Bugs & Biology Grower Group 2014 trials

Crop Nutrition to increase the Financial and Soil Bank Balance	
Authors	Raj Malik, Sally Thomson, Rob Rex and James Hopes
Location of trial	Rockliffe (Kojonup WA) and Westendale (Wagin WA)

Background

This project fits with goals of farmers within Bugs & Biology Group – that is to make more YIYO (yield in – yield out) profit by reducing input costs and the associated risks while maintaining or increasing gross margin. The group wants to see improved soil pH and nutrient recycling to reduce reliance on artificial fertilisers, improved soil water use efficiency, and use of fewer pesticides to make more profit.

The objective is to trial different crop nutrition strategies over a four year period to determine the profitability of each strategy (treatment) representing a farming system as well as looking at changes to soil physical, chemical and biological conditions.

The trial assumes that all nutrition packages included in the study have strengths and weaknesses and these trials will help in determining what they are.

A further objective is to strengthen relationships between farmers, scientists and industry to increase knowledge of soil biology and its applicability in Wheatbelt farming systems.

Aim

Comparing different methods of crop nutrition to provide some answers to the questions of farming profit and sustainability.

The specific aims are to compare different crop nutrition strategies over a four year period to

- Determine the profitability of each fertiliser strategy
- Identifying changes to soil physical, chemical and biological conditions.

Trial Details

2014 was the establishment year for this trial series. Two trials – 14GS40 at Rockliffe (Kojonup) and 14GS41 at Westendale (Wagin) - were established on 30m long and 1.8m wide plots with 22cm row spacing.

Soil samples were taken prior to seeding at 0-10cm, 10-20cm and 20-30cm depths and analysed for physico-chemical properties by Apal Agricultural Laboratory Magill South Australia (Table 1 appendix).

Plants were counted in each plot 4 weeks after seeding and calculated as plants/m^2. GreenSeeker NDVI (normalised difference vegetative index, an indicator of plant color and biomass synthesis) measurements at anthesis and peak season biomass cuts were taken from

Trial Details

each plot at Westendale site. These measurements were no taken at Rockliffe site due to its patchy growth.

Soil samples (0-10cm) were taken from each plot and sent to Microblitz University of Western Australia for biological analysis.

Plant height and lodging (9-0 score, 9 = no lodging, 0 = 100% lodging) were measured before harvest at both sites.

Using plot harvester, each plot was harvested individually with grain yield recorded and subsample kept for grain quality analysis.

After cleaning, grain physical quality was measured for average grain weight, hectolitre weight and screen following CBH protocols. Grain quality for protein, hardness, flour yield, flour swelling volume and water absorption was determined using NIR spectroscopy.

Data was analysed using Genstat 16th edition.

Full trial details are given below and trial locations are given in appendix 1.

Trial - 14GS40

- Property: Rockliffe (Kojonup). James & Nina Hope. RMB 301 Samson Rd Kojonup 6395. Tel - 0404910118, e-mail: jameshope@rockliffe.com.au
- Agzone 3: Growing Season rainfall (GSR) = 500mm
- Soil type: Sandy loam (4.38 % organic carbon)
- Paddock rotation: 2013 canola, 2012 oats 2011 lupin
- Sowing date: 4 June 2014
- Crop – Magenta wheat
- Seeding rate: 120 kg/ha in control and High input conventional and 80 kg/ha in rest of treatments

Trial - 14GS41

- Property: Westendale (Wagin). Rob & Caroline Rex. Westendale Grazing, 3199 Beaufort Rd Wagin 6315 WA. Tel - 98 626067, 0427 626067, e-mail: westendale2@bigpond.com
- Agzone 3: Growing Season rainfall (GSR) 350 mm
- Soil type: Loamy sand (1.71 % organic carbon)
- Paddock rotation: 2013 canola, 2012 oats, 2011pasture
- Sowing date: 5 June 2014
- Crop – Mace wheat
- Seeding rate: 100 kg/ha

Treatment detail

At each site –

Fertiliser strategies (treatments) = 9

Reps = 4

Total treatment plots = 36

Buffers = 29

Total plots = 61

Treatment description

T1. Nil – nil fertiliser. Sometimes this may come up trumps for profitability, but over time it needs to be measured for overall soil fertility.

T2. High input conventional – Standard agronomists package that is designed for yield, often high risk, and theoretically detrimental to soil health and function.

T3. Australian Mineral Fertiliser (AMF) – the package recommended by WMF that is claimed to make more profit and get the soil working through biological cycling.

T4. Australian Soil Planner Liquid – A liquid fertiliser model, a complete fertiliser with a milled phosphate form. Designed to promote mineral cycling, help soil structure and profit.

T5. Cropping Solutions (Agorganics Liquid) – a complete liquid package with a different form of phosphate not available with any other product. Designed to promote mineral cycling, help soil structure and profit.

T6. Biological (Worm/Compost Extract) – a very low cost liquid system that has been shown to work well when biological function is optimal. Aimed at optimising biological function to drive profit.

T7. Low input conventional – granular system, aimed at getting the soil working through lower inputs, basically working to a tight budget.

T8. Low input conventional and Biological – cutting conventional fertiliser rates, and replacing the cost, (or some of the cost) with inputs that stimulate soil function.

T9. Super buffer – compost (10t/ha)

Treatment design

Rockliffe **14GS40**

Run			
1		**BUFFER**	
2		**SUPER BUFFER**	T9
3		**BUFFER**	
4		**1001**	T4 ASPL
5		**1002**	T7 LIC
6		**BUFFER**	
7		**1003**	T2 HIC
8	**Rep 1**	**1004**	T5 AL
9		**BUFFER**	
10		**1005**	T8 LICB
11		**1006**	T3 AMF
12		**BUFFER**	

13		**1007**	T1 CONTROL	
14		**BUFFER**		
15		**1008**	T6 WCE	Individual buffers for T6
16		**BUFFER**		
17		**SUPER BUFFER**	T9	
18		**BUFFER**		
19		**1009**	T8 LICB	
20		**1010**	T5 AL	
21		**BUFFER**		
22		**1011**	T7 LIC	
23		**1012**	T3 AMF	
24	**Rep 2**	**BUFFER**		
25		**1013**	T4 ASPL	
26		**BUFFER**		
27		**1014**	T6 WCE	Individual buffers for T6
28		**BUFFER**		
29		**1015**	T2 HIC	
30		**1016**	T1 CONTROL	
31		**BUFFER**		
32		**SUPER BUFFER**	T9	
33		**BUFFER**		
34		**1017**	T3 AMF	
35		**1018**	T7 LIC	
36		**BUFFER**		
37		**1019**	T2 HIC	
38		**1020**	T8 LICB	
39	**Rep 3**	**BUFFER**		
40		**1021**	T1 CONTROL	
41		**1022**	T5 AL	

42		**BUFFER**		
43		**1023**	T6 WCE	Individual buffers for T6
44		**BUFFER**		
45		**1024**	T4 ASPL	
46		**BUFFER**		
47		**SUPER BUFFER**	T9	
48		**BUFFER**		
49		**1025**	T6 WCE	Individual buffers for T6
50		**BUFFER**		
51		**1026**	T7 LIC	
52		**1027**	T8 LICB	
53		**BUFFER**		
54	**Rep 4**	**1028**	T3 AMF	
55		**1029**	T1 CONTROL	
56		**BUFFER**		
57		**1030**	T2 HIC	
58		**1031**	T4 ASPL	
59		**BUFFER**		
60		**1032**	T5 AL	
61		**BUFFER**		

109.8m

30

Plot length (m)

Total area (ha) 0.3294

Westendale **14GS41**

Run				
1		**BUFFER**		
2		**SUPER BUFFER**	T9	
3		**BUFFER**		
4		1037	T2 HIC	
5		1038	T8 LICB	
6		**BUFFER**		
7		1039	T6 WCE	Individual buffers for T6
8	**Rep 1**	**BUFFER**		
9		1040	T5 AL	
10		1041	T3 WMF	
11		**BUFFER**		
12		1042	T7 LIC	
13		1043	T4 ASPL	
14		**BUFFER**		
15		1044	T1 CONTROL	
16		**BUFFER**		
17		**SUPER BUFFER**	T9	
18		**BUFFER**		
19		1045	T2 HIC	
20		**BUFFER**		
21		1046	T6 WCE	Individual buffers for T6
22		**BUFFER**		
23		1047	T3 WMF	
24	**Rep 2**	1048	T1 CONTROL	
25		**BUFFER**		
26		1049	T5 AL	
27		1050	T4 ASPL	
28		**BUFFER**		

29		1051	T7 LIC	
30		1052	T8 LICB	
31		**BUFFER**		
32		**SUPER BUFFER**	T9	
33		**BUFFER**		
34		1053	T7 LIC	
35		1054	T5 AL	
36		**BUFFER**		
37		1055	T6 WCE	Individual buffers for T6
38		**BUFFER**		
39	**Rep 3**	1056	T1 CONTROL	
40		1057	T3 WMF	
41		**BUFFER**		
42		1058	T8 LICB	
43		**BUFFER**		
44		1059	T4 ASPL	
45		1060	T2 HIC	
46		**BUFFER**		
47		**SUPER BUFFER**	T9	
48		**BUFFER**		
49		1061	T1 CONTROL	
50		1062	T7 LIC	
51		**BUFFER**		
52		1063	T5 AL	
53		1064	T4 ASPL	
54	**Rep 4**	**BUFFER**		
55		1065	T2 HIC	
56		1066	T8 LICB	
57		**BUFFER**		

58		1067	T3 WMF	
59		**BUFFER**		
60		1068	T6 WCE	Individual buffers for T6
61		**BUFFER**		

109.8m

30

Plot length (m)

Total area (ha) 0.3294

Assumptions used in Gross Margins

Costings 2014

Prices GST exclusive

Product	Cost/unit	Units	Freight/unit	Total Cost/unit
Seed				
Mace Wheat	$ 0.37	kg		$ 0.37
Magenta Wheat	$ 0.37	kg		$ 0.37
Seed Dressing				
Gaucho	$ 37.00	litre		$ 37.00
Microbe Premium Ag Blend	$ 116.00	kg		$ 116.00
Microlife	$ 20.00	litre		$ 20.00
SD 14	$ 7.70			$ 7.70
Fertiliser				
Agflow CZM:SOP blend	$ 0.85	Kg		$ 0.85
Agras extra	$ 0.62	kg		$ 0.62
Brix Master	$ 0.20	litre		$ 0.20
Agrical	$ 1.05		$ 0.05	$ 1.10
Calsap	$ 1.15	litre	$ 0.06	$ 1.21
Compost	$ 0.17	kg		$ 0.17
Compost extract	$ 0.03	litre		$ 0.03
Copper Tracer	$ 2.77	litre		$ 2.77
CS Red concent	$ 3.48	litres	$ 0.35	$ 3.83
Dolomite	$ 47.00	tonne		$ 47.00
Fine Phos	$ 1.15			$ 1.15
Flexi-N	$ 0.47	kg	$ 0.03	$ 0.50
Hi Cal	$ 0.04	kg	$ 0.02	$ 0.07

Humic acid	$ 2.00				$ 2.00
Burnt Lime	$ 90.00	tonne			$ 90.00
Lime sand	$ 35.00				$ 35.00
Limestone	$ 36.00				$ 36.00
Manganese	$ 1.05				$ 1.05
MAP	$ 0.69	kg			$ 0.69
MKP	$ 1.80				$ 1.80
NPK Crop	$ 0.73	kg			$ 0.73
Potassum sulphate (soluble)	$ 1.20	kg			$ 1.20
Sulphate of Ammonia	$ 0.22	kg	$	0.02	$ 0.24
Sulphate of Ammonia (bulk)	$ 0.19		$	0.03	$ 0.22
Super Phosphate	$ 0.32	kg	$	0.02	$ 0.34
UAN	$ 0.69	litre			$ 0.69
Urea	$ 0.60	kg			$ 0.60
WMF-N	$ 0.62	kg			$ 0.62
X14	$ 0.97	Litre			$ 0.97
Zinc Tracer	$ 2.77	Litre			$ 2.77
Chemical					
Glyphosate	$ 4.95	Litre			$ 4.95
Jaguar	$ 25.50	Litre			$ 25.50
Tigrex	$ 10.17	Litre			$ 10.17
LVE MCPA	$ 9.32	Litre			$ 9.32
Cypermethrin	$ 6.32	Litre			$ 6.32
Sprayseed	$ 8.00	Litre			$ 8.00
Trifluralin	$ 5.28	Litre			$ 5.28
Sakura	$ 0.30	Gram			$ 0.30
Operations					
Seed	$ 0.37	Kg			$ 0.37
Spray					
Spread					
Harvest	Similar for all treatments				$ 55.00
Costings for Operations costs					
Spray					$ 7.00
Seed					$ 38.00
Spread					$ 6.00
Spread Hi Rate Lime					$ 13.50
Wheat APW2 on farm					$ 260.00

Results

14GS40 - Rockliffe

General observations

Plant establishment was uneven at this site (Table 1) and varied significantly ($p<0.05$) among the treatments. In the beginning of season emerging seedlings were damaged in some of the plots by birds from nearby reserve. Site also had indications of rhizoctonia bare patches. Plants grown under High input conventional and Super buffer treatments were at least 5cm taller than rest of the treatments except Low input conventional. No lodging was observed and hence no treatment difference.

Table 1. Impact of different fertiliser strategies on plant density, NDVI, dry matter yield, plant height and lodging at Rockliffe.

Fertiliser strategy	Plant counts (/m^2)	NDVI	Dry matter yield (t/ha)	Plant height (cm)	Lodging (9-0)
Control	73	-	-	74	9
High input conventional	103	-	-	83	9
Australian Mineral Fertiliser	62	-	-	75	9
Australian Soil Planner Liquid	57	-	-	78	9
Cropping Solutions (Agroganics Liquid)	46	-	-	76	9
Biological (worm/compost extract)	66	-	-	75	9
Low input conventional	63	-	-	80	9
Conventional biological	61	-	-	78	9
Super Buffer (compost)	69	-	-	83	9
Average	**67**	**-**	**-**	**78**	**9**
LSD (p<0.05)	23	-	-	5	ns

Grain yield

Wheat grain yield varied between fertiliser strategies with High input conventional and Super Buffer producing significantly higher yield (p<0.05) than rest of the treatments. Lowest grain yield of 1.5 t/ha was achieved at control whilst the highest 3.2 t/ha was achieved at High input conventional treatments.

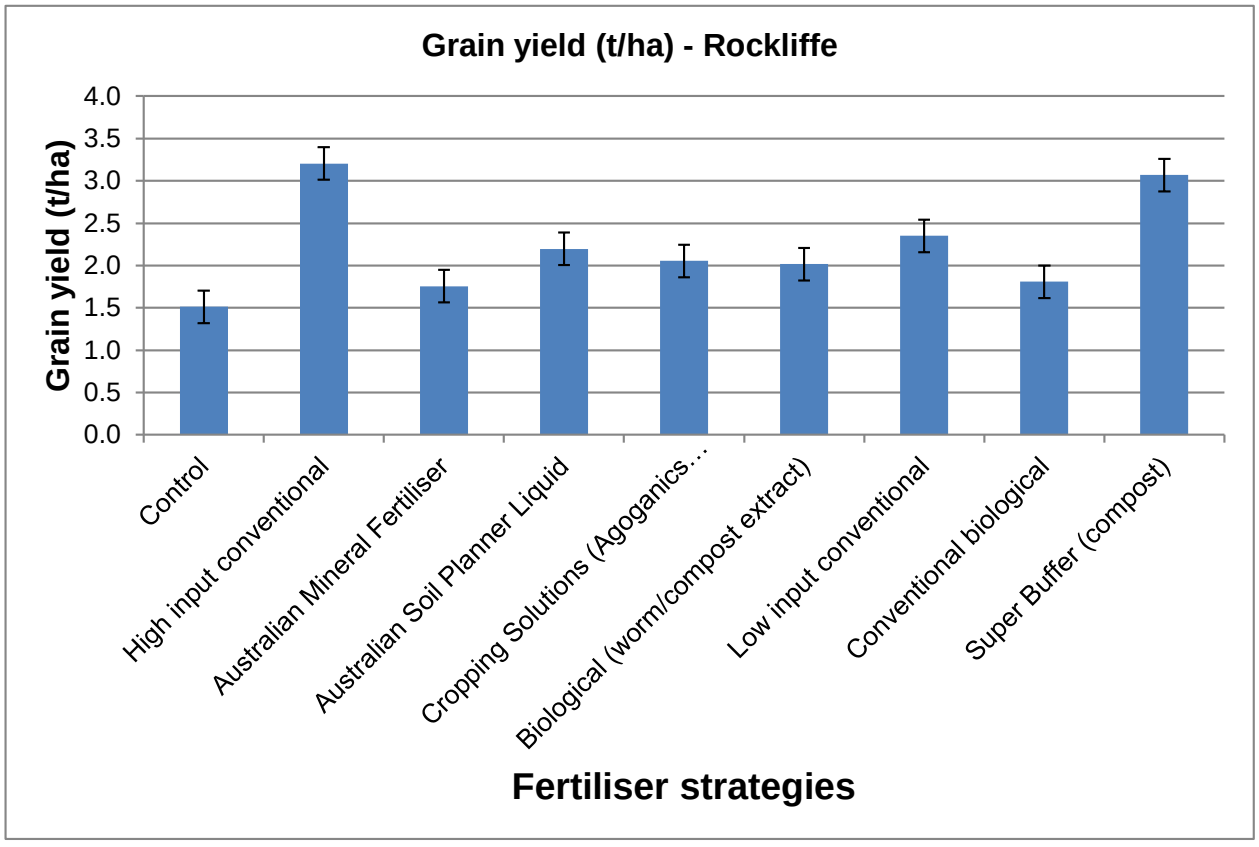

Figure 1. Effect of different fertiliser strategies on wheat grain yield at Rockliffe (LSD p<0.05 = 0.7 t/ha).

Gross margins

There was significant difference (p<0.05) between fertiliser strategies for gross margins. Whist High input conventional system was most profitable with $380/ha, Super buffer was most unprofitable with income loss of $1065/ha. Despite the higher grain yield (3.1 t/ha), it didn't offset the higher cost ($1700/ha) of compost applied in this treatment.

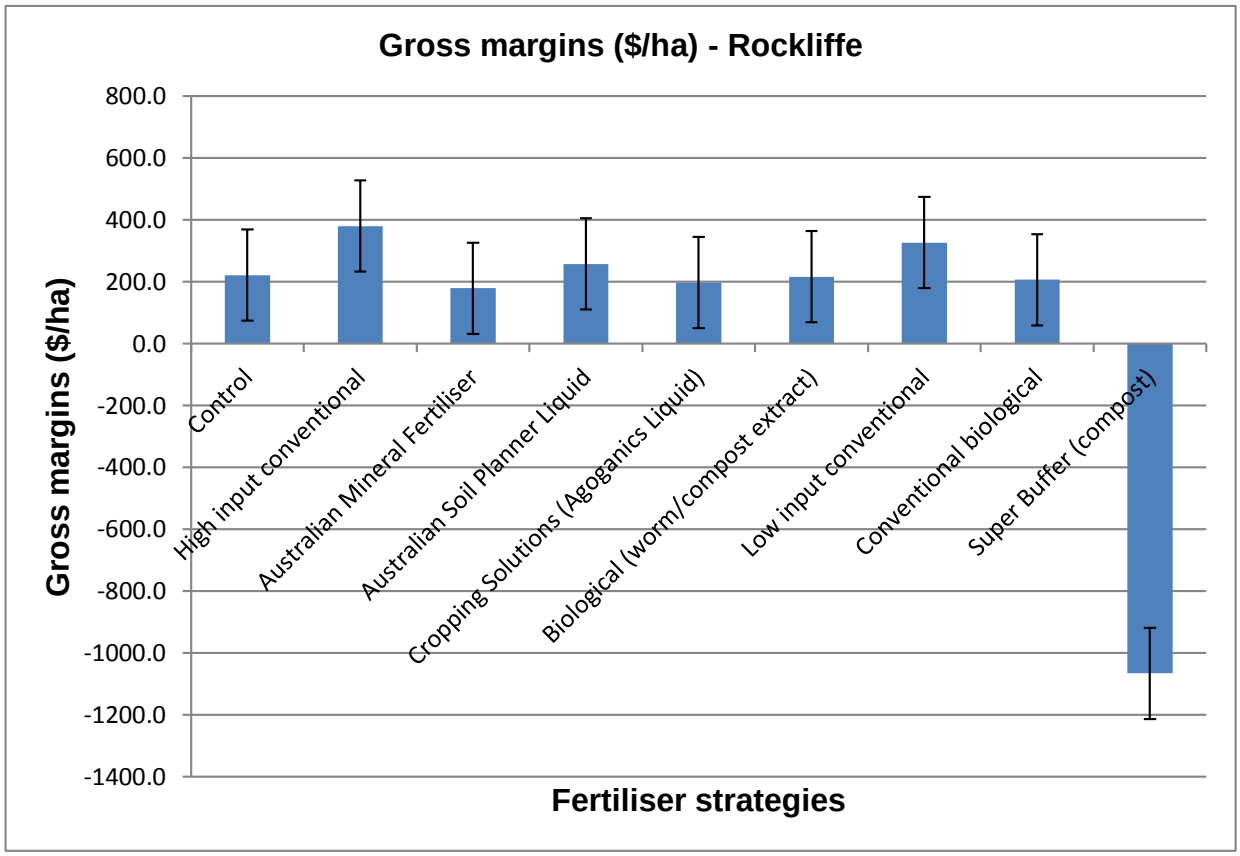

Figure 2. Effect of different fertiliser strategies on wheat gross margins at Rockliffe (LSD p<0.05 = $186/ha).

Grain quality

There was no significant (p<0.05) treatment effect on any of the quality parameters measured (Table 2) and they successfully met CBH receival standards for APW1.

Table 2. Impact of different fertiliser strategies on wheat grain quality at Rockliffe.

Fertiliser strategy	Av grain wt (mg)	Hectolitre wt (kg/hl)	Screenings (%, <2.5mm)	Screenings (%, <2.2mm)	Screenings (%, <2.0mm)
Control	42.42	81.30	7.72	1.59	1.25
High input conventional	43.44	81.40	7.18	1.80	1.37
Australian Mineral Fertiliser	43.68	81.80	6.27	1.44	1.08
Australian Soil Planner Liquid	42.54	81.47	8.90	1.50	1.04
Cropping Solutions (Agroganics Liquid)	42.81	81.69	6.84	1.53	1.13
Biological (worm/compost extract)	42.87	81.53	7.46	1.80	1.32
Low input conventional	43.96	81.87	6.98	1.98	1.63
Conventional biological	43.08	81.69	7.37	1.65	1.21
Super Buffer (compost)	-	-	-	-	-
Average	**43.10**	**81.59**	**7.34**	**1.66**	**1.25**
LSD (p<0.05)	ns	ns	ns	ns	ns
Fertiliser strategy	**Protein (%)**	**Hardness (%)**	**Flour yield (%)**	**Flour swelling volume (%)**	**Water absorption (%)**
Control	10.88	10.66	73.32	19.88	64.77
High input conventional	10.85	11.34	73.33	19.49	64.65
Australian Mineral Fertiliser	10.82	10.41	72.64	18.89	64.64
Australian Soil Planner Liquid	10.86	9.62	73.32	19.05	65.59
Cropping Solutions (Agroganics Liquid)	10.79	10.89	73.08	19.17	64.39
Biological (worm/compost extract)	11.23	9.72	73.18	19.19	65.35

Low input conventional	10.76	10.33	73.57	18.85	64.56
Conventional biological	11.06	10.90	72.48	19.39	64.44
Super Buffer (compost)	-	-	-	-	-
Average	**10.90**	**10.48**	**73.11**	**19.24**	**64.80**
LSD (p<0.05)	ns	ns	ns	ns	ns

14GS42 - Westendale

General observations

Plant establishment was very even at this site (Table 3) with no visible patchiness. There were no significant (p>0.05) treatment effects on dry matter yield, height and lodging. However, plant grown under High input conventional, Australian Soil Planner Liquid and Super Buffer were significantly greener (p<.05) than rest of the treatments.

Table 3. Impact of different fertiliser strategies on plant density, NDVI, dry matter yield, plant height and lodging at Westendale.

Fertiliser strategy	Plant counts (/m^2)	NDVI	Dry matter yield (t/ha)	Plant height (cm)	Lodging (9-0)
Control	196	0.379	8.5	84	9
High input conventional	183	0.559	9.3	85	9
Australian Mineral Fertiliser	187	0.489	9.2	84	9
Australian Soil Planner Liquid	170	0.532	9.1	85	9
Cropping Solutions (Agroganics Liquid)	172	0.502	9.0	86	9
Biological (worm/compost extract)	173	0.434	9.6	81	9
Low input conventional	184	0.470	9.1	85	9
Conventional biological	182	0.448	8.0	81	9
Super Buffer (compost)	178	0.506	9.5	84	9
Average	**181**	**0.480**	9.0	**84**	**9**
LSD (p<0.05)	ns	0.053	ns	ns	ns

Grain yield

Wheat grain yield varied between fertiliser strategies significantly (p<0.05) with control yield producing lower yield (3.5 t/ha) than rest of the treatments except Conventional Biological where it produced statistically similar yield. For rest of the treatment yield varied between 4.1 to 4.4 t/ha.

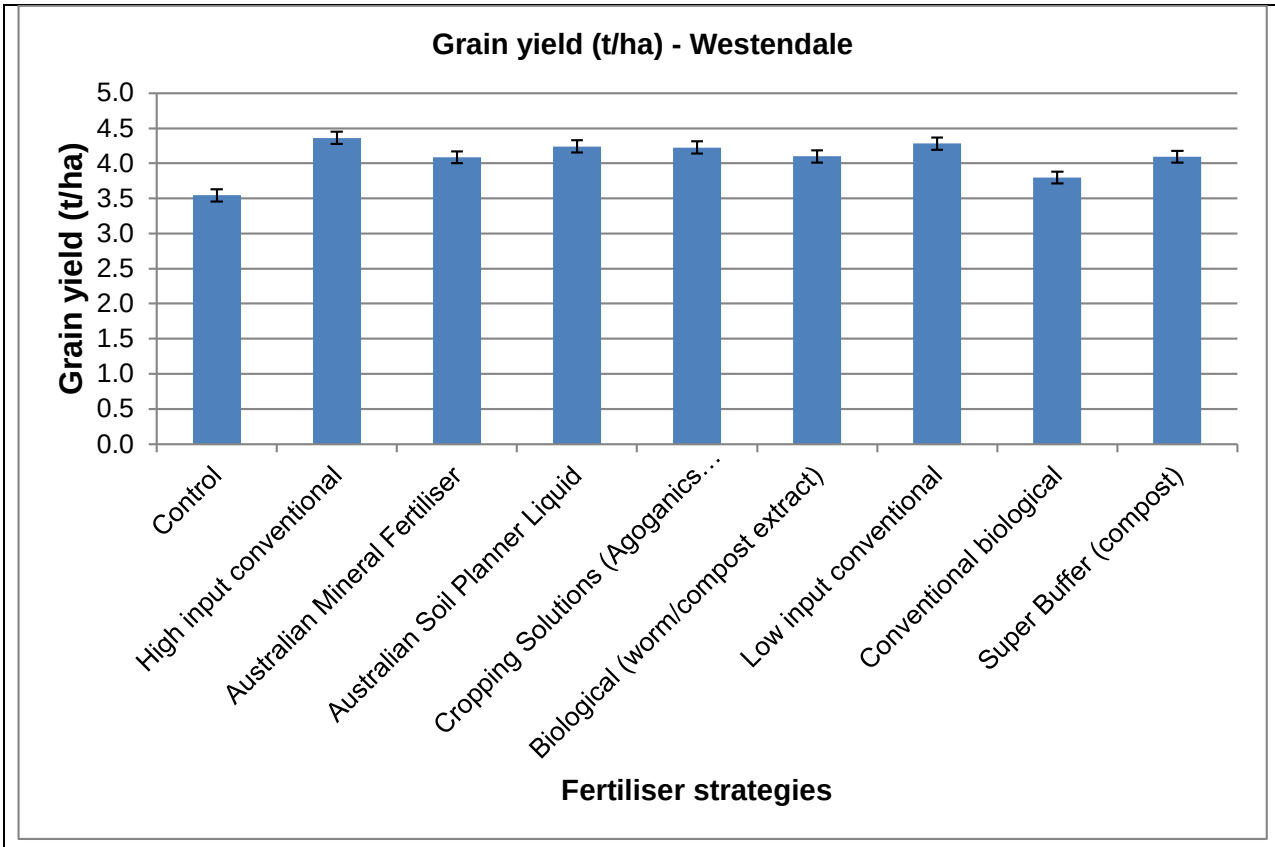

Figure 3. Effect of different fertiliser strategies on wheat grain yield at Westendale (LSD p<0.05 = 0.5 t/ha).

Gross margins

There was significant difference ($p<0.05$) between fertiliser strategies for gross margins. Whist there was no significant ($p<0.05$) difference between fertiliser treatments including control, Super Buffer was most unprofitable with income loss of $830/ha. Despite the grain yield (4.1 t/ha), it didn't offset the higher cost ($1700/ha) of compost applied in this treatment.

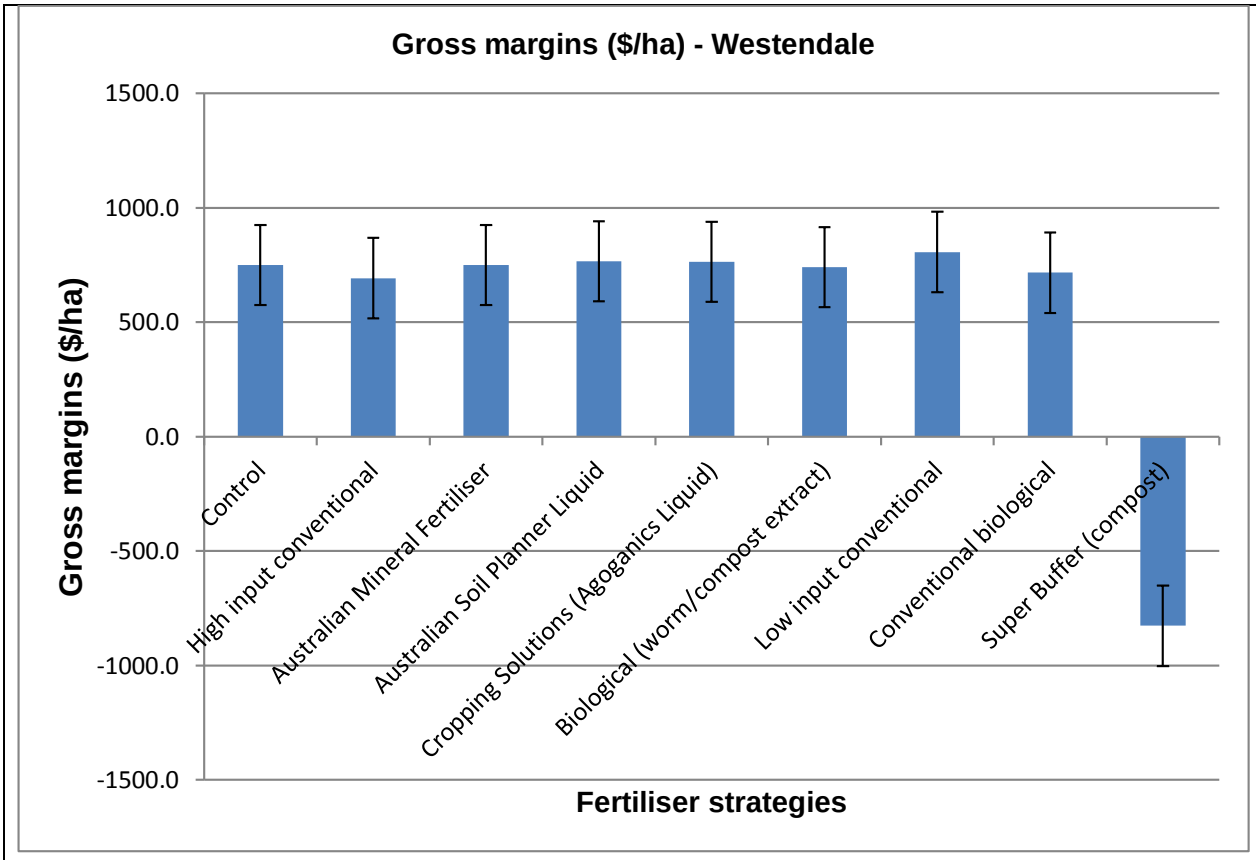

Figure 4. Effect of different fertiliser strategies on wheat gross margins at Westendale (LSD p<0.05 = $120/ha).

Grain quality

There was no significant (p<0.05) treatment effect on any of the physical grain quality parameters except on hectolitre weight (Table 4) in High input conventional. All physical quality parameters successfully met CBH receival standards for APW1. There were some treatment difference for grain hardness and water absorptions. Grain from control and Australian Mineral Fertiliser treatments were relatively harder than others due to less absorption of water (Table 4).

Table 4. Impact of different fertiliser strategies on wheat grain quality at Westendale.

Fertiliser strategy	Av grain wt (mg)	Hectolitre wt (kg/hl)	Screenings (%, <2.5mm)	Screenings (%, <2.2mm)	Screenings (%, <2.0mm)
Control	43.73	82.02	6.03	1.85	1.39
High input conventional	41.79	80.99	9.62	1.65	1.12
Australian Mineral Fertiliser	43.49	81.96	8.02	2.24	1.86
Australian Soil Planner Liquid	42.76	81.38	8.46	1.57	1.14
Cropping Solutions (Agroganics Liquid)	43.56	81.82	6.46	1.32	1.01
Biological (worm/compost extract)	43.40	81.83	6.37	1.60	1.15
Low input conventional	42.97	81.57	6.54	1.42	1.12
Conventional biological	43.11	81.18	7.22	1.64	1.24
Super Buffer (compost)	-	-	-	-	-
Average	**43.10**	**81.59**	**7.34**	**1.66**	**1.25**
LSD (p<0.05)	ns	0.61	ns	ns	ns
Fertiliser strategy	**Protein (%)**	**Hardness (%)**	**Flour yield (%)**	**Flour swelling volume (%)**	**Water absorption (%)**
Control	9.93	16.76	75.73	19.13	60.52
High input conventional	10.53	12.37	75.34	18.14	64.23
Australian Mineral Fertiliser	10.12	16.04	75.72	18.82	61.41
Australian Soil Planner Liquid	10.24	13.81	75.45	19.64	63.21
Cropping Solutions (Agroganics Liquid)	10.54	15.11	75.84	18.25	62.23

Biological (worm/compost extract)	10.13	14.52	75.55	19.39	62.31
Low input conventional	10.10	14.77	74.62	18.77	62.64
Conventional biological	10.21	13.87	74.67	18.36	63.40
Super Buffer (compost)	-	-	-	-	-
Average	**10.23**	**14.66**	**75.37**	**18.81**	**62.49**
LSD (p<0.05)	ns	1.76	ns	ns	1.18

Extension

A Field Day was organised at Westendale site on 14 October 2014. A total of 30 participants attended t

Table 5. Response of participants to Field Day event conducted at Westendale on 14 October 20

Evaluation Questions (1=Lowest)	1 (Low)	2	3	4
Pace of Workshop	0%	0%	28%	50%
Quality of event/Workshop Content	0%	0%	11%	56%
Facilitator(s)/presenter(s)	0%	0%	17%	50%
Organisation	0%	0%	6%	44%
Participants involvement	0%	0%	17%	50%
Quality and quantity of handouts provided	0%	6%	28%	50%
Venue	0%	0%	0%	44%
Catering (if applicable)	0%	0%	11%	11%
My knowledge & Skills (Before w/shop)	11%	11%	39%	28%
My knowledge & Skills (After w/shop)	0%	0%	22%	67%
My willingness to act (Before w/shop)	0%	6%	39%	44%
My willingness to act (After w/shop)	0%	0%	6%	78%

30 Farm Weekly Thursday, November 6, 2014 WEEKLY FARMING

New legume pasture a salinity solution

THE Evergreen Farming Group has established large scale trials of the new annual pasture legume messina which is able to fill a niche in salty areas prone to waterlogging where other pasture legumes are unsuitable.

Supported by the Department of Agriculture and Food (DAFWA) and South West Catchments Council (SWCC), the trials will compare the production and persistence of messina with balansa clover, another legume that can tolerate waterlogging but has limited salt tolerance.

The trial includes a new cultivar of messina developed as part of the Future Farm Industries CRC.

The cultivar is currently being 'bulked up' in South Australia with commercial seed expected to be available in 2016.

Woodanilling farmer Graydn Wilcox, who is hosting one of the trials, believes that if they prove successful, the legume will sell itself.

"Our property would be 45-50 per cent saline, so if it's half as good as what it's made out to be, it will make quite a difference for us," Mr Wilcox said.

The easily accessed trial site has been visited by approximately 60 farmers over two field days during the past month and the feedback has been overwhelmingly positive.

Farmers from Nyabing to Manjimup and Mt Barker attending both the Evergreen Farming field walk and the Southern DIRT field walk were impressed with its growth habit and its ability to provide a leguminous option for saline land.

The farmers were keen to find out when the seed would be commercially available.

Evergreen Farming executive officer Erin Gorter was excited to see the messina growing so well.

"Many of our members have been eagerly awaiting a legume for the more saline waterlogged country," Ms Gorter said.

"As a farmer myself with some of that sort of country, I can't wait to get some on our place to help that part of the landscape become more productive."

The trial is one of 31 projects funded by SWCC's sustainable agriculture team to improve soil health and productivity in the region.

This project is supported by the South West Catchments Council, through funding from the Australian Government and the WA Government.

❒ Large scale trials of the new annual pasture legume messina have impressed farmers who have inspected them.

Trial tests crop nutrition strategies

THE Bugs and Biology Grower Group has captured the attention of farmers with a new trial which will compare gross margin and soil health under eight different crop nutrition strategies.

The trial aims to answer questions being asked about the effects of different management techniques on soils and profit, particularly in the long-term.

It will compare high and low input conventional strategies with five alternative strategies across two farms.

Bugs and Biology Growers chairman Rob Rex said the group is not looking for silver bullets.

"It's not about finding which strategy is best. We want to know what alternative strategies have to offer so we have tools for different situations," Mr Rex said.

The group collaborated with Evergreen Farming to host a field walk west of Wagin that attracted 30 people and featured talks about two of the strategies being trialled.

Col Bowey, CB Farming Systems, described his strategy of building the soil with organic matter, promoting its breakdown into stable forms of carbon and addressing toxic elements, such as with liming programs and softer phosphate options.

"A potential benefit of this approach is the increased ability of crops to withstand more extreme stresses when pushing potential yield," Mr Bowey said.

"In good years the high input system can reap rewards, but in poorer years we've all see crops just stop and die.

"We want to find out if the addition of organic matter will improve the soil and help crops see out the finish of the year."

Agronomist Ken Bailey spoke about his strategy of blending compost with minerals such as phosphate, lime and trace elements.

"We are seeing what effect 0.5 tonnes per hectare will have," Mr Bailey said.

"We can apply these relatively low rates by incorporating clay with the compost which makes a massive difference to the formation of humus in the product."

The replicated trial has so far acquired four years of funding from federal and WA governments and the South West Catchments Council.

The Department of Agriculture and Food will implement the trial and provide independent analysis of the results.

Acknowledgements

Australian Government Department of Agriculture, Community Landcare Grants program for funding the project, DAFWA Research Support Unit for trial operations, Microblitz University of Australia for conducting soil biology analysis, South West Catchments Council for funding years 2015-2017 to extend this trial - and of course the host farmers Rob & Caroline Rex and James & Nina Hope.

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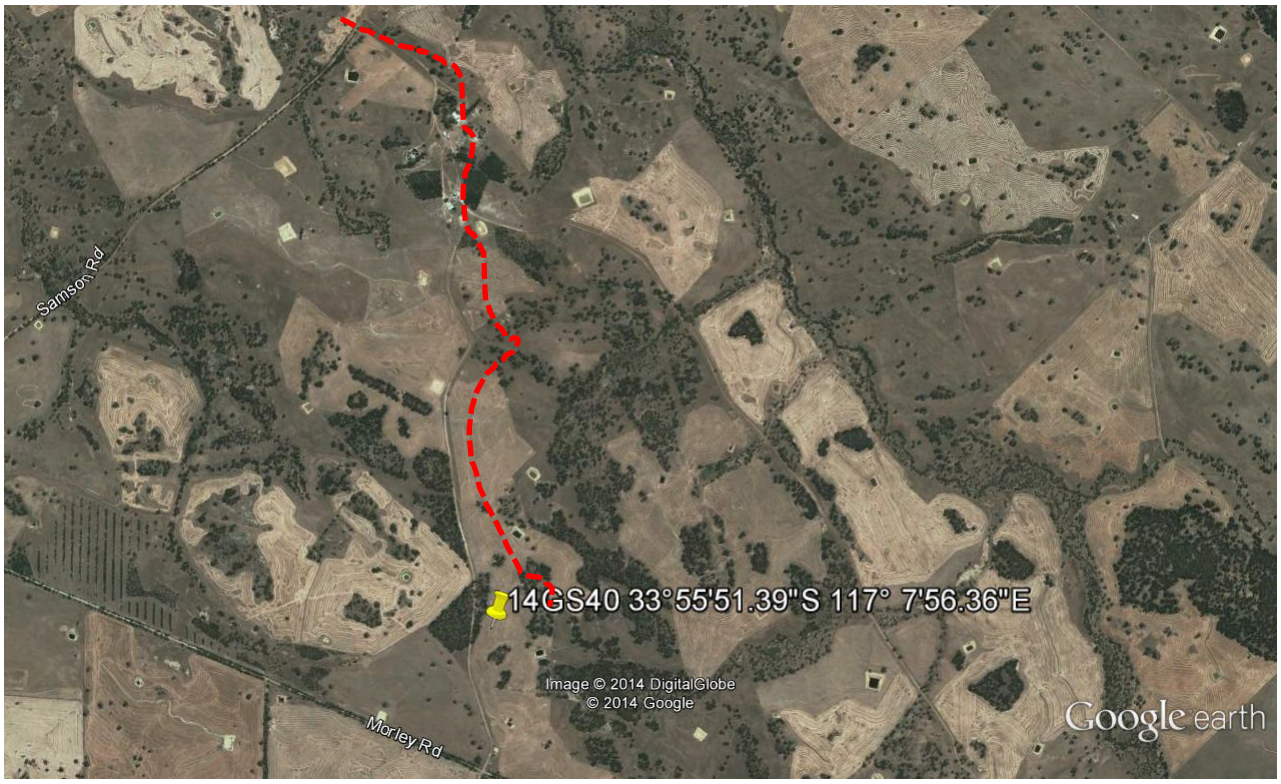
Appendix

Trial locations

NORTH ⇧

14GS40 – James & Nina Hope “Rockliffe” off Samson Rd, South Kojonup SCALE: 3cm = 1km



ROBERT & CAROLINE REX – “Westendale Grazing” off Beaufort Rd, west Wagin SCALE: Scale: 5cm = 1km

Table 1. Soil Analysis results – prior to seeding Feb 2014

14GS40 - Rockliffe

Property	Unit	0-10cm	10-20cm	20-30cm
pH_{Water}		5.44	5.73	5.92
pH_{CaCl}		4.81	4.94	5.12
$EC_{1:5}$	dS/m	0.09	0.04	0.04
Chloride	mg/kg	12.34	10.29	10.97
Boron	mg/kg	0.56	0.53	0.55
Organic Carbon	%	4.38	1.26	0.80
Colwell P	mg/kg	55.72	7.15	3.57
Total P	mg/kg	490.01	130.04	95.03
Colwell K	mg/kg	106.67	80.45	91.76
Sulphur	mg/kg	46.64	29.80	23.91
Exchangeable Ca	mg/kg	750.21	593.55	545.50
Exchangeable Ca	meq/100g	3.74	2.96	2.72
Exchangeable Ca	%	82.94	78.88	76.80
Exchangeable Mg	mg/kg	56.35	68.50	73.49
Exchangeable Mg	meq/100g	0.46	0.56	0.60
Exchangeable Mg	%	10.25	15.10	16.88
Exchangeable K	mg/kg	58.39	45.30	38.50
Exchangeable K	meq/100g	0.15	0.12	0.10
Exchangeable K	%	3.32	3.10	2.80
Exchangeable Na	mg/kg	36.13	25.07	27.56
Exchangeable Na	meq/100g	0.16	0.11	0.12
Exchangeable Na	(ESP) %	3.49	2.92	3.52
CEC	meq/100g	4.51	3.75	3.55
Zinc	mg/kg	0.66	0.18	0.16
Copper	mg/kg	0.29	0.20	0.21
Manganese	mg/kg	5.54	2.00	2.00
Iron	mg/kg	30.57	16.29	16.99
Molybdenum	mg/kg	4.11	3.68	2.80
Aluminium	mg/kg	4.58	0.53	0.19
NO3 Nitrate	mg/kg	29.50	7.73	10.01
NH4 Ammonium	mg/kg	13.35	2.80	2.93
Total N (Dumas)	%	0.31	0.10	0.08
PBI Index		271.23	203.72	157.82

14GS41 - Westendale

Property	Unit	0-10cm	10-20cm	20-30cm
pH_{Water}		5.61	5.86	6.14
pH_{CaCl}		4.74	4.70	4.81
$EC_{1:5}$	dS/m	0.07	0.04	0.04
Chloride	mg/kg	26.05	14.40	15.08
Boron	mg/kg	0.61	0.43	0.52
Organic Carbon	%	1.71	0.48	0.32
Colwell P	mg/kg	40.77	16.81	8.60
Total P	mg/kg	230.42	100.17	66.91
Colwell K	mg/kg	141.14	145.43	123.65
Sulphur	mg/kg	11.58	5.57	4.57
Exchangeable Ca	mg/kg	645.38	326.43	243.95
Exchangeable Ca	meq/100g	3.22	1.63	1.22
Exchangeable Ca	%	70.75	61.22	50.66
Exchangeable Mg	mg/kg	101.85	79.35	92.26
Exchangeable Mg	meq/100g	0.84	0.65	0.76
Exchangeable Mg	%	18.19	24.10	30.91
Exchangeable K	mg/kg	73.98	39.22	31.05
Exchangeable K	meq/100g	0.19	0.10	0.08
Exchangeable K	%	4.04	3.81	3.40
Exchangeable Na	mg/kg	73.37	65.99	84.58
Exchangeable Na	meq/100g	0.32	0.29	0.37
Exchangeable Na	(ESP) %	7.01	10.86	15.03

CEC	meq/100g	4.57	2.67	2.42	
Zinc	mg/kg	1.16	0.28	0.20	
Copper	mg/kg	0.54	0.29	0.29	
Manganese	mg/kg	11.19	4.56	2.75	
Iron	mg/kg	121.60	51.44	47.12	
Molybdenum	mg/kg	0.63	0.57	0.40	
Aluminium	mg/kg	2.67	1.84	0.85	
NO3 Nitrate	mg/kg	3.08	1.78	1.26	
NH4 Ammonium	mg/kg	11.83	3.23	2.73	
Total N (Dumas)	%	0.14	0.06	0.05	
PBI Index		38.05	29.15	25.74	