SRDC Grower Group Innovation Project
Final Report

SRDC project number: *GGP018*

Project title: *Nutrient Management From Variable Rate Technology In Control Traffic System*

Group name: *Oakenden Grower Group*

Contact person: *John Muscat*

Due date for report: *1st December 2008*

Funding Statement: This project was conducted by [*name of Group*] in association with the Sugar Research and Development Corporation (SRDC). SRDC invests funds for sugar R&D derived from the sugar industry and the Australian Government.

Australian Government
Sugar Research and Development Corporation

Body of Report

Executive Summary:
(An overview of the aim, conduct, key results and learning's from the project. Maximum 500 words)

The aim of the project is to determine the benefits of nutrient management system in a controlled traffic farming enterprise in an environmentally sustainable manner. The project will determine the cost benefits by comparing the conventional nutrient application to variable rate application. It will determine the difference between narrow chute planting and wide chute planting. The project will compare different legumes and the impact on the following cane crop. Oakenden Grower Group has documented a fact sheet to enable growers some insight when choosing a GPS system in a question and answer style information sheet.
The Oakenden Grower group was keen to understand the economic impact of these trails which are highlighted in the trial results.

Nutrient management

In the established trials on nutrient management there was replicated strip trials on to different farms comparing conventional soil testing to EM mapped blocks where the soil type is profiled with a Varis 38 machine then soil tested at gps referenced points this method allows the nutrients to be applied at various rates throughout the block.
After the blocks of cane was harvested the variable rate strips achieved an increase in return between $209 and $446 with levies and harvesting costs removed, this has caused some concern with the accuracy of conventional testing which did not pick up the lack of nutrients (Calcium) in the paddock. While determining current soil testing protocols, the EM mapping process has established that the Calcium element to be under the critical value. This may mean EM Mapping zones and soil testing protocols should be further investigated which will produce better understanding of plant nutrient requirements.

Rotational Crops

There were four legume varieties planted Ashgrove, Sun Hemp, Guar, Leichardt, in replicated trials as a rotational crop with bare fallow, Guar was selected because it is root knot nematode resistance.
The crop was monitored after plant emergence for target rate of plants per hectare, Bio-Mass and nitrogen fixation at 60 days and 88 days with an increase in some varieties.
The block was then planted with Q208 and nitrogen applied to fallow strips as per BSES recommendations, After harvesting all costs were collated and the legume crops indicated an increase in return of $193 per hectare above the bare fallow.

Planting Methods

Wide Shute billet planter in this trial utilised a 300mm shute while the narrow shute was 150mm wide whole stick planter at 1.52M row spacings,The wide shute showed a high increase of $537.80 per hectare after levies and harvestings deductions.
The group observation in this trial site was that time of planting may of contributed to the results achieved.

GPS Guidance

There were three different GPS systems investigated for our situation near hills and tree lines, A Fact sheet on different GPS systems is presented in Appendix F, this demonstrates the process and information collected to determine which system delivers the best results.

Background:
(Why did you need to do this project?)

The group assess the benefits of utilising variable rate technology to apply nutrients required in a site specific field utilising Varis EC38 to determine zones and recommended rates. The group members understand that our farming practices need to align to become an environmentally sustainable operation. Utilising this new technology will address these issues and also give us the cost benefits of reducing nutrient application. We would also like to determine the use of break crops and how they affect the nutrient requirement for the following sugarcane crop.

Aims:
(Include the Aim and the expected benefits that were listed in Section 2 of your original Application)
The project aim,
Design comparative trial sites to establish cost comparisons between conventional and variable rate nutrient application
The group is also going to look at the comparison between different types of break crops and determine the nutrient benefit for the following sugar cane crop.
Design a comparative trial site to determine the benefits of different planting configurations in a controlled traffic farming system

Methodology:
(How was the project conducted?)

Four trials were established on three different farm sites
Replicate strip trials were established in all sites
Varis EC 38 machine utilised to produce strip trial maps that has GPS reference points (IAR)
Soil testing was conducted by Independent Agricultural Resources (IAR)
Incitec Laboratory analysis
BSES Limited recommended rates incorporated
BSES Limited trial analysis
Bio-mass determined by determining moisture content and weighing hand cut samples.
Trial results documented are harvest weight achieved

Results and Outputs:
(What results were produced by the Project? The results should include data collected, articles or reports written, events held and anything else you see as relevant to the industry. Relevant files including photographs should be provided on a CD.)

The two trial sites for the fertilizer trial sites that were selected at Geislers and Sievers properties, both were replicated strip trial.

Trial aim
The purpose of these trials was to establish variable rate application of lime and phosphorus verses convention application of lime and phosphorus as per soil test recommendations and BSES recommended rates
Trial layouts
Replicated strip trial design, standard soil test was taken in the conventional strips with nutrient recommendation utilized the variable rate strips were mapped with Varis EC 38 each zone was soil tested and lime or phosphorus applied at the recommended rates. Nutrient soil test and recommended rates were used.

GEISLERS TRIAL
This block of Q183 was planted in August 2007 with a billet planter at 1.6m in both replicated strips and harvested in October 2008.
Rep 1 & 3: Lime application
Red zone (0 tons / ha applied)
Orange zone (1ton / ha applied)
Yellow zone (1.2 tons / ha applied)
Light green (1.4 tons / ha applied)
Dark green (2.2 tons / ha applied)
Rep 2 & 4 No lime applied as per soil test recommendations

GEISLERS BLOCK

Table 1

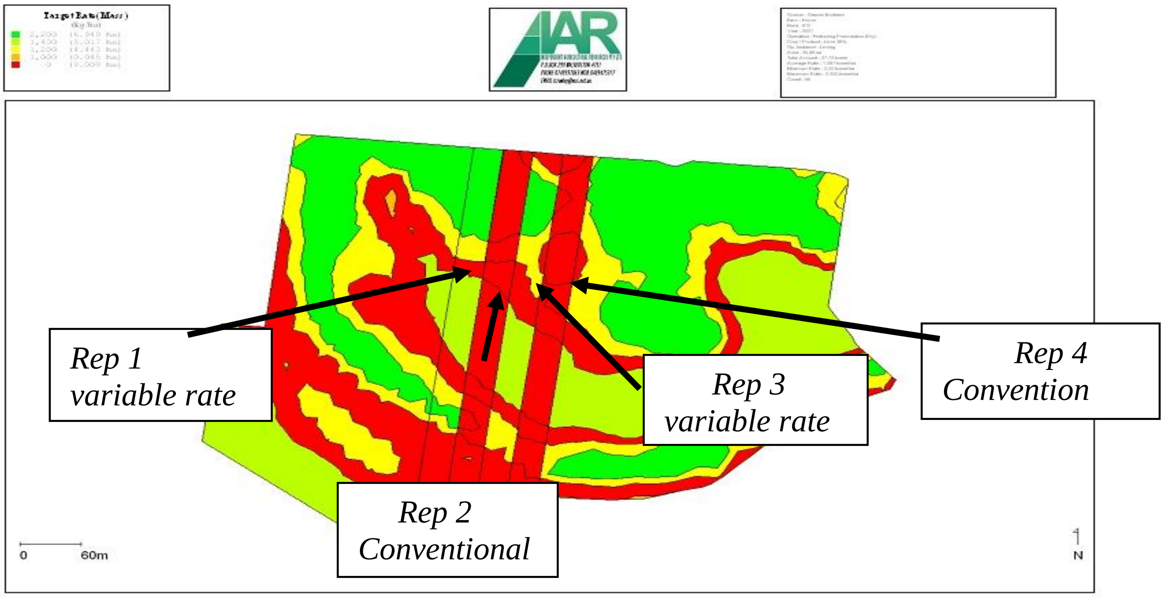

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Table 1 demonstrates the trial layout at Geisler Brother Farm

Table 2

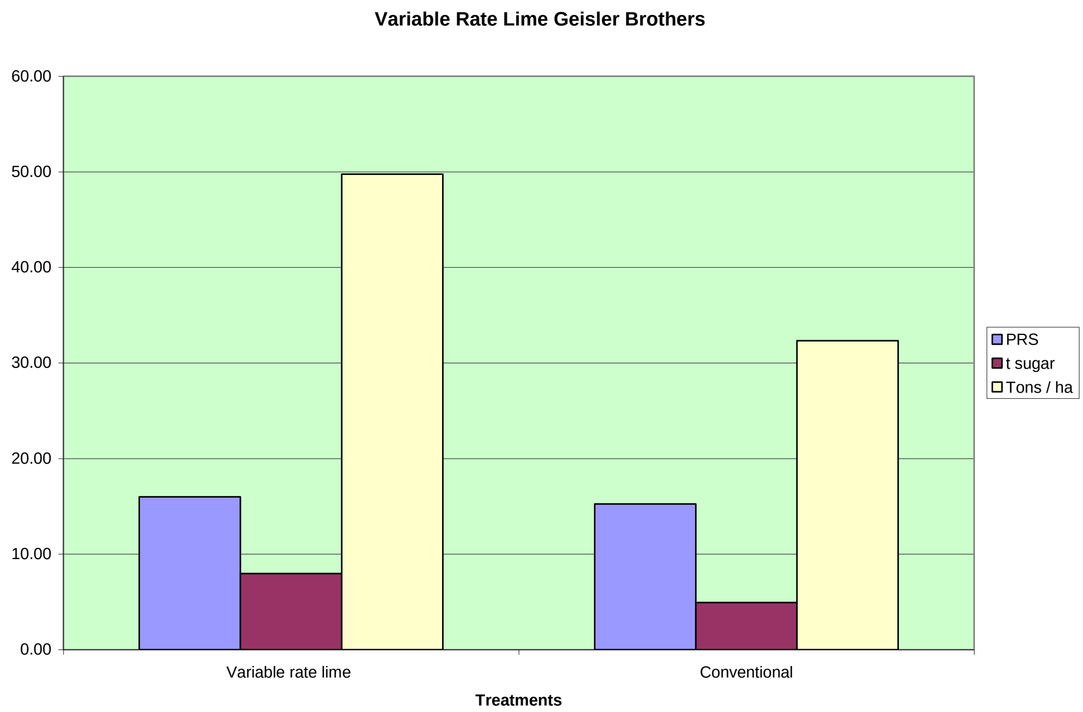
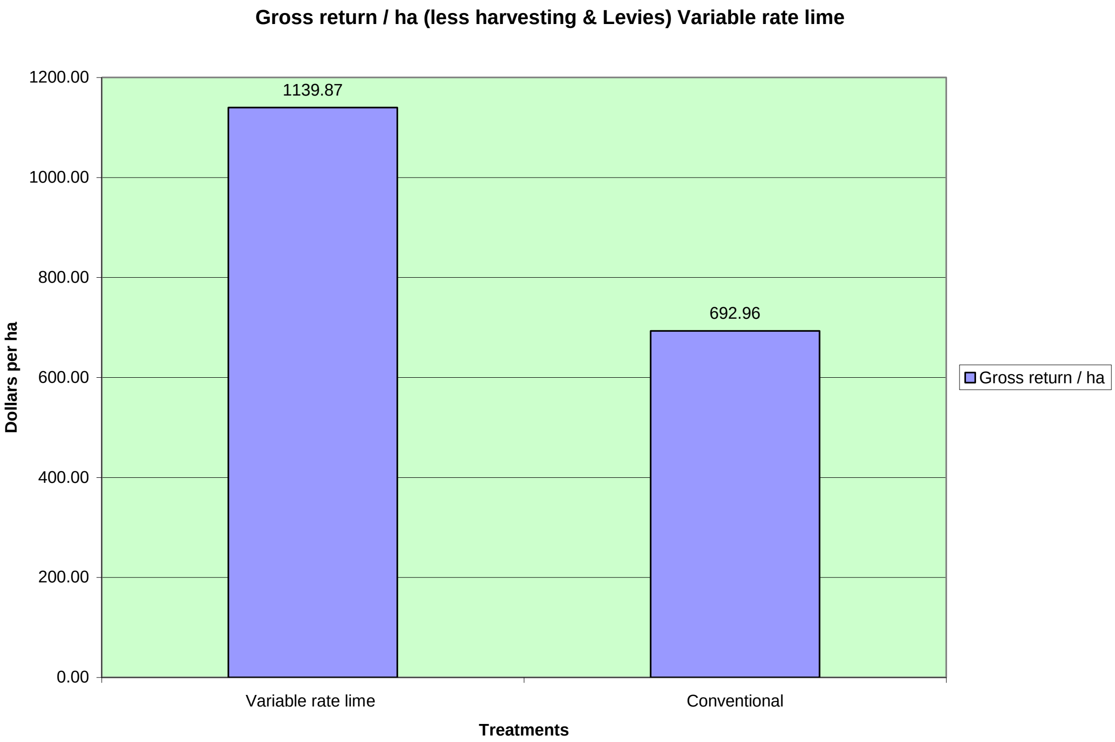


Table 2&3

Table 2: Harvest results achieved from mill data collected. Harvested October 2008
Table 3 Demonstrates gross return achieved between treatments.

Table 3



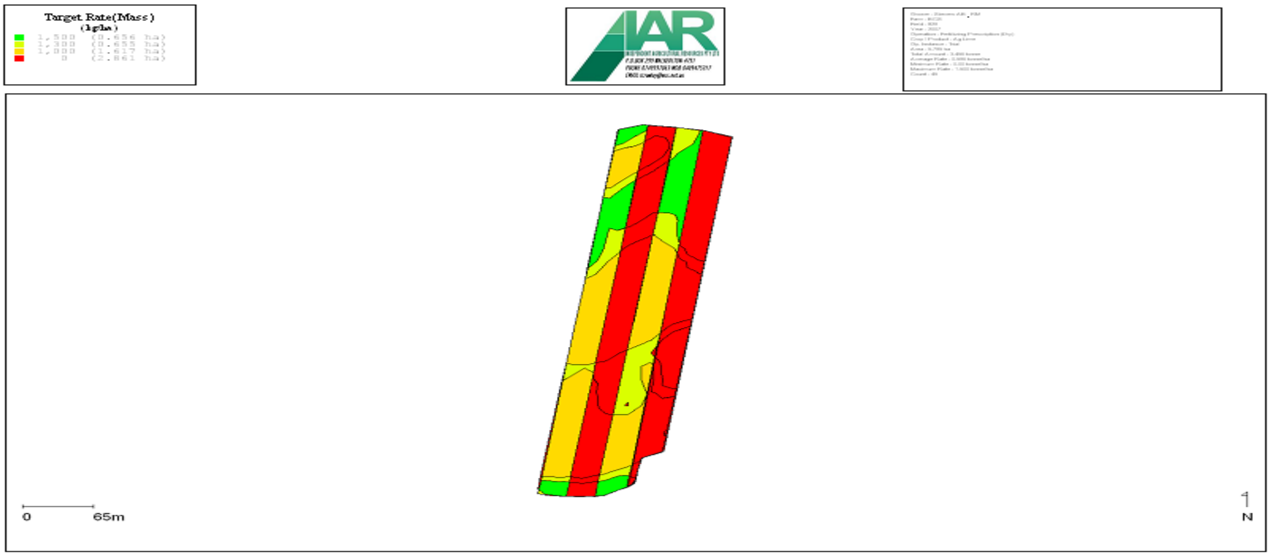
Trial results
Due to excessive rain events in January and February 2008 on Geislers farm we believe that the results in the Variable rate lime treatments were biased because there were low areas in the trial block. This rain fall event has affected the trial results to the point of not being able to utilize the data effectively.

SIEVERS TRIAL

The red strips are treated as conventional strips where there is a small amount of soil collected randomly throughout the strip then mixed and soil sampled as one sample. The nutrients are then applied evenly over the entire strip.
The multi coloured strips have been EM mapped with a varis 38 machine from Independent Agricultural Resources which identifies different soil profiles which are GPS referenced and soil tested as per profile. This allows you to retest the same GPS position in later years to compare soil samples. Conventional trial strips on both farms were not applied with lime as the soil sample indicated there was enough calcium, however the EM mapped strips on Sievers trial needed between zero & 1500kg/ha and the Geisler strips needed between zero & 2000kg/ha. Nutrient soil test and recommendations (appendix A & B Sievers & appendix C & D Gieslers) This was applied by truck with GPS and variable rate technologies where the EM maps were down loaded and lime was applied at variable rate per zone.   All soil tests were valued at the same recommended rates.

Table 4

EM maps of trial design at Shane Sievers

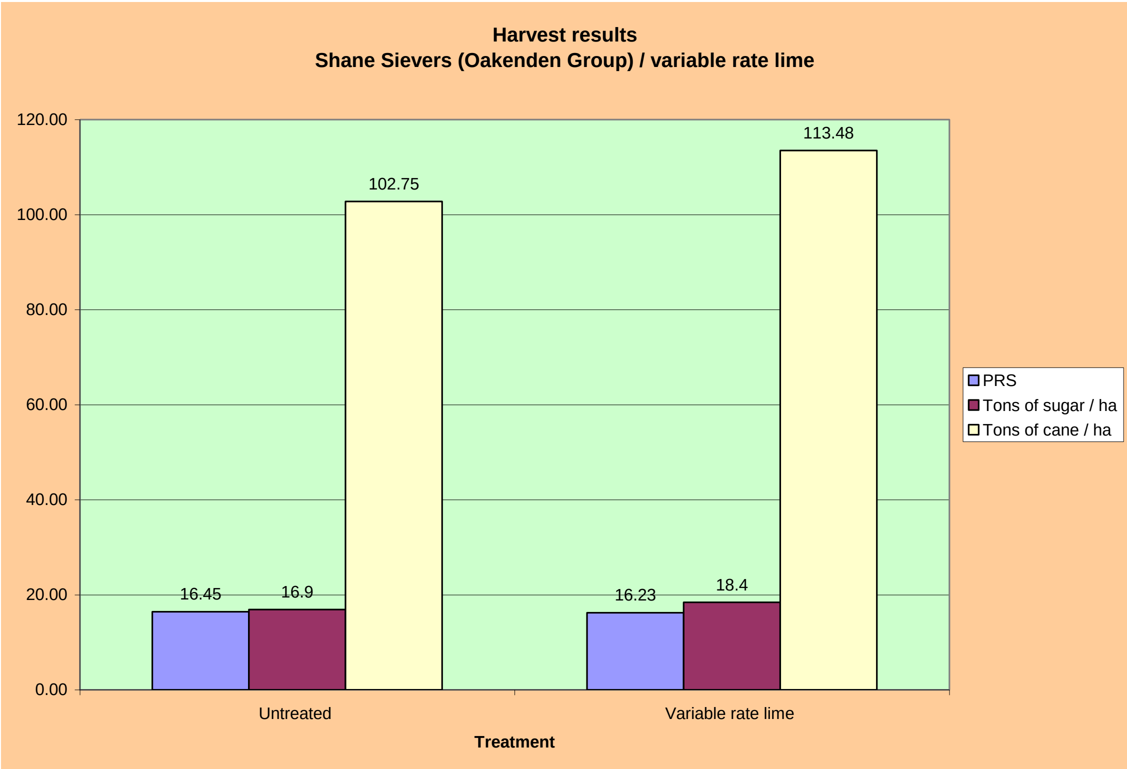


Sievers Trial block of Q208 planted at 1.52m wide with billet planter in August 2007

Table 5

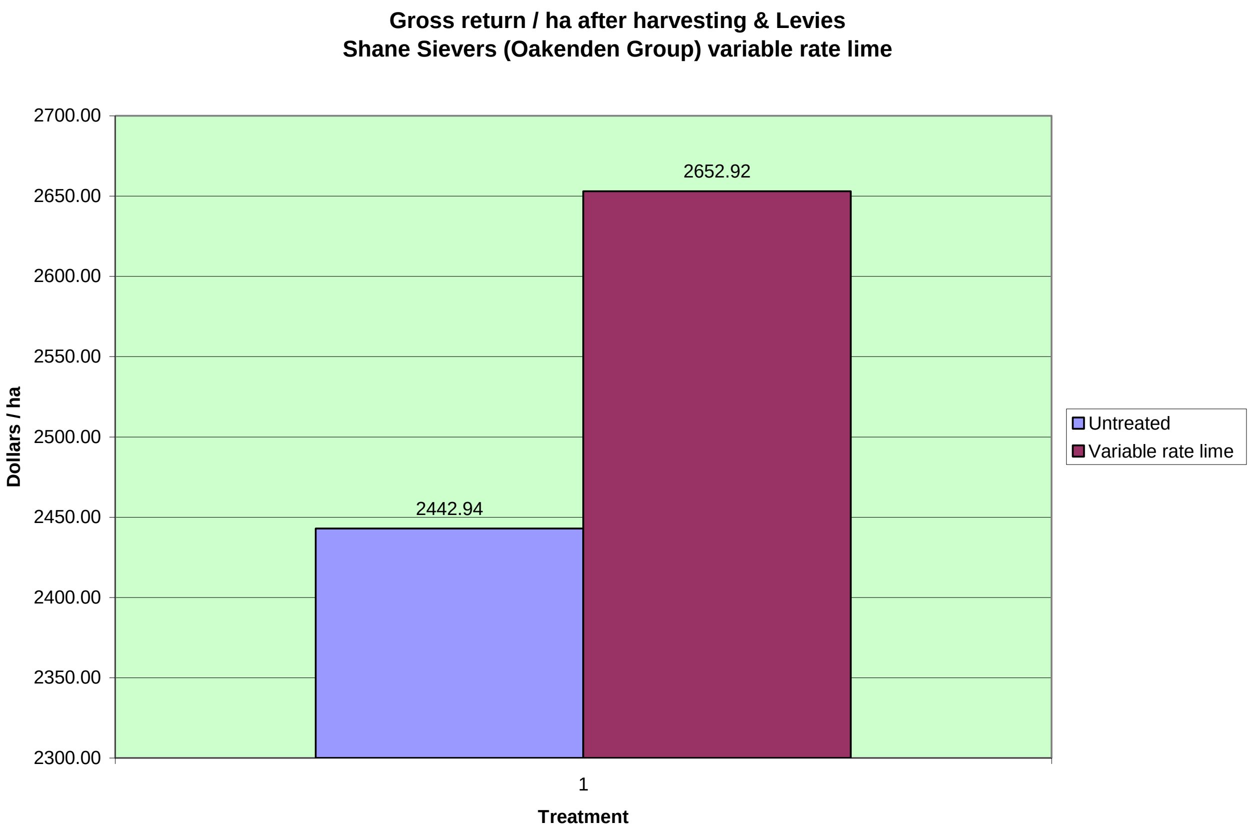
Picture taken in November this block was harvested in November 2008

Table 6



Harvest results achieved

Table 7



Trial results

Gross return comparison achieved between treatments based on sugar price of $315.00 per ton of sugar and harvesting costs at $8.00 / ton and Industry levies at 0.50 c/ ton

As shown by table 7 the variable rate lime has achieved an increase in return by $209.98 per ha after harvesting and levies were deducted.

Both the Giesler Brothers and Shane Sievers trial site indicate that the conventional soil testing protocols indicated that no lime was required, where by the EM mapping which defines the soil zones and soil testing within the defined zones demonstrates a deficiency of lime was required.

MUSCATS TRIAL

Trial Aim:

The objective of this trial is to evaluate the benefit of Sunn Hemp as a legume rotation crop option when compared to Soy bean and Guar. Soy bean has been selected because it represents current industry best practice in relation to a legume rotational crop option. Guar was selected because it is root knot nematode resistant and has a higher value bean in the market place.
This trial site will be monitored in the following cane crop with the comparison made in the replicated trial strips of the different legume treatments and the effects on the following cane crop. The economics will also be collated to determine the gross margin over the fallow period and the first cane crop.

Trial layout:
There were six rows of replicated trials in Leichardt, Sun hemp, Guar, Ashgrove, and Fallow treatments.

Trial results:

Bio-mass and nutrient samples were taken on the 2/03/2007 (60 days old) and on the 30/03/2007 (88 days old)

Table 8 highlights that the bio-mass results achieved by the Sunn Hemp indicate that at 60 days after planting, 5.16 tons of dry matter was produced which represents 39.7% more bio-mass than the Ashgrove soy bean which was the next highest. The nitrogen produced by the Sunn Hemp at 2/03/2007 (60 days) also is presented in table 9, this indicates that 55% more nitrogen has been produced when compared to the next best result which was A6785 Ashgrove soy bean.
At 30/03/2007 (88days) the bio-mass produced from the Sunn Hemp was 9.47 ton of dry matter per ha representing 55.3% more bio-mass with 11.7% less nitrogen from the Sunn Hemp when compared with the A6785 Ashgrove soy bean.

In two trial sites which were conducted in 2008 the bio-mass produced and the nitrogen fix of Leichhardt soybean and Sunn Hemp were examined. The results of the nitrogen fix comparison of Leichhardt and Sunn Hemp determined that no significant difference was achieved, while when the bio-mass comparison was examined there was a significant difference between the Sunn Hemp and the Leichhardt in favour of the Sunn Hemp.

TABLE 8

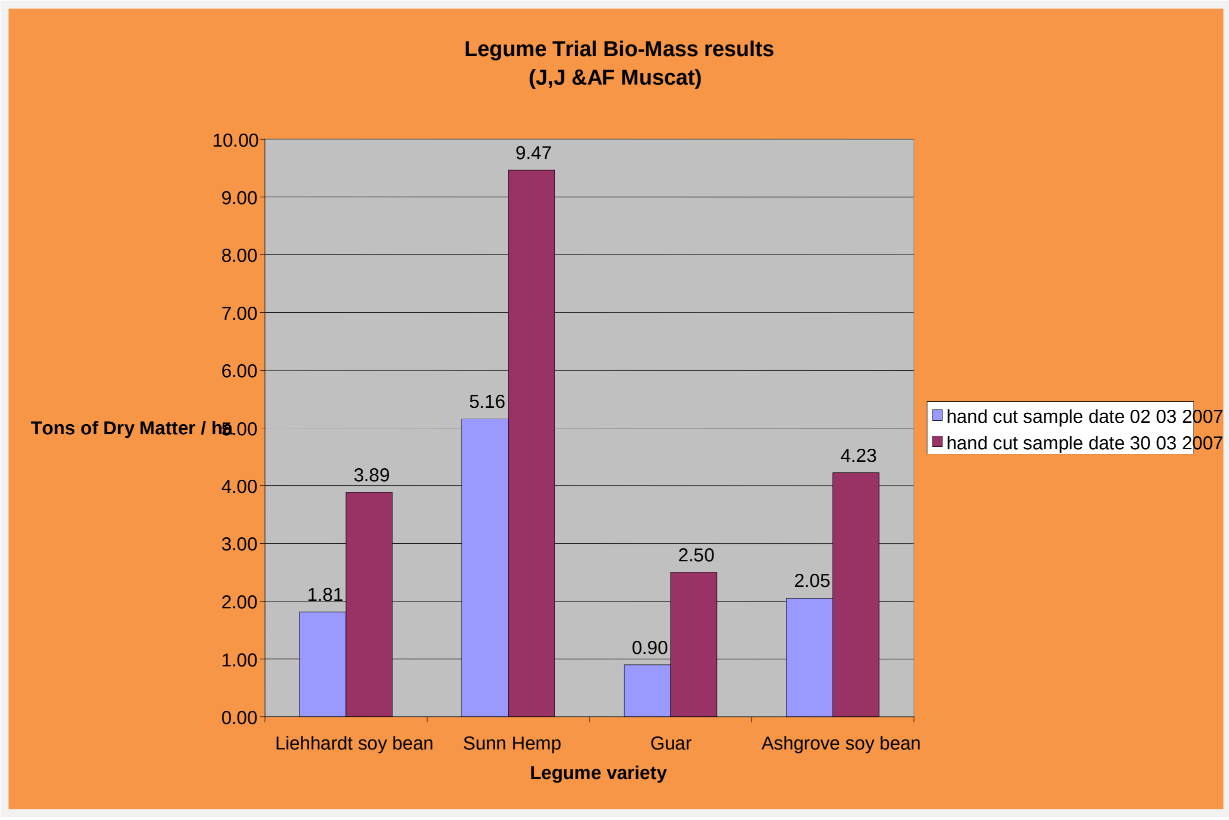


TABLE 9

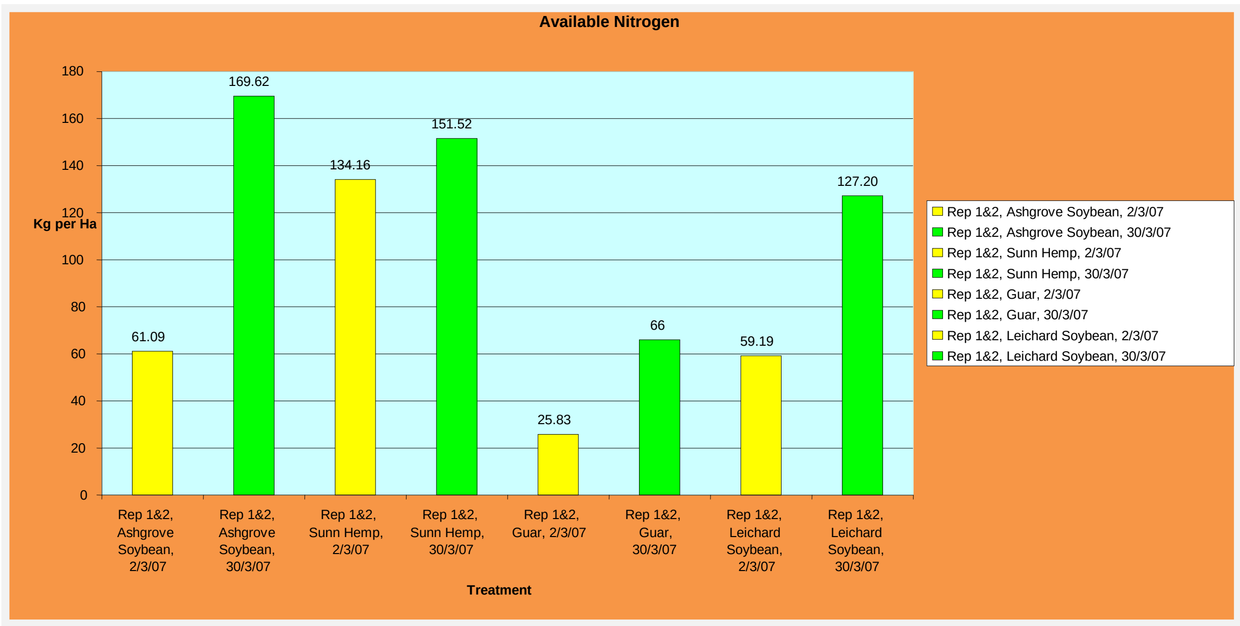
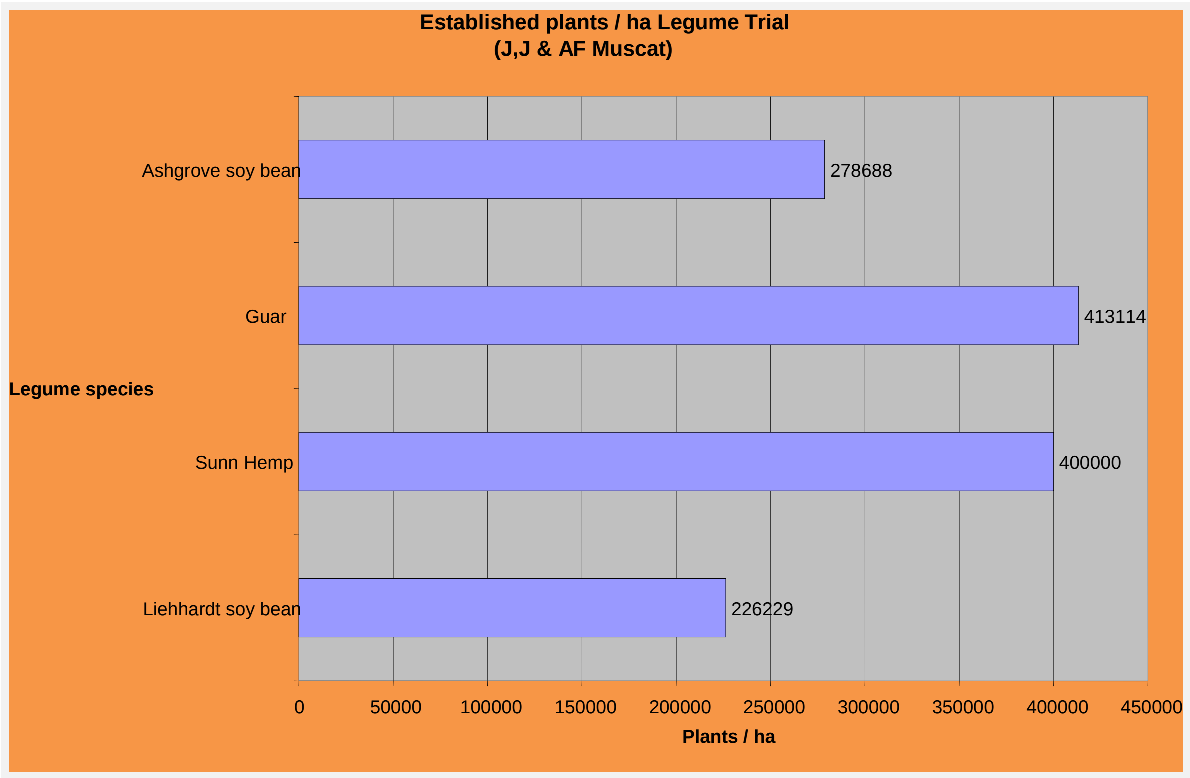


Table 10 highlights the plant establishment of the different legumes, the soybean varieties were planted with a targeted establishment of 275,000 plants per hectare, while Guar and Sunn Hemp were planted at rates to establish 400,000 plants per hectare. Table 10 demonstrates that all targeted rates were achieved except for the Leichhardt soybean; this result may explain why it produced lower amounts of bio-mass and less nitrogen when compared to A6785 Ashgrove and the Sunn Hemp.
The rain fall experienced in February (400mm) destroyed the guar treatments and the majority of the replicated strips were incorporated, a small section was retained for measurement purposes.

Table 10



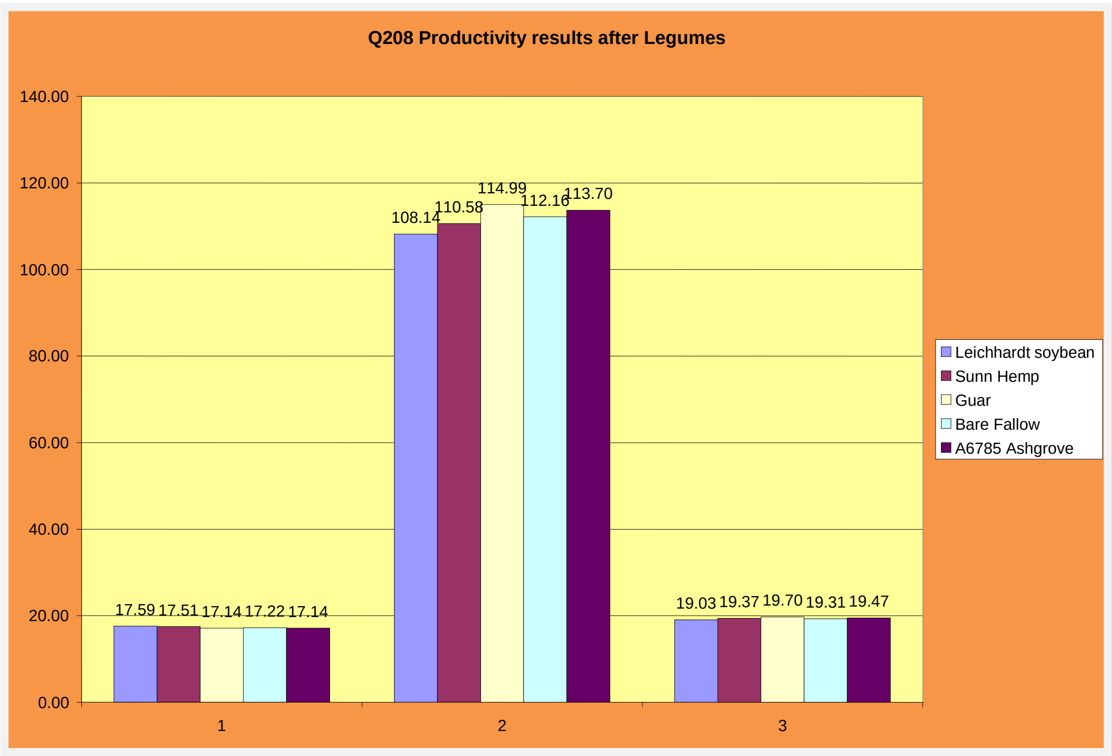
The legume strips were incorporated with the Sunn Hemp strips requiring two extra treatments to enable the bio-mass to be incorporated successfully. The trial site was planted to Q208[A] and the harvest results were measured. The inputs were collated from the time of spray out of the cane crop in 2006, which included planting and seed costs of the legumes and weed management as well as managing the fallow strips.

Table 12 highlights the gross return achieved by the sugar cane, less the harvesting and industry levies, the results exclude the cane crop inputs and the legume and fallow management costs. No significant difference was achieved; the gross return difference was $78.39 between Guar and Leichhardt.

Table 12 highlights the gross return difference between each treatment.

Table 11 demonstrates the harvest results of Q208[A], as can be seen there is no significant difference between the results of the strip treatments but when the economics (Table 12) are collated we can see that when compared to the bare fallow treatments an average increase of $193.50 per ha has been achieved.

Table 11



1 (PRS value)	2 (Tons of Cane per ha)	3 (Tons of sugar per ha)

TABLE 12

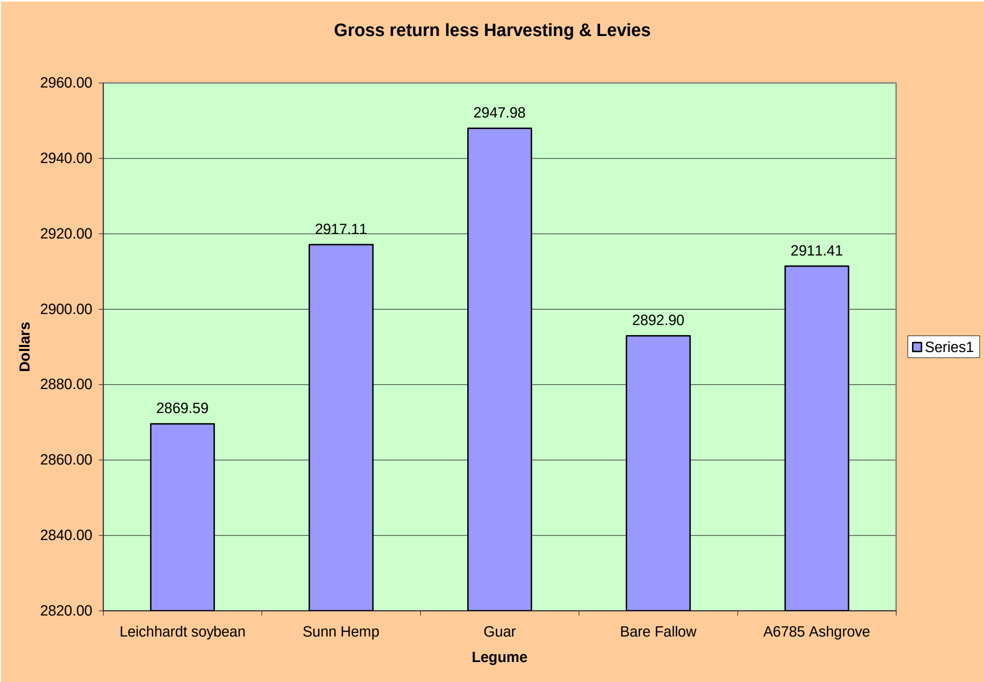


Table 13 introduces all the input costs which take into count the nitrogen applied, the management costs of the legumes and fallow strips. The Guar treatments were treated as bare fallow, because of the failure experienced in the February rainfall event and are not considered. The results achieved are interesting while the bare fallow net returns were $900.25 per ha, the Q208 cane crop following the legumes achieved increased returns as presented in table 14.

Table 13

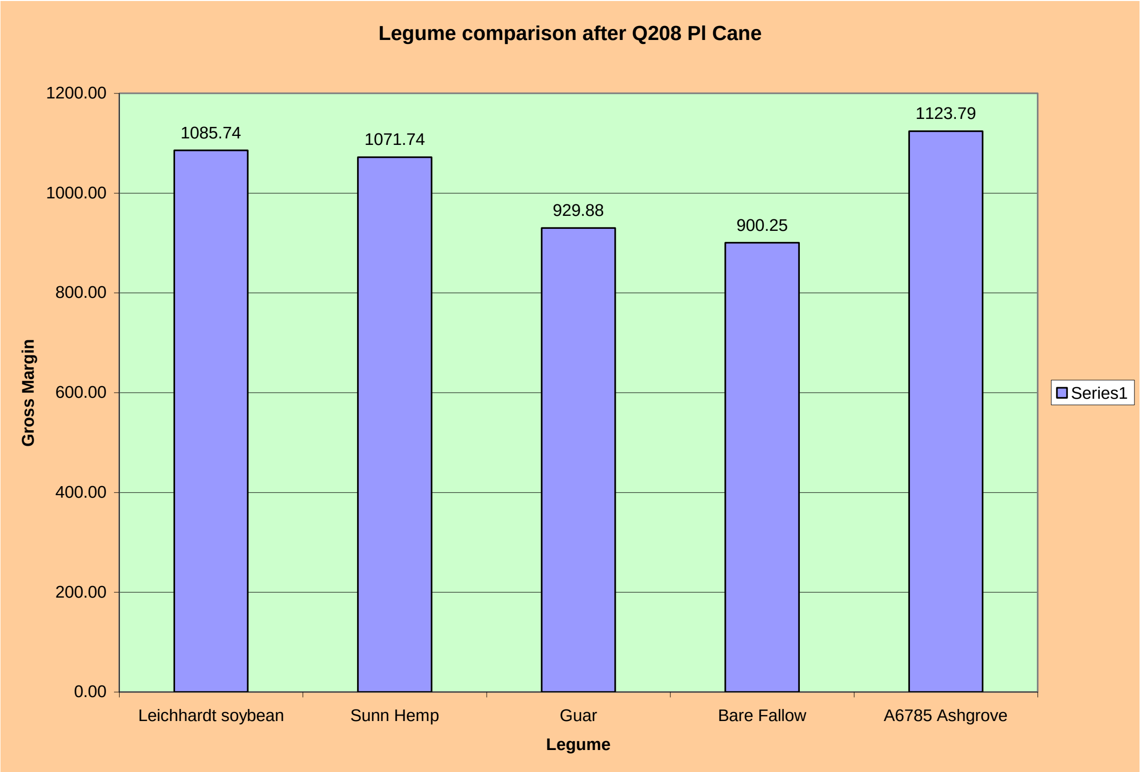


Table 14

Legume	Net return / ha	Increased return per ha when compared to the Bare Fallow result
A6785 (Ashgrove) soybean	$1123.79	$223.54
Leichhardt soybean	$1085.74	$185.49
Sunn Hemp	$1071.74	$171.49

Trial Conclusion

This trial demonstartes that the legumes introduced in rotation with the Q208[A] has incresed the the tons of sugar produced as well as increased the encomomic impact of an average of $193. per ha.

PLANTING TRIAL

TRIAL AIM

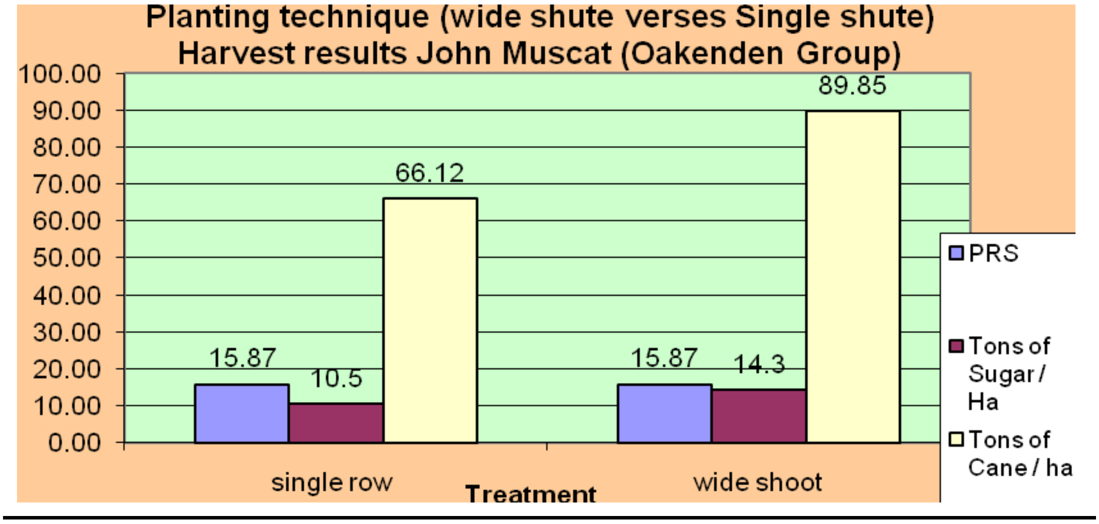
Two evaluate if there is a difference in yield between wide shute and narrow shute planting operations. Wide shute in this trial utilised a 300mm shute while the narrow shute was 150mm wide.

TRIAL LAYOUT

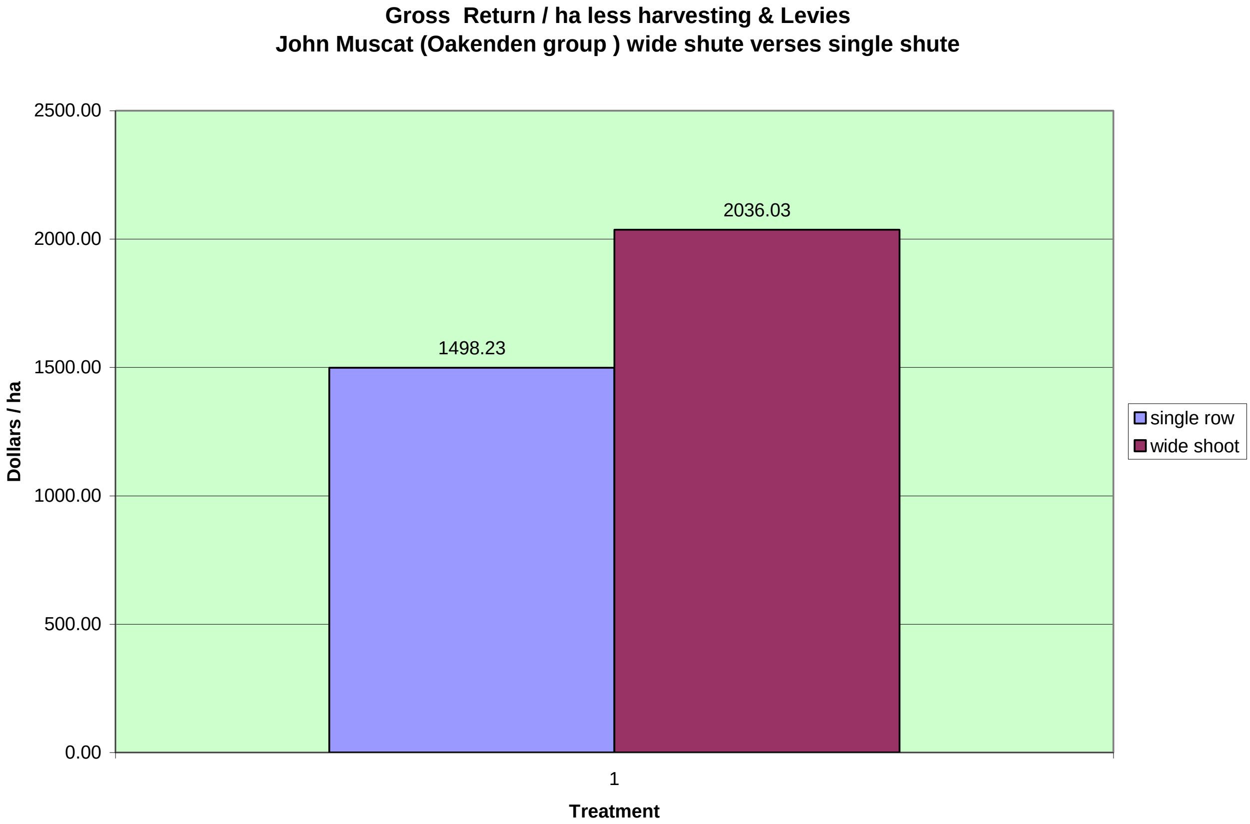
A replicated strip trial site was set out using wide shute billet planter compared to a conventional stick planter with standard shute both trials were planted at1.52 meters with Q208 on both replicated sites, see appendix E for block layout .

Harvest results achieved, PRS, Tons of suagr and Tons of cane are demonstrated in Table 15

Table 15



This graph shows gross return less harvesting and levies



TRIAL RESULTS

After both replicated trials were harvested there is a substantial increase in yield in the wide shute planting in both trials. As shown by the graph below with harvesting and levies deducted there was an average increase of $537.80 with the wide shute over both replicated trial. The group observation in this trial site was that time of planting contribute to the results achieved.

Purchase of GPS unit

To investigate the options in purchasing a GPS unit for controlled traffic application in the Oakenden area.

Investigations carried out.
There were three companies contacted to supply quotes and perform tests on signal strength and overall accuracy of GPS System

Companies quoting were = GPS AG- Independent Agricultural Resources
= AG GUIDE – Ag Guide Precision Farming
= TRIMBLE – BMS LaserSat Pty Ltd

Fact sheet on different GPS systems is presented in Appendix F, this demonstrates the process and information collected to determine which system delivers the best results.

Considerable time testing different units in our situation near hills and creeks and the nearest base station being 13 kms away, it was in our interest to construct a base station that would help the accuracy of our units and the wider community. This discussion moved us towards the GPS AG package.

Intellectual Property and Confidentiality:
(If there is any protected Project Technology, eg information that has been kept confidential, such as equipment specifications, patentable knowledge please outline. Is there anything in this report that should be treated as confidential, and if so under what circumstances?)

Nil

Capacity Building:
(How has the Group's capacity to conduct R&D and implement better farming systems been enhanced?)

Majority of group members attended a water quality workshop conducted by bses staff.
The group has achieved a better understanding of trial design and layout to obtain accurate data.
In group discussions there has been a positive gain in the use of legume crops.

Outcomes:
(What benefits have been achieved or are expected from the project, and what more has to happen to get the full benefit from the project? How do the expected benefits compare with those predicted at the start of the project, as outlined in the Application?)

Conventional Soil testing protocols verses EM mapping zones and soil testing
Evidence that supports legume rotation
Investigative process to determine purchase of GPS units
Success of wide chute when compared to narrow chute.
Bean planter

Environmental Impact:
(Outline any adverse or beneficial environmental impacts of conducting the Project and/or implementing its findings)

Zero till legume reduced soil erosion
Understanding the real soil nutrient requirements has an impact on cane yield.
Oakenden group understanding of water quality within the storages on farm tested, have highlight acceptable water quality results
GPS unit accessibility will allow for the group members to proceed towards zero till and minimum tillage practices into the future.

Communication and Adoption of Outputs:
(Outline any communication activities that have been conducted and any that are planned. How has SRDC been acknowledged or involved? Have any lessons from the project been applied by members of the Group, or others?)

Shed meetings
Field walks
GIVE Conference
BSES field day 2009

Recommendations:(What recommendations would you make as a result of the project, including suggestions for further research and development?)

Determine EM Mapping zones as soil testing protocols should be further investigated which will produce better understanding of plant nutrient requirements.

Publications:
(List and attach copies (electronically if possible) of all articles, newsletters and other publications from the project.)

Appendix A – Fertiliser recommendation – Sievers's Farm - Farm No 4239 – Block 1.1

BSES Sugarcane for the future

Name SHANE SIEVERS **Farm No.** 4 239
Block 1-1 **Date** 15-5-2007

Nitrogen (N)

Organic C % 1·29 ⇨ N mineralisation index M ⇨

Plant	Replant	Ratoon
130 kg/ha	kg/ha	kg/ha

Phosphorous (P)

PBI 143 ⇨ P sorption class L
BSES P 29 ⇨

Plant	Ratoon
20 kg/ha	kg/ha

OR
CEC (me%) ____ ⇨ Texture class ____
Organic Carbon (C) % ____ ⇨ P sorption class ____
BSES P ____ ⇨

Plant	Ratoon
kg/ha	kg/ha

Potassium (K)

CEC (me%) 4·77 ⇨ Texture class LOAM
Nitric K (me%) ·76 ⇨
Exchangeable K (me%) ·29

Plant	Replant	Ratoon
80 kg/ha	kg/ha	kg/ha

Sulphur (S)

Sulphate Sulphur (MCP) mg/kg 7
N mineralisation index VL-L ⇨

Plant	Ratoon
15 kg/ha	kg/ha

Magnesium (Mg)

Mg (Amm-acet.) Meq/100g 1·58 ⇨

Plant
N/A kg/ha

Copper (Cu)

Cu (DTPA) mg/kg 3·3 ⇨

Plant
N/A kg/ha

Zinc (Zn)

pH (water) 5·4

If pH < 6.5 Zn (BSES) mg/kg N/A ⇨

Plant
kg/ha

If pH > 6.5 Zn (DTPA) mg/kg N/P ⇨

Plant
kg/ha

Ameliorants

Lime
pH (water) 5·4
CEC (me%) 4·77 ⇨ NILL tonnes/ha
Ca (me%) 2·83 ⇨ NILL. tonnes/ha

Gypsum
ESP % N/A ⇨ ____ tonnes/ha

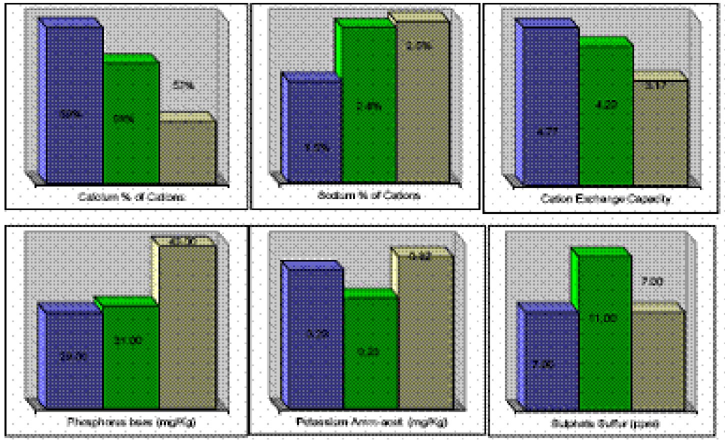
Silicon
Silicon (BSES) 140 Calcium silicate NA tonnes/ha
or
Silicon (CaCl2) 60 Cement NA tonnes/ha
or
Mill mud/ash NP tonnes/ha

Trial 2 - Soil Test Results
APPENDIX B

SOIL TEST RESULTS

S = Satisfactory O = Of interest M = Marginal N = No Value

	Sample 1		Sample 2		Sample 3		IDEALS
Ph(1:5 water)	5.40	O	4.90	O	4.90	O	4.5 - 7.2
Organic Carbon (%)	1.28	M	0.98	O	1.27	M	>2
Nitrate Nitrogen (ppm)	14	N	18	N	46	N	
Sulphate Sulfur (ppm)	7	S	11	S	7	S	>7
Phosphorus bses (mg/Kg)	28	S	31	S	49	S	>25
Phosphorus Colwell (mg/Kg)	29	N	37	N	47	N	
Phosphorus Retention (%)	8	O	12	O	5	O	15 - 30 %
Electrical Conductivity (ds/m)	0.04	S	0.06	S	0.09	S	<.25
Potassium Amm-acet. (mg/Kg)	0.29	S	0.23	S	0.32	S	>.20
Potassium % of Cations	6.1%	S	5.5%	S	10.1%	O	2 - 7 %
Potassium Retention (%)	5	S	8	S	9	O	4- 10 %
Calcium Amm-acet. (mg/Kg)	2.83	N	2.46	N	1.8	N	
Calcium % of Cations	59%	O	58%	O	57%	O	
Magnesium Amm-acet. (mg/Kg)	1.65	N	1.43	N	1.0	N	
Magnesium % of Cations	33%	O	34%	O	31%	O	
Sodium Amm-acet. (mg/Kg)	0.07	N	0.10	N	0.08	N	
Sodium % of Cations	1.5%	S	2.4%	S	2.6%	S	
Cation Exchange Capacity	4.77	N	4.22	N	3.2	N	
Calcium Magnesium Ratio	1.80	O	1.73	O	1.85	O	> 2
Chloride (mg/Kg)	14	S	13	S	17	S	<300
Zinc bses (mg/Kg)	0.80	S	1.00	S	0.90	S	> 6
Copper bses (mg/Kg)	3.30	S	5.40	S	3.20	S	> 22



NUTRIENT RECOMMENDATION

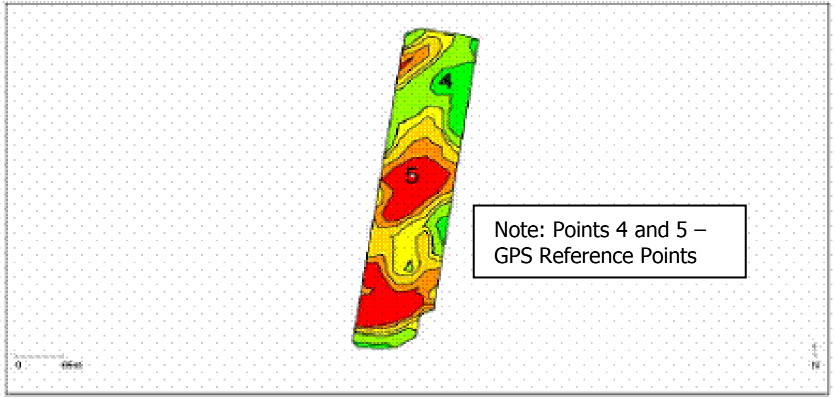
		Sample 1	Sample 2	Sample 3
Soil Type		SANDY LOAM	SANDY LOAM	SAND
N Mineralisation Index		MEDIUM	MEDIUM LOW	MEDIUM
N Baseline Rate	Kg/Ha	130	140	150
Phosphorus Baseline Rate	Kg/Ha	25	20	20
Potassium Baseline Rate	Kg/Ha	60	60	60
Sulphate Baseline Rate	Kg/Ha	10	5	10

These figures are given as baseline rates and do not take into account nutrients obtained from other sources. These rates are a guide only as individual circumstance may differ.

WHOLE OF BLOCK APPLICATION FOR CROP CYCLE

N	P	K	S
140	25	60	5

Soil Sampling Spots



Appendix C – Fertiliser Recommendation

Geisler's Farm - Farm No 3111A – Block 11.1.2

BSES Sugarcane for the future

Name Ceisler Brothers **Farm No.** 3111A

Block 11-1-2 **Date** 3/05/2007

Nitrogen (N)

Organic C % 0.90 ⇨ N mineralisation index MQ ⇨

Plant	Replant	Ratoon
140 kg/ha	kg/ha	kg/ha

Phosphorous (P)

PBI 140 ⇨ P sorption class LOW

BSES P 42 ⇨

Plant	Ratoon
20 kg/ha	kg/ha

OR

CEC (me%) ____ ⇨ Texture class ____

Organic Carbon (C) % ____ ⇨ P sorption class ____

BSES P ____ ⇨

Plant	Ratoon
kg/ha	kg/ha

Potassium (K)

CEC (me%) 3.94 ⇨ Texture class Sand

Nitric K (me%) ____ ⇨

Exchangeable K (me%) ____

Plant	Replant	Ratoon
100 kg/ha	kg/ha	kg/ha

Sulphur (S)

Sulphate Sulphur (MCP) mg/kg 16 ⇨

N mineralisation index ____

Plant	Ratoon
0 kg/ha	kg/ha

Magnesium (Mg)

Mg (Amm-acet.) Meq/100g 0.1 ⇨

Plant
— kg/ha

Copper (Cu)

Cu (DTPA) mg/kg 4.3 ⇨

Plant
NA kg/ha

Zinc (Zn)

pH (water) 5.5

If pH < 6.5 Zn (BSES) mg/kg ____ ⇨

Plant
NA kg/ha

If pH > 6.5 Zn (DTPA) mg/kg ____ ⇨

Plant
NA kg/ha

Ameliorants

Lime

pH (water) NA 5.5

CEC (me%) NA 7.25 ⇨ NA tonnes/ha

Ca (me%) NA 3 ⇨ NA tonnes/ha

Gypsum

ESP % NA ⇨ NA tonnes/ha

Silicon

Silicon (BSES) 140 Calcium silicate NA tonnes/ha

or

Silicon (CaCl2) 50 Cement NA tonnes/ha

or

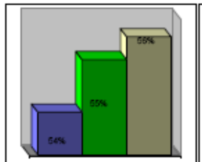
Mill mud/ash NA tonnes/ha

Appendix D

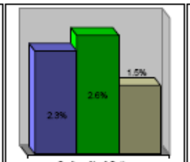
SOIL TEST RESULTS

S = Satisfactory | O = Of interest | M = Marginal | N = No Value

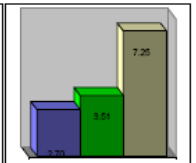
	Sample 1		Sample 2		Sample 3		IDEALS
Ph(1:5 water)	4.60	O	4.80	O	4.80	O	5.5 - 7.2
Organic Carbon (%)	1.16	O	1.23	M	1.20	M	>2
Nitrate Nitrogen (ppm)	13	N	8	N	7	N	
Sulphate Sulfur (ppm)	10	S	13	S	8	S	>7
Phosphorus bses (mg/Kg)	60	S	29	S	30	S	>20
Phosphorus Colwell (mg/Kg)	88	N	41	N	50	N	
Phosphorus Retention (%)	16	S	23	S	1	O	15 - 30 %
Electrical Conductivity (ds/m)	0.07	S	0.06	S	0.05	S	<.25
Potassium Amm-acet. (mg/Kg)	0.32	S	0.33	S	0.28	S	>.20
Potassium % of Cations	11.7%	O	9.5%	O	3.9%	S	2 - 7 %
Potassium Retention (%)	3	O	3	O	10	S	4- 10 %
Calcium Amm-acet. (mg/Kg)	1.45	N	1.93	N	4.0	N	
Calcium % of Cations	54%	O	55%	O	58%	O	
Magnesium Amm-acet. (mg/Kg)	0.88	N	1.16	N	2.8	N	
Magnesium % of Cations	32%	O	33%	O	39%	O	
Sodium Amm-acet. (mg/Kg)	0.06	N	0.09	N	0.11	N	
Sodium % of Cations	2.3%	S	2.6%	S	1.5%	S	
Cation Exchange Capacity	2.70	N	3.51	N	7.2	N	
Calcium Magnesium Ratio	1.65	O	1.67	O	1.42	O	> 2
Chloride (mg/Kg)	16	S	12	S	9	S	<300
Zinc bses (mg/Kg)	1.00	S	1.30	S	1.00	S	>.6
Copper bses (mg/Kg)	3.90	S	4.30	S	4.10	S	>.22



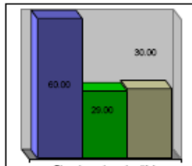
Calcium % of Cations



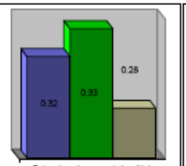
Sodium % of Cations



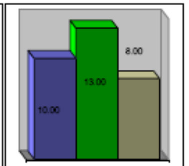
Cation Exchange Capacity



Phosphorus bses (mg/Kg)



Potassium Amm-acet. (mg/Kg)



Sulphate Sulfur (ppm)

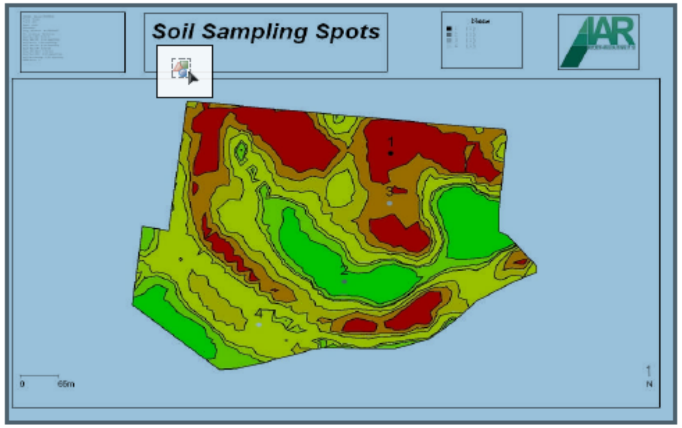
NUTRIENT RECOMMENDATION

		Sample 1	Sample 2	Sample 3
Soil Type		SAND	SAND	SANDY LOAM
N Mineralisation Index		MEDIUM LOW	MEDIUM	MEDIUM
N Baseline Rate	Kg/Ha	140	130	130
Phosphorus Baseline Rate	Kg/Ha	20	25	0
Potassium Baseline Rate	Kg/Ha	60	60	60
Sulphate Baseline Rate	Kg/Ha	10	5	10

These figures are given as baseline rates and do not take into account nutrients obtained from other sources. These rates are a guide only as individual circumstance may differ.

WHOLE OF BLOCK APPLICATION FOR CROP CYCLE

N	P	K	S
140	25	60	5



Appendix E

Appendix F

FACT SHEET

Oakenden Grower Group (April 2008)

Information you need before purchasing GPS RTK System

<table>
<tr>
<td>1. Examine local terrain for
• Hills
• Tree lines
• Area to be covered by GPS
• Community base stations???
• Repeatability</td>
<td>2. Find out systems available
• Ag Guide
• GPS Ag
• Trimble
• Other systems in other areas???</td>
</tr>
<tr>
<td>3. Find out what systems the community base stations can handle</td>
<td>4. Find out about the closest community base station.
• Location
• Signal strength
• Signal accuracy
• Terrain [tree lines] existing between area to be covered and base station
• Repeatability</td>
</tr>
<tr>
<td>5. Find out which system gives the best coverage
• Drive around and check for signal strength
Check for signal strength around trees and ridges more intensely
• Check tractor compatibility with each system
• Check what the system chosen can be adapted to e.g.
1. Variable rate
2. Flow control
• Repeatability</td>
<td>6. Service and Backup
• Is service available locally?
• Is technical backup available locally?
1. Accessible to upgrades
2. Will upgrades be accepted by unit?
• Who does the installation?</td>
</tr>
<tr>
<td>7. Purchase the unit that is most suited to the application required.</td>
<td>8. Reliability –
• What heat is produced by unit?
• What is an acceptable down time for repairs?
• Are exchange units available in case of breakdown?</td>
</tr>
</table>