



2009 Cotton Consultants Australia Report



Australian Government
Cotton Research and
Development Corporation

Qualitative Consultant Feedback

*Analysis of the
2008–09 cotton season*

Compiled by Helen Dugdale

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1 INTRODUCTION

Crop Consultants Australia Inc (CCA) is the national association covering agronomists working in the cotton industry throughout NSW and Queensland. CCA commenced surveying its members and their clients in 1982 in response to a need for reliable product usage records (quantities) and forecasts of product requirements for the following seasons, and to provide key indicators to chemical manufacturers of usage trends. In previous years, surveys have been conducted of both CCA consultants and cotton growers; however, the 2009 survey involved 23 consultants with questions about themselves and the growers they consult for. Overwhelmingly, respondents were independent consultants, with two employed by resellers.

This survey was conducted in May and June 2009, with questions relating to the 2008–09 cotton season. This season was still under drought conditions, and it should be noted that limited water would have affected a number of management decisions.

A separate quantitative survey was undertaken and reported by CCA.

Methodology and analysis

The Cvent® online survey program was used for the first time in 2009 and provides a useful method of sorting data and compiling results into convenient graphs and tables. Interpretations are up to the user. The 23 consultants surveyed represented about 57% of cotton industry hectares for the 2008–09 season. Their responses to the 47 questions were entered into the Cvent system for analysis. Respondents did not necessarily answer all questions and the number of respondents is noted next to each question.

For many of the questions where information has been aggregated, *specific information* for each region is available from CRDC.

Disclaimer

The Cotton Research and Development Corporation (CRDC) provide the information in this publication to assist understanding of the agronomic performance of the Australian cotton industry. CRDC accepts no responsibility or liability for the accuracy or currency of the information contained in this publication, nor for any loss or damage caused by reliance on the information and management approaches surveyed. While the 2009 survey contains information that should be of value to extension officers and researchers in defining future industry needs and as an information source in seeking to improve industry management practices, users of this publication must form their own judgement about the information it contains.

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2 ABOUT THE RESPONDENTS

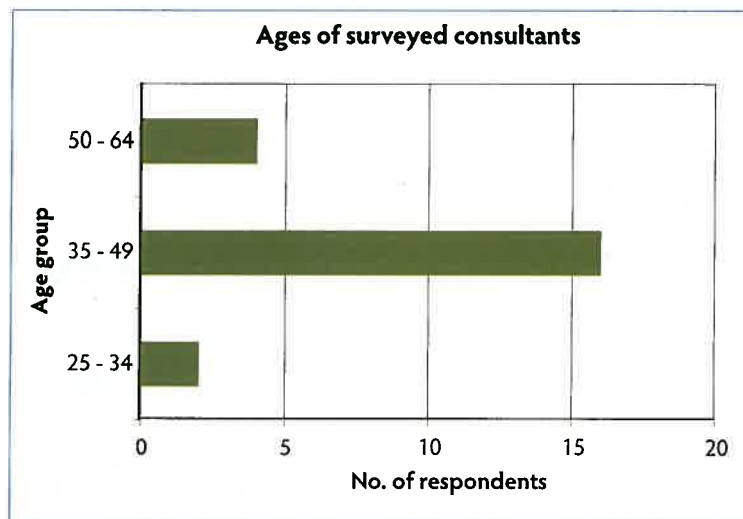
SUMMARY

Of the 23 consultants who responded to the 2009 CCA survey, almost three quarters were in the 30–49 age bracket. 22 of the consultants have been in the industry for more than ten years (since before the introduction of GM cotton) and almost half for more than 20 years. All the consultants possess post-secondary qualifications, with some 81% possessing a bachelor degree or higher. Notably, all respondents took up a career in agriculture for one or more of three reasons: family background, lifestyle choice or empathy with farmers.

QUESTION 1

What is your age group?

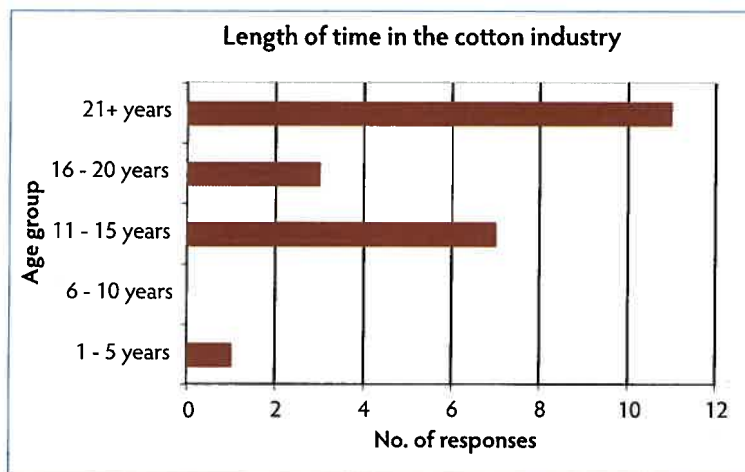
(22 respondents)



QUESTION 2

How long have you been involved in the cotton industry?

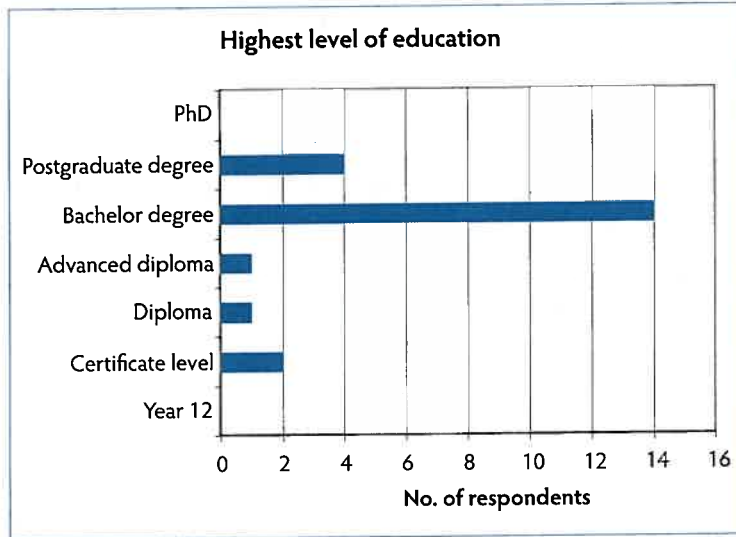
(23 respondents)



QUESTION 3

Please indicate your highest level of education.

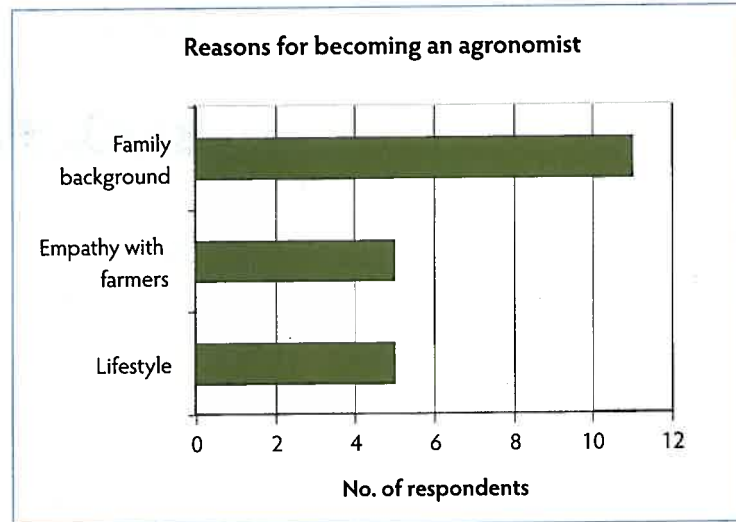
(22 respondents)



QUESTION 4

What attracted you to a career in agriculture?

(21 respondents)



QUESTION 5

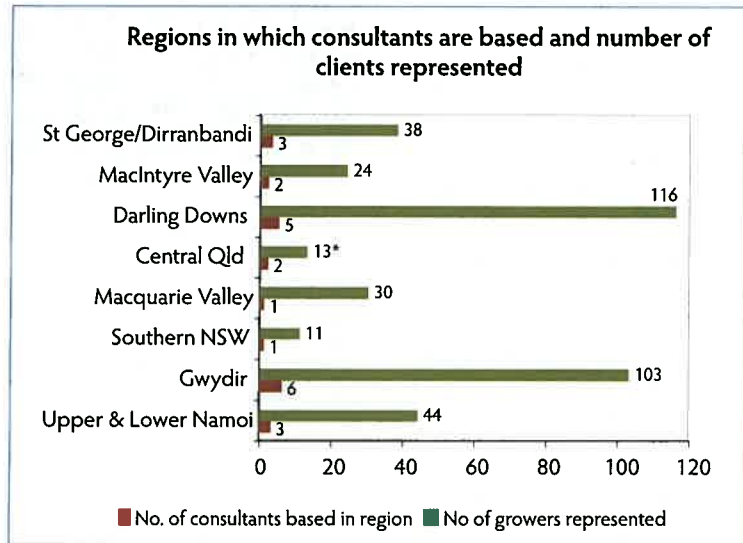
In which region are your clients based;

and

QUESTION 7

How many clients do you provide services to?

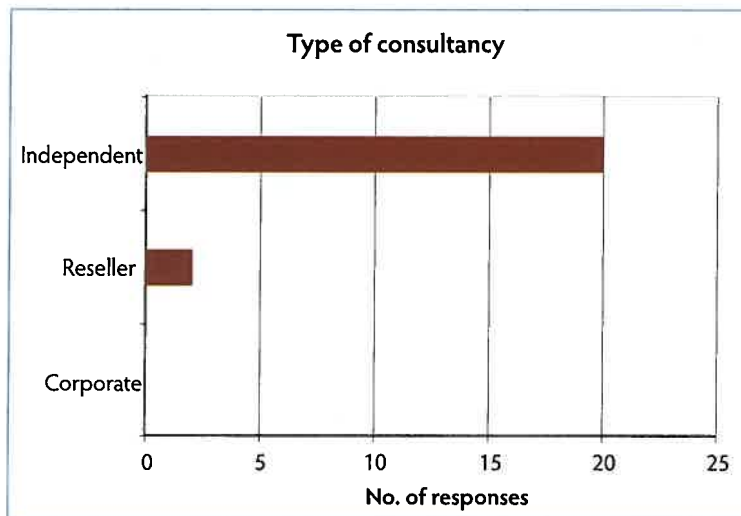
(23 respondents)



QUESTION 6

Please select your operation type.

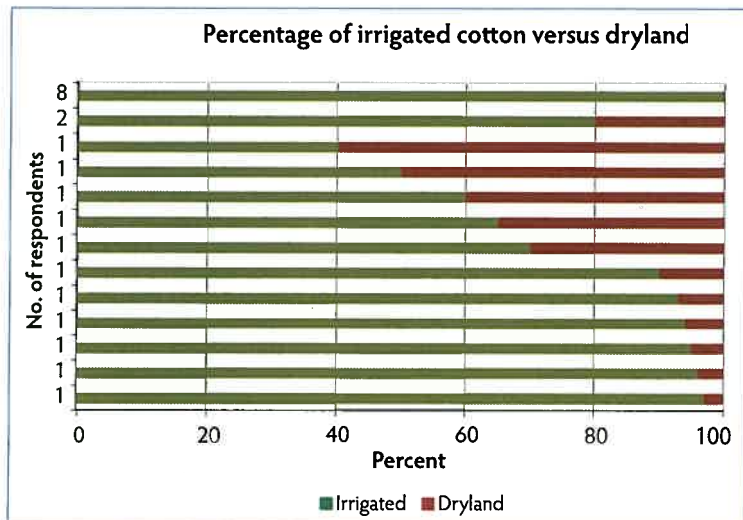
(22 respondents)



QUESTION 8

Please indicate the approximate percentage of irrigated vs dryland cotton you were responsible for in 2008–2009.

(23 respondents)



QUESTION 9

- **What was the approximate number of hectares dedicated to each type of crop you were responsible for in 2008–09?**
- **Forecast the area of cotton that will be grown in 2009–10, presuming average rainfall and a similar water allocation to the previous year.**
- **How much would be grown in 09–10 if water was not limited.**

(23 respondents)

TYPE OF CROP	Crop grown/ forecast (hectares)	No. of Responses	Actual hectares 08–09	Forecast hectares 09–10	Forecast hectares 09–10 if full water allocation available
COTTON	Conventional	9	5,121	4,502	8,020 (78% higher)
	BG II	10	4,287	12,782	21,919 (71% higher)
	Conventional RR	10	1,774	500	950 (90% higher)
	BGII RR	14	6,942	2,300	200 (91% lower)
	Conventional RR Flex	14	5,235	6,859	10,880 (58% higher)
	BGII RR Flex	22	56,464	66,297	111,788 (68% higher)
OTHER CROPS	Sorghum	18	36,489	22,550	22,550 (no change)
	Wheat	22	223,706	110,535	51,700 (53% lower)
	Corn	16	7,313	3,540	2,900 (18% lower)
	Faba beans	12	8,240	7,285	1,735 (76% lower)
	Chick peas	21	46,738	31,937	14,529 (54% lower)
	Vetch	4	3,408	200	200 (no difference)
	Barley	15	47,743	11,442	7,650 (33% lower)
	Other	15	18,890	3,981	4,186 (5% higher)

* One of the two consultants in Central Queensland did not indicate his/her number of clients.

3 MANAGEMENT PRACTICES

SUMMARY

Pest management

Pest management

100% of respondents agreed that Integrated Pest Management (IPM) is important in crop management. This is shared by their grower clients, 68% of whom have implemented IPM changes in 2008/09 to ensure they were adopting best practice.

In relation to the use of refuge crops, the most notable aspect of the responses is a questioning of the value of pigeon peas as a refuge crop compared with unsprayed cotton, ranging from outright rejection of pigeon peas to comments on the need to manage them carefully. A number of respondents emphasise the need to look after refuge crops properly (for example, weed control and sufficient water) in order to maximise their effectiveness.

23 respondents commented at length on their level of satisfaction with current whitefly control methods. A number of respondents were satisfied but concerned about cost; however, some respondents expressed a low level of satisfaction with current control methods. The comment of one consultant summed up the majority:

“Concerned with: price; lack of options; lack of effective IPM area wide management; amount of disruptive chemistry still being sprayed; Q-type resistance to Admiral®; lack of consultant protection for below label use rates in Queensland.”

Most notable of the responses regarding the prevalence of insect pests was that 15 indicated that whitefly was more prevalent during the season, with 10 nominating stinkbugs as more prevalent. 10 respondents indicated that mirids were less prevalent. In relation to weeds, 16 stated that Fleabane had been more prevalent and in relation to diseases, 10 indicated that Black Root Rot was less prevalent.

Although 17 of 22 respondents were concerned with honeydew, as can be seen in Question 15, all but two of these were satisfied with the control methods for whitefly (and thus, by definition, for honeydew).

In relation to mirids, one third of respondents indicated more than 50% of their growers sprayed below industry thresholds, with 14 stating that 50% were at the threshold and three indicating that more than 50% of their growers sprayed above industry threshold. This may well be accounted for by regional differences. 56% of respondents said that the greatest threat from mirid damage was at the pre-flowering stage, with 39% nominating the early boll fill stage.

Once again, 23 respondents took the time to comment fully on the tactics that can be employed to minimise herbicide resistance risk, with herbicide rotation and control by cultivation the most commonly cited methods. Significantly, however, while 95% of respondents agreed that managing herbicide resistance is important, only 60% were actively managing it.

In relation to weed control tactics, responses indicated that there have been significant changes over the last five years. 21 of the 23 respondents reported using less weed control tactics than 5 years ago. Most notably, inter-row cultivation and hand chipping were less used by all respondents. Naturally enough, with the development of Roundup Ready FLEX® cotton varieties in the last 5 years, Roundup® in-crop was the exception to this trend, with 20 respondents reporting using this control method more.

Asked which pests, weeds and diseases posed the greatest threat to the continuing profitability of their clients, the greatest insect threat in the 2008–09 season, whitefly was nominated by 87% of respondents, with *Helicoverpa* resistance a close second at 70%. 87% also nominated Fleabane as the greatest weed threat, with a range of other listed as minor threats. The greatest disease threat was from *Fusarium*, nominated by 82%, with Black Root Rot at 43%.

Questioned as to what information would help to increase the uptake of best practice in insect, weed and disease management, 20 out of 23 respondents provided substantive suggestions to increase uptake, with a number providing more than one suggestion. The greatest need was seen to be for case studies, field days, meetings and workshops, and the greatest influence the economic factors involved in production.

Irrigation

In response to a question about tools used by clients to assist in decisions regarding scheduling of irrigations, overwhelmingly, the visual monitoring of crops and weather forecasts were seen as the primary tools. It is worth noting that 17 of the 22 consultants now offer advice in soil water monitoring: a recent development aided by R&D findings.

Soil management

The responses in this area are of interest, providing an illuminating picture of tools that growers do – and do not – use. Of the 23 respondents, 21 reported that their clients use soil tests to assist in decision-making and all the respondents offered advice in this area. At the other end of the scale, no growers used the online Greenhouse Gas Calculator and no respondents offered advice on this tool.

Of 21 respondents, 15 reported clients applying greater amounts of nitrogen than five years previously.

Precision agriculture

Responses confirm that precision agriculture techniques have become widespread in the industry, with navigation systems and yield monitoring the most widely used, followed by variable rate fertiliser application and EM surveys.

Reduced tillage practices

The survey confirmed that reduced till practices have become widespread, no doubt encouraged by the lengthy drought. Of the 22 respondents, 18 reported that over 80% of their clients are using minimum till.

In interpreting the data, it should be noted that growers who have planted GM cotton are required to pupae bust, which involves minimum tillage. Although the data does not indicate whether GM cotton, non-GM cotton, or other crops such as legumes or grain crops are being grown, it can be inferred that where growers practiced no-till, they were not growing GM cotton.

Water quality

About 65% growers test water quality when mixing chemicals, and about 40% test irrigation water quality, with a much smaller percentage testing run-off quality.

Rotation crops

The most commonly reported rotation crops were the winter crops, wheat, barley, triticale and oats, followed by the summer crops, chick peas and sorghum. At the other end of the spectrum, no respondents reported the use of pigeon peas as a rotation crop.

21 of the 23 respondents reported that their clients grew leguminous crops, mainly because of their nitrogen fixing properties. Other common reasons were their role within current rotation plans, the availability of water and the economic benefits they brought.

Climate Change

Of 21 respondents, eight believed no change is currently needed to accommodate climate change. Other respondents cited a better use of water from irrigation and rainfall, the use of minimum tillage and an increased use of other crops in rotation with cotton. Climate change did not feature strongly as a factor for future planning, with drought the main factor planned for, followed by commodity price fluctuations and new technologies. 11 respondents also nominated floods as a planning priority. It should be noted that the questions did not seek to link issues such as drought and floods to climate change.

When asked what information would enable better future positioning in relation to climate change, responses were notably diverse but the most common theme was the need for credible information. A minority of respondents expressed scepticism about the existence of man-made climate change; however, the questions did not explicitly solicit attitudes to the issue and the basic attitudes of other respondents to the issue cannot be gauged.

Fibre quality

As expected, 20 of the 22 respondents nominated varietal selection to suit factors such as soil type, water availability and disease incidence as a major factor in influencing on-farm fibre quality. Changes to irrigation methods and choice of planting time were the next most commonly nominated influences.

Increasing yield

When asked to influence management factors implemented over the past year to increase yield, easily the most popular were water management, nutrient management and varietal choice.

Reducing the cost of production

The most commonly cited practice implemented to reduce costs was minimum tillage, followed by changed planting configurations, reduced labour cost, adjusted nutrient application, improved integrated pest management and variety selection, all of which received the same number of citations.

The use of cotton R&D websites

20 of 22 respondents indicated that they had used the Cotton Catchment Communities CRC website in the past 12 months, citing NutriLOGIC, agronomic information and the Day Degree Temperature Calculator as the most useful elements, followed by information on pests, diseases and water.

16 of the 22 respondents had visited the CRDC website in the past 12 months but provided no further information.

Internet tools and training

Only four consultants responded to the question of what other internet tools they would like to access, or have clients access, to help with their

businesses. Areas nominated specifically were regional evapotranspiration (ET) values to assist with irrigation scheduling, the Cotton Seed Distributors website and all weather websites.

With regard to future training opportunities, the 14 respondents most commonly nominated irrigation, business skills and precision agriculture as the areas where future training would be useful.

Farm health and safety

The principal factors nominated by the 18 respondents as health and safety factors on cotton farms were machinery use, pesticide handling and mental health issues, followed by on-farm waterways and long work hours.

Natural resource management

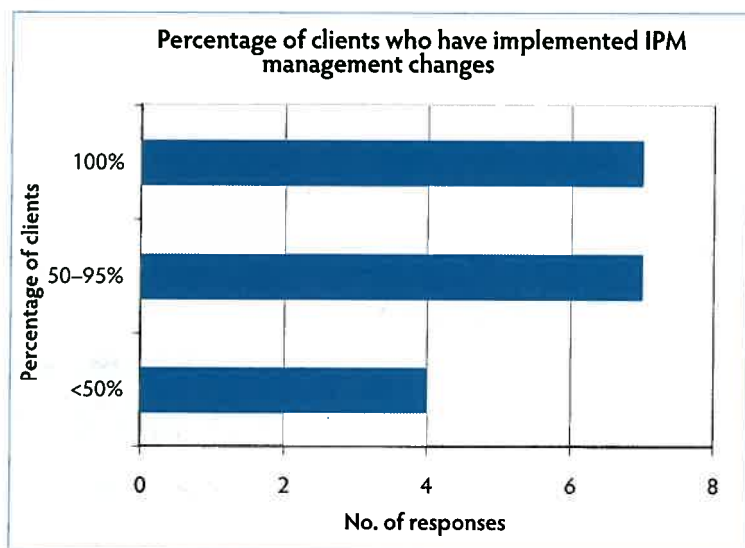
When asked what percentage of their clients actively considers natural resources when making management decisions for their farming systems, eight respondents said that 100% of their clients do so, six said that more than 50% do and four indicated that between 5 and 40% of their clients do.

PEST MANAGEMENT

QUESTION 10

Estimate the percentage of your growers who have implemented changes in management to reflect Integrated Pest Management (IPM) best practice over the 08-09 season.

(18 respondents)



QUESTION 11

Is IPM still important in your business?

(22 respondents)

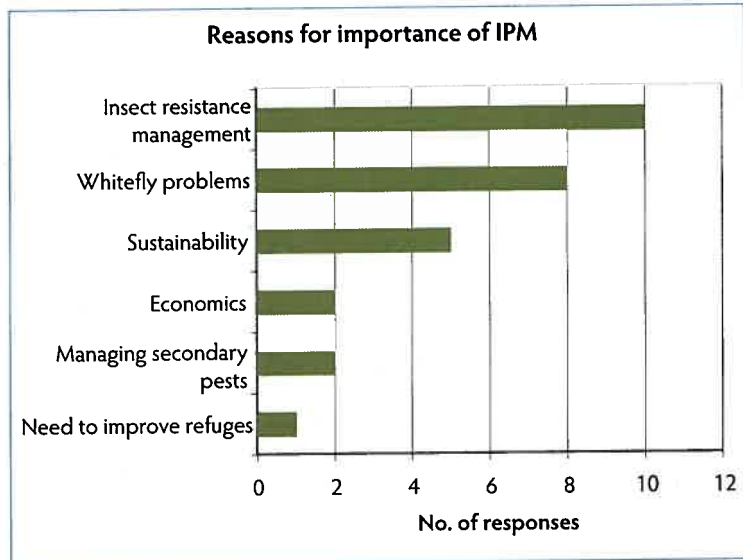
100% agreed that IPM remains important to their businesses.

QUESTION 11B

If IPM is still important in your business, please expand on the reasons.

(22 respondents)

Please refer to the appendix for individual responses.

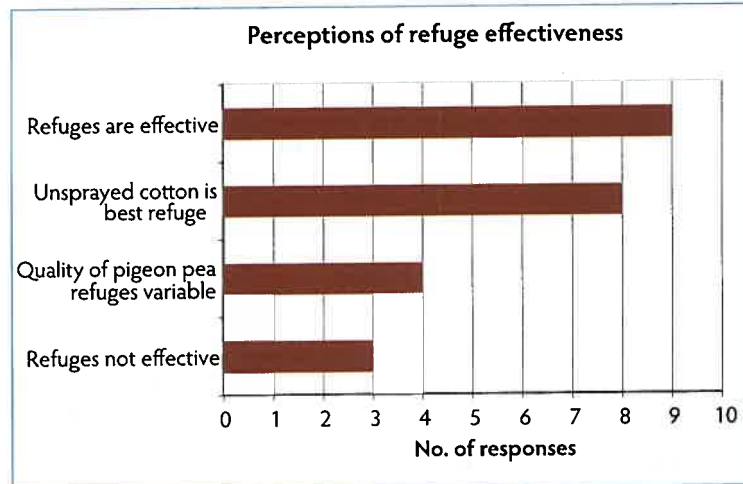


QUESTION 12

What is your perception of refuge effectiveness?

(22 respondents)

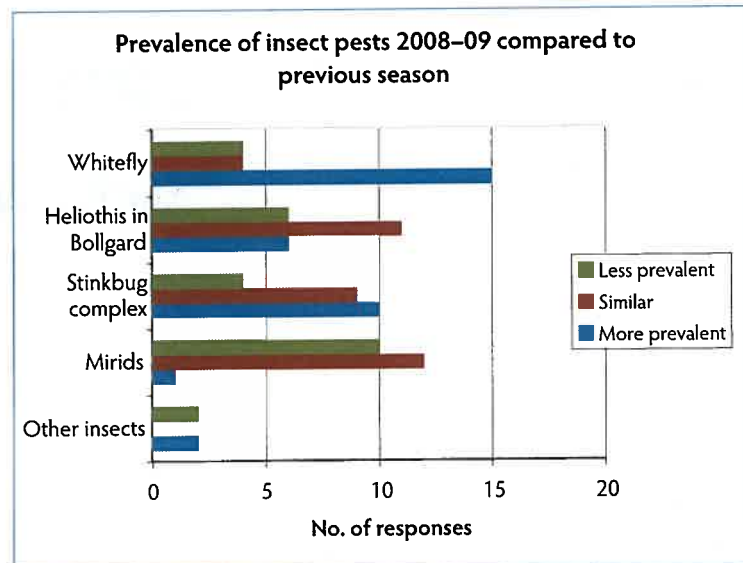
Please refer to the appendix for individual responses.



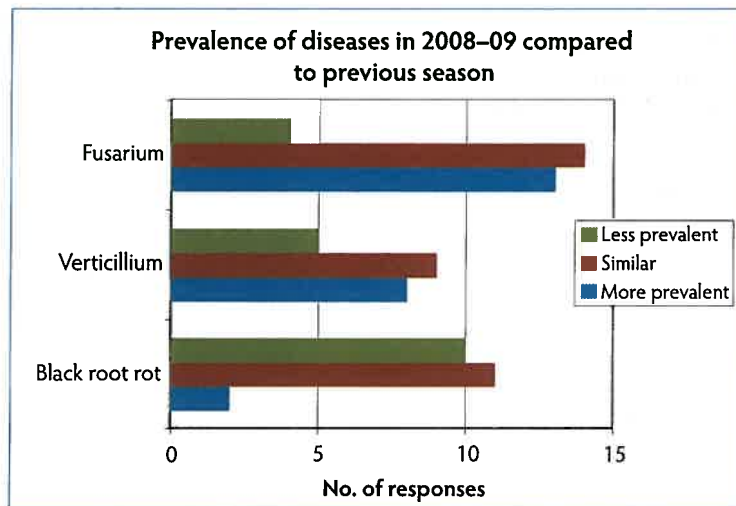
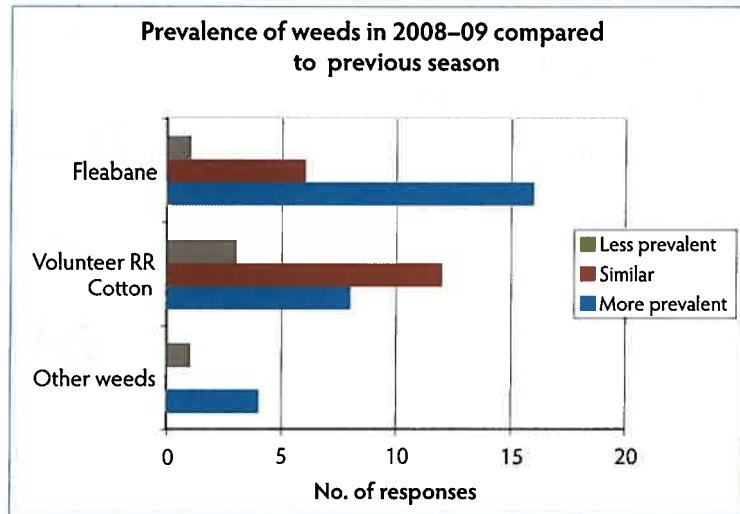
QUESTION 13

What changes in the prevalence of pests did you observe in last 12 months?

(23 respondents)



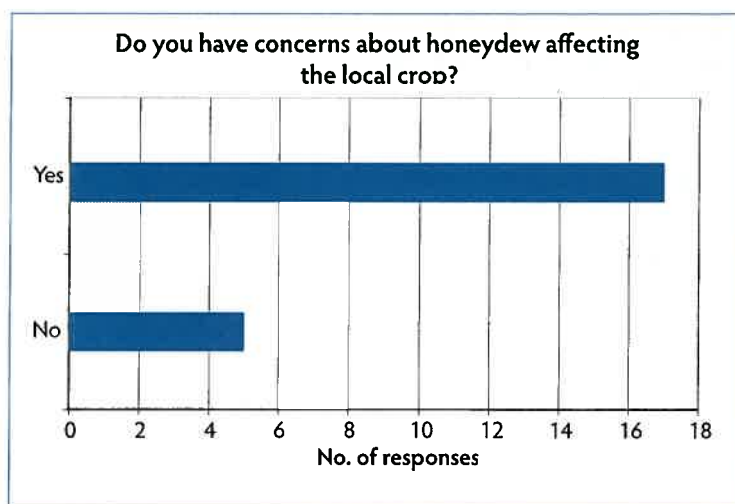
QUESTION 13 (continued)



QUESTION 14

In relation to whitefly, do you have concerns regarding honeydew affecting the local cotton?

22 respondents)

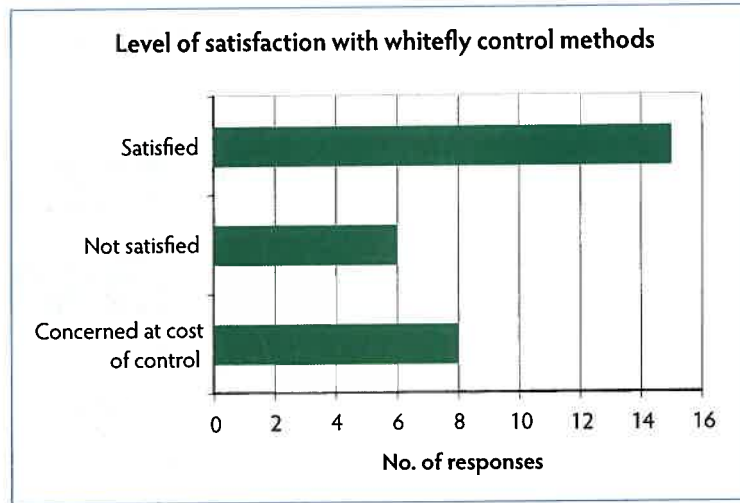


QUESTION 15

Please explain your level of satisfaction with the current control methods for whitefly.

(23 respondents)

Please refer to the appendix for individual responses.

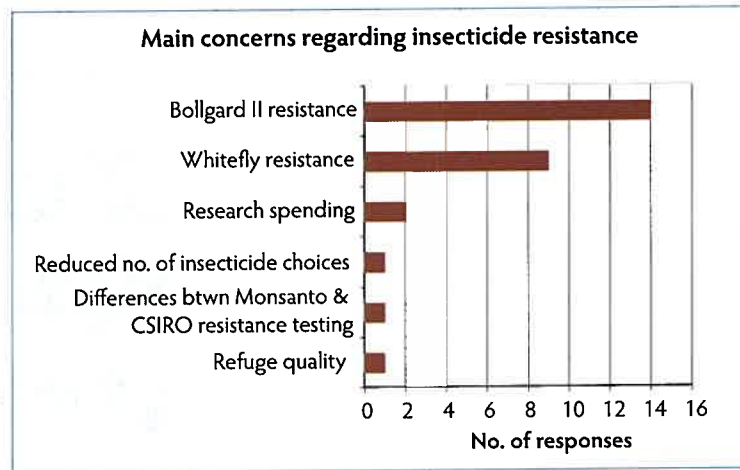


QUESTION 16

What are your main concerns regarding insecticide resistance?

(22 responses)

Please refer to the appendix for individual responses.

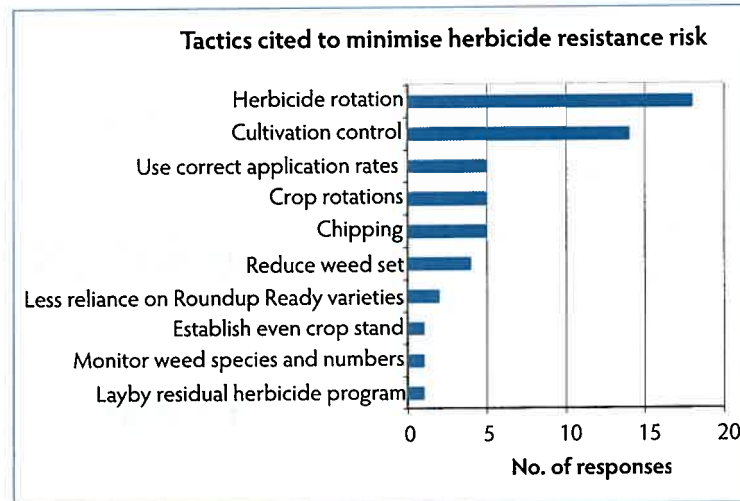


QUESTION 17

What do you understand to be the tactics that can be employed to minimise herbicide resistance risk?

(23 respondents)

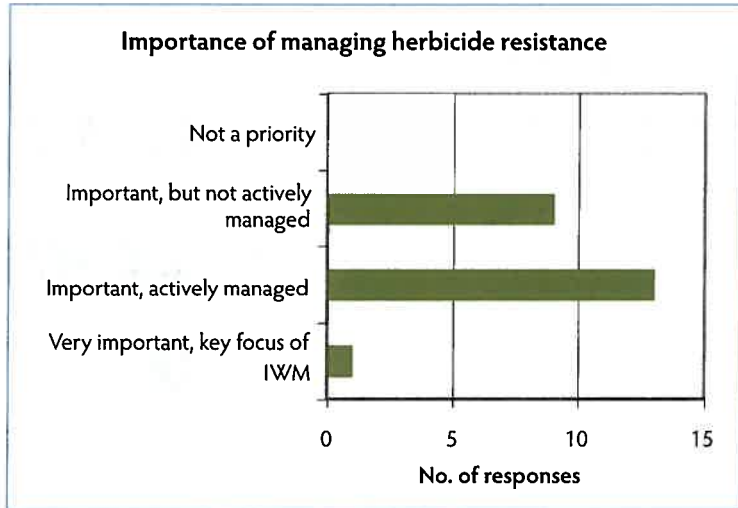
Please refer to the appendix for individual responses.



QUESTION 18

How important do you believe herbicide resistance is to your clients?

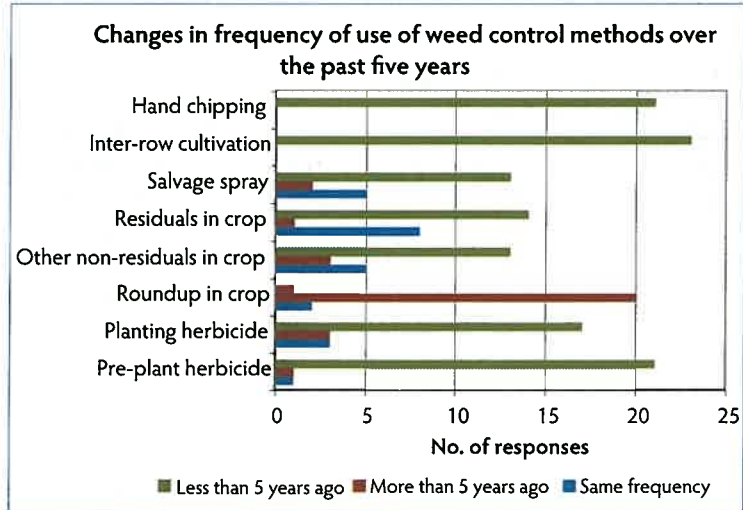
(23 respondents)



QUESTION 19

In relation to weed control tactics, please indicate the changes to the frequency of use over the last five years.

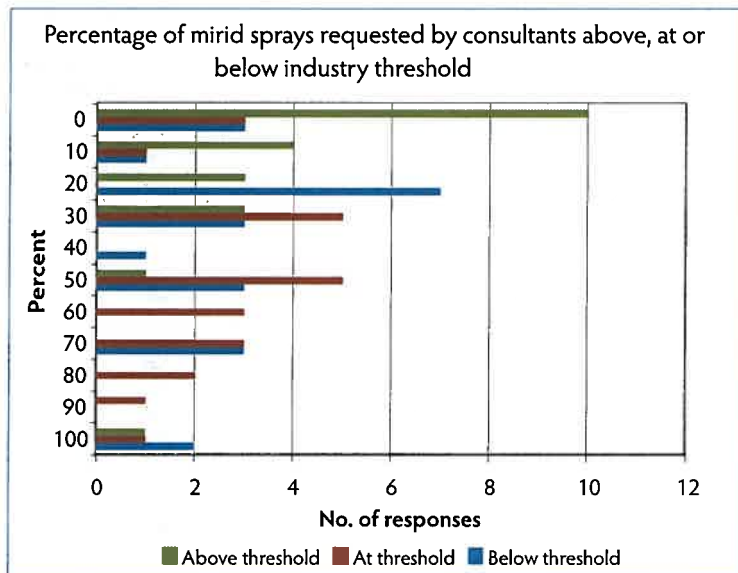
(23 respondents)



QUESTION 20

How often are the sprays you request for mirids above, at, or below the industry's general threshold?

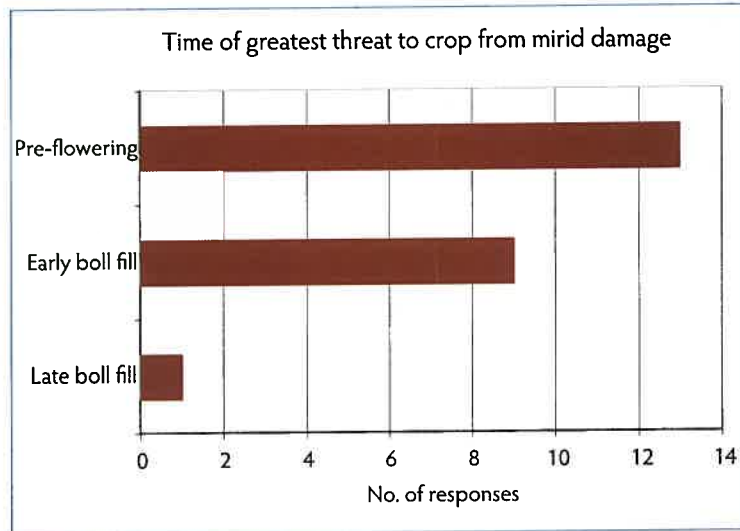
(23 respondents)



QUESTION 21

Between which growth stages are crops at greatest threat from mirid damage?

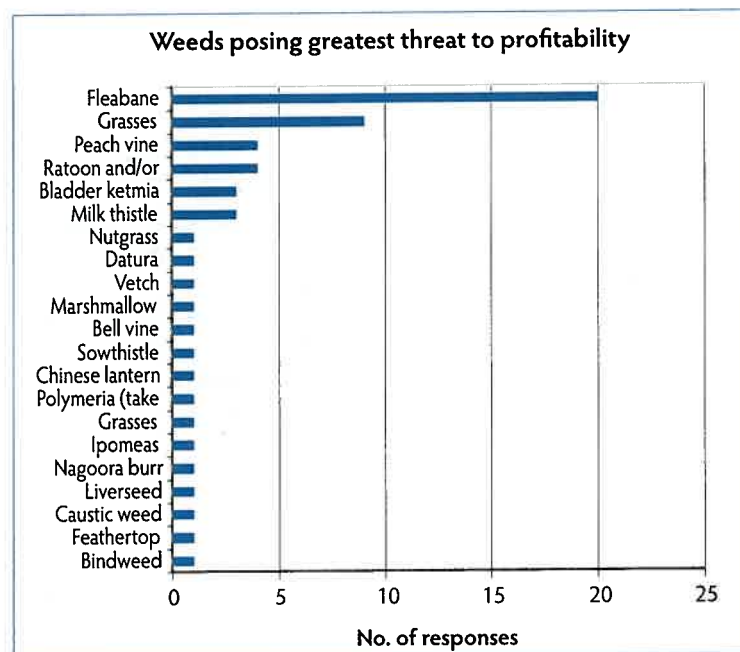
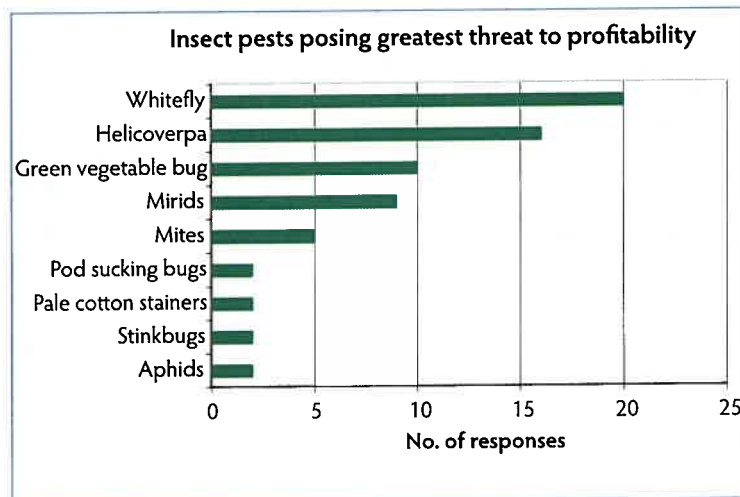
(23 respondents)



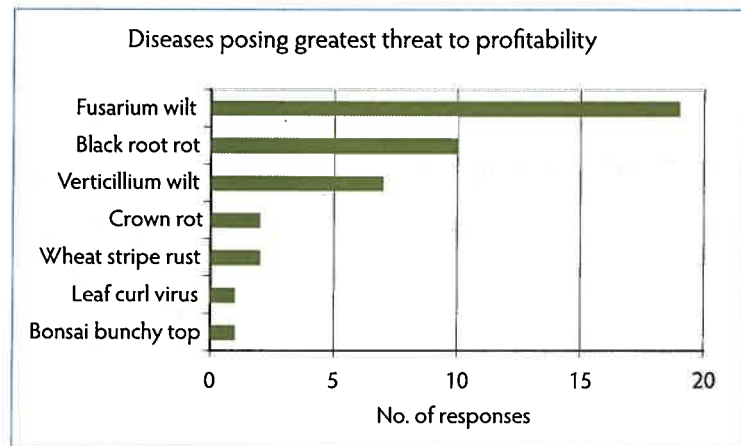
QUESTION 22A

List the pests, weeds and diseases that pose the greatest threat to the continuing profitability of your clients.

(23 respondents)



QUESTION 22A (continued)

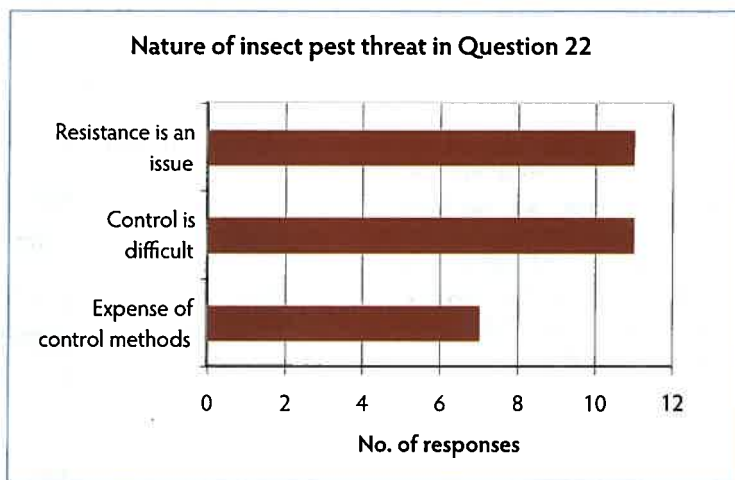


QUESTION 22B

Why do you believe these are the greatest threat?

(22 respondents)

Note: this information was not suitable to summarise, as only some of the responses were specific to the particular insects pests and diseases mentioned by respondents in Question 22. The accompanying graph shows broad categories of responses. For clarification, please refer to the appendix for individual responses.

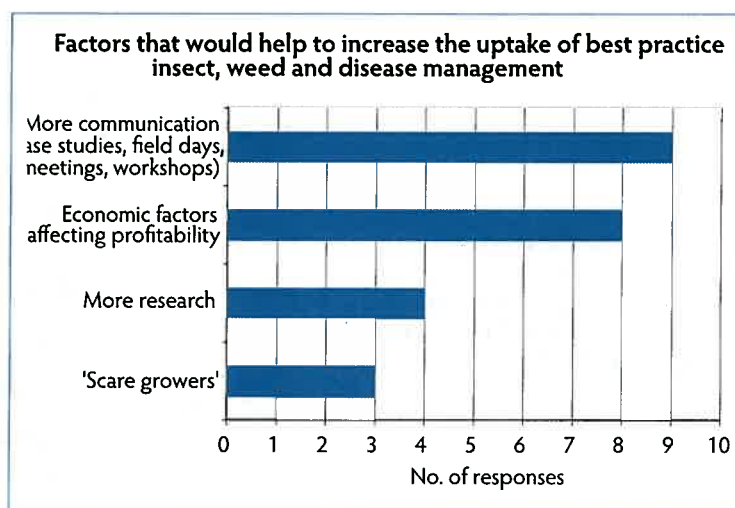


QUESTION 23

What information do you believe would help to increase the uptake of best practice insect, weed and disease management?

(20 respondents)

As with Question 22B, the graph shows the broad categories of responses (with a number of respondents offering more than one response) but responses were varied, so please see the appendix for individual responses.



IRRIGATION IMPROVEMENTS

QUESTION 24

What are the irrigation changes or improvements your clients have made?

(20 respondents)

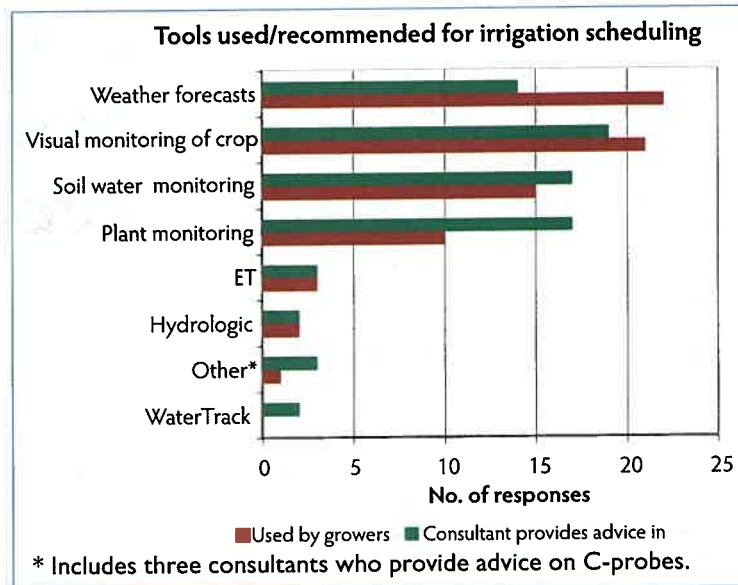
Responses to Question 24 were not of a nature that would provide usable information when graphed; however, certain trends in irrigation management were evident:

- Use of an objective irrigation scheduling tool such as moisture probes is now common, with measures relating to pumping efficiency, storage seepage and measurement of evaporation losses also becoming more common.
- More growers are also undertaking storage surveys. No drip systems had been installed.
- A number of growers undertook EM surveys and installed water meters to measure water use.
- Although storage seepage and evaporation losses were measured increasingly, few storage remediation measures were undertaken. It is probable that this is related to the drought conditions prevalent at the time.

QUESTION 25

What tools are used by your growers to assist in the decisions regarding scheduling of irrigations and, additionally, which ones does your business offer advice in?

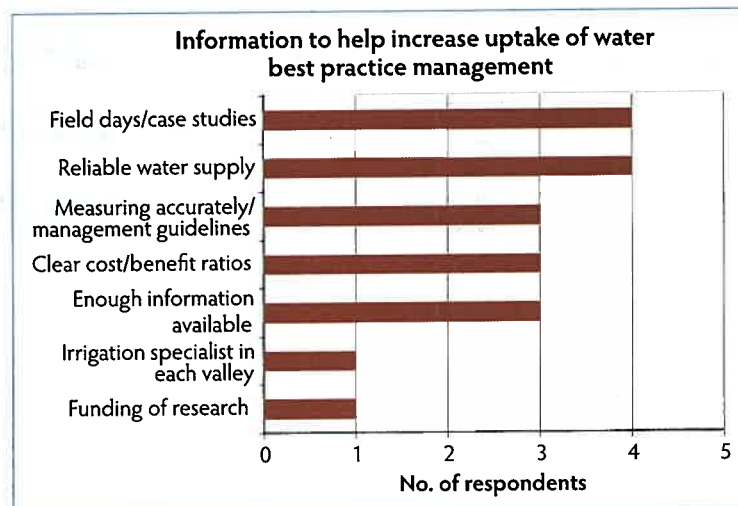
(22 respondents)



QUESTION 26

What information do you believe would help to increase the uptake of best practice in water management?

(16 respondents)

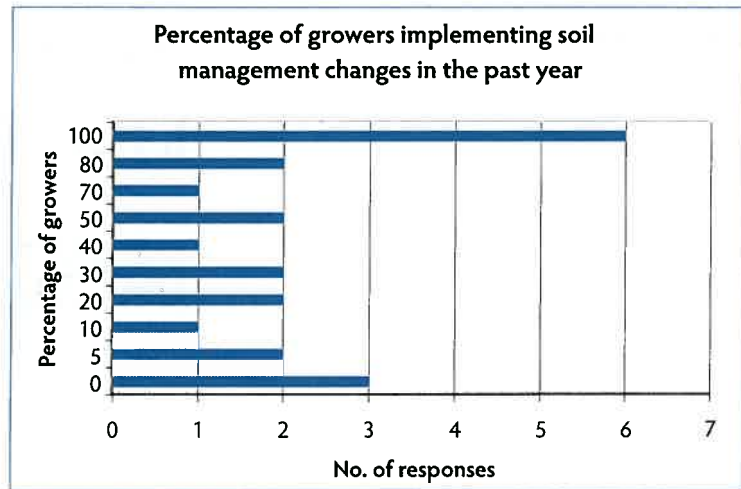


SOIL MANAGEMENT

QUESTION 27

Please estimate the percentage of your growers who have implemented changes in soil management practice in the last year, based on changed or new knowledge of soils and plants best practice.

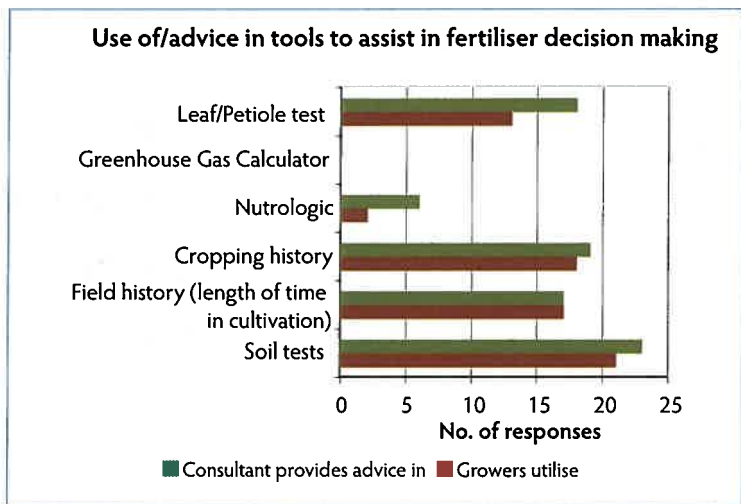
(22 respondents)



QUESTION 28

What tools are used by your growers to assist in the decisions regarding application of fertiliser to their crops and, additionally, what ones do your business offer advice in?

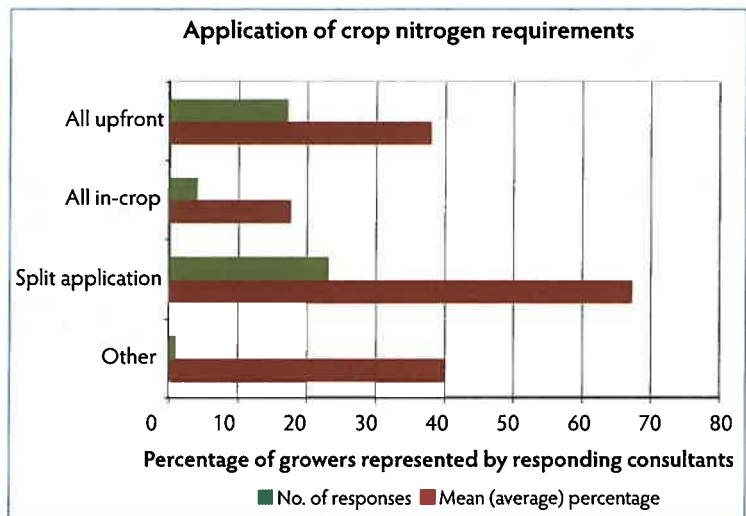
(23 respondents)



QUESTION 29A

How do your clients apply their crop nitrogen requirements?

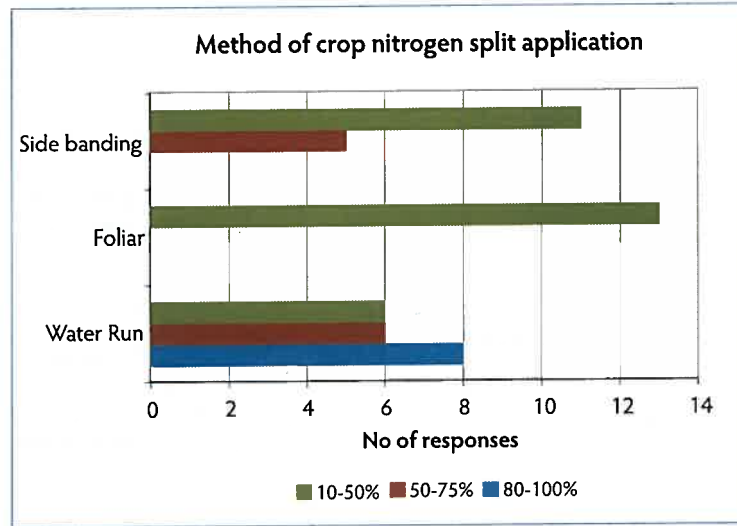
(23 respondents)



QUESTION 29B

Of your clients who use split application, what percentage uses the following?

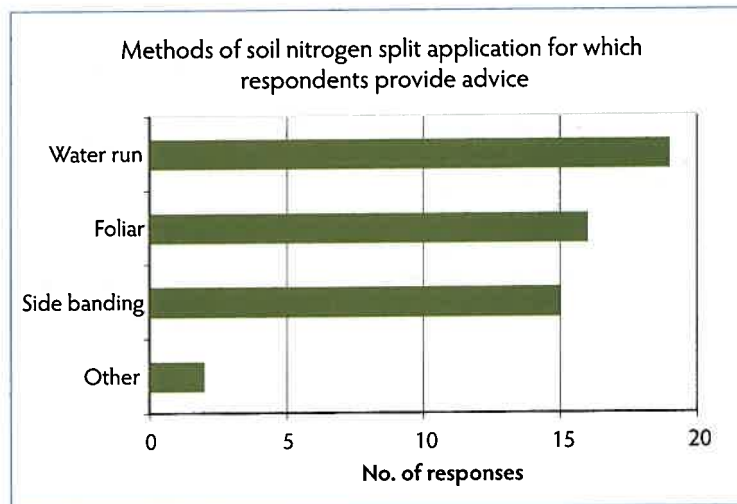
(22 respondents)



QUESTION 29C

Which of the following nitrogen application practices do you provide advice in?

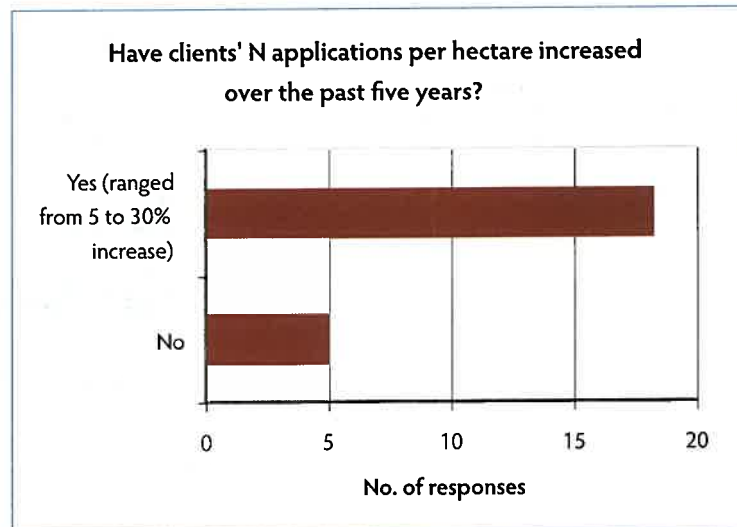
(21 respondents)



QUESTION 30

Has the amount of N applied per hectare increased over the past five years?

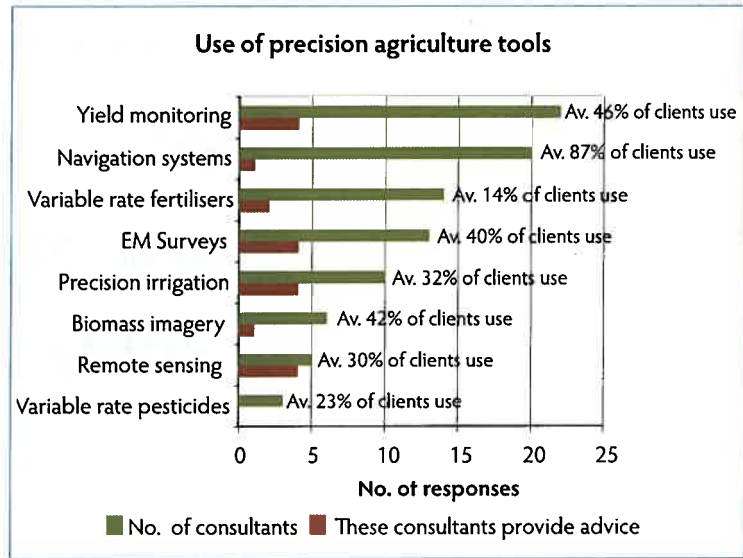
(21 respondents)



QUESTION 31

Which precision agriculture tools are clients using?

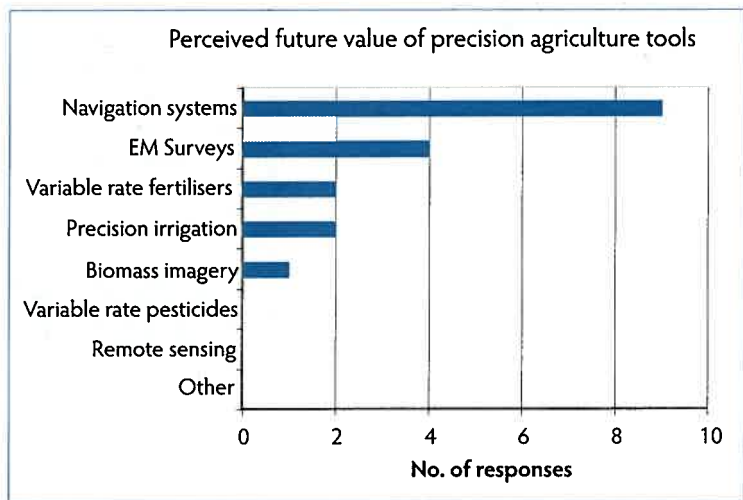
(23 respondents)



QUESTION 32

What precision agriculture tools would you consider will provide the most benefit in terms of future value?

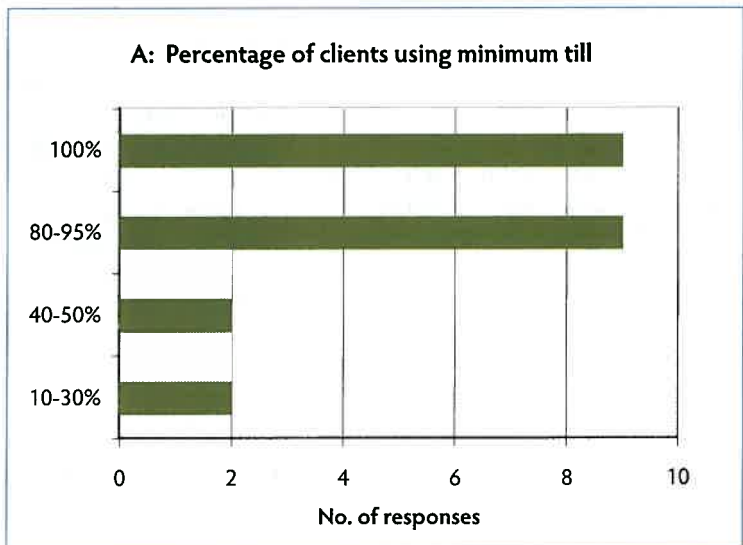
(22 respondents)



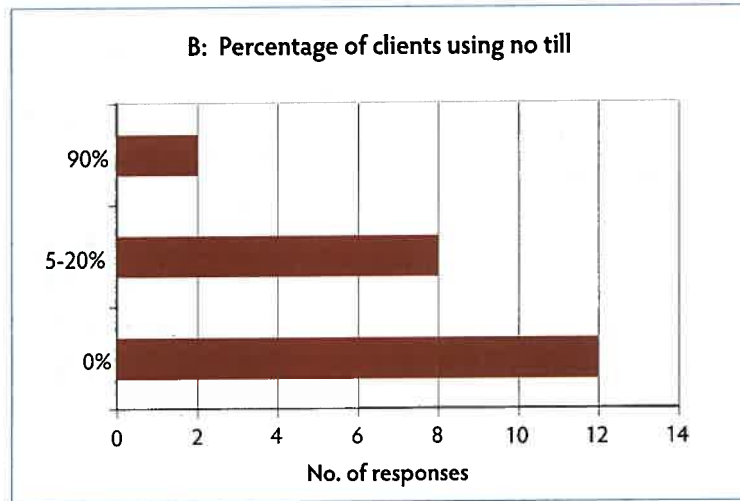
QUESTION 33

What percentage of your clients use reduced tillage practices in their enterprises?

(22 respondents)



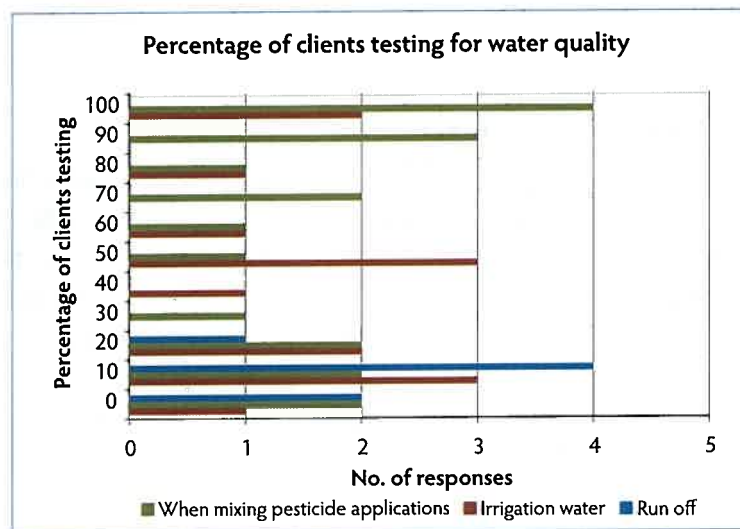
QUESTION 33 (continued)



QUESTION 34

What percentage of your clients test for water quality?

(21 respondents)

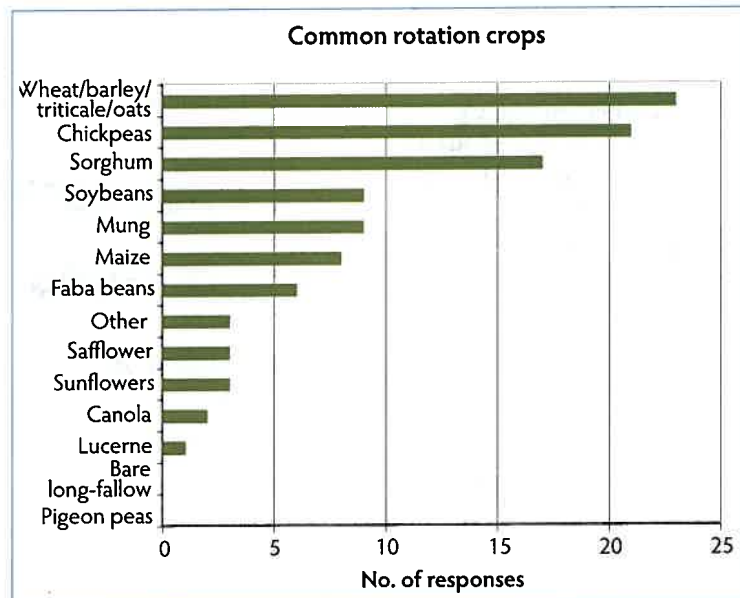


QUESTION 35

Please list the common rotation crops grown in your region.

(23 respondents)

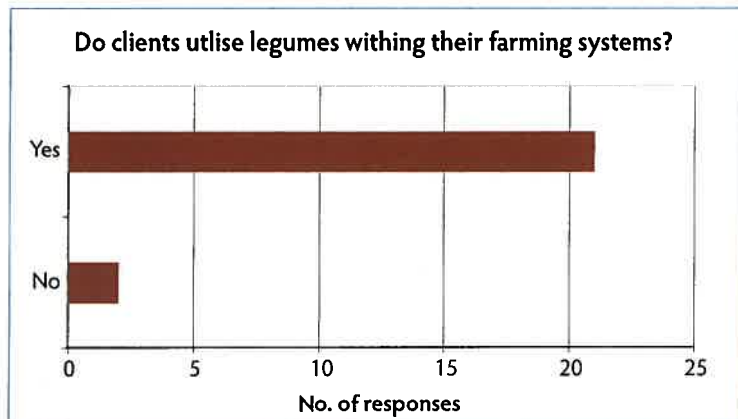
The accompanying graph shows aggregated figures only. Please contact CRDC if you would like figures for individual regions.



QUESTION 36A

Within your clients' systems, do they utilise legumes?

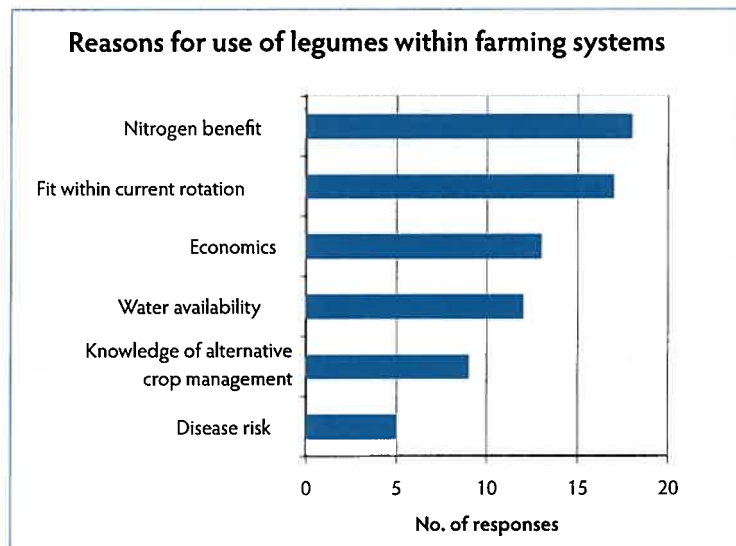
(23 respondents)



QUESTION 36B

Regarding use of legumes, is this because of the following?

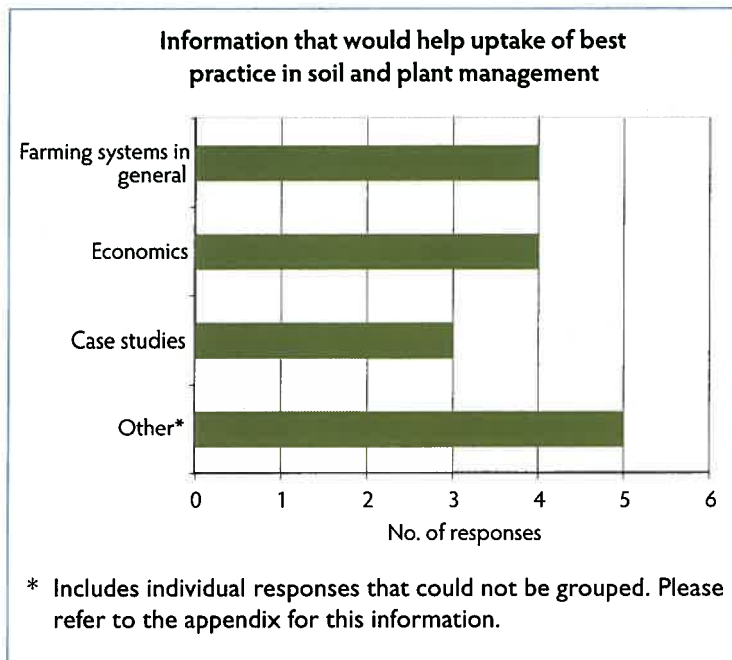
(21 respondents)



QUESTION 37

What information do you believe would help to increase the uptake of best practice in plants and soil management?

(16 respondents)



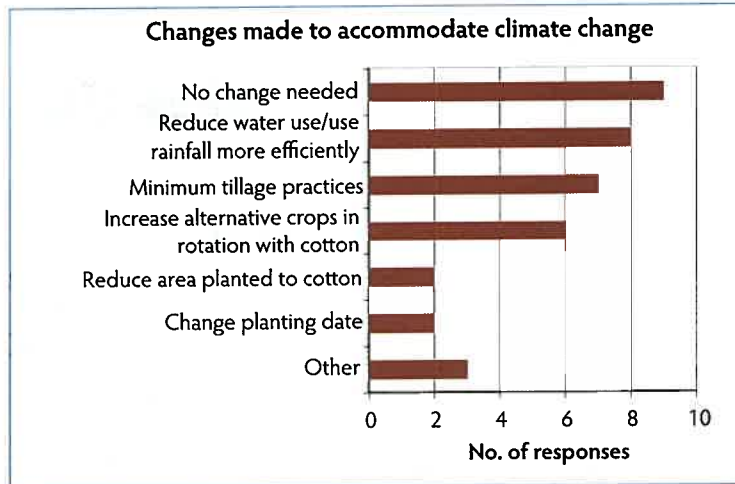
CLIMATE CHANGE

QUESTION 38

Please outline some of the changes made by your growers to accommodate climate change.

(21 respondents)

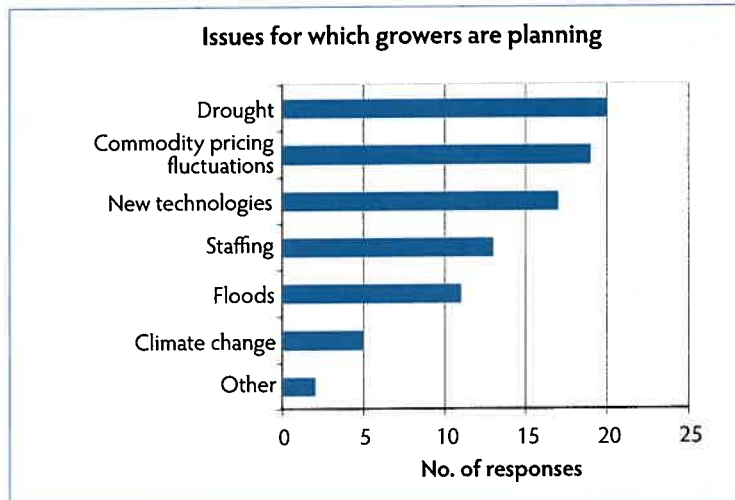
Please refer to the appendix for details of suggested changes.



QUESTION 39

Please indicate the types of issues that your growers are planning for.

(21 respondents)

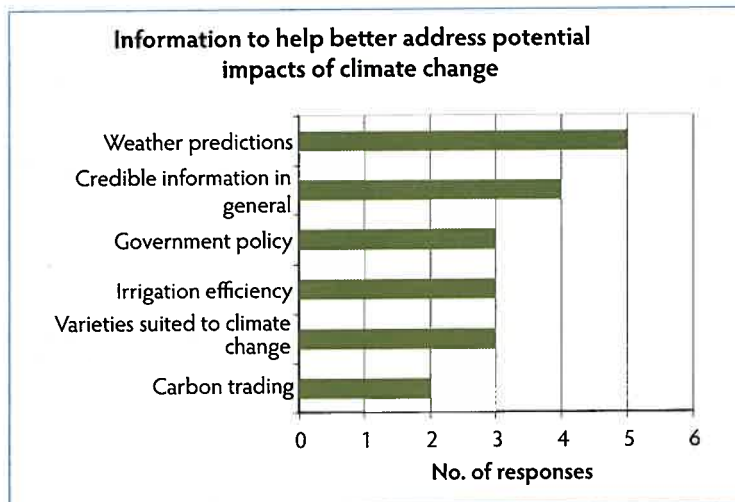


QUESTION 40

What information do you believe would help you and your clients better position themselves for potential impacts of climate change?

(18 respondents)

Responses to this question were notably diverse but a common underlying theme was the need for information to be credible. Please refer to the appendix for individual responses.

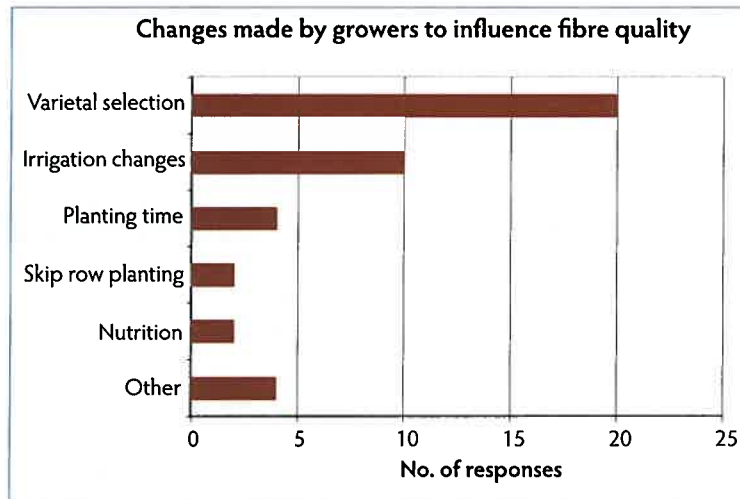


QUESTION 41

Please outline some of the changes made by your growers to influence fibre quality.

(22 respondents)

Please refer to the appendix for individual responses.

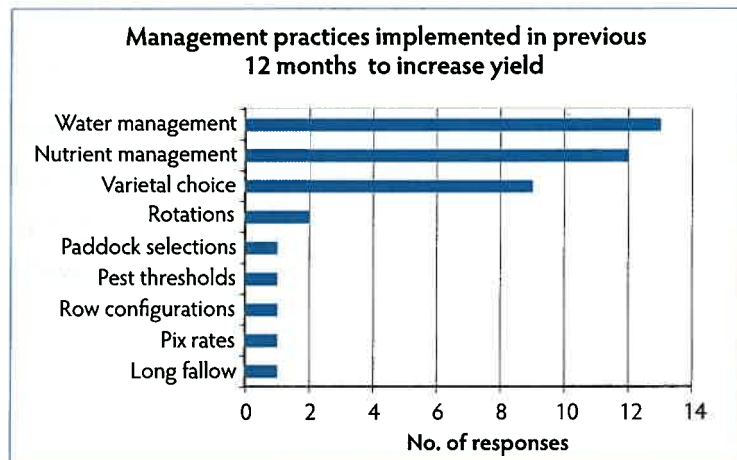


QUESTION 42A

Please list the management practices you have implemented to increase yield for your growers in the last 12 months.

(18 respondents)

Please refer to the appendix for individual responses.

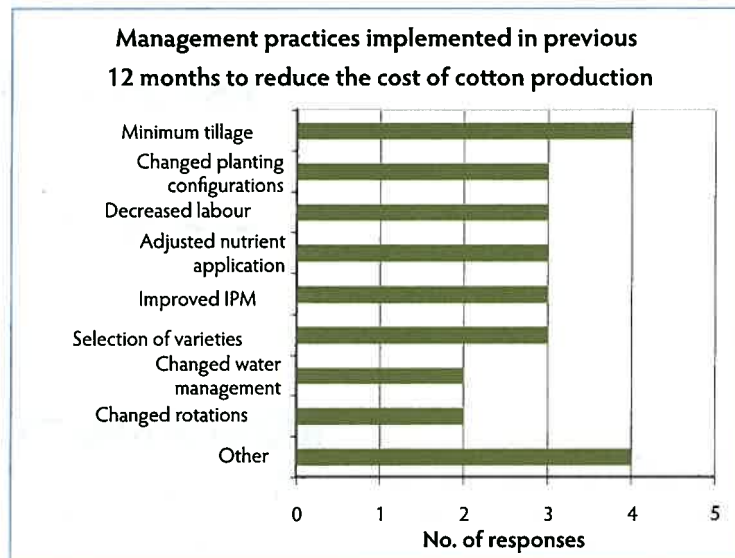


QUESTION 42B

Please list the management practices you have implemented to reduce the cost of cotton production for your growers in the last 12 months.

(14 respondents)

Please refer to the appendix for individual responses.

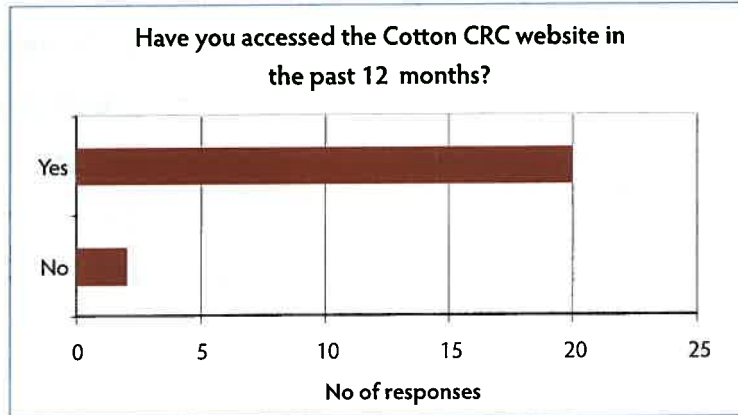


INTERNET & WEBSITES

QUESTION 43A

Have you accessed the Cotton CRC website in the past 12 months?

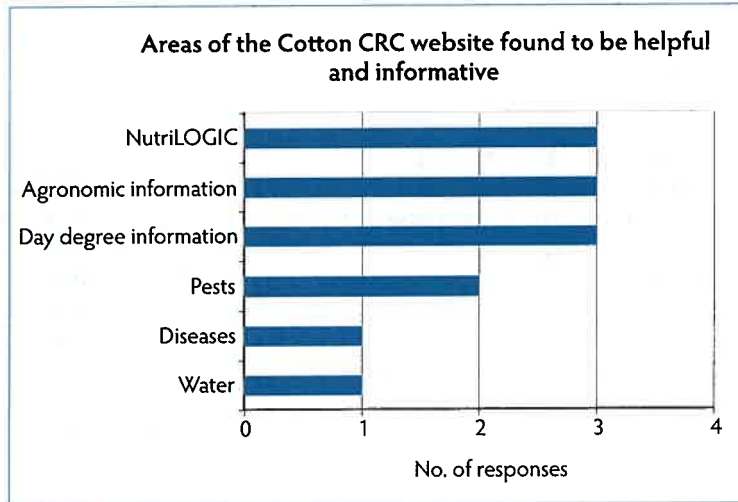
(22 respondents)



QUESTION 43B

Please comment on the areas of the Cotton CRC website you found helpful and informative.

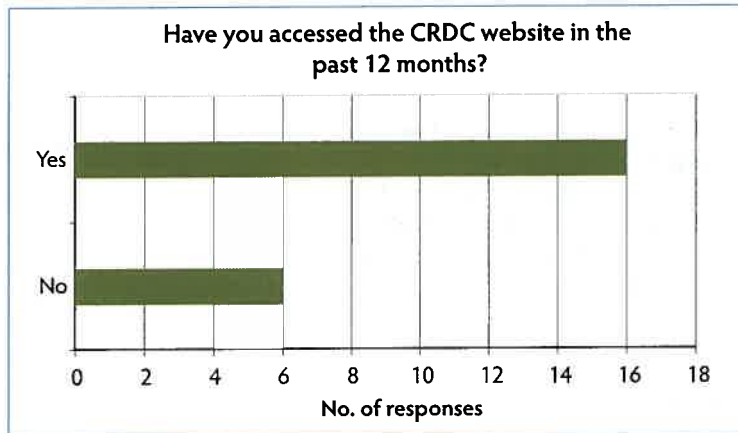
(11 respondents)



QUESTION 43C

Have you accessed the CRDC website in the past 12 months?

(22 respondents)



QUESTION 44

What other internet tools would you or your clients like to access to help with your business?

(4 respondents)

Responses
Evapotranspiration (ET) values for our region to be used for irrigation scheduling.
CSD Website. Every weather site.
Quick reference information and data.
Not sure. There is a lot available now.

TRAINING

QUESTION 45

What training (across all issues) would you or your clients be interested in doing over the next 12 months?

(14 respondents)

Please refer to the appendix for individual responses.

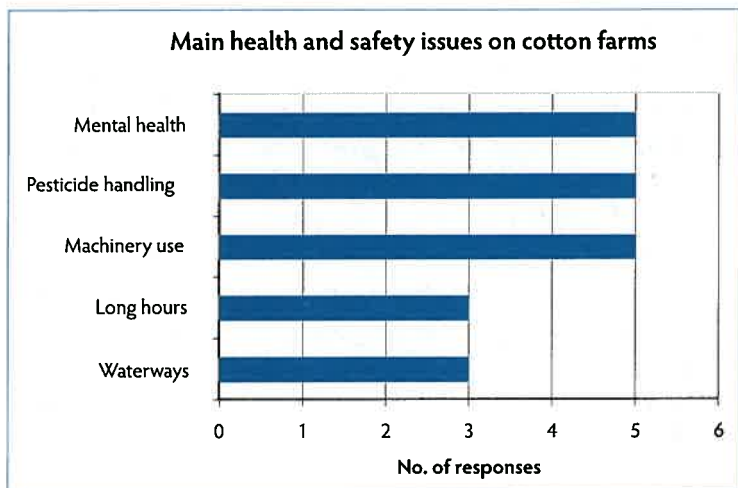


OCCUPATIONAL HEALTH & SAFETY

QUESTION 46

What would you consider as the main health and safety issues on cotton farms?

(18 respondents)

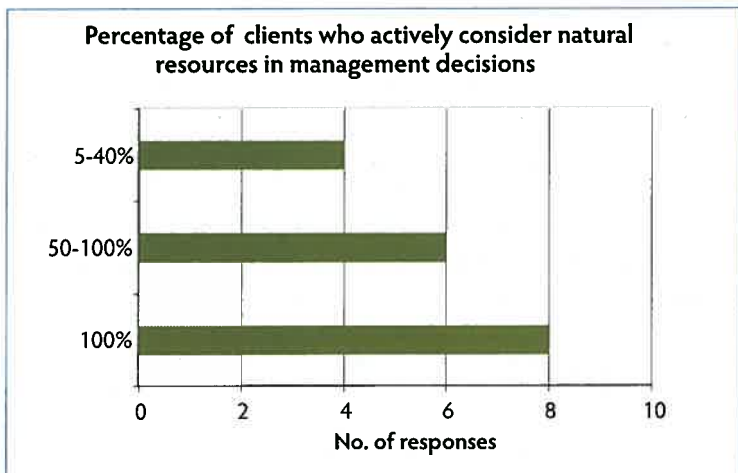


NATURAL RESOURCES

QUESTION 47

What percentage of your clients actively considers natural resources when making management decisions for the overall farming system?

(23 respondents)



4 APPENDIX

What is included in the appendix?

Below you will find individual responses to those questions where this adds to an understanding of the graphed information in Section 3 of the publication, beginning on page 7.

QUESTION 11B

If IPM is still important in your business, please expand on the reasons.

Responses
I believe that IPM is the only way for a sustainable crop production.
Yes. Whitefly is a constant threat and anything we can do to reduce the risk is well worth it.
The threat of silver leaf whitefly and the high cost in controlling the pest have heightened awareness of the importance of IPM in managing this pest. Also, the flare-ups with <i>Helicoverpa</i> in the Bollgard II remind both consultants and growers of the importance of maintaining beneficial insects and parasitoids such as trichogramma in the fields to assist the Bollgard III genes in controlling <i>Helicoverpa</i> in the field.
Reduces the chances of flaring secondary pests
Mites and aphid control costs increase without IPM.
Sustainability.
Whitefly management, reduce pressure on Bollgard, reduce chemicals in environment.
We are always careful with why and how we treat. Whitefly is one driver for this.
Important to continue to manage resistance to conventional chemistry and BG well as an important tool for managing secondary pests like whitefly.
Good IPM practise is vital for sustainability
It minimises secondary pest issues and is important for the resistance management in Bollgard cotton.
Whitefly management, <i>Helicoverpa</i> management in conventional and Bollgard
Increasing problems with whitefly mean it is increasingly important
We must continue as consultants to improve farmer awareness to IPM strategies within their farming practices. Further use of IPM is especially important to decrease the threat of Bollgard <i>Helicoverpa</i> resistance.
Absolutely. To minimise the flaring of other pests like whitefly, and to use natural enemies to help mop whitefly and aphids and help with any <i>Helicoverpa</i> escapes. IPM whether weeds, diseases or insects is the key to long-term sustainability.
With the increase in whitefly pressure growers are continuing to use the softest products available that have the least disruption on the beneficial numbers.
Reduces costs. Less resistance and secondary pests.
To help prevent secondary pest flare-ups and help reduce the pressure of resistance.
To maintain sustainability of production systems by reducing pesticide use, and ensuring that as many tools are used to reduce pesticide resistance.
Required to manage the increase in secondary pest species and numbers.
It is essential. With potential resistance to Bollgard and the whitefly increase, IPM is more important now than it ever was in the old conventional days.
I don't think refuges are 100% effective because of practical reasons. Farmers are going to use fewer inputs to fully maintain proper refuge because it cost money with little or no return. I don't think the incentive is there for better 'compliance' with refuge status. Maybe a reduction in licence fees at the end of the season for the refuge maintenance or discount for next seasons licence. Good quality refuge a discount on fees and average to poor refuge no discount.

QUESTION 12

What is your perception of refuge effectiveness?

Responses
Better supervision from Technology Use Agreement (TUA) provider. I believe that 5% UNSprayed cotton options is more effective than pigeon peas. I will suggest 5 % UNSprayed cotton and I will make sure that growers make sure its effective (irrigation on time).
Are refuges effective? That is the Question that must be asked. In the light of resistance with punctigera are our refuges having any effect on the punkies? This resistance may well be suggesting the refuges are adequate for armigera but have no effect (because of life cycles) on punctigera. We need to look into this quickly before some boffin decides we need more refuge or reduced Bollgard area.
From my perspective the research work is ongoing as to the effectiveness of various refuges. Unsprayed cotton is the best refuge. However the cost of the 10% refuge is exorbitant, we need to have a smaller area of cotton refuge by spraying to kill beneficial insects on a periodic bases and possibly to apply an attractant such as Magnet to increase the egg lay in the refuge. In a mixed cropping area like the Downs, I've often wondered why we need refuges at all.
Most refuges are effective – particularly the unsprayed cotton. Pigeon peas could be more effective if predators of <i>Helicoverpa</i> are managed at critical times: i.e. one sf spray late January.
Unsprayed cotton is more effective than pigeon peas on a unit area basis therefore bringing unsprayed cotton refuge percentage down to 5%.
Limited effectiveness. With unsprayed conventional (from a growers perspective) there is still some room to make a profit from the refuge and is easier to maintain compared to pigeon peas. I continually get feedback from growers on this issue. As cotton is often 'easier' to grow than the peas for many growers I do think that a conventional refuge would remain more attractive for longer as well.
Pigeon Pea refuge is variable: even the best managed crops can flower at the wrong time and have variable <i>Helicoverpa</i> populations. Selection of better pigeon pea varieties may help, also more use of unsprayed cotton refuges and possible use of attractants such as Magnet.
To make pigeon pea the main refuge in dryland. This is able to be planted at the same time and is every bit as [important as] the cotton crop. I think it should be planted through the crop rather than at extremities. Same could apply for irrigated crops.
I believe refuges are effective when managed appropriately.
If they are managed properly agronomically, they are effective.
Pigeon peas are not managed well and are not reliable in producing moths. UNSPRAYED COTTON SHOULD BE THE ONLY REFUGE AVAILABLE.
Grown on a bigger area by a nominated grower paid by Monsanto to do so on a regional basis.
I think that refuge effectiveness is ok, provided the refuges are well managed and grown properly to do the job that is required.
Overall, refuges are not effective, as pigeon peas are most widely used. It is more likely pigeon peas are then neglected (no irrigation, weeds) making it less attractive to pests. Cotton is the most effective refuge crop.
Refuges generally in our region are pretty well managed, and therefore effective. Generally problems with refuges occur because water has not been applied frequently enough or there is a major weed issue, including volunteer cotton (BG). I believe with the small area of cotton grown in the 2007–08 season relative to other crops, that if Cry2AB resistance frequencies are increasing, we need to look at other resistance management strategies – increasing refuge area is not going to work.
I'd prefer to have a 5% cotton refuge which I believe is the most effective option and easier to manage in our farming system. Also, the refuges need to be better looked after in terms of water management.
Generally ok. The Darling Downs has a wide diversity of cropping.
I think they are reasonably effective.

Depending on the season, also the crops being grown. You also need to be financially viable to implement IPM. Refuges are effective although this is a seasonal issue
Majority of refuge crops for Bollgard were pigeon peas. The quality of the pigeon pea refuge and therefore effectiveness, range from excellent (40%) average (40%) and poor (20%). An independent auditor apart from resellers may help improve this situation. Also, a cash rebate on the Bollgard licence may help encourage growers.
Very effective. Should be irrigated on an 80mm deficit to be effective. Consider more unsprayed cotton and less pigeon pea.
Current refuge management and effectiveness is very poor. The predators and parasitoids are more abundant in the refuge, particularly as Bollgard spraying for <i>Helicoverpa</i> increases. Refuges should be sprayed with dimethoate etc to help reduce predatory activity. It also concerns me that Bollgard resistance is on the rise at the same levels in all varying valleys despite variances in natural vegetation and refuge. Does this mean the refugia is a waste of time altogether?

QUESTION 15

Please explain your level of satisfaction with the current control methods for whitefly.

Responses
Satisfied but costly. Using cheaper 'harder' chemicals first rather than later. Not IPM friendly.
In the fields and areas sprayed the control has been acceptable but in some areas we have had re-infestation.
Our systems have been working very well for a number of years now. My only concern is the return of a hot, dry year and large cotton area after a few cooler, wetter years.
Methods are satisfactory if the pest is monitored properly, control methods are applied in a timely fashion and stocks of appropriate products are available when needed.
Control methods work but I need to improve my sampling for whitefly prior to them being a pest
Not satisfactory. During the season on-farm field day outlined the dangers of the greenhouse whitefly and gave the associated thresholds. During this time I did observe numbers much higher than this threshold. However, the \$90 per hectare spray meant that it was very difficult to justify this precaution. Although it was explained that the cotton would go black with honeydew there was never any visual references to compare in all workshops attended. We decided to spray 70 hectares out of all 5000 hectares as a trial and as a result were very happy with the decision to hold off. Although we had some black cotton no discounts were made at ginning.
Reasonably happy.
If we are careful for the early part of the season I think that we should be ok to manage whitefly with the current two main products. But the new Q biotype may be a different problem.
I am satisfied, however cost of control and product supply were issues impacting on pest control decisions.
Current control methods work provided a soft approach is used early in the season.
I am not comfortable with the thresholds yet as in some farms it worked well but in others it was not reliable. We need more soft options for whitefly and mirids and GVB (Green Vegetable Bug) to avoid population blowouts.
Satisfactory but expensive.
Control methods worked well as long as they were used according to the guidelines - if numbers were let get out of control they do not work well.
Current control measures are not adequate. Whitefly populations returned quickly either by re-infestation or by the migration of new populations into the field. More knowledge of IPM strategies is needed.

Correct control methods for whitefly are ok. It is the cost that is the very major problem. If the control options were cheaper it would be easier to encourage an area-wide approach to the management of this pest.
Both Pegasus® and Admiral® provided effective control providing they were applied at their correct thresholds.
Ok if whitefly not severe.
Ok but very expensive.
Need to know more about Admiral and Pegasus in the Gwydir/McIntyre Valleys, level of satisfaction is low.
Whitefly at this point of time has not been an issue in the Macquarie Valley, even though numbers have increased this year. We will be more vigilant next season to monitor and manage crops to prevent whitefly issues.
Poor area wide management. Expensive options once threshold is reached. Not confident in timing first spray
Not satisfied. Concerned with: price; lack of options; lack of effective IPM area wide management; amount of disruptive chemistry still being sprayed; Q-type resistance to Admiral; lack of consultant protection for below label use rates in Queensland when it is being promoted by industry as essential to use below label rates of Fipronil etc to minimise predatory effects.

QUESTION 16

What are your main concerns regarding insecticide resistance?

Responses
For <i>Helicoverpa</i> the refuge quality. For others, over-usage of pesticides.
Bt resistance is the number one concern for now with basically 100% of the area to Bollgard. Whitefly resistance comes a close second.
Development of resistance by <i>Helicoverpa</i> spp. to cry2AB gene in Bollgard II prior to release of third stack gene. Development of resistance by Silverleaf whitefly to Admiral. The industry may have to look at releasing <i>Eretmoceres</i> parasitoids into 'unsprayed' cotton refuges.
Whitefly becoming resistant to Admiral. <i>Helicoverpa</i> becoming resistant to CryIAC/Cry2AB.
Bollgard II: need to monitor resistance levels and make decisions on long term data trends.
More reliance on Bollgard II, which also comes with resistance issues.
Whitefly resistance, mirid resistance, Bollgard resistance.
Any resistance is bad. We can't afford to lose any products or technologies.
Under a season of consistent high pressure IPM will go out the window.
Q-type whitefly control. Limited sucking bug options.
Base level Cry2Ab resistance and the life of Bollgard II. The arrogance of some growers and consultants with regard to IPM and preserving beneficial insects.
Whitefly and <i>Helicoverpa</i> in Bollgard.
The whitefly chemistry at present, as the amount of chemistry available is limited.
This summer saw a pattern where the aerial applications of insecticide were not as successful as ground applied sprays. If this continues, we will see more insect tolerance, as we are not getting a total population kill.
<i>Helicoverpa</i> resistance to CryIAC & Cry 2AB. Aphid to neoniatinoids?? Whitefly to all chemicals.
That we will develop Bt resistance prior to Bollgard III being released.
No real problems.
<i>Helicoverpa</i> becoming resistant to Bollgard.
Monsanto's lack of action. Lack of research dollars, particularly with regard to whitefly.

The need to increase vigilance of Bollgard refuge crops to delay any possible resistance to the current Bt toxin package.

Losing the reducing number of insecticide choices. Lack of new products coming to market. All adding to increase costs

The variance between Monsanto and CSIRO testing results. Not enough protection of the 2AB gene at the end of the season. A planting window restriction is not useful if late crops are allowed to grow on. Industry should be pushing for the removal of pyrethroids, OP's now that whitefly has become such an issue. Why we don't really know why Bollgard resistance is increasing at a rate higher than predicted three years ago

QUESTION 17

What do you understand to be the tactics that can be employed to minimise herbicide resistance risk?

Responses
Less reliance on Roundup and Roundup Ready varieties. Some mechanical methods.
Adopt weed management strategy, crop rotation, general farm hygiene.
Rotation of herb groups and crops, use of adequate rates to kill the weeds, mixing different herbicides or double knockdown strategy for hard to kill weeds.
Monitor fields to identify weed species and density. Avoid over using products from any herbicides group. Use crop and chemical rotation as appropriate. Monitor fields for resistant weed 'escapes'. Target them with alternative herbicide groups and mechanical.
IWM, cultivation, vigilance chemistry rotation, chipping, testing survivors.
Including planting - layby residual herbicide into program.
Rotating knockdowns such as using sprayseed instead of Roundup where possible etc. I do think there is some dangerous literature around such as using Verdict/Select etc in weed seekers to control barnyard grass. Potentially we could get resistance to these in five generations - where will we be then?
Crop rotations, herbicide rotations, strategic use of cultivation and weed chipping, preventing weed seed set, early diagnosis of resistant weeds.
Crop and spray rotations that are common practices in a lot of this area help a lot.
Rotate chemistry and incorporate cultural practice into your weed control program.
Mix up the herbicide options and incorporate as many cultural practices as is practical.
Rotate chemical groups, use other methods such as cultivation or chipping, minimise weed seed downs, establish a good even crop stand to compete with weeds.
Rotate chemistry and crops.
Chemical group rotation, physical methods, use of robust rates – not cutting rates.
Rotating herbicide chemicals is the best measure. Also, mechanical practices are important as minimum tilling fields have higher number of resistant plants.
Use non-chemical means such as cultivation, chipping. Include use of different chemical groups, eg use of residuals and knockdowns etc.
Rotate groups and crops. Also use strategic tillage.
Alternate chemistry and control methods. IWM.
Rotation of chemicals and cultural practices.
Don't grow Roundup Ready cotton; adopt a relevant crop rotation (the rotation of herb groups).
Use of cultivation, rotating herbicides, reducing weed seed banks and utilising chipping when required.
Herbicide rotation, crop rotation. Reduce exposure/reduce reliance.
Cultivation, crop rotations, herbicide rotations, correct application and rates, chipping.

QUESTION 22B

Why do you believe these pests are the greatest threat?

Responses
Insects very migratory moving in and out of the fields. Weeds over reliance on roundup only sprays. Disease no varietal tolerance and farm hygiene.
Difficult to control. Very expensive control in some products. They can develop resistance to chemicals.
High incidence and reproductive capacity of these pest and diseases. Heavy reliance on one chemical group (Bt/glyphosate). Probable development of resistance in medium term. Alternative control measures may be relatively costly or unavailable in the short term. If weeds become resistant to herbicides, there may have to be a shift away from minimum tillage practices. In some cases there is a lack of "soft" alternative chemistry, given the widespread occurrence of Silverleaf and now Q type whitefly, I have great concern about the introduction of an exotic virus which may decimate the crop in the short term and set back the cotton breeding program for years as it grapples with finding resistance traits.
Because they are present every year. Cost a lot to control/manage. Limit to fields options. Risk of resistance.
Mites - continuing problem caused by hot dry conditions and disruptive mirid sprays. Mirids require a lot of monitoring, disrupt IPM when controlling. BB Nightshade - now able to control with Flex varieties but locked into Flex varieties. Fleabane - controlled with residual herbicides. Black root rot - steals time, which reduces yield potential or delays harvest.
<i>Helicoverpa</i> - difficult to budget for as its unknown how much pressure will be experienced during the year. Fleabane - despite best efforts, it is still the most difficult to manage and many herbicide decisions are based around fleabane. Peach vine - possible Roundup tolerance /resistance, difficult to do anything with after two leaf stage. Verticillium/Fusarium wilt - getting worse.
If Fusarium became a problem in Central Queensland, would increase costs and affect ideal variety. Bollgard resistance would affect costs and management, also place pressure back on conventional herbicides. Whitefly management relies on only a few chemicals that are expensive; resistance to these would cause major problems. Stinkbugs are becoming more common. Effective chemicals such as endosulfan are under regulatory pressure.
Because of cost control or problems it causes (fusarium)
These are the pests and disease that cost farmers the most to control and if left Un-controlled jeopardise crop production
Hardest and most expensive to manage.
No soft option for mirids increases whitefly issues which are expensive to control. No good control for Fleabane and FOV and BRR will take off when in full production again.
Insecticide and herbicide resistance issues
Due to the fact that resistance can occur in <i>Helicoverpa</i> , barnyard grass and whitefly, and with fusarium/black root rot it is an issue not yet sorted out by breeding
They have the greater impact on gross margins in terms of controlling cost and also are harder to control in a crop situation.
<i>Whitefly</i> and <i>Helicoverpa</i> - cost of control and ability to develop resistance Fleabane - increasing occurrence & the difficulty in trying to control this weed with group I herbicides over summer in cotton growing areas. Fusarium - can't relax until we have varieties that are completely resistant. Leaf Curl virus - any disease that can be vectored by SLWF has the potential to be devastating.
WF: increasing population, highly resistant, few control options <i>Helicoverpa</i> : increasing resistance levels to BT Pod sucking bugs: increasing numbers Fleabane: roundup resistance and thrives in minimum tillage situations
Large extra costs

They are the most prolific They tend to do the most destruction They are the most difficult and expensive in most cases to control
Weed resistance. Insecticide supply (new products lack of supply). The overuse of Roundup (Monsanto problem?). The overuse of Bollgard cotton with regard to secondary pest and <i>Helicoverpa</i> resistance which Monsanto fails to address.
Whitefly mostly due to offensive host range, resistance to insecticide, and present of Q-type cost of control and cost to industry from down grading. Increasing pod sucking pests with this adaptation to BG cotton. Barnyard grass and fleabane: over-reliance on Roundup to control, leading to weed resistance. Fusarium: due to the rate of spread exceeding plant breeding resistance level.
Because these threats are either staying the same or increasing across the whole farm system

QUESTION 23

What information do you believe would help to increase the uptake of best practice in insect, weed and disease management?

Responses
Cost figures of not using IPM strategies, longer term solutions.
Recent research updates on latest development and new chemistry available.
Growers unfortunately only learn after they get burnt.
Information needs to be up to date, ongoing, comprehensive and well presented at meetings and workshops with small group sizes. Publications of Cottongrower magazine and meeting proceedings.
Profitability, analysis of, with or without BMP
More data on boll fill losses from mirids.
The economic downside in \$\$\$????
Facts.
Economic impact assessment. This will help growers justify the management required to deal with them.
Case study comparisons.
Practical demonstration of the impact of poor practice and benchmarking to show the impact on the bottom line.
Impacts rotations have on the above economically as well as culturally.
Local farm field days /farm walks so growers can see what other farmers other doing on a local level.
Just have to keep trying to get the message out using all means of communication. Unfortunately some recalcitrants won't take the message on board until they end up with a major problem.
Economics of managing these issues.
More cost effective strategies to deal with resistance showing the cost benefit if the correct management strategy is not taken.
Relevant information.
Scare campaign. Case studies where resistance has developed from poor management.
Just keep the research funding going.
Useful, cost effective, practical research results, which make a real difference and improve the overall farm system gross margin over a five year period.

QUESTION 37

What information do you believe would help to increase the uptake of best practice in plants and soil management?

Responses
More information on rotation systems, especially in relation to legume crops.
Regulate the fertiliser industries to some extent so the snake oil specialists have to prove their product before selling it.
Real case histories of tillage and irrigation systems. How they manage planting, fertilising, weed control, and harvesting with plant and equipment under different crop stubbles, planting configurations and irrigation systems.
Better prices for legume crops: eg faba beans, chickpeas.
Economic impact assessment: i.e., highlight the economic benefits achieved through improved fertiliser efficiency and yield improvement/sustainability.
Case study analysis.
A common view between soil biologists, nutritionists, pathologists and farming systems. Uptake of good farming systems is already good in general given the unreliable growing seasons we have had.
Economic assessments of rotations and impact on farming systems.
Area specific trial information on rotation crops, more information/evaluation of machinery advances.
Continue to extend information on benefits of crop rotation for sustainable farming systems.
WUE and economic benefits.
Fertiliser savings, yield increases.
Better measures and understanding of the availability of soil nutrients to plants.
Relevant, disease and nutritional benefits.
Case studies and farm field walks.
How best to handle stubble without detrimental effects to the next crop regarding nutrient tie-up, watering ability etc. How best to plant effectively into heavy soils with stubble cover which are going to be flood irrigated.

QUESTION 38

Please outline some of the changes made by your growers to accommodate climate change.

Responses
(9 respondents indicated no changes are needed).
Reduce the planting areas. Change planting dates and varieties.
Due to lack of reliable irrigation water and rainfall, irrigated cotton could not remain the main crop because growers could not take advantage of reliable irrigation water and rainfall, irrigated cotton could not remain the main crop because growers had to drop cotton from the dryland program because of excessive refuge requirements for Bollgard II. The necessity to pupae bust and because the soil moisture profile was so depleted following rain grown cotton relative to alternative crops. Growers had to take advantage of sporadic rainfall and river/overland flows to plant whatever crop suited the planting window of opportunity and had good prospect of profitable outcomes. The importance of minimum tillage was accentuated. In 10 to 20% of cases, irrigation growers with sound financial status invested in lateral move irrigation and centre pivots. With flood irrigation systems, the pre-planting and post planting irrigations fill up the soil moisture profile. Overhead watering is so far more flexible and allows growers to take greater advantage of rainfall events and minimum tillage practices.

Increased use of rotations and opportunity cropping to take advantage of rainfall events. Use of new centre pivots to reduce water use and allow better use of rainfall events. Reduce tillage to reduce erosion.
Fallow length and type. Some systems have changed to plant crop when rain falls, not by calendar date.
Growing a range of crops depending on water availability and timing. Limiting pre-plant inputs to reduce costs and risk.
Mainly rotation changes due to reduced water availability. Trying to increase storage efficiency by increasing depth.
Minimum tillage practices, crop rotations and maintaining stubble cover.
Using less irrigation. Skip row cotton. Minimum/zero till. Using more weather information
Sustainable farming rather than climate change. Minimum till farming, which has been practiced long before the Labor party was voted in. Crop choice and varieties.
Reduce tillage, retaining ground cover, only planting area to cotton that has sufficient water to finish off the crop.
Irrigation deficits. Date of planting. Plant population/row spacing.
Reduced nitrogen applications. Reduced water logging events. More zero tillage practices. Reduced heavy machinery passes.

QUESTION 40

What information do you believe would help you and your clients better position themselves for potential impacts of climate change?

Responses
None – if there are impacts we will adjust at the time.
More accurate Weather forecast system. Minimum tillage. More drought tolerant varieties.
The truth would be a start, we can then forget all this bullshit and get on with farming.
More information on carbon trading and how it might impact farming practices and derive potential alternative forms of farming income.
Low river allocation influence of ground water in lower Lachlan area.
Government policy regarding water allocation.
Facts.
Currently climate change for farmers mean less rain or pumping opportunities. Currently we are waiting for a return to normal seasons. If these seasons are not going to return we need to know about this as soon as possible.
Credible prediction.
A balance opinion of what the realistic changes to water and temperature will be and their impacts. Not all the extreme media crap. What crops or varieties will best cope with any changes and how to best management for them.
Irrigation efficiency.
Better analysis – more comprehensive information of past climate patterns on both a local and statewide level in Australia that show variations in the climate that have occurred previously, without the spin that we get through the media from governments. Better info from the Bureau of Meteorology in relation to short term outlooks, eg up to three months, so crop planning can occur. At present this information is highly unreliable.
Unfortunately, the current ongoing drought is a far bigger issue, and this is likely to be made permanent for many communities relying on irrigation industry along the Murray/Darling system as the government steps up its water buy-back process. In these cases the changes are happening now and the effects are immediate.
There is enough information; spend the money on plant breeding

More say in the political arena.
Correct information (relevant) not Labor party bullshit. Carbon trading.
More research into limited irrigation systems. Zero till/irrigation system.
Generally the on farm benefits to improve a farm's gross margin will also be of benefit to reduce climate change.

QUESTION 41

Please outline some of the changes made by your growers to influence fibre quality.

Responses
Variety selection.
Good variety selection. Adequate fertiliser and irrigation program. Monitoring picking operation. Good weed control.
Variety is the single biggest factor under fully irrigated agriculture.
Choosing the best variety for the soil, environment, water availability and disease incidence. Ensuring that the variety is managed to maximize fibre quality, i.e., supplying enough water or planting in skip-row configurations to minimise the risk of running out of water too early or failing to keep up with irrigation during heat waves.
They have more water per annum.
Variety, cut out Pix, early planting, Bollgard only.
Variety choice - 71BRF, 71RR, 71BR.
Variety selection.
Varietal selection, agronomic practices, minimisation of sticky cotton through pest control.
Better irrigation management. Trend away from late plantings. Variety choice.
Varietal selection, i.e., 350B in dryland.
Water management, i.e. scheduling. Variety selection.
Growing varieties with better fibre quality and less chance of being on the border line in such traits as micronaire, length and strength.
Better irrigation and nutrient management.
Varietal choice. CSIRO are doing a magnificent job.
Variety selection and water management.
Variety choice. Skip-row cotton. Taking risks on water availability. Conservative planting window.
Adopting the new varieties with improved fibre quality.
Variety choice, water management and nutrition. Only grow what they have enough water for.
Selecting varieties with both good yield and fibre package. Limit plantings to the available water at the beginning of the season.
Variety selection.
Early planting. More drought tolerant practices leading to minimum till, changes to row configurations. Variety choice.

QUESTION 42A

Please list the management practices you have implemented to increase yield for your growers in the last 12 months.

Responses
Increased Nitrogen. Increased water inputs.
More irrigation probes for managing water in short Sicot 70/71 varieties. Introducing new high yielding varieties with suitable disease tolerance packages.
Measure soil water. Petiole N tests. In-crop fertiliser applications. Crop varieties.
Variety-71BRF. Water management to reduce stress.
Better irrigation management. More targeted fertiliser.
Varietal and technology selection.
More long fallow. Better water management. Varietal selection.
Nutrition. Variable rate pix. Water scheduling.
More split N application. Use of varieties to counter disease.
Nutrient application. Introduced new varieties.
Increased nitrogen.
Variety, rotation, water management.
More rotation, using Bollgard. Minimum/zero till. Fine tuning fertiliser and water.
More tailored in-crop N applications. Change row configuration to 75cm rows from 100cm rows.
Water management. Nutrition.
Focused on irrigation timing. Water running nitrogen in first three irrigations for Bollgard cotton.
Irrigation management, nitrogen, pest thresholds.
Variety choice. Water programs. Paddock criteria selection.

QUESTION 42B

Please list the management practices you have implemented to reduce the cost of cotton production for your growers in the last 12 months.

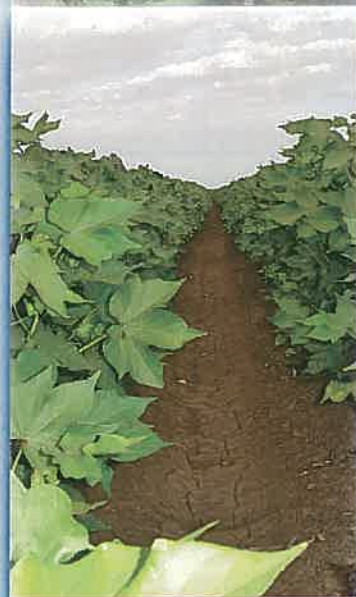
Responses
Reduced p and k. Utilising compost.
Planting in skip-row configurations. Spraying by ground-rig when practicable. Lateral moves. Reduce labour costs.
IPM. Crop variety. Roundup Ready Flex.
More long fallow. Better water management.
Rotations.
More thorough soil testing.
Introduce new planting patterns. Streamlined nitrogen applications.
Minimum tillage. RR technology.
Technology BT cotton/Flex. Lower energy use. More area per man and machine.
Permanent beds. Less cultivations. Weed seekers.
Rotations.

Less cultivations. Storing more rainfall moisture.
Pesticides. Labour. Capital purchase.
Fertiliser reductions and timing. Twelve-month herbicide spray plans. IPM in general.

QUESTION 45

What training (across all issues) would you or your clients be interested in doing over the next 12 months?

Responses
Soil test interpretation so as not to rely on what resellers suggests.
Irrigation Workshops (Water use efficiency).
Carbon trading. Setting up trading plans with growers for other farm commodities eg cotton, soybeans, wheat etc similar to practiced by professional share traders.
Insecticide resistance management – more growers swinging back to conventional cotton. I lack the experience in conventional cotton growing as I entered the industry in the last five years and have until last year had experience with BGII.
Precision agriculture, accessing information from guidance systems etc.
Irrigation improvement.
Precision agriculture – mainly software use and application.
Alternative crops, growers are looking more at other crops as they counter the effect of low water availability. More information on other crops and the role they could play in rotating with cotton would help.
Farming systems. Machinery required for minimum tillage.
Need an apprenticeship program for new young farm workers.
C-probe refresher course.
Soil health workshops. Broad acre crop nutrition – viability versus long term soil nutrition. Marketing and crop insurance options.
More information on combining minimum tillage and irrigation. How to improve a sole operator's business skills for myself.



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