# OPTIMISING THE YIELD GRADE TRADE-OFF (GROWERS AND GINNERS TEAMING UP)

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## Abstract

Co-operation and teamwork between cotton growers and ginners can significantly increase the returns to growers and provide cost savings to gins. The essence of the cost saving is to lift turnouts to the optimum level by monitoring and adjusting ginning techniques to suit each cotton field. Through the Monigin program cotton growers can now actively monitor the performances of their crop from within their paddock until after ginning. The ginner has all the growing information at his fingertips. Together the team can analyse a cotton crop at all stages and the producer and processor can combine to lift the results of production to a level never before obtained.

The system is a unique combination of processors and producers. We are trying to monitor and improve the process, gauge the results and identify any problems.

## Introduction

The Monifield and Monigin programs jointly operate to produce the best possible combination of grade and turnout for cotton producers. Monigin in itself monitors cotton gins and is a link to precision farming in that the program looks at not only what is coming from a paddock, but also looks within that paddock for how things vary and what those variations are, hence how they relate to the growers income. But the program goes further and looks at ginning processes and variations in the process and how that relates back to the individual field. Ginners can monitor the effects of processing methods to examine different variations.

Monifield allows the grower to analyse infield variations such as yield, turnout, grade and colour. Growers can question field production and also analyse differences through field trials using the data.

By combining the programs the grower can integrate agronomic information and processing information. We look at the infield and the processing variations to see how the cotton was processed in relationship to its origin of production within the field.

## Materials and Methods

Tests were conducted on cotton crops covering an extensive area of the cotton growing districts of Australia, over a three year period. Data was collected on approximately 10 percent of the total Australian cotton crop each year over this period of time. As a result a number of studies were carried out on the data collected.

Cotton Computer Systems ran the Monigin and Monifield programs as a service during this period. We had a number of growers using the program and relaying their data to us. We then processed, assessed, and returned this information to these growers for analysis purposes. That way we effectively had a collective group of cotton growing and processing data covering 10 per cent of the Australian cotton crop.

In one such study we examined 86,000 bales of cotton in 4,416 modules from 179 cotton fields involving 31 cotton growers. Six ginning companies and 12 separate gins participated in the sample. The survey investigated the grade turnout trade-off, looking at the difference between the grade of cotton and the level of discounts and premiums obtained. It also examined results and trialed different ginning techniques to find the optimum return for the grower.

## Objectives:

The program aims to achieve consistency of lint processing to maximise the growers returns, provide detailed statistical and graphical data of what is happening in the fields and in the gins. It sets out to network the growers through an electronic system so the ginning process for one group can be monitored and collated to benefit the industry. It also analyses the agronomic practices that effect the ginning process.

This shows how the programs work two ways - studying not just the way the ginning process affects grower returns but also how agronomic decisions affect the ginning process.

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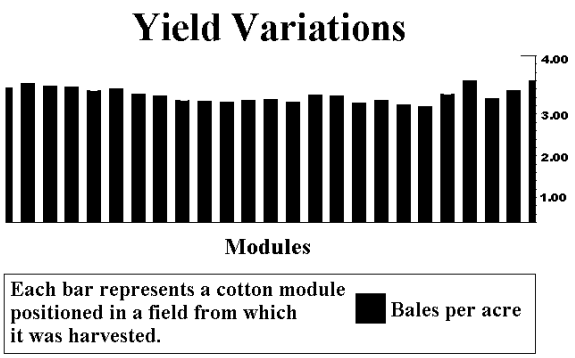
## Examples

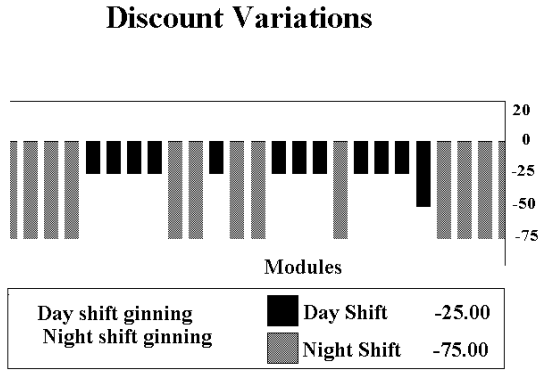
Figure 1.




**Yield Variations**

In Figure 1. each bar of the graph represents one module positioned as it was picked from the field. In this field the graph shows there is a lower yield in the middle. Without this type of data growers would not see a difference in yields. A slight variation in yield can make a significant difference to a growers returns. In this example the variation cost the grower $8,000.

Figure 2.

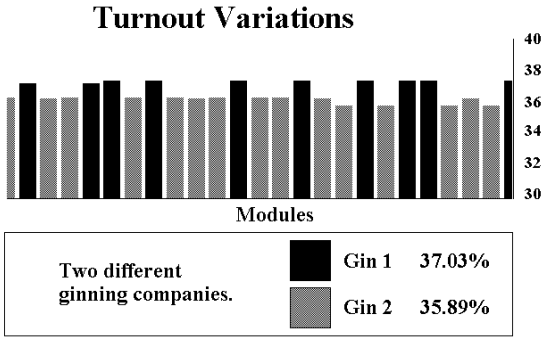



**Discount Variations**

Figure 2. illustrates the reason for developing Monigin. It examines discount variations in day/night shift ginning. Each bar represents a cotton module in ginning shift groups and shows a difference of $500 in discount.

The study showed the difference in variation resulting from the ginning process (note that the module fourth from the right was ginned at the change of shifts). Nobody was aware that this extent of variation existed because of ginning techniques. The day/night ginners had no idea that their work had such a variation. Factors causing the variation included the number of lint cleaners used and the heat and speed of the gin.

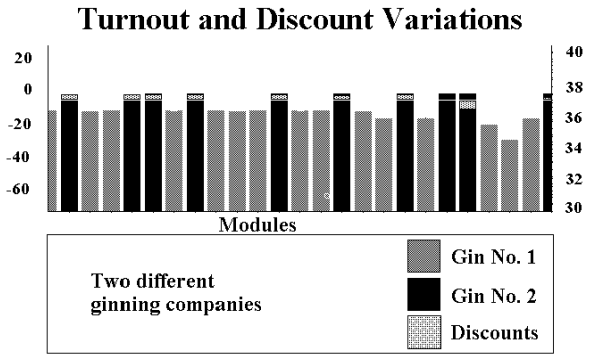
Figure 3.




**Turnout Variations**

Figure 3. illustrates turnout variation - what percentage return the grower gets per module of cotton. In this study we sent certain modules, with no agronomic differences, to one gin and certain modules to another gin. The result was a turnout difference of 1.14 percent between gins, further illustrating the effects of ginning techniques on turnout.

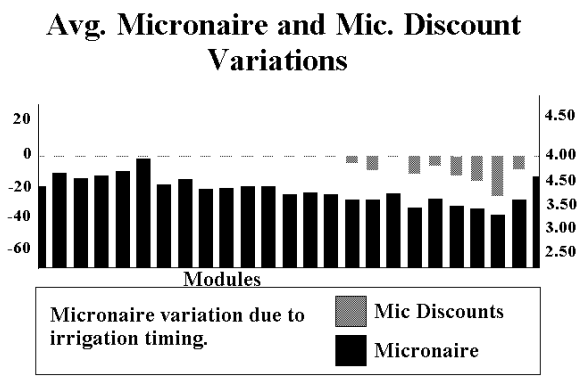
Figure 4.




**Turnout and Discount Variations**

Again using the two ginning companies, in figure 4., we examined the modules of cotton for both turnout and discount. Discounts were generally similar, but there was a better grade and greater discount from the second gin..

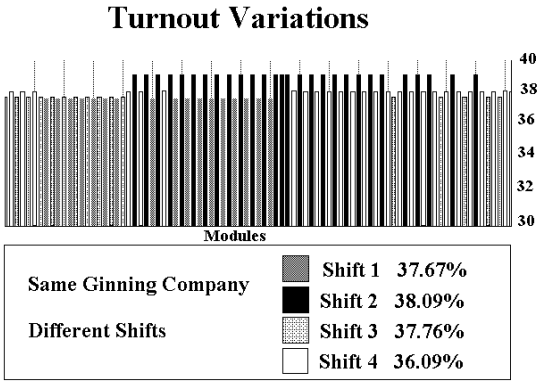
Figure 5.




**Average Micronaire and Mic Discount Variations**

Here in figure 5. we investigated agronomic variations in a field. This example shows how a delay in irrigating from the first section of modules to the end of the field (right) cost the grower in both micronaire and discounts. This translates to approximately $1000 or $15 per bale.

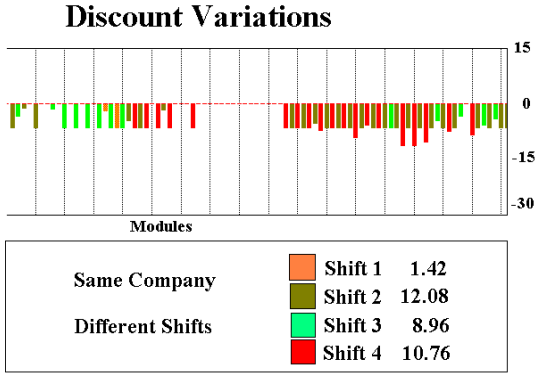
Figure 6.




**Turnout Variations**

The graph in figure 6. shows a distinct difference in turnout variations of cotton grown in the same field and processed in four shifts at the same Gin. There is nearly a two percent difference in turnout between the cotton ginned in shift four and shift one. Proving ginning methods can have a significant effect on turnout. Had the gin processed all of the cotton to the top quality the field would have produced an extra $48,000.

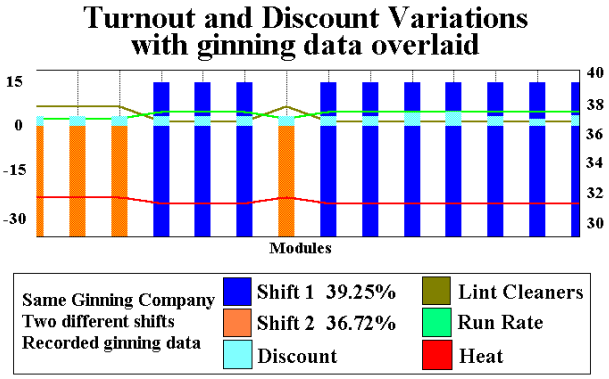
Figure 7.




**Discount Variations**

Figure 7. illustrates the discount variations on the same field as in figure 6. It can be seen that the groups of discounts do not correlate with the gin shifts. The discount variations were due to an agronomic factor and the turnout variations to the ginning process.

Figure 8.

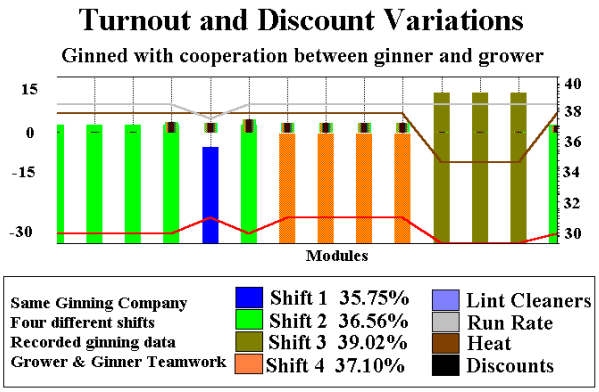



**Turnout and Discount Variations with Ginning Data Overlaid**

In this example (figure 8.) we discovered a 2.53 percent turnout difference between shift one and shift two. The three horizontal indicators show the ginning process and illustrate how variations in the number of lint cleaners, gin speed and the heat being applied has a marked effect on the turnout.

The discounts, which were all in premium, were fairly consistent. In this case shift one was using fewer lint cleaners, was running faster and used less heat and at the same time realised a higher production giving the grower a better return. Shift one operated under a win-win situation for the gin and the grower as costs were down and returns were high. In contrast shift two saw a lose-lose result, costing the grower a great deal in turnout and costing the gin more in operating costs.

Figure 9.




**Turnout and Discount Variations Ginned with co-operation between ginner and grower**

The final step of the testing saw the program operating in the gins. We sent cotton into the gins and monitored the processes. In many cases we made proactive decisions which the ginner would not ordinarily make, for fear of affecting the grade of the cotton.

We allowed for a trade-off between the grade and the quantity of cotton produced. In figure 9. shift 3 ginning was controlled by the operators of Monigin and the grower in conjunction with the ginner. We worked toward obtaining a base premium, cutting grades to produce the maximum turnout. By reducing the lint cleaners from eight to five and cutting the heat altogether we lost all our premiums and got an extra 2 per cent turnout - making a higher profit. Then the ginner was given control (in shift 4) to operate at a level where he felt comfortable. By dropping the heat and maintaining the lint cleaners he achieved a 0.5 per cent turnout increase.

## Using the information

To obtain the best results Monigin allows the ginner to view the picking location, time of picking and special or different treatment of the picking or growing (eg. defoliation/irrigation techniques), to give the ginner as much information as possible which may relate to his ginning methods. The ginner also has historical ginning data which tells him the temperature used to process previous modules, the number of burners or lint cleaners used, ginning times, moisture of the cotton modules ginned, the turnout and other general comments matched with the ginning results.

Classing results are also supplied to the ginner so he can see the grade, colour, staple length and micronaire of the cotton ginned.

The basic premise of the system is teamwork where the grower is involved in the ginning process and there is a team effort to achieve the mutual goal of producing more cotton. The result of this should be fewer conflicts and less dissatisfaction because of the team process and the sharing of responsibility in order to produce a better return. Sharing information and knowledge would achieve a positive relationship and performance for grower and ginner.

## Results and Discussion

Trials of the Monigin program showed dramatic results. In our study involving 86,000 bales, 179 cotton fields from 31 growers we found a turnout variation of up to three percent in one cotton field. There was commonly a one to 1..5 per cent turnout variation in fields and the turnout over this band of sample varied between 30.02 and 41.67 percent within fields.

The average turnout of the group was 35.92 per cent across the whole sample, while the highest average turnout was 36.75 percent. This points to a potential gain of 0.83 percent across the group. While this may not appear significant, it means a increase of 2049 bales in this study, or given today's prices equates to an additional $1,047,039 directly benefiting the 31 growers.

If the 0.83 percent increase could be translated to the Australian cotton industry, which produces 1.6 million bales, a $23 million increase to growers would be realised.

In the larger US market, taking a figure of 20 million bales, we would have a gain of 467,412 bales or an additional $238,847,530.

The important thing to realise is that this money is presently simply being 'thrown away'. The money, which could be realised with some relatively basic monitoring of ginning, growing and picking methods, could see the world-wide cotton industry gaining a dramatic improvement in profit. In Australia the 31 growers lost $1.3 million. In the American market growers are losing almost a quarter of a billion dollars annually.

In summary from the results we established a link between the ginning process and turnout variations. Actively monitoring crop performances, analysing results at all stages and alerting growers to potential problems will ultimately produce an increase in turnout, hence increased returns.