Siratac

An Investigation of Siratac's Role in the Australian Cotton Industry

A Research Project for the
Cotton Research Council

December, 1987

The Siratac Research Project
was authorised and funded by the
Cotton Research Council
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NOTE

The Cotton Research Council has received and noted a number of points made in this report. The report should be read as the point of view of the project team and not the formal position of the Cotton Research Council, nor of other interested parties such as the New South Wales Department of Agriculture and CSIRO.

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Preface

The Siratac Research Project was jointly conducted by the Faculty of Agriculture at Hawkesbury Agricultural College and the NSW Department of Agriculture.

Our objective was to undertake a collaborative research study to identify and investigate problems associated with the perceived "poor adoption rate of Siratac, and develop an action plan and advisory programme to significantly improve adoption"[1].

This document is the final report for the Cotton Research Council and it summarises our findings, including:

i). issues regarding Siratac's market and its position within that market,

ii). research into attitudes and expectations of users, non-users and past users,

iii). a summary of an industry consultative group meeting regarding a future direction for Siratac and Siratac Ltd., and developments since that meeting, and

iv). conclusions and recommendations to achieve the defined future direction, and potentially improve acceptance.

The concept of Siratac as an automated crop (insect pest) management information system is relatively new and offers significant potential to the cotton industry. Yet, despite this potential, Siratac's future appears somewhat unclear.

[1] "Improving the Adoption of Siratac", Research Proposal to the Cotton Research Council, June 1986.

Introduction

This project originally evolved out of conversations between the Australian Cotton Growers Research Association (ACGRA), Siratac Ltd. and the NSW Department of Agriculture. The Department met with Hawkesbury Agricultural College (HAC) and drew up the basic idea of the project and its frame of reference. They then requested funds from the Cotton Research Council.

Our original brief was "to undertake a collaborative research study to identify and investigate problems associated with the poor adoption rate of Siratac and develop an action plan and advisory programme to significantly improve adoption"[1].

Like any other large scale commercial cropping venture, cotton growing needs an accurate and efficient way to make agronomic decisions, including pest management decisions. Agriculture is increasingly using information technology to meet needs like these; the Siratac programme is just one example of this trend.

Siratac is an on-line computer based crop management system for cotton growers; at present it is particularly related to insect pest management. So, given the cotton growers' need for an efficient crop and insect pest management system, there was good reason to expect Siratac to succeed. But, as the figures below show, growers have not adopted Siratac across the board.

Region	Siratac	85/86 Total	Siratac	86/87 Total
Macquarie/Bourke	12878	19050	9877	16604
Namoi/Boggabri	11170	43271	8646	34230
Gwydir	13526	53506	12968	47390
Macintyre	1440	19529	2262	16450
St George	1834	8055	1695	7592
Downs/Lockyer	1190	9529	872	6656
Biloela/Theodore	281	10192	290	5716
Emerald	1018	8167	700	6491
Kingaroy	-	90	63	90
Totals	43339	173635	37571	142313
Siratac % of Totals	24.9	100	26.4	100

Figure 1: Number of hectares under Siratac in comparison to total Australian irrigated hectares.[2]

[1] "Improving the Adoption of Siratac", Research Proposal to the Cotton Research Council, June 1986.

[2] The details in Figures 1 and 2 are approximate.

Region	Siratac	85/86 Total	Siratac	86/87 Total
Macquarie/Bourke	33	38	24	34
Namoi/Boggabri	29	158	26	123
Gwydir	20	93	17	79
Macintyre	10	60	7	50
St George	14	36	8	33
Downs/Lockyer	23	77	5	48
Biloela/Theodore	3	66	2	14
Emerald	14	46	10	34
Kingaroy	-	2	2	3
Totals	146	574	101	418
Siratac % of Totals	25.4	100	24.2	100

Figure 2: Number of farms using Siratac in comparison to total irrigated cotton farms.

In the 1984/85 season the Siratac system was used on around 22% of the total Australian crop area; but 50% of that figure represented only one client company. In the 1985/86 season the area under Siratac totalled 44,000 hectares--approximately 25% of the Australian total of 175,000 hectares, and in the 1986/87 season the figures were 26% of a total crop of 142,000 hectares. So Siratac's adoption, and therefore Siratac Ltd's revenue, has levelled out. What this adds up to is a threat to the longterm expansion and perhaps viability of Siratac Ltd. as a commercial company.

This mismatch between the industry's needs and its hesitance to adopt what seemed like a promising (partial) solution, led us to try and identify:

* Siratac's benefits;
* Siratac's market;
* The industry's perceptions of Siratac (and Siratac Ltd.) and the reasons for its non-adoption; and
* Feasible and desireable changes for Siratac and Siratac Ltd.

Before we tackle each of these we will outline the process we used in the project.

The Process:
How we went about this study

We based our approach to this project on a problem solving methodology developed by Dr. Peter Checkland and his colleagues at Lancaster University, U.K.[1] In line with this approach, we avoided defining the problem(s) we were dealing with until we had thoroughly analysed the context surrounding the adoption and non-adoption of Siratac.

We planned the analysis to answer two clusters of questions:

1. What resources are deployed in what operational processes under what planning procedures within what structure, in what environments and wider systems, by whom?
2. How is the resource deployment monitored and controlled?

Our answers to these questions raised two items for our agenda:

1. We needed to carry out an in-depth analysis of attitudes to and perceptions of Siratac held within the industry.
2. We needed to develop a means of integrating the mass of information and insights we were generating.

We decided on a qualitative survey for the former and a conceptual model for the latter.

1. Attitudes

We chose a qualitative attitude survey method (indepth interview technique)[2] because this is the best way to discern what people know and believe, and how they feel about an issue.

Approximately 150 people were interviewed in the survey. Each interview lasted approximately 45 minutes and was taped for reference.

The aim in a qualitative survey is to explore the data generated in the interviews and to discern emerging themes which relate to the aim of the survey--in this case to explain the adoption or non-adoption of Siratac.

The survey had the secondary aim of raising Siratac as a discussion point within the industry. We saw the qualitative survey as a vehicle for identifying issues and stimulating discussion and debate. We designed it with a later quantitative questionnaire in mind which would also seek responses from a much wider grower audience on possible changes to improve the situation.[3]

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[1] Checkland, P. B. (1981), Systems Thinking: Systems Practice, John Wiley and Wison, B. (1984) Systems Concepts, Methodologies and Application, John Wiley.

[2] "Qualitative techniques are intended to determine what exists rather than how many such things there are. Because qualitative techniques are not concerned with measurement they tend to be less structured than quanitative ones and therefore can be made more responsive to the needs of the respondents and to the nature of the subject matter." Walker, R. (1985) "An Introduction to Applied Qualitative Research" in Applied Qualitative Research, ed. Walker, R., Gower.

[3] We wrote up the results of the survey in the discussion paper "Siratac: The Challenges and Changes", which you will find in appendix 1.

2. The Conceptual Model

To integrate our information and insights, we imagined a situation where the intention was "to develop an automated farm management information system that meets the decision-making needs of end-users". We then built a conceptual model of the activities needed to effectively carry out this goal.[1] Comparing the actual Siratac situation with the conceptual model enabled us to highlight those aspects of the Siratac situation that explained why it was the way it was.

The conceptual model we developed incorporated activities concerned with:

- the political process of getting support and resources for the proposal;
- policy-making;
- developing the required technology;
- setting up an appropriate organisational framework;
- developing a marketable product profile;
- promoting the product;
- allocating resources and co-ordinating activities within the organisation;
- delivering a satisfactory product to end-users;
- monitoring and evaluating all these activities.

The model gave us a frame-of-reference as we organised and interpreted the data we were gathering.

3. The Debate

The project was designed to not only analyse the situation but to also generate a debate within the industry about desirable and possible change. Our plan for this debate was to:

- set up an industry consultative group that represented a range of opinions about Siratac using a cross-section of growers and other industry personnel, such as consultants and researchers;

- circulate the qualitative survey report and hold a consultative group meeting whereby perceptions of the current Siratac situation would be canvassed and proposals for desirable changes developed;

- circulate the discussion paper and a summary of the consultative group meeting's decisions to all growers, together with the quantitative questionnaire. This was designed to include all growers in the debate about change, and to collect information on their views about proposals for change that emerged from the consultative group meeting;

- include all of this information in our final project report, together with conclusions and recommendations.

The consultative group meeting was held at Wee Waa on September 15, 1987.[2] Tabled and discussed at the meeting was a specific proposal for changes written by Mr Terry Naughtin, an agronomist with Colly Farms.[3] It was suggested at the meeting

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[1] See appenix 6.

[2] We will discuss the results of the meeting later on in this report and you will find a list of those who were invited and attended in appendix 3.

[3] See appendix 4.

that Mr Naughtin's paper was consistent with the general thrust of the proposals for change generated at the meeting and that we should include it within the package of information to growers as an example of how change might be implemented.

We made it clear at the meeting that we intended to send to growers the qualitative survey report, the questionnaire and a summary of the consultative group meeting. We also agreed to add Mr Naughtin's proposal. There was some discussion about the merit of sending out the qualitative survey report, but we left the meeting believing we had tacit support to send out the total package.

We subsequently designed the questionnaire.[1] While we were preparing this material, we began to get disturbing feedback on our proposal to distribute the qualitative survey report to all growers. In response to high-level representations from the CSIRO to the Department of Agriculture, we considered it would be counter-productive to circulate the report at that stage. To do so, we believed, would have diverted energy away from the project into a potentially destructive debate about the merits of circulating the report.

The climate surrounding our project changed about this time. Whereas there had been a climate of co-operation between ourselves and those working with Siratac, we began to experience a sense of competition and hostility. In response to this, a meeting was held in Gunnedah on November 11 between some members of our team and people representing the management of Siratac Ltd. The Siratac Ltd. were reluctant to see the proposed questionnaire go out as planned. At this meeting we agreed that the only information that should go out to growers at that stage was the summary of the outcomes of the consultative group meeting at Wee Waa. We subsequently mailed these on November 17th.

By now it was obvious that the situation surrounding Siratac was changing rapidly. The need for change seemed to us to be widely accepted, and various parties were canvassing proposals for wide-ranging changes in the services Siratac Ltd. offered and the way it was structured, governed and managed. An indication of this mood were the proposals for change put forward at the annual general meeting of the Namoi Cotton Co-operative on November 25th.

We now turn to the substance of our report.

[1] You will find a copy of this questionaire in appendix 2.

An Overview of the Siratac Situation

A. Introduction

While our study has focussed on adoption, this has not been our sole focus. We have tried to look at the Siratac situation from as many perspectives as possible. In particular, we wanted to get inside the unease the industry was experiencing with Siratac, and to try and identify why only a limited number of growers had adopted and persisted with Siratac.

One of the problems we encountered throughout this study was the tendency of various groups (eg. Siratac Ltd., researchers, growers and consultants) to only identify and address issues that were important to them. Therefore, we needed to develop an industry picture that was representative and not skewed by the "imperatives" of any particular sector within the industry.

Following our methodology outlined above, we developed a "rich picture" of the Siratac situation. We wanted to collect and portray key information and impressions in a structured and evocative way by attempting to take into account all the forces that impact upon the situation.

The reason we developed this picture was to ensure that we sought a variety of information and opinions before starting to draw conclusions and consider actions.

This section of the report summarises under 4 headings the relevant information and opinions that we have encountered as we explored the Siratac situation:

* Siratac: the product and its benefits;
* Siratac and its market;
* The industry's perceptions of Siratac (and Siratac Ltd.) and the reasons for non-adoption; and
* Feasible and desireable changes for Siratac and Siratac Ltd.

B. Siratac: The Product and its benefits

1. What is Siratac?

The name Siratac is an acronym derived from the CSIRO and Department of Agriculture TACtics for growing cotton.

Siratac is an on-line computer based management system for cotton growers, currently directed at insect pest management. It takes into account all known factors influencing the development of insect pests, crop growth and yield forecasts as determined from accumulated and current climatic, insect and plant data; it forecasts the optimum pesticide to use and the timing of the application(s) to the crop.

Siratac Ltd. is the non-profit commercial company which was formed in 1981 to market the Siratac programme to the cotton industry. The Annual Report for 1987 lists membership of Siratac Ltd. at 255 of which 158 (61.9%) are cotton growers.

Research workers from the CSIRO and the Department of Agriculture at Narrabri Agricultural Research Station have continuously refined the system since the early 1970's.

The initial purpose of Siratac was to develop the results of research into an integrated insect pest management system which growers could use with a high degree of confidence.

The researchers based their work on insect pest management principles aimed at producing a cotton culture which is economically and ecologically stable. This led to Siratac's philosophy of preserving the effectiveness of insecticides for as long as possible by i). minimizing selection for insecticide resistance by ii). using insecticides only when necessary and, whenever possible, iii). using the softest insecticide option in terms of its effect on beneficial insects.

Siratac offers a number of important benefits to the cotton industry. Some are clear; but many are intangible, and difficult to promote to an industry oriented to hard cost/benefit ratios.

2. What has Siratac Achieved?

What follows is an overview of the concept and attributes of Siratac. We are indebted to the researchers at the CSIRO and Department of Agriculture for the following summary of this subject.

i). Insecticide resistance reduced

Insecticide resistance is the most important problem facing the cotton industry today. Cotton growers rely totally on the longterm effectiveness of a very limited group of insecticides. In fact, the survival of the industry in its present form depends on these chemicals. Siratac incorporates the Synthetic Pyrethroid Strategy and provides a scientific approach to the insect resistance problem.

Siratac has played a major role in reducing insecticide use, which in turn is important in countering the build-up of resistance to insecticides. The Ord River was a dramatic illustration of the destructiveness of insecticide resistant insect pests.

If the current levels of resistance should increase, timing of sprays will be even more critical. Siratac enables farmers to apply sprays at the most appropriate times, thus optimising their effectiveness against pests.

Siratac is built around the concept of "action thresholds"; that is, a grower only sprays when he anticipates that the insect damage will be greater than the cost of the spray. The strategy takes advantage of natural control of pests and offers farmers the option of taking advantage of the crop's capacity for compensation to reduce the frequency of insecticide sprays. And, more recently, the introduction of the new cotton variety Siokra (which is less affected by insects) allows Siratac users to further reduce insecticide use.

Siratac's aim is to help farmers to take advantage of the role of "beneficial" insects to control, for example, Heliothis. Natural control also occurs through extremes of weather (heavy rainfall, wind, humidity and high temperatures) and Siratac allows a farmer to use these to advantage. This is important; the greater the level of natural control, the lower the need for pesticide application and, consequently, the lower the chances of insecticide resistance developing in the pest population.

Siratac also uses crop compensation to combat resistance. It offers growers the option of taking advantage of the natural fruiting habit of the cotton plant, to extend insecticide spraying intervals. The longer intervals further reduce the frequency of insecticide sprays, without foresaking yield or delaying the crop. A cotton plant produces two to three times more fruit than it can mature. There is no need to protect

fruit which will not mature and, depending on the growth stage of the crop, the plant can compensate and replace lost fruit.

ii). Savings on spraying costs

Since Siratac came onto the market, there has been a marked reduction in insecticide use in the Australian cotton industry as a whole, resulting in substantial savings in spraying costs. Siratac allows better assessment and timing of sprays and can reduce the number of sprays under light insect pressure; however, under heavy insect pressure (rare) the differences and advantages are less.

iii). A responsible approach to environmental contamination

Siratac enables farmers to demonstrate to the community that they are using insecticides in a responsible way. Siratac's objective of reduced, more precise insecticide use provides a disciplined, rational and responsible approach and one that improves the image of the industry.

iv). Accurate record keeping

Siratac provides an excellent, up-to-date record keeping system for chemical spray applications, chemical budgeting, and basic field reports, such as variety, planting date, nitrogen rate, plant population and irrigation dates. Accumulated over the seasons, this record becomes an invaluable reference data base for the entire cotton industry, including researchers.

v). The fruit model

The fruit model calculates the survival of present fruit and the number of fruit which will set in the absense of insect pests. Together with insect counts, this data predicts whether the crop can produce more fruit than insects can eat. The fruit count allows a grower to accurately record the growth and development of his crop and to predict boll opening date and final yield. It also allows him to compare his crop with the region averages. Finally, it provides a comprehensive end-of-year report which summarizes all data measured during the season.

vi). The cotton industry's image as a leader and innovator

Siratac helped stamp the Australian cotton industry as a leader and innovator. Siratac is a world first--it is the first commercial attempt within the rural sector to use a sophisticated system in crop management.

When we asked growers to give their opinions about Siratac, few cited the benefits of Siratac as outlined above. It seems that these benefits were not obvious to the growers or that other aspects of Siratac were more salient.

C. Siratac and its Market

1. Adoption of Siratac within the market place

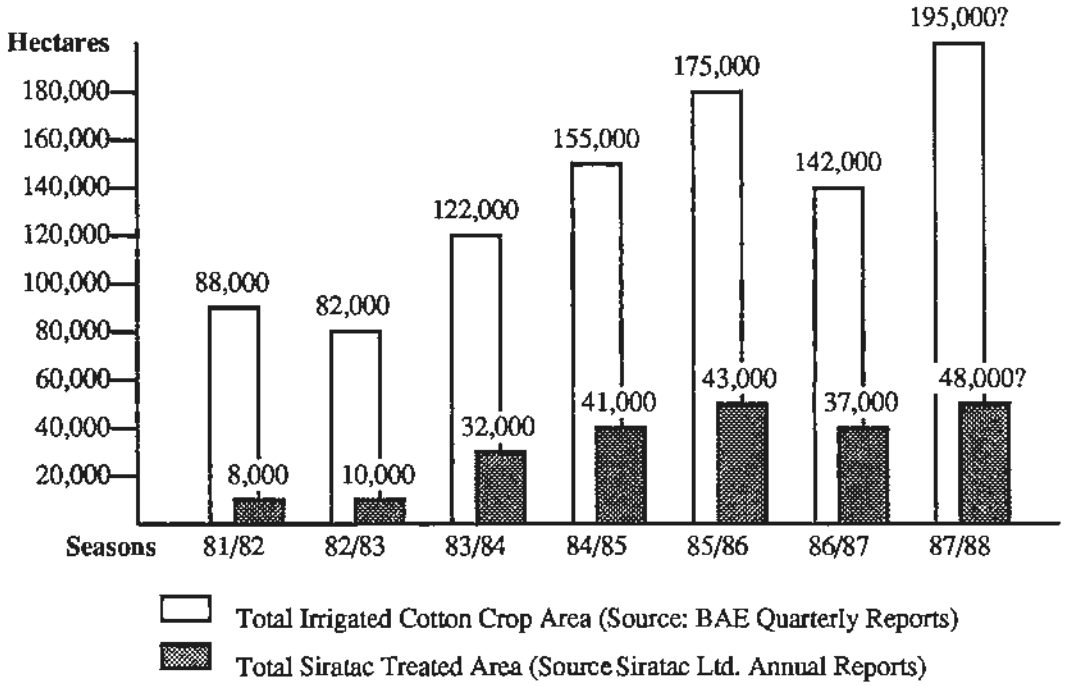

Figure 3: Siratac's share of the irrigated hectares
(diagram not strictly to scale).

As the above figure shows, the company initially experienced a rapid growth phase within the market. This has now matured to approximately 25% (plus or minus 3%) of the market. In other words, adoption has levelled out and now poses a threat to the longterm future of Siratac Ltd. as a commercial company.

2. The Overall Market

i). Size of the market

If Siratac is to be a commercial concern we must consider its overall market size. The Australian cotton industry is a relatively small market for Siratac as compared to overseas cotton producing countries (as shown in figure 4). Our Australian scene consists of some 400-600 growers and anywhere from 80,000 to 175,000 hectares (the approximate range over the past six years). Some estimate that the maximum number of irrigated hectares will not exceed 200,000 hectares given the amount of present and planned public irrigation water.

China	28	million bales
USA	12.3	" "
USSR	11.7	" "
India	6.6	" "
Pakistan	4.5	" "
Brazil	3.9	" "
Turkey	2.7	" "
Mexico	1.3	" "
Egypt	1.8	" "
Australia	1.1	" "

Figure 4: Australian production relative to overseas production (1985/86).[1]

ii). Segmentation of the market

Not only is the market relatively small, it is also segmented into small growing areas. These areas and their isolation from one another pose further problems including the absence in some areas of a reliable telephone system, which effectively inhibits potential users from adopting the Siratac system.

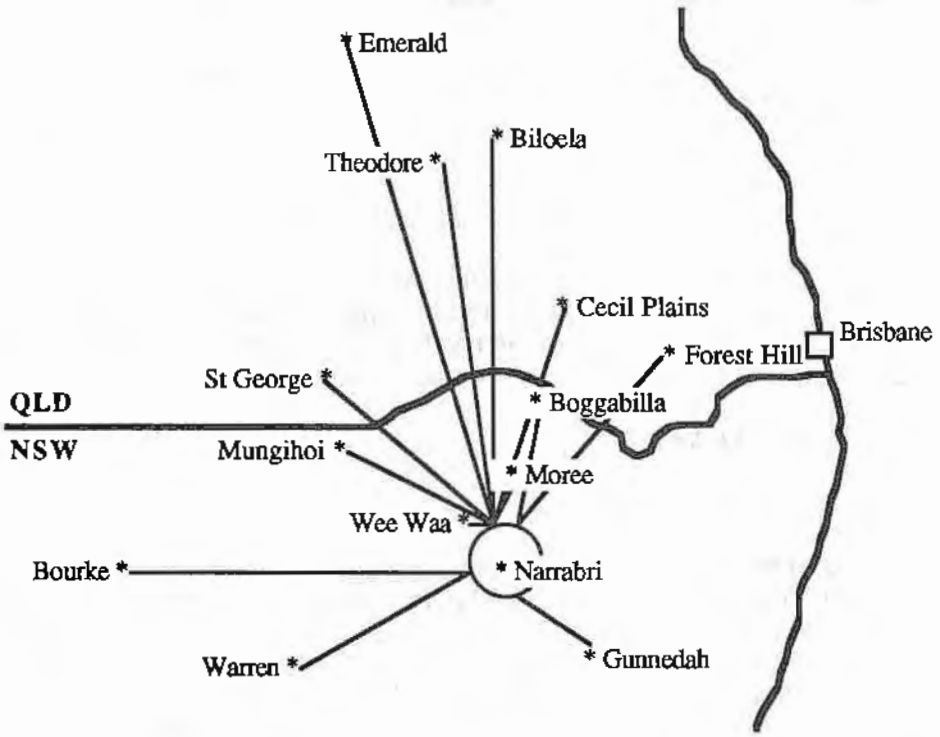

Figure 5: Cotton growing areas and the Siratac communication network.

Cotton is grown in scattered regions ranging from Emerald in Central QLD in the north to the Macquarie Valley and Bourke in NSW in the south and west. These areas range in size from 5-7,000 hectares throughout QLD, and 16,000 to more than 50,000 hectares in NSW (1986/87 figures). The vast majority of the hectares put to crop are under irrigation, but recent Bureau of Agricultural Economics reports (September 1987) indicate that dryland production in Queensland could increase significantly. The Siratac system was designed for irrigated crops only.

[1] The Australian Cotton Story, Australian Cotton Foundation, 1986.

Given the present locations of Siratac technical field staff[1], there are significant areas which they cannot service and others they can only cover occasionally. This in itself impedes Siratac realising its market potential.

iii). Nature of the market

The market is extremely sensitive to international market forces: as world stocks (supply) and demand fluctuates, so does the size of the Australian market. Therefore, forecasted cotton prices, exchange rates and net return to growers are increasingly determining the area put to crop (ie. the market size).

The industry is innovative, dynamic and volatile. It faces enormous pressures from market fluctuations, increasing insect resistance to pesticides, and environmental groups opposed to the use of those same pesticides that are needed to control the insect populations.

iv) The needs and wants of the market

The cotton idustry has a variety of needs and wants. The primary need for individual cotton growers seems to be to remain viable. Many growers and consultants emphasise their need to reduce costs and increase yields. In short, Siratac must be seen as having a positive impact upon the growers' "bottom line".

At the same time, the whole industry needs to remain viable, and to be seen to be environmentally responsible.

3. Consumers of Siratac

We might assume that the individual grower is the consumer for Siratac services. After all, it is his cotton field and he pays the fees to Siratac. Yet there is another group of actual and potential clients of Siratac.

Over the last ten years the independent consultants have progressively developed into an influential body within the cotton industry. The newly formed Crop Consultant Association (CCA) has found a niche for itself in the extension/advisory role for the industry: Scouting[2] and consulting to over 60% of the Australian cotton crop (this figure would be much higher if the dozen or so corporate farms were excluded).

Group	% Total Hectares	No. farms	No. hectares
Consultants	60%	269	85,233
Self	10%	51	15,469
Corp. Farms (self)	20%	11	28,291
Chemical Companies	5%	29	6,920
Siratac (Direct)[3]	0.5%	6	800
Unknown/Others	4.5%	52	5,600
Total	100%	418	142,313

Figure 6: Scouting percentages for the Australian cotton crop 1986/87.[4]

While services and expertise vary from consultant to consultant (ranging from 'scouts' to 'consultants' offering a wide range of agronomic advice), some consultants' clients

[1] Macquarie, Namoi and Gwydir Valleys in NSW, and Emerald, QLD.

[2] A scout collects the data and passes on this information to the grower who then makes the decision. A consultant, on the other hand, directly influences the decision making.

[3] Siratac (Direct) should not be confused with Indirect Siratac which has 25% of the market.

[4] Personal communication from Kerry Watts, Cotton Growers Services.

are unaware exactly what price and/or what chemicals are used. Many of these growers leave responsibility for the crop in the consultants' hands.

Siratac Ltd. must recognise the importance of this new type of relationship between the grower and his consultant. If the consultant is the one making the decisions, then in many respects he is Siratac's real client.

4. Competition to Siratac

Yet while Siratac Ltd. must see the consultants as consumers for their product, historically a sense of competition has existed between them and Siratac Ltd., which restricted the latter from developing the market potential of its product.

Since Siratac's inception consultants have either directly or indirectly challenged it as an extension and advisory tool. The independent consultants with the help of the Pyrethroid Strategy have assumed the major advisory role. While much of the industry has seen the consultants and Siratac as competitors, they were intended to complement one another.

5. Siratac's Financial Profile

Figure 7 below is a breakdown of Siratac Ltd's income sources since its inception:

Income	81/82	82/83	83/84	84/85	85/86	86/87
Fees for services:						
i) indirect	39,586	52,751	173,857	346,361	410,528	399,148
ii) direct	8,094	9,199	45,783	33,329	52,246	-
Other income	2,176	919	4,014	3,717	8,544	10,741
Members subscriptions	46	172	60	66	82	106
Interest other persons	122	346	3,952	64	2,238	16,841
Sale of surplus assets	-	-	-	12,214	3,010	2,914
Grants	-	-	-	-	110,240	25,000
Grower levies	109,890	149,476	-	-	-	-
Total	159,908	212,857	227,666	395,751	586,888	454,750

Figure 7: A breakdown of Siratac Ltd.'s income sources.[1]

As shown in figure 7, Siratac Ltd. has derived some 20% of its total income over the past seven years from grants and levies. This was the company's original intention--ie. to be a service supported by levies and grants. But the question now is: can Siratac support itself in the future without levies or grants?

To help answer this question we must consider the profit and loss and net asset statements over the past seven years.

[1] A breakdown of operating and capital expenses can be found in the Appendix 5.

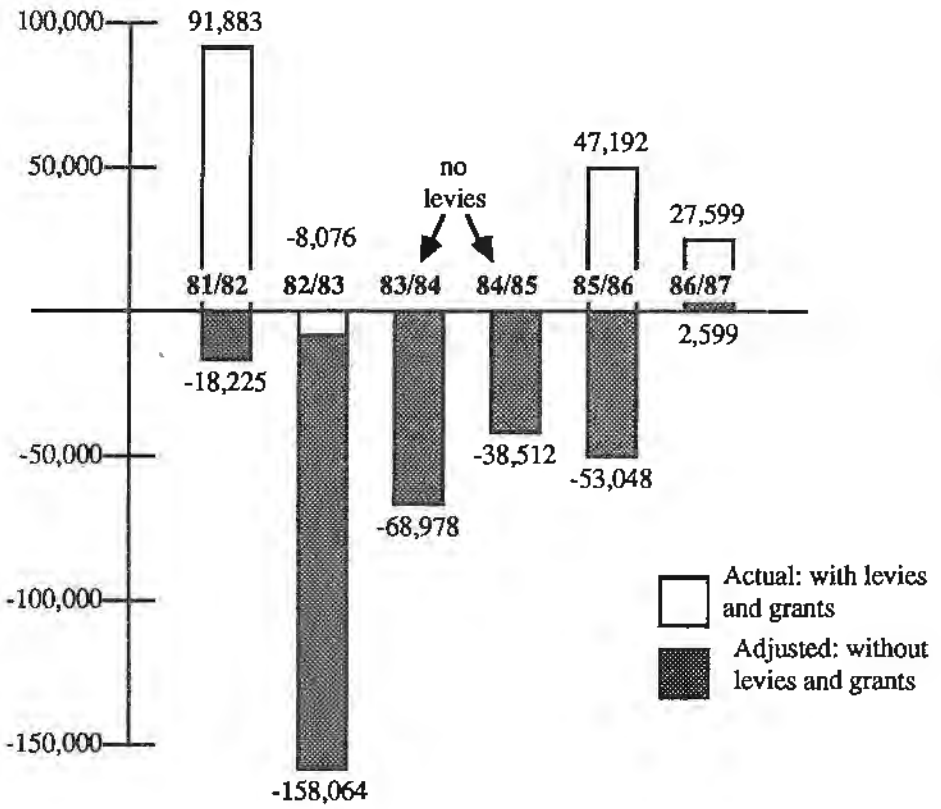

Figure 8: Profit and loss breakdown of Siratac Ltd. from 1981-87.[1]

Notes:
i). No levies/grants were received in 83/84 and 85/86
ii). Without levies/grants, every year from 81/82 to 85/86 showed a deficit.
iii). Without a $25,000 grant in 86/87, operations would have shown a modest surplus ($2,599.00) for the first time. However, if this outcome was achieved because of an exceptional one-off surge in income from "Interest Received: Other Persons"--it jumped from $2,238.00 in 85/86 to $16,841.00 in 86/87--then the financial state of Siratac Ltd. remains quite fragile.

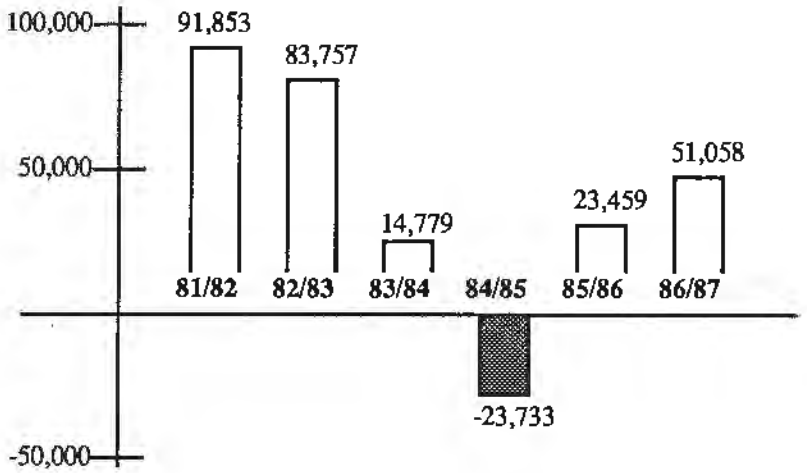

Figure 9: Net assets of Siratac Ltd. for 1981-87.[1]

Note: Levies and grants are included in these figures.

[1] The details in figures 8 and 9 are from Siratac Ltd. Annual Reports.

It is evident that Siratac has not been on a sound financial footing. Without the levies and grants, returns from operations would not have been able to sustain the company. If Siratac Ltd. is to keep going without the injection of funds from levies or grants, then they must significantly increase grower use of the service, ie. increase adoption. If they can increase adoption from 25% to 40% of the area cropped, with only incremental additional cost of operations, then Siratac Ltd. would become commercially viable. Based on the present cost of operations a minimum of approximately 40,000 hectares under contract seems necessary to sustain operations.

D. The Industry's Perceptions of Siratac and Reasons for not Adopting it

1. Introduction

The main emphasis of the project focussed on obtaining a better understanding of Siratac and the reasons for growers using, or using and then discarding, or never using the service.

In part, Siratac Ltd's future financial viability depends on it finding out why growers were not subscribing to its service (or dropping out), and to see what they must change before a larger number of growers will use the system on a regular basis.

To do this we undertook a qualitative survey to obtain growers', consultants' and company agronomists' attitudes, perceptions and opinions on Siratac and Siratac Ltd.[1]

This particular report unearthed some sensitive and controversial issues relating to policy and direction, management, marketing and funding of Siratac and Siratac Ltd.

At the same time, the survey revealed what may be the most significant reason why growers had never used or were now not using Siratac. Many of the past users passed comments to the effect that no-one had been able to show them that if they used Siratac there would be a positive impact on their "bottom line".

So before we discuss recommendations and viable changes, we need to summarise the reasons growers stated for not using Siratac.

2. Why some Growers don't use Siratac

i). The benefits have not been sold to the potential users

The non-users of Siratac claimed that no one had ever sold them the benefits of the system; therefore, they did not see a need for it. Many looked for a "dollar value" return for using the system; as yet, Siratac does not appear to offer one.

It seems, then, there is a problem at the most fundamental level of marketing--Siratac Ltd. is not clearly identifying and/or selling the product and its benefits to potential users.

Growers want to see a tangible "cost saving" benefit and do not consider or do not think that Siratac's "intangible (though generally laudable) benefits" are worth paying for. Many want the service for free; they feel that they already pay for Siratac through the research levy.

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[1] You will find a copy of the resulting discussion paper in appendix 1.

ii). The problem of misunderstanding Siratac

It was quite clear that over half of the non-users we interviewed were poorly informed as to what Siratac is, why it was developed, and what its purpose was within the industry. Many based their opinions on hearsay and gossip.

iii). The problem of taking undue risks with their crop

Many growers disagreed with the types and timing of chemicals recommended by Siratac; they were too expensive when a cheaper one would do, and Siratac was prone to using fewer sprays than growers felt comfortable with. Consequently, growers felt that they were subjecting their crops to undue risks by using the system. Many found that they were continually over-riding the system and subsequently abandoned it.

These particular perceptions were common amongst both the non-users and past users, and appear to stem from experience with the original Siratac system when it was in its infancy. Growers need to know the product changes that have taken place.

The issue of "dynamic thresholds" arose time and time again throughout the research.[1] Many growers believe that dynamic thresholds produce late crops, and are unconvinced by the research that shows there is minimal delay (if any) in the maturing of the crop.

Growers want an early crop--they rate this as a very high priority--but many see Siratac as synonymous with late crops.

At present many growers are not convinced that dynamic thresholds are economically sound, even if a good idea, and they need further proof. At present many are not prepared to "risk the experiment".

iv). Practicalities of using Siratac

Since a large number of growers are sceptical about the benefits of Siratac, it is understandable that these same growers see it as futuristic and unrealistic in their situations.

Many complained about their own practical limitations: like not having offices, computers, a reliable 'phone service, and that the sampling and boll counts take too much time. These growers said that Siratac was in fact not applicable to their situation.

An issue that many cited was the need for Siratac Ltd. to be more efficient in processing the data, and also to consider the on-farm practicalities of day-to-day operations. Siratac Ltd. has taken a major developmental step with the Portable Data Terminal (PDT), which should reduce the time taken to process data and so speed up the response to the grower. Good promotion of this development could increase grower satisfaction and, therefore, adoption.

v). Siratac and the consultants

As we mentioned earlier, a sense of competition has developed between Siratac Ltd. and the consultants. Consequently, relationships have not been good; in fact, for a long time there was no contact at all. This situation now appears to be improving. A cotton grower/consultant now sits on the Siratac Board as an Associate Director, and two more consultants may be appointed in the immediate future.

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[1] It should be pointed out that dynamic thresholds have always been only an option in the service.

Some consultants have either directly or indirectly had a positive effect on the acceptance of Siratac. But many feel that Siratac Ltd's management has not adequately recognised them, or kept them up-to-date with developments. Conversely, other consultants accepted the role of competitor to Siratac and acted (effectively) to discourage adoption.

Siratac Ltd. and the consultants must regularly get together to exchange market data. Siratac Ltd. must gain the support of the consultants for any marketing strategy to work which tries to increase grower adoption of the Siratac system.

vi). The history of Siratac

A number of historical problems have tainted the image of the company.

Many growers initially felt threatened by Siratac (man versus machine). Many stated that their own experience and knowledge in the industry had been overlooked, and the levy created a great deal of hostility and anger within some sectors of the industry. This coupled with the 25 cent/bale levy on growers to support Siratac were not the best way to launch a new and complex product. This ill-feeling is still very much present today.

vii). Siratac's image within the industry

The most dominant constraint that Siratac faces in the future is a general negative attitude amongst non-users. These attitudes may now be so entrenched that only a massive industry re-education campaign will change them. If Siratac Ltd. moves for a shift from 25% to 40% adoption, then it must reckon with the attitudes of those many small growers who constitute the target market.

E. Feasible and desireable changes for Siratac and Siratac Ltd.

1. The Wee Waa Consultative Group

On September 15th, 1987, a Consultative Group met in Wee Waa . The group drew from a wide cross-section of the industry, including growers, consultants, company agronomists, researchers and Siratac Ltd. personnel.[1]

We hoped that the Group would be able to outline an ideal situation which would later serve the Siratac Board, researchers and management as a template to guide their future planning and decision-making.

All participants were mailed a copy of the discussion paper "Siratac: The Challenges and Changes", which covered the industry's present knowledge of, perceptions about, and attitudes towards both Siratac and Siratac Ltd. The group debated the report extensively before generally agreeing that it was a useful starting point for planning for change.

In order to plan the actions that Siratac Ltd. should initiate, the group believed they should explore not only where Siratac is now, but also where it should be in, for example, five years' time. Accordingly, the group focussed on a preferred future situation for the Siratac system and for Siratac Ltd. The debate centred on six key issues:

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[1] You will find a full list of the participants in appendix 3.

i). The need (or not) of an expanded Siratac product as a tool for management decision-making.

ii). Establishing a profile of the type of management personnel that would operate in a 'new' Siratac.

iii). Exploring and defining the desirable ownership of Siratac Ltd. and its objectives.

iv). Identifying the key issues that make Siratac a system of value (or not) to the entire cotton industry and to the wider community.

v). Identifying those key constraints that would prevent the emergence of a 'new' Siratac.

vi). Identifying who were the real potential customers, both now and in the future.

We framed six questions corresponding to the six key issues above, and asked each member of the group to respond individually to them. Here are the questions and responses:[1]

"In your vision of a preferred future Siratac:

1. What will clients use the system for; ie. what will it enable them to do more effectively and/or efficiently?

Most believed that the Siratac programme needs to be substantially expanded beyond its present pest management capacity.

An agronomist summed up the various additional needs explored by the panel by stating that a future Siratac would be:

"An industry wide communication system that would have the capacity to:
- continue as a pest management system;
- contain an agronomic data base;
- model 'what if' situations (financial issues included), and to expand its utility as an aid to crop management decision-making."

No respondent wished to see Siratac stay as it is: all wanted some expansion of the program's capacity; they only debated the degree of expansion.

2. Who will the clients be? What group or groups will it be targetted at (eg. big growers, small growers, consultants, the community)?

The panel unanimously agreed that Siratac Ltd. must work more closely with consultants as key clients. A short-list of Siratac clients should include all growers, consultants, and corporate agronomists. A minority view added commercial marketing organisations allied to the industry (ie. chemical companies) to the list.

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[1] It is important to note that we are here reporting the majority view of the consultative group to each question. Where warranted, we also include a minority view that either sensibly expands upon the majority view, or is opposed to it. We have not attempted to interpret the responses, only to report them.

3. What sort of person or persons, with what sort of expertise, will be needed to manage it?

Though recognising the continuing need for technically competent field and support staff, the panel concentrated on the issue of Siratac Ltd's top management needs. The great majority of the panelists stressed the need for a professional manager with a sound marketing background. Ideally the manager would be sales oriented and have definite skills in 'people management'; ie. able to help and motivate staff, able to carry the company's viewpoint to top-level industry and government representations, and able to relate well with growers.

The panelists were less concerned with the technical background of the manager; a technical background would be desirable, but the key requirement was professional management ability.

Similarly, the panel noted that field staff need more than technical competence--they need to be trained salespeople.

4. In whose hands would ownership and government (control) of the system be (eg. commercial, research, semi-government)?

The panel, by a great majority, believed Siratac Ltd. should be a cotton industry owned company operated on a strictly commercial basis. Accepting this philosophy in turn raises the following questions:

i). Should Siratac Ltd. be owned by the Cotton Research Council and be provided with infra-structure support?

ii). If a commercial operation, shouldn't the Board be restructured to allow for inputs from professional business managers; ie. finance, marketing and general management disciplines?

iii). Should Siratac Ltd. become a public company with either growers or the Cotton Council retaining a minimum 51% shareholding?

iv). Should a commercial Siratac Ltd. be profit or non-profit oriented? If owned by the industry, Siratac Ltd. could be a non-profit organisation. If a public company, Siratac Ltd. would need to be profit oriented.

As would be expected, views on the above four issues varied considerably. However, everyone accepted that Siratac Ltd. should be industry owned and should operate as a commercial enterprise, irrespective of the final form it would take.

5. In what way would the industry or wider community be served by the system?

The discussion was wide-ranging but certain common themes emerged. The panel believed that the Siratac system provided the following benefits:

i). A cotton pest control database that was constantly being refined and which would prove to be of increasing value to the whole industry as the historical data was accumulated;

ii). A cotton management tool that could be expanded beyond pest control into such areas as water resource management;

iii). A public relations tool that identifies the Australian cotton industry as being not only technologically advanced, but also highly responsible with regard to care for the environment.

One panelist summarised all these issues in the following statement: "An industry that works smarter and is seen to be working smarter becomes wealthier in a general community environment that benefits from its success and is supportive of its operations".

The panel believed the Siratac system could satisfy all the implications of this last statement.

6. What do you see as the major constraint to the emergence of your preferred system?

Once again, the panel unanimously identified several key themes as the major constraints:

i). Funding--unless more growers use the system, Siratac will never be able to generate funds to sustain its operations. The demise of Siratac would be totally unacceptable to the industry. Therefore, another source of funding is essential. Whether a commercially revitalised Siratac Ltd. can generate these funds, or the industry is to provide them on a grant (or other) basis is the issue to be reckoned with.

ii). Consumer attitude--Siratac Ltd. management estranged itself (and its product) from a large proportion of its potential clients through its insensitivity to their needs. If Siratac is to succeed, then it must act to remedy the existing situation by rebuilding bridges with its clients and by changing the negative perceptions that undoubtedly exist.

iii). Siratac: the Product--for growers to see the Siratac system as a valid tool to aid management decisions, Siratac Ltd. must make the actual use of the system simpler and more responsive in real time.

Mr Terry Naughtin, an agronomist at Colly Farms, tabled a discussion paper "Siratac: What It Could Be"[1] during the meeting. The paper was briefly discussed and the group saw this as an example of how Siratac Ltd. might implement a vision of a preferred future Siratac like that which had emerged at the meeting.

Mr Naughtin proposed that Siratac Ltd. be replaced by three organisations, one of which would retain the name Siratac Ltd. The three were:

1. A research, extension, and insect pest management organisation carrying out many of the current functions of Siratac Ltd and retaining the name;

2. A new organisation to develop and provide two new services: i) an interactive communication/information service where users can receive direct information and conduct business with a number of organisations servicing the industry, and ii). an agronomic database and computer modelling facility using the capabilities of the Siratac Vax computers that farmers, agronomists, and consultants could use for record keeping and problem solving .

[1] See appendix 4.

3. A new organisation to sell computer hardware and software, develop software for microcomputers used in the industry, and train customers in computer use.

The two new organisations would supplement Siratac Ltd's current source of funds.

Mr. Brian Hearn saw Mr Naughtin's proposal as consistent with a model that saw the insect pest management expert system as the apex of four levels of computer-based services for the cotton industry.

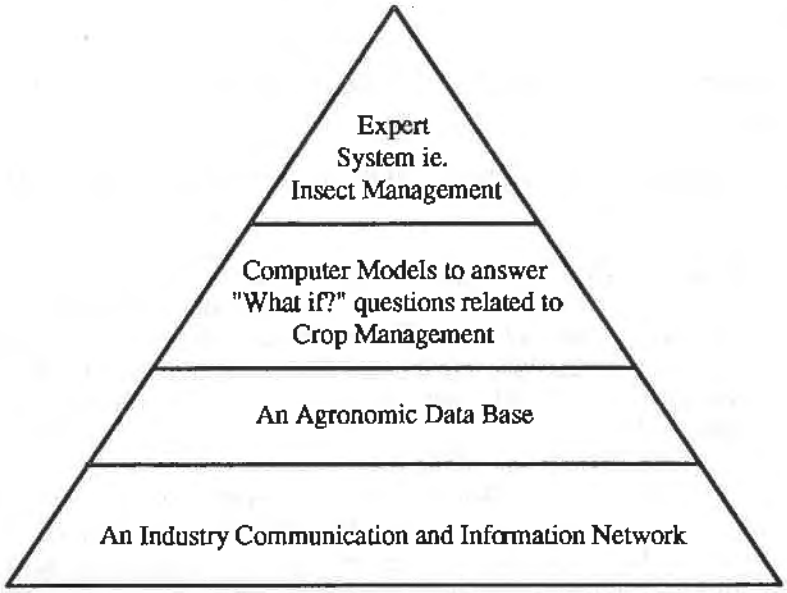

Figure 10: Four levels of computer based services for the cotton idustry.

Mr. Hearn said that the researchers had concentrated on developing Siratac as an expert system, but the possibilities at lower levels in the pyramid were becoming clearer as expertise and information technology improved.

2. Developments since Wee Waa

The Consultative Group set up a working party to consider Mr Naughtin's proposal in some detail and this group met at Narrabri on September 22. Mr Bob Jansen, from the CSIRO's Information and Technology Division, and Dr. David Russell, a member of the project team, attended the meeting. The meeting heard some of technological problems associated with the proposals from Mr. Jansen.

The working party also focussed on the role of consultants as clients of Siratac Ltd., and the need for a study on the way they carried out their consultancy activities on crop management. This was seen as a pre-requisite for tailoring Siratac services to meet consultant's needs.

It was apparent at the annual general meeting of the Namoi Cottongrowers Cooperative at Moree on November 25, that a close parallel now existed between the thinking of the directors and managers of Siratac Ltd. and the outcomes of the consultative group meeting.

Speaking in support of a motion to levy members to supplement Siratac Ltd's funds, Mr Ralph Schulze outlined a future Siratac situation where:

i). the insect pest management system would be linked to an automated management information base,
ii). a general manager with commercial entrepreneurial skills would be appointed,
iii). market research would be carried out to clarify the needs of end users, and
iv). information technologists would be appointed to develop the management information base.

Mr. Schulze believed Siratac Ltd. needed the proposed levy to fund the expansion of the Siratac system. However, the meeting voted to hold off making a decision on the levy until members had a chance to become better informed about the proposed changes.

F. Summary: The Key Areas for Change

With so many reasons for the non-adoption of Siratac, we consider that these issues are merely symptoms of more fundamental problems within Siratac Ltd's policy, direction, management, marketing and methods of funding.

It now appears that Siratac's and Siratac Ltd's greatest constraints are more profound than first thought. Significantly improving the adoption rate of Siratac demands far more than a little grower re-education, promoting and advertising. The company must develop a whole new approach to its structure and management, and the marketing of its services and products.

1. Policy and direction

Our research and the later consultative meeting in Wee Waa, suggest that Siratac Ltd. lacks positive direction, suffers from inadequate commercial know-how and lacks longterm objectives.

2. Management

Subsequently, many people within the industry point to a perceived lack of hard-nosed business management within Siratac Ltd. They believe that many of the problems within Siratac have their origin in inadequate policies, management and marketing strategies.

High-tech companies frequently encounter this problem. The researchers and product developers drift into management, and the brilliant promise of the high-tech product is never realised. Siratac Ltd. must recognise the old adage of "horses for courses" and staff its management team with outside professionals.

3. Marketing

Generally, the marketplace misunderstands and/or is ignorant of Siratac and Siratac Ltd. Many of the perceptions within the industry are based on a complete lack of understanding of the product and the company. This argues for a new approach to grower educational and advisory services.

The company must become more market orientated, meeting the needs of its consumers, and being seen by them as willing to investigate and respond to their needs and wants. We suggest a General Manager with a strong marketing background or a professional Marketing Manager could chart this new course.

4. Siratac's potential

Siratac not only needs to expand its adoption by growers, but also to expand and diversify its services. Many people spoke of Siratac's "undiscovered potential" and the need for change and action. The industry seems to agree that Siratac's potential extends far beyond the pest management system; it could contain an agronomic database, as well as having the capacity to be an industry-wide communication system on all facets of cotton production.

5. Siratac's image

Siratac Ltd. must reckon with how the growers see it--and act to change this image; the contrast in perceptions could not be more stark--from the enthusiastically positive to the embarrassingly negative.

A new image of Siratac and Siratac Ltd.--a positive change in people's perceptions of them--is essential for their future expansion and development.

6. Siratac's structure

During the course of our research we established that some growers are using a loop-hole in the method of invoicing for services used by Siratac Ltd. For example, a grower may have 5000ha. put to crop in (say) three different but contiguous paddocks. The grower contracts Siratac Services for only one paddock, but applies the results to the entire holding, thus beating the system.

Siratac Ltd. must remedy this procedural matter and contract with growers on their total hectares put to crop.

In addition, the current structure of Siratac Ltd. does not discriminate between the benefits that accrue to the cotton industry as a whole and, in some respects, society at large, and those that individual growers receive.

We believe there is a sound case for separating Siratac Ltd. into two separate but related organisations:

1. A research and development company funded by an industry wide levy or some other equitable arrangement (possibly with supplementary government grants), and

2. A commercial company offering an insect pest management system on a user-pays basis.[1]

[1] We have discussed this proposal at greater length in our Conclusions and Recommendations below.

Conclusions and Recommendations

1. An Overview

The project team believes that the immediate crop management needs of growers are not the same as the long term needs of the industry as a whole, and of the wider community.

Having made this basic distinction, we recommend that the cotton industry can best be served by two separate but complementary information management bodies as outlined in the following model:

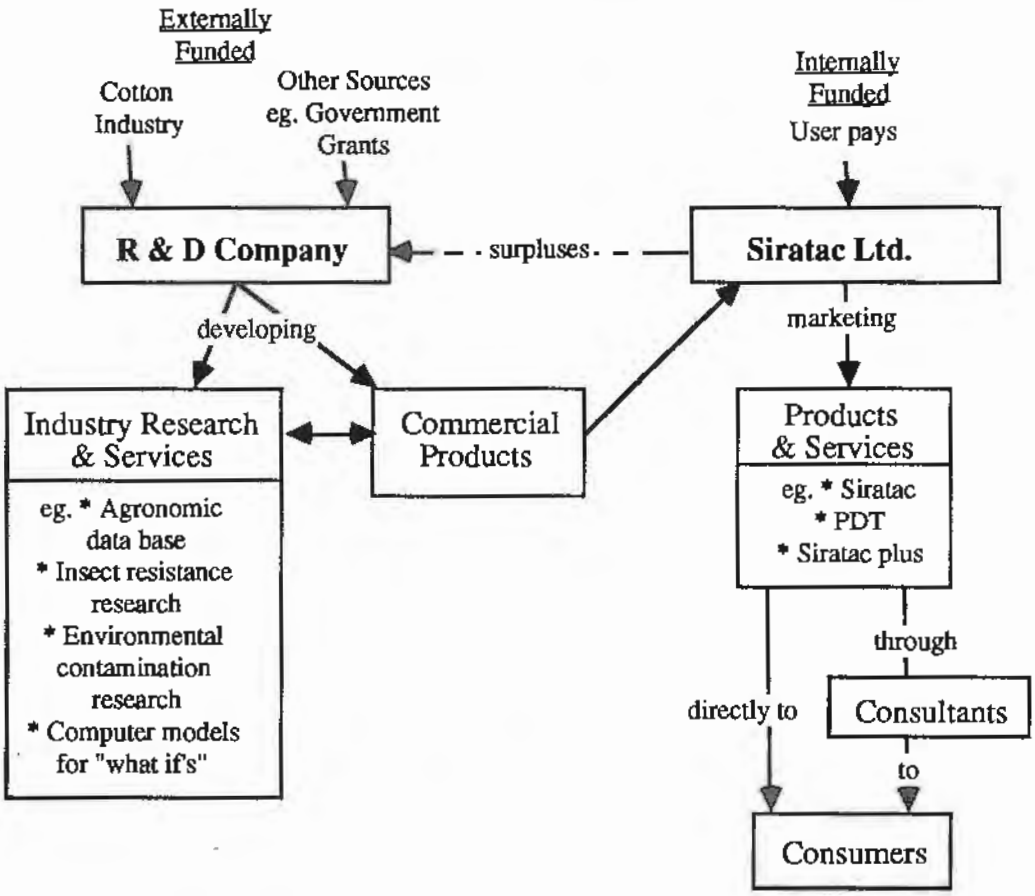

Figure 11: Roles and funding sources of the proposed 2 companies.

Specifically we recommend that:

i). Siratac Ltd. become a grower responsive organization with a prominent commercial/marketing ethos;

ii). Siratac Ltd. be funded on a user-pay basis since the individuals who use the pest management system are the ones who receive its benefits;

iii). a new research and development organization be responsible for the generation of:

* an agronomic database to be available to all growers, consultants, etc,
* new research to address the key issues affecting the longterm concerns of the industry, particularly the issues of insect resistance to insecticides and environmental contamination,
* computer models for "what if" situations to do with crop management decision making, and
* an information transfer and communication network;

iv). the research and development company would play an important public relations role for the industry, particularly regarding a responsible approach to environmental issues;

v). this new body be funded by the entire industry by means of a levy or some other equitable arrangement; and

vi). Siratac Ltd. and the new research and development organization should be linked in a way that enables a flow of information, new products and resources between the two.

If Siratac Ltd. is to become a market oriented organization, we believe it must:

i). accept the critical role played by the consultants in most matters affecting the crop;

ii). approach the consultants immediately (through workshops and other forms of direct contact rather than surveys) to better ascertain:

* the exact nature of the relationship betweeu growers and consultants, and
* how best to use the new and improved version of Siratac (Siratac Plus) as a joint decision making tool for growers and consultants on possible crop management strategies;

iii). integrate the consultants into the distribution/education process--perhaps as agents for Siratac;

iv). address the perceived product "misunderstandings" and develop a marketing/education campaign to get the message out to the growers;

v). tie the campaign to the development of Siratac Plus;

vi). appoint a General Manager or Marketing Manager with extensive marketing experience and expertise to work thoroughly through all of the above issues and recommendations before developing a marketing strategy for Siratac Ltd. An advisory/educational strategy will fail without this background work; and

vii). work together with the NSW Department of Agriculture Advisory Services to design and carry out an appropriate educational campaign.

If professionally implemented, the above would achieve the following outcomes:

1. A great deal of grower misunderstanding could be overcome and a significant start made in changing the existing negative attitudes.

2. Consultants would be integrated within Siratac Ltd's marketing thrust and, as agents, have a commercial and professional motivation to see that the

programme succeeds. In short, consultants would become the aggressive and informed sales force that Siratac Ltd. has always needed.

3. Conversion of a significant number of growers to adopt Siratac would mean a substantial lift in Siratac Ltd's revenues, at small incremental cost: consultants' (agents) fees plus the one-off cost of mounting the campaign. If, as a short-term goal, Siratac Ltd. could improve its position from 25% to 40% of the total hectares under long term contract then, assuming no significant lift in operating costs, the company would be commercially viable.

2. Leadership Changes

It is clear that the Board is already responding to certain of its deficiencies. We refer to the creation of Associate Director positions and the filling of these with non-grower industry personnel, eg. consultants. We applaud this inclusion of individuals with other expertise. Yet we feel that it is not enough.

The essential responsibility of a Board of Directors is to establish policy and to undertake long range or strategic planning so that the company attains both its short and long term objectives. Of course, the Board must also ensure that operations are indeed implementing the policies and managing the company's affairs on a day-to-day basis in a manner consistent with the long range plan.

In order to discharge these responsibilities, the Board must have Directors (or Associate Directors) who can form judgements on the issues that are subject to review. Therefore, we recommend that the Board consider co-opting outside people with expertise in long-range planning, marketing and finance. These temporary appointments (say for two years) would not mean great expense to the company (probably expenses only in most cases). But such appointments will bring commercial expertise to the Board and will give vital support and direction to operations management.

In our view, it is clearly time for Siratac Ltd. to review the nature of its management. In pa rticular, the company needs either a General Manager with a strong marketing background or an Administrator and a Marketing Manager.

We would suggest that, after some probationary period, the General Manager (or the Marketing Manager) be elevated to the Board as Managing Director (or Director of Marketing). We do not see the need for the Administrator (if that option is chosen) to become a member of the Board.

3. A Three Phase Programme for Change

A. Phase 1

1. Make changes to the Board of Directors to include:

* strategic management skills (development of long range policy and strategies), and
* marketing skills.

2. Obtain Board agreement on dividing the operations of the organisation into two companies and implement this division. The two companies would be:

* a research and development company, and
* a "commercial" Siratac Ltd.

3. Employ a General Manager with marketing expertise and/or a Marketing Manager--the Board should consider inviting him or her onto the Board.

4. The research and development company moves to:

* establish how to best use consultants,
* establish a "selling platform" for convincing growers of the need for a levy and of the advantages of Siratac Plus, and
* prepare a prospectus.

B. Phase 2

Siratac Ltd. workshop with consultants groups to determine a mutually acceptable strategy to use consultants as "agents", and as the future main marketing arm for promoting Siratac Plus.

C. Phase 3

The research and development company cooperates with Siratac Ltd. to identify growers needs and their bearing on future research developments, eg. an information transfer and communication network.

Postscript

One of the research aims of this project was to develop and evaluate a methodology for improving complex inter-organisational problem situations. The Siratac situation is undoubtedly a good example of the latter.

One issue that surfaced is the need to clearly define who your client is. We assumed our clients were the cotton-growers, as represented by the Cotton Research Council. We have since realised the concerns of those associated with the direction and management of Siratac and Siratac Ltd. over a project which impinged directly on their sphere of operations and influence, but which they did not initiate and over which they had no direct control. This confusion led to tension between the various interested parties.

This tension first surfaced over whether or not we should circulate the discussion paper "Siratac: The Challenges and Changes" to growers as part of a package of information. The report reviews the perceptions held within the industry of Siratac and Siratac Ltd. and we intended to circulate it as a discussion paper with the questionnaire and proposals for change generated by the consultative group. But some perceived it as an attack on Siratac and Siratac Ltd. which would damage the interests of both. The validity of the report then came under attack, the main issue being our use of a qualitative methodology for the initial interviews. We continue to believe the methodology was professionally carried out and appropriate for our intended purpose.

Our principal aim in this project was to facilitate changes that would improve the situation. We realise that there are powerful forces at work within the industry and we do not overestimate the significance of our project in this complex situation. Nevertheless, we believe that the project has already been an important catalyst for change and has facilitated the emergence of proposals that are currently being mooted within the industry.

We empathise with the visionaries who built Siratac and we detect within the industry a widespread appreciation of its importance to that industry and a desire to see it prosper. We believe this will happen and that this project will come to be seen as an important contributing factor.

Appendix 1

Siratac

The Challenges and Changes

A qualitative study of the Cotton Industry's perceptions and attitudes towards Siratac and Siratac Ltd.

Discussion Paper
Wee Waa Consultative Meeting
September 15, 1987

The Siratac Research Project
was authorised and funded by the
Cotton Research Council
and conducted by:

Hawkesbury Agricultural College
(Mr. Robert Macadam, Associate Dean [Academic],
Dr. David Russell, Director of Post-Graduate Studies,
Mr. Walter Potts, Lecturer in Marketing,
and Mr. Ian Britton, Graduate Researcher)
and the **Department of Agriculture, NSW**
(Mr. Barry Baillie, Regional Director of Advisory Services,
and Mr. Angus Shaw, Special Agronomist for Fibres and Oils)

The Principal researchers were
Ian Britton (Hawkesbury Agricultural College)
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Contents

Preface

1 How this project began

This project originally evolved out of conversations between the Australian Cotton Growers Research Association (ACGRA), Siratac Ltd. and the NSW Department of Agriculture. The Department met with Hawkesbury Agricultural College, NSW (HAC) and drew up the basic idea of the project and its frame of reference. Then they requested funds from the Cotton Research Council to study the industry's perceptions of and attitudes to Siratac and Siratac Ltd. Basically, they wanted to analyse the 'Siratac situation' and, in particular, to try and identify why only a limited number of growers had adopted Siratac.

For the last 8 months we have moved in and around the cotton industry and viewed the world of Siratac from as many angles as possible (see the appendix for details). Our study has identified several major themes related to Siratac's adoption rate (which many people perceive as poor), ranging from technical problems to political and managerial issues. Now we need to test these opinions against the people who live and breathe the Siratac 'problem'. Together the industry must find a long term realistic way to improve the situation.

2 Why we wrote this document

This document is a discussion paper. In it we have recorded what we think is an accurate picture of how the industry views Siratac and Siratac Ltd.

We realise that much of what we have written is provocative, controversial and possibly untrue. We were not concerned with the relative 'accuracy' of people's perceptions, so many of the opinions we record are bound to be imbalanced. Our role to this stage has been to help the industry see itself in relation to the Siratac issue--not to make value judgements about those perceptions, or to provide answers.

We wrote this document to stimulate debate between all concerned parties--growers, consultants, researchers, chemical companies, industry groups, and Siratac personnel. We hope you will read it carefully and offer some constructive ideas towards a better Siratac service.

3 Where the project will go from here

Throughout the next month or so we will be meeting with a number of key people drawn from many aspects of the industry. Together we will work through the issues this document raises and the way these people see those issues and respond to them. The group will then try to draw the various threads together and suggest steps to improve the situation.

Introduction

1 The situation

The cotton industry as we know it today is relatively young, dynamic and innovative. It generates a great deal of wealth for some individuals and local communities, is well known for its acceptance of technology and innovation, and arguably has one of the most competent groups of scientists and researchers in the world.

Like any other large scale commercial cropping venture, cotton growing needs an accurate and efficient way to make agronomic decisions, including pest management decisions. Agriculture is increasingly using information technology to meet needs like these. The Siratac programme is just one example of this trend.

Siratac is an on-line computer based crop management system for cotton growers--particularly related to pest management. So given the cotton growers' need for efficient crop and pest management systems, there was good reason to expect Siratac to succeed.

2 The complication

Yet growers haven't adopted Siratac across the board. In the 1984/85 season the figure was around 22% of the total Australian crop area--but 50% of that figure represents only 1 company. In the 1985/86 season, the area under Siratac totalled 44,000 hectares--approximately 24% of the Australian total of 175,000 hectares. And in the 1986/87 season the figures were 26% of a total crop of 142,000 hectares. So Siratac's adoption has levelled out. What this adds up to is a threat to the long term expansion and perhaps viability of Siratac Ltd. as a commercial company.

3 The questions

This mismatch between the industry's needs and its hesitance to adopt what seemed like a promising (partial) solution raises at least 2 obvious questions:

1 'Why haven't more growers accepted Siratac?'; and

2 'How can Siratac's acceptance be improved?'

These questions take us to the heart of what our research has been about, and we will structure the document around them.

4 Our overall answer

Obviously we cannot and should not provide the 'final' answers to these questions--that is the responsibility of the industry as a whole. There is a great deal to consider, including a range of thorny questions concerning the industry's needs and Siratac Ltd.'s history, management and on-going rationale. We have tried to identify some of these questions.

Both Siratac and Siratac Ltd. seem to still have an important role to play within the industry, and there are good reasons why the industry should support them. But at the same time a great deal has to change, particularly within the Siratac camp and in the attitudes of both users and non-users.

The 2 Major Questions

1 Why haven't more growers accepted Siratac?
2 How can Siratac's acceptance be improved?

Why haven't more growers accepted Siratac?

Introduction

As we talked to users, past-users and non-users of Siratac, 2 words seemed to summarise a great deal of what we heard: confusion and dissatisfaction. Not that every one was either confused or dissatisfied--some users clearly articulated why they used the programme and said that they were happy with it.

But frequently these 2 words said it all--whether we were speaking to users, past-users or non-users. We will look at these feelings under 3 main headings:

1 The product itself;
2 How to use the product; and
3 How Siratac Ltd. manages and markets the service.

This first section mainly consists of quotes from the people we interviewed. Our aim was to record the industry's attitudes, not our interpretation of them. So apart from a few of our summary statements, we have tried to let the industry speak for itself. We will try to interpret this situation in the second section.

1 Confusion and dissatisfaction over the product

a. What are Siratac's benefits?

We found a wide diversity of opinion over the same issues. If A said Siratac's main benefit was Z, B would say that Siratac was no help at all with Z! For example, some growers saw Siratac and the company as a necessary public relations tool for the industry, while others believed it would be counter-productive in that role.

We also found great differences in how far people had thought through the issues, and consequently how able or unable they were to argue their case. Some users and non-users appeared to have worked the issues through carefully and could give precise reasons for their opinions. But the majority of both users and non-users could only make vague, off-the-cuff or second-hand comments.

Users

The main reason growers used the Siratac system was because they found it to be a useful management tool. In particular, many of them saw the programme as an aid to decision-making. At the same time, many carefully stressed that 'it was merely a management tool and not something that dictates to you':

> 'It's a back-up for decision-making.'
>
> 'It's a second opinion.'
>
> 'It's there in black and white--you base your decision on the information provided.'
>
> 'It shows the direction that the crop is heading. Being able to monitor performance and use the records as a post mortem if things go wrong is a bonus.'
>
> 'Allows growers to assess the crop, gives reasons for changes and problems that occur.'
>
> 'It's related to crop growth development, insect control and seasonal variances, ie. day degrees, therefore it can give reasons for changes and failures.'
>
> 'It's an objective approach based on scientific research you don't have to worry about being conned by one of the chemical companies.'
>
> 'It gives you the information to make the decision--it doesn't make the decision for you. Often we won't follow the recommendation, but that's because of some other consideration that we have to take into account. It's not Siratac's fault--it's just a guide.'

Many growers went further and identified specific features about Siratac which made it useful to them in decision-making and overall management. In particular, they referred to the value of having accessible information for crop monitoring. Many also felt that Siratac introduced a new objectivity to the work--it set standards:

> 'The records are a plus, it makes for an excellent filing system.'
>
> 'Well it introduces standards--it's a yardstick.'
>
> 'It introduces standards and routines. It's a discipline.'

'The fruit model--its number one'

'It's a good means for communicating common resistance problems and combating them.'

'We all need to be accountable for using such things as chemicals--why, where and how we use them. Siratac seems a logical place to store that information.'

'It is, or it could be, a very good tool for communicating research.'

Many users and non-users stressed public relations (ecological) benefits:

'Its important for the industry to be seen as doing the right thing environmentally.'

'As a guardian against greenies, I think it's essential for the industry.'

'It keeps the greenies off our back.'

Other benefits people saw in Siratac were:

'It educates growers in regard to pest management and growing cotton.'

'It teaches you how to grow cotton.'

Many users passed comments similar to the following:

'The fact is, it does work, although many people would not like to hear that.'

'Siratac is a good system as is.'

'Siratac checking doesn't take any longer than proper commercial checking.'

'I feel it is very objective--more so than a great many consultants' gut feelings on pest management.'

A number of the pro-Siratac people (particularly the researchers) were understandably defensive about many of the criticisms that have been leveled at them over the years:

'Its rubbish the comment you hear about Siratac producing late and low yielding crops. Its just a smoke screen for other resentments.'

'The fact is that they asked for it, we didn't force it upon them.'

'Consultants are motivated by 'short term' gains and want to appease the farmers at every turn--they don't want any controversial decisions.'

'No, we can't do exactly what they want. If we do there will be more things like pyrethroid resistance and compaction occuring. We need to state the facts as we see them, not what they'd like to see.'

It soon became evident to us that many people were confused about the purpose of Siratac. Many of them couldn't state precisely why they used it, but gave vague 'social' and/or 'environmental' reasons. The following comments were common:

'Its all related to the dollar return for the information you get. Some put a high dollar value on it, others don't.'

'No, I just believe its a good thing for the industry to have round, especially for the inexperienced growers with no training. Its a good bench mark.'

'I used it last year as I thought it was a good thing for the industry.'

So how can we summarise the users' attitudes to the products?

The main plus growers identified was Siratac's usefulness as a management tool. They believed it allowed them to record information accurately and efficiently and could help them make pest management decisions. Alongside this seemingly precise rationale stands a whole range of vague comments about intangible benefits. Interestingly, no one could point to specific dollar benefits.

Past users

Some growers who had used Siratac in the past have discontinued it. Many pointed to logistical reasons for their decision to quit, such as disagreeing about the type and timing of chemicals Siratac recommended:

'It doesn't necessarily save sprays--it didn't last year.'

'Often its prone to spraying too much--not what I was expecting.'

Others identified service difficulties:

'What's the point of using it, if you are continually over-riding the system?'

Some questioned the logic and value of the whole strategy, believing that in the final analysis the programme really offered very little:

'All we were getting was a sheet of paper or a phone call from our consultant to spray or not to spray. At the end of every week or two weeks we'd get the print out. Whats the point? He said it wasn't helping him.'

'Once you've used the system for a year or two you soon learn the thresholds etc.'

But like many of the users, often the past-users couldn't offer any clear reasons for their decision to pull out:

'I hadn't seen any benefits for the cost of it.'

I originally used it as I thought it was a good thing for the industry . . . I guess I just wasn't getting anything out of the programme.'

'There's no particular reason.'

Non-users

So what about the growers who have never used Siratac--why don't they? Some growers believe that Siratac could only be counter-productive on their farms because it would waste their time, ie. they would be spending a lot of time and money for something that doesn't work, or merely to be told what they already knew:

'I've been looking at it over the fence now for a number of years and to date it hasn't shown any positive benefit.'

'It would probably suit a more inexperienced grower than myself. Once you've been growing cotton for a number of years you get a feel for it.'

'If it doesn't improve performance and reduce costs forget about it.'

'I don't use it, as I am after maximum yield.'

Others already have a consultant and believe that he can do everything that Siratac offers--perhaps even better:

'At the moment I rely heavily on my consultant. Maybe if he up and left I'd change my mind.'

Many simply can't see any benefits in Siratac:

'I've just never seen a need for it.'

'I can't see what the benefits are in using it.'

'What are the benefits, I've never been sold the benefits.'

A summary of feelings about Siratac's benefits

Many growers and consultants find it hard to accept and use the information provided by Siratac. No objection seems as important as the trade off between:

1 **Economic criteria**--Growers usually base their decision-making on maximising their returns;

2 **Market demands** for a high quality, blemish free product; and

3 **Environmental criteria**--Siratac appear to base much of its research on these concerns and is trying to get growers to take more account of this criteria in their decision-making.

There appears to be a Catch 22 in all this. A farmer feels a need to produce a high yielding, high quality crop for as little outlay as possible to remain viable. This includes taking as few risks as possible. Often they achieve this viability at the expense of the ecosystem and insect resistance.

Sheahan[1] suggests that pest management decision-making is simply not a matter of basing a decision on 'economics' or 'environmental' criteria, but is influenced by many factors. The way growers view all sub-systems influences the decisions they make in any one subsystem:

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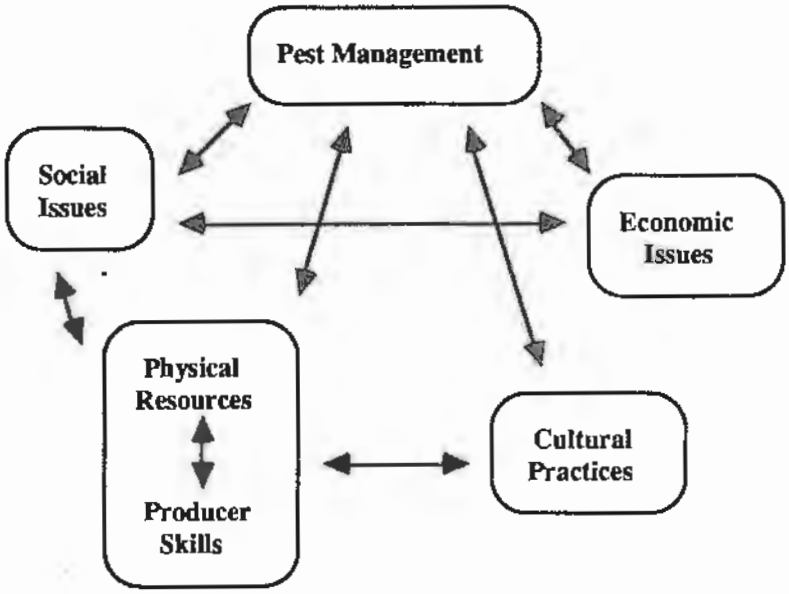
[1]Cited in L. Capon (1980), "Report on Integrated Pest Management Research," Departments of Agriculture and Entomology, University of Queensland, prepublication manuscript.



For example, a decision to adopt or reject a pest management programme is influenced by social pressures from family, other producers and other sections of society. Sheahan uses the example of a producer living near other producers. If they use strict chemical control methods, he may feel pressured to use a similar technique, so that the other growers won't see his property as a source of any future infestation.

Despite some users' optimism and claims, most growers have never heard a clear and/or convincing statement of Siratac's benefits. It seems there is a problem at the most basic level of marketing--Siratac Ltd. is not clearly identifying or selling the product and its benefits.

b. How practical is Siratac for growers?

Since a large number of growers are sceptical both about the agenda of the Siratac researchers and the benefits of the product, its understandable that these same growers see Siratac as unrealistic in their situations. According to them, Siratac:

1 Isn't practical given their facilities and day-to-day activities;
2 Doesn't allow for weather and farm variations;
3 Often leads to unacceptable insecticide choices;
4 Forces them to take too many risks with their crops;
5 Can threaten their viability; and
6 Isn't what they really wanted in the first place.

The problem of limited facilities and time pressures

The Siratac programme assumes the following situation for both grower and consultant--unhindered access to telephones and computers, a working knowledge of computers, and flexible time schedules for growers, consultants, pilots, and anyone else involved in monitoring and implementing the programme. But this is rarely the case.

First of all, it isn't practical for consultants to collect insect and fruit counts during the day and then to access the Siratac computer from their homes at night--the facilities need to be on the farm. Apart from the stress that working each night places on the consultant (and his family), the grower usually needs to make a decision about spraying before the consultant leaves the property in order to make arrangements with pilots.

Consultants need access to the computer throughout the day, including those times when the grower is away from the farm. But access to the Siratac computer presumes that each district has a reliable telephone system--which plainly isn't the case in many areas. In particular, central QLD has significant problems in this regard at this stage (but these may be overcome in the future).

Secondly, and related to the problem of inadequate facilities, is the question of time. Many growers (and others involved in the programme) feel they simply don't have or can't afford the time (or flexibility of time) to use Siratac:

> 'I am flooded with data and it takes real time to get the information out. It ends up being historical data instead of decision-making data.'
>
> 'The whole system needs to be more efficient in processing data.'
>
> 'It's annoying when you have a 100 and one things to do and you're waiting around to get on the computer.'
>
> 'There's nothing more annoying than when the phone lines drop out.'
>
> 'As a pilot nothing annoys you more than to spray a Siratac managed farm--say 3 fields one night, one field the night after and another the night after that. It's just not practical nor economical for us to do so. Soon we'll have to start charging extra.'

The 'problem' of weather and farm variations

Growers often believe that Siratac is unrealistic because its based on 'averages' and 'ideals'--especially in regard to weather conditions and paddock consistency:

> 'It's insurance--Siratac assumes 'average' weather conditions (but when do you get an average season?).
>
> 'Say you do what Siratac says . . . First flowers 17th January, cut out February 19th, thresholds five grubs per metre (for example), it's a high threshold level . You haven't had a spray in November, it's been beautiful growing conditions for October and November, she's up to the sixth or seventh node, you start cleaning up. Where I would have done it three weeks earlier, everything is super. You get through February 7th then a great bloodly monsoon blows in the Ord, and it rains for a week to 10 days, then turns cold. Who's going to get the biggest yield, the one who protects early or Siratac?'

Several consultants see that the lack of uniformity within management units (plant stand, soil type, inadequate land levelling, relatively slow irrigation rates from bores) places restrictions on the Siratac programme.

The problem of insecticide choice

Both users and non-users frequently disagreed about the insecticides recommended in the Siratac programme--both as to what chemicals to use and when to use them:

> 'There have been innumerable arguments about insecticide recommendation within the programme.'
>
> 'It's a little difficult to have faith in the programme when it recommends endosulfan on tipworm and doesn't come up with a curacron spray for mites.'

endosulfan on tipworm and doesn't come up with a curacron spray for mites.'

'It always recommends the dearest chemical when a cheaper one will do.'

'Often its chemicals selection was a bit whacky, especially phase three. Very expensive.'

'It doesn't address rates.'

The problem of taking risks

Many growers see the root thrust of Siratac as the 'dynamic theshold'. And while many agree it's a good concept, they're not prepared to take the risks of having a late crop and/or of getting what they perceive as a low yielding crop:

'While it's a great concept and a nice theory, it's just not practical.'

'There's nothing wrong with dynamic thresholds, it's just that there is a time and place for using them.'

'Dynamic thresholds and late crops go hand in hand.'

'The cotton plant is a factory and you can't afford to shut it down for a month. You don't shut a car plant down for a month--if you do, you don't produce.'

Growers often see Siratac as taking undue risks with their crop. They question the plant's ability to compensate both for letting bugs chew the crop early and for low levels of spraying. Subsequently, many have attached a 'greenie' image to the company.

'It depends on your attitude to risk--most growers are not prepared to risk it.'

Yet the researchers are quick to point out that using dynamic thresholds has always been optional in the programme. They believe that growers use the threshold issue as a smokescreen for other resentments.

The problem of trade-offs in staying viable

The producer's ultimate goal is to maintain a viable production unit. So any potential economic risks involved in adopting a pest management and environmental innovation will influence the grower's decision. In contrast to commercial innovations which are designed to increase output in the immediate future, growers see environmental innovations as those designed primarily to protect natural resources and prevent loss of output over the longer term.[1]

This may be a case of naivety on the growers' part--'out of sight out of mind'. But given their economic restraints, its an understandable attitude:

'Compensation is a good idea, but what about economics, two and a half early sprays equal one late one . . . so what do you do? You protect early.'

'They're not economic thresholds, but confidence thresholds. It all depends on your attitude to risk.'

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[1]Chamala cited in L. Capon (1980), "Report on Integrated Pest Management Research," Departments of Agriculture and Entomology, University of Queensland, prepublication manuscript.

'You know, you just don't make decisions on thresholds only.'

The problem of an 'unwanted' product

Many people believed the real issue with Siratac was that the product isn't what the industry wanted on the whole (remembering that half pleaded ignorant to Siratac). They felt that there were too many problems associated with the product--its recommendations, distribution and application--hence they could not see the benefit in using the service. More than half of the non-users interviewed made similar comments:

'The problem isn't what they think it is--its a product problem. '

2 Confusion and dissatisfaction over how to use the product

a. Why is there so much ignorance about Siratac?

We estimate that over half of the people we interviewed, if not more, were ignorant to what Siratac is, what it does, and how it operates:

'I don't know anything about it!'

'Look I've heard about it, but I don't know much about it.'

'I know about it, but I don't know about it--you know what I mean?'

This was particularly evident when we asked what products and services Siratac offered or who was working for Siratac. Many couldn't say. This was particularly the case with the Queensland growers.

Many of the people who use or have used Siratac used the system incorrectly, either intentionally or unintentionally. Subsequently, the information it produces is incorrect:

'I don't know anyone who uses it properly, often its a piece of paper after the event.'

'No-one follows the instructions. A.S.O.'s often miss days when the crop should be checked, or they're 3 or 4 days late. Often the fruit model is not up-dated regularly so the computer bases its decisions on old information. The system is only as good as the information that goes into it.'

'The grower must be prepared to get involved with the system, otherwise its just not worthwhile doing--you don't see the benefits.'

Yet the researchers claim that Siratac has impressed growers who have used it direct and followed the procedure to the letter.

There is no doubt that many who use Siratac or have used it in the past have an educated opinion (whether the opinion is positive or negative). But the objections and opinions of those who haven't used it mostly show an overall ignorance of what it is and what it does. And much of this resistance appears to stem from a vague 'them' and 'us' mentality built on hearsay.

Yet despite the bad attitudes and industry 'gossip', much of the ignorance seems to stem from Siratac Ltd.'s failure to present the product clearly enough: 'Their message

Yet despite the bad attitudes and industry 'gossip', much of the ignorance seems to stem from Siratac Ltd.'s failure to present the product clearly enough: 'Their message just isn't clear'. Later we'll look more closely at the issues of management, marketing and public relations.

b. How do growers feel about computers?

The Siratac system doesn't suit all growers and every situation. The majority of them don't have a computer or facilities for a computer, and often only receive their print-outs every 2 or 3 weeks. Some believe the computer has the potential to educate the user to the extent where he'll no longer need to use it.

The amount of time growers could put into learning and using the programme often controlled what they got out of it. Similarly, the level of assistance they received heavily influenced how useful the programme was to them:

> 'It all depends on the information that you put in. It's like anything--what you put into it, is what you get out of it.'
>
> 'You need to be educated in the way it works--the more you know the more you get out of it.'
>
> 'Growers need to be encouraged to use the computer. The Siratac people need to run the programme and show the other advantages of having a computer. It's no point just giving it a go to see how it works, as 9 times out of 10 they won't see the benefits.'
>
> 'Siratac should explain its answers--that might give me more confidence in the system.'
>
> 'I think if I had more personal contact and support, I could trust it more.'

Not surprisingly, despite the fact that they subscribe to the service, many users expressed a general lack of confidence in computers:

> 'I am just not sure where these computer systems are leading us to.'
>
> 'The whole idea of a computer--'big brother' you know--it just doesn't rest easy.'

Some growers questioned the basic concepts which are supposed to make a computer so valuable:

> 'Quantifying a biological system . . . its all a bit "iffy". Where does it stop? You can't quantify everything.'

But once again a certain vagueness and ignorance characterised many of the comments:

> 'I just don't like computers.'

3 Confusion and dissatisfaction over the way Siratac Ltd. presents and manages the product

a. How was and is Siratac researched and developed?

Part of our answer to 'Why haven't more growers adopted Siratac?' involves the research behind the product, or at least the way various groups perceive that research.

The research has always focussed specifically on the cotton industry--there can be no doubt about that. But that comment begs an important question: the industry as seen through whose eyes--the researchers or the growers? The question unearths a

fundamental mismatch, or at least a significant communication difficulty between growers and researchers (and perhaps even between 'conservative' and 'radical' researchers).

The growers wanted research and innovations to directly serve their management needs and financial goals. Many of them believe the researchers haven't even considered these issues. This has fueled the confusion and dissatisfaction about Siratac's specific purposes and benefits which we outlined earlier.

Many researchers, on the other hand, believe that growers must stop thinking narrowly about their own financial concerns, and begin to see the bigger picture of overall industry and ecological needs. Originally, the CSIRO and Department of Agriculture based their research on the integrated pest management (IPM) philosophy. About this approach Lloyd and Twine (1982)[1] state:

> 'Unfortunately, interest in the concept has been mainly stimulated by the failures and disasters brought on by the total reliance on synthetic organic insecticides in dealing with pest problems.

But most growers didn't, and still don't, accept the pest management principles Siratac is based on because they associate them with late crops and unnecessarily high costs for chemicals. It seems that the researchers and/or their respective organisations (reluctantly?) responded to this grower resistance by avoiding certain features of IPM to make Siratac more acceptable to the growers.

More recently (1983) the government researchers in co-operation with the agro-chemical companies and the cotton growing industry developed an insecticide resistant management strategy (the pyrethroid strategy). This strategy complements IPM and has many similar features to Siratac. And on the whole, this strategy appears to be more acceptable to growers.

A CSIRO scientist expressed a number of problems associated with the production, development and research aspects of Siratac.

> 'Chemical companies want all their registered products included in the Siratac programme. Companies do not always like the conditions under which Siratac recommends their product. Although recommendations are always consistent with conditions on the registered label, their advertising often conflicts with pest management.'
>
> 'Consultants feel their experience is as valuable as the scientists data and that their value judgements are more important than those based on pest management principles.'
>
> 'Many farmers want the solutions to be consistent with their preconceived ideas and expect Siratac to be a consensus of the best of current commercial practices. Many growers reject the pest management philosophy, while economic factors force many to be interested in short-term rather than long-term goals.'
>
> 'The main motivation of (Siratac Ltd.'s) staff is to get more clients in order to improve the company's financial situation. They want a product that is easy to sell and aren't interested in features that do not sell Siratac, like dynamic thresholds which apply much of the pest management philosophy--a philosophy which growers distrust.'

[1]Lloyd and Twine (1982), "Siratac on the Darling Downs, 1981-82," unpublished paper.

'Siratac Ltd. tends to align with farmers' attitudes.'

'The conservative scientists also tend to align with farmers' attitudes. They are critical of some of the programme content, particularly in relation to use of 'soft' insecticides and the crop's capacity to compensate. Such criticsm is based on opinion rather than data, while Siratac scientists feel that too many concessions have been made to farmers and consultants in the interest of producing a saleable product.'

'Really there's not enough scientists in the CSIRO, and Siratac Ltd. expect research staff to give priority to maintaining software rather than research.'

A summary of the attitudes towards Siratac research

The disagreement about Siratac's research and end use involves conflicting paradigms: a 'marketing paradigm' and a 'research paradigm'.

The marketing paradigm states: 'If we take notice of who our customers are, what their needs and wants are and cater for them, we will not only make them happy, but we will generate profit for ourselves.' The scientists' paradigm looks at the issue differently: They carry out trials based on their research--which they believe is not biased by personal preference or opinion like the marketing concept. Yet it should be obvious that neither group is anywhere near as neutral or objective as they profess to be.

It seems as though there was a mismatch from the beginning--but perhaps not. Its possible that each group's concerns could complement the other to produce a research policy structured around common interests--if the 2 groups communicate adequately with each other. Apparently that isn't happening. And so whether or not the different purposes are poles apart, many people on both sides of the research fence have come to see it that way.

So where do the 2 approaches leave us at the moment? The scientists believe they are 'right'--while the growers and consultants believe they are equally 'right'. Communications have broken down and a network of negative attitudes has evolved between the individual researchers, Siratac Ltd., growers, chemical companies and consultants. This antagonism has hindered the expansion of Siratac Ltd. and the acceptance of Siratac.

b. How do growers see the back-up service?

Frequently users criticised Siratac Ltd.'s back-up service. Interestingly, some growers see the researchers as their back-up, and not always the technical officers. The researchers certainly don't see their own role that way. Nevertheless, the growers complained that the researchers were often unavailable, unconcerned and unapproachable:

'They need a change of image, the research people are invisible boffins. Why are there no personal touches? They never visit you, and none of them live in the town or mix socially.'

'The problem is they're so absorbed in the magic of computers rather than practical, efficient farming.'

practical, efficient farming.'

'The people at the research station work a 35 hour week, go home on weekends, go on leave over Christmas. There's a crisis every minute of the day, but you can't get hold of them.'

'The problem is, there's always been a problem. If you can't get on the computer, it's broken down, it's the weekend or they're on holidays and you can't get hold of them.'

'They're in their own technological dream without any of the practical or commercial realities of farming.'

'Look those . . . out there at the station, don't realise that\ we are busy, practical people that don't like to be stuffed around.'

'Researchers and academics--you want to get them out of it!'

c. How was and is Siratac marketed?

Siratac is a technically innovative product with very few if any models to base itself on. It is perhaps too advanced and 'futuristic' for its consumers. Yet the majority of people felt that the problems weren't just in the product--rather they believed it had been poorly managed.

These people specially mentioned the manner in which Siratac Ltd. initially introduced its product to the industry. They believed Siratac and Siratac Ltd. threatened and offended many growers. This intensified the contention that the initial levy had raised and contributed to the overall poor 'sale' of Siratac to the cotton industry:

'It wasn't sold, we were dictated to.'

'They (Siratac Ltd.) thought they were going to take-over the industry, without even talking to the industry first.'

'I found it offensive! When you've been growing cotton for 30 years then someone turns around and tells you you've been doing it wrong for all those years--no wonder people get their backs up.'

'It was presented in such a way that it undermined growers intelligence.'

'Many of the older growers weren't going to have a computer dictate to them.'

'Not only that but . . . was very jealous, autocratic and dogmatic in his approach. No-one would listen.'

'It then became fashionable to knock Siratac.'

The basis for promoting the product initially centred around the early trials and the growers who conducted the trials on their farms. These growers were impressed with Siratac to the extent that they thought it should be made available to all growers within the cotton industry--consequently, Siratac Ltd. evolved. However, much of the cotton industry was of a different and in fact contradictory opinion.

The growers weren't the only ones that felt used and abused. Since Siratac Ltd. began (almost 6 years ago--October 1981) the company has lost 10 employees. This has

been a major problem. Many past employees spoke of 'poor money', 'bad cars', 'no security', 'isolation', 'no room for promotion', 'no training' and 'continuous abuse' from growers and consultants as major reasons for leaving:

> 'The fact is, the job's just too . . . hard.'

The majority of past employees have now accepted positions with chemical companies, where they enjoy better wages, houses, cars, expenses, job security and promotion prospects. Both present and past employees mentioned stress and (quite often) a lack of support associated with the position:

> 'Burn out--you know there's only a certain level of coping.'
>
> 'It's a thankless job in a very demanding and over serviced industry.'
>
> 'Instead of being a technical officer, often you feel like the manager of a complaints department.'
>
> 'I just didn't get any help or support. I rang them and they didn't do a thing--they just ignored me.'

Not only have the conditions been a problem, but the company often seemed to employ the 'wrong' type of personnel. Furthermore, they didn't train their employees adequately:

> 'They have never employed the right people--Siratac have never had the right man in the managers position.'
>
> 'They have never employed a marketing, sales person.'
>
> 'They need a leader, a business manager. They've never had one.'
>
> 'They are always young, straight out of university.'

Since Siratac Ltd. was 'born' out of the research organisation and the product was so technically orientated, the initiators naturally presumed that the company should only employ people who could understand and use the product. This policy created a business and administrative gap within the organisation, as well as a poor approach to marketing the company and the product. The directors now realise the problem, but it still remains:

> 'It's never had a figurehead, a leader, a people person who could relate to farmers.
>
> 'There is no-one within the company trained to manage or sell the product. They're all excellent T.O.'s but not salesmen.'

Growers and consultants, users and non-users, continually mentioned a 'lack' of selling as an important issue. Many of the users believed Siratac Ltd. has a marketable product, its just a matter of getting out there and 'selling it' to the growers and consultants:

> 'It needs to be more one to one.'
>
> 'Talk people through it, demonstrating its virtues. The technical officers and researchers know what they've got.'

'You need salesman who are prepared to stand up--not this "puppy dog" approach.'

'Be positive and don't pussyfoot around.'

'The problem again--they are not aggressively selling the product.'

The emphasis should be on the grower and consultant and their respective problems and needs, not on Siratac's possibilities as a product. Siratac needs to be demonstrated in such a way that it shows how it can aid present management practices. At present it's too 'distant' and is not seen as relevant to the growers' and consultants' needs.

d. Who should use Siratac--the grower or the consultant?

The rocky relationship between consultants and Siratac Ltd. goes back to its launching. Initially, when Siratac was being developed in the late 1970's, independent consultants (as they are known today) were virtually non-existent. But during the trials and early years of Siratac Ltd., consultants were establishing and developing their own businesses, and many of them felt they had been overlooked and bypassed by the management of Siratac Ltd.

Thus the consultants felt the introduction of Siratac Ltd. would threaten their own business:

'We were completely overlooked by the board.'

'It was presented in such a way, that it made us (consultants) look ridiculous and irrelevant.'

'It was a basic concern to me as I was just establishing my own business at the time.'

'The establishment looked down on us and treated us like donkeys and peasants.'

Siratac originally sold itself as an advisory and extension tool for the industry, with an emphasis on its potential for saving spraying costs. Apparently, the Siratac management initially tried to involve the consultants. But the consultants weren't interested and the management thought it could capitalise on this by 'cornering' a large slice of the 'market'. However, they underestimated the relationships between the consultants and their growers and the expected changeover didn't occur.

Subsequently Siratac Ltd. didn't win the share of the market they would have liked--some directors blame the consultants for this:

'The consultants have a lot to answer for.'

The consultants response was predictably terse:

'It's time they stopped feeling sorry for themselves and took a more positive approach.'

'It's an excellent system in the hands of the wrong people.'

'Their selling philosophy is based on emotional outbursts . . . crying for money . . . crying for support.'

Apart from the Siratac board/consultant relationship, consultants have to face a number of basic logistical problems when using Siratac on their clients' farms--especially in QLD:

> 'Farm and paddock sizes are generally much smaller than those in NSW, therefore consultants must check more management units per 1000 acres of cotton. For example the Darling Downs would handle 12 management units per 1000 acres, Biloela Theodore have about 10 management units per\1000 acres, whilst a NSW consultant would handle between 7 and 8 management units per 1000 acres, and often less.'

A trained consultant and a casual assistant can only check about 1,700 acres or approximately 18 mu/day on a reliable basis. So if a consultant wants to use Siratac he may have to employ more staff:

> 'Consultants who have used Siratac in QLD estimate that 40% more time is required to run the Siratac programme compared with the current commercial situation. In order to maintain an economically viable area, the consultant must employ extra labour if he is to handle a significant area under Siratac.

QLD growers generally want to see their consultant on their farms at least once per week. These growers would have to be educated to receive less direct service from their consultant and to rely more on casual scouts.

Like so many growers, consultants often come back to the questions of benefits and how (im)practical the programme is for them to use:

> 'On the whole I am quite open (to Siratac), however it just comes down to logistics. When you're consulting on 3000 acres and there are 30 to 50 management units, you don't have the time--you just get caught in a bottle neck.'

> '(Pest management) is not that difficult--it's a bit of an "overkill". It's obvious 90% of the time when it does and doesn't need a spray, the other 10% is usually a psychological decision. Who's to say that I'm right or the computers right--you just can't afford to take the risk.'

> 'Yield predictions only tell you what you can see.'

e. How did growers react to the levy?

The grower representatives elected by the growers to their prospective marketing organisations imposed a levy of 25c/bale on all growers to be collected at the point of ginning commencing with the 1981/82 season. The idea was to run the levy for 3 years as a means of financing the initial stages of Siratac Ltd. until it could support itself. The rationale given for the levy was that it was going to be an industry company (similar to a cotton seed distributor)--grower owned and controlled. At the time a levy seemed the most logical, feasible and practical method for collecting the necessary funds. However, this wasn't to be.

Many growers spoke out strongly against the levy. Many felt they were subsidising the growers using the system--why should they pay for something they didn't use? This was particularly the case in the Namoi Valley, and to a lesser extent in the Gwydir and MacIntyre Valleys:

> 'This idea of subsidisation is out of the question. That levy--I hated it and I let my feelings be felt.'

'If it can't support itself, too bad--its part and parcel of business. That's the problem with governments today.'

'Subsidisation--it's just not on.'

'You know, when I started out I didn't have anyone giving me a handout, why should they?'

The levy created a great deal of hostility and anger within some sectors of the cotton industry. This seems to be the major reason why the grower representatives disbanded it in its third year.

f. What are the politics of Siratac?

The politics of cotton

Many growers and individuals within the industry are uncomfortable with the industry politics, especially in the Namoi Valley. It wasn't as noticeable in the rest of the industry's cotton growing areas.

'Cotton politics will ruin the industry.'

'There's a certain amount of jealousy involved, not only in Siratac but the whole industry--many are often too selfish for their own good.'

'It's not the growers' industry anymore, it's just individuals.'

'Look, the whole industry shouldn't be so self-centred.'

Siratac needs to rise above growers' political ignorance.'

Whatever political influences operate within the industry, they appear to be detrimental to Siratac and potentially so to the industry as a whole. In particular, some individuals seem to hold a disproportionate amount of power and to use this power in questionable ways:

'You know there were groups who set out to destroy Siratac in its early years.'

'What happens to the information I give you? There are some people who would use this information against me.'

The politics of Siratac

Many people within the cotton industry feel that Siratac, by nature of its board and by nature of the industry, has become a victim of 'industry politics'. They believe much of the criticsm directed towards Siratac is unfounded.

Yet some of these same individuals, and others, feel that Siratac Ltd.'s board represents the 3 major processing organisations rather than the growers. This provided a 'power base'. Because of this, these individuals believed that Siratac Ltd. had become a tool for certain influential people:

'Siratac should be selling its virtues and not its political and personal preferences.'

'Siratac has become a 'political football' between various groups and

'Siratac has become a 'political football' between various groups and individuals within the cotton industry.'

'Since the board is made-up of the 3 processing groups, it gives them a power base. They all wear their industry hats, which is their bigger interest, not Siratac.'

As we've noted before, Siratac Ltd.'s entry into the cotton industry was not without its problems. Their message was not clear, and many growers were offended and 'put out' by the introduction of Siratac into the market place. They felt either threatened or couldn't understand what Siratac was, or what it was trying to do. As one grower stated:

'(Siratac is) paying the cost for what happened 5 or 6 years ago. It's an historical problem.'

Consequently, as we've also noted above, a 'them' and 'us' attitude developed--'them' being the growers with Siratac managed fields, and 'us' being the growers who are non-Siratac users (or vice versa). This attitude is still well and truly alive:

'You know, you're a good bloke and I'm a bad bastard. I don't care about the environment.'

'It's them and us.'

'Siratac grew that crop, I grew mine.'

About one quarter of the people interviewed passed similar comments to those above. These people see Siratac as the decision maker, not as an aid to decision-making. And this attitude and misunderstanding seems to lie behind much of the confusion about Siratac Ltd.'s identity and affiliation.

Misunderstandings about Siratac

A small group sees Siratac as Government intervention:

'It's typical government intervention.'

'We were being told what we could do and what we couldn't do.'

'They've got to get away from the government bureaucracies and the scientists --privatise it.'

Others see it as a 'greenie intervention' that takes undue risks with crops'. Roughly half of the people interviewed made similar comments:

' . . . goes softly, softly--(Siratac) don't seem to care much about the crop.'

A similar confusion concerns Auscott's relationship with Siratac. Many people see Siratac and Auscott as one and the same:

'It's just another arm of the public service and old Auscott.'

'Well, Auscott's its biggest support.'

'Auscott are always promoting it.'

Whilst the Auscott farms have contributed significantly to Siratac, Siratac's association with Auscott has done little for either's public image and promotions (Auscott Warren being the exception and in fact the contradiction).

> 'Auscott are no longer the leaders and innovators within the cotton industry.'
>
> 'In fact, you should work on the philosophy, whatever Auscott do, do the opposite.'
>
> 'You drive past Auscott out there and their cotton is always stunted, discoloured and low yielding--is that the sort of crop Siratac grows?'

Of course, its possible that Auscott carries the financial burden of Siratac Ltd. because it has a bigger vision of the industry and its future. In any case, many of Auscott and Siratac's knockers seem happy to benefit from Auscott's support of Siratac.

Summary: What is Siratac's image now?

The management image

Almost 80% of those interviewed felt Siratac needed a more professional approach to managing and presenting itself and its products. Many felt that finding an experienced manager would be a big step in the right direction:

> 'Poeple are its biggest asset--its got to be non-political, tough, shrewd and adopt an intelligent approach.'
>
> 'There's no-one there prepared to take the initiatives--it needs someone to drive it.'
>
> 'It's been controlled by academics, conservatives and researchers. The message is just not clear, they're not actively persuading people to use it.'
>
> 'It's an excellent system in the hands of the wrong people.'
>
> 'It's in a position of being a free marketer of an information service and has done little in taking the opportunity. They have become stagnant and dogmatic in their approach. It must be seen as being dynamic, adjusting with people's needs and attitudes. They're just too narrow minded.'
>
> 'There have always been emotional outbursts, crying for money and support--not the way to run a commercial company.'
>
> 'Siratac has become the laughing stock of the cotton industry.'

The financial image

Many growers felt the financial position of the company was indicative of its management. A great deal of uncertainty surrounds its financial basis. In theory it was to operate as a commercial company but in practice it has failed to do so. Siratac has in fact relied heavily on grower levies and grants--though the annual $1 per bale research levy does not go to Siratac Ltd., but is used to fund research:

> 'Is it a private enterprise?'
>
> 'The whole thing doesn't rest easy--why try to rescue a sinking ship? It's in a preferred position supported by the co-op and marketing organisations.'

'You wonder why they don't spend $100,000 on promotion instead of a computer--there's no point updating something they can't sell.'

'It's a Claytons venture--the commercial venture when you're not having a commercial venture.'

'If its such a success why fund it? Why can't it stand on its own 2 feet? Who's been diddling the books?'

A study in contrasts

Siratac's public image varies dramatically within the cotton industry--from the enthusiastically positive to the embarassingly negative:

'It's essential, I honestly believe it's that good.'

'It's a terrific system that makes a science of pest management.'

'Siratac, what's that--a chemical company?'

'Siratac's an accumulative thing and it's only in its early stages of development. So am I, and I can't really afford to get into it at present.'

'It's socialism (socialising?) the cotton industry. It's typical government intervention, telling us what to do.'

'It would be disastrous if Siratac had a large percentage of the Australian cotton crop. We cannot afford to have poor quality cotton like that on our world markets--it's bad for our image.'

'The whole system needs more realism in it. Practically, socially and economically. At the moment it's slow, awkward, unintelligent and cumbersome.'

The contrast in perceptions couldn't be more stark: while many users associate Siratac with good quality cotton and efficient management, half of the non-users relate Siratac to low yields, a late poor quality crop, greenies, government interference, and cumbersome, awkward and time consuming management practices. In short, for many people Siratac means problems . . . problems . . . problems!

With this sort of image its easy to understand why more growers won't use Siratac. Any consumer decides what he or she will buy according to their own subjective picture of the product. It may be the best possible product with impressive supporting evidence, but if it doesn't match the consumer's pictures of it and their own needs, they won't accept it. Whether or not Siratac is the 'best' product, and whether or not the growers really understand the product, Siratac Ltd. must reckon with how the growers see it--and act to change this image.

How can Siratac's acceptance be improved?

Introduction

Originally, Siratac was established against the background of the Ord River disasters of the 1960's and 1970's to offer a way of directing and accomodating research based on integrated pest management principles. During the earliest trials Siratac highlighted significant problems with the then current commercial practices. In particular, the trials suggested that growers were using far too many sprays and too many 'hard' chemicals, which increased the risk of resistance without offering any profit increases.

Understandably, rightly or wrongly, these research 'findings' became Siratac's marketing platform--'using Siratac will help you solve insect problems and cut your chemical costs at the same time'. So Siratac's role shifted from being a facilitator of research (one input to decision-making) to being an industry extension body (a decision-making tool)--an advisory service geared to 'responsible spraying' practices. The shift sounds subtle, but its effects were profound.

Since Siratac's inception 2 other factors came into prominence which challenged and all but supplanted Siratac as a decision-making tool:

1 A marked increase in the number and influence of independent crop consultants in the industry; and

2 The development of the insecticide resistant management strategy (pyrethroid strategy).

The independent consultants took over the extension role to a large degree from the chemical companies. And, with the help of the pyrethroid strategy, they have also assumed the major advisory role of helping growers to decide when, what and how to spray. All of these factors combined with Siratac's emerging image (late crops, etc) signalled the end of Siratac and Siratac Ltd.'s growth in this area.

But the 'evidence' of growers' experiences does not necessarily lead to the conclusion that Siratac has nothing to offer and/or could have nothing to offer in the future. Rather, the 'evidence' seems to point to Siratac's shortcomings in the specific role of a decision-making tool. In other words, the product has performed 'poorly' because people expected it (or were led to expect it) to do something beyond its capacity.

1 Management, marketing and service changes

Growers and consultants gave a variety of reasons for not subscribing to Siratac. But almost every one of them emphasised what they saw as the unprofessional manner in which Siratac Ltd. has been managed, especially the way the company marketed its service to the Australian cotton industry.

Siratac Ltd. must come to grips with the power and influence of the consultants throughout the industry, and address its relationship to them. In other words, it must identify who its real clients are. Siratac Ltd. must decide whether they are primarily servicing the growers or the consultants (ie. the growers via the consultants). Once Siratac Ltd. establishes this point for themselves and the industry at large they must identify what their clients' real needs are and work towards providing products and services to meet these needs.

The Queensland Consultants Association has outlined the direction they would like future promotional (and research) activities to take. The QCA would like to see Siratac promoted to the industry at the grower level not so much as a cash advantage (less and cheaper insecticide sprays), but in the following ways:

> 1 As pest management with a consultant interface--Siratac being a bench mark or second opinion which one may accept or override depending on particular circumstances;
>
> 2 As a source of crop information with regard to fruiting data, meteorological data, technical data base, and book-keeping with associated managerial benefits; and
>
> 3 As an effective and important organisation demonstrating the responsible attitude of the industry to the health and well-being of the community and to government legislators.

The Association believes that the promotion of Direct Siratac would be bad for the industry. They acknowledge that Siratac Ltd. has not actively promoted Direct Siratac, but they believe Siratac Ltd. and the various cotton organisations must go further and emphasise the value and need for a consultant to act as the interface between the farm and the computer. They believe this is particularly pertinent in the case of inexperienced growers.

Consultants believe they fulfil many of the aims of the Siratac system which are currently being promoted. Consequently, they believe Siratac Ltd. would claim greater industry acceptance by promoting itself as a 'useful management tool' rather than as a system which will save growers cash by reducing the volume and cost of insecticide sprays. Many of them would like to liaise with Siratac Ltd. and the researchers to develop Siratac in this direction, particularly with regard to technical programme changes.

Despite the in-house intrigue and arguments, Siratac portrays an image of innovation--it helps to stamp cotton as a highly progressive industry. The community at large views Siratac as evidence of an environmentally insensitive industry beginning to take a responsible attitude towards chemical spraying and the environment. The industry can't afford to lose any more chemicals from the market or earn further bad publicity. In other words, Siratac might become an important public relations tool.

2 Product changes and possibilities

a. Is there room for development?

If Siratac Ltd. surveys its market to discover the growers' needs, then it must also clarify its research agenda.

Siratac is only and can only be as good as the philosophy, technology and information it is based on. But perhaps even more important than these limiting factors is the question of its purpose.

If Siratac Ltd. continues to market Siratac as an advisory service and decision-maker, the product may have come as far as it can. Many growers believe that using Siratac as a decision-maker leaves them open to too many risks and questionable chemical choices.

And technically there appear to be unresolved questions regarding the sampling, thresholds, conversion ratios and varieties, and models which are the basis for the product. As long as the aim is to produce a 'fool proof' advisory service, Siratac Ltd. may be trying to achieve the impossible. This seems to be the concensus of international opinion regarding expert systems:

> 'Computer aid for complex strategic decision-making is a more complex issue and it is possible that the current level of scientific knowledge is insufficient for such programmes to be fully effective.'[1]

But there may be an altogether different scenario for Siratac Ltd. if it decides to develop its product and services in a different direction. Cotton growers will always need reliable, accurate records of crops, weather, finances (etc) on which to base their decisions. Siratac has huge potential in this field--not as a decision-maker, but as a resource for decision-makers.

If Siratac Ltd. pulls back from an advisory role (or stresses this as only an optional service), it could then concentrate on developing its potential as an information resource. Most researchers believe that there is more than enough information and technology available to develop the product in this direction. The soon to be released Mark 2 version of Siratac and several other new products will demonstrate this potential.

b. What new developments are on the way?

Siratac Ltd. will release several new initiatives in the near future:

> 1 Siratac Mark 2--The researchers have finished rewriting the Siratac programme and they believe its level of sophistication will make the present system look crude in comparison;
>
> 2 Portable Data Logger --This programme should allow\ growers and consultants to process data quicker and more efficiently; and

---

[1]K. J. Blokker (1986: 79), "A View of Information Technology as an Aid to Decision-Making by Farmers," Research and Development in Agriculture 3:2 (our emphasis). Blokker writes about his research into a similar programme to Siratac used in the Netherlands.

3 Laser Videodisk Cotton Encyclopaedia--This will offer instant access (with TV screen quality) to information relating to all facets of Australian cotton production.

As well as these new products, Siratac Ltd. plans to make available a range of existing agricultural software, including Nitrate, Level (land leveling programme), irrigation and soil packages, and data bases.

Siratac Ltd. could also investigate and capitalise on a variety of other computing oriented opportunities. For example, they could

1 Sell the expert system, models and data bases as separate packages priced according to market demands;

2 Explore how Siratac could form part of a much wider range of software and services, such as the software for the neutron probe services and the National Mutual software for paddock chemical recording and ginning;

3 Explore offering software and services outside the cotton industry--for example, Sorpact for sorghum growers; and

4 Explore the possibilities of selling their programmes overseas.

Whatever new ventures Siratac Ltd. pursues they must be careful not to repeat the past. They must develop any new products and services in line with thorough marketing research, and subject those products (etc.) to rigourous pilot tests and case studies. And with regard to both their existing and future products and services, Siratac Ltd. must communicate clearly and extensively with the users and provide a thorough educational service for them.

So how could we summarise the needs and possibilities for changes to Siratac Ltd.'s products and services?

It seems that many if not most information systems are insufficiently adapted to the target groups that would potentially use them--and Siratac is no exception. Often farmers needs and use of information differ from what designers of computer programmes assume (or would like). Scientists must switch from simply multiplying the amount of available information to distilling this information into useable knowledge. Siratac must become a 'knowledge provider' rather than an 'information generator'.[1]

Designers shouldn't demand more from users than is strictly necessary. The system should be kept as simple ('user friendly') as possible, not only with regards to the data collection, but also regarding what the system puts out.

At the moment it seems that Siratac Ltd. cannot clearly demonstrate the benefits of Siratac to growers, and/or the growers can't appreciate them. If a grower sees the computer as only capable of providing a 'yes' or 'no' answer to spraying, he will not see the benefits of using the system. Growers must be encouraged through demonstrations of the advantages of the system that are relevant to him, not Siratac, not the environment, not the industry, but him the grower. Siratac must also make the system more 'user friendly' and less cumbersome.

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[1]R. C. Smith (1986), "Technical Efficiency of Irrigation Agriculture: The Importance of Biological, Engineering and Human Factors," paper presented at the 1986 Irrigation Conference, Toowoomba, QLD.

Perhaps Siratac and Siratac Ltd. can become the focus of a wide range of computer based innovations and services for consultants and growers. Siratac won't revolutionise the cotton industry--but it is an unknown quantity with seemingly enormous potential.

3 Perception and attitude changes

The discussion about Siratac's benefits and future must focus on long-term issues and possibilities. There is quite a way to go before Siratac realises its potential since it is a relatively new concept and will probably stay that way for some time. Many growers agree:

> 'Its real benefit will be in the future. At the moment its a nice thing to have around . . . its not a necessity.'
>
> 'In the short term its not going to be as good as it will be in the long term.'
>
> 'Siratac is probably at the stage where it can be actively marketed to the industry. A few years ago it was just far too crude. I'd imagine that they will build on what they've already got and it will become a thing of the future.'
>
> 'It's for the future, its for the next generation and the generation after that.'
>
> 'Siratac is only as good as its data base. Its a developmental thing, the more information that goes into it the better it gets.'

In a sense the debate about Siratac needs to be lifted to the philosophical as well as the operational level--it requires a little vision. What the CSIRO and Department of Agriculture have produced and are still developing could have profound implications for the cotton industry, and even for agriculture in general.

But the number one priority must be breaking down the communication barriers surrounding Siratac and opening up constructive dialogue and cooperation between Siratac Ltd., researchers, growers, and consultants.

Summary: How do Siratac and Siratac Ltd. need to change?

Siratac Ltd. must face its image. Whether or not it deserves the tags, much of the industry labels it as government interference, 'greenies' and the source of little more than problems.

Siratac Ltd. must become more professional as a commercial service operation. In other words, it must throw off its 'public service' and 'back-yard' images by employing staff and strategies more sensitive to the realities of the marketplace.

There is considerable potential for growth if Siratac Ltd. can clearly demonstrate Siratac's benefits, and if it can get alongside the growers and particularly the consultants to understand their needs and to develop mutually beneficial strategies for research and development, management, marketing and client service.

Conclusions

1 What are the major issues?

There are no 'quick-fix' ways to improve Siratac's acceptance, but there are avenues worth pursuing. Siratac and Siratac Ltd.'s future lies in a major shift of emphasis. Siratac should investigate:

1 Clarifying its existing and potential benefits and clients--it must do its marketing homework (perhaps with outside help);

2 Building a cooperative research policy and outlining a mutually beneficial development programme;

3 Withdrawing from any direct consultancy role;

4 Marketing Siratac as an information tool--a way of recording and recalling agronomic and other data;

5 Offering a wider range of software and computer services tailored to growers' and consultants' needs; and

6 Developing its potential as a public relations service for the industry.

Siratac Ltd. must create a new image for itself and Siratac. In many sectors of the industry the word 'Siratac' has become synonymous with 'problems'. As Siratac Ltd. rethinks its role and develops its products and services, it must also work hard at its marketing strategy and at rebuilding its relationships throughout the industry.

2 What must happen?

The full responsibility for improving Siratac's acceptance can't rest with Siratac Ltd. alone. Siratac will only develop its potential, and thereby serve the industry, if the industry as a whole calls a moratorium on knocking and gets down to constructive debate.

Ultimately, the question of whether or not Siratac can be improved revolves around the question of whether or not people are committed to change. There may well be sufficient technology and resources available for change, but they will be useless without a new framework for open exchange, dialogue and research:

'The great tragedy will be if the industry is too narrow minded to get behind the new information technology. The future is in working smarter not harder. Siratac should stop being treated as a political football by a few individuals. I hope they will have the vision to see it through for the industry's future development.'

Appendix:
How we went about this study

An Overview of our Methodology

Ian Britton, a graduate of Hawkesbury Agricultural College, carried out most of the research behind this document. Since we were trying to uncover the industry's knowledge, perception and attitudes towards Siratac and Siratac Ltd., we decided to use personal interviews as the major research tool. Ian conducted all of these interviews and our methodology included the following:

1 Locating the interviews
2 Determining the sample size
3 Compiling interview lists
4 Arranging the interviews
5 Formulating an interview style

Locating the interviews

Ian conducted the interviews during November and December 1986. In New South Wales, he interviewed people throughout the following areas:

1 The Macquarie Valley (including Bourke)
2 The Namoi Valley
3 The Gwydir Valley
4 Macintyre Valley (or border rivers)

In Queensland, the areas visited were the:

1 St George cotton growing area
2 Darling Downs cotton growing areas
3 Biloela and Theodore cotton growing areas

Unfortunately, floods in early December prevented Ian from surveying the Emerald cotton growing areas of central QLD, and he only partly covered the Macintyre Valley due to illness. Ian used a telephone survey to explore any emerging issues that had not been adequately covered during the personal interviews.

Determining the sample size

The diagram at the top of the next page shows how Ian broke down the primary sample from states to regions, and the particular roles and situations of people involved with Siratac.

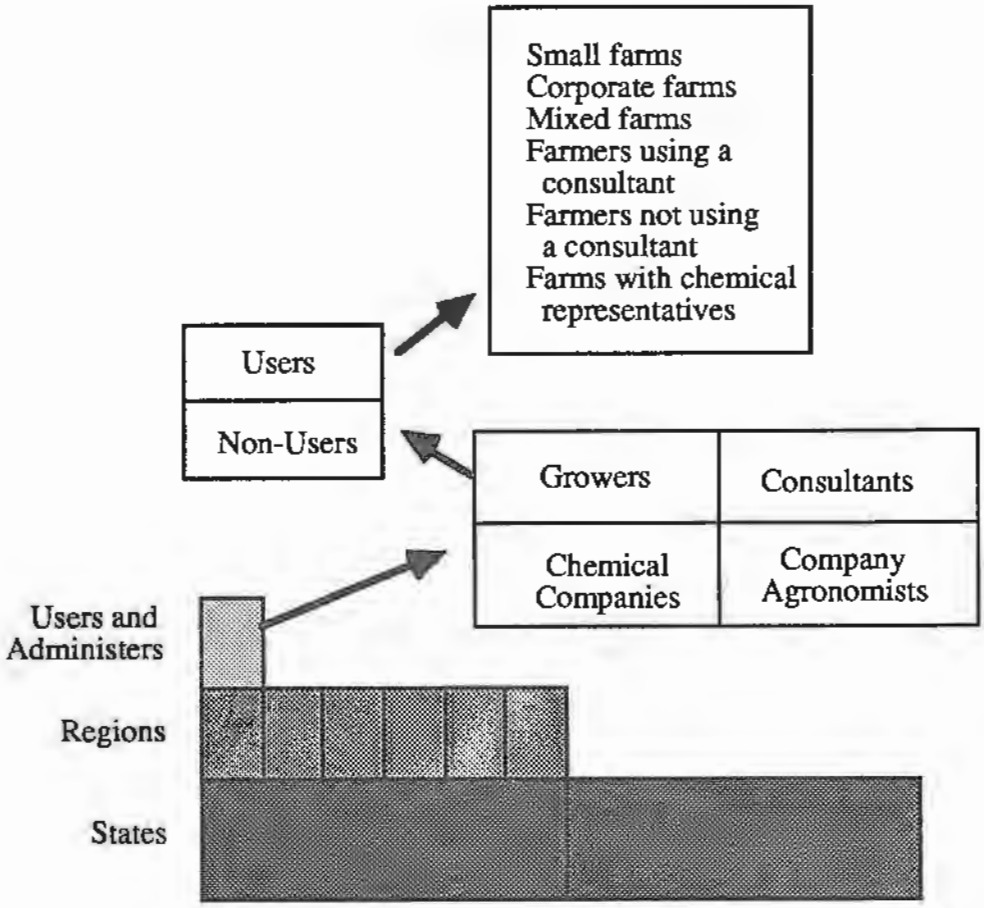


Table 1 over the page shows the numbers of people interviewed according to their role.

	Grower User	Grower Non-user	Consultant	Company Agronomist	Chemical Company	Totals
Macquarie/ Bourke	12	3	3	1	2	21
Namoi	5	14	5	1	2	27
Gwydir	4	10	5	4	3	26
Macintyre	1	3	2	0	0	6
St George	3	6	3	0	1	13
Darling Downs	5	10	4	0	3	22
Biloela/ Theodore	1	3	1	0	0	5
Emerald	1	2	1	0	0	4
TOTALS	32	51	24	6	11	124

Table 1: Number of Interviews Per Various Groups

Ian focussed on a variety of other people as a secondary sample to help him gain a feel for the industry as a whole and not just the perspective of a few key individuals.

CSIRO Scientists	4
Dept. of Agriculture staff	5
Siratac Board	8
ACCRA Board	6
Cotton Foundation	3
Environmental groups	2
Other opinion leaders	40
Processing organisations	3
NSW Institute of Technology staff	2
Siratac staff	6
Journalists	2
Overseas personnel involved with expert systems	4
TOTAL	85

Table 2: Numbers of Other Industry People Interviewed

While these categories in both tables are quite broad they do however illustrate the numbers and types of individuals surveyed. Some of these groups fall under two or more categories. Overall, Ian interviewed approximately 150 individuals (some people appear in both Tables 1 and 2).

Compiling the interview lists

Siratac technical officiers compiled the majority of the lists for their prospective regions. We tried to ensure that the respondants were chosen impartially and in context with the primary and secondary samples. Rather than merely taking a random cross section of the population, we concentrated on small groups of people with specific characteristics and roles.

Arranging the interviews

Ian telephoned the various individuals on the list to (1) identify himself as a graduate of Hawkesbury Agricultural College, (2) explain that the Australian Cotton Growers Research Council had funded a study to investigate the future of Siratac, and (3) ask if it were possible to meet to discuss the person's attitudes towards Siratac. Once the individual agreed to participate in the survey, Ian arranged a convenient time for an interview.

Ian conducted the interviews in the other person's home or office. Each interview lasted approximately 45 minutes and was taped for reference.

Formulating an interview style

Canvassing industry opinions is not only a vast task, but a precarious one too. It is extremely easy for the researcher to misinterpret what is being said, and to allow his or her own biases to determine the research methods and/or to prejudge the data collected. Perhaps the best safeguard against this is for the researcher to keep these dangers in the forefront of his or her mind. We do not claim to be neutral--but we have tried to be fair and sensitive.

We decided to use a non-directive 'indepth interview technique'. Ian introduced himself by explaining the purpose of the interview and giving an outline of the topics which he wished to cover. The introduction was usually wide-ranging and ramified both to avoid offence, and generally to relax the interviewee. Usually the discussions started broadly, such as talking about the person's farm or themselves. But gradually Ian narrowed the focus of the interview by encouraging the interviewee to speak freely about Siratac.

We decided that Ian's role was to be essentially passive--not to challenge or bias the interview. He encouraged his interviewees to range widely and spontaneously over all aspects of the topic, relating in their own words what interested or concerned them. Ian avoided loaded questions and instead focussed on finding out what the interviewee wanted to say and how they wanted to say it. Whenever the discussion fell into silence, Ian usually left restarting the conversation up to the other person, or else he started the conversation by referring to a point the person had mentioned earlier.

Thus the data which resulted from these interviews is essentially qualitative and anecdotal. For this reason we haven't attempted to quantify the findings. The report offers a summary of the views, but gives the greatest space to those opinions which were consistent across the whole sample.

Appendix 2

Questionnaire for Cotton Growers regarding Siratac and Covering Letter

HAWKESBURY
AGRICULTURAL
COLLEGE
A COLLEGE
OF ADVANCED
EDUCATION

12th November, 1987

Dear Cotton Grower,

I am writing on behalf of a small team of staff from Hawkesbury Agricultural College and the New South Wales Department of Agriculture. We are working on a project concerning the past, present and future of Siratac and Siratac Ltd. The project is funded by the Cotton Research Council.

The first phase of the project was an extensive survey of a cross-section of people in the industry. This was done by Ian Britton. The objective of the survey was to determine the present industry knowledge of, perceptions about and attitudes toward both the Siratac system and Siratac Ltd.

For the second phase we invited 18 people from within the industry to meet with us as a consultative group and we met at Wee Waa on September 15. A report of our earlier survey was circulated to group members before the meeting.

At the Consultative Group meeting the members of the group shared with us their reaction to our report and their view of the current situation surrounding Siratac. The group then moved to a discussion of a desirable and feasible future situation.

I am attaching a summary of the outcomes of the meeting and I think you will find it interesting reading. It raises a number of issues about which decisions have to be made. If you have ideas you would like to share with us on these or any other aspect of Siratac we would be pleased if you would write to me.

Our project will be completed in December and we will be submitting a report to the Siratac Board of Directors and the Cotton Research Council.

Yours faithfully,

R. MACADAM,
ASSOCIATE DEAN,
FACULTY OF AGRICULTURE.

(Encl.)

QUESTIONNAIRE FOR COTTON GROWERS REGARDING SIRATAC

WE WOULD LIKE TO HEAR YOUR VIEWS ON A NUMBER OF ISSUES CONCERNING SIRATAC. WE WOULD APPRECIATE IT IF YOU WOULD COMPLETE THIS QUESTIONNAIRE AND SEND IT BACK IN THE PRE-PAID ENVELOPE BY (FRIDAY, NOVEMBER 13).

1. Which of the following statements best applies to you (tick one):

   i. I am a current client of SIRATAC. [ ]

   ii. I am a past client of SIRATAC. [ ]

   iii. I have never been a client of SIRATAC. [ ]

2. Do you pay an independent consultant to advise on crop management? (tick one)

   YES [ ]

   NO [ ]

3. Do you think independent consultants provide equivalent services as SIRATAC in the area of pest management? Please tick one of the following to indicate your response:

   The equivalent services [ ]

   Very similar services [ ]

   Some similar services [ ]

   Few similar services [ ]

   Not similar at all [ ]

   Any comment (optional) _____

   _____

   _____

4. How well do you think SIRATAC has informed growers of the services it offers? (tick one of the following):

   Very well [ ]

   Well [ ]

   Moderately [ ]

   Poorly [ ]

   Very poorly [ ]

   Any comments (optional) _____

   _____

/..2.

5. To what extent do you consider SIRATAC to be effective as an aid to pest management decision making? Please tick one of the following:

Extremely effective [ ]

Very effective [ ]

Effective [ ]

Minimally effective [ ]

Not effective [ ]

Any other comment (optional) _____

_____

_____

6. To what extent do you consider the SIRATAC system value for money? (Please tick one of the following):

Extremely good value [ ]

Good value [ ]

Moderate value [ ]

Poor value [ ]

No value [ ]

Any comments (optional) _____

_____

_____

7. How would you rate the services provided by SIRATAC in meeting the needs of the following groups? (Please tick one box for each group):

Groups	Their needs are: Extremely well met	Well met	Moderately well met	Poorly met	Not met at all
Small-medium size grower	[ ]	[ ]	[ ]	[ ]	[ ]
Large grower	[ ]	[ ]	[ ]	[ ]	[ ]
Researchers	[ ]	[ ]	[ ]	[ ]	[ ]
Consultants	[ ]	[ ]	[ ]	[ ]	[ ]

Any comments (optional) _____

_____

_____

8. Are there any services SIRATAC is currently NOT offering that you would like to see offered?

YES [ ]

NO [ ]

DON'T KNOW [ ]

If yes, please indicate what service(s) you would like: _____

_____

_____

9. THE FOLLOWING ARE OPINIONS THAT HAVE BEEN EXPRESSED ABOUT SIRATAC IN THE FUTURE. PLEASE INDICATE YOUR VIEWS ON THESE BY PLACING A CIRCLE AROUND THE APPROPRIATE NUMBER:

	Strongly Agree				Strongly Disagree
A. The SIRATAC system should NOT be expanded beyond its present pest management function:	1	2	3	4	5

Any comment (Optional) _____

_____

_____

B. For small to medium size growers access to the future SIRATAC should be through the consultants they employ.	1	2	3	4	5

Any comment (Optional) _____

_____

_____

C. The manager of a future SIRATAC should be essentially a technical expert.	1	2	3	4	5

Any comment (optional) _____

_____

_____

D. A future SIRATAC should be funded by levying all farmers.	1	2	3	4	5

Any comment (Optional) _____

/..4.

D. (cont.) _____

_____

E. A great asset to the industry of a future SIRATAC will be the image it portrays to the public of an environmentally responsible industry: 1 2 3 4 5

Any comment (Optional) _____

_____

_____

F. The future SIRATAC should be funded on a user pays basis: 1 2 3 4 5

Any comment (Optional) _____

_____

_____

G. SIRATAC Ltd. should be listed as a public company: 1 2 3 4 5

Any comment (Optional) _____

_____

_____

NAME: (Optional) _____
(Please print)

ADDRESS: (or Region) _____
(e.g. Namoi, Darling Downs) _____

_____

Area of cotton planted for the 1987/88 season: _____(ha)

Appendix 3

Participants at the Consultative Meeting held in Wee Waa on September 15, 1987

Maurie Fay
Jack Warnock
David Anthony
John Quigley (apologies)
Brian Hearn
Dick Browne
Peter Cull (apologies)
Richard Williams
Ralph Schulze (apologies)
Bob Macadam (HAC)
Wally Potts (HAC)
Barry Baillie (Dept Ag)
Geoff Brown
Hans Woldring
Terry Naughtin
Ken Brooke
Ron Swansbra
Jeremy Kitchen
Ian Hamparsum
Hugh Holland
Alan Brimblecombe (apologies)
David Russell (HAC)
Ian Britton (HAC)
Gus Shaw (Dept Ag)

Appendix 4

Siratac: What it could be

Introduction

This discussion paper is an attempt to formulate a scenario of what a preferred Siratac system could be.

The ideas put forward in this paper are not meant to pre-empt today's discussions in any way. No doubt by the time it is presented, may of the issues will have been discussed.

Many of the concepts presented have come from discussions about Siratac, its problems and future directions, with a wide range of people throughout the industry. They are not necessarily original. The views expressed are my own and should not be regarded as the views of either Colly Farms or the Cotton Consultants Association.

What has been attempted is to design a framework to overcome many of the problems associated with the current Siratac system and open up new possibilities for the system. This framework attempts to utilise the many good features of the current Siratac system and redirect them to meet the industry's needs. The proposed framework would not solve all the problems that currently exist and would need considerable refinement before implementation.

Whilst some of the concepts may appear ambitious, I feel they are technically feasible, commercially viable and could be implemented relatively quickly. The proposed system is certainly no more ambitious than what the Siratac system must have seemed when it was first proposed.

T. L. Naughtin
14/9/87

"Some men see things and say why,
others see things and say why not."
John F. Kennedy

Aims of Proposed System

1. To provide a cotton industry computer based information and communication system.

2. To improve the effectiveness of Siratac as a management tool.

3. To expand the information system to include as many facets of cotton growing as possible to service the real needs of cotton growers.

4. To provide a financial base to fund further development of Siratac programmes.

5. To provide a means of getting around Siratac's poor image and poor acceptance in the cotton industry.

6. To simplify and improve communications within the industry.

7. To raise the standard of computer skills within the industry.

Organisation Structure

The proposed organisation has three components:

1. A research, extension and pest management organisation, doing many of the roles currently undertaken by Siratac. The name Siratac Ltd. would be retained by this organisation.

2. A new organisation whose task would be to develop and run the communications network for the industry. The name proposed for this organisation is the Australian Cotton Telecommunications Network (A.C.T.N.).

3. A third organisation whose roles would be computer hardware and software sales, software development for microcomputers used in the industry, and training customers in computer use. The name proposed for this organisation is the Australian Cotton Telecommunications Network (Marketing). This would be a subsidiary company of ACTN.

Role of Siratac

The roles of Siratac Ltd. within the proposed framework would be:

1. To provide a pest management programme using Siratac 2.

2. To provide an extension conduit for CSIRO, ACGRA and commercial research within the industry.

3. To provide a feedback conduit for consultants and growers to the researchers.

4. To conduct research in its own right on relevant aspects of pest managements.

5. To manage the computer system for ACTN.

6. To be the source database of the cotton industry.

Role of ACTN

1. To be the "front" organisation of the integrated communication, information and pest management system.

2. To provide the communication system and information system to the industry on a "user pays" basis.

3. To generate funds for Siratac research and development.

4. To lobby for improvement of telecommunications within cotton growing areas.

Role of ACTN Marketing

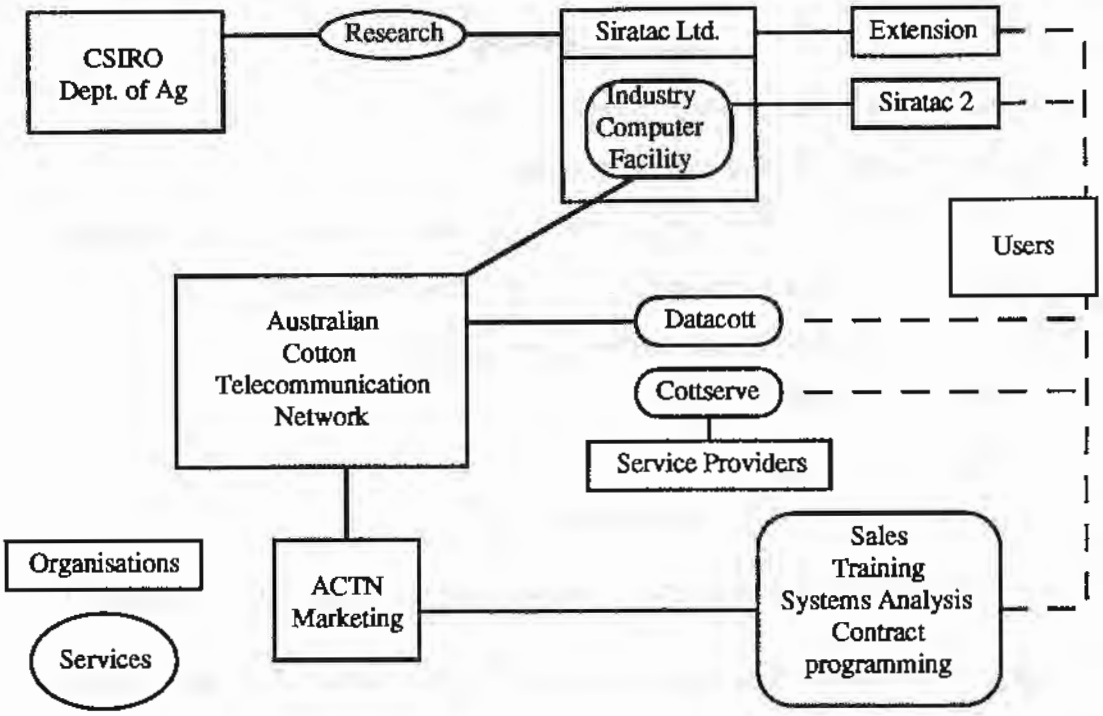
1. To sell computer hardware and software to the cotton industry.

2. To conduct systems analysis studies and develop software and software applications for microcomputers suitable for use in the cotton industry.

3. To conduct computer training courses for the cotton industry.

4. To promote computer skills in the industry through user groups.

Proposed Structure of Organisations Services



ACTN Services

Two types of information service are to be provided by A.C.T.N.:

1. An interactive communication/information service where users can receive information directly from and conduct business with a number of organisations servicing the industry. The proposed name for this service is COTTSERVE.

2. An agronomic database and computer modelling facility that growers, agronomists and consultants could use for record keeping and problem solving using the computer modelling capabilities of the Siratac Vax computers. This facility would be an extension of the current Siratac Datacott facility and would be called DATACOTT.

1. Cottserve

The Cottserve service would enable the subscriber access to a wide range of service organisations and the ability to conduct business with them from his home and office. It would become the Viatel of the cotton industry. Some possible applications for the service are:

Ginning: Gin reports, grower surveys, grower contracts, newsletters.
Marketing: Brokers reports, market information and advice, direct trading capacity through brokers.
Futures/Currency: Updated market information and advice, direct trading capacity through brokers.
Banking: Electronic funds transfer.
Aerial Operators: Booking sprays via computer so that early notice of sprays is given before consultants leave the farm. Transfer of monthly accounts from operator to client.
Water Resources: Direct ordering of water, notification of allocation and freeflow.
Machinery Dealers: Identification, location and ordering of spare parts or equipment items.
Chemical Dealers: Estimates, stock ordering and reconciliation, accounts, product information.
Accountants: Contact with and data transfer between accountant and client.
Manpower Resources: Direct liaison with CES listing of positions vacant and applicants for positions within the industry.
Cotton News Bulletin: Capacity to spread information quickly around the industry.

Mailbox: A message system for all people in the industry to communicate easily with each other.
Advertising: A medium for advertisers to advertise and promote their products to the cotton industry.

COTTSERVE would have considerable benefits for both those providing the services and those receiving them. Therefore both service providers and growers could pay the costs of the system, with the service providers bearing the major proportion of the costs.

2. DataCott

DATACOTT would be an extension of the current Siratac programme of the same name and provide an agronomic database and computer modelling facility that growers, agronomists and consultants could use for record keeping and problem solving using the computer modelling and database capabilities of the Siratac Vax computers. It is envisaged that this service would be marketed independently of the Siratac 2 programme, ie. customers would have access to it regardless of whether they used Siratac pest management or not. Customers should be able to input their own raw data into models rather than having to use Siratac data collection techniques.

The DATACOTT programme would have two aspects, access to information and computer modelling.

The types of information available would include weather data, moth activity, disease activity, spray efficacy, district yields, etc. It is envisaged that the customer could then manipulate this data on his own microcomputer to assist his decision making.

The computer modelling facility would enable customers using their own data "what if" questions. These types of questions are usually of two kinds: comparison questions and consequence questions, e.g.

"What sort of kill will I get if I use Curacron instead of a pyrethroid under the situation I am faced with at the moment?"

"What will happen to my mite population later on if I use a pyrethroid instead of Curacron now?"

"How will my yield be affected if I hold off the last irrigation?"

ACTN Marketing Services

1. Background

Microcomputers have evolved since the original concept of Siratac, ie. a central computer with terminals, was developed. The form microcomputer is now capable of performing many of the tasks that only a minicomputer could have performed when the Siratac concept was developed. Any further developments in Siratac programmes must take into consideration that the on-farm or consultant's microcomputer will be the main workstation in an integrated management/information system. Only tasks that require computer power beyond the capacity of microcomputers, e.g. industry-wide databases, computer modelling or communications systems, need to be placed on a central computer.

Siratac has already recognised that lack of computer skills is a major obstacle to the widespread adoption of Siratac and has attempted, quite successfully, to train users in microcomputer skills.

Some of the steps taken include:

- Adoption of Apple Macintosh as a standard computer for users.
- Sales of Macintosh computers as an agent for Norther Computer Services.
- Formation of the Siratac/Macintosh user group.
- Conducting training seminars on computers.

All of these are moves in the right direction and are to be encouraged. However, the concept should be extended and a formal structure created for computer sales, training and software development.

At present sales of microcomputers into the industry is not co-ordinated and a range of computer types and software exist. There is no overall policy or sense of direction as to where the industry needs to be going in this field. This organisation has the potential to set the direction for the whole industry and produce industry standardised software.

2. Sales of Microcomputers and Software

ACTN Marketing should actively sell hardware and software to the industry either as an agent for distributors or as a distributor in its own right. There is no reason why its sales efforts should be confined to the cotton industry: it could become a distributor of hardware and software to a range of Agricultural industries and/or a distributor of CSIRO-developed software. This organisation could play a vetting role, ie. determining what software is useful to consumers and what isn't. Furthermore, software could be adapted to become the industry standard.

i). Training

Proper training of customers in how best to use their computers will be critical to the success of an enlarged information/management system. Siratac technical officers should concentrate their efforts into training so that the products sold are well-supported. Training on all facets of the new system would be an integral part of computer sales.

ii). Software Development

ACTN Marketing should aim to develop software useful for microcomputers for consultants and farmers in the cotton industry. The task is really adapting or creating applications for the industry using existing spreadsheets and databases and specified software.

The software adaptions should be made with two concepts in mind:

1. They should be very relevant to growers' needs and easy to use.
2. They should have the capacity to download data back into the Siratac database without compromising the growers' information security.
3. They should provide a standard format so that downloaded data is meaningful.

In this way the Siratac database can be built up and extended to cover many more facets of the industry.

Some software applications appropriate for development include:

- Field records
- Soil test and petiole test records
- Wages and salaries
- Contractors costings
- Fuel use reconciliation
- Neutron probe data and water budgets
- Budgets and budget variations
- Spray records and costings
- Consultants field reports for owners
- Machinery operations costings
- Water and pump costs
- Analysis of turnout and grade.

It may be possible to develop standardised systems so that between farm and district comparisons can be made using data downloaded into Siratac databases.

ACTN Marketing should undertake the role of systems analysis to determine how to adapt the system to best meet users needs.

The organisation should actively develop new technologies that are perceived as being of potential use to the customers, for example:

- Portable data terminals
- Cellular phones with data transmission capacity
- Digital scanners for data input

- Remote sensing
- Laser disc storage of data.

Funding of the Proposed System

1. Background

At present Siratac has put itself in a vicious circle.

Lack of revenue ..... Lack of development funds
: :
: :
: :
Poor market acceptance ..... Lack of changes to the product

The way to break this cycle is by a massive injection of funds to develop new products quickly.

The proposed $1.00/bale levy may be one way of overcoming the problem. However, it is unacceptable to the majority of growers in the region for a variety of reasons.

The proposed system must stand on its own feet commercially and be seen by its users to be doing so.

2. Funding

The proposed funding would be as follows:

i). Siratac 2

The current payment system would be maintained:
1. Research levy via ACGRA.
2. User pays on per acre basis for full Siratac programme.
3. In addition, ACTN would be charged for the use of the industry computer facility.

ii). ACTN

This organisation would be floated as a public company (2nd Board) to raise capital for its development. It is envisaged that the majority shareholding would be held by either growers or industry organisations, eg. ACGRA. However, those organisations participating in Cottserve could become important shareholders.

Once capital has been raised, the company can then seek either loan funding or government grants to quickly inject capital into the system.

The services provided by ACTN would be funded as follows:

COTTSERVE:
a) Service providers - a fee to connect into the system plus charges on a time or use basis.
b) Service users - subscription fee plus charges on a time or use basis.

DATACOTT:
a) Subscription fee to be able to access the system.
b) Charges on a time/use/average basis.

ACTN MARKETING:
This organisation would be a wholly owned subsidiary of ACTN and answerable to ACTN. It would be funded by:
a) Hardware and software sales profits.
b) Charges for training courses.
c) Contract systems analysis and contract programming.
d) Development funding for software would be allocated from ACTN funds.

Appendix 5

Financial Details of Siratac Ltd.

Expenses	1982	1983	1984	1985	1986	1987
Administration	2,000	2,000	2,200	4,438	26,994	29,390
Advertising and staff placements	2,260	44	83	2,348	3,371	1,764
Auditor	1,750	2,095	2,200	2,750	4,340	2,692
Bad debts	-	60	-	2,831	780	-
Bank fees	82	307	376	878	1,907	1,103
Computer costs	5,773	21,592	25,516	26,725	23,418	40,701
Depreciation						
i). Computer	5,036	39,754	41,615	48,584	54,689	58,226
ii). Motor vehicle	7,404	10,201	12,268	16,869	22,556	17,075
iii). Office equipment	603	664	735	839	960	986
Director's fees and expenses	-	-	-	5,344	8,690	1,838
Doubtful debts provision	-	-	2,500	-	2,500	-
Electricity	75	655	720	731	599	-
Holiday pay provision (reduction)	2,165	1,825	(192)	5,750	1,337	(4,444)
Insurance	2,595	8,081	9,736	15,350	23,619	26,855
Interest						
i). Bank	87	-	-	2,603	1,324	-
ii). ACGRA loan	-	7,310	8,350	8,334	8,334	8,334
Legal fees		1,142	130	-	140	1,311
Motor Vehicle						
i). Lease	-	-	-	2,855	4,283	1,429
ii). Running costs	2,643	13,819	27,793	36,489	46,574	28,956
Payroll tax	-	-	408	4,384	2,920	-
Postage	-	165	560	676	1,624	1,191
Project expenses	669	2,410	277	1,182	2,995	574
Printing and stationary	1,037	2,311	4,294	4,521	8,870	5,737
Rent	910	3,640	3,815	4,940	4,310	4,400
Salaries	25,945	88,363	129,896	200,783	247,415	168,814
Seminar and training	2,092	2,592	2,182	1,260	943	4,205
Subscriptions and licences	40	134	346	815	1,298	500
Sundry office expenses	239	292	167	212	81	1,754
Superannuation	776	1,766	4,456	2,187	1,230	6,068
Telephone	1,697	8,884	15,977	219,954	23,516	14,762
Travel, Accomodation and entertainment	750	1,839	4,366	9,491	6,908	2,405
Totals	68,075	220,933	296,644	434,263	539,696	427,151

Appendix 6

Our Conceptual Model

The model below is our way of expressing:

> A system to integrate vision, intent, knowledge and materials into an automated farm management information system (MIS) that meets the decision-making needs of end users.