Benchmarking to Improve your Performance in Pest Management

Chris Wicks
Regional Financial Services, Toowoomba
Phone: 07 4613 0110 Email: c.wicks@rfs.net.au

1 Introduction to CotBench

In 1998 when we first started Benchmarking we were not sure what we were going to find. At the time the Darling Downs in particular had suffered a number of years of rising insect pressure and insect control costs, Ingard was just being released with mixed results and insect resistance was rising rapidly. The long term economic sustainability of growing cotton was being threatened.

The objective we set at the beginning of the CotBench Benchmarking Program was "to provide cotton growers with a quality analysis, as well as the motivation and support to evaluate their cotton operation's gross margin and to take action to improve their profitability and sustainability".

Over the five seasons the objectives of the Benchmarking have now developed to:

- Identify which cotton growing practices & strategies are performing best by collecting data from cotton growers on their returns, costs and methods of production (especially insecticides & water use) on a per field basis.
- Use participant groups to analyse the CotBench data and facilitate the uptake of the best practices identified for improving gross margin.
- Assess, Develop and Implement the most successful principles of Integrated Pest Management (IPM).
- Collect information from growers on their adoption of and attitudes towards new technologies and management practices, and analyse this information for relationships with gross margin and farm profit.
- Review cotton grower's adoption of IPM and its impact on cotton management.

To achieve these objectives, we collect and benchmark in groups information to find out what growers are doing to achieve higher gross margins from their fields. The benchmarking has highlighted that although over 85% of the variation in gross margin was directly due to yield variation, a high yield didn't guarantee a high gross margin. The most successful growers were achieving good yields and were also spending less on crop inputs.

The Benchmarking also showed that insect control represented around 30 percent of the total cotton growing costs and an very high percentage of the costs that can be managed. That is, there was little variation between fields for the other major crop inputs of fertilizer, herbicide, irrigation costs and field operations. However insect control costs could vary by more than 50 percent for fields that had achieved similar yields in the same area. This therefore became the focus of the benchmarking.

This paper will set out where possible using graphs:

- the assumptions that were used in the benchmarking
- some key outcomes of the data
- how the information was used by cotton growers
- some of the trends that the benchmarking has tracked

For the 2001/02 season Chris Wicks, Regional Financial Services Toowoomba, has benchmarked more than 10 groups in Central Queensland and in the Macintyre, Balonne, Gwydir, Namoi and Macquarie Valleys using the CotBench benchmarking program.

2 Methodology

Because in CotBench we want to focus on differences in cotton management that affect gross margin we need to collect in detail all the crop inputs on a per field basis directly from the growers or their cotton consultants. We eliminate differences in input prices between growers and standardise the selling prices for lint and cotton seed for each season.

This methodology focuses the emphasis of CotBench on production management, rather then attitudes to marketing or hail risk or the purchasing price of inputs. Therefore the gross margin figures do not reflect the actual financial performance of grower's fields but are a measure which allows grower's field performance to be compared against others in the district.

3 CotBench Program

3.1 Reports

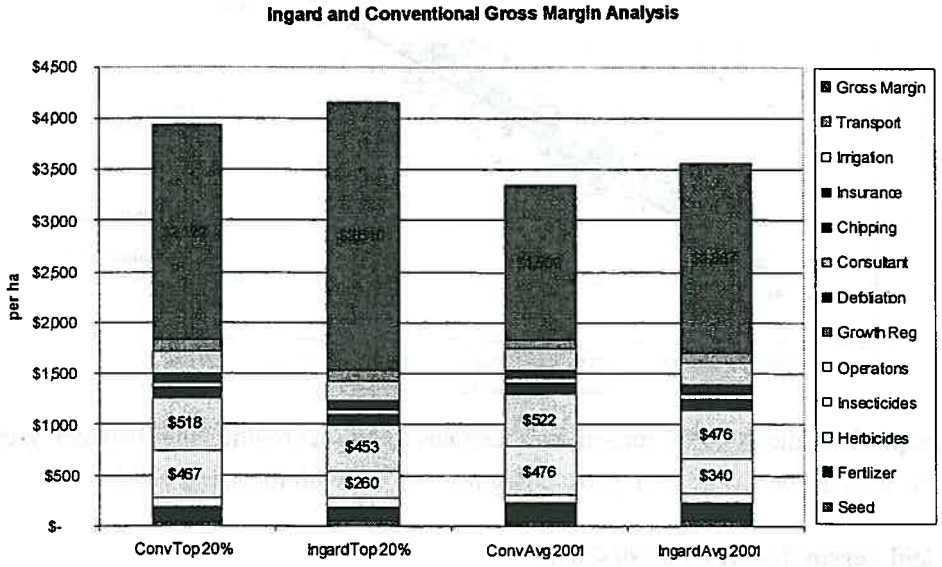
3.1.1 Field by Field Comparison

CotBench reports the benchmarking results in two parts. The first part of the Report compares a cotton growers field results to those of other participants in the existing Area Wide Management group or the specific CotBench Management Group formed to workshop the results. All fields are compared on a gross margin basis, weighted for area, against the group averages and the Top 20% of fields.

In some cases a field or farm will stand out from the averages by having higher costs in weed control or fertilizer but in general the most significant variance between fields is in insect control costs. For this reason we analyse insect control costs in more detail breaking them down into stages and also looking at how disruptive a field's spray program is on beneficial insects using the Beneficial Disruptive Index or BDI.

An example of a Gross Margin Graph is shown below in this case comparing the Top 20% and Group averages for Conventional and Ingard fields. A participant's group report would compare their fields on this graph against the group results.

Graph 1 – Gross Margin Analysis



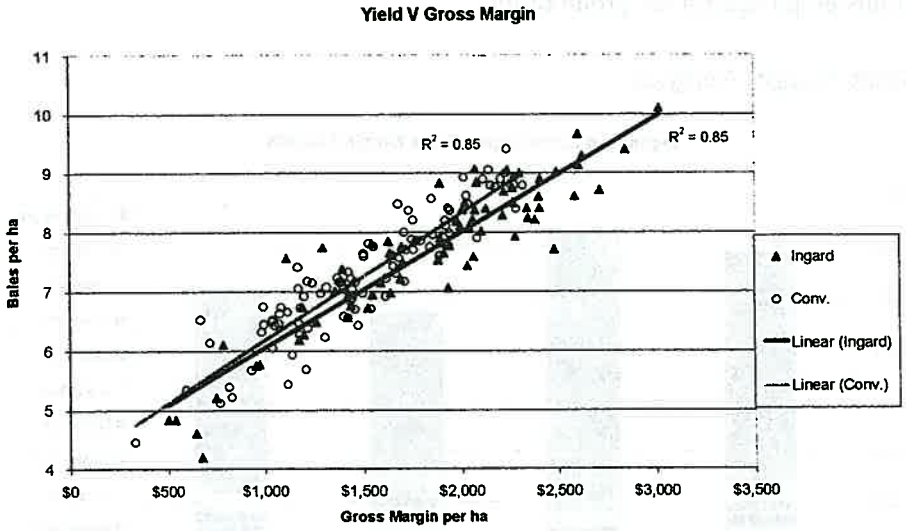
3.1.2 Group Trends

The second part of the report analyses data from all of the fields in a group to identify trends and use this information facilitate the exchange of information between growers in groups, particularly groups established for the Area Wide Management (AWM) of cotton pests.

The scatter graphs are very effective in demonstrating both the variation and trends that are occurring in the groups between the key agronomic and economic parameters. In this way we are able to present a large amount of data that can be filtered and interpreted in group workshops. Some examples of the key relationships are shown below in graphs 2 and 3.

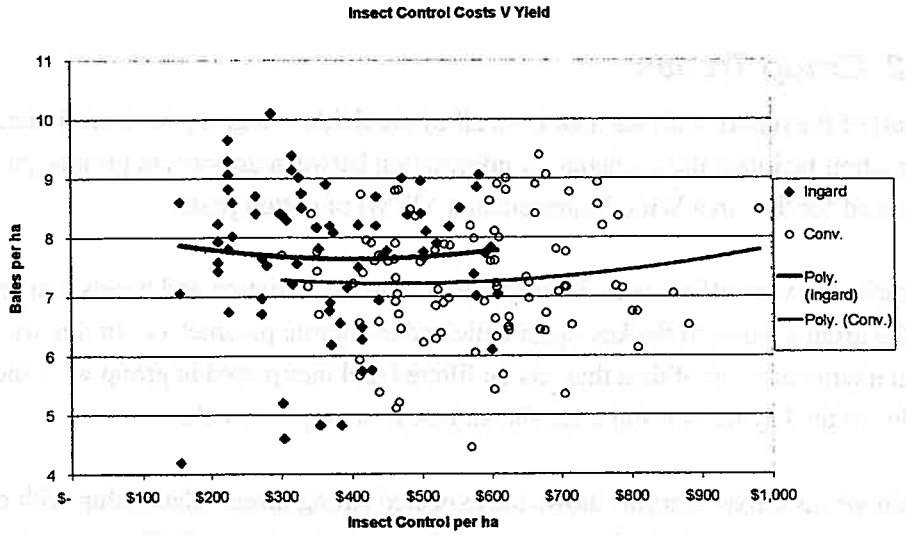
Graph 2 - Yield versus Gross Margin, shows the expected strong direct relationship with over 85 percent of the gross margin variation being explained by variation in yield. The interesting factor however is that the graphs also show that for any given yield there are often very significant variations in gross margin. The challenge then, and the focus of the CotBench program, is to determine how growers can obtain the best gross margin from their achievable yields.

Graph 2 - Yield versus Gross Margin



This scatter graph from the 2000/01 season demonstrates the direct relationship between yield and gross margin as well as the variation in gross margin for fields with the same yield.

Graph 3 - Yield versus Insect Control Costs



Graph 3 of the group's Yields and Insect Control Costs shows that there was no trend of increasing yields from higher insect control costs. It also highlights the large variation in insect control costs in the group and the potential for growers to improve their gross margins by implementing the practices that have achieved the lower control costs. These practices are identified in the CotBench report and discussed at the group workshops as outlined below.

3.2 Group Workshops

It has been our experience that the success of CotBench in improving the gross margin and cotton management of participating cotton growers is largely due to the use of group workshops. This is in large part because the growers are able to interrogate and verify the independent information in a

forum of other growers and their cotton consultants. Therefore the growers are able to have confidence in results that have been achieved by their peers in commercial fields.

The workshop forum of CotBench which encourages growers to evaluate and exchange experiences, challenging and learning from others in the group, has proved to be a very effective way to identify improvements and actively encourage their implementation. This has also been enhanced by the other AWM activities that the groups participate in during the growing season, like field walks, and also by the active involvement of consultants in the process.

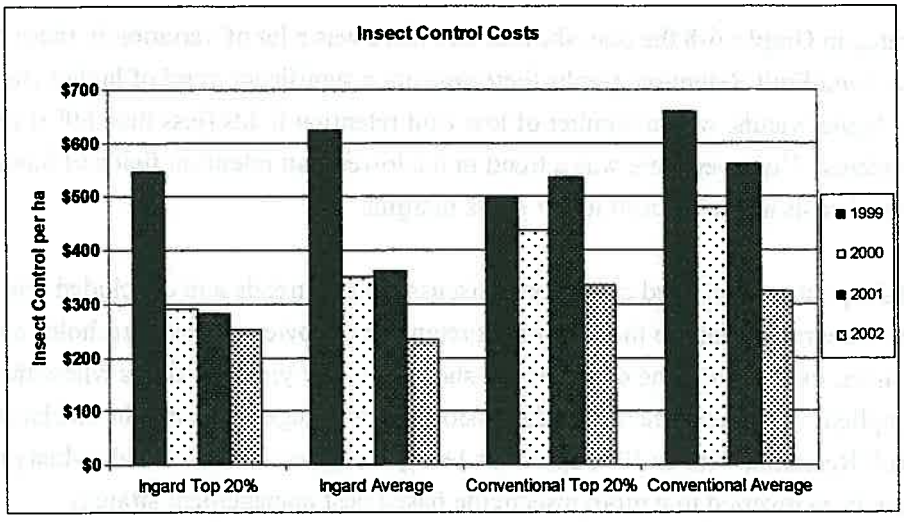
4 Facilitating Change in Insect Management

The significance of Integrated Pest Management (IPM) in reducing insect control costs and improving gross margins was highlighted by CotBench in two ways. Firstly in the vast majority of groups the Top 20% of fields by gross margin had lower insect control costs than the group averages (as shown in Graph 1). Secondly, growers are able to identify what practices have been successful in reducing insect control costs without reducing yields.

As well the CotBench results have supported the cotton research data that has been demonstrating the economic and insect resistance benefits if IPM for some time. Growers and their consultants therefore have confidence in the CotBench results and are motivated to implement the best practices identified.

For these reasons CotBench has been a key part of a significant change in the approach to managing cotton pests with an increased adoption of IPM - in conjunction with better efficacy from Ingard cotton and new softer chemical options. Graph 4 below shows the insect control costs for the Macintyre Valley fields over the four seasons of data (2002 data is still preliminary).

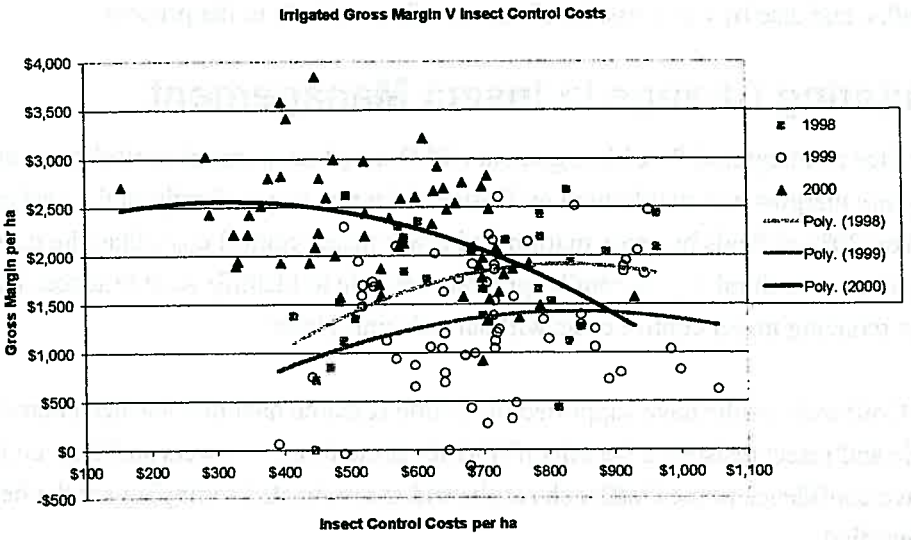
Graph 4 – Insect Control Costs 1999- 2002 Macintyre Valley



Graph 4 shows that growers in the Macintyre have been able to achieve reductions in average insect control costs in the 2001/02 season of over 50% compared to the 1998/99 season (regarded as high insect pressure) or 33% compared to 1999/2000 (regarded as a low pressure season).

Graph 5 shows the change in insect control costs over 3 consecutive seasons in the Dalby CotBench group. In the 2000 year the data reflects the successful implementation in these fields of the practices highlighted by the CotBench program especially the adoption of IPM.

Graph 5 – Insect Control Costs 1998-2000 (Dalby)



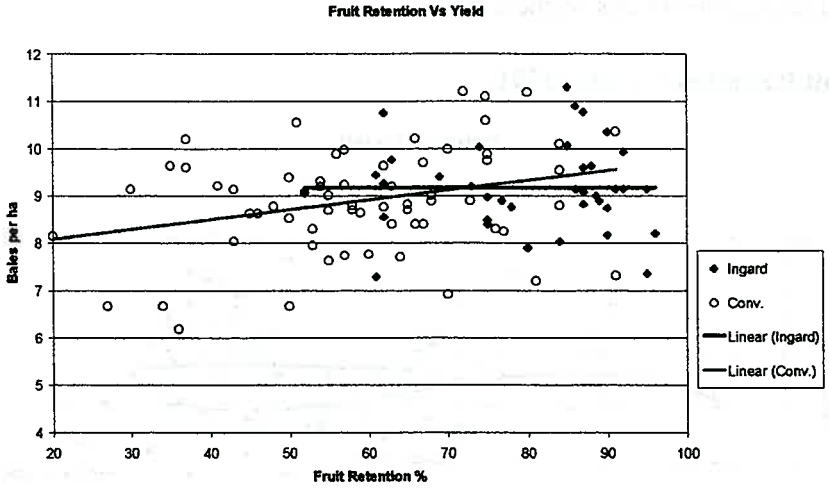
Example of Fruit Retention at First flower

Another example of how benchmarking has been able to improve insect management has been in Cotbench's analysis of Fruit Retention data. In the AWM groups in the Macintyre Valley we looked at the relationships between Fruit Retention (measured at first flower) and Yield, Gross Margin and Insect Control Costs.

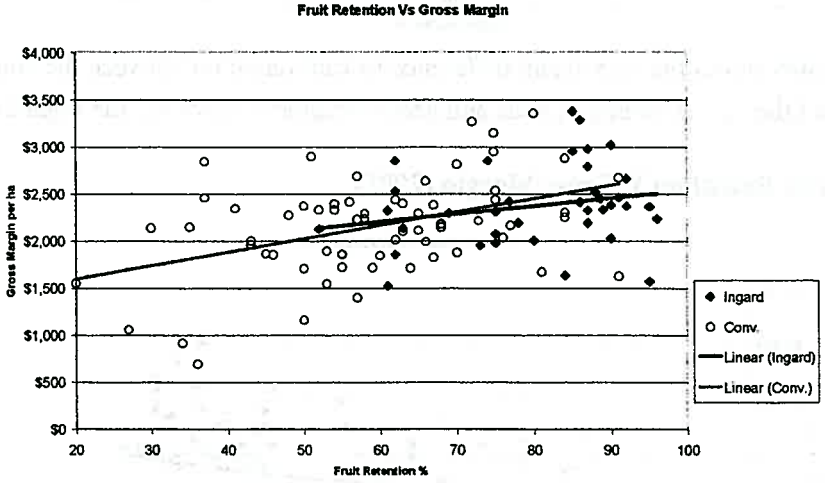
As illustrated in Graphs 6-8 the data showed that there was a lot of variation in these relationships. In the Yield and Fruit Retention graphs there was not a significant trend of higher fruit retention leading to higher yields, with a number of low fruit retention fields (less than 60%) still achieving Top 20% yields. However there was a trend in the lower fruit retention fields of having higher insect control costs and as a result lower gross margins.

At a workshop the growers and consultants discussed these trends and concluded that in some fields they were responding to the lower fruit retention by lowering pest thresholds and therefore spraying more, even though the data was not showing lower yields in fields where this response was not applied. The outcome of this discussion was a change in the emphasis placed on early season Fruit Retention with an IPM approach being continued on these fields when previously they would have been reverted to a more insecticide based pest management strategy.

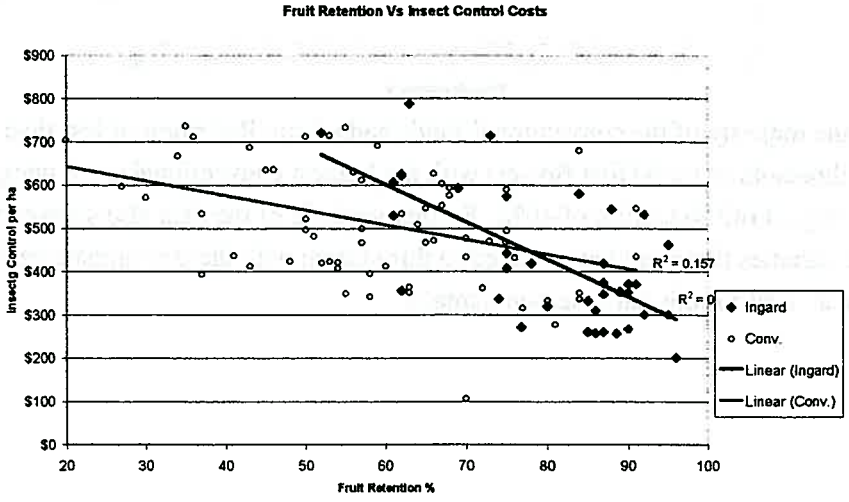
Graph 6 – Fruit Retention V Yield (2000)



Graph 7 – Fruit Retention V Gross Margin (2000)

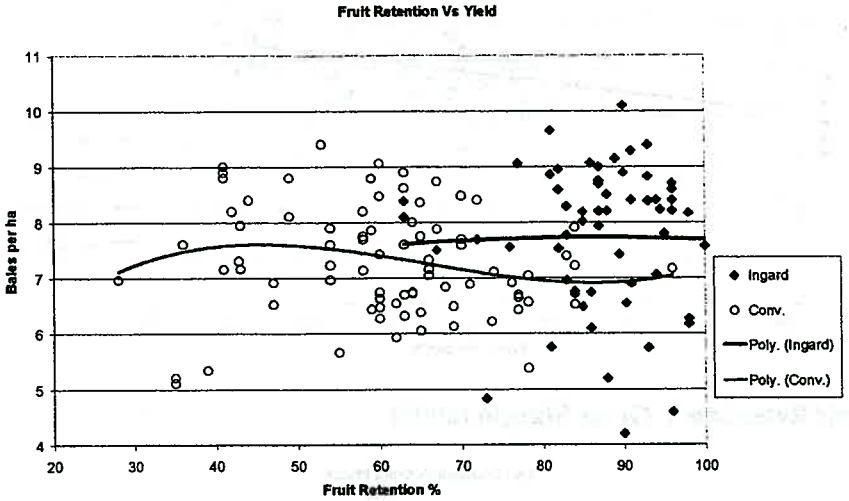


Graph 8 – Fruit Retention V Insect Control Costs (2000)



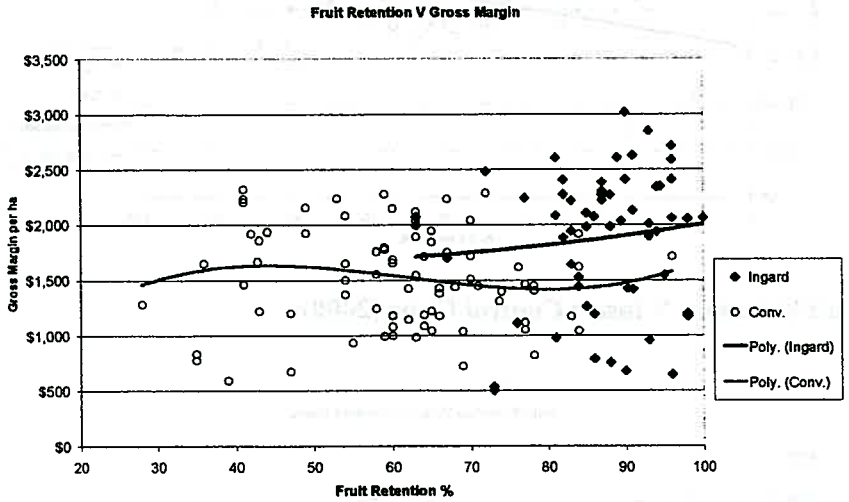
The following year's data for this group is shown in Graphs 9-11. It demonstrates the increased tolerance of lower fruit retention in the conventional fields without the previous year response of increased insect management costs on these fields.

Graph 9 – Fruit Retention V Yield (2001)



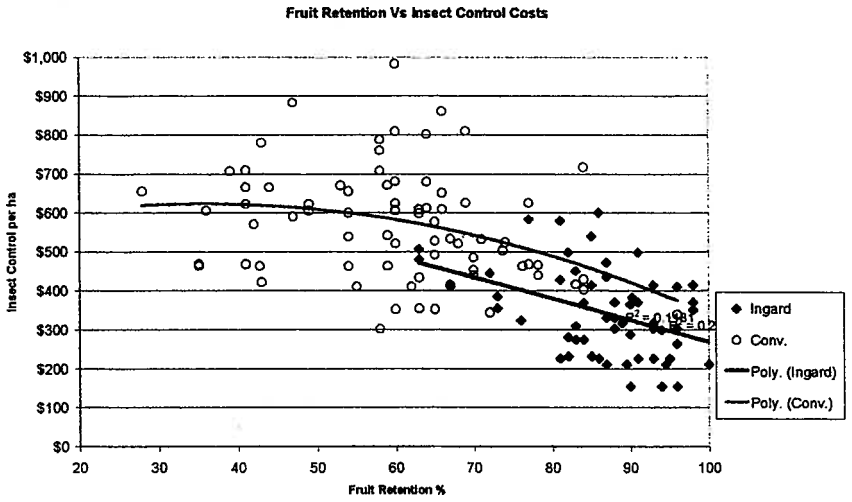
The 2001 year also shows the significant difference in fruit retention between the conventional and Ingard fields and the higher average yields and gross margins achieved in the Ingard crops.

Graph 10 – Fruit Retention V Gross Margin (2001)



In this group the majority of the conventional fields had a Fruit Retention of less than the conventional threshold of 60% (first flower) with the highest conventional gross margin field for this group having a Fruit Retention of 40%. Further analysis of the data also showed that it was the indeterminate varieties that were better suited to this system with the determinate varieties not able to compensate as well for this early season damage.

Graph 11 – Fruit Retention V Insect Control Costs (2001)



5 Conclusion

In this paper I have outlined some examples of how CotBench has provided the information, confidence and motivation to improve the insect management of cotton growers who have participated in the program. CotBench also looks at other aspects of cotton management including the performance of varieties across an AWM group, fertilizer and irrigation strategies and how these can also be improved to increase gross margin.

Cotton growers who are using the best management practices are achieving the maximum return on the inputs they are putting into their crops. In the case of insect management the best return on inputs are being achieved by growers who:

- collect as much information as they can about what is happening in their crops
- rely on IPM, particularly the pest management they are getting from beneficial insects
- supplement control by beneficials with non disruptive insecticides where possible
- ensure that the timing and application of insecticides will maximise their efficacy
- manage the nutrition of their crops to avoid excess vegetative growth in late season
- use IPM to maximise their gross margins

The future predictions for cotton prices have been indicating that growers may have some years of prices that will be lower than those received in the last decade. If this is the case then maximising input efficiency will become even more important to enure ongoing profitability. Benchmarking using CotBench has demonstrated that it has been an effective tool for growers to achieve the goal of sustainable and profitable cotton production, especially in the key agronomic and economic area of pest management.