Seasol Pasture Evaluation Trial

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2. Introduction

One small plot replicated field trial as conducted between October 2022 and May 2023 to determine the effect of Seasol Pasture Products on pasture production and plant nutrient uptake.

This report contains the experimental methods used and presents the results obtained.

3. Experimental Details

Trial Location Details
Lance Field, Edwards Road, Burnham

Trial Design

Table 1: Trial design	
Design:	Randomised Complete Block
Replicates:	Eight
Plot Size:	10 x 1.5
Buffer details:	No buffer between plots
Application date 1:	19 October 2022
Application date 2:	1 December 2022
Application date 3:	11 January 2022
Application date 4:	24 February 2022

Treatments

All treatments were applied as a liquid using a compressed CO_2 backpack sprayer with four Hardi MD02 air induction flat fan nozzles. Pressure was 280 kPa and the water rate applied was 200L/ha. Urea was dissolved in water prior to applications. The treatments were reapplied after each harvest.

Table 2: Treatment methods and sprayer output	
1:	Untreated
2:	Urea at 50 kg/ha
3:	PastureMasta at 10 L/ha
4:	PastureMasta at 10 L/ha + Urea at 50 kg/ha
5:	Urea at 25 kg/ha
6:	PastureMasta at 10 L/ha + Urea at 25 kg/ha
7:	Seasol Commercial at 10 L/ha
8:	Seasol Trilogy at 10 L/ha

Statistical analysis

Data generated in this trial was managed and statistically analysed within ARM (Agriculture Research Manager), a data management package used for planning, recording, evaluation and retrieval of trial data.

Data analysed using Analysis of Variance, using Duncan's New MRT multiple range comparison test.

LSD (P=.10) Least significant difference at the 90% confidence level.

4. RESULTS

Yield

Urea treatments and PastureMasta + Urea treatments had a significantly higher yield than the untreated control at the first harvest (Table 3). PastureMasta, Seasol Commercial and Seasol Trilogy treatments did not significantly differ from the control. Urea 50 kg/ha, PastureMasta + Urea 50 kg/ha and Urea 25 kg/ha had the highest yields, ranging from 1950-2030 kg DM/ha. This was significantly higher than all treatments apart from PastureMasta + Urea 25 kg/ha. The yield of PastureMasta + Urea 25 kg/ha were not significantly higher than PastureMasta, Seasol Commercial and Trilogy.

At the next assessment, all treatments apart from PastureMasta had a higher yield than the control. Once again Urea 50 kg/ha and Urea 50 kg/ha + PastureMasta had the highest yield but this was not significantly higher than any of the treatments apart from PastureMasta and Trilogy.

On 17/02/2023, Urea 50 kg/ha and Urea 50 kg/ha + PastureMasta had the highest yield of 1550 kg DM/ha. This was significantly higher than all treatments apart from Urea 25 kg/ha and PastureMasta + Urea 25 kg/ha. PastureMasta, Seasol Commercial and Trilogy did not significantly differ from the control.

At the final assessment, Urea 50 kg/ha and Urea 50 kg/ha + PastureMasta had the highest yield of 2430 kg DM/ha and 2490 kg DM/ha respectively. Urea 25 kg/ha and Urea 25 kg/ha + PastureMasta had the next highest yield of ~2100 kg DM/ha. Trilogy had the next highest yield of 1670 kg DM/ha which was significantly higher than the control but not PastureMasta and Seasol Commercial. PastureMasta and Seasol Commercial did not significantly differ from the control.

Urea 50 kg/ha and Urea 50 kg/ha + PastureMasta had the highest total yield of ~7300 kg DM/ha, followed by Urea 25 kg/ha and Urea 25 kg/ha + PastureMasta with ~6700 kg DM/ha. Seasol Commercial and Trilogy had a higher total yield than the untreated control with an increase of 540 kg DM/ha and 610 kg DM/ha, respectively. PasutreMasta had an increase of 390 kg DM/ha when compared to the control. However, this was not significantly higher than the untreated control.

Table 3: Pasture Yield Kg DM/ha								
Trt No	Treatment	Rate	Appl Code	24/11/2022	4/01/2023	17/02/2023	26/04/2023	Total Yield Dry Matter
1	Untreated	-		1627 c	909 d	1214 c	1454 d	5202 d
2	Urea	50 kg/ha	A	2030 a	1303 a	1553 a	2434 a	7320 a
3	PastureMasta	10 L/ha	A	1706 bc	1049 cd	1279 bc	1555 cd	5588 cd
4	PastureMasta + Urea	10 L/ha + 50 kg/ha	A	2014 a	1310 a	1527 a	2494 a	7345 a
5	Urea	25 kg/ha	A	1947 a	1231 ab	1425 ab	2040 b	6643 b
6	PastureMasta + Urea	10 L/ha + 25 kg/ha	A	1868 ab	1226 ab	1452 ab	2185 b	6730 b
7	Seasol Commercial	10 L/ha	A	1763 bc	1143 abc	1279 bc	1554 cd	5740 c
8	Seasol Trilogy	10 L/ha	A	1773 bc	1116 bc	1247 bc	1674 c	5810 c
LSD P=.10				160.8	154.7	188.0	191.2	456.6
Standard Deviation				191.8	184.6	224.2	228.1	544.7
CV				10.40	15.90	16.34	11.86	8.65
F. Probability				0.0004	0.0008	0.0151	0.0001	0.0001

Root DW

Treatment had no effect on root dry weight with treatments ranging from 0.0828 to 0.0899 kg DM/spade square (Table 4).

Table 4: Pasture root DW (kg DM/spade square) on 26/04/2023				
Trt. No.	Treatment	Rate	Appl Code	Root DW (kg DM/spade square)
1	Untreated		A	0.0896
2	Urea	50 kg.ha	A	0.0853
3	PastureMasta	10 L/ha	A	0.0873
4	PastureMasta + Urea	10 L/ha + 50 kg/ha	A	0.0860
5	Urea	25 kg/ha	A	0.0863
6	PastureMasta + Urea	10 L/ha + 25 kg/ha	A	0.0889
7	Seasol Commercial	10 L/ha	A	0.0828
8	Seasol Trilogy	10 L/ha	A	0.0899
LSD P = .10				0.00820
Standard Deviation				0.01714
CV %				4.8
F Probability				0.858

Soil Test

An initial soil test of the trial site was taken on 20 September 2022 prior to the first application and a following soil test was taken on 24 May 2023 at the end of the trial (Table 5). The treatments had little effect on pH with pH ranging from 6.2-6.6. All treatments had a lower Olsen P than the untreated control (35 mg/L) with Trilogy having the lowest Olsen P of 13 mg/l. Potassium was higher than the untreated control in all treatments apart from Trilogy.

Potentially available nitrogen was highest in the Urea 50 kg/ha treatment. The remaining treatments had equal or slightly lower potentially available nitrogen than the control.

Table 5: Soil test results of initial test (20 September 2022) and Treatments (24 May 2023)

Analysis	Initial	Trt 1	Trt 2	Trt 3	Trt 4	Trt 5	Trt 6	Trt 7	Trt 8
pH	6.3	6.6	6.5	6.5	6.5	6.5	6.4	6.3	6.2
Olsen P (mg/L)	27	35	19	20	15	18	18	15	13
Potassium (me/100g)	0.83	0.54	1.04	0.80	0.80	1.09	0.68	0.88	0.42
Calcium (me/100g)	10.1	10.0	10.6	9.0	9.2	11.3	8.1	7.6	7.1
Magnesium (me/100g)	1.55	1.61	1.61	1.15	1.25	1.49	1.15	1.10	1.05
Sodium (me/100g)	0.14	0.16	0.16	0.14	0.14	0.18	0.13	0.16	0.16
CEC (me/100g)	17	17	19	15	16	19	15	16	15
Total Base Saturation (%)	74	74	72	72	72	76	66	61	60
Volume Weight (g/ml)	0.83	0.86	0.74	0.89	0.80	0.77	0.90	0.83	0.90
Potentially Available N (kg/ha)	175	207	247	171	182	206	177	177	172
Anaerobically Mineralisable N (ug/g)	140	160	222	128	152	178	132	143	127
Organic Matter (%)	9.3	11.5	14.0	9.0	10.8	11.1	9.1	8.7	8.1
Total Carbon (%)	5.4	6.7	8.1	5.2	6.3	6.5	5.2	5.0	4.7
Total Nitrogen (%)	0.49	0.48	0.59	0.39	0.45	0.50	0.39	0.41	0.37
C/N Ratio	10.9	13.8	13.7	13.5	13.8	12.8	13.3	12.2	12.6
Anaerobically Minerablisble N/Total N Ratio (%)	2.8	3.3	3.8	3.3	3.3	3.5	3.3	3.5	3.4

4.3 Foliage Test

There were few large differences in the foliage analysis between the treatments. Foliage nitrogen % was 2.0% in the untreated control at the first assessment. PastureMasta, Urea 50 kg/ha + PastureMasta, Seasol Commercial and Trilogy had slightly higher nitrogen % while the remaining treatments had a slightly lower nitrogen % than the control. Nitrogen % had increased by the second assessment with the untreated control having 2.8%. Treatments containing PastureMasta, Seasol Commercial and Trilogy had a slightly higher nitrogen % than the Urea 25 and 50 kg/ha treatments.

Some nutrients, such as phosphorous, sulphur, calcium, and sodium, were slightly increased when PastureMasta was added to urea 50 kg/ha.

Metabolisable energy (ME) increased for all treatments between the two assessments. At the November assessment ME was higher than the control in Treatment 4, 7 and 8.

Table 6: Foliage analysis - 25 November 2022

Analysis	Trt 1	Trt 2	Trt 3	Trt 4	Trt 5	Trt 6	Trt 7	Trt 8
Nitrogen %	2.0	1.7	2.3	2.1	1.8	1.9	2.1	2.2
Nitrogen %DM	2.1	1.8	2.4	2.2	1.8	2.0	2.2	2.3
Phosphorus %	0.27	0.28	0.27	0.31	0.31	0.30	0.30	0.29
Potassium %	2.8	2.7	3.0	2.6	2.6	2.9	2.9	3.0
Sulhpur %	0.24	0.21	0.25	0.25	0.25	0.24	0.27	0.24
Calcium %	0.54	0.45	0.46	0.56	0.55	0.53	0.56	0.37
Magnesium %	0.15	0.15	0.14	0.17	0.16	0.16	0.15	0.13
Sodium %	0.152	0.106	0.106	0.166	0.145	0.168	0.133	0.111
Iron mg/kg	79	65	80	81	93	90	79	70
Manganese mg/kg	37	31	35	34	37	42	40	42
Zinc mg/kg	19	18	22	18	18	19	19	20
Copper mg/kg	5	5	6	5	6	5	6	6
Boron mg/kg	6	5	6	7	9	6	9	5
Molybdenum mg/kg	0.93	1.32	1.05	1.48	1.61	1.06	0.98	1.09
Cobalt mg/kg	0.04	0.04	0.04	0.04	0.05	0.04	0.05	0.03
Selenium mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chloride %	1.5	1.53	1.52	1.14	1.01	1.48	1.29	1.67
Crude Protein %DM	13.2	11.3	15.3	13.9	11.5	12.3	13.6	14.5
DOMD* %	62.4	57.9	59.4	63.3	60.0	59.7	63.3	63.8
Metabolisable Energy MJ/kgDM	10.0	9.3	9.5	10.1	9.6	9.6	10.1	10.2

Table 7: Foliage Analysis - 24 May 2023								
Analysis	Trt 1	Trt 2	Trt 3	Trt 4	Trt 5	Trt 6	Trt 7	Trt 8
Nitrogen %	2.8	2.8	2.9	3.0	2.8	3.1	2.9	3.2
Nitrogen %DM	2.9	2.9	3.0	3.1	2.9	3.2	3.0	3.4
Phosphorus %	0.43	0.35	0.38	0.38	0.38	0.37	0.36	0.43
Potassium %	3.6	3.4	3.6	3.5	3.2	3.2	3.4	3.8
Sulhpur %	0.31	0.29	0.31	0.32	0.32	0.31	0.33	0.30
Calcium %	0.46	0.48	0.52	0.52	0.60	0.61	0.47	0.52
Magnesium %	0.17	0.16	0.18	0.19	0.20	0.19	0.18	0.20
Sodium %	0.183	0.202	0.182	0.240	0.344	0.316	0.313	0.392
Iron mg/kg	136	163	103	141	108	101	88	120
Manganese mg/kg	29	36	31	30	30	39	34	68
Zinc mg/kg	21	21	22	22	19	20	19	21
Copper mg/kg	7	6	7	7	7	7	7	6
Boron mg/kg	4	5	6	5	6	5	4	5
Molybdenum mg/kg	2.1	1.46	1.34	1.56	1.73	1.46	1.29	1.91
Cobalt mg/kg	0.04	0.06	0.03	0.06	0.04	0.04	0.03	0.05
Selenium mg/kg	0.03	0.02	<0.02	<0.02	0.02	<0.02	0.02	0.01
Chloride %	1.68	2.0	1.67	1.74	1.63	1.55	1.71	1.94
Crude Protein %DM	18.3	18.1	19.0	19.5	18.3	20.2	18.8	21.2
DOMD* %	63.2	69.9	67.4	69.0	65.6	69.2	68.5	65.5
Metabolisable Energy MJ/kgDM	10.1	11.2	10.8	11.0	10.5	11.1	11.0	10.5