Growers working together

GROWER GROUP INNOVATION PROJECTS TRIAL RESULTS

Australian Government
Sugar Research and Development Corporation

Grower Group Services

Published version 2 - November 2010

Funded by:
Sugar Research and
Development Corporation

Australian Government
Sugar Research and Development Corporation

www.srdc.gov.au
Compiled by:
Growers Group Services

www.growergroupservices.com.au

Designed by:
Prose PR
www.prosepr.com.au

Welcome to the third edition of results from Sugar Research and Development Corporation funded Grower Group trials coordinated by Grower Group Services. The aim of this booklet is to provide growers with clear, concise information from two-year trials carried out on-farm by leading growers.

The results are useful for making informed decisions about increasing profit from your farm business. All trials presented here have been replicated. While some have been statistically analysed, others are presenting the average of the reps from machine harvested results as achieved from the mill.

All results are available in that individual Grower Group Innovation Project (GGIP) group's final report submitted during the 2009-10 financial year. These reports provide more background information and detail about the work that was conducted and are available on the Grower Group Services website at www.growergroupservices.com.au, under the Grower Groups page, milestone archive.

SRDC and Grower Group Services strongly recommend growers examine their individual farming operation and seek independent advice if necessary before adopting any of the practices contained in the trials. Growers should consider their farming situation, climatic conditions and machinery before making on-farm changes based on the trial results presented here.

Research and improvement never stops. More trials are underway across the industry and Grower Group Services and SRDC look forward to bringing you more information in future years.

Che Trendell, Joe Muscat and Chris Aylward
Grower Group Services
www.growergroupservices.com.au

We would like to acknowledge the following Grower Group Innovation Projects funded by SRDC:

Advanced Nutrient Solutions
Blackburn Harvesting Group
Castellani Harvesting Group
Innisfail Babinda Innovative Farmers Group
Mackay Fibre Producers
Maryborough Advanced Growers Group
Mulgrave Cane Grub Management Group
North Clarence Innovative Planting Group
PAD Farming
Silkwood Drainage Board

TABLE OF CONTENTS

* Not statistically analysed, instead highlights actual harvest results

Grower Group Innovation Projects (GGIP) helps grower groups build their capability for innovation, by conducting their own research projects in their own region. Through these projects the goal is to create more profitable and environmentally sustainable sugarcane farming systems in Australia.

The Sugar Research and Development Corporation (SRDC) encourages grower groups of any size, from any Australian sugarcane region, to submit an application to attract part or full funding from SRDC for their research and development project. Depending on the scope of the individual projects, SRDC will provide funding of up to $80,000 per project over a term of up to three years.

Over the past five years, SRDC has funded over 100 Grower Group Innovation Projects from Cairns in north Queensland to Harwood in the south. The projects cover a diverse range of topics from testing new cane varieties, to fighting pests, to finding the best sources of nitrogen and fibre on a cane farm.

For generations many growers have successfully designed their own innovative technology, performed research trials and created new farming methods to suit their own environment. We recognise growers have good ideas and GGIPs are a way for these to be tested on-farm by a grower group.

The projects outlined in this booklet have been chosen on merit to be funded by SRDC and have been supported by growers who have given their time, energy and expertise to ensure these projects are completed and the outcomes shared with the industry. Their efforts are to be applauded and I wish to congratulate all involved.

GGIP can address an assortment of topics which the grower group believes is critical to improving the sugar cane farming system and this is what makes this work so invaluable and worthy of SRDC support.

This booklet will assist you in making the right choices for your farm business to ensure it remains profitable and sustainable in the long term.

Annette Sugden
Executive Director
Sugar Research and Development Corporation
www.srdc.gov.au (07)32100495

ALL-IN-ONE PLANTER BED FORMER TRIAL

Aim: Compare a conventionally planted 1.5m system to conventionally planted 1.8m system to an all-in-one planter/bed former (PAD) 1.8m system.

Table 1 : Growing Costs

	GROWING COSTS (FALLOW & PLANT)		
	FALLOW COST DETAILS ($/ha)		
	PAD 1.8m	Conv 1.8m	Con 1.5m
Land Preparation	$512.52	$512.52	$512.52
Weed Control	$101.01	$101.01	$101.01
Total Costs	$613.53	$613.53	$613.53
Labour (hrs/ha)	2.61	2.61	2.61
Total Costs Inc. Labour	$678.78	$678.78	$678.78
Difference from Con 1.5m	$0.00	$0.00	$0.00
	PLANT CANE GROWING COST ($/ha)		
	PAD 1.8m	Conv 1.8m	Con 1.5m
Land Preparation	$396.92	$396.92	$396.92
Planting & Seed	$285.10	$285.10	$223.37
Fertiliser	$521.36	$590.39	$590.39
Weed Control	$118.22	$195.73	$210.82
Insect & Disease Control	$63.33	$63.33	$63.33
Total Growing Costs	$1,384.93	$1,531.47	$1,484.83
Tractor Labour(hrs/ha)	8.85	12.53	13.47
Total Growing Costs Inc Labour	$1,606.18	$1,844.72	$1,821.58
Difference from Con 1.5m	$215.40	-$23.14	$0.00

	PRODUCTION FIGURES		
	PLANT CANE		
Treatment	YIELD	CCS	TSH
PAD 1.8m	101	15.1	15.25
Conv 1.8m	107.7	15.56	16.76
Conv 1.5m	114.2	15.16	17.31
Average	107.63	15.27	16.44

Table 2 : Yield Results

	PLANT CANE GROSS MARGIN	
	Gross Margin ($/ha) PLANT CANE	Difference From Conventional 1.5m
PAD 1.8m	$992.75	-$144.50
Conv 1.8m	$1,073.75	-$63.50
Conv 1.5m	$1,137.25	0

Table 3 : Gross Margin Analysis using FEAT

** Production based on trial results (3 replications)*
** Includes tractor labour at $25 per hour*
** Sugar Price : $ 330/tonne IPS Harvesting & Levies : $ 7.88*
** All figures are exclusive of GST*

	km/ hour	bag/ acre	Area (acres)	Minutes	$/ha	Tons billets/ ha	Emissions	Stool tipping	1st pass	2nd pass
1.8M ALL-IN-ONE SYSTEM										
Planter	7	3.7	3	60		2-5.3				
Fertiliser dropped on top	20	2.4	3	15						
Camel Roller	10		3	20						
CONVENTIONAL PLANTING AT 1.5M										
Planter	8	3.8	3	60		2-2.5				
2 Leg Ripper	6		3	20						
Weeder Rake	8		3	24						
Grubbing	6		3	30						
Hilling Up	5		3	30						
Fertiliser Underground	6	2.4	3	75						
Herbicide Application			3						Krismat	Velpar
Belly Roller	10		3	20						
CONVENTIONAL PLANTING AT 1.8M										
Planter	7	3.92	3	60		2-2.5				
2 Leg Ripper	6		3	15						
Weeder Rake	6		3	20						
Grubbing	6		3	25						
Hilling Up	6		3	25						
Fertiliser Underground	6	2.4	3	54						
Herbicide Application			3						Krismat	Velpar
Belly Roller	10		3	20						

Table 4 : Record of Paddock Operations

Note - *More compaction in 1.5m drills with 2 leg ripper, ground worked up lumpy.*

ALL-IN-ONE PLANTER BED FORMER TRIAL DISCUSSION.

- The total plant cane growing costs per hectare for the 1.8m all-in-one system was $1,606.18, compared to conventional 1.8m system costs of $1,844.72, and conventional 1.5m system with costs of $1,821.58

- For the 2007-2009 seasons, the savings achieved by using the 1.8m all-in-one system' on 300 acres planted, compared to a conventional 1.5m system includes
    - Time comparison savings 298 tractor hours = less wear and tear
    - Wages saved $8,940
    - Fuel saved 5,586 litres @ $1.40/l = $7 820.40
    - Total dollars saved $16,760.40
    - Greenhouse emissions saved 5,586 litres of diesel fuel burnt x 3.1kgCO2/litres = 17,316kg of carbon dioxide less in the atmosphere

- In replicated trials the 1.8m all-in-one systemachieved 15.25 tonnes sugar per hectare compared to a conventional 1.8m system which achieved 16.76 TSH and a conventional 1.5m system which achieved 17.31 TSH

- Although the 1.8m all-in-one system had lower growing costs, due to the slightly lower yields, the Gross Margin was also slightly lower than the other two systems. The 1.8m all-in-one system achieved a Gross Margin of $992.75, compared to the 1.8m conventional system which achieved $1,073.75 and the 1.5m conventional system which achieved $1,137.25

- When working the ground for plant cane a record of paddock operations was kept. This record showed a huge reduction in time taken to work the PAD system
    - The 1.8m all-in-one system system took a total of 95 minutes
    - The Conventional 1.8m system took a total of 219 minutes
    - The Conventional 1.5m system took a total of 259 minutes

- The 1.5m system appears to have the greatest decrease in first ratoon yield after being cut wet in plant cane, compared to the 1.8m systems

GGIP Group: P.A.D. Farming Company
Contact Person: Daryl Morellini – 0419 200 721

COMPARING DUAL ROW PLANTERS TRIAL

Aim: Compare a conventional John Deere dual row planter to a converted power haul dual row planter. Investigate billet quality as well as yield.

	Conventional John Deere Dual Row Planter	Converted Power Haul Dual Row Planter
AVERAGE (5 REPS)		
Total Eyes	47 (rounded down)	40 (rounded down)
Billet Weight	3.84 kg	3.86 kg
Planting Rate per acre	3.84 tonne	3.84 tonne

Biomass sampling (stalks+tops) 28/8/09 Q203

	Conventional Dual Row Planter	Converted Power Haul
Millable stalks/10m dual row bed	184	178.5
Weight of 20 Stalks	20.45	21.3
Weight of stalks kg per 10m	188	21.3
Average cane yield tonnes/ha	104	106
Average yield tonnes/acre	42	43

Chart compiled and provided by Mr Robert Aitken Harwood BSES Extension Officer, New South Wales

COMPARING DUAL ROW PLANTERS TRIAL – DISCUSSION

Statistical analysis showed no significant difference in yield between planters.

- The self propelled unit is more user friendly than the conventional dual row planter. It is shorter in length, which means it has a smaller turning circle, and also allows easier inspection and monitoring of the working machine

- The design provides greater carrying capacity of cane billets within the holding bin which consequently provides longer planting times and less refilling, therefore saving time and fuel consumption

- The trial proved that there is no vast difference in planting success; i.e. strike rate and/ or set placement

- A total of $65,506.43 (inc GST) was spent in constructing the self-propelled dual row planter. Current prices of a conventional dual row Hodge cane planter alone, are (at time of printing) $74,000 (inc GST). The conventional option still requires a tractor to pull the machine, which increases the value of the unit to an estimated total of $175,000 (pending on the make and model of the tractor)

GGIP Group: North Clarence Innovative Planting Group
Contact Person: Chris Shannon – 0417 452 602

COMPOST APPLICATION TRIAL

Aim: Compare using compost as a fertiliser source vs combination of compost and granular vs granular only.

Treatment Name	Treatment	Rate kg/ha	Product analysis %				Units applied (kg/Ha)			
			N	P	K	S	N	P	K	S
1. Compost	Compost*	37000	0.51	0.9	0.45	0.09	132	233	116	23
2.Compost +	Compost*	37000	0.51	0.9	0.45	0.09	132	233	116	23
	DAP	259	18	20	0	1.6	47	52	0	4
	TOTAL						179	285	116	27
3.Granular	DAP	259	18	20	0	1.6	47	52	0	4
	Ck50:50(s)	627	21.6	0	21.5	4.3	135	0	135	27
	Total						182	52	135	31

** Compost analysis provided by Advanced Nutrient Solutions P/L. Compost measured at 70% dry matter at time of application.*

** The application of industry by-products has limited ability to vary each nutrient element because the percentage of each nutrient element is fixed, once the application rate is changed then all elements change respectively, the application rates utilised within this trial specifically addressed the nitrogen element.*

Treatment	Tonnes cane/ha	PRS	Tonnes Sugar/Ha	$/ha gross return after harvest costs	$/ha return after harvest costs and fertilizer costs
Compost	80.34	16.60%	13.34	$3223.28	$2409.28
Compost+	89.36	16.47%	14.72	$3536.30	$2565.30
Granular Avg	79.42	16.91%	13.44	$3310.75	$2694.75

Treatment means - Yield and Economics

Fertiliser Option	Rate t/ha	Cost $/t	Cost $/ha (product only)
Compost	37	$22	$814
Compost +			
Compost	37	$22	$814
DAP	0.259	$605	$157
Total			$971
Granular			
DAP	0.259	$605	$157
CK50:50 (s)	0.627	$732	$459
Total			$616

Cost of Fertiliser Options

COMPOST TRIAL – DISCUSSION

- Statistical analysis of the data using Statistic 9 showed no significant difference between any treatment means (95% CI)
- Even though there is a substantial difference in the actual cost per hectare of the fertiliser options, the variation in yield within the replications for each treatment has resulted in there being no statistical difference in gross return after harvesting and fertiliser costs have been deducted
- A major issue highlighted by this trial is that because compost is a fixed ratio of nutrients (for each batch), consideration will need to be given to how to match nutrient application rates to rates indicated by soil tests. For instance, in this trial the initial soil test indicated that 30 kg/ha of P and 0 kg/ha of K was required but the compost and compost + treatments supplied in excess of 200 kg/ha of P and 116 kg/ha of K. The DAG GGIP group in Maryborough are attempting to address these issues by developing prescription compost to suit specific soils in Maryborough

GGIP Group: Advanced Nutrient Solutions
Contact Person: Neal Ross – 07 4954 1289

PRECISION MILL MUD APPLICATION TRIAL

Aim: Compare no mill mud application vs banded mill mud applied at 50 wet tones/ha vs broadcast mill mud applied at 125 wet tones/ha; in plant cane and first ratoon.

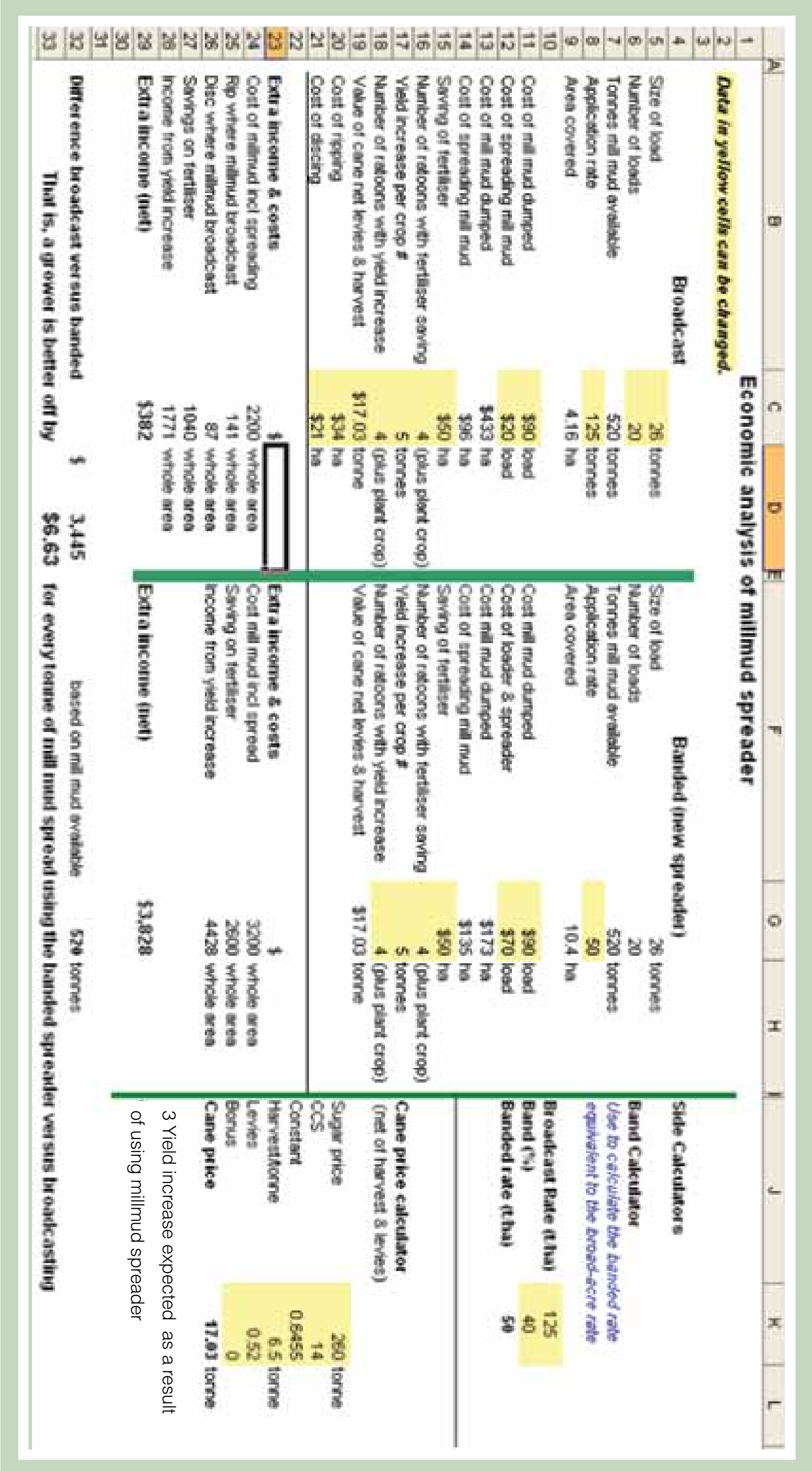
Nutrient Source	Nitrogen (kg/ha)	Phosphorus	Potassium (kg/ha)	Sulfur (kg/ha)
Soil (0-10cm)	1.6 (Nitrate N)*	15.3 (BSES P)	26 (Nitric K)	1.2 (Sulfate)
Fertiliser (planting)	72		72	
Fertiliser (top dress)	38		38	7.5
Total soil and fertiliser	111.6	15.3	136	8.7
Mill mud (banded)	88	56 (BSES P)	61.5 (Nitric K)	2 (Sulfate)
Mill mud (broadcast)	220	140 (BSES P)	154 (Nitric K)	5 (Sulfate)
Total Zero mill mud	111.6	15.3	136	8.7
Total branded mill mud	199.6	71	197.5	10.7
Total broadcast mill mud	332	155	290	13.7

GROWER GROUP INNOVATION PROJECTS TRIAL RESULTS

	Cane Yield (t/ha)	CCS	Sugar Yield (t/ha)
Plant Crop			
No Mill Mud	101	14.17	14.35
Banded Mill Mud (50t/ha)	110	14.03	15.40
Broadcast (125 t/ha)	107	14.07	15.01
1st Ratoon			
No Mill Mud	127	14.70	18.67
Banded Mill Mud (50 t/ha)	133	14.50	19.25
Broadcast (125 t/ha)	133	15.10	20.07
Cumulative			
No Mill Mud	228	28.87	33.02
Banded Mill Mud (50 t/ha)	243	28.53	34.65
Broadcast (125 t/ha)	240	29.17	35.09

CANE YIELD

A screen image is shown below of the Microsoft Excel spreadsheet produced by Trish Cameron from DEEDI. The spreadsheet allows the evaluation of various scenarios comparing broadcasting and banding of mill mud.



Economic analysis of millmud spreader

Data in yellow cells can be changed.

	B	C	D	F	G	H	J	K	L
4	Broadcast			Banded (new spreader)			Side Calculators		
5	Size of load	26	tonnes	Size of load	26	tonnes			
6	Number of loads	20		Number of loads	20		Band Calculator		
7	Tonnes mill mud available	520	tonnes	Tonnes mill mud available	520	tonnes	*Use to calculate the banded rate*		
8	Application rate	125	tonnes	Application rate	50		*equivalent to the broad-acre rate*		
9	Area covered	4.16	ha	Area covered	10.4	ha			
10							Broadcast Rate (t/ha)	125	
11	Cost of mill mud dumped	$90	load	Cost mill mud dumped	$90	load	Band (%)	40	
12	Cost of spreading mill mud	$20	load	Cost of loader & spreader	$70	load	Banded rate (t/ha)	50	
13	Cost of mill mud dumped	$433	ha	Cost mill mud dumped	$173	ha			
14	Cost of spreading mill mud	$96	ha	Cost of spreading mill mud	$135	ha			
15	Saving of fertiliser	$50	ha	Saving of fertiliser	$50	ha			
16	Number of ratoons with fertiliser saving	4	(plus plant crop)	Number of ratoons with fertiliser saving	4	(plus plant crop)			
17	Yield increase per crop #	5	tonnes	Yield increase per crop #	5	tonnes	Cane price calculator		
18	Number of ratoons with yield increase	4	(plus plant crop)	Number of ratoons with yield increase	4	(plus plant crop)	(net of harvest & levies)		
19	Value of cane net levies & harvest	$17.03	tonne	Value of cane net levies & harvest	$17.03	tonne			
20	Cost of ripping	$34	ha				Sugar price	260	tonne
21	Cost of discing	$21	ha				CCS	14	
22							Constant	0.6455	
23	Extra income & costs	$		Extra income & costs	$		Harvest/tonne	6.5	tonne
24	Cost of millmud incl spreading	2200	whole area	Cost mill mud incl spread	3200	whole area	Levies	0.52	
25	Rip where millmud broadcast	141	whole area	Saving on fertiliser	2600	whole area	Bonus	0	
26	Disc where millmud broadcast	87	whole area	Income from yield increase	4428	whole area	Cane price	17.03	tonne
27	Savings on fertiliser	1040	whole area						
28	Income from yield increase	1771	whole area				3 Yield increase expected as a result		
29	Extra income (net)	$382		Extra income (net)	$3,828		of using millmud spreader		
32	Difference broadcast versus banded	$	3,445	based on mill mud available	520	tonnes			
33	That is, a grower is better off by		$6.63	for every tonne of mill mud spread using the banded spreader versus broadcasting					

PRECISION MILL MUD APPLICATION TRIAL - DISCUSSION

- The results suggest that in the plant crop and first ratoon crop, there is little difference in cane and sugar yield between the broadcast and banded treatments
- A load of mill mud applied on the band can treat almost three times the area than a load that is broadcast
- If 50 t/ha of mill mud is applied in a band rather than 150 tonnes/ha broadcast there is a saving of $6.63/tonne of mill mud spread (provided the yield of the two practices is the same, which these trials demonstrated)
- These results suggest that current practices of applying mill mud are wasteful, time consuming and expensive

GGIP Group: Maryborough Advanced Growers Group
Contact Person: Jeff Atkinson – 0428 212 792

Daryl Morellini (right) and farm employee Ryan Anderson (left) with an innovative all-in-one planting system developed by a group of Herbert River growers with financial assistance from SRDC. This planter cuts farming costs, minimises labour and reduces machine hours, fuel usage and wear and tear by combining bed formations and planting in one fast controlled traffic operation (photo taken by Bill Kerr).

TWO-IN-ONE HARVESTER YIELD TRIAL

Aim: Compare two-in-one base cutter system operated manually on a 1.64m row spacing vs two-in-one base cutter system operated automatically (with a Techagro automatic base cutter system) on a 1.64m row spacing vs two-in-one base cutter system operated manually on a 1.85m (controlled traffic) row spacing vs two-in-one base cutter system operated automatically on a 1.85m (controlled traffic) row spacing.

Plant Cane Results

Treatment	Avg TCPH	Avg CCS	Avg $/HA
1.64m Auto On	104.3	15.9	2142.52
1.64m Manual	104.6	16.1	2197.95
1.85m Auto On	108.73	15.9	2234.39
1.85m Manual	108.9	16.1	2299.3

First Ratoon Results

Treatment	Avg TCPH	Avg CCS	Avg $/HA
1.64m Auto On	105.3	16.55	2786
1.64m Manual	103.8	16.1	2775.50
1.85m Auto On	105.7	16.7	2833.50
1.85m Manual	104.25	16.55	2766.50

- The additional benefits of a wider row spacing in relation to harvesting efficiencies are apparent from previous research undertaken by BSES and are applicable to this situation
- During the trial, soil in cane supply was assessed while the harvester was operating with the automatic base cutter on and off. No significant difference in percent soil in cane supply was found - 1.00 manual and 1.09 automatic
- During the trials conducted in both years no noticeable difference between the automatic and manual treatments for cane pickup losses (were the cane was correctly filled in) were found. Difficulties were experienced in poorly filled rows; this issue is no different when operating manually

GGIP Group: Castellani Harvesting group
Contact Person: Elio Castellani – 0427 774 793

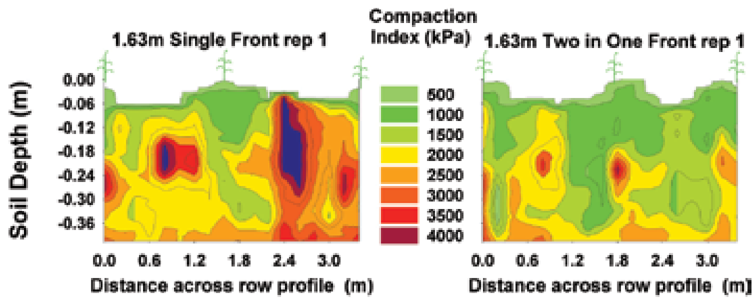
TWO-IN-ONE HARVESTER COMPACTION TRIAL

Aim: Conduct compaction assessments in the first ratoon crop to identify trends when comparing all treatments.

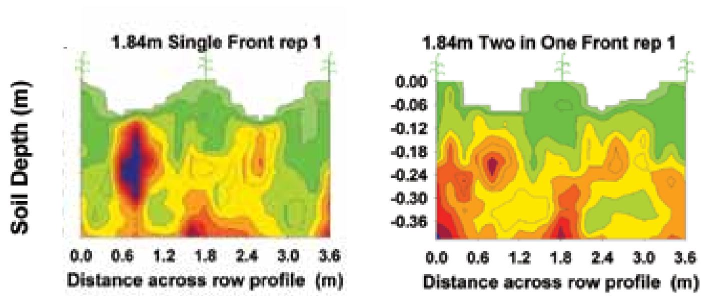
In the trial the following treatments were assessed:

1. The harvester used as a single row front, in a 1.63m row spacing.
2. The harvester used with the two-in-one to harvest 2 rows, in a 1.63m row spacing.
3. The harvester used as a single row unit, in a 1.84m row spacing.
4. The harvester used with the the two-in-one to harvest two rows, in a 1.84m row spacing.

Results:
The data shows more compaction (red and blue) under the single front when compared to a two row front, in a 1.63m row spacing.



When comparing a single row front and a two row front on a 1.84m row spacing, higher compaction levels were experienced when cane was harvested on a single row.



TWO-IN-ONE HARVESTER COMPACTION TRIAL - DISCUSSION

- A single row on a 1.63m row spacing experienced the highest amount of compaction when compared to all treatments. This indicates that there are significant opportunities offered by harvesting cane on a wider swath when considering compaction issues

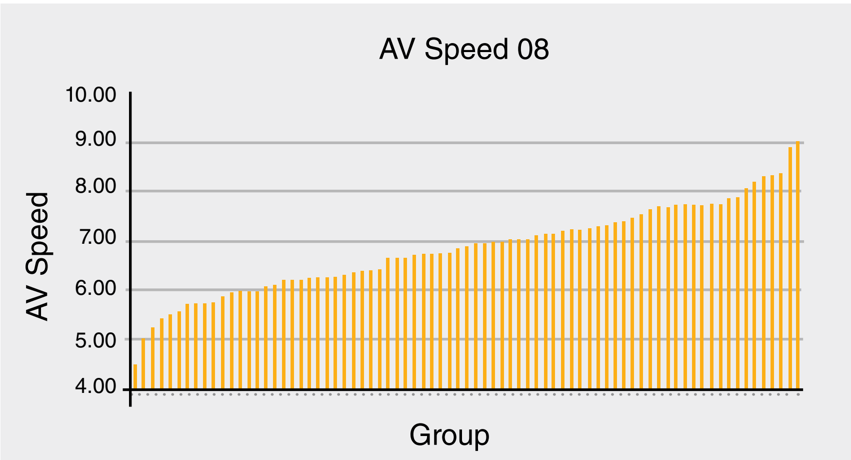
GGIP Group: Castellani Harvesting group
Contact Person: Elio Castellani – 0427 774 793

TWO-IN-ONE HARVESTER EFFICIENCY COMPARISON

Aim: As a part of this project Herbert Cane Productivity Services Ltd staff undertook an analysis of standard harvesters and the two-in-one harvesters operating in the same productivity zones and on the same soil types over years. The average of all single row harvesters in the mill area is also included.

Year	Two-in-one Yield (TCPH)	Single Row Yield (TCPH)	Yield Diff	Total All Harvesters Mill Yield Average
2003	81	70.9	10.1	71.1
2004	90	82.3	7.7	82.3
2005	98.4	84.6	13.8	97.3
2006	83.5	68.2	15.3	85
2007	84.5	75	9.5	75

HCPSL data also indicates that the two, two-in-one harvester units operating in the Herbert are operating at the lowest harvester speeds in the region. This is attributed to the increased throughput through the harvester.



TWO-IN-ONE HARVESTER EFFICIENCY COMPARISON - DISCUSSION

- The data indicates that the two-in-one units are not performing worse than the single row units in relation to cane yield and have no noticeable negative impact on cane yield
- Wider swath harvesting offers the industry opportunities to reduce or contain costs; and reduce in-field compaction

GGIP Group: Castellani Harvesting group
Contact Person: Elio Castellani – 0427 774 793

BIODIESEL FEASIBILITY STUDY

Aim: Investigate the feasibility of producing biodiesel from oil seed.

The biodiesel concept investigated by MFP, produces 250,000 litres of biodiesel which would require 1,500 tons of soybeans to be crushed. The crushed soybean would produce 202,700 litres of oil provided that 13% oil extraction has been achieved. This would then produce 1,230 tons (82%) of soybean meal. 5% of the total product would be assumed as losses to the production system. MFP has made some assumptions to determine its findings:

- 1,500 tons of soy bean
- Oil recovery from extraction process 13%
- Meal recovery from extraction process 82%
- Losses to the production system 5%
- Biodiesel
    - 80% oil
    - 16% methanol
    - 4% sodium hydroxide
- Glycerine produced 7.5%
- Soybean oil specific gravity kg to Litres 0.925
- Reaction cost / Litre 0.40 cents
    - Methanol $1.22 / Litre
    - Sodium Hydroxide 1.2c / Litre

MFP broke the project investigations into four areas,

Phase 1 storage and receivable section

Phase 2 extraction of oil from the grain

Phase 3 processing and conversion of oil to biodiesel

Phase 4 storage of biodiesel

Phase 1

This section would create a facility to receive and store grain. It would also need to have the ability to dry the grain to allow for safe storage. The receivable area would be able to receive grain from trucks and feed into grain silos or dryer as required. It is also recognised that a weigh bridge facility would be required, which has not been costed into the feasibility.

To store 1,500 tons of soybean, 15 x 100 ton new silos have been costed.The dryer has been costed second hand. Delivery and discharge augers to load into silos and also deliver into hammer mill (dehuller) have been costed new. The censoring equipment would automate the delivery of the grain to the hammer mill (dehuller) to enable continuous supply. A magnetic sensor has been costed to protect the extractor from foreign metal which could damage the unit.

Phase 2

This stage is to produce oil from soy bean and to handle and store the oil and soy meal produced from the extraction process.
The first stage is to lightly crack the grain or to dehull the soy bean to maximise the extraction process. Once dehulled the cracked grain would enter the extractor via a small conveyor. These units have been costed second hand. Two extractors have been costed new for this project fitted onto tandem trailers which would allow the extractors to be mobile at a later period.

The long term approach would be to reduce transport costs.The extractor unit chosen has capacity of 350kg / hr, two of these units would be required for this project. The production capacity of these units will require 9.75 hrs per day with 220 days per year. There would be scope to increase oil extraction by operating 24hrs. The machines are built in Germany by KEK (Egon Keller GMBH & Co. KG) and provide a cold pressing system. These machines are operated electrically and require hard wiring.

The extraction process requires pumping and filtration equipment for the oil being produced to be stored ready for the reactor which will produce the biodiesel. The extractor clean down pump is utilised to wash down any residue meal around the extractor screw which also provides for some cooling. The conveyor taking away the meal produced will deliver the meal into a collection bin which will then be conveyed into the storage shed. The collection bin will have a protection unit which would stop overfilling and spillage. It is also recognised by Mackay Fibre Producers that a hammer mill to treat the soy meal and a bagging unit would be required to market the soy meal, this component has not been costed in this project.

Phase 3

This stage of the project is to produce the biodiesel from an esterification process, which is a chemical process which adds methanol and sodium hydroxide to the soy bean oil to produce biodiesel.

The soybean oil would be heated and the methoxide (methanol sodium hydroxide mixture) would be added, this mixture would be agitated for thorough mixing.

The next stage is to wash down the reacted batch with water, the batch would then

separate into three layers, the water is removed, then the glycerine and methanol is removed, this product is then pumped through a condenser to reclaim up to 30% of the methanol, and then the glycerine is pumped into the glycerine storage tank.
The next stage is to separate the soap and gums that are present from the batched mixture. This separation process is done by a centrifuge which removes the soap and gums. The batch is then complete and is pumped into the biodiesel storage tanks.

Phase 4

Producing 250,000 litres of biodiesel requires 11 storage tanks which would need to be accessible by the end user. MFP also acknowledges that the biodiesel would need to be transported to the end user, the cost of transport hasn't been calculated in this feasibility.

Project summary

Mackay Fibre Producers Pty Ltd (MFP) has determined that the scale of this project is not viable to continue. The project findings has utilised a number of parameters to determine its viability. The buying price of soybean and the sale price of the soybean meal are key components that reflect the price of producing biodiesel. The biodiesel price matrix demonstrates the break-even point (spread sheet worksheet) with the majority indicating that the price of the biodiesel is greater than the existing purchase price of diesel. MFP also recognises that the Federal government fuel excise adds significant cost to producing biodiesel and reduces the cost of diesel to the cane grower. A comparison of the net outlay/profit between simply purchasing the fuel and selling the soybean and producing the biodiesel finds that is much better to simply purchase the fuel rather than produce it. Further costs would also be required for testing the sample on a regular basis to ensure it meets the government's conditions - this cost has not been included.

Rebate per litre	0.38
Fuel Price per litre	1.3
Sale Price Soy Beans per Tonne	690
Cost of producing Soybeans per tonne	385

Biodiesel Feasibility Study - Discussion

- There is an extra $227,500 in cash generated through purchasing fuel and selling the soybean, compared to producing biodiesel
- The return on the production of biodiesel in the future will be reduced as the government discontinues the fuel rebate by 2012
- The biodiesel concept investigated by MFP, produced 250,000 litres of biodiesel which would require 1,500 tons of soybeans to be crushed. The crushed soybean would produce 202,700 litres of oil provided that 13% oil extraction was achieved. This would then produce 1,230 tons (82%) of soybean meal. 5% of the total product would be assumed as losses to the production system
- A more detailed cost analysis produced by the Mackay Fibre Producers can be found on the Grower Group Services website

GGIP Group: Mackay Fibre Producers
Contact Person: Joe Muscat 0429 377 162

Table : Biodiesel price matrix / Litre

Soybean buying price ($/ton)

Soy-Meal selling price ($/ton)	250	300	350	400	450	500	550	600	650	700	750	800
200	1.92	2.22	2.52	2.82	3.12	3.42	3.72	4.02	4.32	4.62	4.92	5.22
250	1.68	1.98	2.28	2.58	2.88	3.18	3.48	3.78	4.08	4.38	4.68	4.98
300	1.43	1.73	2.03	2.33	2.53	2.83	3.13	3.43	3.73	4.03	4.33	4.63
350	1.19	1.49	1.79	2.09	2.39	2.69	2.99	3.29	3.59	3.89	4.19	4.49
400	0.94	1.24	1.54	1.84	2.14	2.44	2.74	3.04	3.34	3.64	3.94	4.24
450	0.69	0.99	1.29	1.59	1.89	2.19	2.49	2.79	3.09	3.39	3.69	3.99
500	0.45	0.75	1.05	1.35	1.65	1.95	2.25	2.55	2.85	3.15	3.45	3.75
550	0.2	0.5	0.8	1.1	1.4	1.7	2	2.3	2.6	2.9	3.2	3.5
600	-0.04	0.26	0.56	0.86	1.16	1.46	1.76	2.06	2.36	2.66	2.96	3.26
650	-0.29	0.01	0.31	0.61	0.91	1.21	1.51	1.81	2.11	2.41	2.71	3.01
700	-0.54	-0.24	0.06	0.36	0.66	0.96	1.26	1.56	1.86	2.16	2.46	2.76

(Figures in green represent break even or having a net return, numbers in orange highlight no return)

OPTIMUM SOIL MOISTURE FOR COULTERS IN RED SOILS

Aim: Determine the appropriate soil moisture content for achieving the best results with Daybreak implement coulters in red volcanic soils.

Soil Moisture Trial Results/Discussion

- It was found that instead of the soil moisture content, it was the stickiness of the soil relating to its structure, bulk density and aggregate stability that largely determined the effectiveness of the coulters
- It was found that the stickier the soil, the more problems it posed to the traditional coulter
- The stickier the soil, the greater the build up on the coulters and the higher the probability of the coulter choking up with trash and failing
- The tactile method of forming a bolus (soil ball) (McDonald, Isbell et al. 1990) was used to determine field texture, i.e. 'stickiness' of the soils
- It is important to note that in this method no water was added to soils, instead a handful of soil was simply picked up in the field and kneaded in an attempt to form a bolus
- The behaviour of the bolus was used to develop the following measurement scale of soil stickiness given in Table 1

Behaviour of the bolus	Grade of soil stickiness
Nil to very slight coherence	No potential to stick
Slight coherence	Low to nil potential to stick
Coherent but brittle	Some potential to stick
Coherent	Medium potential to stick
Strongly coherent bolus	High potential to stick
Coherent plastic bolus	Very high potential to stick

Table 1: The soil stickiness grades determined from bolus behaviour in the field.

GROWER GROUP INNOVATION PROJECTS TRIAL RESULTS

Figure 1 Forming a bolus (soil ball) in the field to determine soil stickiness.

GGIP Group: Innisfail Babinda Innovative Farmers Group
Contact Person: Miles Darveniza – 0407 630 499

DAYBREAK COULTERS COST BREAKDOWN

Aim: Determine the cost of developing the Daybreak coulters to their current stage.

A breakdown of the development costs of the Daybreak coulters. The running cost per hour and the minimum tractor size required is also presented.

Equipment Development	Cost
Purchase of Daybreak coulters from Milne industries and freight to Innisfail	$27,000
Adjustment and re-alignment of coulters before and during trial stages	$1,600 40Hrs @$40/hr
Modification of coulters to apply Confidor Guard includes fitting and tank purchase	$4,500
Workshop Consumables	$400
Total	$33,500
Operation cost	~ $96/hr
Speed	7 km/hr
Minimum tractor size	120hp

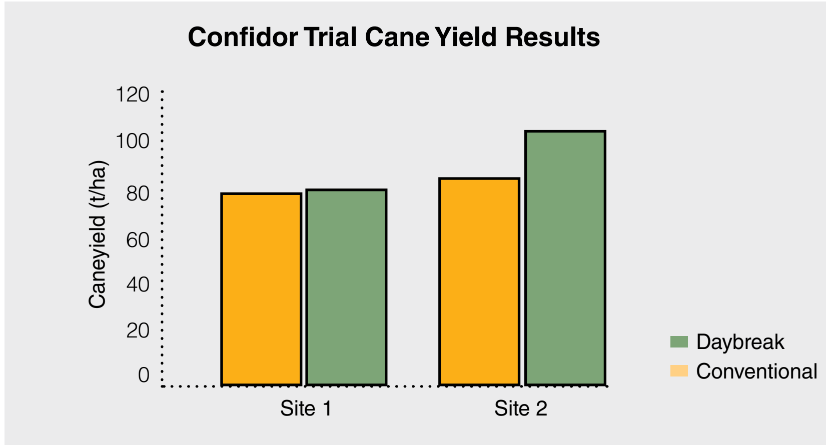
IMPLEMENT COULTERS COST - DISCUSSION

- The total cost of developing the Daybreak coulters, including the fitting of the Confidor applicator was $33,500
- In comparison, the approximate cost of a traditional style coulter set up is $12,000
- However, productivity losses associated with traditional coulters need to be considered when conducting a cost benefit analysis. Additionally, with increasing demand the price of the Daybreak coulters is likely to come down
- Also presented in the table above is the operation cost ($/hr) and the minimum tractor size for the Daybreak coulters. Due to the weight of the tool bar (~2000 kg) a minimum 120hp four wheel drive tractor is required to operate the coulters. Future developments will look into lowering the weight of the tool bar so that the implement can also be used on smaller tractors

GGIP Group: Innisfail Babinda Innovative Farmers Group
Contact Person: Miles Darveniza – 0407 630 499

COMPARING COULTERS FOR CONFIDOR APPLICATION

Aim: Compare Confidor® application using a traditional coulter system to the Daybreak coulters in red volcanic soils.



DAYBREAK COULTERS CONFIDOR APPLICATION TRIAL - DISCUSSION

- Final yield results suggest that the Daybreak coulter system was more effective in applying Confidor® to soils, resulting in reduced yield losses due to grubs where these were present
- At Site 1 there was no significant difference in yield between the conventional and Daybreak treatments
- The lack of a treatment effect at Site 1 is attributed to low grub activity at this site during the 2008 – 2009 growing season. In contrast at Site 2, where there was evidence of a high level of grub activity, the yield differences between the treatments were statistically significant
- At Site 2 there was a mean increase of 18 t/ha in yield in the Daybreak treatments in comparison to the conventional treatment. An ANOVA showed this difference was highly significant (P = < 0.001)

GGIP Group: Innisfail Babinda Innovative Farmers Group
Contact Person: Miles Darveniza – 0407 630 499

GRUB PREDICTION MODEL

Aim: Monitor and predict greyback cane grub population dynamics and potential damage in Mulgrave over two consecutive seasons (2008-2009) to move towards strategic grub control rather than blanket application of chemicals.

As shown in Figure 1 growers' responses to grub numbers have always been reactionary, but in 2009, a rise in the number of plots protected was simultaneous with the gradual rise of grub numbers, indicating that growers acted proactively in anticipation of the predicted rise in grub numbers in 2009. This is a major outcome of this project and it demonstrates the value of this study in achieving a good level of strategic insecticide application.

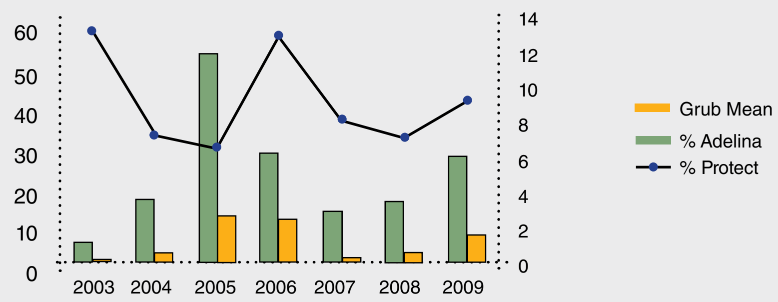


Figure 1. Grub numbers and Adelina infection levels

GRUB PREDICTION PROJECT - DISCUSSION

- This project has been very successful in the sense that, through work experience and previous research, it has been noticed that growers response to grub dynamics has always been reactionary, where the rise and fall of insecticide treatment always followed the rise and fall of grub populations
- This is the first time growers' reactions have been proactive, where treatment rates rose simultaneously with the expected (predicted) rise in grub numbers
- Most Mulgrave growers could see the benefit in this project to the extent that the Mulgrave Cane Grub Management Group has succeeded in raising funds to keep the grub monitoring activity going for another year after the conclusion of this project

GGIP Group: Mulgrave Cane Grub Management Group
Contact Person: Jeff Day – 0409 264 263

GROWER GROUP INNOVATION PROJECTS TRIAL RESULTS

SEDIMENT TRAPPING FIELD GUIDE

The following information has been summarised from the "Sediment Trapping Field Guide" developed by the Silkwood Drainage Board grower group. For a full copy of the field guide please see the Grower Group Services website www.growergroupservices.com.au

Sediment traps are designed to capture dissolved sediment on a rising stage of flow or increasing sediment load, which is generally the result from heavy rain impacting on exposed ground.

Steps to establishing a sediment trap:

- Inspect farm drains – inspect directly after heavy rain to ensure drain lines are flowing well and what areas may need to be fixed. Also note which areas of the farm are more inclined to have sediment runoff
- Survey the trap site – the main factors to consider are; 1. The stability of the soil (sandy or granite type soils can be problematic during/after drain excavation); 2. The amount of free space or headland (how will the trap affect farming operations?); 3. Estimated cost; 4. Effect of the trap on drainage. It is best to site the trap in a flat section of drain
- Calculate catchment area and water flow as this affects trap size – a catchment area of 30ha, a rainfall rate of 10mm per hour and a runoff coefficient of 0.5 (50%) equates to approximately 1500 cubic metres of rainfall runoff per hour. Using a settling time of 20 minutes, the trap size would need to be excavated out to 500 cubic metres (25m long x 10m wide x 2m deep)
- Trap design – the proposed trap needs to "fit" the existing drain without detracting from the drains performance and/or encroaching too much on headland space. The water flow should enter the centre of the trap rather than the side
- Construction material – quarry rock in a minimum size of 300mm is used to control the outflow of a trap. It is placed at the exit point, on the drain floor, to act as a leaky weir
- Method of construction – a long reach excavator is the ideal machine. If the drain is wet at the time it is best to stockpile the fill on site until it dries
- Monitor the sediment trap – install rising stage sample plots at the entrance and exit points of the sediment trap. The National Turbidity Units (NTU) value for the entry and exit points can be compared to record the difference.

The table below shows approximate trap size required to hold water for 10 or 20 minutes from different catchment areas. This is based on rainfall of 10mm/hr and runoff coefficient of 0.5 (50%). Please note that sandy or clay soil types will have different runoff levels.

Catchment area of paddocks (ha)	Trap holding time in minutes	Trap size required in cubic metres
10 ha	10 minutes	83 cu mt
	20 minutes	167 cu mt
20 ha	10 minutes	167 cu mt
	20 minutes	333 cu mt

The table below uses the Post and Jakeman (1995) formula to establish an approximate co-relationship between NTU value and sediment load. This table highlights possible reductions in sediment load.

Reduced turbidity as a NTU value between entry and exit points of the trap	Volume of water in cubic metres per hour from 30 ha at 10mm rain/hr at 0.5 coefficient	Volume of sediment reduction in kg/hr using Post & Jakeman formula	Volume of sediment reduction in kg/24 hr period
5 NTU	1500 cu/mt	14 kg	336 kg
10 NTU	1500 cu/mt	25 kg	600 kg
15 NTU	1500 cu/mt	36 kg	864 kg
20 NTU	1500 cu/mt	47 kg	1128 kg

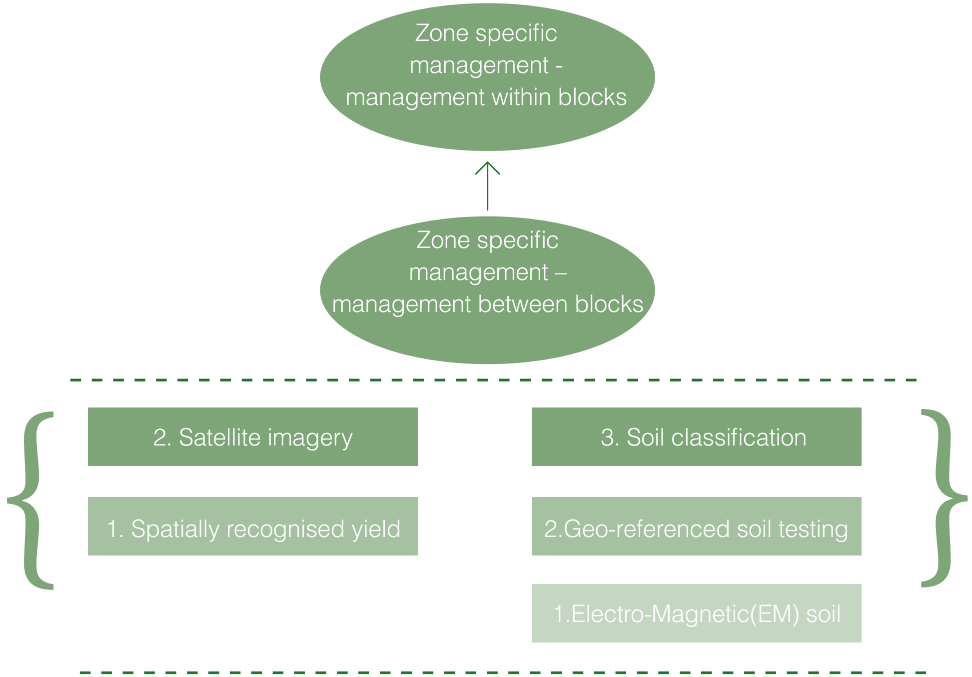
GGIP Group: Silkwood Drainage Board
Contact Person: Ian Brooks – 0428 652 339

LAYERING SPATIAL INFORMATION ANALYSIS

Aim: Utilising available technology to better manage yield variability within blocks.

The Blackburn brothers have collected a number of different layers of information such as: Satellite imagery, Electro-Magnetic (EM) mapping 'soil', yield mapping, soil analysis and leaf analysis. Using this information they were able to vary their nutrient application within a block to better match application rates to requirements. By tailoring their inputs to match the information portrayed by the different layers of information, they now have a better decision-making process which has led to an improvement in the bottom line. This is the first step towards Precision Agriculture.

The following diagram shows the information collected and the stages it was collected.



1: Exercise to map soil type variations between blocks and within blocks.

2: Ground-truthing mapping results by conducting geo-referenced soil tests, also revealing the nutritional attributes of the designated soil type zones identified by the EM soil mapping activity.

3: Classification of designated soil type zones.

LAYERING INFORMATION ANALYSIS - DISCUSSION

- The different layers of information collected has allowed for increased understanding to better manage at the block level the nutrient requirements
- The Blackburn group has adopted block specific management to increase gross margins as well as the adoption into a controlled traffic farming system
- Clear understanding of the advantages of precision agriculture and the practical benefits of utilising the technology

GGIP Group: Blackburn Harvesting Group
Contact Person: Lee Blackburn - 0405 140 322

GROWER GROUP INNOVATION PROJECTS TRIAL RESULTS

PRECISION MILL MUD APPLICATOR



GGIP Group: Maryborough Advanced Growers Group
Contact Person: Jeff Atkinson – 0428 212 792

COULTERS FOR WET TRASH ON RED VOLCANIC SOILS

An illustration of the minimal disturbance caused to the trash blanket after passing the Daybreak coulter system in the pilot study.

GGIP Group: Innisfail Babinda Innovative Farmers (Innisfail)
Contact Person: Miles Darveniza – 0407 630 499

GROWER GROUP INNOVATION PROJECTS TRIAL RESULTS

INVESTIGATING DIFFERENT SEDIMENT TRAP DESIGNS

GGIP Group: Silkwood Drainage Board (Tully)
Contact Person: Ian Brooks – 0428 652 339

ALL-IN-ONE PLANTER AND BED FORMER

Cover discs are hydraulically pushed down 75mm by the remotes on the tractor to cover the billets on the end of the drill when taking off, and then return up after 5-10m down the drill.

GGIP Group: PAD Farming (Ingham)
Contact Person: Daryl Morellini – 0419 200 721

GROWER GROUP INNOVATION PROJECTS TRIAL RESULTS

TWO-IN-ONE HARVESTER ATTACHMENT

GGIP Group: Castellani Harvesting (Ingham) Contact Person: Elio Castellani – 0427 774 793

FROM POWERHAUL TO PLANTER

Self-propelled dual row billet planter

GGIP Group: North Clarence Innovative Planting Group (NSW)
Contact Person: Chris Shannon – 0417 452 602

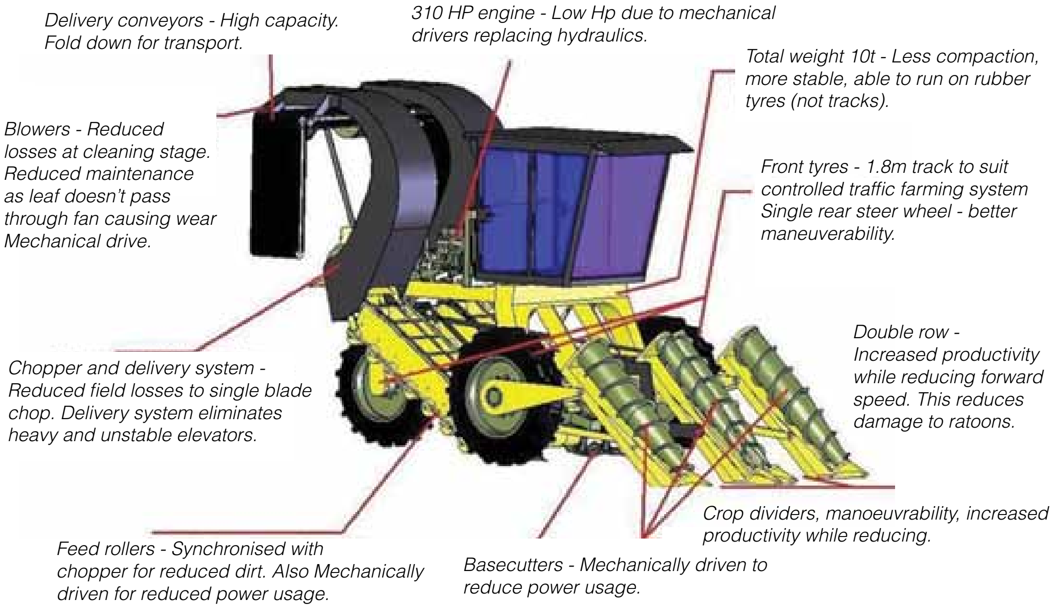
USING COMPOST AS A FERTILISER SOURCE

GGIP Group: Advanced Nutrient Solutions (Mackay)
Contact Person: Neal Ross – 07 4954 1289

SUB-SURFACE COMPOST APPLICATOR

GGIP Group: Advanced Nutrient Solutions (Mackay)
Contact Person: Barbara Walker – 0448 591 042

INNOVATIVE 2 ROW HARVESTING CONCEPT



GGIP Group: Group 2 Harvesting Innovations (Burdekin)

Contact Person: Chris Cannavan – 07 4782 1577

GROWER GROUP INNOVATION PROJECTS TRIAL RESULTS

BIODIESEL FEASIBILITY STUDY

GGIP Group: Mackay Fibre Producers Pty Ltd (Mackay)

Contact Person: Joe Muscat - 0429 377 162

USING A GRUB PREDICTION MODEL

Grub damage in Pine Creek, Mulgrave 2009

GGIP Group: Mulgrave Grub Group
Contact Person: Jeff Day – 0409 264 263

GROWER GROUP INNOVATION PROJECTS TRIAL RESULTS

CONTACT DETAILS:

Grower Group Services
www.growergroupservices.com.au

Chris Aylward:
grower-group-services@live.com.au
0417 668 125

Joe Muscat:
jcmuscat@qld.chariot.net.au
0429 377 162

Che Trendell:
ctrendell@bigpond.com.au
0439 588 627

Sugar Research and Development Corporation
www.srdc.gov.au
(07) 3210 0495
PO Box 12050
George Street
Brisbane QLD 4003
reports@srdc.gov.au