7th International Acid Sulfate Soil Conference

Vaasa, Finland August 2012

Integrated Practices for an Improved Sustainable, Sugarcane Industry in ASS soil

Presented by

Robert Quirk

Cane Grower from New South Wales

Australia



The Problem

- What we did to solve it.
- The Results
- Our Responsibility to develop practices in the first world





Quirk Farm History

 Held in Family for 100 Years
Growing Sugar for 70 Years
"Full Circle" 1949 Green Cane Harvesting to Green Cane Harvesting Today



100% farmers have an acid drainage plan





Organic carbon levels



Nutrient Advantager	ntage≋				
Nutrient Ad	vantage	Advice	Recommendat	ion Report	
Quirk R			Report Print Date: Agent/Dealer: Advisor/Contact: Phone: Purchase Order No:	30/08/2011 Peter McGuire 02 6670 1745 24	
Grower Name: Quirk R Sample No: 021344405 Block Name: 806 Sample Name: Sample Depth (cm) 0 To 25			Nearest Town: TUMBULGUM Test Code: A41 Sample Type: Soil Sampling Date: 19/08/2011		
Analyte / Assay	Unit	Value	Very Low Marginal Optimum	High Excess	Optimal
pH (1:5 Water)		4.80	Very Strongly Acidic		55.80
pH (1:5 CaCl2)	-	4.20	Not Chart Referenced		0.0-0.0
Organic Carbon (OC)	16	6.30		-	-
Phosphorus (BSES)	mg/kg	30.00	Contraction of the local division of the		30 - 120
Phosphorus (Colwell)	mg/kg	42.00	Not Chart Referenced		
Phosphorus Buffer Index (PBI-Col)		1030.00 *	the second s		140 - 280
Potassium (Amm-acet.)	meq/100g	0.26			
Potassium (Amm-acet.)	%	1.70	Not Chart Referenced		
Potassium (Nitric K)	meq/100g	2.40	Concession of the local division of the loca		>0.7
Sulphate Sulphur (MCP)	mg/kg	250.00	A REAL PROPERTY AND A REAL		>10->15
Calcium (Amm-acet.)	meq/100g	7.00	A DESCRIPTION OF TAXABLE PROPERTY.		>1.5
Calcium (Amm-acet.)	%	47.00	Not Chart Referenced		
Magnesium (Amm-acet.)	meq/100g	1.60	and the second se		>0.25
Magnesium (Amm-acet.)	%	11.00	Not Chart Referenced		
Sodium (Amm-acet.)	meq/100g	0.26	Not Chart Referenced		
Aluminium (KCI)	mg/kg	530.00			
Aluminium (KCI)	meq/100g	5.90	Not Chart Referenced		
Auminium Saturation	%	39.00	and the second		<50%
Electrical Conductivity	dS/m	0.15	Not Chart Referenced		
Silicon (BSES)	mg/kg	310.00	New York and the second second		>70
Silicon (CaCl2)	mg/kg	39.00	State of the second second second		>10
Cation Exchange Capacity	meq/100g	15.00	States and some set of the		>4
Calcium/Magnesium Ratio	-	4.40	STREET,		>2:1
sodium % of Cations (ESP)	5	1.70	Contraction of the second second second		<6%

Nu	trient Adva	intage	Advice	80	Rec	omn	nendat	ion I	Report	
Quirk R						Report Print Date: 28/03/2012. Agent/Dealer: Advisor/Contact: Peter McGuire Phone: 02 6670 1745 Purchase Order No: 31				
Grower Name: Sample No: Block Name: Sample Name:	Quirk R 020485766 813 Critical	Valve	-	Nearest Test Cod Sample 1 Samplin	Town: le: Type: g Date:	TUN B1 Tiss 19/0	18ULGUM 08 13/2012	-	1	
Analyte / Assay	PERSONAL PROPERTY.	Unit	Value	Very	ow M	larginal	Optimum	High	Excess	Opti
Nitrogen (Kjeldahl)	1-8%	- %	2.40	DA	0					
Nitrate Nitrogen		mg/kg	<50.00						-	-
Phosphorus	0.19	56	0.22	1	/					
Potassium	(-1	%	1.10	in	opala	-1			-	
Sulphur	0.13		0.23	4	.0					
Calcium	0.2	%	0.37	~						
Magnesium	0.05	%	0.14	1						1
Sodium		%	0.03				all	- Se	tistal	ary
Chloride		%	0.43					-	0	/
Manganese	15	mg/kg	88.00	V						
iron		mg/kg	110.00							
Copper	3	mg/kg	6.00	1						
Zinc	13	mg/kg	18.00	V						
Boron		mg/kg	3.30							
N/P Ratio			11.00							
N/K Ratio			2.20							
N/S Ratio			10.00							



8 South Road, Werribee VIC 3030 Email



Analyses conducted by Nutrient Advantage Laboratory Services





ASPAC NATA Accreditation No: 11958 Certificate of Analysis is available upon request.

GHG Emissions

Emissions						Total			
	Total	Area	Scope 1	Sc op e 2	Scope 3	Scope 1	Scope 2	Scope 3	Total
Diesel	18600	108	0.003			55.8	0	0	55.80
									0.00
Nitrogen	90	108	3.9		6.2	60.264	0	37.908	98.17
		108							0.00
Phosphorus	23	108	0.714					1.773576	1.77
		108							0.00
Pottassium	43	108	1.61					7.47684	7.48
		108							0.00
Electricity	3920		0.89		0.13		3.4888	0.5096	4.00
Total									167.22
Sequestration Nitrogen Avoida	ance 59kg/ha ov	er avearge							
Nitrogen	59	108	3.9		6.2	37.908	0	60.264	98.17
Plant Stones	400kg/C/yea	r							

Plant stones CO2

Plant stones co2

over property

688

74.304

Accumulation OC

Total Emissions	167.22 0816			
Avoidance of N/year	98.172			
Plant stones	74.304			
Co2 sequested	2 14266. 37	3 21399.55	4 28532. 74	5 35665. 92
years of offseting your activities N/avoidance Excluded plant stones included	153.54	230.31	307.08	383.85
years of offseting activities plant and n excluded	85.31	127.97	170.63	213.29

Wet and Dry







Making progress...?

9

9

6,800 tonnes



The finished product

11,200 tonnes

- Filled 6 km of drains
- Laser levelled 100%

2002

.5 Metre AHD





The BAD NEWS...





Our problem soil



Audit sheets

Laser grading

- Q 7 Did you laser grade any blocks last year?
- No 🗖

Yes 🗹

137

No 🗖

No 1

Q 8 If "Yes", please list the blocks you graded and whether lime was applied

Paddock No.	Area (ha)	Amount of lime applied (tonnes)		No lime required
eg paddock 202	1.62	4.0	OR	
111	1.64	STPH	OR	
302, 304	Not Lase	STPH	OR	Ø
403,601,611			OR	ø
506,101,108	27.5	STPH	OR	Ø
805,806,807		(OR	Ø
812,814			OR	ľ

Other lime

- Q 9 Did you apply lime to any other blocks?
- Q10 If "yes", how much lime did you apply to these other blocks?
- Fish kills
- Q 11 Have you noticed any fish kills on your farm and Yes 🗆 adjoining drains over the last year?
- Q 12 If you answered "yes" please provide some details.

Floodgates

- Q 13 Have you opened floodgates to allow river water to enter your drains in the last year? No I
- Q 14 If "Yes", have you done this more than in previous years. No 🗆
- Thank you for completing this record. Please keep this form with your other farm records. Council may select your farm as part of the annual audit.



COMPLIANCE RECORD Sugar industry self regulation of drainage and earthworks in acid

sulfate soil areas

1st July 2011 to 30th June 2012

These records are required for the NSW sugar industry to maintain it's self-regulation status for drainage works on acid sulfate soils. Please complete the form and keep it with your records. You may be required to produce these records as part of an annual audit by council.

arm number:	8158
our name:	Robert Quirk.
rading name:	-RG Quirk.

Drain maintenance

Trading name:

- Q1 Did you clean or spin any drains on your PAE last year?
- Q 2 If "Yes", please complete the following table.

		die and b	Method(s) u	sed (~)		area ana		
Length of drains cleaned (m) Sampling site number closest to drains cleaned	Sampling	Excavator		Spinner	Drain plough	Month(s) cleaned	Lime requirement from Drain Plan	Amount of lime applied (X if no lime req'd)
	Bucket with slots or holes	Closed bucket (no drain holes/slots)						
4,900	1,2,3	fellowin Stario				July.	1,2.5,5	5786.

Drain spraying

- Q 3 Did you spray any drain banks last year?
 - Q 4 How were they sprayed? spray
- Blanket

No 🗆

Spot spray

Yes 🗹

Please tick as necessary

Yes I No D

Shallower drains

Yes

Yes

- 0.5 Have you filled in or made any drains shallower over the last year? Yes 🗖 No 🗹
- Q6 If "Yes", what length of drains (approximately) have you modified over the last year? Drains shallowed metres Drains filled in .metres



Good News



Mole drains





Clean drains





Sugarcane Growing – Current Direction

- Zero Minimum Till
- Chemical weed control
- Direct drilled break crops
- Mounded rows
- Controlled traffic
- Wider multiple rows
- Direct drilled, mechanical cane planting
- Building Carbon Content
- Calcium Nitrate









Zero – Minimum Till

- Harvesting
- Minimum Till Fertilising
- Stool Raking











Chemical Weed Control

Inter Row Weed Control

- Selective Herbicides
- Trash After Seven Years





Direct Drilled Break Crops

Direct Drilled Soybeans Into Trash Blanket



Direct Drilled Break Crops

Direct Drilled Soybeans Into Trash Blanket





Lupins in ass

Mounded Rows

Laser Levelling

Bed Forming





Controlled Traffic



Building Carbon Content

- Minimum Input Oats
- OM Incorporation
- Urea Application





Wet and Dry





Other Practical Solutions

Riparian Re-vegetation







Other Practical Solutions

Development of wetland
2ha – reducing discharges
Industry leadership
COMPASS program
EMS
BMP





Results of Changing My Farming System

- Flotation Almost Eliminated
- Fertiliser Application Reduced by 25%
- Herbicide Application Reduced by 30%
- Fuel Usage Cut by 47%
- Tractor Hours Reduced by 40%
- Labour Component cut by 66%
- Eliminated the Use of Phosphorous Fertilisers
- OM Reduces the Discharge of Heavy Metals
- Macro-Fauna Introduced and Sustained
- Soil Biota Population has Positively Evolved and Increased
- Productivity Increased by 75%
- Unit Cost Decreased by 50%







Take Home Message

My Experience shows that the development and implementation of an economically improved farming systems has unexpectedly demonstrated that positive economic outcomes are directly linked to positive environmental outcomes

