Comparing Single species to Multispecies, Tansey

Proposed Trial Details

Planting and Fertilising

Paddock 1

20 acres millet, irrigated, to be fertilised with Urea

13 acres planted 05.10.24 and remaining 7 acres planting 29.10.24, seed on hand

Will be fertilised (Urea), fertiliser on hand

Paddock 2

35 acres Summer Crop Mix (25 acres irrigated, 10 acres dryland), will be fertilised with Chicken Manure (5acres), 20 acres Microbes (2 applications). Trial area sizes, products and applications as per discussions and recommendations with Tim from Kandanga Farm Store. All costs associated have been invoiced by Kandanga Farm Store ($4,939.80 including GST, and we are very grateful that they have provided a substantial discount to support this trial and enable us to have everything needed/recommended).

Soil Testing

Soil Testing to be coordinated by Kandanga Farm store (EAL in Lismore). Also testing Microbial Mass and Fungal to Bacteria ratio (Microbometer) and Brix Refractometer will be used to record plant sugars/minerals/vitamin content. *Comparing this data to end weight gain in cattle also.

Trial Details

Planting and Fertilising

Paddock 1 (pivot circle 1)

- 20 acres millet, irrigated, to be fertilised with Urea
- 13 acres planted 05.10.24 and remaining 7 acres planting 29.10.24, seed on hand

Paddock 2 (pivot circle 2)

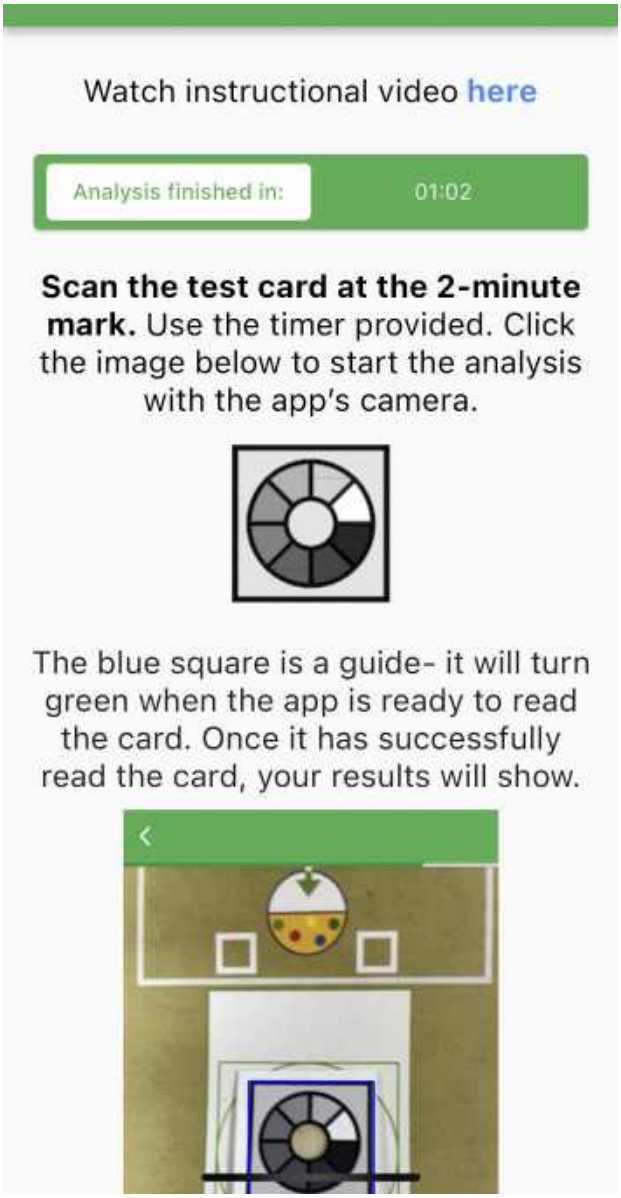
- 35 acres Summer Crop 2024 Mix (25 acres irrigated, 10 acres dryland), will be fertilised with Chicken Manure (5acres), 20 acres Microbes (2 applications)

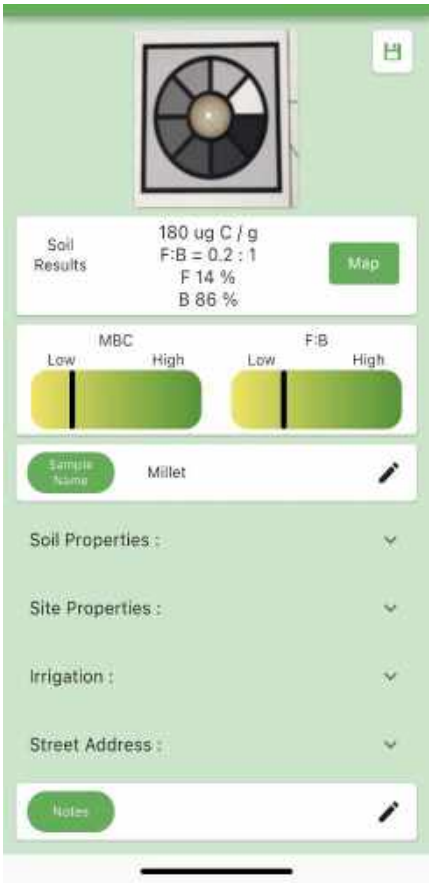
Soil Testing

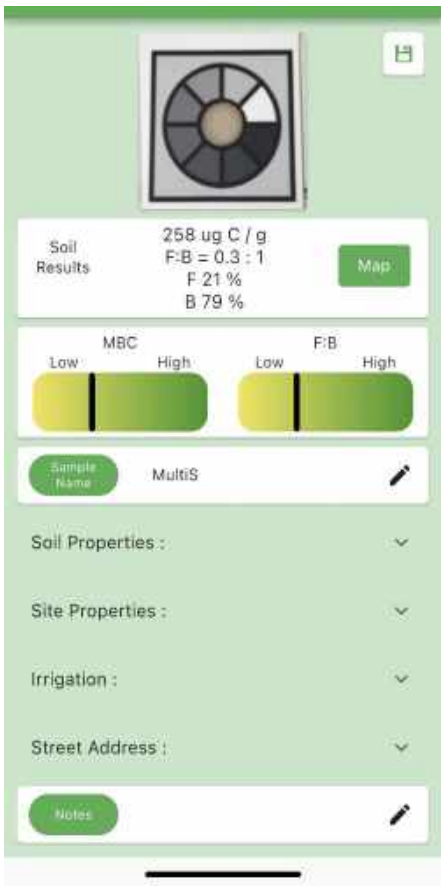
Pre Testing

Soil Testing EAL Results attached as Annexure A. Comparative testing to be completed at end of Winter crop rotation.

Microbometer testing:




Soil Results
180 ug C / g
F:B = 0.2 : 1
F 14 %
B 86 %
Map
MBC
Low
High
F:B
Low
High
Sample Name
Millet
Soil Properties :
Site Properties :
Irrigation :
Street Address :
Notes


Soil Results
258 ug C / g
F:B = 0.3 : 1
F 21 %
B 79 %
Map
MBC
Low
High
F:B
Low
High
Sample Name
MultiS
Soil Properties :
Site Properties :
Irrigation :
Street Address :
Notes


MultiS
Millet

Trial Information

Rainfall

9th October 80mm

24th October 15mm

31 October 24mm

5th November 7mm

9th November 2mm

11th November 17mm

13th November 36mm

14th November 23mm

19th November 3mm

20th November 3mm

22nd November 4mm

1st December 37mm

11th December 94mm

13th December 20mm

15th December 10mm

16th December 40mm

17th December 20mm

18th December 25mm

29h December 5mm

30th December 10mm

1st January 2025 32mm

2nd January 6mm

10th January 100mm

13th January 20mm

19th January 6mm

March 2025 total 326mm

Irrigation

Did not use irrigation (pivot circle 1 or pivot circle 2) during the trial

Plating

Millet:

- Planted Panorama Millet 5th October, 12 acres
- Planted Panorama Millet 28th October, 12 acres
- No Urea applied, too wet

Multispecies

- Planted 38 acres under pivot circle 2, 10th November
- Fertilised with Poultry Manure (Terra Firma), approx. 200kg per acre, 5 acre test strip, 11th November
- Activfert microbiome spray application – not applied, too wet at planting and grew too quickly to apply when the black soil was dry enough for tractor.

Photos

Planting – 10th November 2024

Germination: 16th November 2024

20th November 2024 – Day 10

28th November 2024 – Day 18

10th December 2024 – Day 30

14th December 2024 – Day 34

18th December 2024 – Day 38

5th January 2025 – Day 56

30th January 2025 – Site visit Ann McKenzie BCCA, refractometer testing

7th February 2025 – Day 88

31st March 2025 – New shoot after 5inches of rain

Overall Findings

Paddock 1 Millet

- Estimated yield 6-8 tonne dry matter per hectare. On par with previous seasons
- Some millet died out due to wet feet
- Cattle went straight onto feed when gates were opened. Previous seasons have been controlled feeding (strip feed moving electric fencing). Not able this season due to weather
- Crop quality good to average as expected with no fertiliser.

Paddock 2 Multispecies

- Estimated yield 10-12 tonne dry matter per hectare
- Some died out due to wet feet (all species affected)
- Possibly started off looking deficient in something but grew quickly and colour improved substantially during the growing period
- Would have liked to get cattle onto the paddock sooner when it was prime but couldn't due to weather/black soil
- Good strike of all the species planted
- At peak prior to opening gates Sunflowers were approx. 10ft in places, beans growing gup sunflower stalks, huge number of insects, good refractometer results (see below), thick growth in most areas of all species
- When cattle went into paddock, they showed a preference to eating the grasses first
- Cattle often observed eating the leaves off the stalks of the Sun hemp and Sunflower

- No oblivious (visual) improvement in the test strip Terra Firma Poultry Manure – may have been too wet I that area and lost its benefit. Would possible trial again another time.
- Visually appeared to produce better results in the virgin soil planted edge of paddock
- After 5 inches of rain in March we locked cattle off paddock and could confidently say that the regrowth would provide another round of feed in 1 month
- Will definitely continue to trial Multispecies given the results of this trial
- Based on visual inspection of cattle they have performed well on the feed (both weight and body score), found the feed to be highly palatable, and continue to move towards the feed nightly (even when it appeared that improved pastures in surrounding areas would be more palatable and easier to access).
- Feral pigs were frequenting the MS paddock, passing Lucerne and other palatable crops to get to the MS. We can only assume the variety of crop and nutrient value was better to them then the surrounding areas.

Cattle Mob 1 put onto Millet Paddock Feed 25th November 2024 (45 head backgrounders mix heifers and steers)

Cattle Mob 2 put onto MS Paddock Feed 30th January 2025 2024 (45 head backgrounders mix heifers and steers). *Note: Cows and Calves were also fed on the MS paddock because there was so much feed. Not initialled consider for the trial but didn't want the quality feed to be wasted.*

Paddock Split 2 mobs have been used for the trial. 1 mob on Millet and 1 mob on MS. They have been kept separate. Weights for both can be provided.

* Unfortauinetly during the trial our scales broke and we will weigh the scale as soon as possible and will provide an update on cattle weights shortly

Next Steps After seeing what has regrown/germinated we now plan to mulch the MS, mulch plant Winter multispecies Kandanga Farm Stall mix and apply ActivFert Soil Life. Oats will be planted where Millet was (pivot circle 1) s a comparison crop.

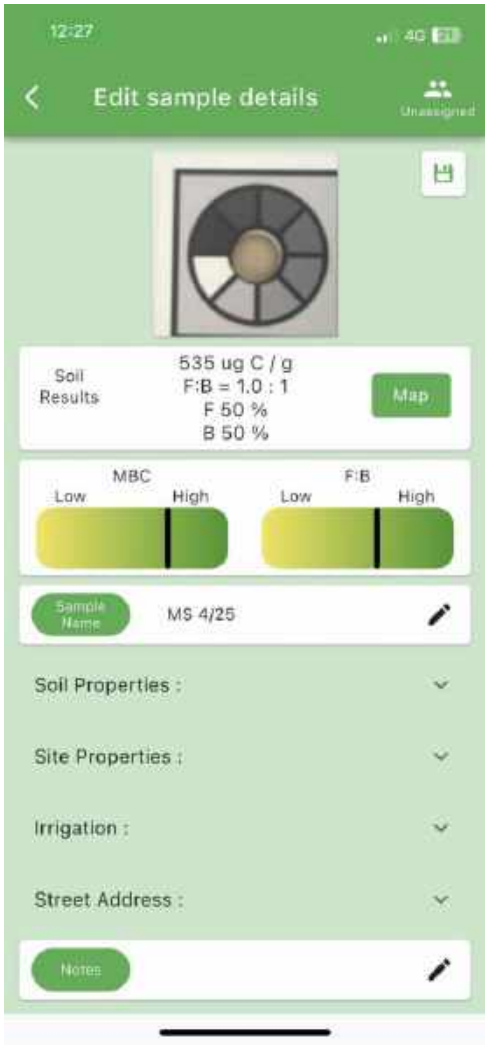
Post Trial Soil Testing

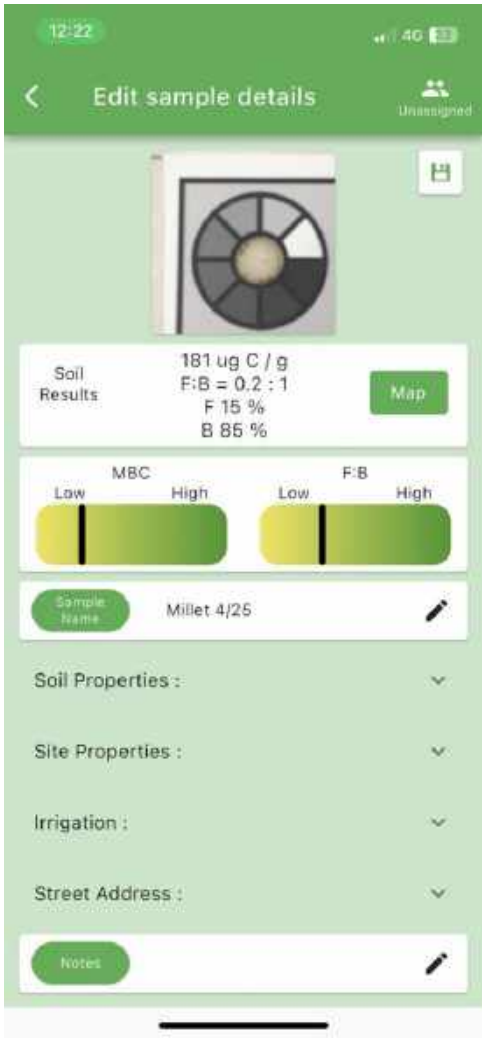
Soil Testing Pre EAL Results attached as annexure A, Post EAL testing will be performed after Winter MS crop round is completed

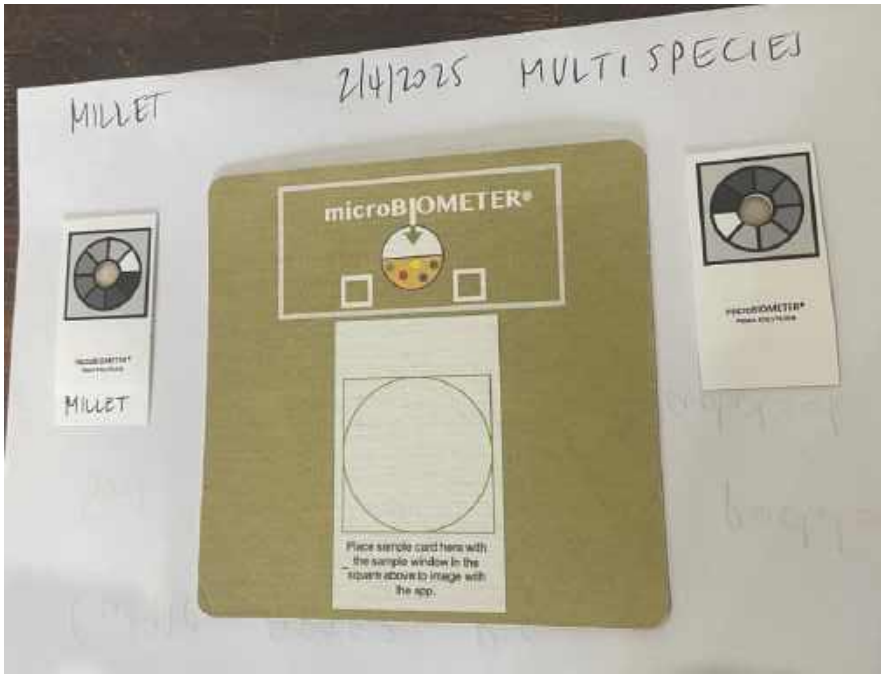
Brix Refractometers readings

- Ann McKenzie did a site visit just prior to letting cattle onto feed.
- Using refractometer, we took readings of the Cow Pea, Lablab, Sorghum, Sunflower, Sun hemp and Soy Bean. All tested between 10-15 Brix %
- Ann was very excited and pleased with the results measured on her visit.
- Millet testing the following week at 5-10%. Millet was aged at this stage.

Microbometer testing 02/04/2025:







Millet 4/25

,
2025-04-02

Soil Results
181 ug C / g
F:B = 0.2 : 1
F 15 %
B 85 %

Millet

,
2024-11-12

Soil Results
180 ug C / g
F:B = 0.2 : 1
F 14 %
B 86 %

MultiS 4/25

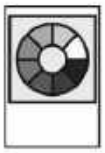
,
2025-04-02

Soil Results
535 ug C / g
F:B = 1.0 : 1
F 50 %
B 50 %

MultiS

,
2024-11-12

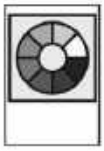
Soil Results
258 ug C / g
F:B = 0.3 : 1
F 21 %
B 79 %



MultiS 4/25

,
2025-04-02

Soil Results
535 ug C / g
F:B = 1.0 : 1
F 50 %
B 50 %



MS 4/25

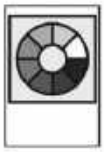
,
2025-04-02

Soil Results
535 ug C / g
F:B = 1.0 : 1
F 50 %
B 50 %

Millet 4/25

,
2025-04-02

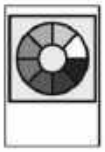
Soil Results
181 ug C / g
F:B = 0.2 : 1
F 15 %
B 85 %



Millet

,
2024-11-12

Soil Results
180 ug C / g
F:B = 0.2 : 1
F 14 %
B 86 %



MultiS

,
2024-11-12

Soil Results
258 ug C / g
F:B = 0.3 : 1
F 21 %
B 79 %

Annexure A – Soil Testing

Environmental Analysis Laboratory

Southern Cross University

Certificate of Analysis E24-00-0942

Client:	Bos Rural Supplies	Laboratory:	Environmental Analysis Laboratory
Contact:	Amber Scott	Contact:	EAL Customer Service Team
Address:	PO Box 93, KANDANGA, QLD 4570, Australia	Address:	PO Box 157, East Lismore NSW 2480 Australia
Telephone:	0428 776 348	Telephone:	(02) 6620 3678
Email:	info@kandangafarmstore.com.au	Email:	eal@scu.edu.au

Customer reference:	Lehmann	Request ID:	EAL /E24-00-0942
Number of samples:	2	Report ID:	E24-00-0942_RCOAP1_1
Date samples received:	15 November 2024	Issue date:	28 November 2024

Authorised by:	Brian Smith
Position:	Senior Technical Officer

ASPAC NATA

Comments: EAL is a NATA accredited laboratory (14960), accredited for compliance with ISO/IEC 17025 - Testing.

Certificate of Analysis

Request ID: EAL/E24-00-0942 Report ID: E24-00-0942_RCOAP1_1 Issue date: 28 November 2024

				Client Sample ID:	1	2
				Sample Date:	5 November 2024	5 November 2024
				Your Client:	Lehmann	Lehmann
				EAL Sample ID:	E24-00-0942-0001	E24-00-0942-0002
Parameter	Unit	Method Reference	LOR	---	---	
Calcium - Soluble	mg/kg	** Inhouse S10 - Morgan 1	<10	1660	2630	
Magnesium - Soluble	mg/kg	** Inhouse S10 - Morgan 1	<1	680	916	
Potassium - Soluble	mg/kg	** Inhouse S10 - Morgan 1	<25	69	53	
Phosphorus - Soluble	mg/kg	** Inhouse S10 - Morgan 1	<1	6.0	8.9	
Phosphorus - Bray 1	mg/kg	** Rayment & Lyons 2011 - 9E2	<1	28	19	
Phosphorus - Colwell	mg/kg	** Rayment & Lyons 2011 - 9B2	<1	100	76	
Phosphorus - Bray 2	mg/kg	** Inhouse S3A	<1	88	64	
Nitrate-N - KCl extractable	mg/kg	** Inhouse S37	<0.1	24.0	15.3	
Ammonium-N - KCl extractable	mg/kg	** Inhouse S37	<0.1	3.3	3.0	
Sulfur - KCl extractable	mg/kg	** Inhouse S37	<1	17	43	
pH (H2O)	units	Rayment & Lyons 2011 - 4A1	---	6.37	7.66	
Electrical Conductivity	dS/m	Rayment & Lyons 2011 - 3A1	<0.005	0.135	0.238	
Calcium - Exchangeable	cmol+/kg	Rayment & Lyons 2011 - 15D3	<0.05	20.1	31.1	
Calcium - Exchangeable	kg/ha	Rayment & Lyons 2011 - 15D3	<22	9000	14000	
Calcium - Exchangeable	mg/kg	Rayment & Lyons 2011 - 15D3	<10	4020	6230	
Magnesium - Exchangeable	cmol+/kg	Rayment & Lyons 2011 - 15D3	<0.01	11.9	15.5	
Magnesium - Exchangeable	kg/ha	Rayment & Lyons 2011 - 15D3	<2	3250	4220	
Magnesium - Exchangeable	mg/kg	Rayment & Lyons 2011 - 15D3	<1	1450	1880	
Potassium - Exchangeable	cmol+/kg	Rayment & Lyons 2011 - 15D3	<0.12	0.68	0.71	
Potassium - Exchangeable	kg/ha	Rayment & Lyons 2011 - 15D3	<112	593	626	
Potassium - Exchangeable	mg/kg	Rayment & Lyons 2011 - 15D3	<50	265	279	
Sodium - Exchangeable	cmol+/kg	Rayment & Lyons 2011 - 15D3	<0.065	0.47	1.13	
Sodium - Exchangeable	kg/ha	Rayment & Lyons 2011 - 15D3	<33	241	584	
Sodium - Exchangeable	mg/kg	Rayment & Lyons 2011 - 15D3	<15	108	261	
Aluminium - Exchangeable	cmol+/kg	** Inhouse S37	<0.01	0.03	0.06	
Aluminium - Exchangeable	kg/ha	** Inhouse S37	<1	5.6	12	
Aluminium - Exchangeable	mg/kg	** Inhouse S37	<1	2.5	5.3	
Hydrogen - Exchangeable	cmol+/kg	** Rayment & Lyons 2011 - 15G1	<0.01	0.11	< 0.01	
Hydrogen - Exchangeable	kg/ha	** Rayment & Lyons 2011 - 15G1	<1	2.4	< 1	
Hydrogen - Exchangeable	mg/kg	** Rayment & Lyons 2011 - 15G1	<1	1.1	< 1	
Calcium - Base Saturation	%	** Calculation	<0.1	60	64	
Magnesium - Base Saturation	%	** Calculation	<0.1	36	32	
Potassium - Base Saturation	%	** Calculation	<0.1	2.0	1.5	
Sodium - Base Saturation (ESP)	%	** Calculation	<0.1	1.4	2.3	
Aluminium - Base Saturation	%	** Calculation	<0.1	< 0.1	0.1	
Hydrogen - Base Saturation	%	** Calculation	<0.1	0.3	< 0.1	
Calcium/Magnesium Ratio	---	** Calculation	<0.1	1.7	2.0	
Effective Cation Exchange Capacity	cmol+/kg	** Calculation	---	33.3	48.4	
Zinc - DTPA	mg/kg	Rayment & Lyons 2011 - 12A1	<0.5	2.7	1.2	
Manganese - DTPA	mg/kg	Rayment & Lyons 2011 - 12A1	<0.1	47.6	15.2	
Iron - DTPA	mg/kg	Rayment & Lyons 2011 - 12A1	<0.5	130	34.8	
Copper - DTPA	mg/kg	Rayment & Lyons 2011 - 12A1	<0.1	2.8	2.0	
Boron - CaCl2 extractable	mg/kg	** Rayment & Lyons 2011 - 12C2	<0.1	1.4	1.1	
Silicon - CaCl2 extractable	mg/kg	** Inhouse S11	<1	98	89	
Carbon - Total	%	Inhouse S4a	<0.02	3.69	3.59	
Nitrogen - Total	%	Inhouse S4a	<0.02	0.26	0.27	
Carbon : Nitrogen Ratio	Ratio	Inhouse S4a	<1	14.2	13.2	
Estimated Organic Matter	%	Inhouse S4a	<0.04	6.46	6.28	
Basic Texture	---	** Inhouse S65	---	Clay	Clay	

Certificate of Analysis

Request ID: EAL/E24-00-0942 Report ID: E24-00-0942_RCOAP1_1 Issue date: 28 November 2024

				Client Sample ID:	1	2
				Sample Date:	5 November 2024	5 November 2024
				Your Client:	Lehmann	Lehmann
				EAL Sample ID:	E24-00-0942-0001	E24-00-0942-0002
Parameter	**Unit**	**Method Reference**	**LOR**		—	—
Basic Colour	—	** Inhouse 565	—		Brownish	Black
Maximum Soil Chloride Estimate	mg/kg	** Calculation (Electrical Conductivity x 640)	—		86	152

			Guideline:	Heavy Soil Guidelines	Light Soil Guidelines	Medium Soil Guidelines	Sandy Soil Guidelines
Parameter	**Unit**	**Method Reference**		—	—	—	—
Calcium - Soluble	mg/kg	** Inhouse 510 - Morgan 1		1150	375	750	175
Magnesium - Soluble	mg/kg	** Inhouse 510 - Morgan 1		160	60	105	25
Potassium - Soluble	mg/kg	** Inhouse 510 - Morgan 1		115	60	75	50
Phosphorus - Soluble	mg/kg	** Inhouse 510 - Morgan 1		15	10	12	5.0
Phosphorus - Bray 1	mg/kg	** Rayment & Lyons 2011 - 9E2		48	24	30	20
Phosphorus - Colwell	mg/kg	** Rayment & Lyons 2011 - 9B2		80	45	50	35
Phosphorus - Bray 2	mg/kg	** Inhouse 53A		90	48	60	40
Nitrate-N - KCl extractable	mg/kg	** Inhouse 537		15	10	13	10
Ammonium-N - KCl extractable	mg/kg	** Inhouse 537		20	15	18	12
Sulfur - KCl extractable	mg/kg	** Inhouse 537		10.0	8.0	8.0	7.0
pH (H2O)	units	Rayment & Lyons 2011 - 4A1		6.5	6.3	6.5	6.3
Electrical Conductivity	dS/m	Rayment & Lyons 2011 - 3A1		0.200	0.120	0.150	0.100
Calcium - Exchangeable	cmol+/kg	Rayment & Lyons 2011 - 15D3		15.6	5.0	10.8	1.9
Calcium - Exchangeable	kg/ha	Rayment & Lyons 2011 - 15D3		7000	2240	4816	840
Calcium - Exchangeable	mg/kg	Rayment & Lyons 2011 - 15D3		3125	1000	2150	375
Magnesium - Exchangeable	cmol+/kg	Rayment & Lyons 2011 - 15D3		2.4	1.2	1.7	0.60
Magnesium - Exchangeable	kg/ha	Rayment & Lyons 2011 - 15D3		650	325	448	168
Magnesium - Exchangeable	mg/kg	Rayment & Lyons 2011 - 15D3		290	145	200	75
Potassium - Exchangeable	cmol+/kg	Rayment & Lyons 2011 - 15D3		0.60	0.40	0.50	0.30
Potassium - Exchangeable	kg/ha	Rayment & Lyons 2011 - 15D3		526	336	426	224
Potassium - Exchangeable	mg/kg	Rayment & Lyons 2011 - 15D3		235	150	190	100
Sodium - Exchangeable	cmol+/kg	Rayment & Lyons 2011 - 15D3		0.3	0.22	0.26	0.11
Sodium - Exchangeable	kg/ha	Rayment & Lyons 2011 - 15D3		155	113	134	57
Sodium - Exchangeable	mg/kg	Rayment & Lyons 2011 - 15D3		69	51	60	25
Aluminium - Exchangeable	cmol+/kg	** Inhouse 537		0.6	0.4	0.5	0.2
Aluminium - Exchangeable	kg/ha	** Inhouse 537		121	73	101	30
Aluminium - Exchangeable	mg/kg	** Inhouse 537		54	32	45	14
Hydrogen - Exchangeable	cmol+/kg	** Rayment & Lyons 2011 - 15G1		0.6	0.4	0.5	0.2
Hydrogen - Exchangeable	kg/ha	** Rayment & Lyons 2011 - 15G1		13	8	11	3
Hydrogen - Exchangeable	mg/kg	** Rayment & Lyons 2011 - 15G1		6	4	5	2
Calcium - Base Saturation	%	** Calculation		77.6	65.6	75.7	57.4
Magnesium - Base Saturation	%	** Calculation		11.9	15.7	11.9	18.1
Potassium - Base Saturation	%	** Calculation		3.0	5.2	3.5	9.1
Sodium - Base Saturation (ESP)	%	** Calculation		1.5	2.9	1.8	3.3
Aluminium - Base Saturation	%	** Calculation		3.0	5.2	3.5	6.0
Hydrogen - Base Saturation	%	** Calculation		3.0	5.2	3.5	6.0
Calcium/Magnesium Ratio	—	** Calculation		6.5	4.2	6.4	3.2
Effective Cation Exchange Capacity	cmol+/kg	** Calculation		20.1	7.8	14.3	3.3
Zinc - DTPA	mg/kg	Rayment & Lyons 2011 - 12A1		6.0	4.0	5.0	3.0
Manganese - DTPA	mg/kg	Rayment & Lyons 2011 - 12A1		25	18	22	15
Iron - DTPA	mg/kg	Rayment & Lyons 2011 - 12A1		25	18	22	15
Copper - DTPA	mg/kg	Rayment & Lyons 2011 - 12A1		2.4	1.6	2.0	1.2
Boron - CaCl2 extractable	mg/kg	** Rayment & Lyons 2011 - 12C2		2.0	1.4	1.7	1.0
Silicon - CaCl2 extractable	mg/kg	** Inhouse 511		50	40	45	35
Carbon - Total	%	Inhouse 54a		>3.1	>2.0	>2.6	>1.4
Nitrogen - Total	%	Inhouse 54a		>0.38	>0.20	>0.25	>0.15
Carbon : Nitrogen Ratio	Ratio	Inhouse 54a		10-12	10-12	10-12	10-12

Certificate of Analysis

Request ID: EAL/E24-00-0942 Report ID: E24-00-0942_RCOAP1_1 Issue date: 28 November 2024

		Guideline	Heavy Soil Guidelines	Light Soil Guidelines	Medium Soil Guidelines	Sandy Soil Guidelines
Parameter	Unit	Method Reference	—	—	—	—
Estimated Organic Matter	%	Inhouse S4a	>5.5	> 3.5	> 4.5	> 2.5
Basic Texture	—	** Inhouse S65	—	—	—	—
Basic Colour	—	** Inhouse S65	—	—	—	—
Maximum Soil Chloride Estimate	mg/kg	** Calculation (Electrical Conductivity x 640)	—	—	—	—

Notes:

- All results presented as a 40°C oven dried weight. Soil sieved and lightly crushed to < 2 mm.
- Conversions to kg/ha = mg/kg x 2.24.
- Soluble salts are included in exchangeable cation results. No pre-wash is carried out unless specifically requested.
- The chloride estimate result (Electrical Conductivity x 640) is considered an estimate, and is generally an over-estimate.
- ** denotes NATA accreditation does not cover the performance of this service.
- All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (available on request or at scu.edu.au/eal).
- Analysis conducted between sample arrival date and reporting date.
- This report is not to be reproduced except in full.
- Results only relate to the item tested.
- Indicative guidelines are based on 'Albrecht' and 'Reams' concepts.
- Guidelines for phosphorus have been reduced for Australian soils.
- Methods from Rayment and Lyons, 2011. Soil Chemical Methods - Australasia. CSIRO Publishing, Collingwood.
- The Morgan 1 Extract is adapted from 'Science in Agriculture', 'Non-Toxic Farming', and 'LaMotte Soil Handbook'.
- Conversions for 1 cmol+/kg = 230 mg/kg Sodium, 390 mg/kg Potassium, 122 mg/kg Magnesium, 200 mg/kg Calcium

Annexure B – Cattle Observation Photos

Backgrounders BEFORE – Purchased at Sale

Backgrounders AFTER –

Multispecies grazing