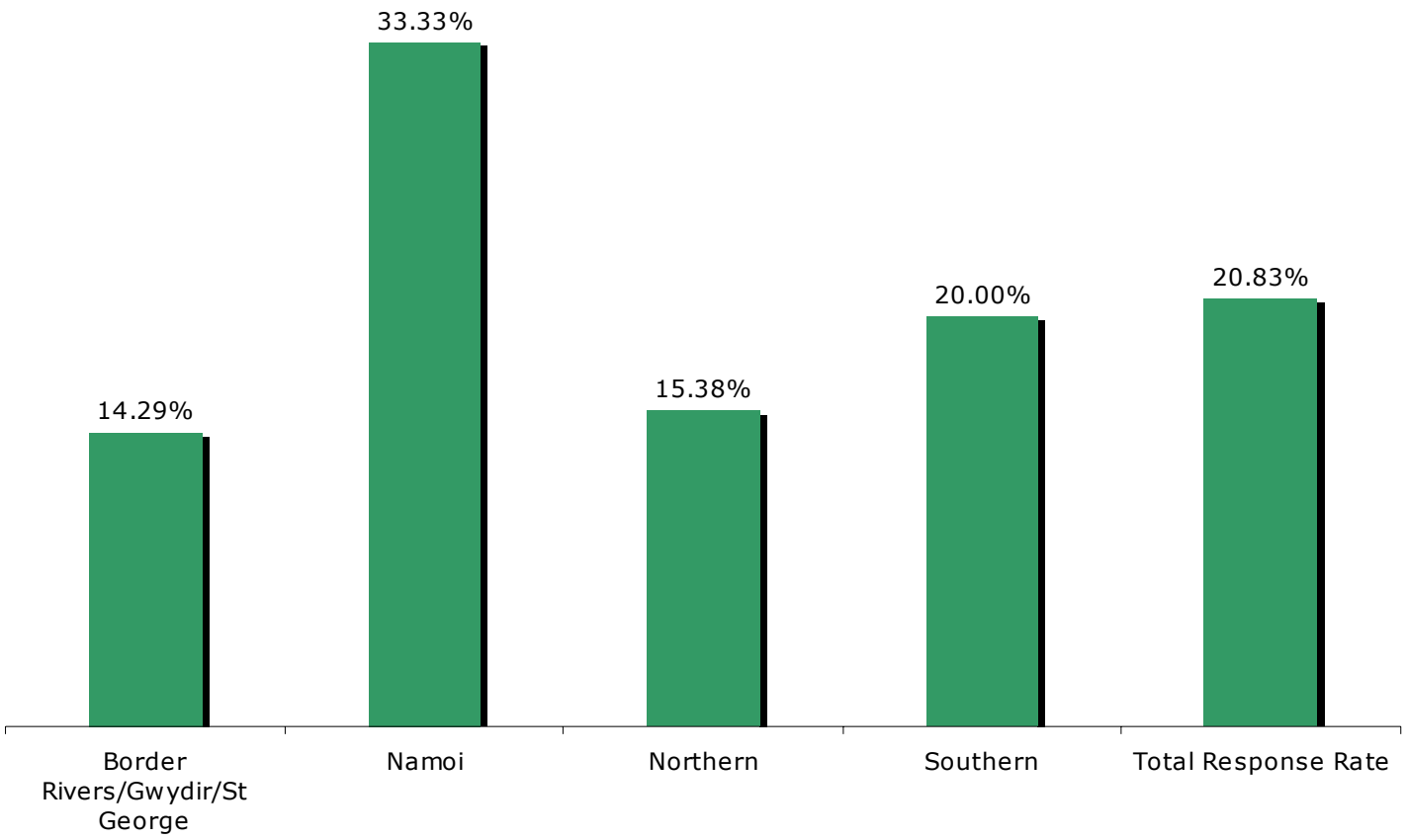
Creek and river management - Grazing use (extensive/continuous): by Region



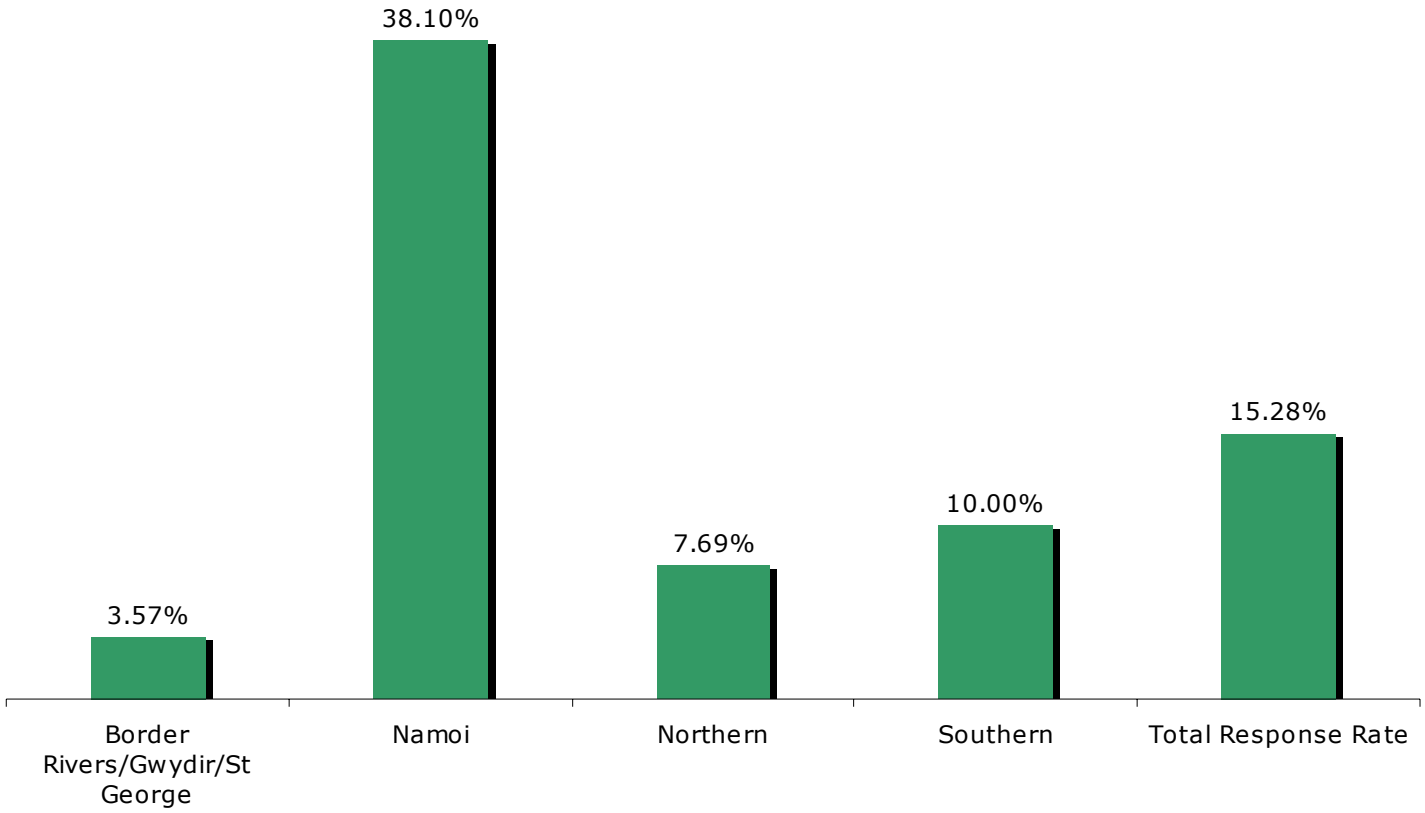
Creek and river management - Fenced (selectively grazed): by Region



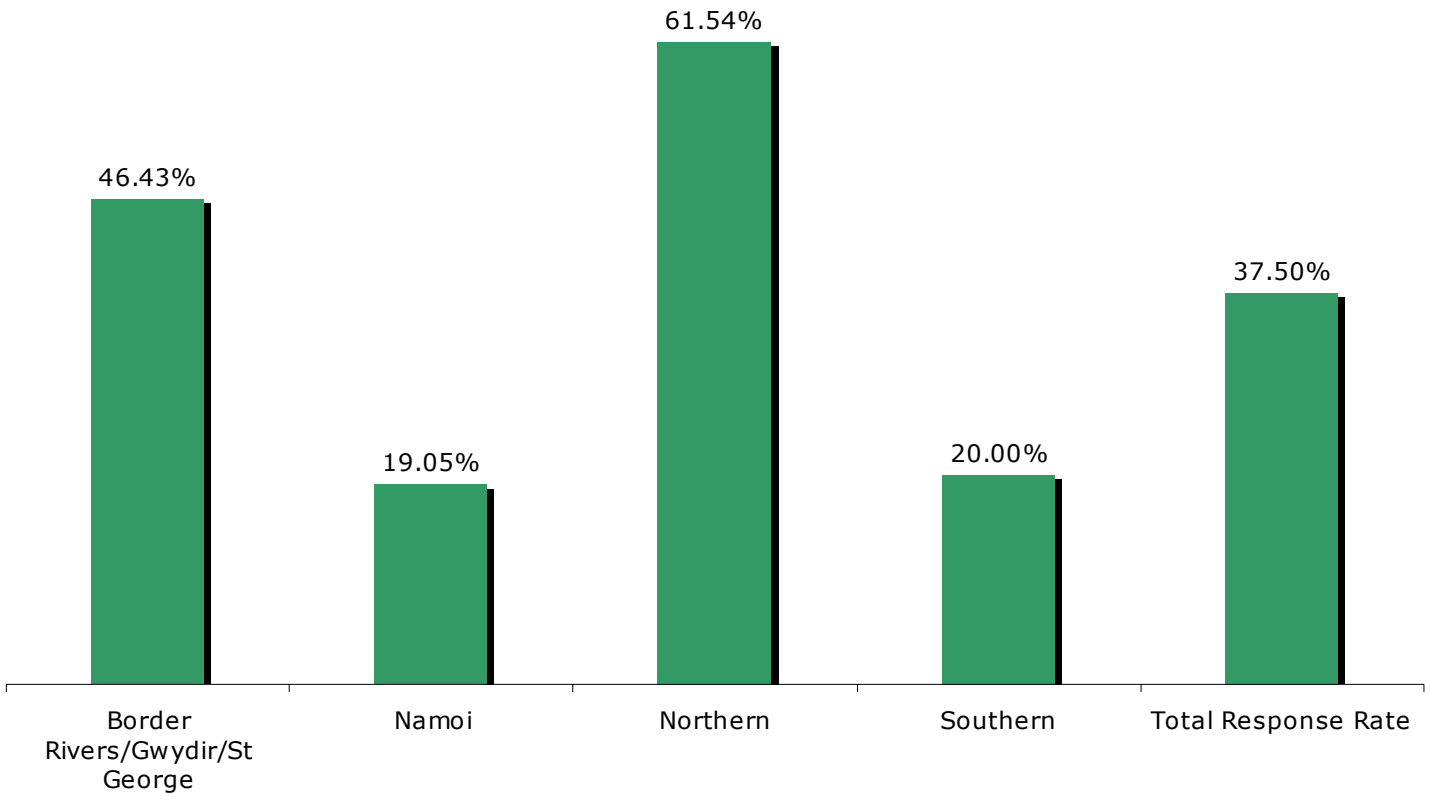

Creek and river management - Not grazed: by Region
46.43%
33.33%
53.85%
20.00%
40.28%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate


Creek and river management - Control pest/weeds: by Region
33.33%
14.29%
15.38%
20.00%
20.83%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate

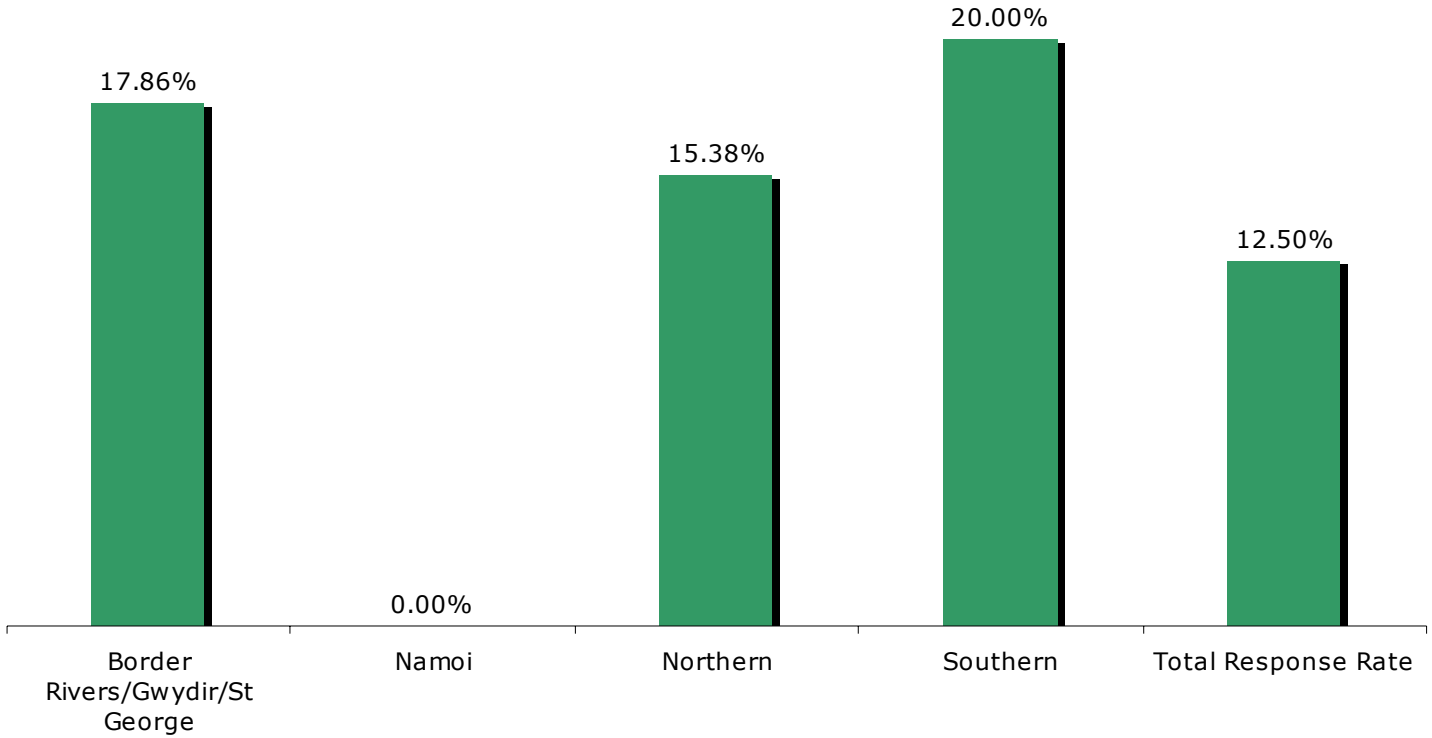
Creek and river management - Plant native vegetation/trees: by Region



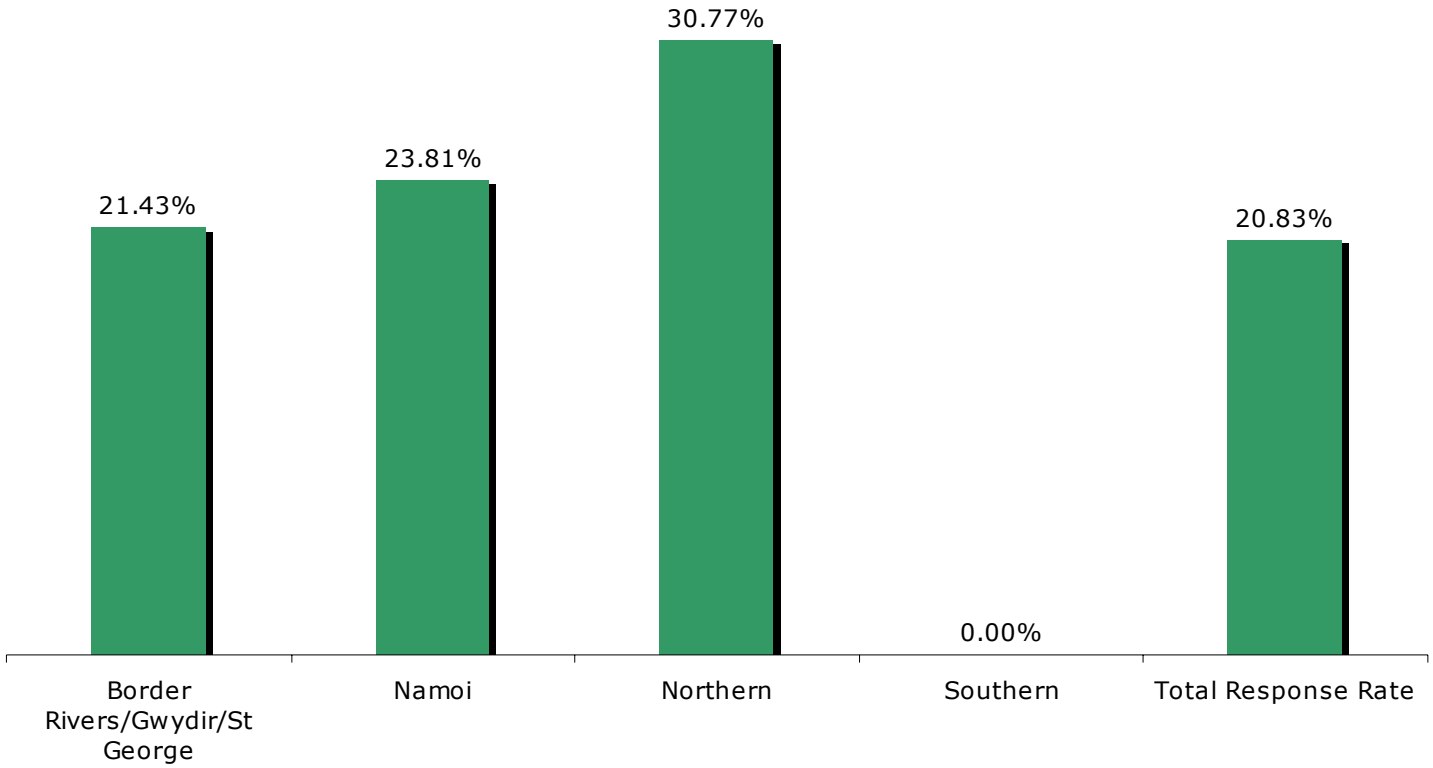
Creek and river management - Leave undisturbed: by Region



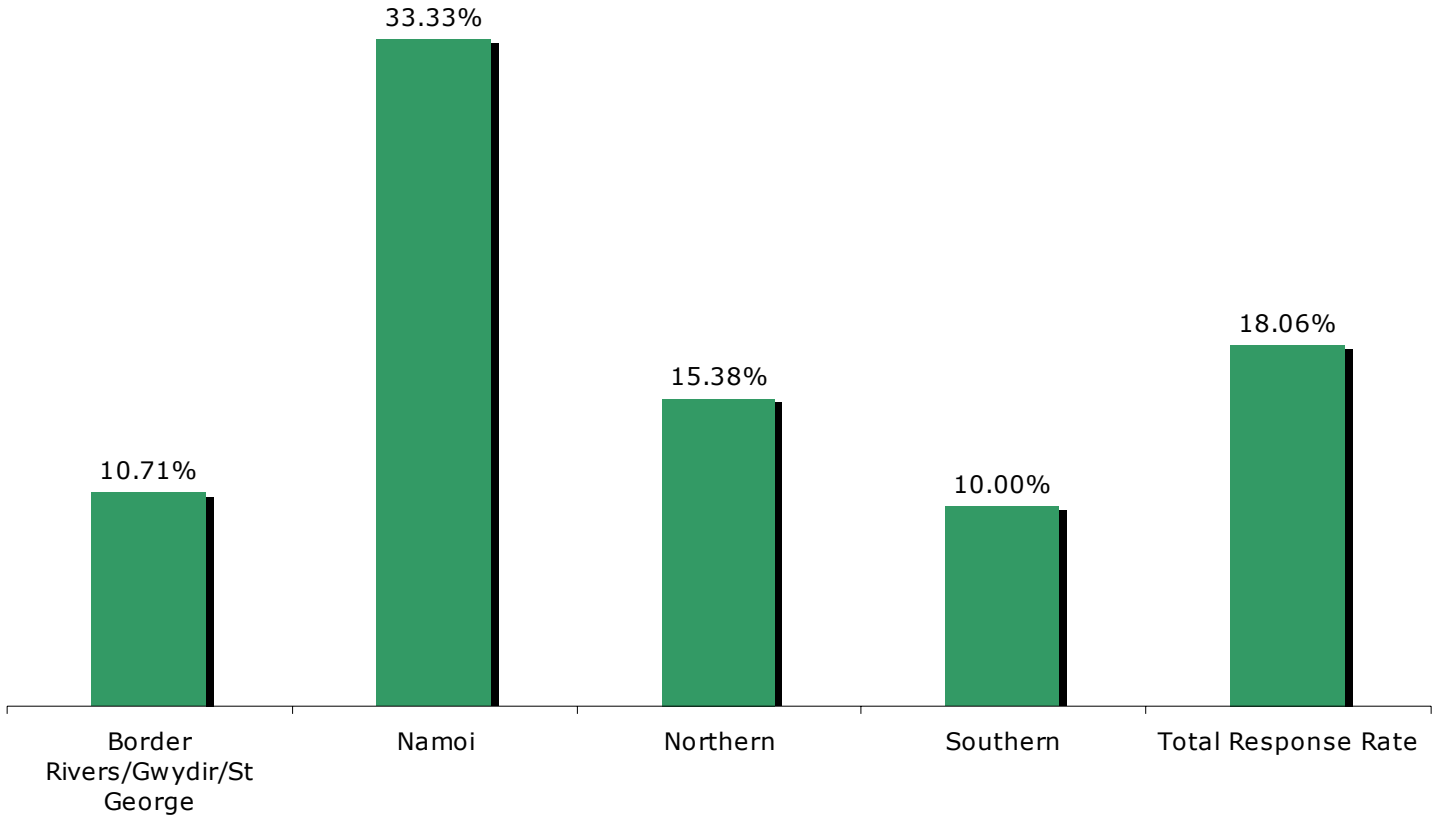
Creek and river management - Control vehicle access: by Region



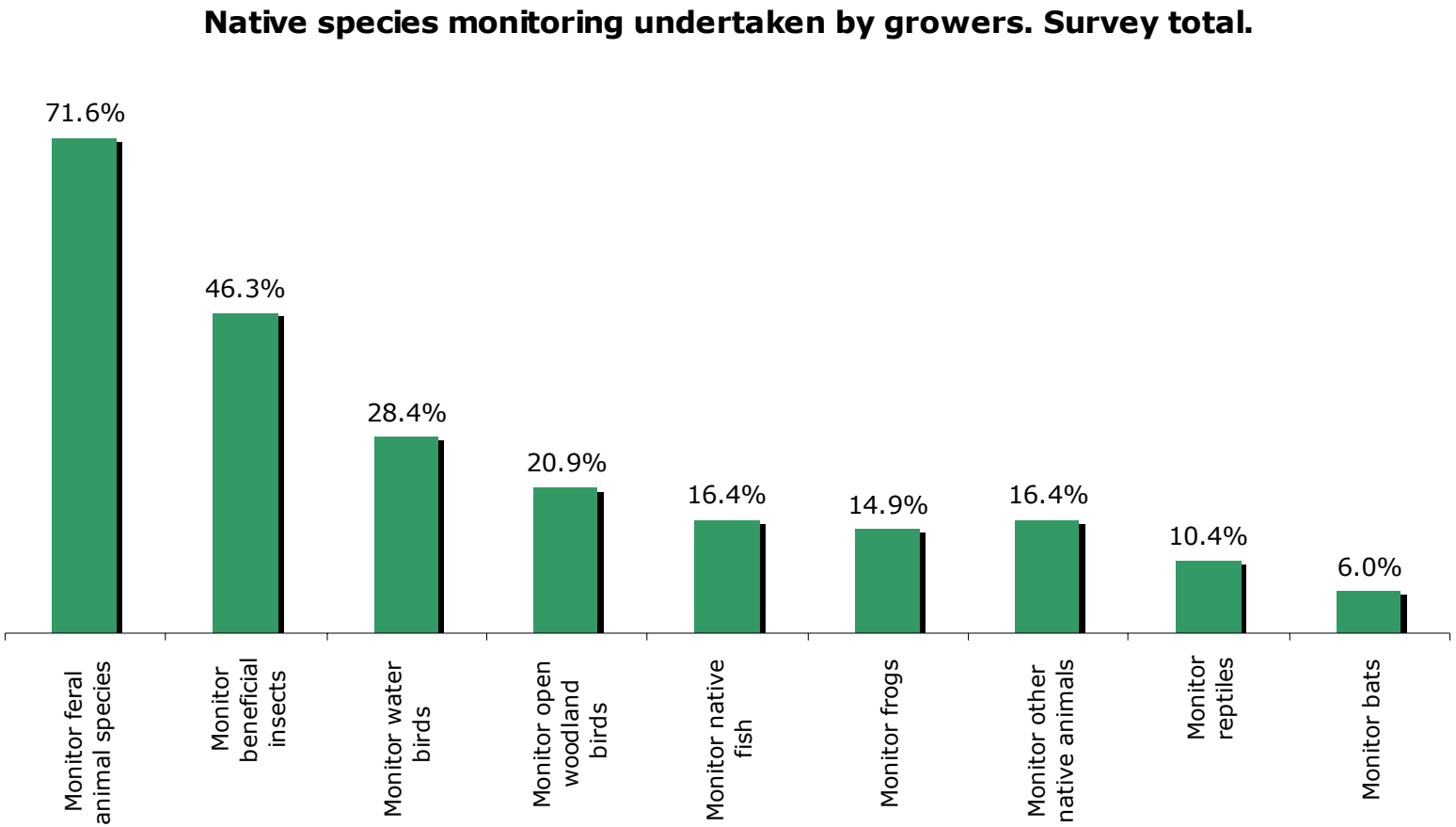
Creek and river management - Provide alternative watering points for stock: by Region

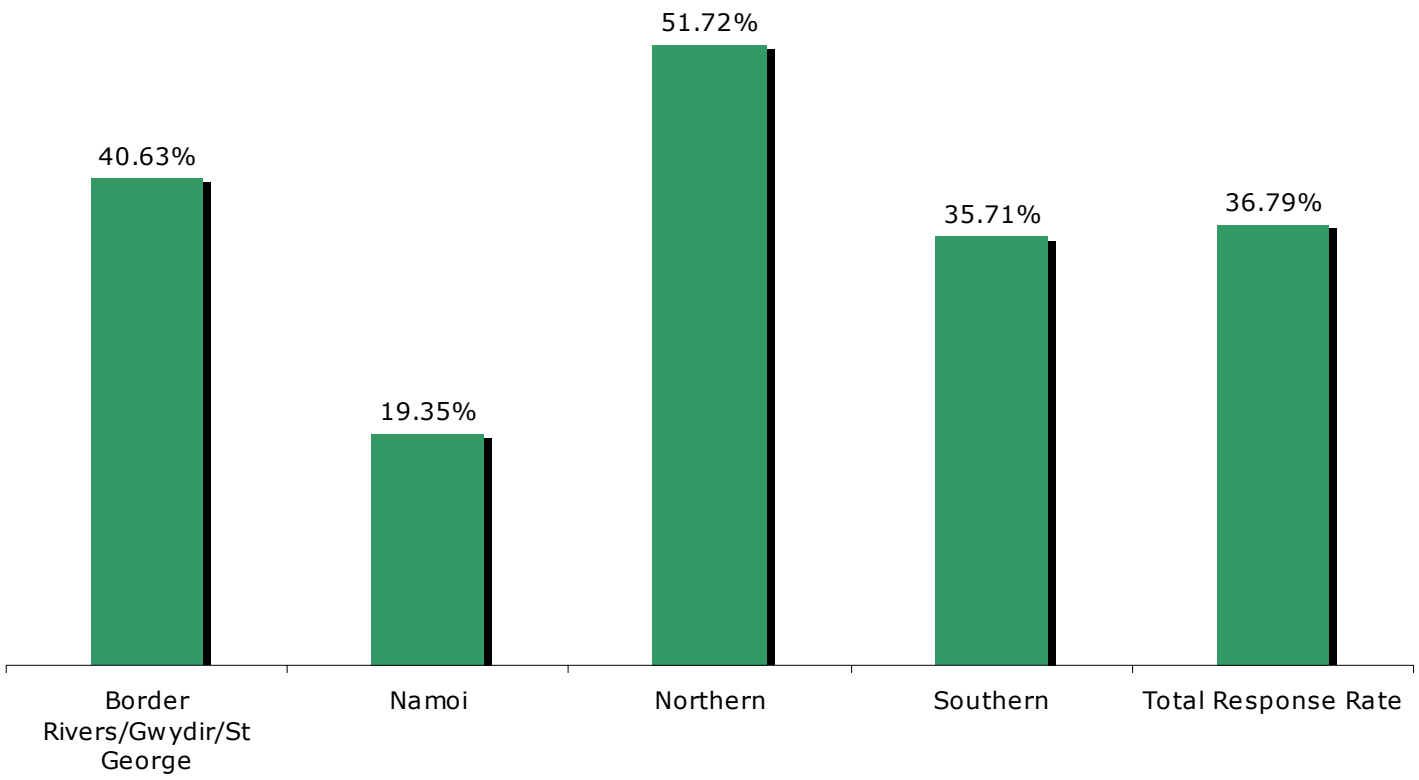


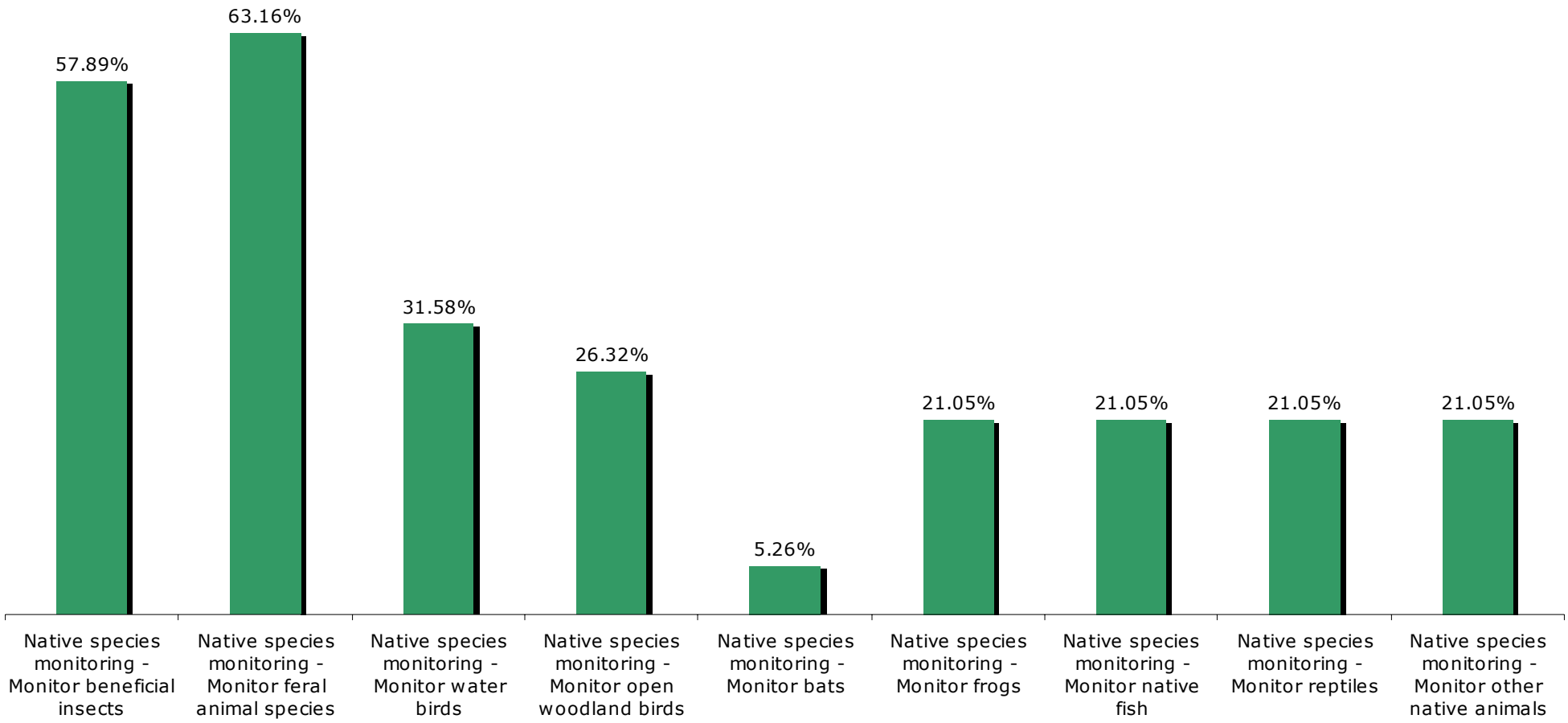
Creek and river management - Maintain filter strips and buffer zones near areas: by Region



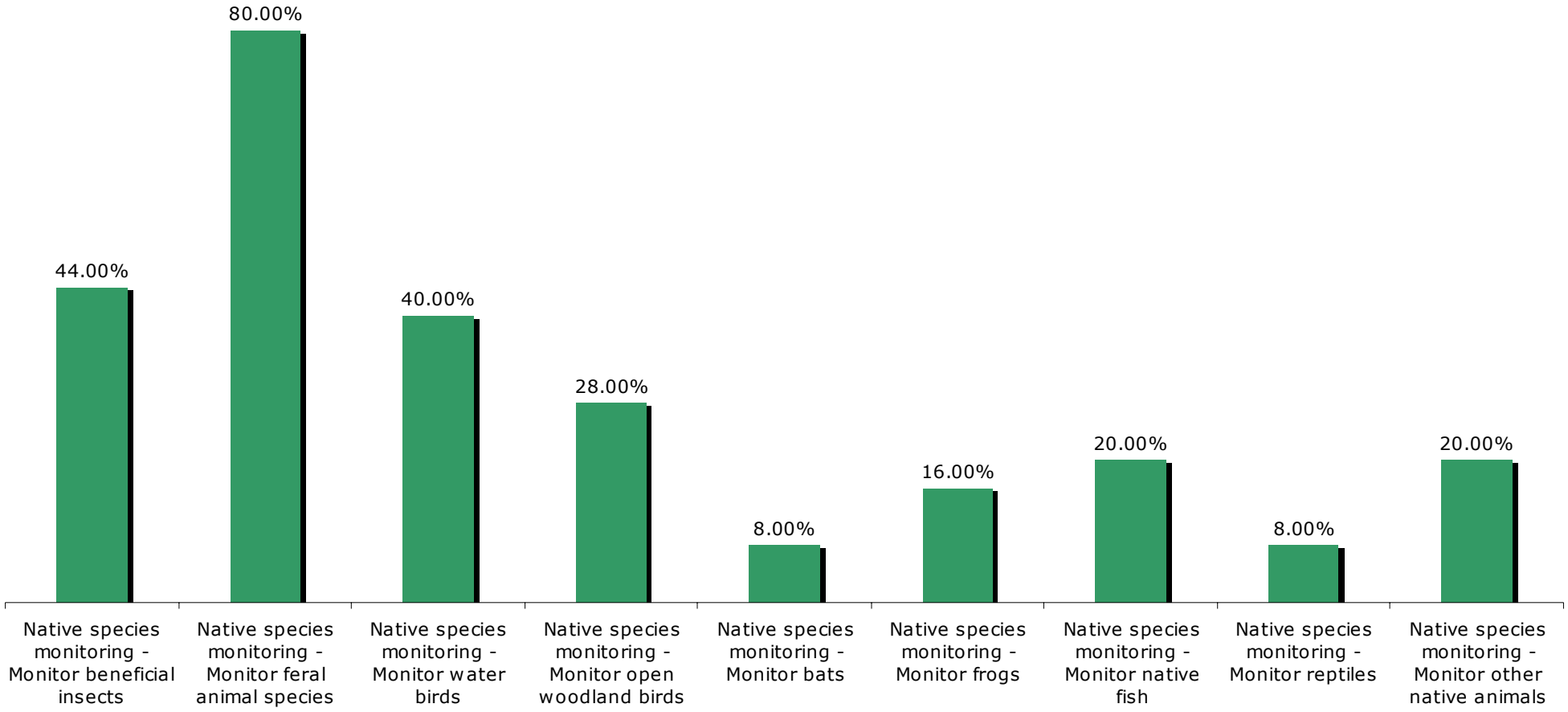
4.4 Fauna species monitoring: by region



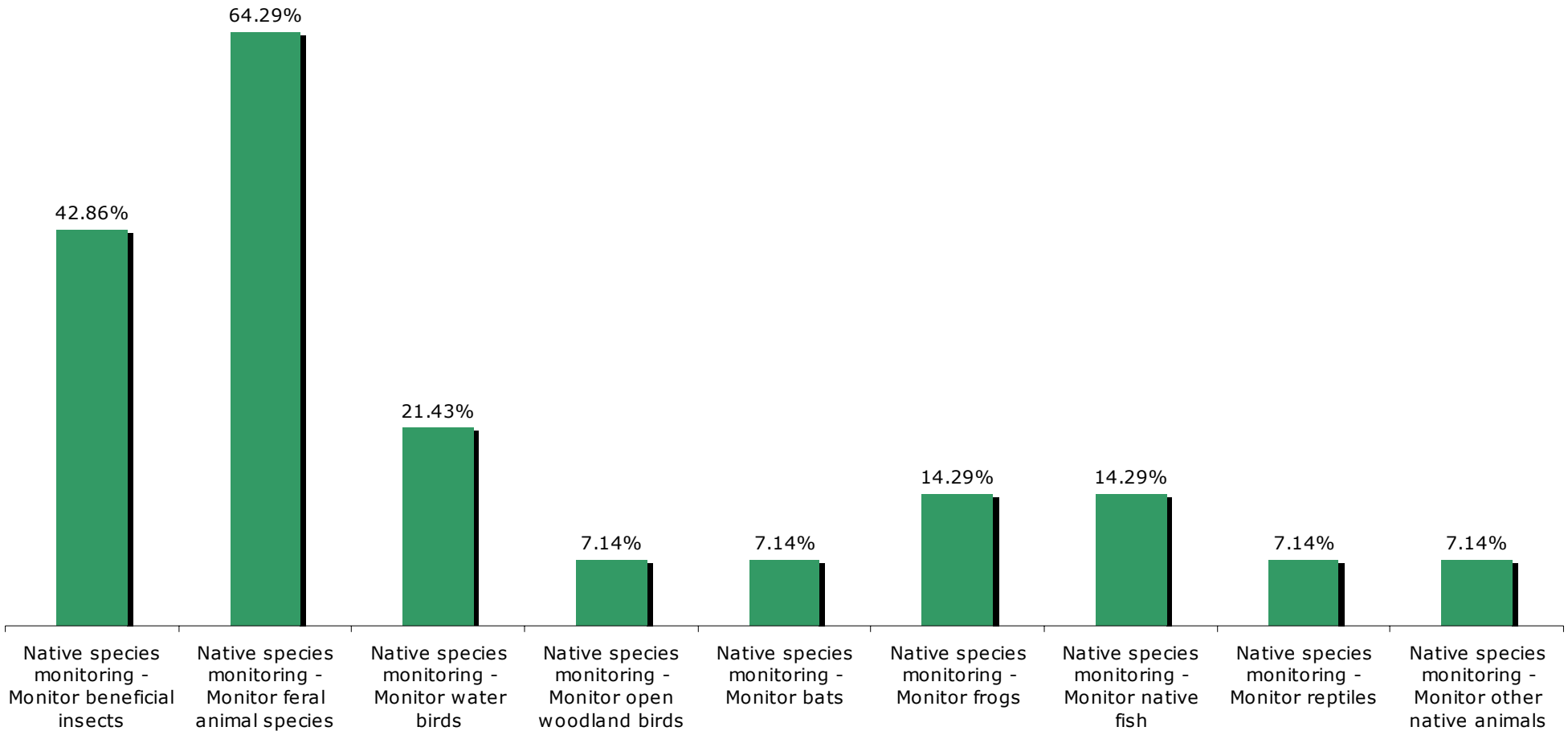

Native species monitoring - No monitoring: by Region
40.63%
19.35%
51.72%
35.71%
36.79%
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total Response Rate


Native species monitoring: Border Rivers/Gwydir/St George (19 Responses)
57.89%
63.16%
31.58%
26.32%
5.26%
21.05%
21.05%
21.05%
21.05%
Native species monitoring - Monitor beneficial insects
Native species monitoring - Monitor feral animal species
Native species monitoring - Monitor water birds
Native species monitoring - Monitor open woodland birds
Native species monitoring - Monitor bats
Native species monitoring - Monitor frogs
Native species monitoring - Monitor native fish
Native species monitoring - Monitor reptiles
Native species monitoring - Monitor other native animals

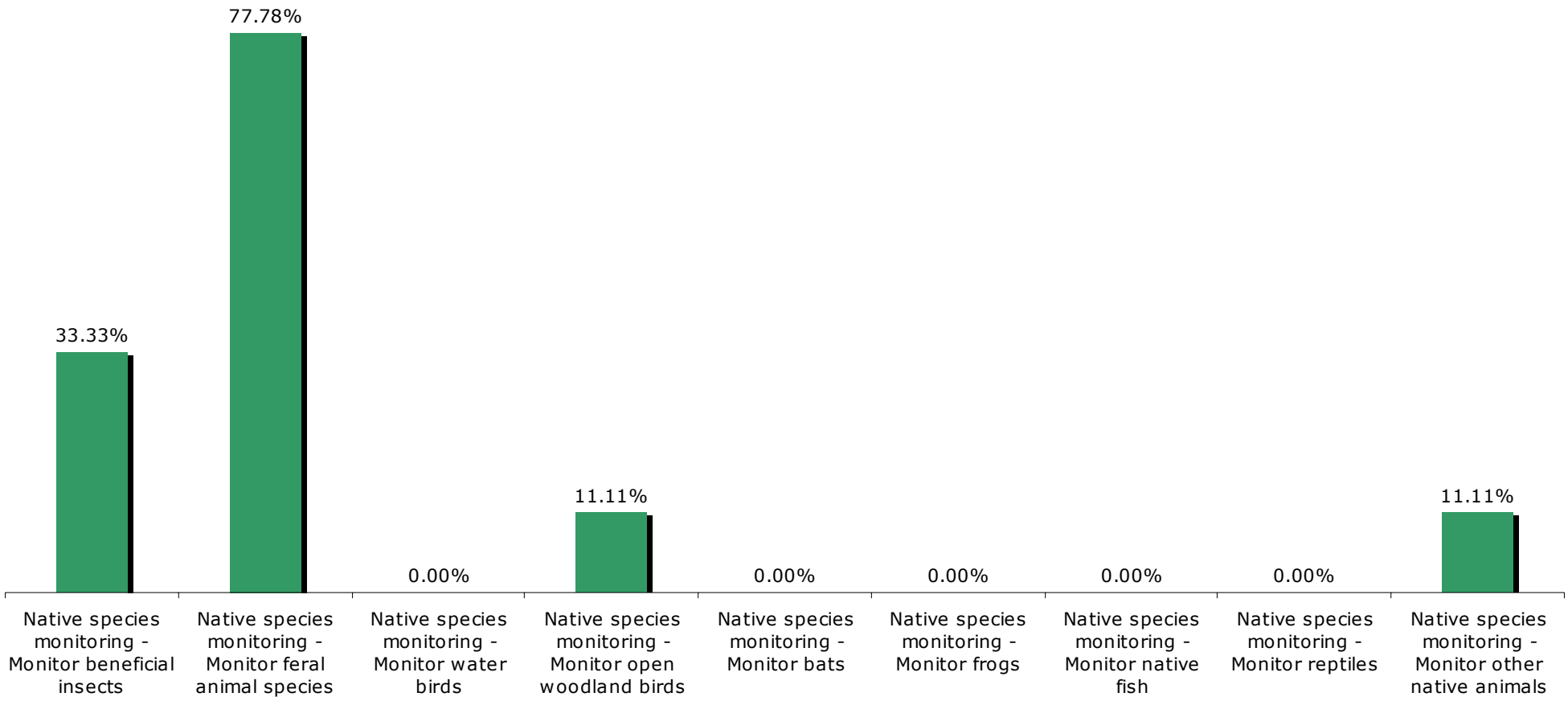
Native species monitoring: Namoi (25 Responses)



Native species monitoring: Northern (14 Responses)



Native species monitoring: Southern (9 Responses)



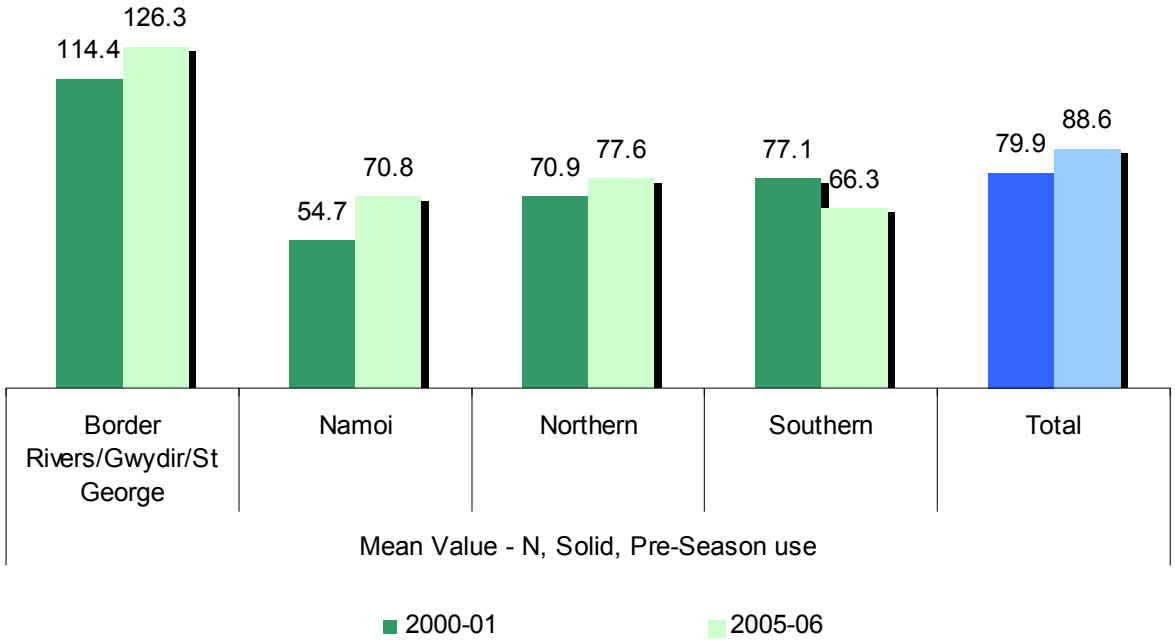
Section 5: Fertiliser Use

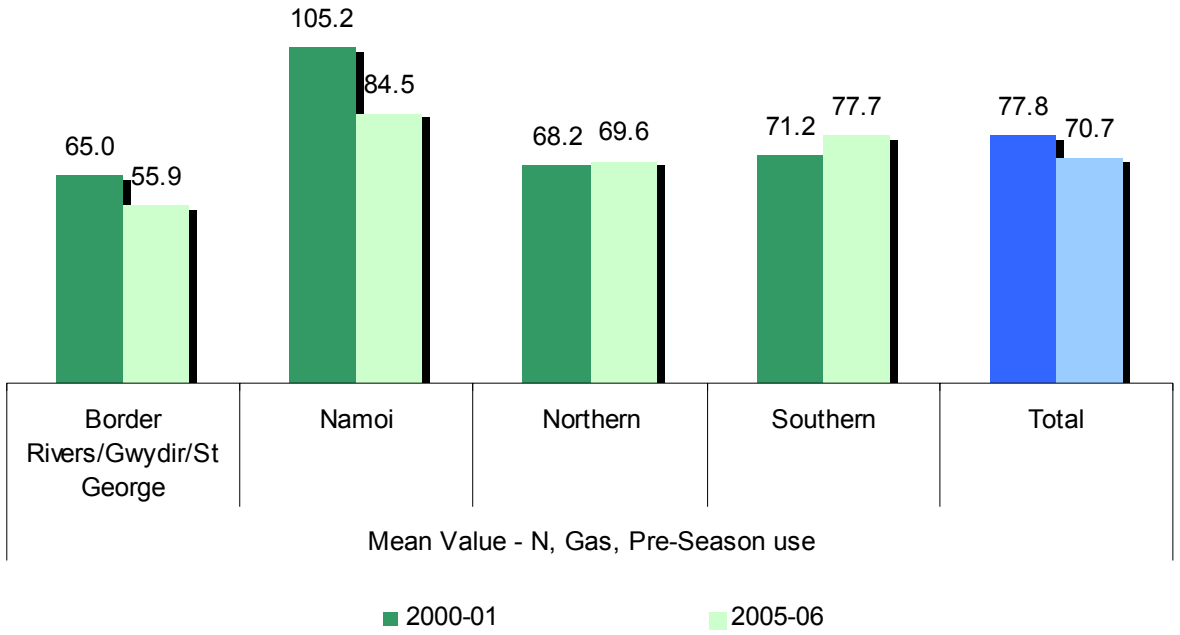
5.1 General trends in fertiliser application rates over the last 4-5 years: mean values by region

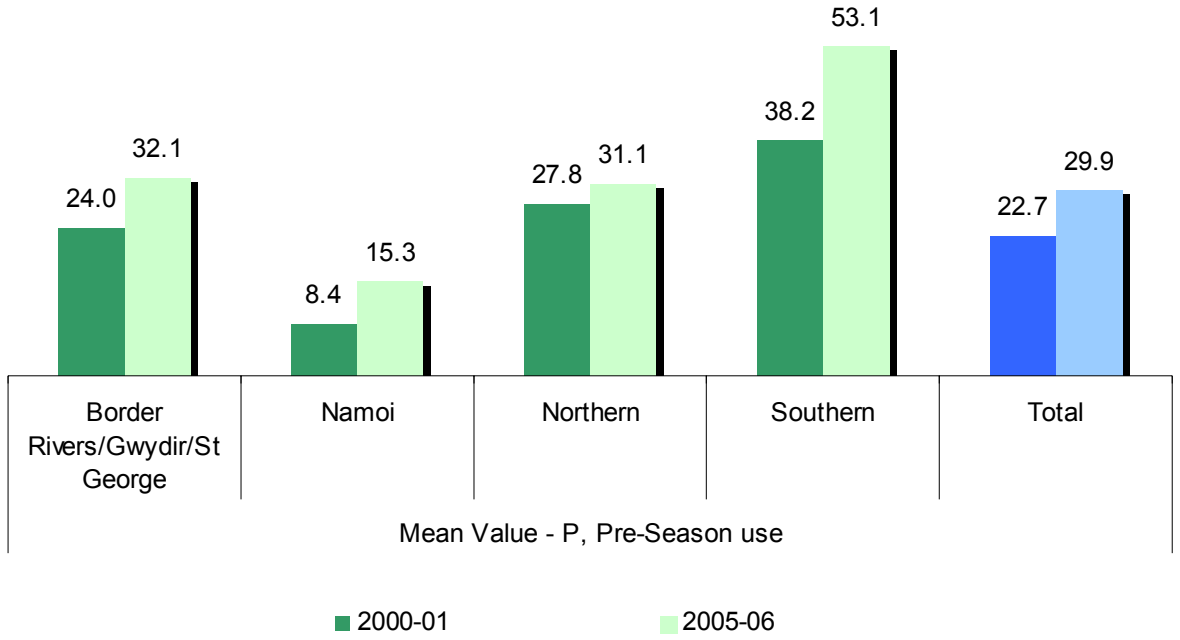
Growers were asked to indicate the amounts of N (solid and/or gas), P, K, and other fertilisers used pre-season and during season. Growers were then asked to provide the same figures for usage levels four or five seasons previously. Means have been produced for the data, while the figures for 2005-06 season use and those from four or five seasons ago (assumed to be the 2000-01 season), are included side by side for comparison, and presented by region.

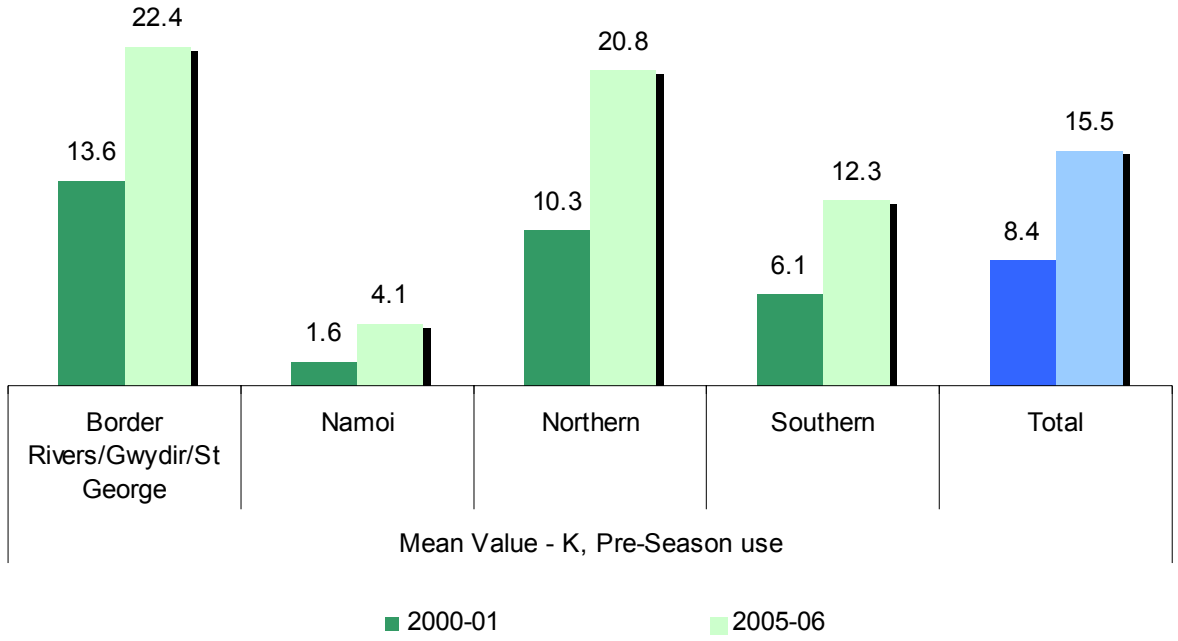
5.1.1 Pre-season fertiliser use

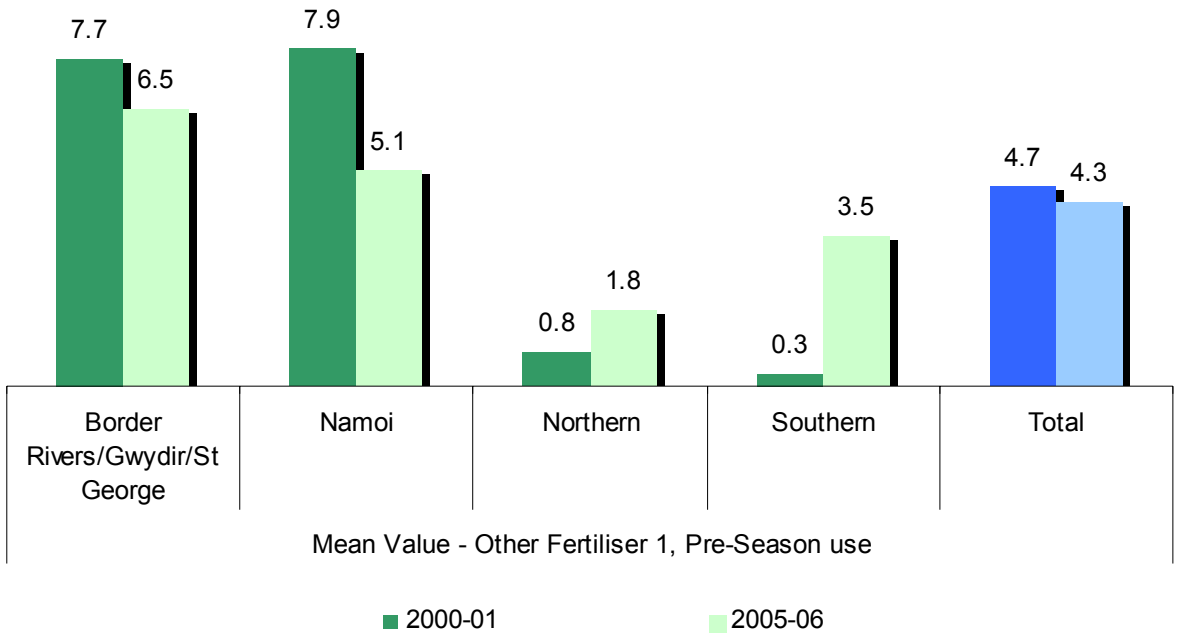
• With the exception of the Southern region, use of N (Solid) has increased over the past 5 seasons. The use of N (Gas), however, stands in contrast, having decreased in all regions except the Southern.
• The use of P and K has increased across all regions, with K having almost doubled in use (in kilograms per hectare) from 8.4 to 15.5.

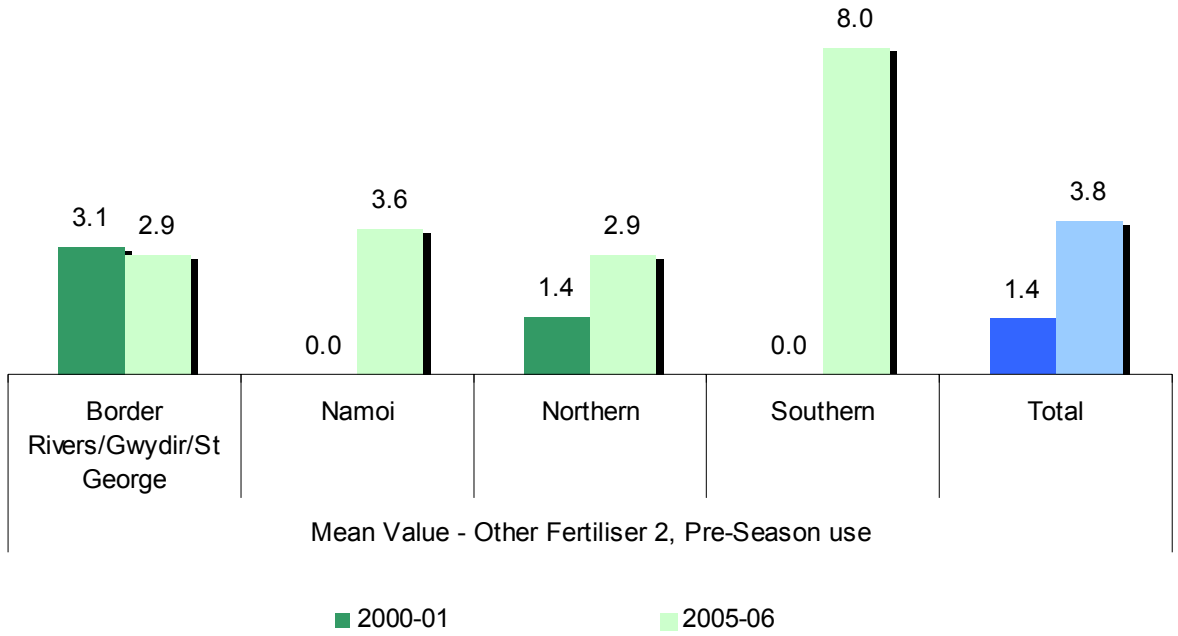



105.2
84.5
65.0
55.9
68.2
69.6
71.2
77.7
77.8
70.7
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - N, Gas, Pre-Season use
2000-01
2005-06


53.1
38.2
32.1
29.9
31.1
27.8
24.0
22.7
15.3
8.4
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - P, Pre-Season use
2000-01
2005-06

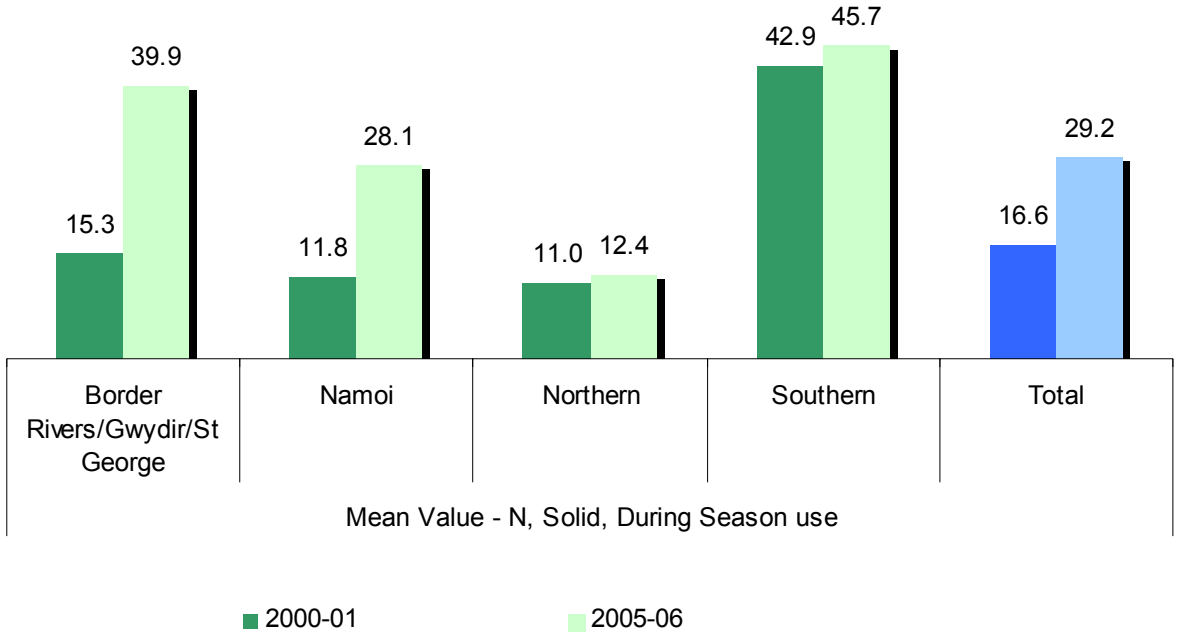

22.4
13.6
20.8
15.5
12.3
10.3
8.4
6.1
4.1
1.6
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - K, Pre-Season use
2000-01
2005-06

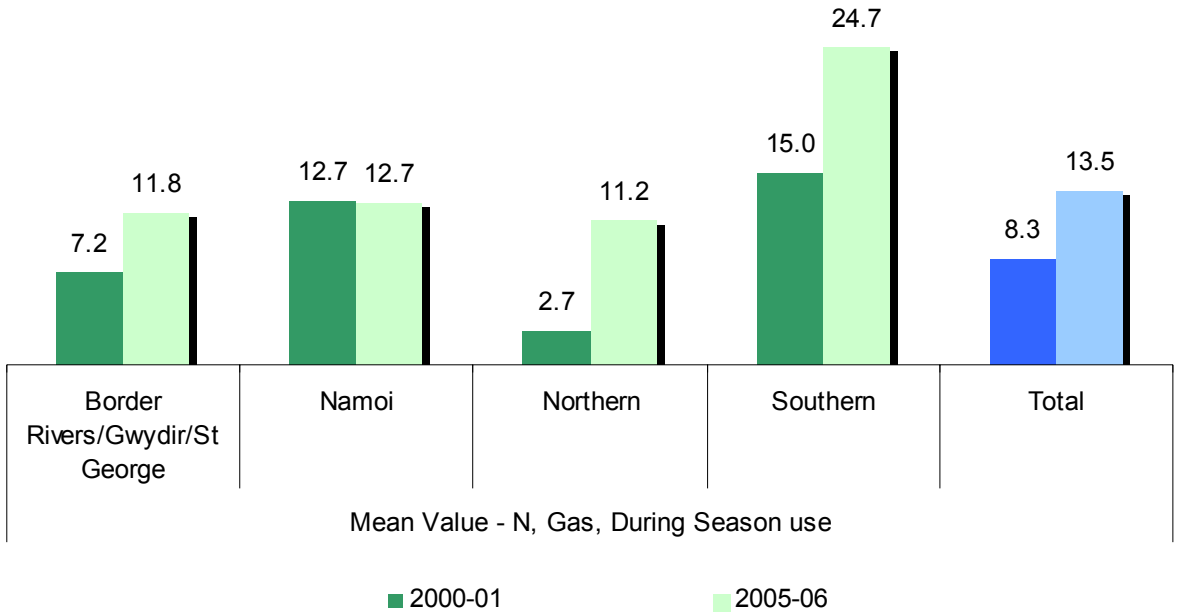

7.7
6.5
7.9
5.1
0.8
1.8
0.3
3.5
4.7
4.3
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Other Fertiliser 1, Pre-Season use
2000-01
2005-06

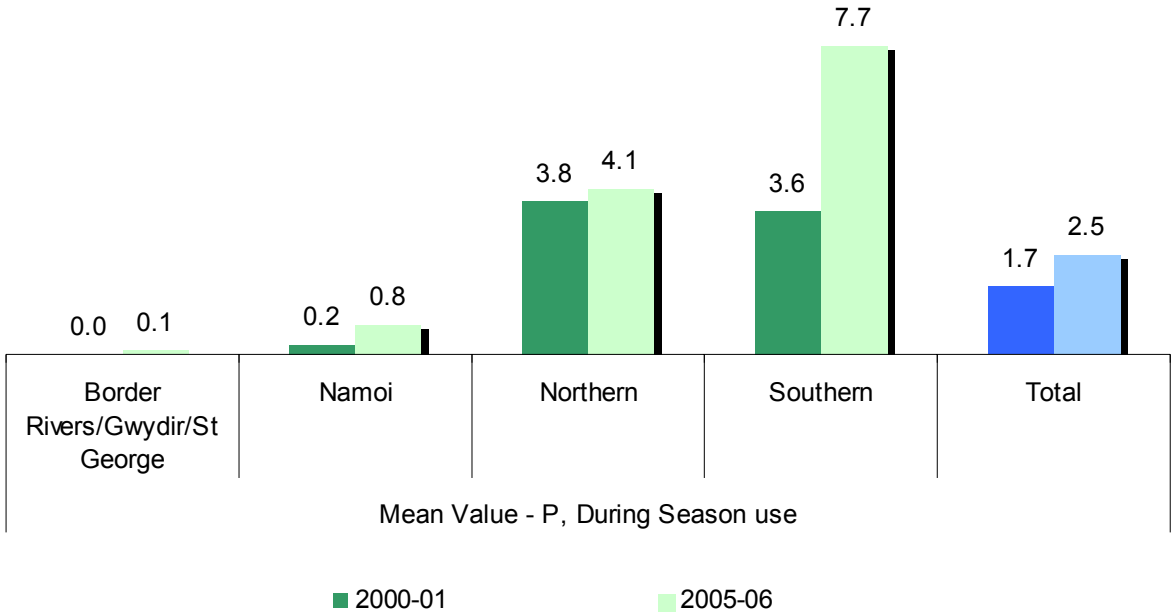

3.1
2.9
0.0
3.6
1.4
2.9
0.0
8.0
1.4
3.8
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Other Fertiliser 2, Pre-Season use
2000-01
2005-06

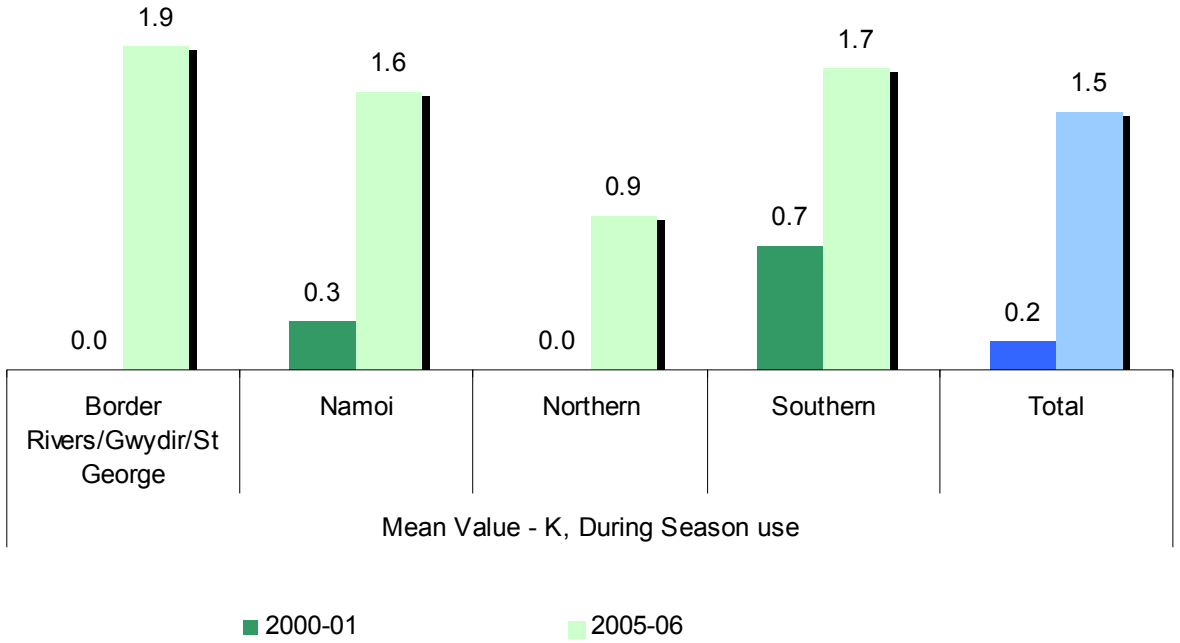
5.1.2 During season fertiliser use

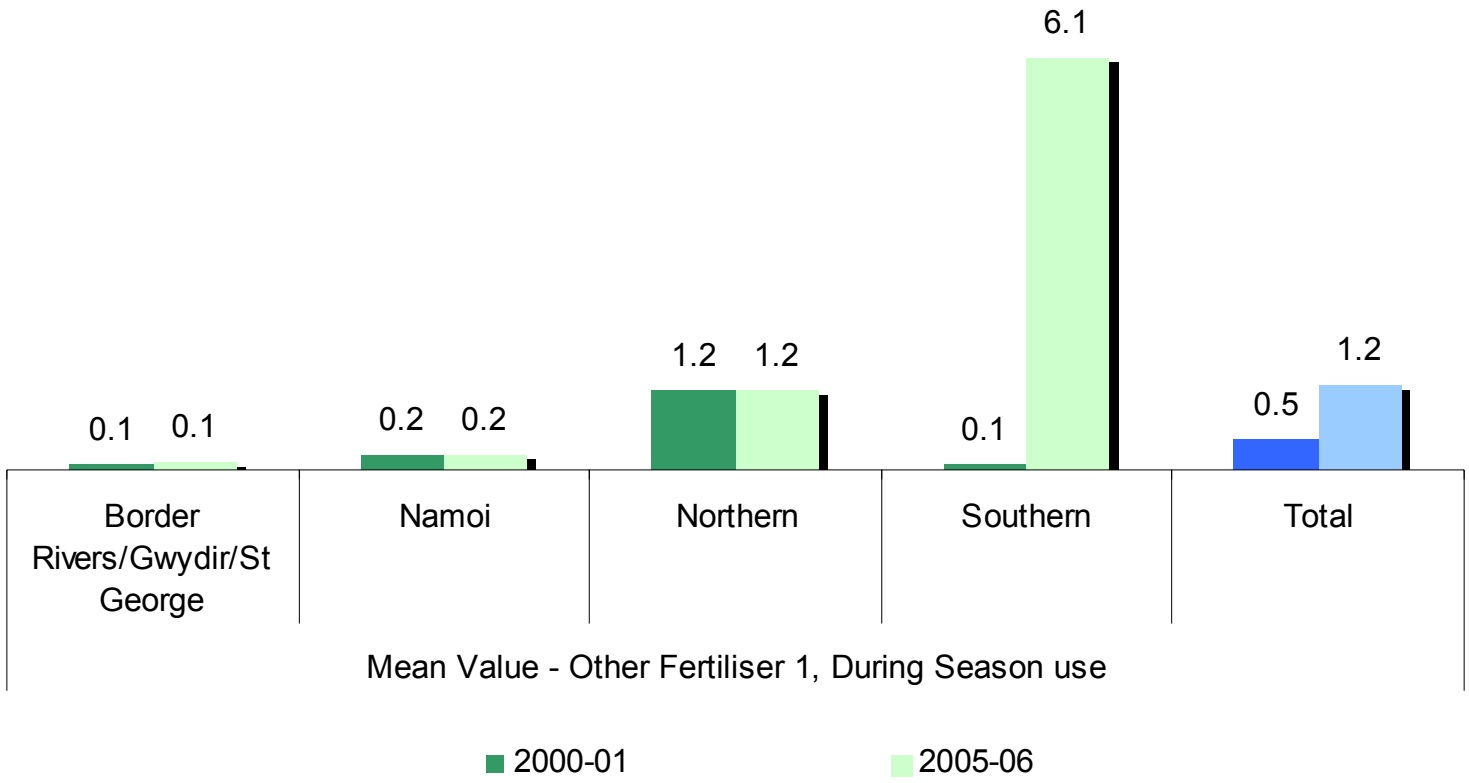
• N (Solid) and N (Gas) were both used at higher rates in 2005-06 when compared to 2000-01. Use of N (Solid) almost doubled over this period, rising from 16.6 to 29.2 kilograms per hectare. Much of this increase came in the Border Rivers/Gwydir/St George region, where an increase from 15.3 to 39.9 kilograms per hectare was indicated.
• Both P and K were used in very limited amounts in the 2000-01 season. However, growers indicated that they are using these increasingly, with K in particular rising from an overall value of 0.2 to 1.5 kilograms per hectare over the period.




7.2
11.8
12.7
12.7
2.7
11.2
15.0
24.7
8.3
13.5
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - N, Gas, During Season use
2000-01
2005-06


0.0
0.1
0.2
0.8
3.8
4.1
3.6
7.7
1.7
2.5
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - P, During Season use
2000-01
2005-06

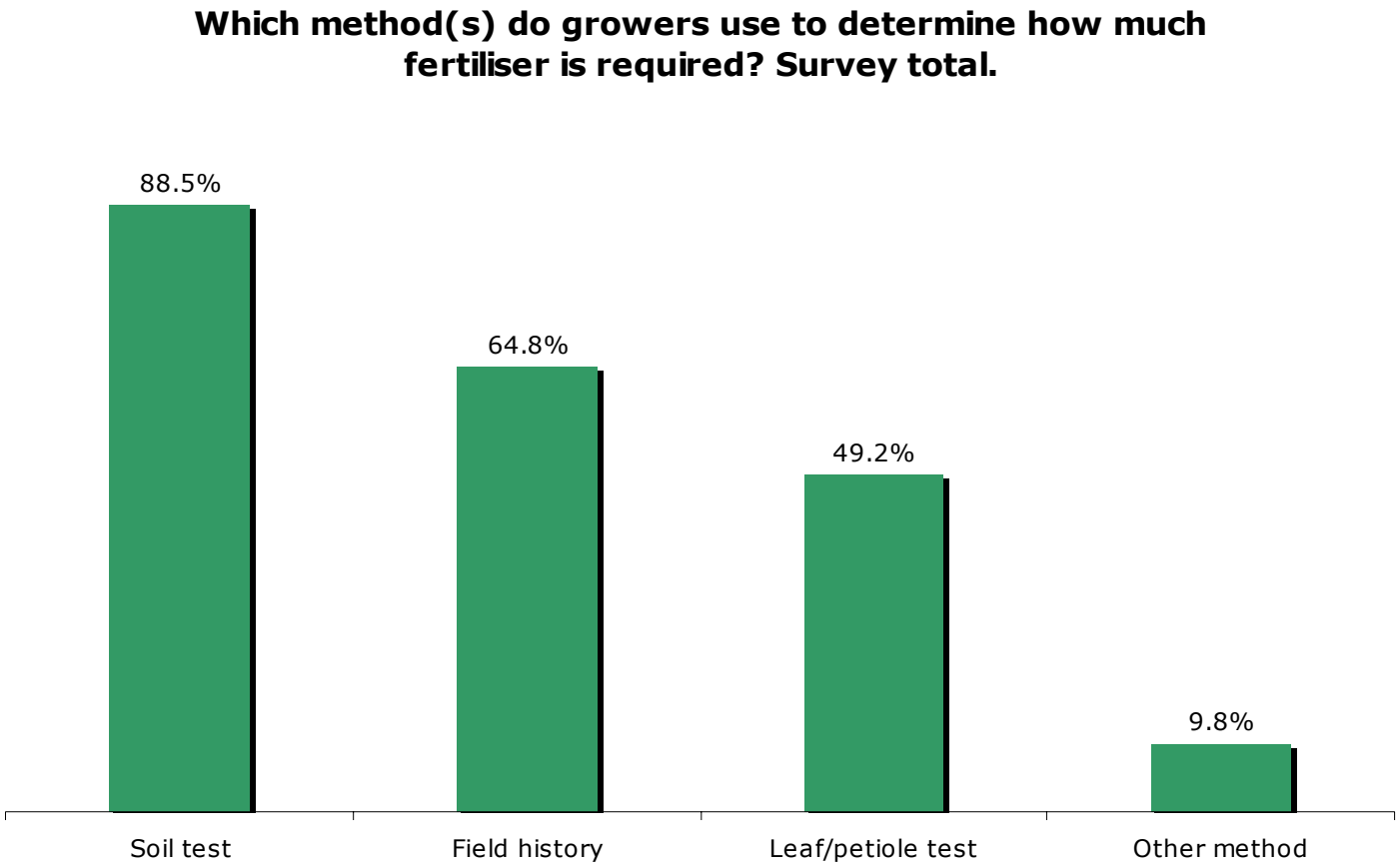

1.9
1.6
1.7
1.5
0.9
0.7
0.3
0.0
0.0
0.2
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - K, During Season use
2000-01
2005-06


0.1
0.1
0.2
0.2
1.2
1.2
0.1
6.1
0.5
1.2
Border Rivers/Gwydir/St George
Namoi
Northern
Southern
Total
Mean Value - Other Fertiliser 1, During Season use
2000-01
2005-06

Grouped Region	First Product 'Other'	Second Product 'Other'
Border Rivers/Gwydir/St George	2/L	
Border Rivers/Gwydir/St George	Some starter Zn	
Border Rivers/Gwydir/St George	Zinc	
Border Rivers/Gwydir/St George	Various trace as required	
Border Rivers/Gwydir/St George	Zinc	
Border Rivers/Gwydir/St George	Zinc	
Border Rivers/Gwydir/St George	Zinc	
Border Rivers/Gwydir/St George	Zinc	
Northern	Zinc	
Northern	Zinc	
Northern	Zinc	
Northern	Zinc	
Northern	Zinc	Sulphur
Northern	Zinc	Sulphur
Northern	Zinc	
Northern	Zinc	
Northern	Zinc	
Northern	Zinc	
Northern	Zinc	
Namoi	Zinc	
Namoi	Zinc	
Namoi	MAP	
Namoi	Zinc	
Namoi	Zinc	
Namoi	Starter z	
Namoi	Zinc	
Namoi	Zinc	
Namoi	Zinc	
Namoi	Zinc	
Namoi	Zinc	
Namoi	Zinc	
Namoi	Zinc	
Namoi	Zinc	
Namoi	Zinc	
Namoi	Zinc	
Southern	Zinc	
Southern	1.5 Zinc	
Southern	Zinc	
Southern	Zinc	

5.2 Methods used to determine amount of fertiliser required

Growers were asked to indicate the various methods used to determine the amount of fertiliser required. Clearly soil testing is central to the majority of growers decision making process. Soil tests are augmented by field history and leaf or petiole testing. Approximately one in 10 growers nominated other methods, these are listed on the following page.



Grower Type	Which method(s) do you use to determine how much fertiliser is required? Other Method
Opportunist	Agronomist
Opportunist	Visual assessment and seasonality
Opportunist	Agronomist
Opportunist	Visual.
Professional	Consultant
Stalwart	How the crop performed in past years.
Traditional	Estimated replacement
Traditional	Balance models from crop history U/S testing.
Traditional	Experience
Opportunist	Gut
Stalwart	Guess
Opportunist	Past crop s nutrient usage
Traditional	Guestimate

5.3 Differences between fertiliser testing methods and rates of fertiliser application

The data were examined to look for patterns in the methods used by growers to determine how much fertiliser is required on fields. Examination of the data revealed four main groups:

1. Soil Test, Petiole Test and Field History
2. Soil Test and Petiole Test
3. Soil Test and Field History
4. Soil Test Only

Growers in each of these groups were then compared in terms of the average fertiliser use. The results are listed in the following table where the mean kilograms in 2005-2006 are listed along with the percentage change over the levels used 5 years previous. The results would suggest pre-season use of gas has reduced for all groups with a much larger change recorded for those growers who use the combination of soil and petiole tests to decide on the level of fertiliser required. In-season nitrogen applications have increased, this trend reflects the need for flexibility in the production system and a general shift to just-in-time management approaches that can promote efficiency in a responsive system.

	Total Sample N=106		Soil & Petiole Test & Field History N=43		Soil & Petiole Test N=14		Soil Test and Field History N=28		Soil Test Only N=21	
	Mean Kg/Ha	% Change 2001 - 2005	Mean Kg/Ha	% Change 2001 - 2005	Mean Kg/Ha	% Change 2001 - 2005	Mean Kg/Ha	% Change 2001 - 2005	Mean Kg/Ha	% Change 2001 - 2005
N, Solid, Pre-Season use	91	11%	62	8%	69	3%	144	20%	86	9%
N, Gas, Pre-Season use	70	-8%	91	-3%	60	-30%	46	-7%	71	-11%
P, Pre-Season use	30	26%	29	32%	34	17%	31	33%	31	12%
K, Pre-Season use	16	79%	16	39%	14	63%	22	404%	11	-3%
N, Solid, During Season use	29	86%	37	123%	33	70%	20	58%	25	75%
N, Gas, During Season use	11	48%	8	-15%	17	0%	12	31%	13	71%
P, During Season use	3	44%	5	27%	5	68%	0		0	

The four groups developed for the analysis were then contrasted in terms of demographic and situational variables, the results are presented in the table below. The largest group is the respondents who indicated that all three soil test methods are used. Contrasting this group to the balance of growers, they planted more cotton and winter cereals in 2005-2006, they employ the highest number of full-time staff on average. They have a much larger area committed to dryland cropping and grazing and consequently have the highest number of beef cattle.

	Total Sample N=106	Soil & Petiole Test & Field History N=43	Soil & Petiole Test N=14	Soil Test and Field History N=28	Soil Test Only N=21
	Mean	Mean	Mean	Mean	Mean
Year of birth	1959	1960	1958	1958	1961
Year first involved in cotton	1986	1985	1988	1984	1988
Total hectares	4925	6433	1933	3459	6101
Green hectares	1230	1426	815	844	1767
Cotton 05/06	449	590	353	328	420
Winter Cereals 05/06	681	935	348	478	549
Cotton Yield 05/06	7.6	8.1	8.9	7.6	5.9
Full Time Staff	4.1	4.8	3.4	3.5	3.9
Part Time Staff	1.1	0.8	0.6	0.6	2.6
Casual Staff	3.0	1.6	2.9	2.9	6.2
Dryland cropping/grazing	2962	5321	649	1825	1383
Native vegetation (including riparian areas)	880	824	117	1001	1529
No. Beef Cattle	631	860	365	543	524
No. Sheep for Wool	834	1000	0	1071	928

Section 6: BMP Accreditation

Grower responses were split based on whether they are BMP accredited. Fifty three grower respondents indicated that they are BMP accredited, while sixty three indicated that they are not. Six growers did not answer the question, and were therefore removed from the data set used for the analysis below.

6.1 Summary of Section 6

Differences in farm practices between BMP accredited growers and non-BMP accredited growers

Includes significant cross tabulations and charts of mean data, arising from a comparison of BMP and non-BMP cotton growers. As the first cross tabulation demonstrates, 90.5 per cent of non-BMP accredited growers follow BMP guidelines anyway. However, there are some significant differences between those who choose to formalise their BMP accreditation, and those who follow the guidelines but are not accredited.

• While there is not a big difference between the two groups, the cross tabulation results do show that BMP accredited growers are more likely to measure WUE, monitor ground water levels, measure soil sodicity, use soil pits to monitor soil, and calculate WUE in bales/megalitre, while a much higher proportion of accredited growers will have soil erosion risks assessed. BMP accredited growers are more likely to agree or somewhat agree that they orientate their farming operation towards cotton. With regard to native vegetation and wildlife, BMP accredited growers are more likely to plant native vegetation along waterways, provide alternative watering points for stock, and monitor feral animal species. Finally, accredited growers are more likely to conduct soil tests every year. In contrast, a higher proportion of non-accredited growers prefer industry information to arrive in the post.

• An examination of means also reveals that BMP accredited growers are likely to employ more full time and casual staff, and, over the past 4-5 seasons, have used higher rates of N during the season as part of their fertiliser program. BMP-accredited growers are more likely to apply chemicals using aerial spraying, while non-accredited growers will use their own equipment for a larger proportion of their chemical treatment requirements.

Differences in farm characteristics between BMP accredited growers and non-BMP accredited growers

In addition to farm practices, there are a number of differences in the farm and demographic characteristics of BMP-accredited cotton growers, as compared to those who are not accredited.

• Just over half (50.9 per cent) of accredited growers have finished tertiary study, as compared to 31.1 per cent of non-accredited growers.

• Accredited growers have a larger overall property size (5234.36 hectares on average, compared to non-accredited growers on 4216.44), had a larger cotton areas planted in 2005/06, have more green hectares, a larger dryland cropping/grazing area, and more native vegetation.

• Over the last two seasons accredited growers have produced, on average, a significantly higher cotton yield (in 2005/06, 8.09 bales/hectare compared to 7.35 bales/hectare).
• Finally, accredited growers are more likely to have regulated stream or river frontage, have a larger stream or river frontage, but source less of their water from unregulated streams or rivers than non-accredited growers.

BMP accreditation

BMP-accredited cotton growers can perhaps be understood as 'more serious' cotton growers, in that they have a larger cotton area, are more likely to adopt a range of cotton management practices, and have a higher cotton yield. Furthermore, they run larger farming operations with more staff, and have completed a higher level of education. This picture reinforces the view of BMP accreditation as one way in which growers work to maximise gains from their cotton crop.

6.2 Differences in farm practices between BMP accredited growers and non-BMP accredited growers: percentages

Are BMP Accredited	Follow BMP guidelines	
	Yes	No
Yes	100.0	0.0
No	90.5	9.5

Are BMP Accredited	Measure water use efficiency	
	Yes	No
Yes	66.0	34.0
No	50.8	49.2

Are BMP Accredited	Monitor ground water levels	
	Yes	No
Yes	56.6	43.4
No	42.9	57.1

Are BMP Accredited	Measure soil sodicity on your farm	
	Yes	No
Yes	67.9	32.1
No	47.5	52.5

Are BMP Accredited	Have soil erosion risks assessed	
	Yes	No
Yes	50.0	50.0
No	28.6	71.4

Are BMP Accredited	The primary crop we orientate this farm towards is normally cotton.				
	Totally Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Totally Disagree
Yes	45.5	40.0	9.1	3.6	1.8
No	43.5	21.0	12.9	14.5	8.1

Are BMP Accredited	Soil monitoring method - Soil pits	
	Yes	No
Yes	47.5	52.5
No	19.6	80.4

Are BMP Accredited	Do you calculate water use efficiency in terms of bales/megalitre?	
	Yes	No
Yes	69.4	30.6
No	47.2	52.8

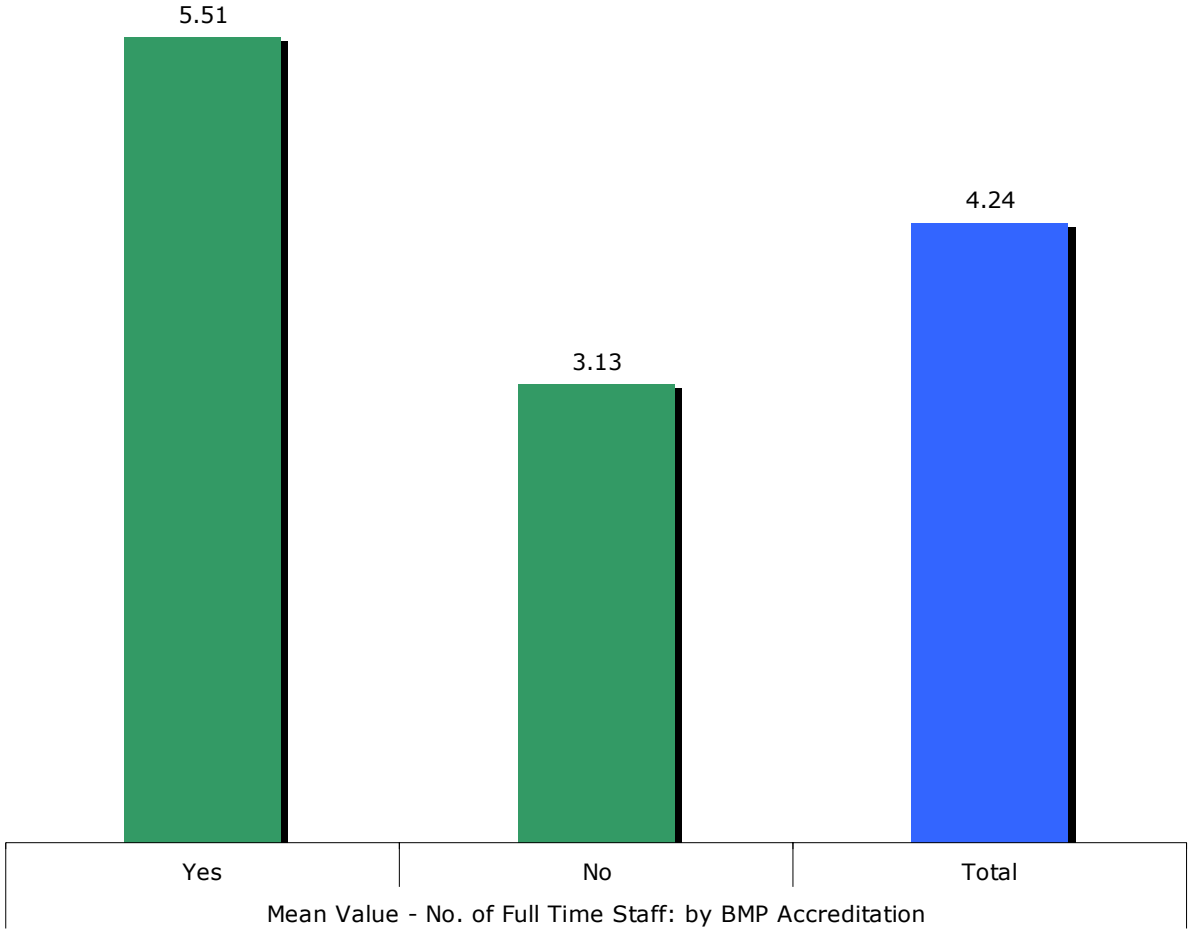
Are BMP Accredited	Creek and river management - Plant native vegetation/trees	
	Yes	No
Yes	18.4	81.6
No	3.8	96.2

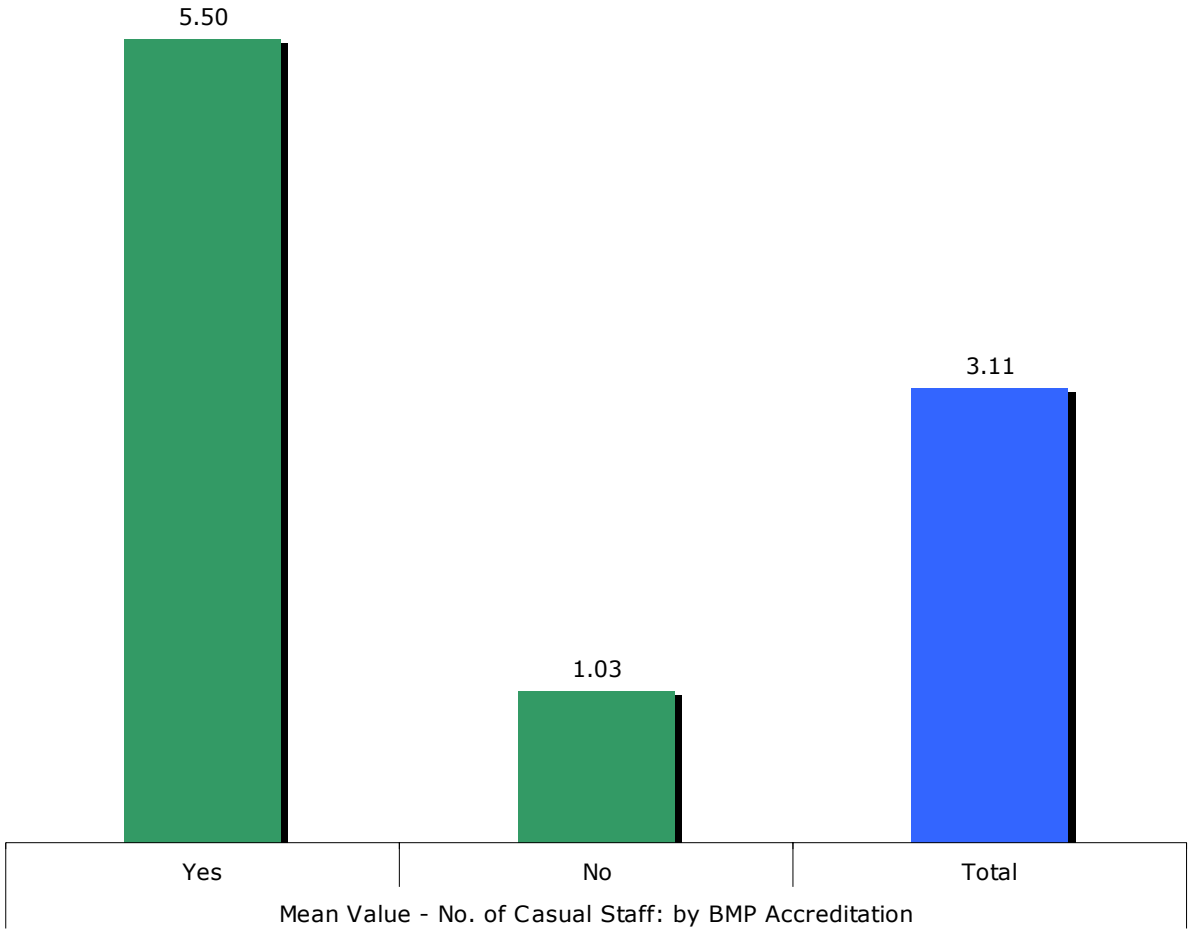
Are BMP Accredited	Creek and river management - Provide alternative watering points for stock	
	Yes	No
Yes	22.4	77.6
No	7.7	92.3

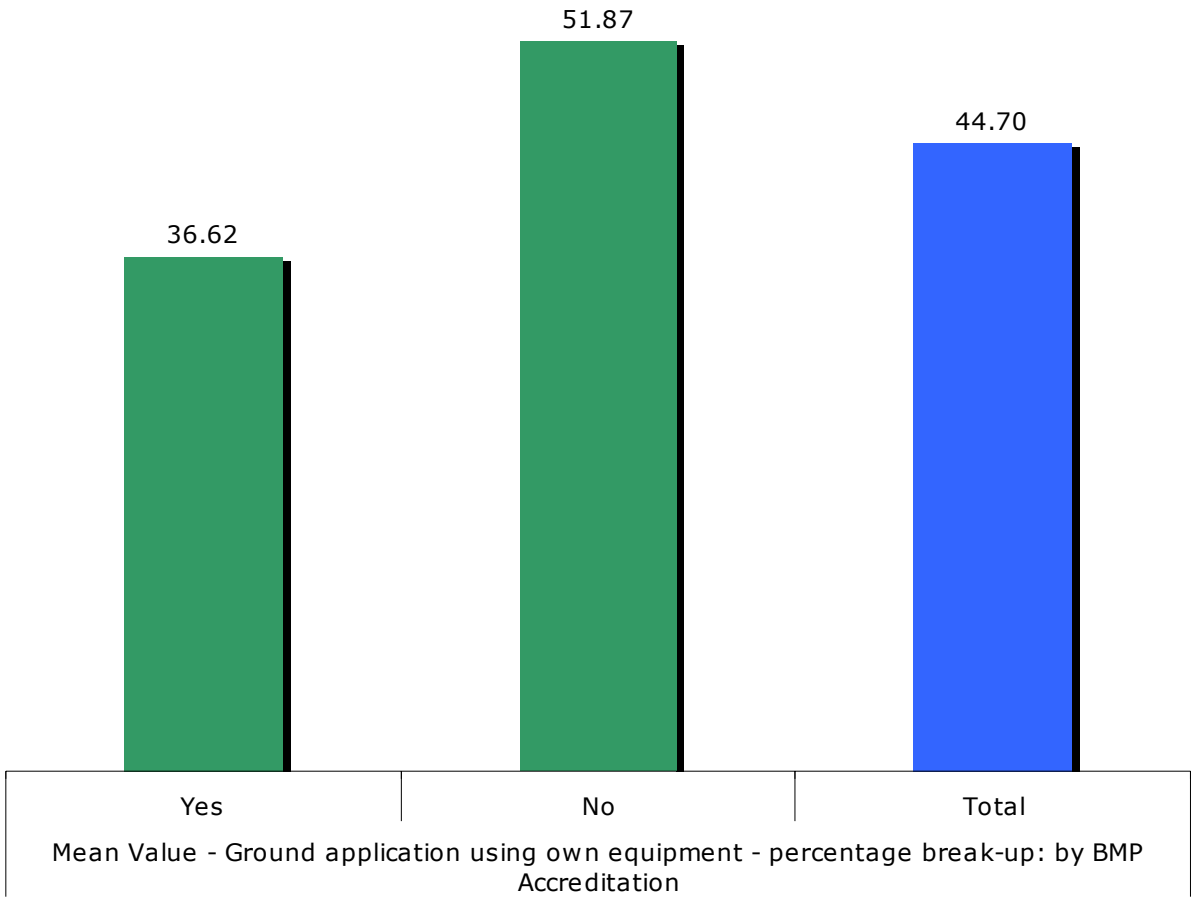
Are BMP Accredited	Native species monitoring - Monitor feral animal species	
	Yes	No
Yes	36.2	63.8
No	56.9	43.1

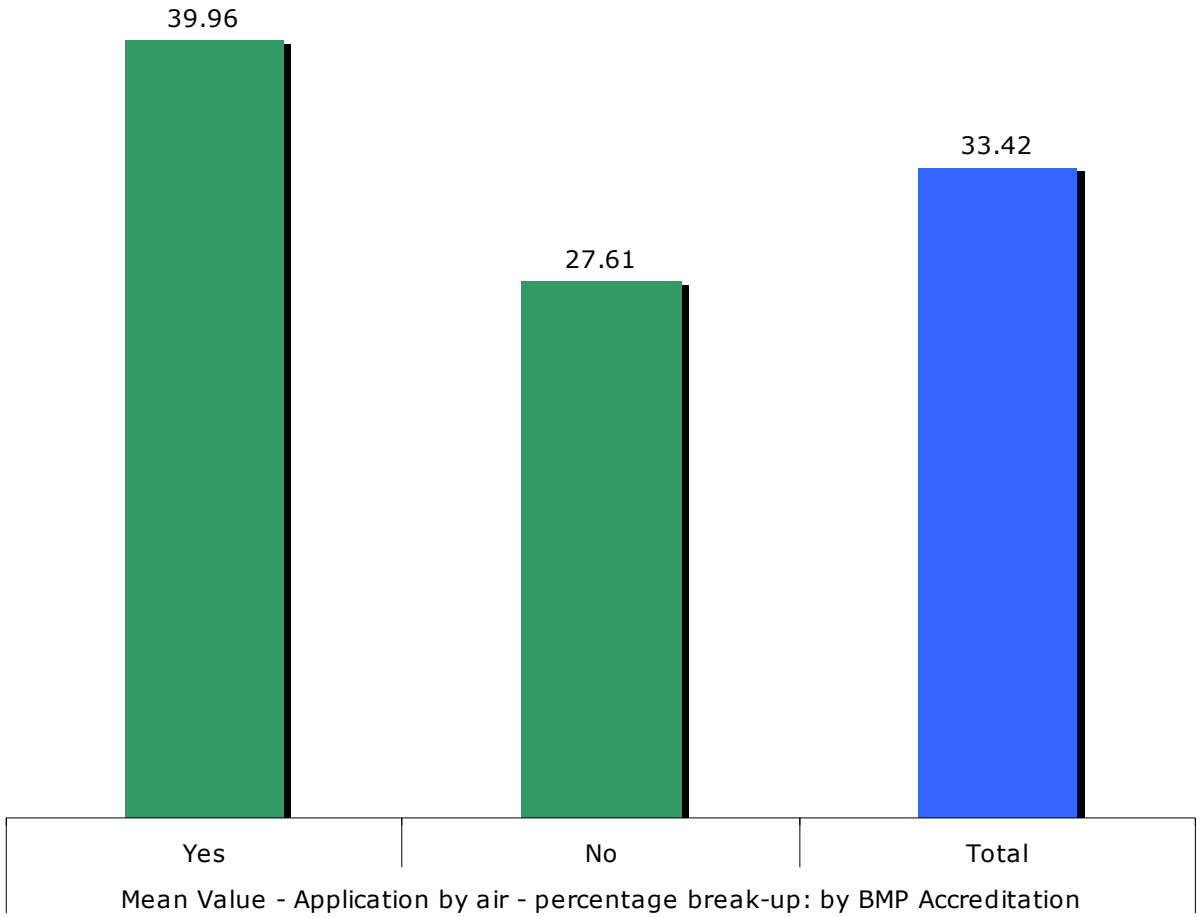
Are BMP Accredited	How often do you conduct soil tests in any one field?		
	Every year	No set strategy	Before every cotton crop
Yes	42.3	28.8	28.8
No	30.0	50.0	20.0

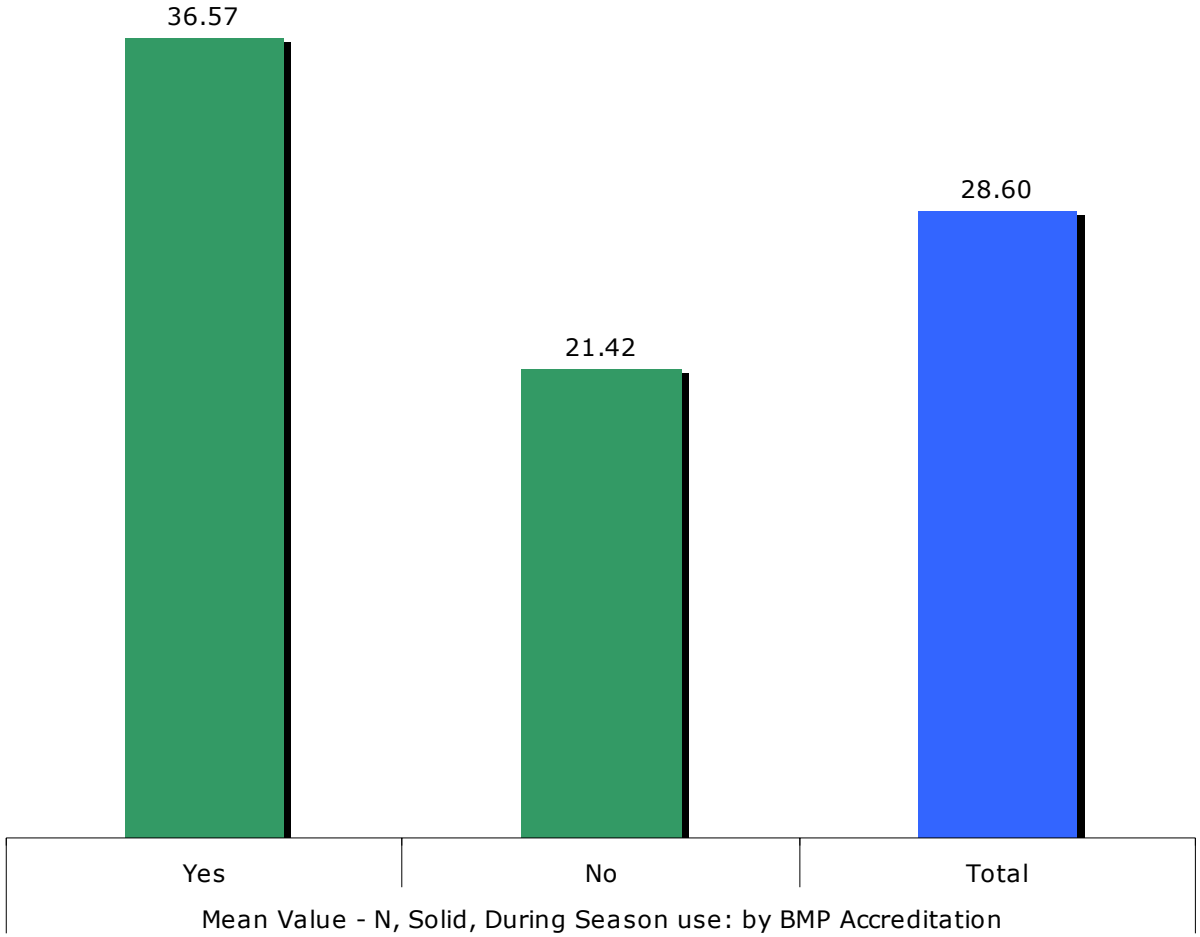
Are BMP Accredited	More information - Post	
	Yes	No
Yes	44.2	55.8
No	63.3	36.7

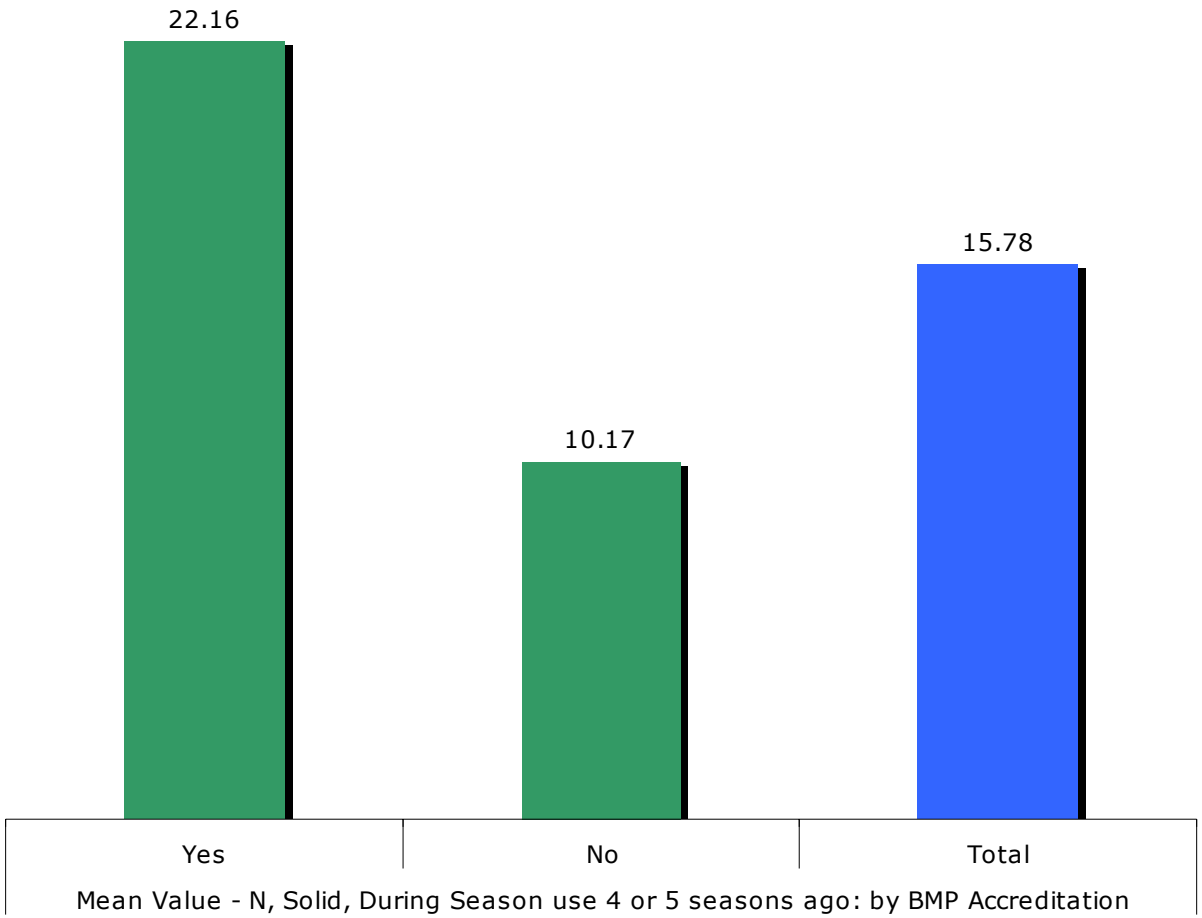

5.51
3.13
4.24
Yes
No
Total
Mean Value - No. of Full Time Staff: by BMP Accreditation


5.50
1.03
3.11
Yes
No
Total
Mean Value - No. of Casual Staff: by BMP Accreditation


51.87
44.70
36.62
Yes
No
Total
Mean Value - Ground application using own equipment - percentage break-up: by BMP Accreditation

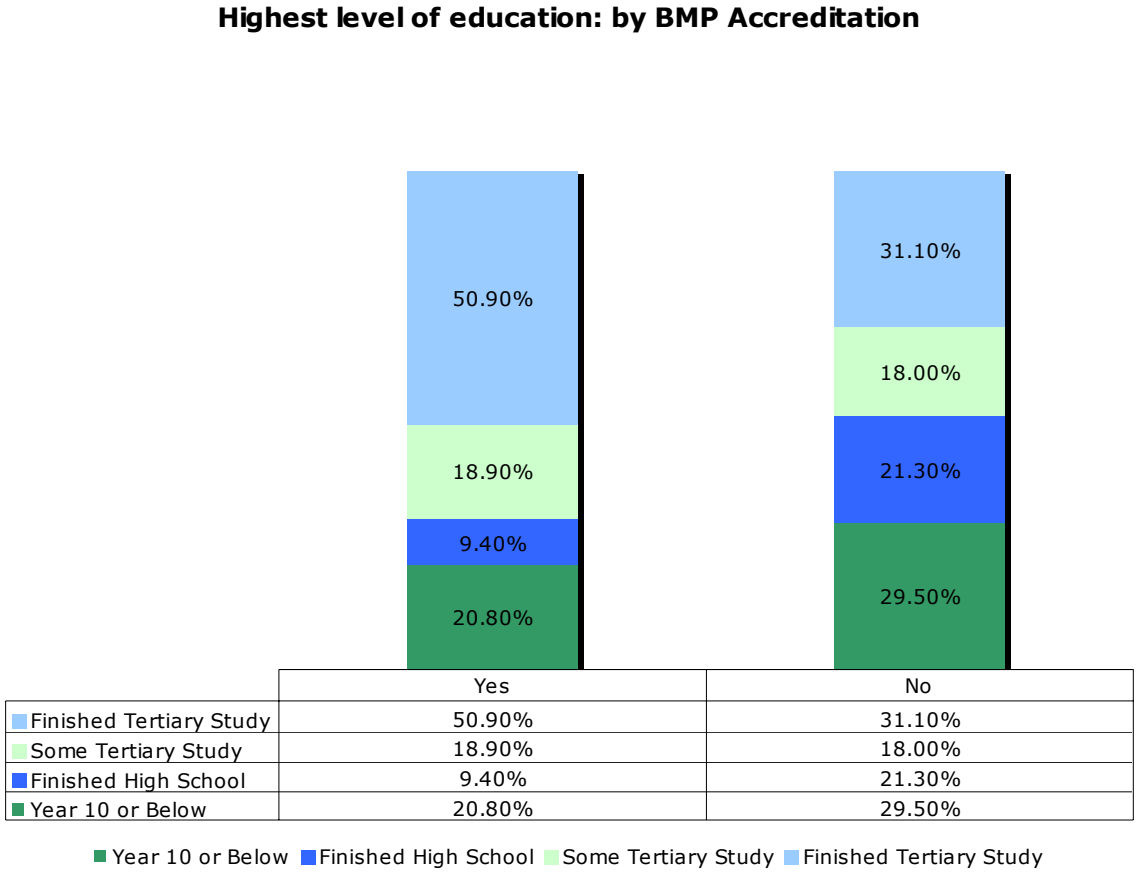

39.96
27.61
33.42
Yes
No
Total
Mean Value - Application by air - percentage break-up: by BMP Accreditation


36.57
21.42
28.60
Yes
No
Total
Mean Value - N, Solid, During Season use: by BMP Accreditation

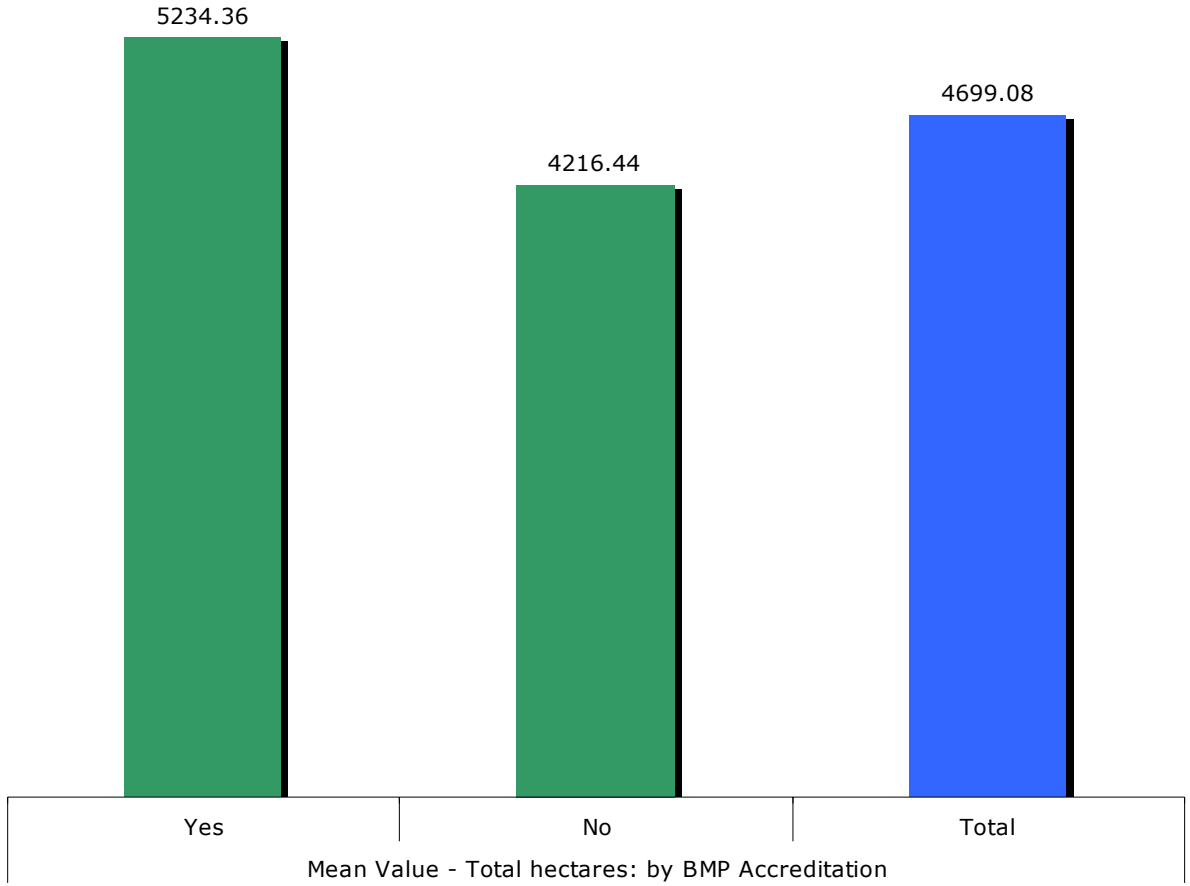

22.16
10.17
15.78
Yes
No
Total
Mean Value - N, Solid, During Season use 4 or 5 seasons ago: by BMP Accreditation

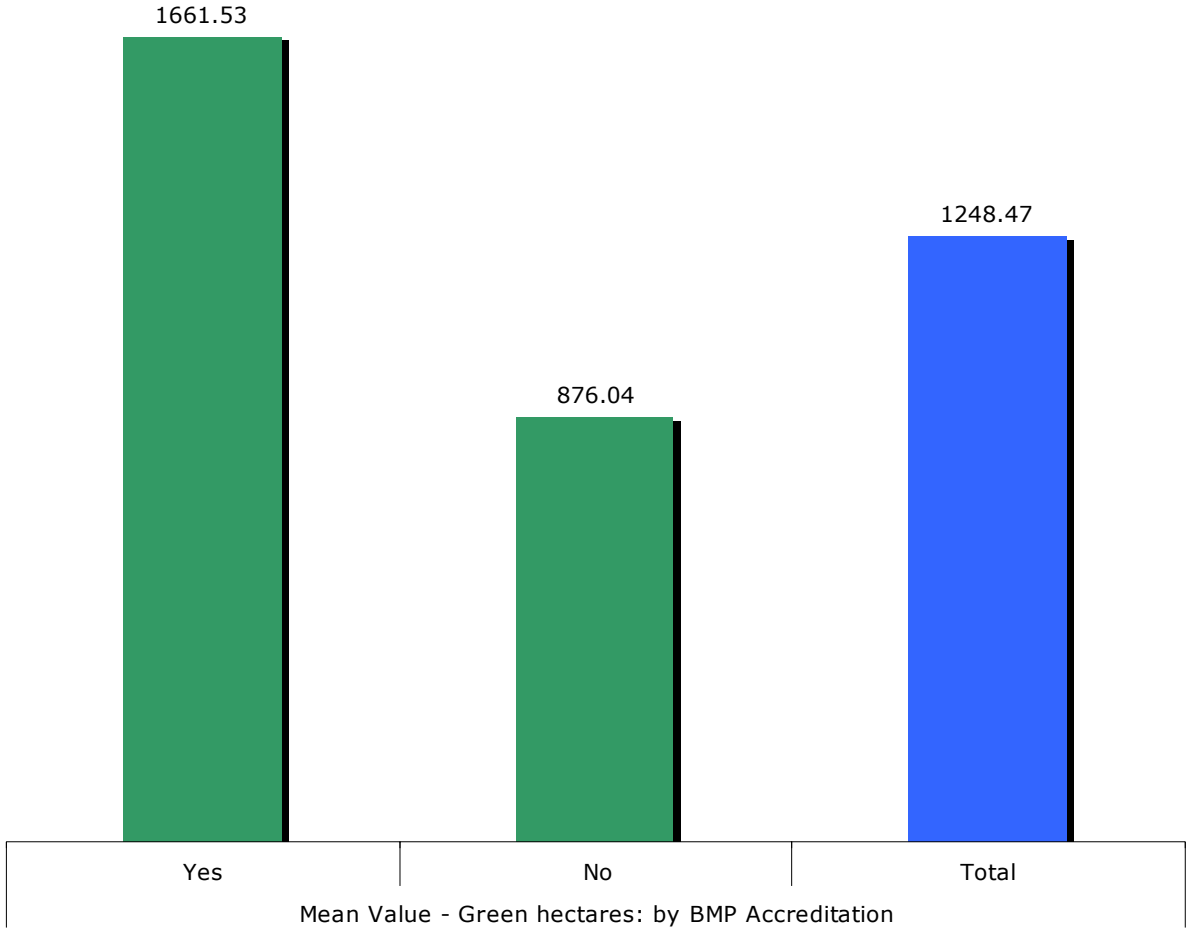
6.3 Differences in farm characteristics between BMP accredited growers and non-BMP accredited growers: percentages

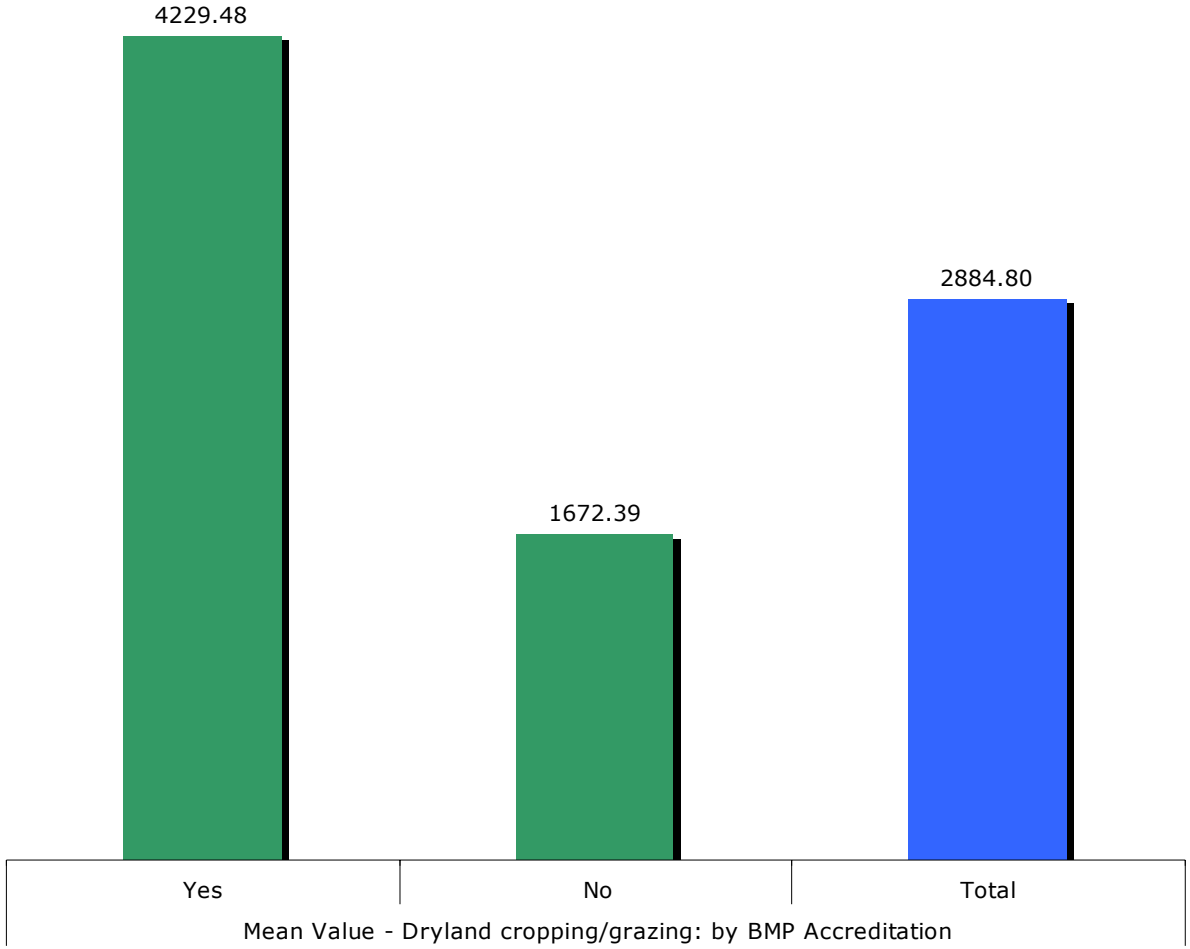
Are BMP Accredited	Highest level of education			
	Year 10 or Below	Finished High School	Some Tertiary Study	Finished Tertiary Study
Yes	20.8	9.4	18.9	50.9
No	29.5	21.3	18.0	31.1

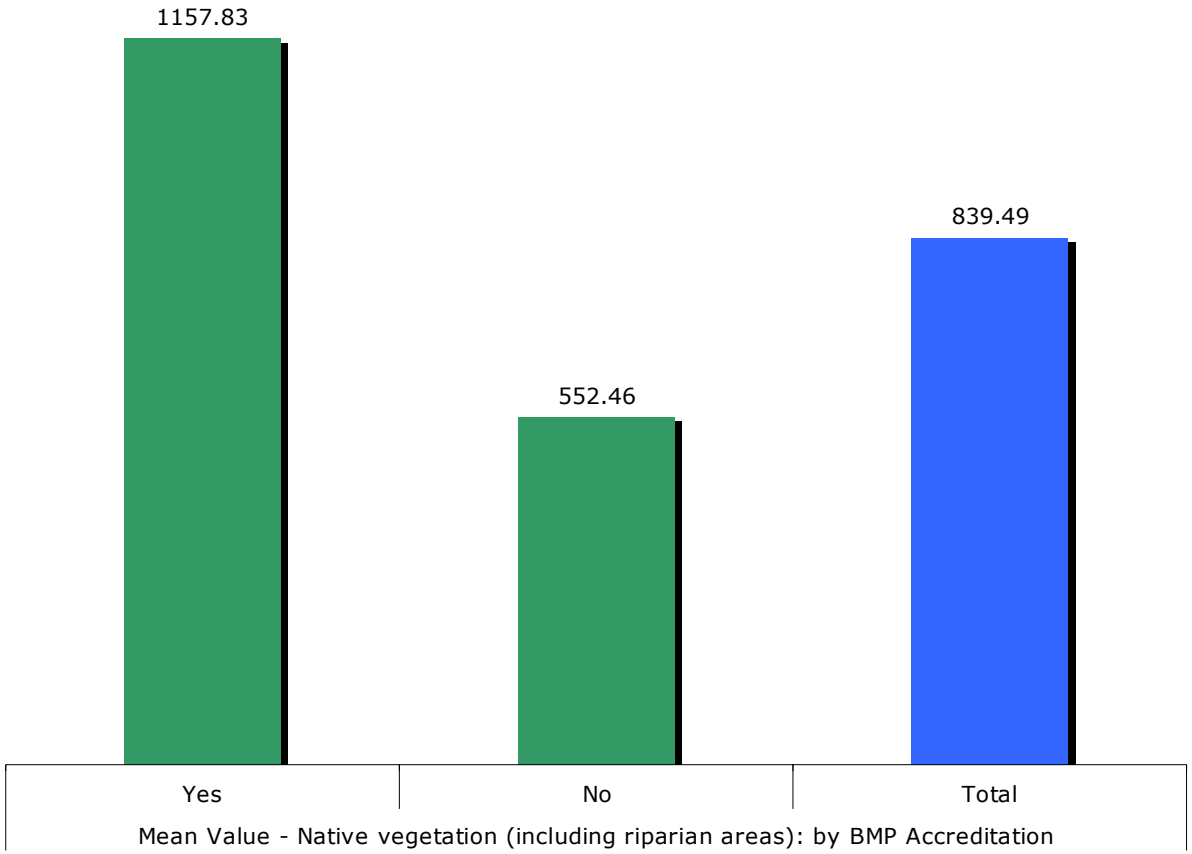


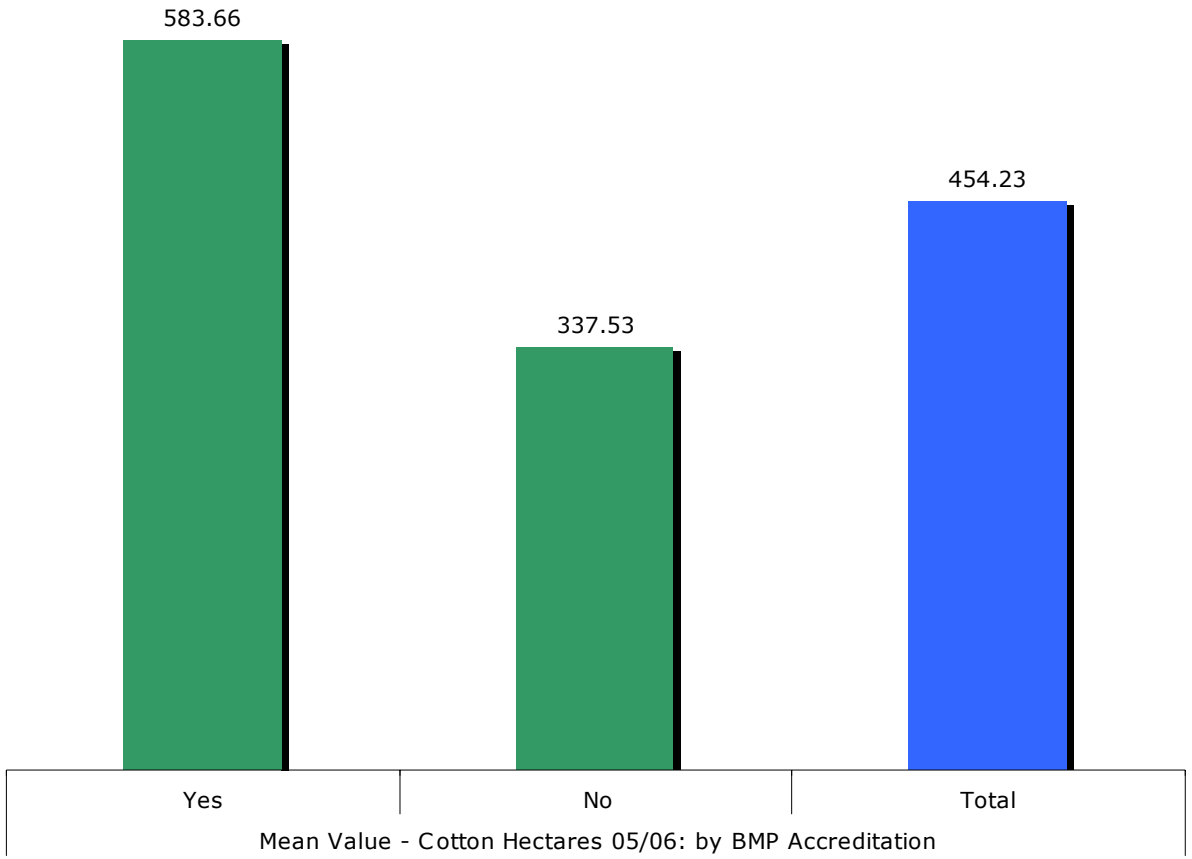
Are BMP Accredited	Do you have any stream or river frontage on your farm?	
	Yes	No
Yes	76.4	23.6
No	64.5	35.5

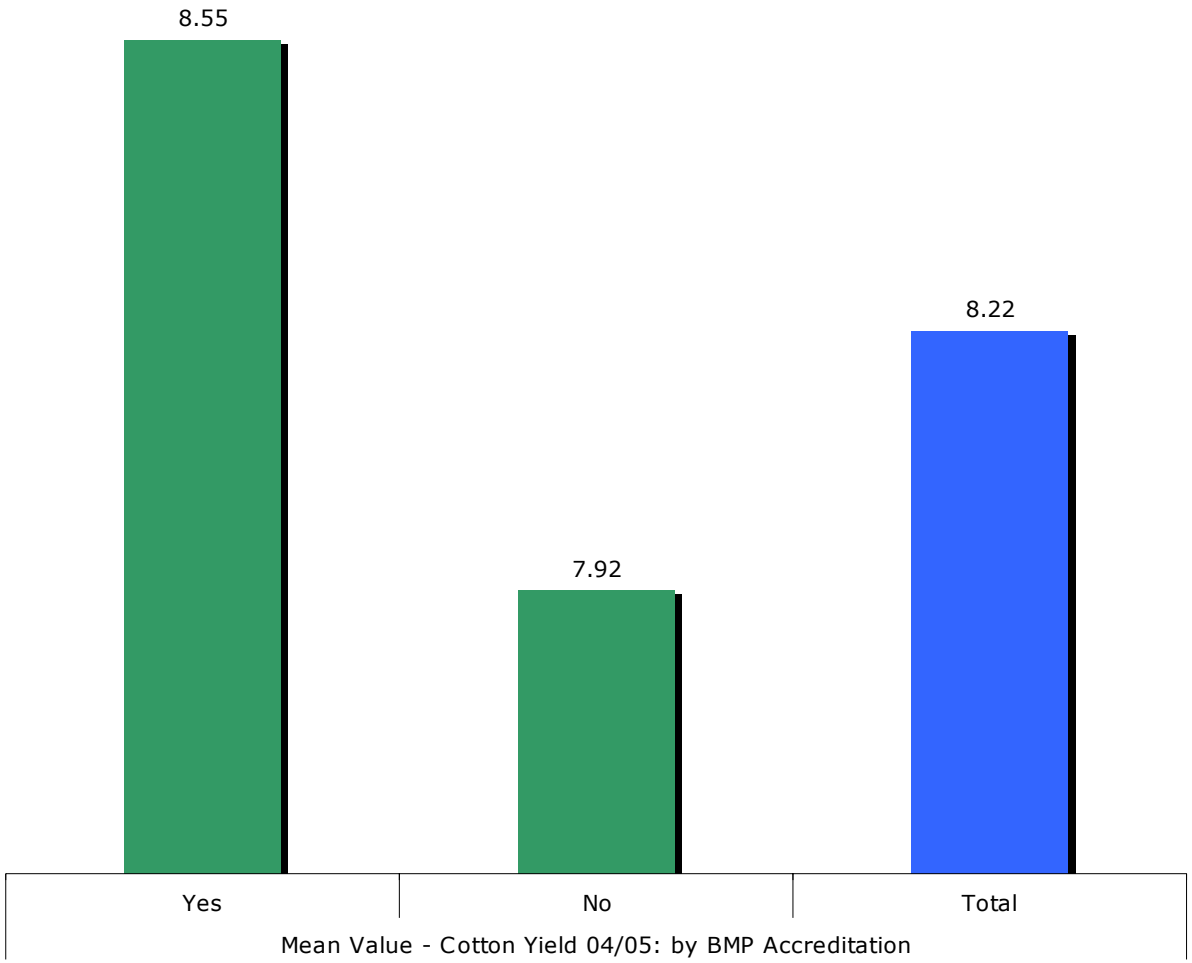


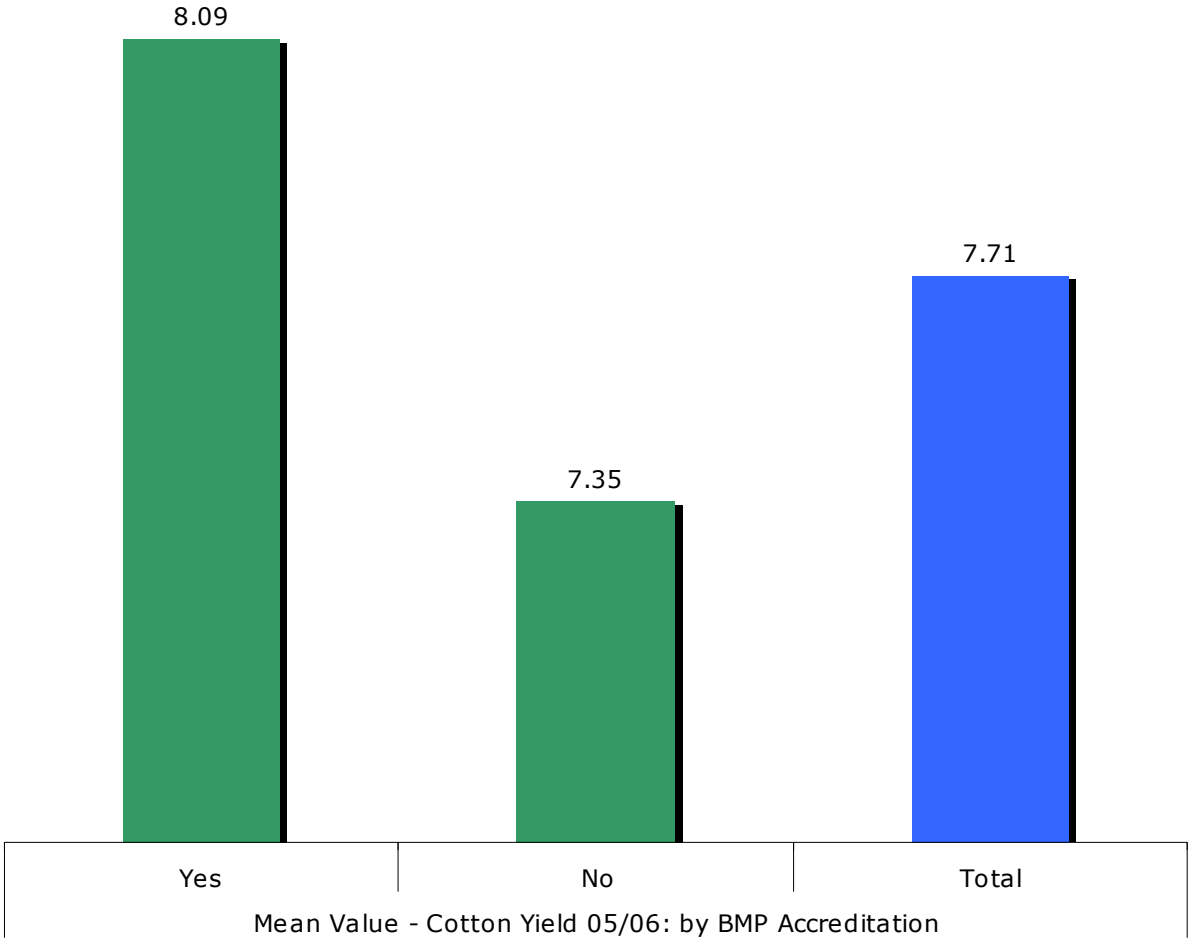

1661.53
876.04
1248.47
Yes
No
Total
Mean Value - Green hectares: by BMP Accreditation

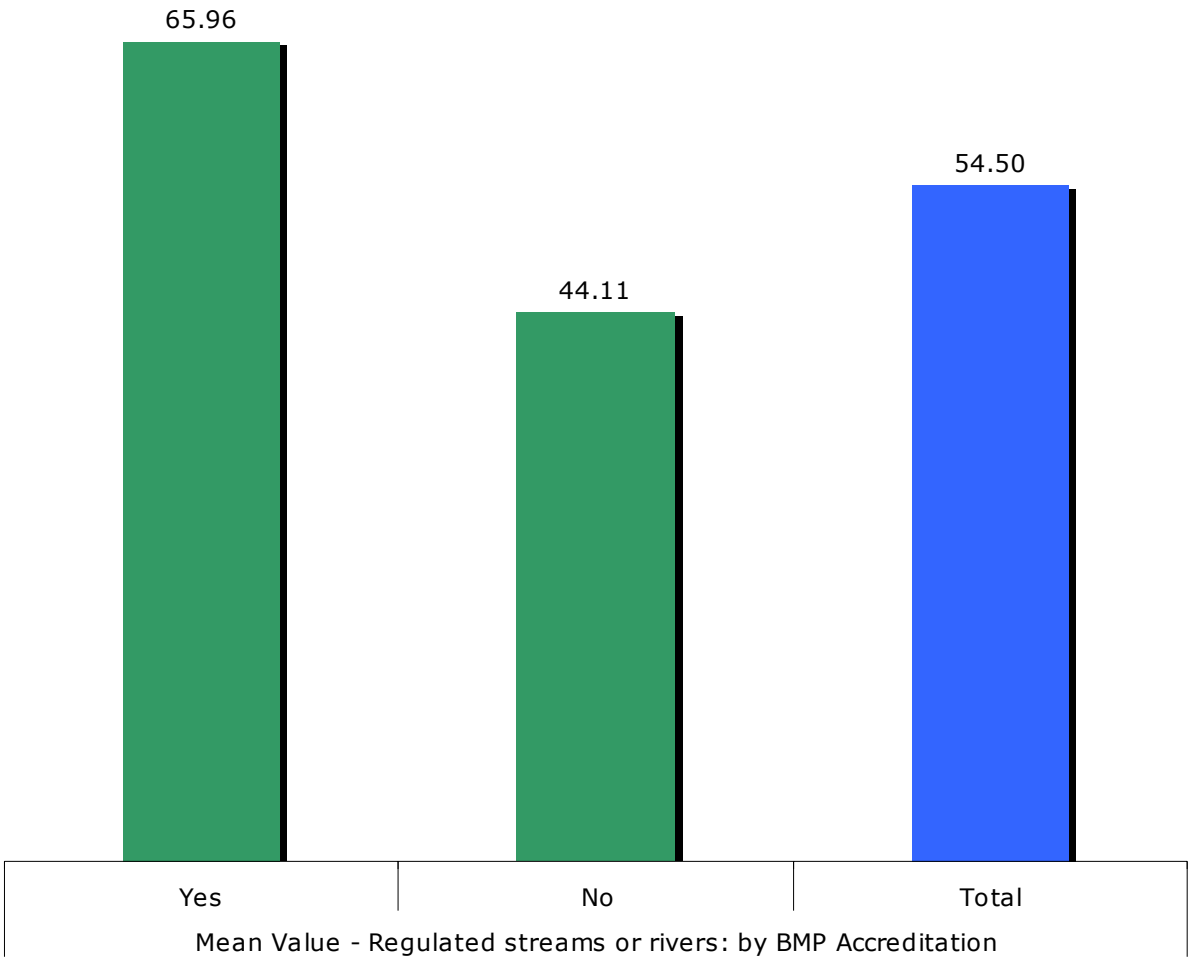

4229.48
1672.39
2884.80
Yes
No
Total
Mean Value - Dryland cropping/grazing: by BMP Accreditation

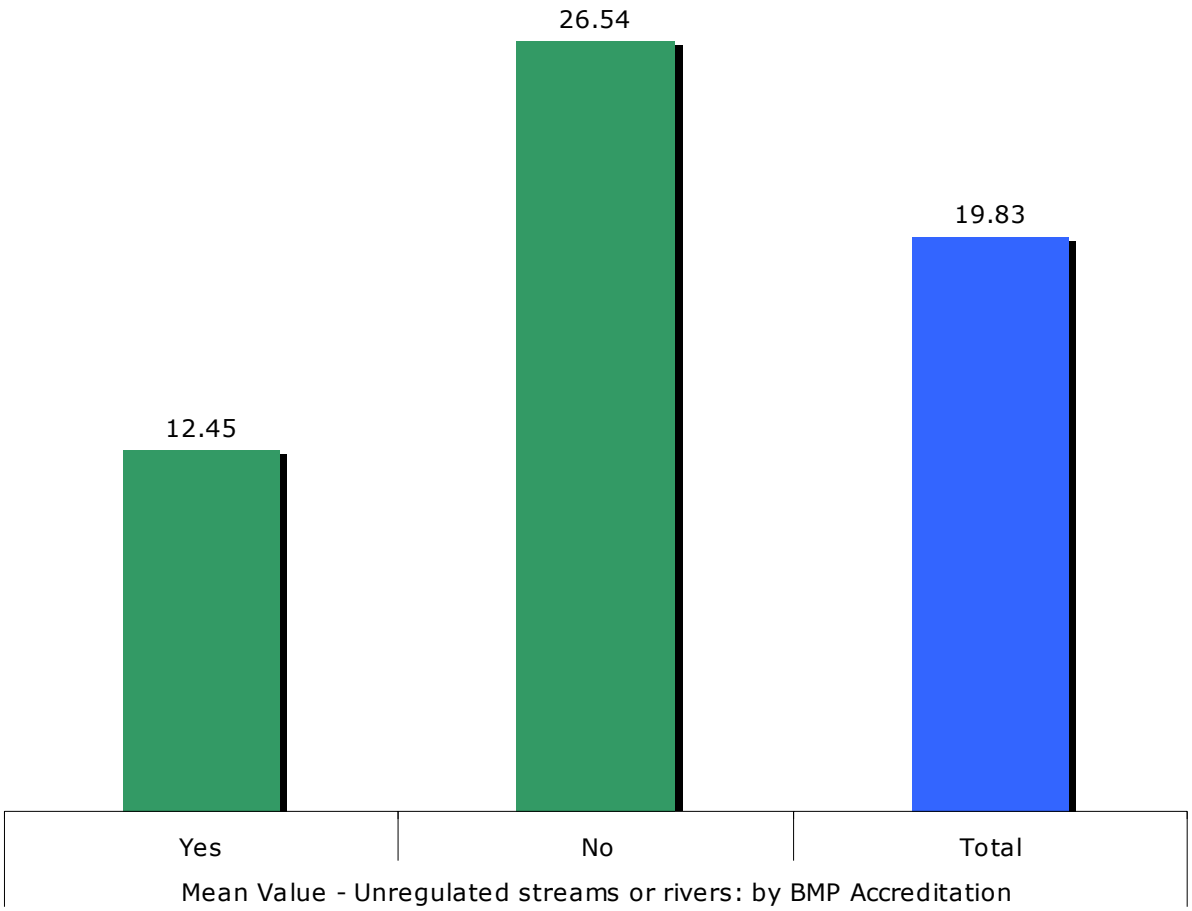

1157.83
552.46
839.49
Yes
No
Total
Mean Value - Native vegetation (including riparian areas): by BMP Accreditation

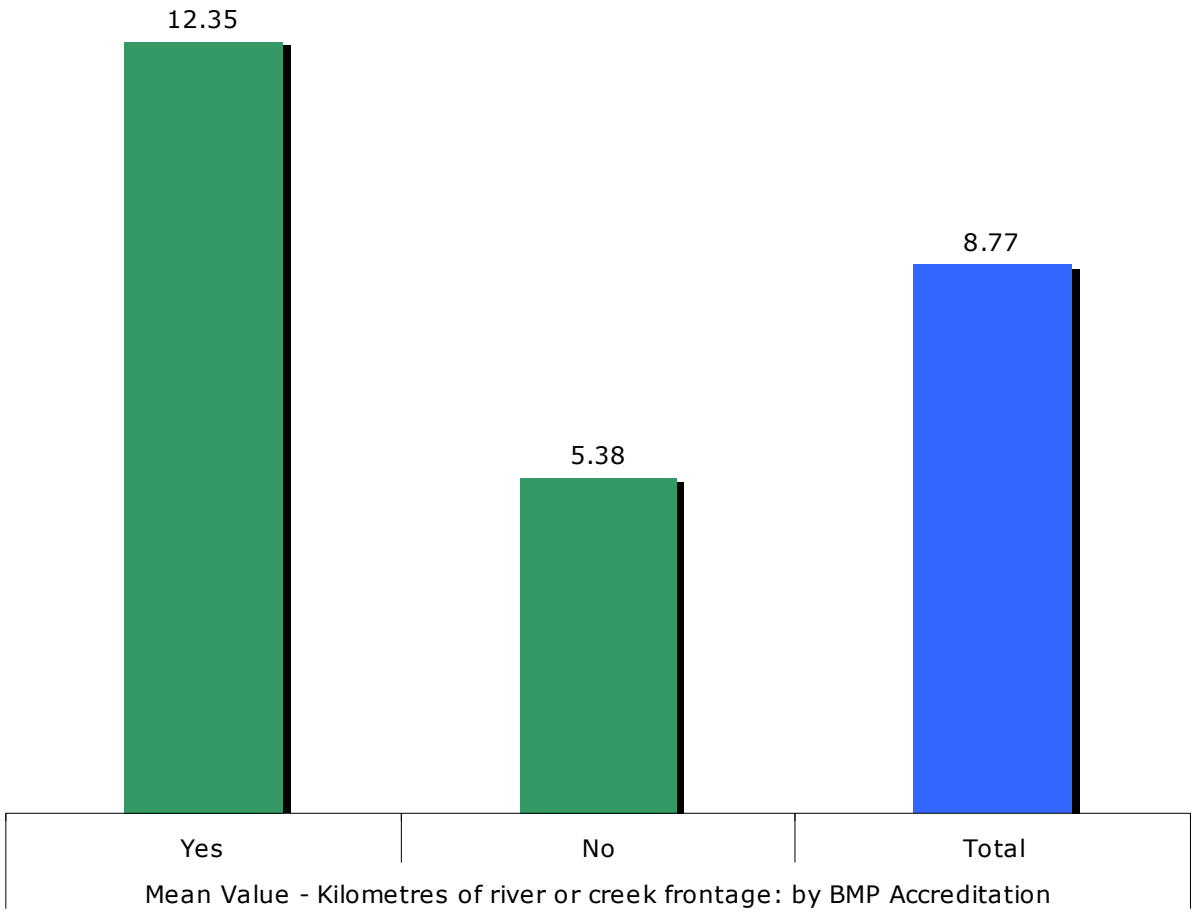

583.66
337.53
454.23
Yes
No
Total
Mean Value - Cotton Hectares 05/06: by BMP Accreditation


8.55
7.92
8.22
Yes
No
Total
Mean Value - Cotton Yield 04/05: by BMP Accreditation


8.09
7.35
7.71
Yes
No
Total
Mean Value - Cotton Yield 05/06: by BMP Accreditation


65.96
44.11
54.50
Yes
No
Total
Mean Value - Regulated streams or rivers: by BMP Accreditation


26.54
19.83
12.45
Yes
No
Total
Mean Value - Unregulated streams or rivers: by BMP Accreditation


12.35
5.38
8.77
Yes
No
Total
Mean Value - Kilometres of river or creek frontage: by BMP Accreditation

Appendix: The 2006 Cotton Grower Feedback Survey

Cotton Grower Feedback Survey

Dear Grower

This is the Fourth Annual Cotton Grower Feedback Survey conducted by Cotton Consultants Australia. Information about how growers view important issues regarding the supply chain, Industry Research and Development and the products that are used annually on cotton crops in Australia has been improved by contributions from growers over previous years. We are back to you again this year to keep our level of knowledge about how the industry is changing up to date.

One of the main aims of this survey is to gain an understanding of the range of farms that grow cotton and how they differ in terms of the systems and methods they use. **By taking time to complete this survey, you will be helping suppliers and industry research teams to better understand the situation you are dealing with. This information will result in improved services and innovative research outcomes that have your needs as their primary focus.**

The questionnaire has three sections. First we need some information about your situation so that we can examine the responses in terms of your production system. The second section gathers information about the role of your consultant on the farm, and how you see the future for the services they bring to your business. Lastly, we are seeking feedback on farming practices and the types of decisions you have to make in your management.

All responses to this survey will be aggregated and reported in four zones, Northern, Border Districts, NSW North and Southern cotton regions. This will ensure that no individual respondent can be identified, allowing you to make honest and frank assessments throughout. **Confidentiality is assured.** As part of the University of New England, all research conducted by IRF Cotton Research must comply with the University's ethical guidelines.

As a participating grower, you will receive a summary report of the findings for your information and records. If you have any questions regarding this survey, please feel free to contact me on 02 6773 3077 or email on Brendan.Doyle@une.edu.au

Thank-you for your help with this important industry analysis. If you could post this survey in the reply-paid envelope by **Monday July 3**, it would be most appreciated. Widespread involvement by growers will give this information the credibility to heavily influence suppliers to the industry and make a difference to your consultant's association.

Best regards

Brendan Doyle
IRF Cotton Research

Mailing ID «Code»

10th June, 2006

Section 1 – Your Farm and You

In this section we need a little information about you and your farming operation.

(1) Are you one of the primary decision makers on the farm? Yes ❒ No ❒

(2) Year of birth? 19_____ and year you were first involved in cotton _____

(3) Would you please indicate your highest level of education

❒ Year 10 or Below ❒ Finished High School

❒ Some Tertiary Study ❒ Finished Tertiary Study

Other _____

(4) How many hectares do your cropping enterprises cover?

_____ Total hectares, including _____ Green hectares

_____ Dryland cropping/grazing _____ Native vegetation (including riparian areas)

(5) Please indicate approximately how many hectares of the following crops you grew over previous years, and your best estimate for how much you will plant in the coming season

	2004/05	2005/06	2006/07?
Cotton	_____	_____	_____
Winter Cereals	_____	_____	_____
Winter Oilseeds	_____	_____	_____
Summer Cereals	_____	_____	_____
Summer Oilseeds	_____	_____	_____
Other _____	_____	_____	_____
Other_____	_____	_____	_____

(6) Please indicate any livestock production that you are involved in. Please list types of livestock and numbers.

No. Head _____ Beef Cattle

No. Head _____ Sheep for Wool

No. Head _____ Sheep for Meat

(7) Please indicate the average yield across your cotton areas -

2004/05 _____ Bales per hectare, 2005/06 _____ Bales per hectare

(8) Could you please give the break-down of gene stacks for your 2005/2006 crop, and provide a "best estimate" for the 2006/2007 season?

	Conventional	Conventional RR	Bollgard	Bollgard RR
2005/2006	_____%	_____%	_____%	_____%
2006/2007	_____%	_____%	_____%	_____%

(9) Please indicate how much irrigation water you would have available if you had 100% of total storage, allocation and other sources - _____ Megalitres
What percentage of this total is currently available for next season? _____%

(10) Please indicate the number of staff that you employed in the **2005/06** season? (Please include your own personal management and labour and any family members that you employ.)

Full Time Staff _____ Part Time Staff _____ Casual Staff _____

(11) Please indicate whether you have, have done, or are doing, the following:

On farm water storage	❒ Yes	❒No
Follow BMP guidelines	❒ Yes	❒No
Are BMP Accredited	❒ Yes	❒No
Eight-row equipment	❒ Yes	❒No
Twelve-row equipment	❒ Yes	❒No
Measure water use efficiency	❒ Yes	❒No
Monitor ground water levels	❒ Yes	❒No
Measure soil salinity on your farm	❒ Yes	❒No
Measure soil sodicity on your farm	❒ Yes	❒No
Measure soil organic content quality	❒ Yes	❒No
Have soil erosion risks assessed	❒ Yes	❒No
Some overhead irrigation systems	❒ Yes	❒No
Some drip irrigation systems	❒ Yes	❒No
Your own pickers and other harvesting plant	❒ Yes	❒No
Use contract picking crews	❒ Yes	❒No

(12) Aside from rainfall and water harvested on farm, roughly what percentage of water used for irrigation on the farm comes from the following sources?

Regulated streams or rivers	_____ %
Unregulated streams or rivers	_____ %
Ground water	_____ %
Total	**100 %**

(13) Do you have any stream or river frontage on your farm? ❒Yes ❒No
If yes, approximately how many kilometres? _____

(14) Have you had any interaction with your Catchment Management Authority or Regional Body? ❒Yes ❒No

Comments? _____

_____

_____

(15) Please list the break-up of chemical application methods used in an average season in percentage terms. Assuming average seasons in the next few years, do you think the listed chemical application methods will increase, decrease or stay about the same over the next few years across your cotton areas? (Please Tick ☑)

	Break-up	Increase	Decrease	Stay about the same
Ground application using own equipment	____%	❒	❒	❒
Ground application using contractor	____%	❒	❒	❒
Application by air	____%	❒	❒	❒
Total	**100 %**			

(16) There are a range of views held by growers with respect to various trends and practices that form current thinking in the industry today. Please give your opinion on the following statements by indicating your level of agreement or disagreement. (Please Tick ☑)

	Totally Agree	Some-what Agree	Neither Agree nor Disagree	Some-what Disagree	Totally Disagree
Measuring **Water Use Efficiency is important** in the management of our operation.	❒	❒	❒	❒	❒
I find that in our situation, calculating a **Water Use Efficiency figure is a relatively easy thing to do.**	❒	❒	❒	❒	❒
If a new product looks like being effective in our situation, **we will generally use it** as soon as it is available.	❒	❒	❒	❒	❒
Bollgard yields were generally a bit higher than comparable Conventional fields.	❒	❒	❒	❒	❒
I can continue to farm productively using my current farming practices **for the next 50 years**.	❒	❒	❒	❒	❒
There is adequate information available for me to **calculate nitrogen efficiency** on my farm.	❒	❒	❒	❒	❒
Soil health is an important issue to me.	❒	❒	❒	❒	❒
Water quality monitoring is very important for our operation.	❒	❒	❒	❒	❒
We are finding **that Canopy Oil is important** in our spraying program.	❒	❒	❒	❒	❒
Over the top herbicides **will be an important tool** for managing weed problems in our situation.	❒	❒	❒	❒	❒
If I were looking for information during the growing season **I would use the Internet** to find it.	❒	❒	❒	❒	❒
The primary crop **we orientate this farm towards** is normally cotton.	❒	❒	❒	❒	❒
Industry Development Officers (IDOs) are a resource **that I think the industry needs to have.**	❒	❒	❒	❒	❒

	Totally Agree	Some-what Agree	Neither Agree nor Disagree	Some-what Disagree	Totally Disagree
Using new technology on the farm can be risky, but **I will generally trial something new early on** to decide if it is right for our farm.	❒	❒	❒	❒	❒
I think that there are **real and tangible benefits** associated with foliar fertilisers in our situation.	❒	❒	❒	❒	❒
It is **rare** that any other crop **can deliver a higher gross margin** per megalitre than cotton.	❒	❒	❒	❒	❒
The opportunity to **extend payment terms for chemical purchases** would be welcome in our situation.	❒	❒	❒	❒	❒
Considering everything, **Roundup Ready varieties are better** in our situation than over the top products like Staple or Envoke.	❒	❒	❒	❒	❒

Section 2 – Your Consultant

This section seeks your thoughts and opinions on the services and advice you receive from your consultant. Consultants are generally a member of Cotton Consultants Australia Inc (CCA). The CCA undertakes to promote and enhance cotton consultancy as a profession and believes that grower's needs should drive the future education and training that is made available to consultant members.

All comments will be treated in the strictest confidence. All responses are aggregated so that no respondent or their consultant can be identified. Honest assessments and suggestions will feed directly into the policy reviews undertaken by the CCA. These policies directly influence the services you receive from your consultant.

(17) Your consultant works to add value to many aspects of your business. Would you please list the three main areas of your business where your consultant delivers the greatest benefit?

1. _____
2. _____
3. _____

(18) Please tick the services your consultant provides to your business, and indicate whether you expect you will use more or less of these services in the future.

	Services Used Now	Use of consultant in the future		
		Less	Same	More
Pest management	❒	❒	❒	❒
General agronomic advice	❒	❒	❒	❒
Transgenic crop management	❒	❒	❒	❒
Rotation crop selection	❒	❒	❒	❒
Nutrition advice	❒	❒	❒	❒
Application advice	❒	❒	❒	❒
Irrigation scheduling	❒	❒	❒	❒
Water Use Efficiency	❒	❒	❒	❒
C Probes	❒	❒	❒	❒
Natural Resource Management	❒	❒	❒	❒
Accounting advice	❒	❒	❒	❒
Market advice	❒	❒	❒	❒

(19) Are there any services not provided by your consultant now (or that are provided someone else) that your consultant could bring to your business in the future? Please list in order of importance.

1. _____
2. _____
3. _____

(20) Consultants in the industry are constantly updating their knowledge through training and working with industry researchers to understand production systems. Are there any particular areas that you believe are important for your consultant to undertake training in?

_____

_____

_____

(21) There may be areas of your operation that you would like further training or information on. Are there any training or information sessions which you would like to undertake in conjunction with your consultant?

1. _____
2. _____
3. _____

Section 3 – Farming Practices

This final section seeks your thoughts and opinions on your farming system. By providing the industry with an overview of your farming operation, you will assist them in finding ways to provide you with improved research and services. Again, understanding what is important to growers will allow the wider industry to better meet your needs. Your considered opinions are very important.

(22) On average, how much fertiliser do you apply per season to your cotton crop? Please include rate applied in kilograms per hectare.

	Pre-Season	During Season
N, kg per Ha. Solid ❒	_____	_____
N, kg per Ha. Gas ❒	_____	_____
P, kg per Ha.	_____	_____
K, kg per Ha.	_____	_____
Other (e.g. zinc, boron), _____ kg per	_____	_____
Other (e.g. zinc, boron), _____ kg per	_____	_____

(23) Thinking back 4 or 5 seasons ago, what was the average rate of fertiliser you applied? Please include rate applied in kilograms per hectare.

	Pre-Season	During Season
N, kg per Ha. Solid ❒	_____	_____
N, kg per Ha. Gas ❒	_____	_____
P, kg per Ha.	_____	_____
K, kg per Ha.	_____	_____
Other (e.g. zinc, boron), _____ kg per	_____	_____
Other (e.g. zinc, boron), _____ kg per	_____	_____

(24) Which method(s) do you use to determine how much fertiliser is required?

- ❒ Soil test
- ❒ Leaf/petiole test
- ❒ Field history
- ❒ Other, please describe: _____

(25) Do you monitor soil structure? ❒Yes ❒No

If yes, how often do you undertake this? _____

What indicators do you use to monitor soil structure?

- ❒ Visual inspection of field
- ❒ Crop condition
- ❒ Other, please describe: _____
- ❒ Soil pits
- ❒ Field and boundary tests

(26) What management techniques do you employ to minimise soil movement around your farm?

- ❒ Monitor high risk areas for signs of erosion
- ❒ Maintain good ground cover where possible
- ❒ Reduce irrigation run-off
- ❒ Use buffer zones, vegetative strips or silt traps
- ❒ Limit furrow lengths
- ❒ Laser level fields
- ❒ Use temporary ponds to hold runoff waters
- ❒ Design drains to minimise water velocities
- ❒ Develop a storm water management plan

(27) On average, what is your frequency of cotton production?

- ❒ Less than one cotton
- ❒ One cotton
- ❒ Two cotton
- ❒ Three cotton
- ❒ Four cotton, one rotation
- ❒ Five cotton, one rotation
- ❒ Six cotton, one rotation
- ❒ More than six years cotton

(28) Some growers like to collect information on the quality of their surface and ground water. If you collect this information, could you please indicate whether you are doing the following?

		Pre-Season	During Season
Don't collect water quality information		❒	❒
Monitor on farm water quality and measure for:	EC	❒	❒
	SAR	❒	❒
	pH	❒	❒
	Other	❒	❒
Use other off farm data sources		❒	❒

(29) Do you calculate water use efficiency in terms of bales/megalitre? ❒ Yes ❒ No

Could you please provide an indication of last year's value? _____ bales/megalitre

Does this include rainfall? ❒ Yes ❒ No

How much rainfall was included in last season's values? _____ mm

(30) There are a number of ways to measure water delivered to the paddock, and moisture levels present in the profile. Would you please describe the method(s) you use?

_____

_____

(31) When is rainfall taken into account in WUE measurements?

_____

_____

(32) Some growers have areas on the farm that contain native vegetation and yet are still an important resource to the farm. How do you manage these areas on your farm?

❒ Grazing use (extensive/continuous)
❒ Fenced (selectively grazed)
❒ Not grazed
❒ Farmed
❒ Control pest/weeds
❒ Control re-growth
❒ Plant native vegetation/trees
❒ Leave undisturbed
❒ Control vehicle access
❒ Control erosion
❒ Other, please describe:

_____

(33) Some cotton farms are located along creeks and rivers, and growers manage these areas in different ways. Please indicate some of the ways in which you manage these areas.

❒ Farm does not have a creek or river frontage
❒ Grazing use (extensive/continuous)
❒ Fenced (selectively grazed)
❒ Not grazed
❒ Control pest/weeds
❒ Plant native vegetation/trees
❒ Leave undisturbed
❒ Control vehicle access
❒ Provide alternative watering points for stock
❒ Maintain filter strips and buffer zones near areas

(34) There are a range of native plants and wildlife on farms. When managing these, which of the following assessments do you carry out?

❒ No monitoring
❒ Monitor beneficial insects
❒ Monitor feral animal species

Some farmers also conduct extensive monitoring of a range of native species. Would you please indicate if you also carry out the following assessments?

❒ Monitor water birds
❒ Monitor open woodland birds
❒ Monitor bats
❒ Monitor frogs
❒ Monitor native fish
❒ Monitor reptiles
❒ Monitor other native animals

(35) When you think about the health of your soil, what do you consider to be the most important issues?

	Please rank in order from 1 to 9, where 1 = most important, 9 = least important	e.g.
Nutrition and fertility	_____	3
VAM	_____	7
Pesticide residues	_____	4
Organic carbon	_____	9
Plant pathogens	_____	8
Crop yield	_____	1
Compaction	_____	5
Sodicity	_____	6
Stubble management/retention	_____	2

(36) Over the last 10 years, do you think your soil health has:

- ❒ Improved
- ❒ Declined
- ❒ Remained steady
- ❒ Unsure

(37) How often do you conduct soil tests in any one field?

- ❒ Every year
- ❒ Before every cotton crop
- ❒ No set strategy

(38) Would you please indicate your preferred method/s for obtaining more information about current trends within the industry?

- ❒ Post
- ❒ Email
- ❒ Industry websites
- ❒ Industry newsletters/magazines
- ❒ Workshop/field days
- ❒ Conferences and courses
- ❒ Visits from company reps
- ❒ Advertisements in the media
- ❒ Other, please describe: _____

(39) What kind of Internet connection do you have on your farm?

- ❒ A standard dial-up using a normal telephone line
- ❒ A high speed broadband or ISDN service
- ❒ Other, please specify: _____
- ❒ Don't have an Internet connection but have a computer
- ❒ Don't have a computer

(40) Could you please detail the different types of spray nozzles you use, and describe as outlined below?

	Brand/Type	Angle	Size	Water Rate (L/Ha.)
Soil Products	_____	_____	_____	_____
Systemic/Contact	_____	_____	_____	_____
Fungicides	_____	_____	_____	_____

(41) Is water quality a concern in relation to your spray activities? ❒ Yes ❒ No
What measures do you undertake to ensure that your water quality is of a suitable standard?

_____

_____

(42) When contractors are spraying on your farm, there are a range of risks and responsibilities which both you and the contractor need to address. For your situation, could you please list the responsibilities for you, and for the spray contractor?

	Your Responsibilities	Spray Contractor's Responsibilities
Ground Rig	_____	_____
	_____	_____
	_____	_____
	_____	_____
Aerial Application	_____	_____
	_____	_____
	_____	_____
	_____	_____

(43) Could you please comment on droplet size as it applies to spraying across your farm?

_____

_____

(44) Would you please comment on any **yield** and **quality** differences between Conventional and Bollgard cotton?

_____

_____

(45) Thinking about refuge crops in the season just finished, would you please rate the quality of the refuges you saw in your district, in terms of refuge attractiveness and effectiveness in managing resistance in Bollgard.

High Quality	____ %
Medium Quality	____ %
Low Quality	____ %
Total	**100%**

(46) If you grew refuge crops, what did you grow?

_____ Percentage ____ % _____ Percentage ____ %

_____ Percentage ____ % _____ Percentage ____ %

(47) There are a range of different crops that can be planted as refuge. Growers have expressed interest in finding a standardised way to calculate and account for the true cost of growing different refuge crops as the percentage of Bollgard planted changes.

Could you please indicate whether information along these lines would be useful to you?

Extremely Useful	Very Useful	Somewhat Useful	Only a bit Useful	Not Useful
❒	❒	❒	❒	❒

Please list any further comments that you would like your consultants, researchers, or supplier industries to take on board.

Thank-you for your time in providing this important Industry information. A summary of the results will be forwarded to you.