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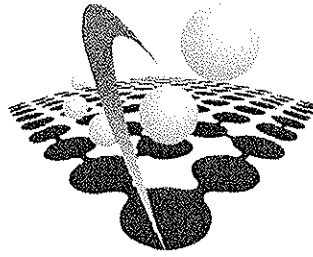
INSTITUTE FOR **Rural Futures**

Cotton Consultants Australia Integrated Pest Management Survey

UNIVERSITY OF NEW ENGLAND, ARMIDALE NSW 2351



**Cotton Research and
Development Corporation**



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Draft Report to Cotton Consultants Australia

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All errors and omissions remain the responsibilities of the authors.

Executive Summary

The concepts associated with Integrated Pest Management (IPM) are central to insect control and management across the Australian cotton industry. This report outlines the results of a survey conducted to explore IPM practices with agronomic consultants during August and September, 2001.

The survey covered five broad areas of IPM; aphid management, endosulphan usage, IPM guidelines and practices, area wide management groups and the management of beneficial insects and spiders. Survey respondents were drawn from across the cotton growing districts of Australia, with 35 Cotton Consultants Australia members contributing survey data.

Aphids have traditionally being acknowledged as a secondary pest in most cotton growing systems. The advent of Ingard cotton varieties and recent outbreaks of cotton bunchy top, have increased the prominence of aphids as a pest that can result in significant expense to control with impacts on yield that can result in economic losses. The survey sought to understand the types of pressure experienced in recent seasons, thresholds used to assist in spray decisions and information about the types of sprays used to control aphids. Generally, consultants were concerned to keep on top of aphids with the trend appearing to be a reduction in the thresholds, however the reported aphid pressure across valleys was variable with approximately half of those surveyed indicating that they reduced aphid thresholds last season due to the threat of bunchy top. Most consultants were reporting the need to be careful with the sequencing of chemical types, specifically to avoid organophosphate/carbamate resistance.

Endosulfan is still an important tool that is used throughout the industry. The survey found that two thirds of consultants report using endosulfan on less than 50 per cent of fields. When used, endosulfan is almost exclusively applied by ground-rig and aerially by Large Droplet Placement (LDP) spray, the majority by ground-rig. The efficacy of LDP sprays were assessed by respondents to be acceptable overall.

The IPM guidelines were widely used by respondents to the survey with the majority of consultants who used the guidelines finding them particularly useful. Most consultants sourced the guidelines through Cotton Consultant Association Inc. meetings, seminars or mail-out. The other source most often mentioned was the 'Entopak', supplied by the Cotton Cooperative Research Centre. Survey respondents went into depth reporting the key elements they were working to implement. In a general sense, these elements reflected the content of the guidelines. Regional differences were evident however, highlighting the variability in production contexts across cotton production valleys. Consultants suggested that the IPM guidelines will need to be reviewed regularly to keep the information current. Similarly, in-depth recommendations regarding beneficial populations, and their impact on pests would improve the guidelines.

The philosophy underlying area wide management groups appeared to be well supported by survey respondents. Unfortunately, the practical application of this philosophy is proving to be a challenge for growers and consultants alike. A large amount of frustration was reported by consultants who seemed unable to generate a commitment to AWM principles beyond the planning and planting period of each season. The breakdown of communication and collective planning by individual groups was reported as often being associated with the first programmed spray failure, or, when grower's workload found them unable to attend meetings. Suggestions to improve AWM effectiveness centred on increasing communication within AWM groups through the use of independent coordinators. Survey respondents also indicated that growers needed to have ownership of the process or be in control if they are to commit fully to the process.

Beneficial insects and spiders were mentioned by respondents throughout the survey. Maintenance of beneficial populations is constantly strived for across valleys, with the 'soft' chemical options frequently referred to as being the type of chemistry that should be used for as long as possible. In excess of 90 per cent of respondents sampled crops for beneficials, the majority of these consultants sampling two to three times per week. Approximately 80 percent of survey respondents used the information on beneficial insects and spiders when formulating spray decisions, abundance and predator/prey ratios being nominated as the most useful data.

The results of this survey show that agronomic managers in the Australian cotton industry are working hard to embrace integrated pest management strategies. The level of commitment exhibited across the valleys is being tested by some practical and social barriers. In other words, there are a range of areas where IPM is performing well and others where improvements will bring benefits to individual, consultants, growers and the industry as a whole.

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Introduction

In his paper to the 2000 Australian Cotton Conference, Greg Kauter quotes the 1999/2000 IPM guidelines;

'Cotton integrated pest management (IPM) is a constantly evolving approach to managing insect and mite pests in cotton. The goal of IPM is to integrate all means of managing pest populations with the aim of reducing insecticide use whilst maintaining profitability.'

This survey was designed to collect data that is consistent with, and useful in quantifying industry movement towards this definition. These data include quantitative and qualitative information on aphid management, endosulfan usage, integrated pest management guidelines, area wide management groups and beneficial insect and spider management from agronomic management consultants across Australian cotton growing valleys.

The number of respondents from each region are displayed in Box 1. Given the low number of responses for some individual valleys, no cross valley quantitative analyses have been undertaken. However the information provided by respondents has assisted in building a comprehensive picture of integrated pest management practices and associated issues in aggregate.

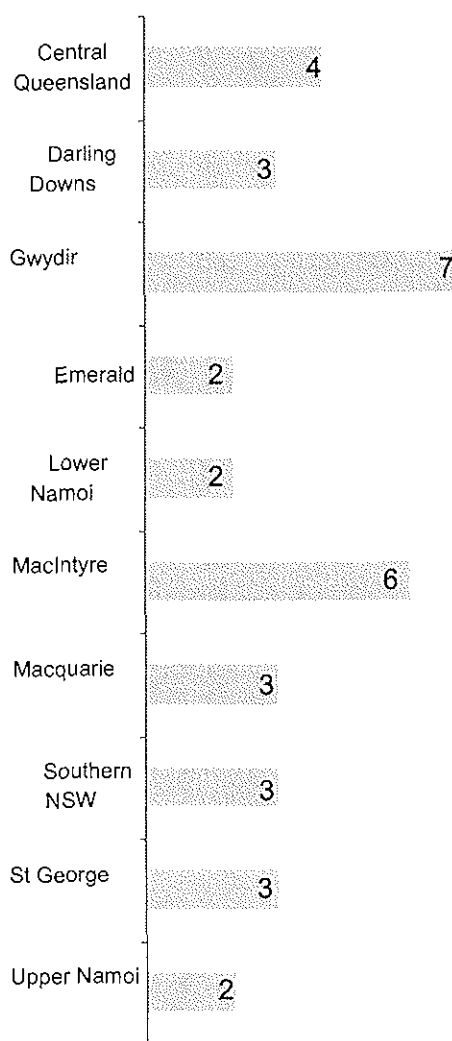
An electronic mailable survey was sent by email and facsimile to 173 members of Cotton Consultants Australia Inc. 35 useable responses were received¹. After adjusting for redundant email addresses, the response rate was 22%.

This is a relatively low response rate for a survey of this type, however feedback from consultants has indicated that although upwards of 80 per cent of CCA members had valid email addresses, a much smaller number use them frequently, or check their email during the off-season. Response to the survey would be improved in the future by notification of the email via post.

The report is in five sections, each providing an overview of a component of the IPM strategy. Verbatim quotes comprise a large part of this report. Quantitative data is present in graphical format wherever possible. Section one over-page looks at aphid management.

¹ Four respondents indicated that they had not checked cotton last season, leaving a sample of 31 for analysis.

Box 1: Regional Responses



1. Aphid Management

This section outlines the results of the survey, highlighting the comments of consultants in relation to aphid pressure and associated management techniques.

Aphid thresholds used to guide spray decisions were reduced during the 2000-01 season by 52% of the consultants responding to the survey. Aphids were judged as being harder to control by 47% of respondents.

Aphicides were reported as being rotated by 88% of consultants. Respondents nominated chemicals that were sprayed to control aphids and failed. Chemicals used to re-treat the field were listed. These paired chemicals are listed in Box 2 at the bottom of this page.

1.1 Aphid management 1999-00 compared to 2000-01 season

Figures 1.1 and 1.2 present the data for responses to the question:

Did you experience overall, a higher aphid pressure this season (2000-2001) compared to last season (1999-2000)?

The graphs show that approximately 20% of survey respondents experienced similar levels of aphid pressure across the two seasons.

Ingard cotton varieties were reported as having experienced higher pressure by 42% of respondents and lower levels by 36%. Conventional cotton varieties were reported as having experienced higher aphid pressure by 42% of respondents and not higher by 42%. The following comments about aphid pressure are presented by valley.

Central Queensland:

Aphid pressure was very high and constant from mid-December onwards. Fairly good control was achieved with OPs, but we desperately need more chemistry, but preferably more information on thresholds, damage etc., or purchasing in predators to control the aphids.

Both years had very high aphid pressure.

Emerald:

Pressure high in both seasons

Gwydir:

Had resistant aphid on 2 farms and needed to control with Pegasus – very expensive aphid.

OPs were not working well by the end of the season.

Aphids were more prevalent this year, especially on the Ingard.

Aphids were present as soon as the Temik ran out (10 wks).

Lower Namoi:

Any crops treated with Regent early had bigger aphid problems.

The western end of the valley has higher pressure and more resistance.

The presence in conventional fields was lower than Ingard fields, but still higher than last year.

Figure 1.1
Aphid Pressure in 2000-01 Versus 1999-2000
Ingard Cotton

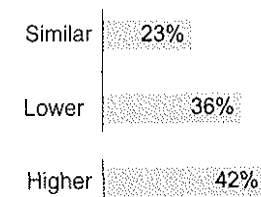
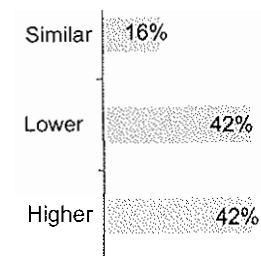


Figure 1.2
Aphid Pressure in 2000-01 versus 1999-2000: Conventional Cotton



Box 2: Aphicide Treatments

Chemical that Failed

Central Queensland: →
Dimethoate 400EC (Perfekthion)
Pirimicarb 500WG (Pirimor)
Imidacloprid 200SC (Confidor)

Gwydir:
Dimethoate 400EC (Perfekthion)
Pirimicarb 500WG (Pirimor)
Imidacloprid 200SC (Confidor)

Lower Namoi:
Profenofos 500EC (Curacron)

MacIntyre:
Pirimicarb 500WG (Pirimor)
Imidacloprid 200SC (Confidor)

Upper Namoi:
Dimethoate (Rogor®)

Re-treated With

Chlorpyrifos-methyl EC/UL (Rescue)
Diafenthiuron 500SC (Pegasus)
Dimethoate 400EC (Perfekthion)

Diafenthiuron 500SC (Pegasus)
Diafenthiuron 500SC (Pegasus)
Chlorpyrifos: 300EC/UL (Predator)

Endosulfan 350EC

Diafenthiuron 500SC (Pegasus)
Pirimicarb 500WG (Pirimor)

Diafenthiuron 500SC (Pegasus)

A slight increase in aphid pressure from last season. Our pressure was probably a bit more persistent than in previous seasons. No control problems were experienced however.

Macquarie:

The numbers were not higher than usual and they were not harder to control. But the time taken to reinfest the crop seems to be increasing. We have not detected any OP resistant aphids at this stage.

St George:

No, overall thought aphid pressure was similar to previous year.

Upper Namoi:

Minimal aphid pressure throughout the year. A few isolated patches that posed no significant control problems.

Variable between fields and varieties. No real reason for it.

Consultants were also asked to estimate the number of dedicated aphid sprays that they used throughout the season. Their responses are summarised for Ingard and conventional varieties in figures 1.3 and 1.4.

1.3 Aphid and the 2001-02 season:

Survey participants were asked to comment on:

Whether/how you will change your aphid management and thresholds for the coming season (2001-2002).

Their responses are presented by valley.

Centre Queensland:

Would aim to initiate treatment earlier to allow for failure or rapid increases in numbers.

Will concentrate more on the appearance of honeydew more so than actual aphid numbers. This is because of the variation of colonies in field (see original DT).

Will take the advice of Lewis Wilson on observing the number of winged aphids

in the population and delaying the spray decision until it looks like the population is increasing. I would like to encourage predators, particularly ladybirds and their larvae, as they do a good job of keeping aphid levels manageable. I hope to use a high threshold, but decrease it as bolls start to open.

Restrict Tracer spray as long as possible to keep aphid parasites working.

Darling Downs:

We are very aware of the problem that can arise due to prolonged high population of aphids and therefore, we will be closely monitoring all our fields for aphids from emergence to defoliation.

The Downs experienced significant CBT problems in 1998-99. Consequently, my threshold up to boll opening has been reduced to 10-20% of plants infested with aphid colonies, not winged adults. As yet, we do not know what causes CBT and we do not know how many aphids are required for how long in the crop to cause CBT symptoms. I am very concerned about litigation if aphids are allowed to persist in a client's crop and the crop suffers significant yield loss due to CBT. The symptoms don't appear till 6-8 weeks after the aphid infestation. I lost two major clients in 1998-99 due to CBT induced yield losses. In the past, I had felt comfortable with a low level of aphid infestation in the crop because I found aphid to be the best attractant and food source for beneficials in a cotton crop. I am now very reluctant to follow this practice. In the future, I will probably encourage growers to plant CBT resistant varieties provided they have the appropriate combination of yield, quality, standability, and disease tolerance. In irrigated cotton, there has been a swing towards the use of Aldicarb such that 90% to 95% of the crop is now treated with this product at planting. Aldicarb is not being used to control aphid specifically but to give the cotton plant sufficient seedling vigour to withstand the cold shocks often experienced on the Downs, to increase yields, and to combat Fusarium Wilt, which is endemic on the Downs.

Due to the IRMS and concerns about aphid insecticide resistance, the first spray for aphid, if they should appear early in the season, will have to be either Endosulfan or Confidor. Endosulfan is likely to be the first choice because of its better fit in an IPM program. Until varieties tolerant to Fusarium Wilt and

Figure 1.3
Number of Aphid Sprays
- Ingard Cotton

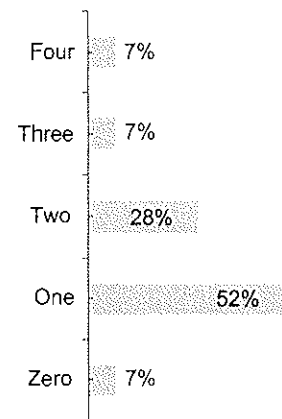
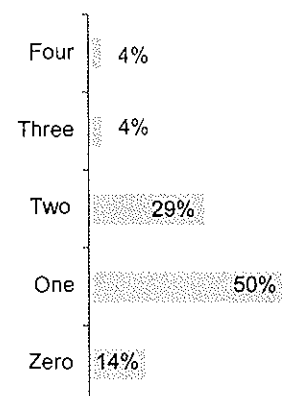


Fig 1.4
Number of Aphid Sprays
Conventional Cotton



CBT are available, it is unlikely that irrigated cotton farmers will swing away from using Aldicarb.

Thrips:

Probably use a lower threshold than industry standard to ensure products like Confidor work. Also due to some 'Bunchy Top' concerns.

However, did not get 'Bunchy Top' last year even in heavily infested crops.

Will use lower thresholds on farms in sensitive areas (generally close to town) where it is not possible to use OPs such as Predator or Profenofos. Some of this will be to ensure that a second application of Pegasus is possible taking into consideration label periods between applications and withholding periods. I do not believe Pirimor is an option. OPs (particularly Predator) were working better last season but still had a total failure with Pirimor.

Aphids:

Rotate all chemistry to consider aphids and their resistance. Hopefully keep thresholds at industry threshold but I will be a little conservative or act as directed by the grower.

Will be more of aphid chemistry and rotation for management of aphid populations. Will maintain conservatively lower thresholds (i.e. not 90% but more 50%), as experience has shown it is difficult to maintain suppression of high populations.

No.

Aphids are becoming a major pest. So far this year, the wheat has a population already, so am predicting that it could be a similar year to last year. The chemistry will be rotated to control resistant aphids, Endosulfan will be used more to take out early resistant generations. Thresholds will be varied, depending upon pressure and time of crop. Certainly Bunchy Top is in the back of my mind when aphids are about. We are planting more deltapine lines that are 'Bunchy Top' resistant.

At planting we use Temik, so this puts us in the hardest situation for our first aphid spray if it needs to be early, as our only options are Confidor, Pegasus and Endo. Confidor is not terribly IPM friendly and expensive and not 100% effective, Pegasus is not for early season as it needs a full canopy for fumigant

action and we don't use Endo due to environmental constraints. Pirimor is our choice because of IPM fit, but it is in the same group as Temik, so I am not sure what we will do yet – hope for no early season aphids I suppose!! We need another aphid product that is not an 1B or 1A Group and that is IPM friendly for early season use. We will probably have to let our thresholds go a little higher than we would like due to the fact that we run an IPM program and we don't have a product that fits early season, and also so that we can stick to the IRMS. Or hope that beneficials will help us out! The conventional threshold is too high, but based on last season I will use a threshold based upon Hoverfly numbers, I found that they reduced the numbers from as high as 60% plants infested down to around 20% The spray threshold will be up around 50% mid-season depending on beneficials.

Lower Nematode:

Using a system of not targeting one pest at a time. If thresholds are at 30% infestation, hold off till there is a problem that requires heavy application and take out beneficials as well. Use beneficials as a guide and use chemistry that will allow for the beneficials to re-enter the field quickly.

Yes: 1) No, Regent early regardless of thrip or mirid activity. 2) Explore spray oil alternatives. 3) Endosulfan next option.

MacIntyre:

I think I will leave my aphid strategy the same as last season, making sure that I rotate chemistry.

In the western end of the valley we will change from granular at planting treatments to Gaucho seed treatment. This will let us rotate to Pirimor as the first in crop spray and Pegasus late season.

Will continue to use a low threshold. Will avoid the use of Dimethoate to avoid resistance. Will be more aware of seed dressings and treat on the first spray with a different chemical to the seed dressing.

I will follow the aphid strategy guidelines. I will rotate chemistry including soil insecticides. Preserve my beneficials for as long as possible. Farm hygiene.

Our strategy will be to still keep our thresholds reasonably tight due to threat of CBT. Will probably look at 10% to 20%

We will probably have to let our thresholds go a little higher than we would like due to the fact that we run an IPM program and we don't have a product that fits early season and also so that we can stick to the IRMS. Or hope that beneficials will help us out.

Aphids are becoming a major pest. So far this year, the wheat has a population already, so am predicting that it could be a similar year to last year. The chemistry will be rotated to control resistant aphids, Endosulfan will be used more to take out early resistant generations. Thresholds will be varied, depending upon pressure and time of crop.

threshold depending on the client. We are encouraging growers to be more strict about their farm hygiene this winter so as not to get a population build up on weeds like milk thistle. Our insecticide strategy will be to mainly use Gaucho as a seed treatment (this product has variable results as a foliar), if aphids build up and Heli pressure is quiet or in Ingard we will use Pirimor, or if Heli pressure is an issue we will use Endo. If aphid pressure is an issue later in the season we will look to use Pegasus and control later season spider mite at the same time. This strategy is similar to the one we used last season except for the increase in farm hygiene as well as taking into consideration the seed treatment used when looking for chemistry rotation.

Macquarie:

Keep field perimeters free of winter weeds that act as hosts for over wintering aphids. Control aphids when numbers are low (below 50%). Rotate chemistry (if aphids are present early season use Endo or Confidor) avoid using OP early in the season. Encourage beneficial populations by using softer chemistry in Stage I and II, where possible.

Probably the same as last season.

Southern NSW:

Pirimor gave a better result than Dimethoate. Dimethoate sprayed block had one extra insecticide than the pirimor sprayed blocks for heliothis control.

St George:

Depending on what the season brings. If the aphid pressure is higher then I will consider changing my management of aphids.

Will have no change compared to the past two seasons.

Upper North:

I will be very wary of aphid infestations and will not tolerate significant infestations. Due to the IPM and Area Wide Management approach. I will avoid OPs control as long as economically possible.

If cotton is big enough with good canopy I will start with Pegasus because I will have used Temik, so OPs and Carbamates are out

We will continue to use a low threshold. Will avoid the use of Dimethoate to avoid resistance. Will be more aware of seed dressings and treat on the first spray with a different chemical to the seed

