November 2023

Seasol Nutrient Use Efficiency Trial

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Disclaimer

Executive Summary

This study investigated the effect of Seasol, a seaweed extract, on lettuce growth under different rates of fertiliser. Lettuce was grown in pots in a greenhouse with 18 replicates per treatment. The experimental design successfully limited lettuce growth at lower fertiliser rates.

Seasol treated lettuce was 15% ($P<0.05$) heavier (fresh weight) than untreated lettuce at 75% fertiliser rate. This is supported by a 5% higher dry weight of Seasol treated lettuce compared to untreated lettuce. Head weights were higher in Seasol treated lettuce at 100%, 75% and 0% fertiliser rates.

Residual soil nitrate was higher in untreated lettuce compared to Seasol treated lettuce, showing greater nutrient (nitrate) uptake when Seasol is applied. Leaf nitrate was 96% higher in Seasol treated lettuce compared to untreated lettuce at the standard fertiliser rate.

Roots were longer in and heavier in Seasol treated lettuce.

Seasol application effectively improved the nutrient use efficiency of lettuce plants by increasing their growth and nutrient uptake. On average, Seasol-treated lettuce were larger, heavier, grew longer and heavier roots. However, there are some inconsistent trends between the fertiliser rates which would benefit from further research.

Introduction

A water use efficiency trial was commissioned by Seasol to collect data on the effect of Seasol on plant yield and quality at different fertiliser rates. The trial was conducted on cos lettuce in a pot trial at the Ross Street Greenhouse on the Sydney University campus from May to July 2023.

Methodology

Soil Collection and Analysis

Soil was collected from a commercial farming operation in Cobbity, NSW, which is on the Southwestern fringe of Sydney.

A new batch of soil was collected in May 2023.

Pot Preparations and Treatment Applications

Soil was transferred to a clean wheelbarrow, thoroughly mixed again, before 2300g was weighed into to each pot, which filled pots to 11cm (Figure 1)

Pot dimensions: 14cm square x 22cm high.

The standard fertiliser recommendation was for 400 kg/ha Nitrophoska (NPK 12:5.2:14.1), which equates to 800mg per pot. Each treatment received the following amount of Nitrophoska:

1. Standard fertiliser rate: 800mg
2. 75% fertiliser rate: 600mg
3. 50% fertiliser rate: 400mg
4. No fertiliser: 0mg

An additional 1900g of soil was weighed into a bucket, mixed with the appropriate amount of fertiliser (Figure 2) and transferred to each pot which filled pots an additional 10cm, which simulates the typical pre-plant fertiliser application depth.

400 cos lettuce seedlings (Leppington Speedy Seedlings) were screened, and any atypical plants were discarded. All Seedlings were carefully transplanted by hand to all pots in a random order (Figure 3).

Seasol was labelled with batch number 224-SR-23027 and manufactured on 30/03/2023 (Figure 4). The Seasol treatment rate is 10L/ha per fortnight of retail grade Seasol, which is half the strength of Commercial grade Seasol. This equates to 5 L/ha per fortnight of commercial grade Seasol. Retail grade Seasol was diluted at double the label rate to 60ml/9L (which equates to 6.66ml Seasol/L) (Figure 5) and 3ml of solution was applied via pipette as a soil drench to each applicable seedling (Figure 9).

Figure 1: Re-mixing soil and filling pots to 11cm with 2300g of soil.

Figure 2: Fertiliser added soil prior to mixing and final filling of pots.

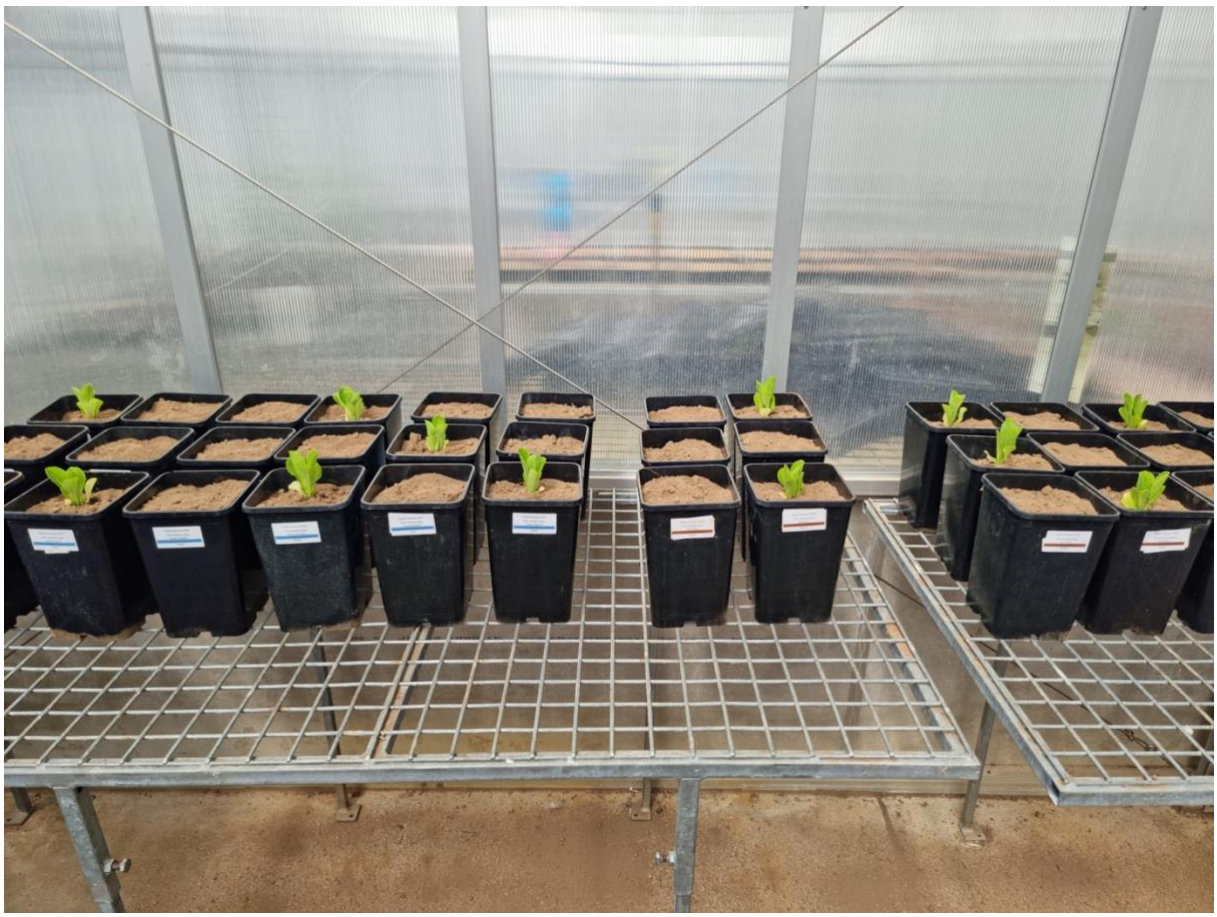

Figure 3: Lettuce seedlings transplanted randomly to prepared pots.

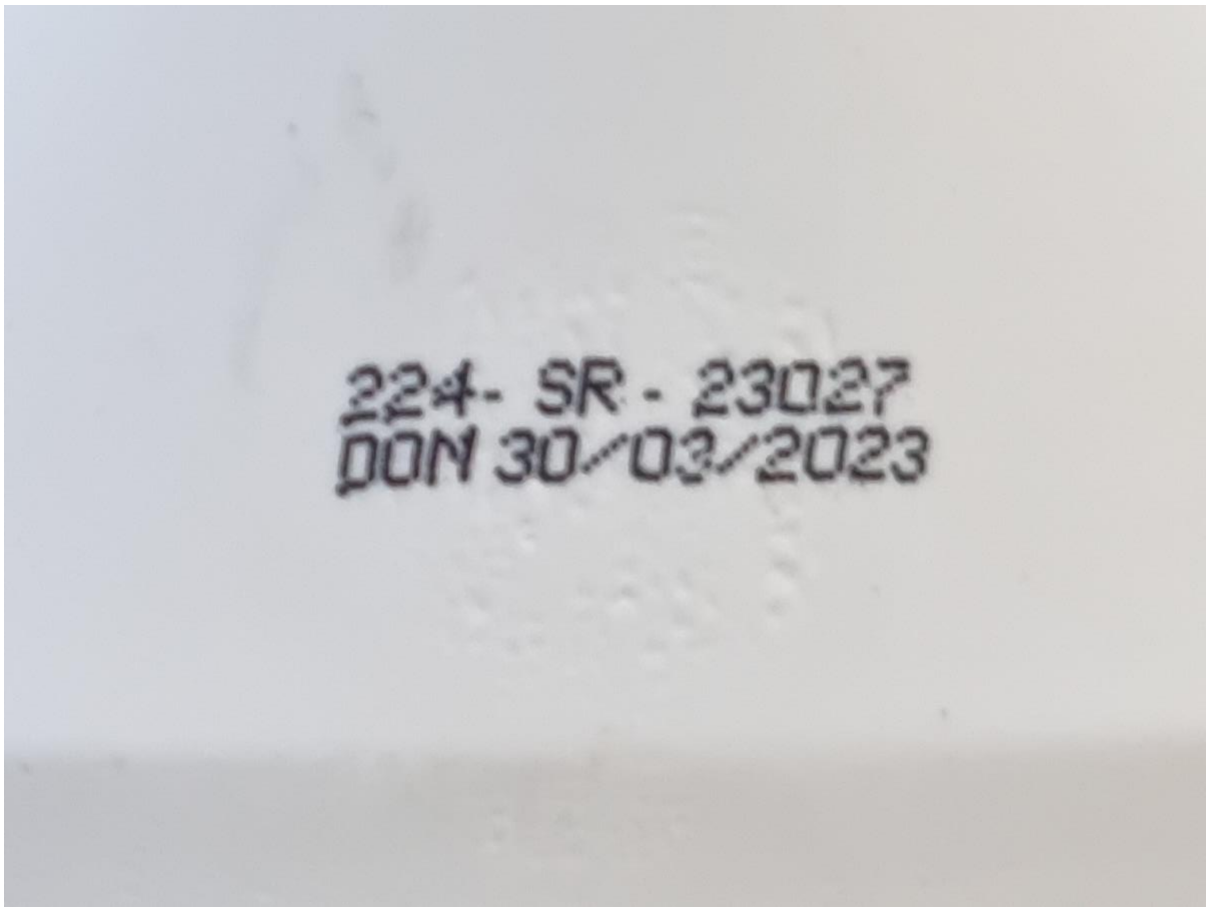

Figure 4: Recently manufactured Seasol used for day 1 treatments.

Figure 5: Seasol concentrate was diluted to 60ml per 9L or 6.66ml/L.

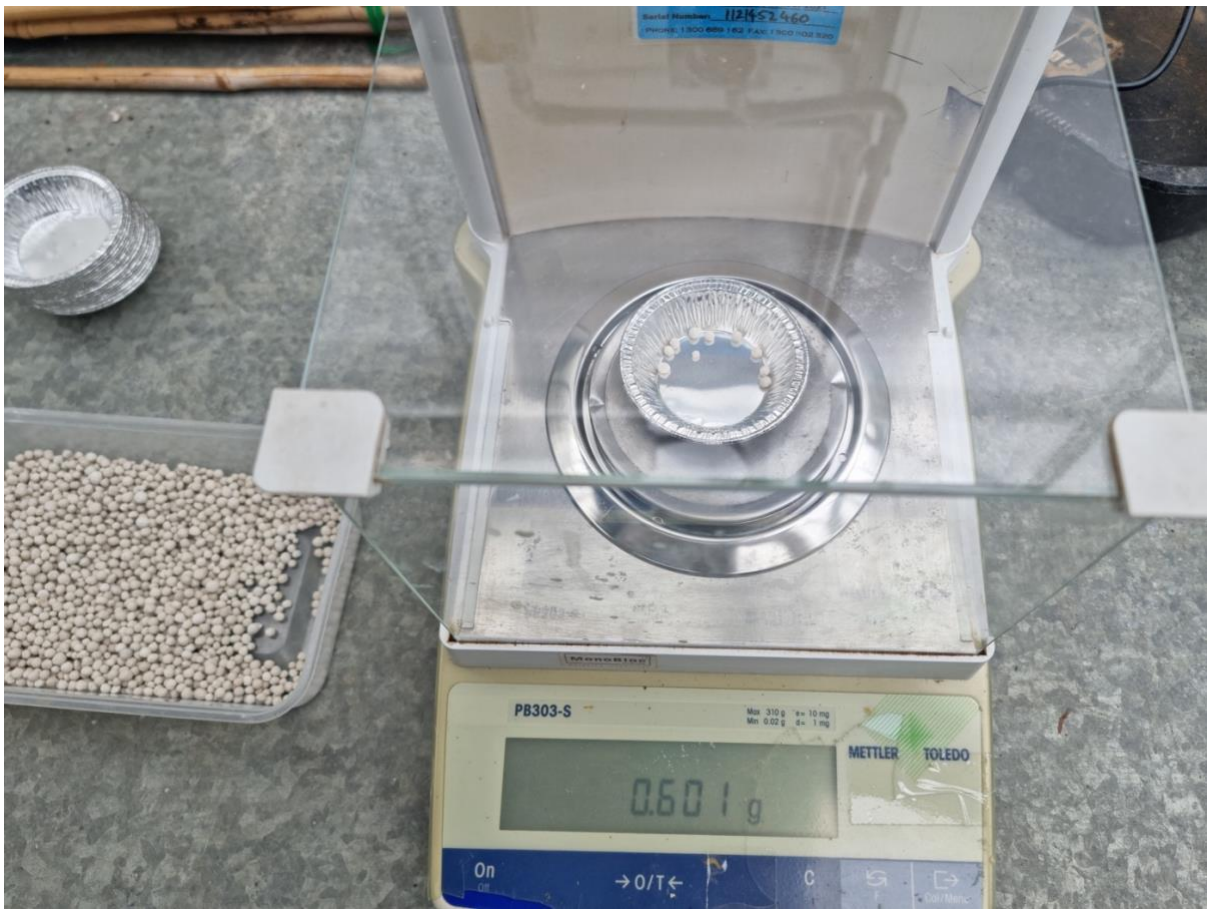

Figure 6: Fertiliser accurately weighed into aluminium trays.

Figure 7: Fertiliser prepared for mixing with soil.

Figure 8: Soil weighed to 1900g in preparation for fertiliser application.

Figure 9: 10L/ha Seasol applied via pipette in a 4cm radius around each lettuce seedling. 3ml of solution applied to each applicable pot.

Irrigation System

A drip irrigation system (Pope Eze Drip) was built to uniformly irrigate each pot on a schedule, monitored by soil moisture probes and visual assessments. The drip line had two raised emitters over each pot, which prevented water running down the drip line (Figure 10). Each emitter discharged 2L per hour.

Irrigation was controlled by a Holman 2 dial tap timer which was manually adjusted to suit the crop needs.

Figure 10: Drip Irrigation installed to water lettuce regularly and uniformly.

Watering Log

Each of the treatments received the same amount of irrigation, as shown in (Table 1):

Irrigation was set daily immediately after transplant to avoid any stress to the seedlings.

Two weeks after transplant, irrigation was reduced to every second day to avoid waterlogging and risk of disease.

Nine weeks after transplant, irrigation was increased to daily to meet plant water requirements.

In the final 11 days of the trial, irrigation was set to twice daily.

Table 1: Watering log. Shading indicates weekly grouping of irrigation events required for carbon assessments.

Date	Runtime (min)	Irrigation Volume (ml)
9/5/23	2	133
10/5/23	2	133
11/5/23	2	133
12/5/23	2	133
13/5/23	2	133
14/5/23	2	133
15/5/23	2	133
16/5/23	2	133
17/5/23	2	133
18/5/23	2	133
19/5/23	2	133
20/5/23	2	133
21/5/23	2	133
22/5/23	2	133
23/5/23	2	133
24/5/23	2	133
25/5/23	2	133
27/5/23	2	133
29/5/23	2	133
2/6/23	2	133
4/6/23	2	133
6/6/23	2	133
8/6/23	2	133
10/6/23	2	133
12/6/23	2	133

14/6/23	2	133
16/6/23	2	133
18/6/23	2	133
20/6/23	2	133
22/6/23	2	133
24/6/23	2	133
26/6/23	2	133
28/6/23	2	133
30/6/23	2	133
2/7/23	2	133
4/7/23	2	133
6/7/23	2	133
8/7/23	2	133
10/7/23	2	133
12/7/23	2	133
13/7/23	2	133
14/7/23	2	133
15/7/23	2	133
16/7/23	2	133
17/7/23	2	267
18/7/23	4	267
19/7/23	4	267
20/7/23	4	267
21/7/23	4	267
22/7/23	4	267
23/7/23	4	267
24/7/23	4	267
25/7/23	4	267
26/7/23	4	267
27/7/23	4	267
28/7/23	4	267
Total (L)		**9.1**

Seasol Treatment Applications

Seasol was labelled with batch number 224-SR-23027 and manufactured on 30/02/2023 (Figure 4). The Seasol was applied at 10L/ha per fortnight of retail grade Seasol, which is half the strength of Commercial grade Seasol. Seasol was diluted at double the label rate to 60ml/9L (which equates to 6.66ml Seasol/L) (Figure 5) and 3ml of solution was applied via pipette as a soil drench to each applicable seedling (Figure 9) (Table 2).

All treated pots received identical volumes of diluted Seasol solution. Untreated pots received supplementary irrigation to match the volume of Seasol solution applied to treated pots.

Table 2: Seasol application rates and volumes.

Date	Seasol Rate – Retail Grade (Commercial Grade)	Volume Seasol solution per pot	Dilution
09/05/2023	10L/ha (5L/ha)	3ml	60ml/9L
25/05/2023	10L/ha (5L/ha)	3ml	60ml/9L
09/06/2023	10L/ha (5L/ha)	3ml	60ml/9L
22/06/2023	10L/ha (5L/ha)	3ml	60ml/9L
05/07/2023	10L/ha (5L/ha)	3ml	60ml/9L
19/07/2023	10L/ha (5L/ha)	3ml	60ml/9L
Total (ml)		**18ml**	

Fertiliser Applications

A fertiliser schedule was prepared by an agronomist (4 Leaf Ag) using baseline soil tests, which included the following recommendations:

1.	Preplant	Nitrophoska (NPK 12:5.2:14.1)	400 kg/ha
2.	Topdress	Calcium Nitrate (NPK 15.5:0:0)	460 kg/ha

09 May 2023 Nitrophoska (NPK 12:5.2:14.1)) was basally applied at the following rates:

1. Standard fertiliser rate: 800mg
2. 75% fertiliser rate: 600mg
3. 50% fertiliser rate: 400mg
4. No fertiliser: 0mg

16 June 2023 Calcium Nitrate (NPK 15.5:0:0) was as a top dress around the base of the lettuce at the following rates (Figure 11):

1. Standard fertiliser rate: 920mg
2. 75% fertiliser rate: 690mg
3. 50% fertiliser rate: 460mg
4. No fertiliser: 0mg

Figure 11: Calcium nitrate fertiliser quantitively applied to lettuce pots.

Trial Layout

Pots were laid out in a randomised block design. There were six blocks for each trial, which corresponds to the six replicates in each trial, for a total of 12 blocks. There are three pots of each treatment assigned to each block. There are 24 pots per block (Figure 12).

Figure 12: Lettuce pots laid out in a randomised block design.

Monitoring

The following data was being monitored throughout the trial:

1. Crop condition via a remote camera (Figure 13)
2. Pot moisture via two soil moisture probes (Figure 14)
3. Room air temperature of two rooms via two temperature loggers (Figure 15)
4. Flying insect loads of two rooms via three sticky fly traps. This also helped control insect loads.

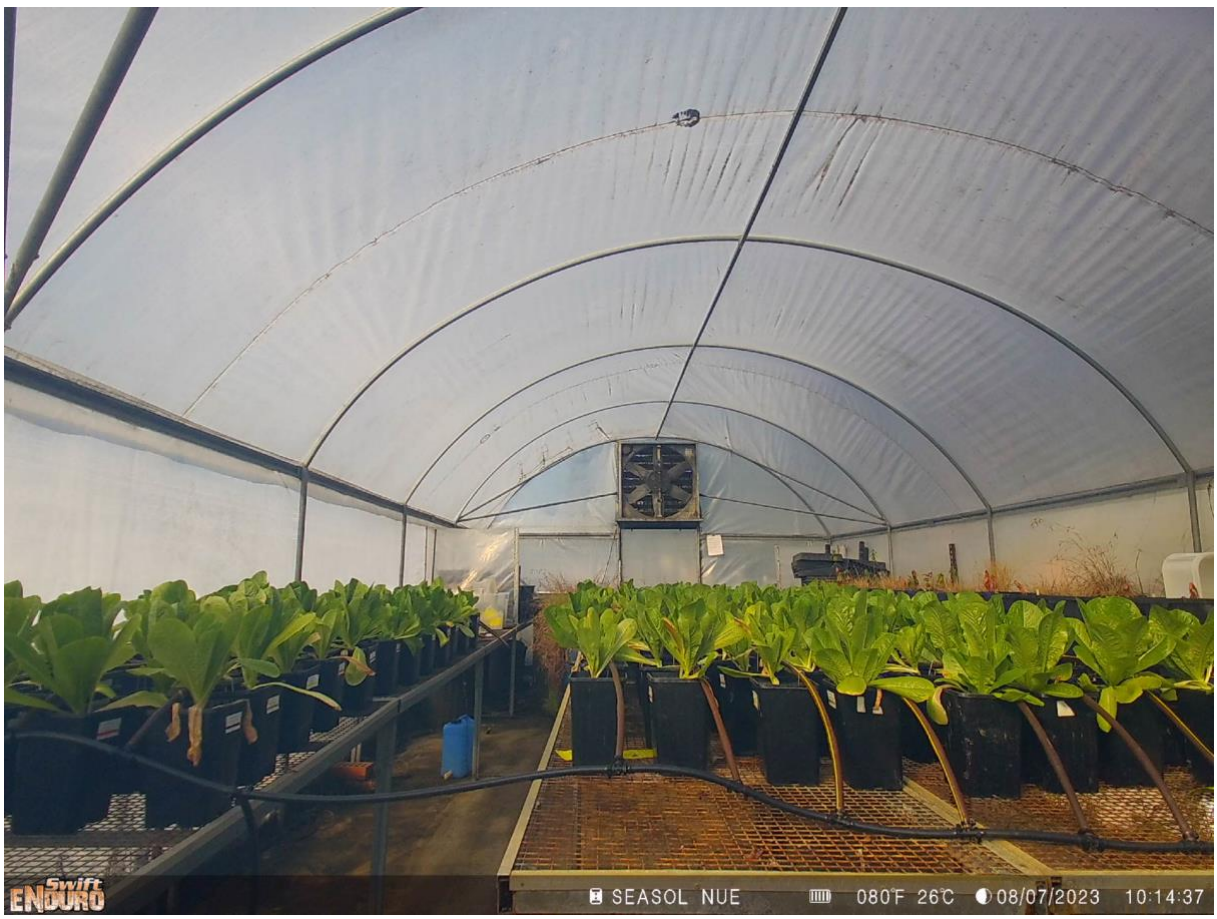

Figure 13: Remote camera monitoring the lettuce trial.

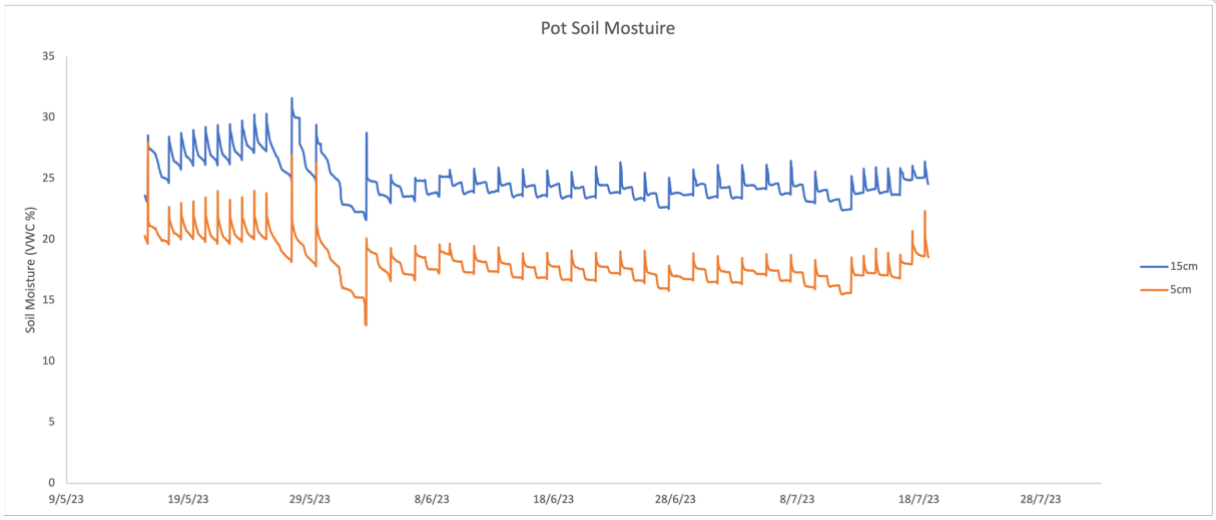

Figure 14: Soil moisture data collected on the lettuce trial at 5cm and 15cm depths.

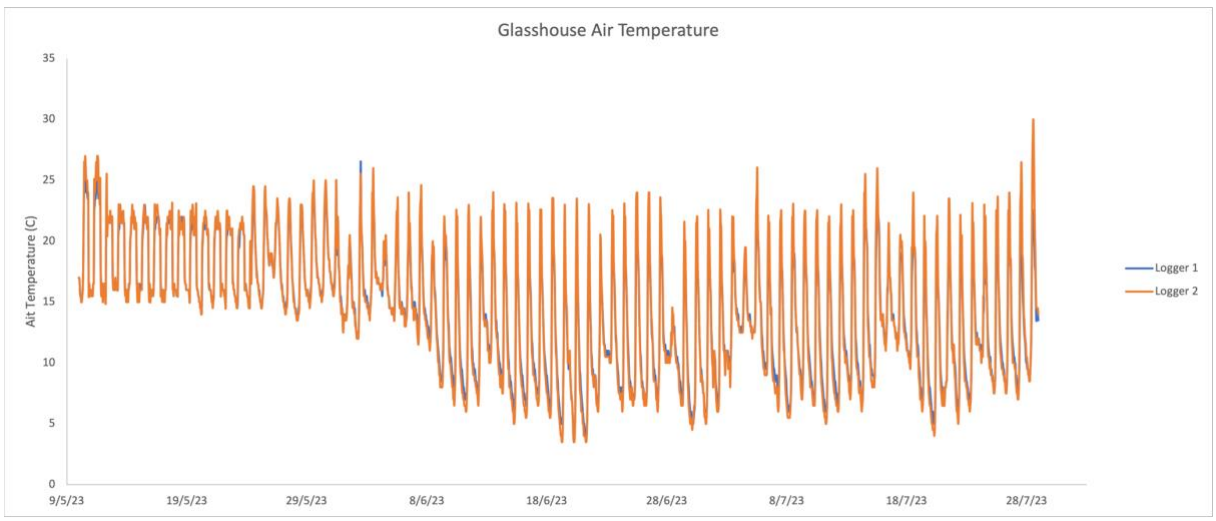

Figure 15: Air temperature data collected at two locations in the greenhouse.

Maintenance

The trial was checked daily via camera and physically inspected each week. The following maintenance tasks were carried out:

1. Check pest traps
2. Remove and weeds from pots
3. Check plants for pest damage
4. Adjust irrigation volumes if necessary

Assessments

There were three assessments carried out on the lettuce trial:

- 26 June 2023: Plant height, SPAD
- 10 July 2023: Plant height, SPAD
- 28 July 2023: Plant height, plant fresh weight, plant dry weight, root length, root fresh weight, root dry weight, leaf SPAD, root assessments.

Root Cleaning and Photography

Each pot was randomly selected for root cleaning and destructive analysis over a two-day period. Replicates 5, 4, 3 were assessed on day 1 and replicates 6, 2, 1 were assessed on day 2.

Pots were gently inverted and emptied, taking care not to disturb the soil and root mass. The plant and soil mass were laid out to be photographed on a stainless-steel mesh (Figure 16). Soil was gently washed away from the roots using a hose until there was no visible soil remaining (Figure 17). Soil washed from roots were collected for nutrient analysis.

Figure 16: Lettuce plant and root structure laid out prior to root cleaning.

Figure 17: Roots were gently cleaned with a hose.

Plant Height and Root Lengths Assessments

Lettuce head heights were measured with a tape measure from the root crown the highest leaf (Figure 18). Measurements were recorded to the nearest millimetre.

Plant roots were cut from the lettuce head at the root crown and the length of the root mass measured with tape.

Figure 18: Lettuce plant and root mass laid out for length measurements and photography.

Plant Fresh Weights

Lettuce heads were separated from soil, washed and root cut at the crown before weights were measured by benchtop scales (Figure 19) (d=0.1g).

Figure 19: Lettuce head fresh weights measured immediate after harvest.

Leaf SPAD

Leaf SPAD was measured at 10 points on each lettuce head. Each measurement was taken on a unique young and mature leaf using a *Minolta SPAD 502 Chlorophyll Meter*, which was regularly recalibrated throughout the assessments (Figure 20).

Figure 20: SPAD measurements were collected from 10 leaves on each lettuce head.

Soil Nutrients

Representative soil samples were collected from each pot for a bulked analysis of each of the six treatments by Phosyn Analytical (now Eurofins) for the following nutrients:

pH (H_20), pH ($CaCl_2$), EC, S, P, Na, K, Ca, Mg, Al, Cl, Cu, Zn, Mn, Fe, B, NH4-N, NO3-N, Organic Matter

Plant Dry Weights

Lettuce were bagged, labelled and dried for 72 hours at 65°C in a fan forced plant dehydrator (Figure 21) before being re-weighed with benchtop scales (d=0.1g) for dry weight measurements. Leaf matter was sampled for nutrient analysis by Phosyn Analytical (now Eurofins).

Figure 21: Lettuce heads were individually bagged for drying in a fan-forced plant dehydrator.

Root Dry Weights

Roots were bagged, labelled and dried for 72 hours at 65°C in a fan forced plant dehydrator before being re-weighed with benchtop scales (Figure 22) (d=0.1g) for dry weight measurements.

Figure 22: Roots were weighed after drying.

Leaf Nutrients

Representative dried leaf samples were collected from each plant for a bulked analysis of each of the six treatments by Phosyn Analytical (now Eurofins) for the following nutrients:

N, S, P, K, Ca, Mg, Cu, Zn, Mn, Fe, B, Na, Mo, Cl, NO_3

Root Arbuscular Mycorrhizal Fungi

Three sets of roots from each treatment were randomly collected for arbuscular mycorrhizal fungi assessments. Roots were carefully collected (Figure 23), washed (Figure 24) and stored in 70% alcohol (Figure 25) before staining and assessment by Ryan Hall under a microscope.

Figure 23: Roots were carefully collected prior cleaning of the root mass.

Figure 24: Roots were gently dipped in water for cleaning

Figure 25: Roots were stored in 70% alcohol prior to staining.

Results

Key results:

1. Seasol treated lettuce was 15% (P<0.05) higher than untreated lettuce at 75% fertiliser rate. This is supported by a 5% higher dry weight of Seasol treated lettuce compared to untreated lettuce. Head weights were higher in Seasol treated lettuce at 100%, 75% and 0% fertiliser rates.
2. Residual soil nitrate was higher in untreated lettuce compared to Seasol treated lettuce, showing greater nutrient (nitrate) uptake when Seasol is applied. Leaf nitrogen was slightly in Seasol treated lettuce.
3. Leaf nitrate was 96% higher in Seasol treated lettuce compared to untreated lettuce at the standard fertiliser rate. No leaf nitrate was detected at lower fertiliser rates.
4. Roots were longer in and heavier in Seasol treated lettuce.

Assessment Results

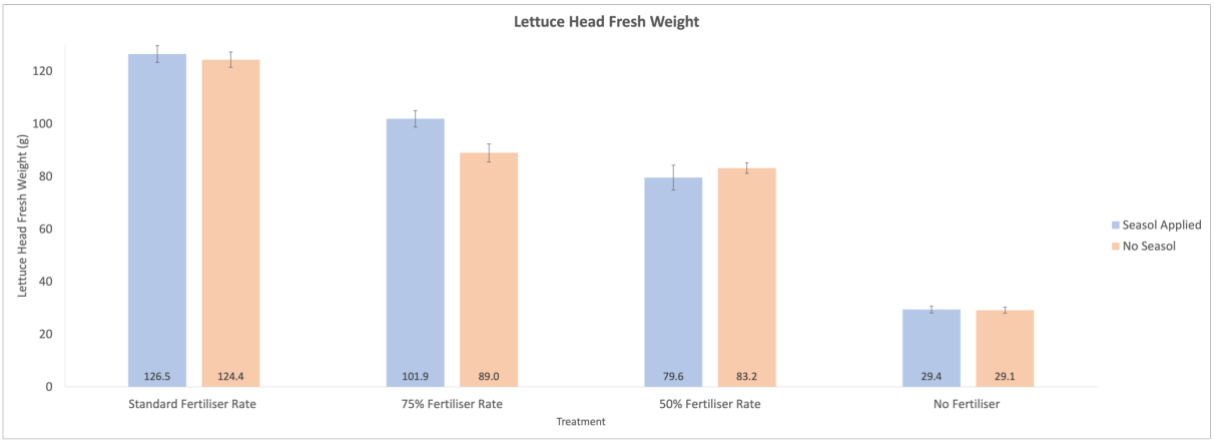

Figure 26: Lettuce head fresh weight data collected at harvest. Lettuce heads treated with Seasol are 15% heavier (P<0.05) at the 75% fertiliser rate. Lettuce heads treated with Seasol are 2% higher at 100% fertiliser rate, and 1% higher when no fertiliser was applied.

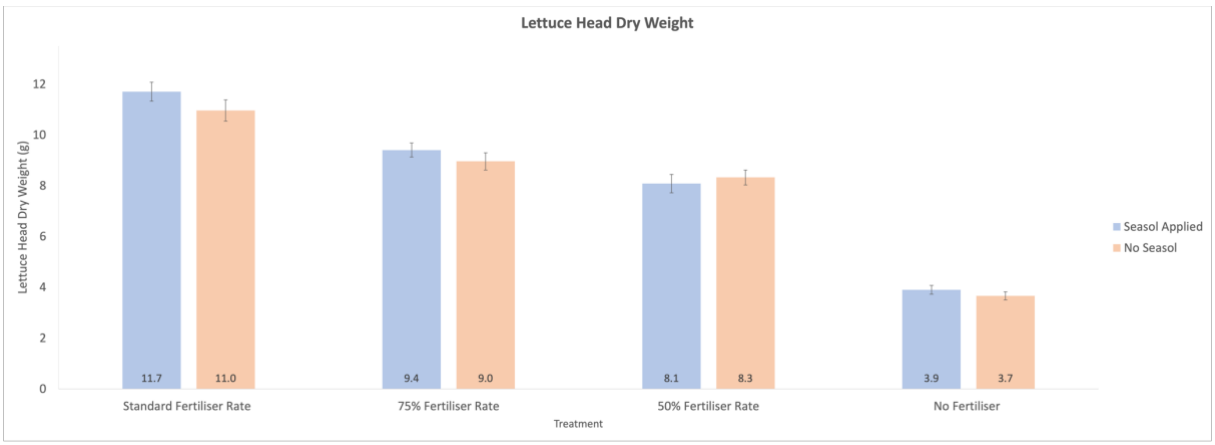

Figure 27: Lettuce head dry weight data collected after drying for 72 hours. Lettuce heads treated with Seasol are 7% higher at 100% fertiliser rate, 5% higher at 75% fertiliser rate and 6% higher when no fertiliser was applied.

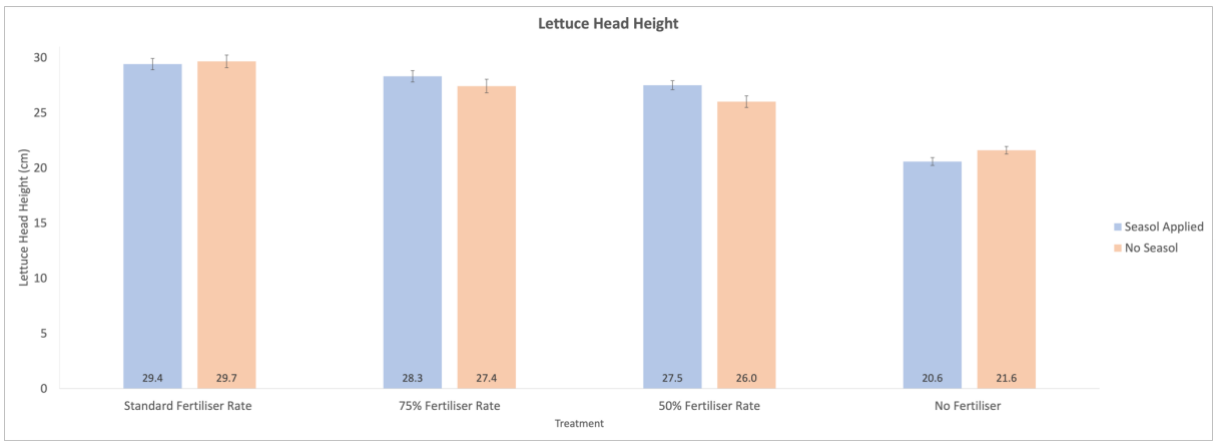

Figure 28: Lettuce head height data collected at harvest. Lettuce heads treated with Seasol are 3% higher at 75% fertiliser rate, and 6% higher (P<0.05) at 50% fertiliser rate. Lettuce head height is 5% higher (P<0.05) without a Seasol treatment when no fertiliser was applied.

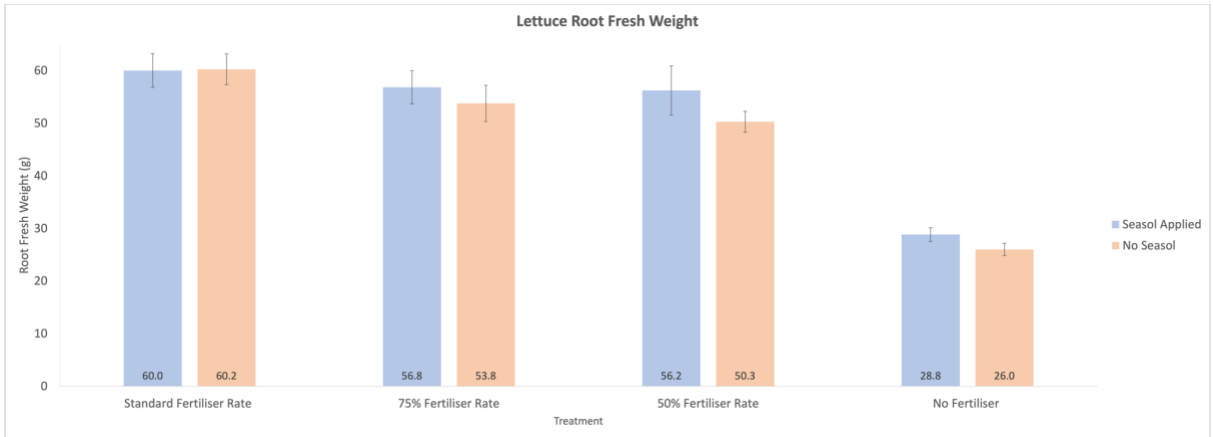

Figure 29: Lettuce root fresh weight data collected at harvest. Lettuce roots treated with Seasol are 6% higher at 75% fertiliser rate, 12% higher at 50% fertiliser rate, and 11% higher at 0 fertiliser rate.

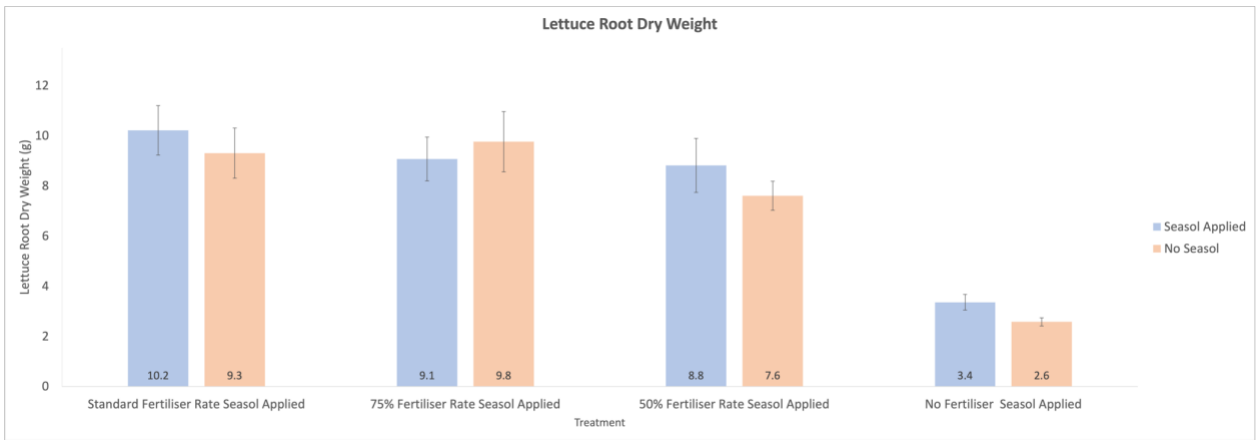

Figure 30: Lettuce root dry weight data collected after drying for 72 hours. Lettuce roots treated with Seasol are 7% higher at 100% fertiliser rate, 16% higher at 50% fertiliser rate, and 30% higher (P<0.05) at 0 fertiliser rate.

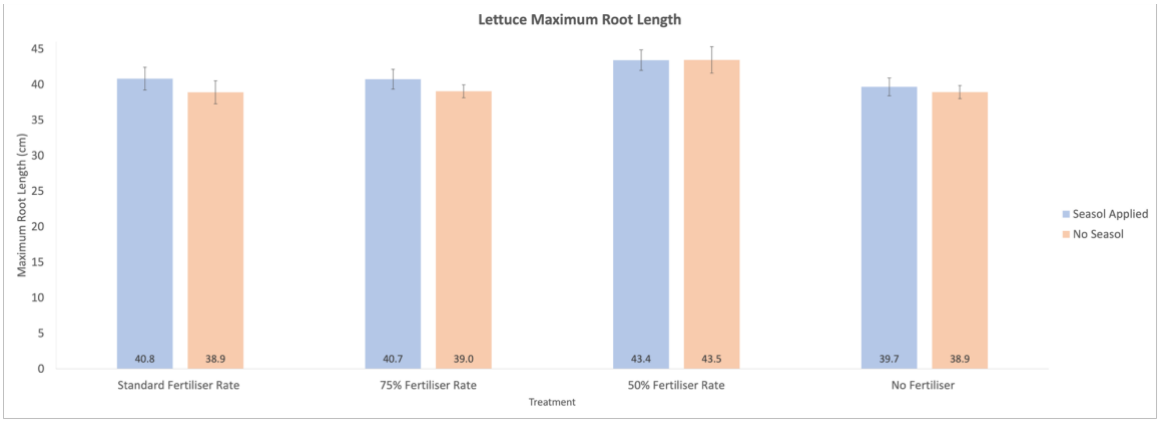

Figure 31: Lettuce maximum root length data collected at harvest. Lettuce roots treated with Seasol are 5% longer at 100% fertiliser rate, 4% longer at 75% fertiliser rate, and 2% longer at 0 fertiliser rate.

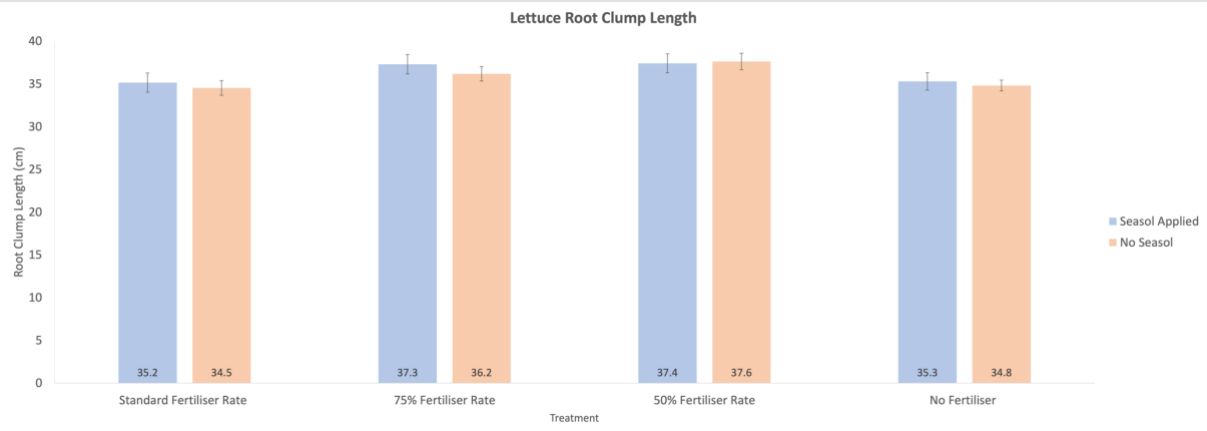

Figure 32: Lettuce maximum root clump length data collected at harvest. Lettuce roots treated with Seasol are 2% longer at 100% fertiliser rate, 3% longer at 75% fertiliser rate, and 1% longer at 0 fertiliser rate.

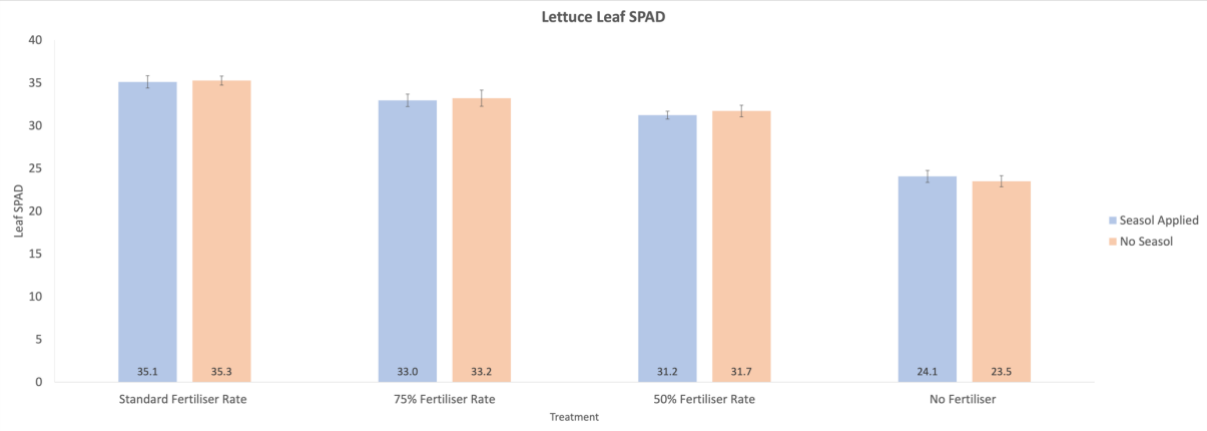

Figure 33: Leaf SPAD data collected at harvest.

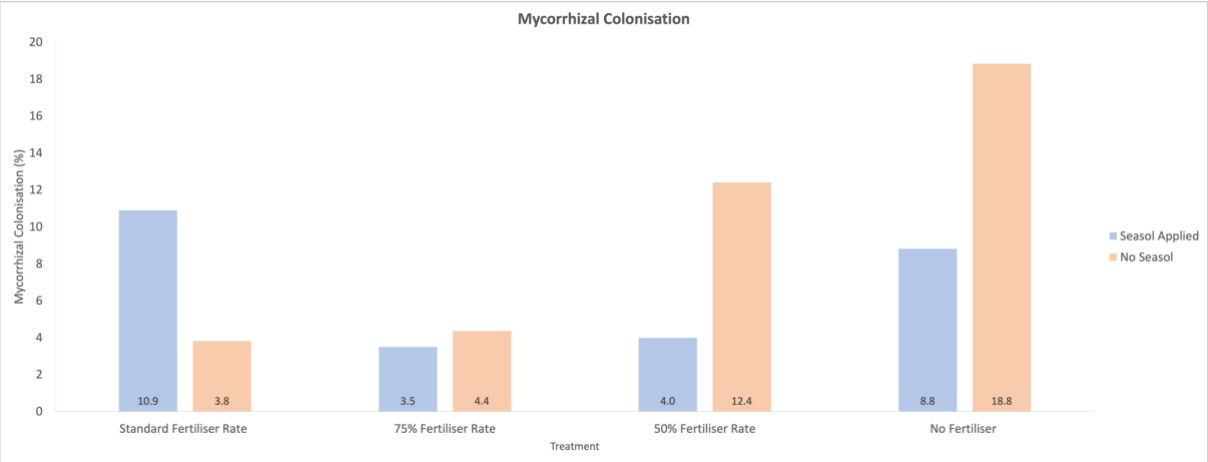

Figure 34: Mycorrhizal colonisation data collected on root samples after harvest.

Lettuce Biomass Analysis

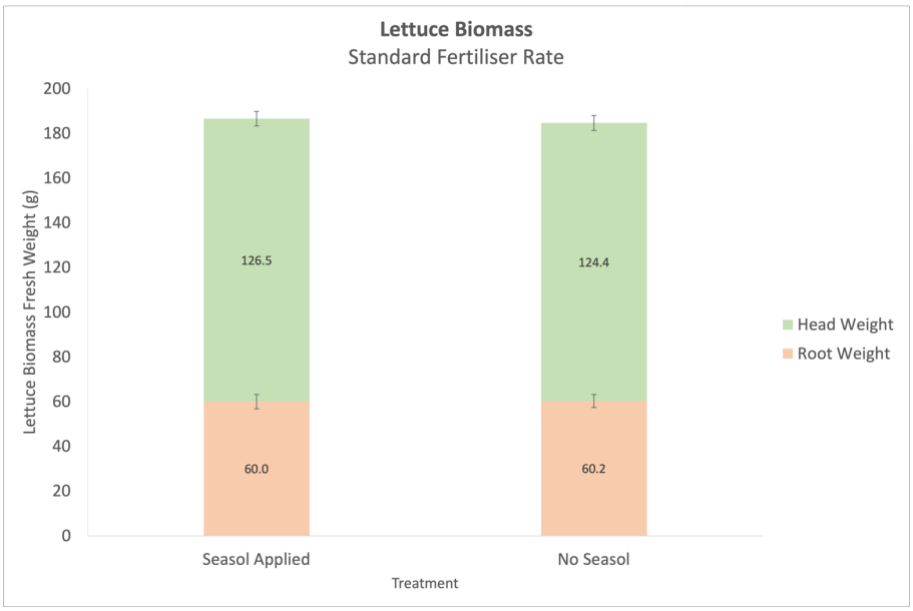

Figure 35: Lettuce biomass at standard fertiliser rate.

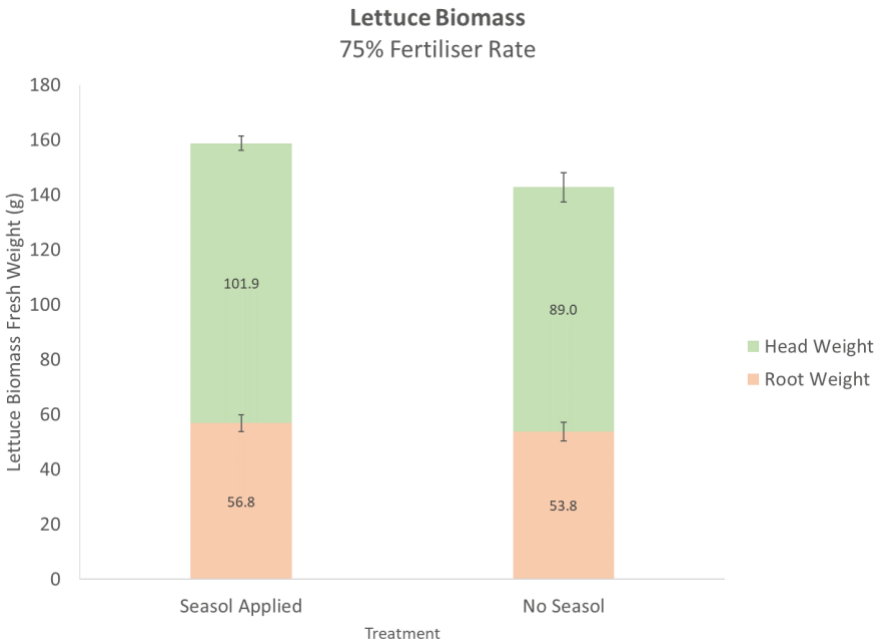

Figure 36: Lettuce biomass at 75% fertiliser rate.

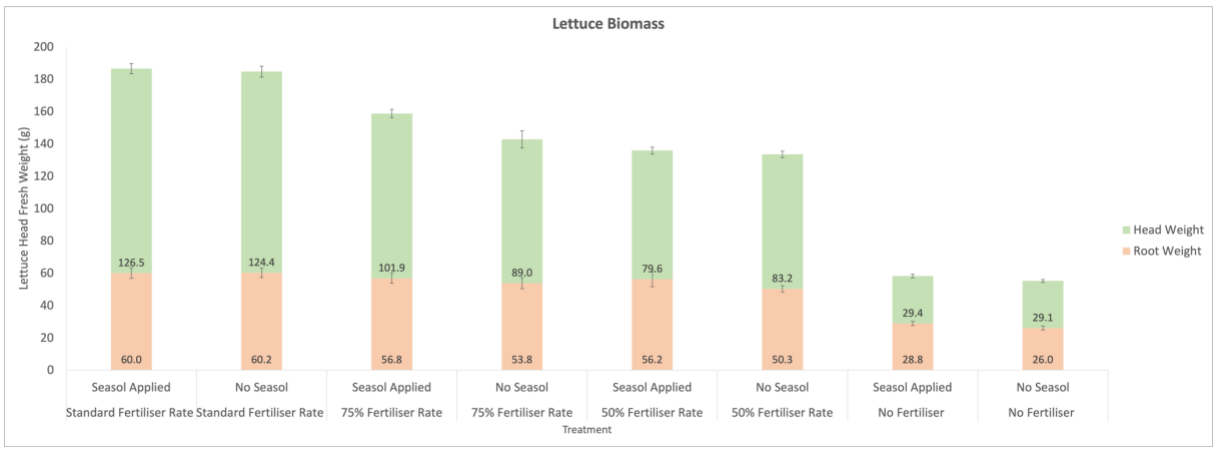

Figure 37: Lettuce biomass at all fertiliser rates.

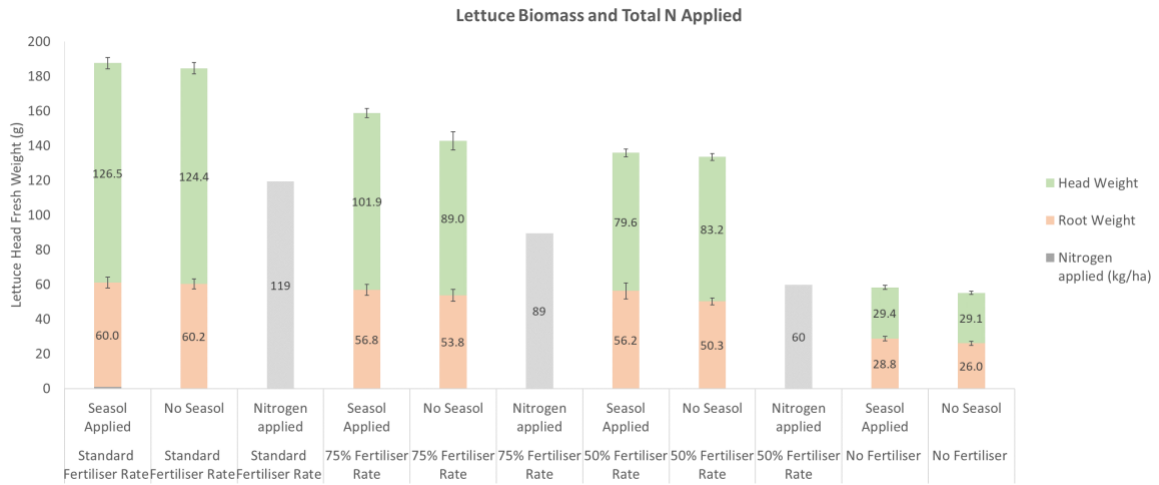

Figure 38: Lettuce biomass and total N applied at all fertiliser rates.

Laboratory Results

Nitrogen

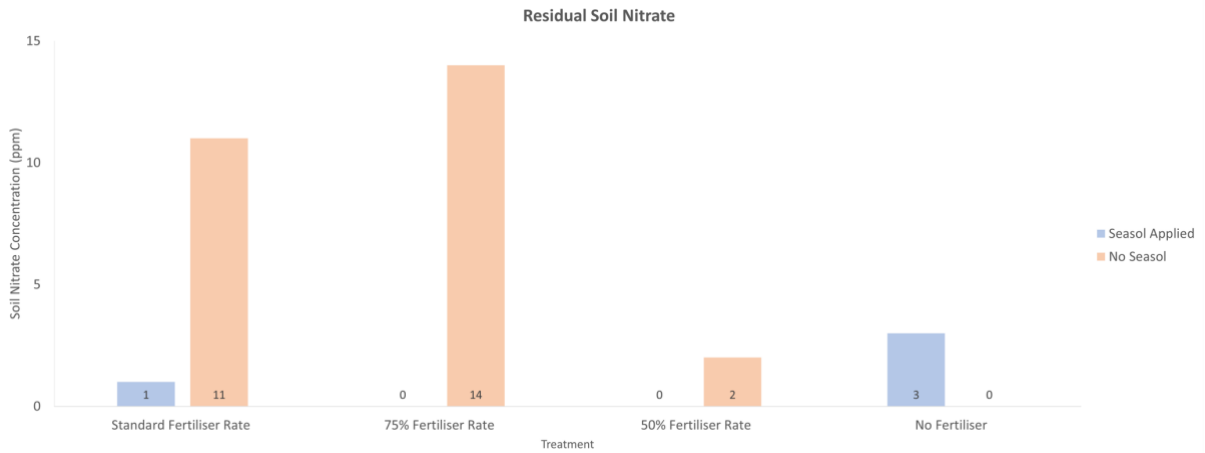

Figure 39: Residual nitrate data on soil collected after lettuce harvest and promptly analysed by Eurofins laboratory. Residual soil nitrate is high in the standard and 75% fertiliser rates, yet low when lettuce were treated with Seasol, indicating that Seasol allowed for greater nutrient uptake.

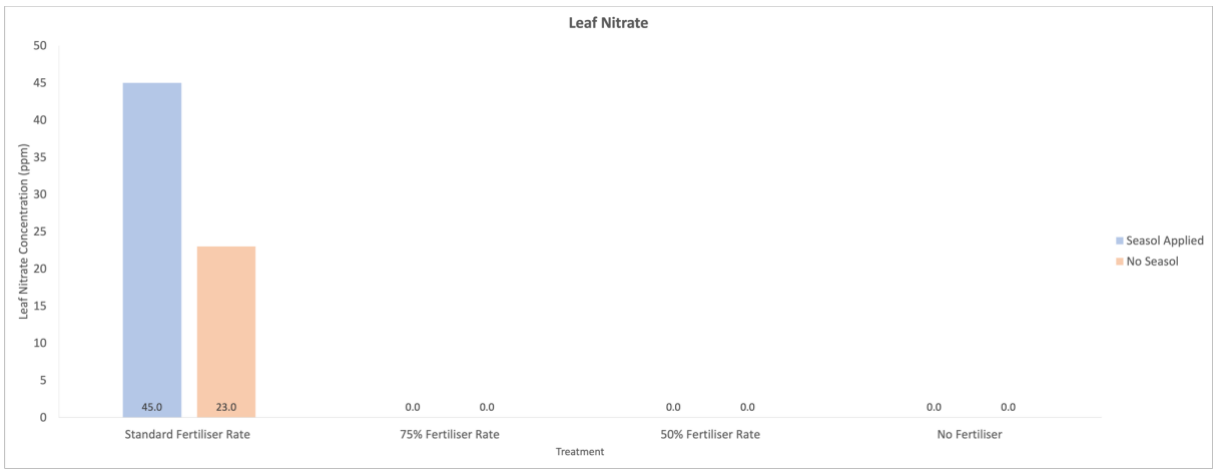

Figure 40: Nitrate data after lettuce leaf collected at harvest and promptly analysed by Eurofins laboratory. Leaf nitrate is 96% higher in lettuce treated with Seasol at the standard fertiliser rate, indicating that Seasol allowed for greater nutrient uptake.

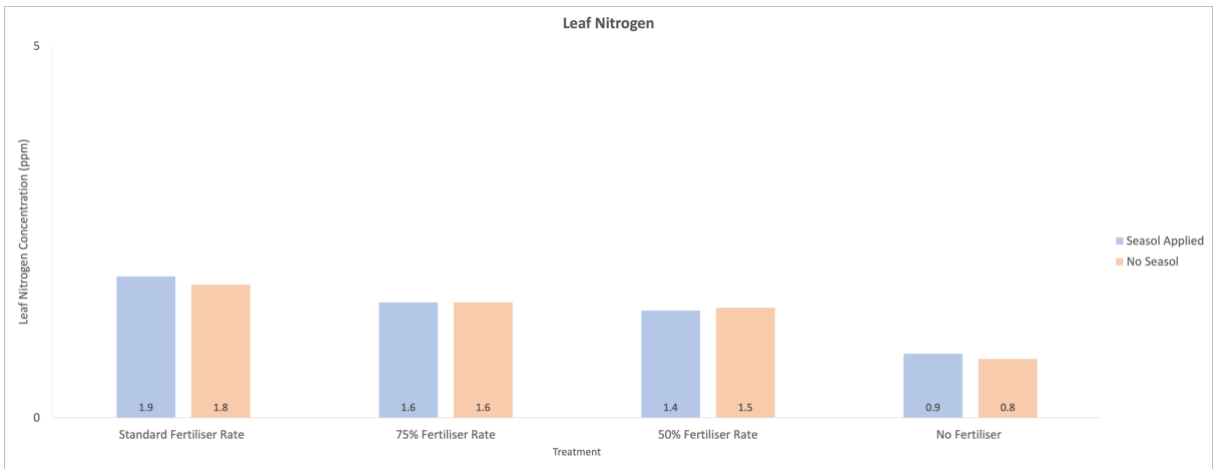

Figure 41: Nitrogen data after lettuce leaf collected at harvest and promptly analysed by Eurofins laboratory.

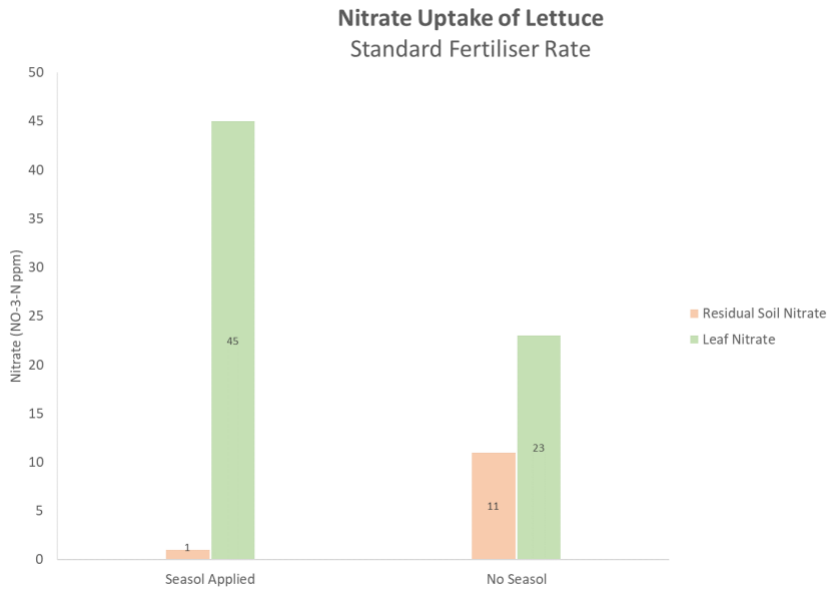

Figure 42: Nitrate uptake of lettuce at standard fertiliser rate.

Phosphorus

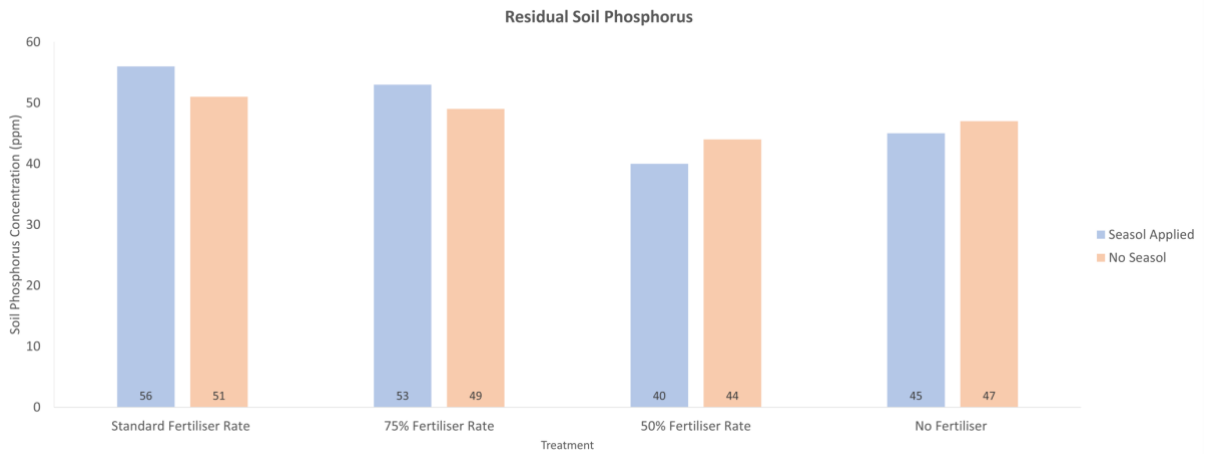

Figure 43: Residual phosphorus data on soil collected after lettuce harvest and promptly analysed by Eurofins laboratory.

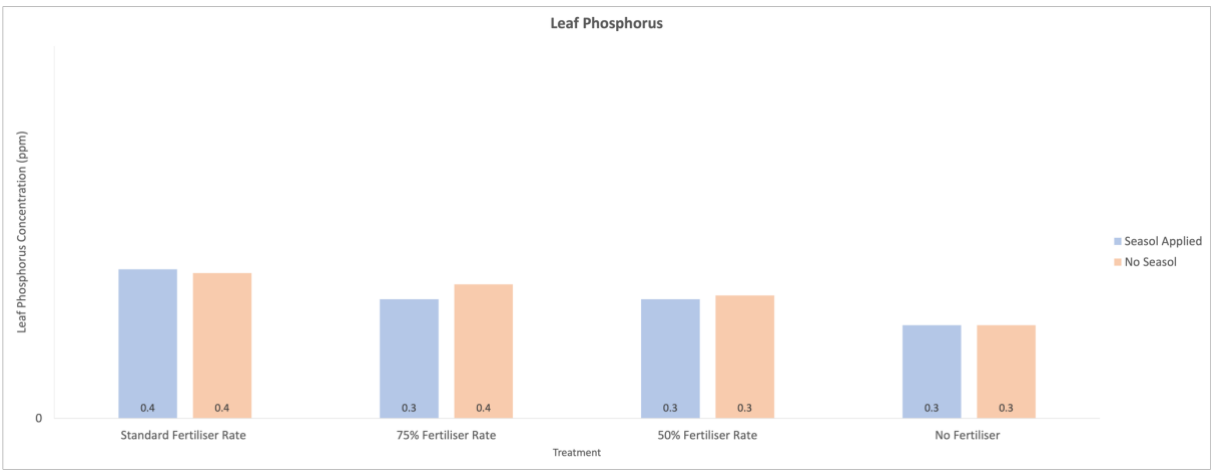

Figure 44: Phosphorus data after lettuce leaf collected at harvest and promptly analysed by Eurofins laboratory.

Potassium

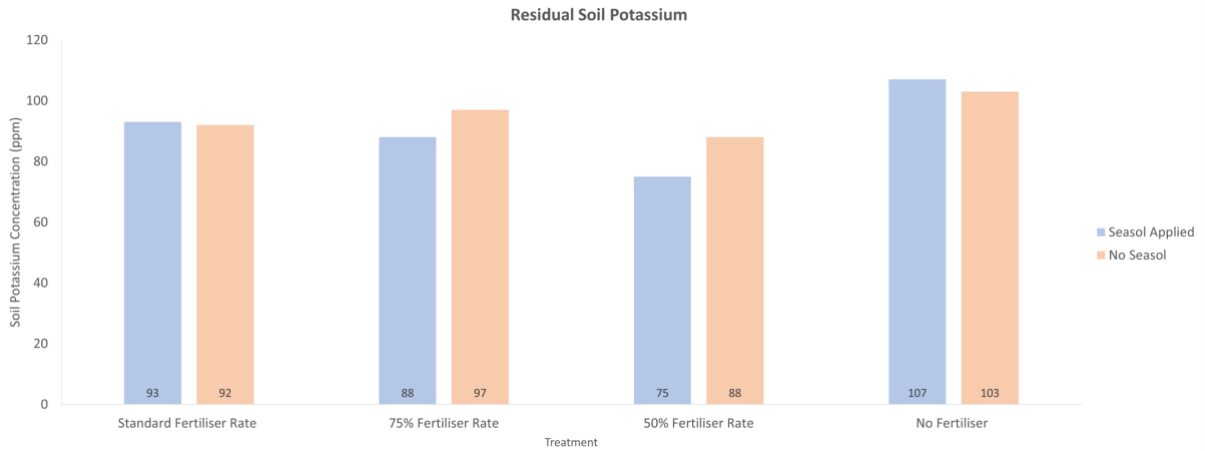

Figure 45: Residual potassium data on soil collected after lettuce harvest and promptly analysed by Eurofins laboratory.

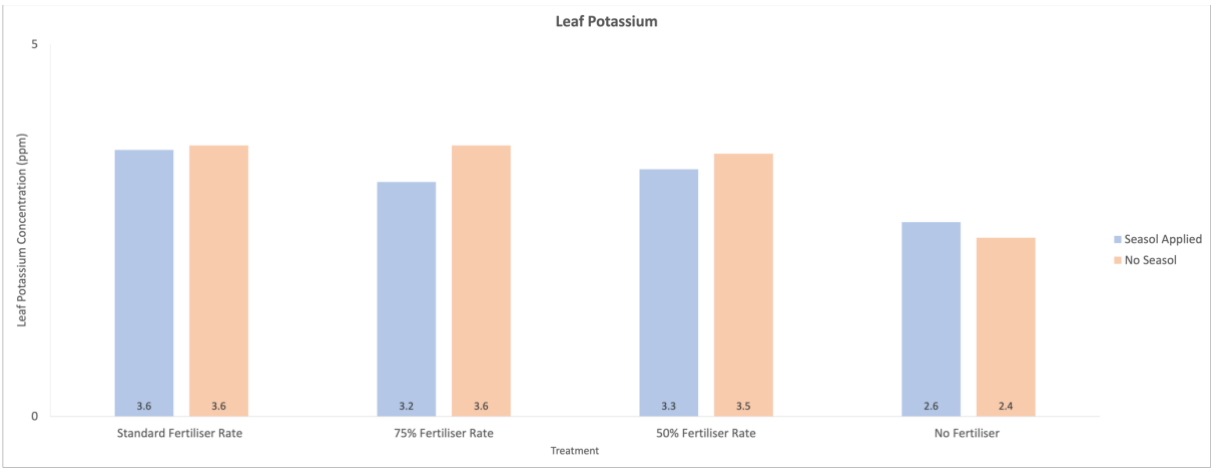

Figure 46: Potassium data after lettuce leaf collected at harvest and promptly analysed by Eurofins laboratory.

Table 3: Analysis of variation (ANOVA) P-values of results. Results in bold are significant at a 95% confidence interval.

Treatment	Lettuce head fresh weight	Lettuce head dry weight	Root dry weight	Root fresh weight	SPAD	Height (cm)	Root length clump	Longest root
Standard Fertiliser Rate	0.65	0.20	0.52	0.96	0.86	0.74	0.66	0.41
75% Fertiliser Rate	**0.03**	0.32	0.65	0.52	0.83	0.27	0.43	0.31
50% Fertiliser Rate	0.23	0.61	0.31	0.25	0.56	**0.03**	0.88	0.98
No Fertiliser	0.87	0.33	**0.03**	0.11	0.55	**0.04**	0.69	0.64

Conclusion

Seasol application effectively improved the nutrient use efficiency of lettuce plants by increasing their growth and nutrient uptake. On average, Seasol-treated lettuce were larger, heavier, grew longer and heavier roots. However, there are some inconsistent trends between the fertiliser rates which would benefit from further research.

LEAF ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	Report Date:	11/08/2023
Agent Address:	PO BOX 3114	Sampling Date:	29/07/2023
	BUNDEENA NSW 2230	Date Received:	09/08/2023
Client:	AHR CROPSCIENCE	Submission ID:	L001009
Test Set or Quotation:	P3	Sample Name:	Seasol T1 - Standard Fertiliser Rate Seasol Applied
Barcode:	PBC3167	Analysing Laboratory:	Burleigh Heads

NUTRIENT ELEMENT BALANCE CHART

Analyte		Result		Very Low / Low / Slightly Low / Normal / High	Target	
Nitrogen ^	N	1.90	%	Slightly Low	3.10-5.00	%
Nitrate N	NO3-N	45	ppm		#	ppm
Phosphorus ^	P	0.40	%	Normal	0.35-0.80	%
Potassium ^	K	3.58	%	Slightly Low	4.50-8.00	%
Calcium ^	Ca	0.91	%	Slightly Low	1.20-2.10	%
Magnesium ^	Mg	0.22	%	Low	0.30-0.90	%
Sulfur ^	S	0.13	%	Low	0.20-0.30	%
Boron ^	B	25.0	ppm	Normal	25.0-55.0	ppm
Copper	Cu	3.9	ppm	Low	7.0-80.0	ppm
Iron	Fe	249	ppm	High	50-100	ppm
Manganese	Mn	153	ppm	Normal	50.0-300	ppm
Molybdenum	Mo	0.19	ppm	Slightly Low	0.20-1.00	ppm
Zinc	Zn	38.0	ppm	Normal	30.0-80.0	ppm
Sodium	Na	0.19	%	Normal	0.10-0.50	%
Chloride	Cl	0.98	%	Normal	0.10-1.00	%

Additional Comments

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- ^ NATA accredited tests. Accreditation No. 20543.

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LEAF ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	Report Date:	11/08/2023
Agent Address:	PO BOX 3114	Sampling Date:	29/07/2023
	BUNDEENA NSW 2230	Date Received:	09/08/2023
Client:	AHR CROPSCIENCE	Submission ID:	L001009
Test Set or Quotation:	P3	Sample Name:	Seasol T2 - 75% Fertiliser Rate Seasol Applied
Barcode:	PBC3168	Analysing Laboratory:	Burleigh Heads

NUTRIENT ELEMENT BALANCE CHART

Analyte		Result		Very Low / Low / Slightly Low / Normal / High	Target	
Nitrogen ^	N	1.55	%		3.10-5.00	%
Nitrate N	NO3-N	<1	ppm		#	ppm
Phosphorus ^	P	0.32	%		0.35-0.80	%
Potassium ^	K	3.15	%		4.50-8.00	%
Calcium ^	Ca	0.78	%		1.20-2.10	%
Magnesium ^	Mg	0.19	%		0.30-0.90	%
Sulfur ^	S	0.11	%		0.20-0.30	%
Boron ^	B	24.0	ppm		25.0-55.0	ppm
Copper	Cu	4.5	ppm		7.0-80.0	ppm
Iron	Fe	482	ppm		50-100	ppm
Manganese	Mn	150	ppm		50.0-300	ppm
Molybdenum	Mo	0.26	ppm		0.20-1.00	ppm
Zinc	Zn	35.0	ppm		30.0-80.0	ppm
Sodium	Na	0.13	%		0.10-0.50	%
Chloride	Cl	0.89	%		0.10-1.00	%

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LEAF ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	Report Date:	11/08/2023
Agent Address:	PO BOX 3114	Sampling Date:	29/07/2023
	BUNDEENA NSW 2230	Date Received:	09/08/2023
Client:	AHR CROPSCIENCE	Submission ID:	L001009
Test Set or Quotation:	P3	Sample Name:	Seasol T3 - 50% Fertiliser Rate Seasol Applied
Barcode:	PBC3169	Analysing Laboratory:	Burleigh Heads

NUTRIENT ELEMENT BALANCE CHART

Analyte		Result		Very Low / Low / Slightly Low / Normal / High	Target	
Nitrogen ^	N	1.44	%		3.10-5.00	%
Nitrate N	NO3-N	<1	ppm		#	ppm
Phosphorus ^	P	0.32	%		0.35-0.80	%
Potassium ^	K	3.32	%		4.50-8.00	%
Calcium ^	Ca	0.81	%		1.20-2.10	%
Magnesium ^	Mg	0.19	%		0.30-0.90	%
Sulfur ^	S	0.11	%		0.20-0.30	%
Boron ^	B	22.0	ppm		25.0-55.0	ppm
Copper	Cu	4.2	ppm		7.0-80.0	ppm
Iron	Fe	287	ppm		50-100	ppm
Manganese	Mn	116	ppm		50.0-300	ppm
Molybdenum	Mo	0.23	ppm		0.20-1.00	ppm
Zinc	Zn	33.0	ppm		30.0-80.0	ppm
Sodium	Na	0.12	%		0.10-0.50	%
Chloride	Cl	0.96	%		0.10-1.00	%

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LEAF ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	Report Date:	11/08/2023
Agent Address:	PO BOX 3114	Sampling Date:	29/07/2023
	BUNDEENA NSW 2230	Date Received:	09/08/2023
Client:	AHR CROPSCIENCE	Submission ID:	L001009
Test Set or Quotation:	P3	Sample Name:	Seasol T4 - No Fertiliser Seasol Applied
Barcode:	PBC3170	Analysing Laboratory:	Burleigh Heads

NUTRIENT ELEMENT BALANCE CHART

Analyte		Result		Very Low / Low / Slightly Low / Normal / High	Target	
Nitrogen ^	N	0.86	%		3.10-5.00	%
Nitrate N	NO3-N	<1	ppm		#	ppm
Phosphorus ^	P	0.25	%		0.35-0.80	%
Potassium ^	K	2.61	%		4.50-8.00	%
Calcium ^	Ca	0.66	%		1.20-2.10	%
Magnesium ^	Mg	0.15	%		0.30-0.90	%
Sulfur ^	S	0.08	%		0.20-0.30	%
Boron ^	B	19.0	ppm		25.0-55.0	ppm
Copper	Cu	3.9	ppm		7.0-80.0	ppm
Iron	Fe	266	ppm		50-100	ppm
Manganese	Mn	85.0	ppm		50.0-300	ppm
Molybdenum	Mo	<0.05	ppm		0.20-1.00	ppm
Zinc	Zn	24.0	ppm		30.0-80.0	ppm
Sodium	Na	0.13	%		0.10-0.50	%
Chloride	Cl	1.03	%		0.10-1.00	%

Additional Comments

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LEAF ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	Report Date:	11/08/2023
Agent Address:	PO BOX 3114	Sampling Date:	29/07/2023
	BUNDEENA NSW 2230	Date Received:	09/08/2023
Client:	AHR CROPSCIENCE	Submission ID:	L001009
Test Set or Quotation:	P3	Sample Name:	Seasol T5 - Standard Fertiliser Rate No Seasol
Barcode:	PBC3171	Analysing Laboratory:	Burleigh Heads

NUTRIENT ELEMENT BALANCE CHART

Analyte		Result		Very Low / Low / Slightly Low / Normal / High	Target	
Nitrogen ^	N	1.79	%	Slightly Low	3.10-5.00	%
Nitrate N	NO3-N	23	ppm		#	ppm
Phosphorus ^	P	0.39	%	Normal	0.35-0.80	%
Potassium ^	K	3.64	%	Slightly Low	4.50-8.00	%
Calcium ^	Ca	0.94	%	Slightly Low	1.20-2.10	%
Magnesium ^	Mg	0.23	%	Slightly Low	0.30-0.90	%
Sulfur ^	S	0.12	%	Low	0.20-0.30	%
Boron ^	B	25.0	ppm	Normal	25.0-55.0	ppm
Copper	Cu	5.4	ppm	Slightly Low	7.0-80.0	ppm
Iron	Fe	490	ppm	High	50-100	ppm
Manganese	Mn	168	ppm	Normal	50.0-300	ppm
Molybdenum	Mo	0.33	ppm	Normal	0.20-1.00	ppm
Zinc	Zn	41.0	ppm	Normal	30.0-80.0	ppm
Sodium	Na	0.19	%	Normal	0.10-0.50	%
Chloride	Cl	0.96	%	Normal	0.10-1.00	%

Additional Comments

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- Plant tissue analyses performed and reported on samples dried at 70°C and ground (NB/ Fruit, Fruitlet & Tuber reported on fresh weight basis).
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LEAF ANALYSIS

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Agent Address:	PO BOX 3114	Sampling Date:	29/07/2023
	BUNDEENA NSW 2230	Date Received:	09/08/2023
Client:	AHR CROPSCIENCE	Submission ID:	L001009
Test Set or Quotation:	P3	Sample Name:	Seasol T6 - 75% Fertiliser Rate No Seasol
Barcode:	PBC3172	Analysing Laboratory:	Burleigh Heads

NUTRIENT ELEMENT BALANCE CHART

Analyte		Result		Very Low / Low / Slightly Low / Normal / High	Target	
Nitrogen ^	N	1.55	%		3.10-5.00	%
Nitrate N	NO3-N	<1	ppm		#	ppm
Phosphorus ^	P	0.36	%		0.35-0.80	%
Potassium ^	K	3.64	%		4.50-8.00	%
Calcium ^	Ca	0.91	%		1.20-2.10	%
Magnesium ^	Mg	0.21	%		0.30-0.90	%
Sulfur ^	S	0.12	%		0.20-0.30	%
Boron ^	B	23.0	ppm		25.0-55.0	ppm
Copper	Cu	4.2	ppm		7.0-80.0	ppm
Iron	Fe	219	ppm		50-100	ppm
Manganese	Mn	143	ppm		50.0-300	ppm
Molybdenum	Mo	0.34	ppm		0.20-1.00	ppm
Zinc	Zn	34.0	ppm		30.0-80.0	ppm
Sodium	Na	0.14	%		0.10-0.50	%
Chloride	Cl	1.03	%		0.10-1.00	%

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LEAF ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	Report Date:	11/08/2023
Agent Address:	PO BOX 3114	Sampling Date:	29/07/2023
	BUNDEENA NSW 2230	Date Received:	09/08/2023
Client:	AHR CROPSCIENCE	Submission ID:	L001009
Test Set or Quotation:	P3	Sample Name:	Seasol T7 - 50% Fertiliser Rate No Seasol
Barcode:	PBC3173	Analysing Laboratory:	Burleigh Heads

NUTRIENT ELEMENT BALANCE CHART

Analyte		Result		Very Low / Low / Slightly Low / Normal / High	Target	
Nitrogen ^	N	1.48	%		3.10-5.00	%
Nitrate N	NO3-N	<1	ppm		#	ppm
Phosphorus ^	P	0.33	%		0.35-0.80	%
Potassium ^	K	3.53	%		4.50-8.00	%
Calcium ^	Ca	0.84	%		1.20-2.10	%
Magnesium ^	Mg	0.20	%		0.30-0.90	%
Sulfur ^	S	0.12	%		0.20-0.30	%
Boron ^	B	23.0	ppm		25.0-55.0	ppm
Copper	Cu	5.0	ppm		7.0-80.0	ppm
Iron	Fe	638	ppm		50-100	ppm
Manganese	Mn	182	ppm		50.0-300	ppm
Molybdenum	Mo	0.20	ppm		0.20-1.00	ppm
Zinc	Zn	34.0	ppm		30.0-80.0	ppm
Sodium	Na	0.10	%		0.10-0.50	%
Chloride	Cl	0.97	%		0.10-1.00	%

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LEAF ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	Report Date:	11/08/2023
Agent Address:	PO BOX 3114	Sampling Date:	29/07/2023
	BUNDEENA NSW 2230	Date Received:	09/08/2023
Client:	AHR CROPSCIENCE	Submission ID:	L001009
Test Set or Quotation:	P3	Sample Name:	Seasol T8 - No Fertiliser No Seasol
Barcode:	PBC3174	Analysing Laboratory:	Burleigh Heads

NUTRIENT ELEMENT BALANCE CHART

Analyte		Result		Very Low / Low / Slightly Low / Normal / High	Target	
Nitrogen ^	N	0.79	%		3.10-5.00	%
Nitrate N	NO3-N	<1	ppm		#	ppm
Phosphorus ^	P	0.25	%		0.35-0.80	%
Potassium ^	K	2.40	%		4.50-8.00	%
Calcium ^	Ca	0.61	%		1.20-2.10	%
Magnesium ^	Mg	0.14	%		0.30-0.90	%
Sulfur ^	S	0.08	%		0.20-0.30	%
Boron ^	B	19.0	ppm		25.0-55.0	ppm
Copper	Cu	3.9	ppm		7.0-80.0	ppm
Iron	Fe	250	ppm		50-100	ppm
Manganese	Mn	139	ppm		50.0-300	ppm
Molybdenum	Mo	0.11	ppm		0.20-1.00	ppm
Zinc	Zn	25.0	ppm		30.0-80.0	ppm
Sodium	Na	0.12	%		0.10-0.50	%
Chloride	Cl	0.92	%		0.10-1.00	%

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SOIL ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	**Report Date:**	09/08/2023
Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T1 - Standard Fertiliser Rate Seasol Applied
Barcode:	SDE2562	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

	Analyte	Unit	Desired Level	Level Found	ppm
	Colour		#	GREY BROWN	
	Texture		#	SANDY LOAM	
	CEC ^	meq/100g	12.0-40.0	4.88	
	Lime Requirement	t/ha	#	<0.50	
	Organic Matter	%	3.0-8.0	1.7	
	pH [1:5 H2O] ^		6.3-9.0	6.5	
	pH [1:5 CaCl2] ^		5.7-8.4	5.6	
Extractable N-P-K-S	NO3-N ^	ppm	15-70	1.0	
	NH4-N	ppm	#	<1.0	
	Phosphorus [Olsen] ^	ppm	35-130	56	
	Sulphur [MCP] ^	ppm	8-20	24	
Exchangeable cations	Calcium[Am. Acet.] ^	meq/100g	6.00-15.0	3.71	742
	Magnesium[Am. Acet.] ^	meq/100g	1.00-4.50	0.78	94.0
	Potassium[Am. Acet.] ^	meq/100g	0.50-1.50	0.24	93.0
	Sodium[Am. Acet.] ^	meq/100g	0.3-3.0	0.1	30.0
	Aluminium[KCl]	meq/100g	1.0-2.5	<0.02	
Trace Elements	Boron[CaCl2] ^	ppm	1.0-5.0	0.4	
	Iron [DTPA] ^	ppm	5-120	24	
	Manganese [DTPA] ^	ppm	5.0-60.0	49.6	
	Copper [DTPA] ^	ppm	2.5-20.0	1.6	
	Zinc [DTPA] ^	ppm	5.0-15.0	4.5	
Salt	Chloride ^	ppm	200-1100	20	
	EC [1:5 H2O] ^	dS/m	0.90-3.0	0.060	
Ratios	Ca:Mg Ratio		2.5-3.0	4.7	

	Analyte	Unit	Desired Level	Level Found	Exchangeable cation % (eCEC)
Exch. cation %	Calcium	%	50.0-75.0	76.0	50.0-75.0 %
	Magnesium	%	5.0-15.0	16.1	5.0-15.0 %
	Potassium	%	2.0-5.0	4.9	2.0-5.0 %
	Sodium	%	1.0-2.0	2.7	1.0-2.0 %
	Aluminium	%		<1.0	

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SOIL ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	**Report Date:**	09/08/2023
Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T1 - Standard Fertiliser Rate Seasol Applied
Barcode:	SDE2562	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

Additional Comments

- NT = Not Tested IS = Insufficient Sample # = Target levels are not available
- Eurofins APAL will review published literature for crop desired levels, and reserves the right to make changes to this information in test reports as and when these reviews are conducted.
- Soil analyses performed and reported on samples dried at 40°C and sieved to <2mm.
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SOIL ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	**Report Date:**	09/08/2023
Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T2 - 75% Fertiliser Rate Seasol Applied
Barcode:	SDE2563	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

	Analyte	Unit	Desired Level	Level Found	ppm	Very Low / Low / Slightly Low / Normal / High
	Colour		#	GREY BROWN		
	Texture		#	SANDY LOAM		
	CEC ^	meq/100g	12.0-40.0	4.55		
	Lime Requirement	t/ha	#	<0.50		
	Organic Matter	%	3.0-8.0	1.5		
	pH [1:5 H2O] ^		6.3-9.0	6.4		
	pH [1:5 CaCl2] ^		5.7-8.4	5.6		
Extractable N-P-K-S	NO3-N ^	ppm	15-70	<1.0		
	NH4-N	ppm	#	<1.0		
	Phosphorus [Olsen] ^	ppm	35-130	53		
	Sulphur [MCP] ^	ppm	8-20	28		
Exchangeable cations	Calcium[Am. Acet.] ^	meq/100g	6.00-15.0	3.53	705	
	Magnesium[Am. Acet.] ^	meq/100g	1.00-4.50	0.69	83.0	
	Potassium[Am. Acet.] ^	meq/100g	0.50-1.50	0.22	88.0	
	Sodium[Am. Acet.] ^	meq/100g	0.3-3.0	0.1	20.0	
	Aluminium[KCl]	meq/100g	1.0-2.5	<0.02		
Trace Elements	Boron[CaCl2] ^	ppm	1.0-5.0	0.4		
	Iron [DTPA] ^	ppm	5-120	23		
	Manganese [DTPA] ^	ppm	5.0-60.0	50.4		
	Copper [DTPA] ^	ppm	2.5-20.0	1.8		
	Zinc [DTPA] ^	ppm	5.0-15.0	4.7		
Salt	Chloride ^	ppm	200-1100	24		
	EC [1:5 H2O] ^	dS/m	0.90-3.0	0.060		
Ratios	Ca:Mg Ratio		2.5-3.0	5.1		

	Analyte	Unit	Desired Level	Level Found	Exchangeable cation % (eCEC)
Exch. cation %	Calcium	%	50.0-75.0	77.6	50.0-75.0 % (0 20 40 60 80 100)
	Magnesium	%	5.0-15.0	15.2	5.0-15.0 % (0 5 10 15 20 25 30 35 40)
	Potassium	%	2.0-5.0	4.9	2.0-5.0 % (0 5 10 15 20)
	Sodium	%	1.0-2.0	1.9	1.0-2.0 % (0 5 10 15 20)
	Aluminium	%		<1.0	(0 5 10 15 20)

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SOIL ANALYSIS

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Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T2 - 75% Fertiliser Rate Seasol Applied
Barcode:	SDE2563	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

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SOIL ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	**Report Date:**	09/08/2023
Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T3 - 50% Fertiliser Rate Seasol Applied
Barcode:	SDE2564	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

	Analyte	Unit	Desired Level	Level Found	ppm
	Colour		#	GREY BROWN	
	Texture		#	SANDY LOAM	
	CEC ^	meq/100g	12.0-40.0	3.98	
	Lime Requirement	t/ha	#	<0.50	
	Organic Matter	%	3.0-8.0	1.7	
	pH [1:5 H2O] ^		6.3-9.0	6.5	
	pH [1:5 CaCl2] ^		5.7-8.4	5.6	
Extractable N-P-K-S	NO3-N ^	ppm	15-70	<1.0	
	NH4-N	ppm	#	<1.0	
	Phosphorus [Olsen] ^	ppm	35-130	40	
	Sulphur [MCP] ^	ppm	8-20	15	
Exchangeable cations	Calcium[Am. Acet.] ^	meq/100g	6.00-15.0	3.14	628
	Magnesium[Am. Acet.] ^	meq/100g	1.00-4.50	0.57	68.0
	Potassium[Am. Acet.] ^	meq/100g	0.50-1.50	0.19	75.0
	Sodium[Am. Acet.] ^	meq/100g	0.3-3.0	<0.1	<18.4
	Aluminium[KCl]	meq/100g	1.0-2.5	<0.02	
Trace Elements	Boron[CaCl2] ^	ppm	1.0-5.0	0.3	
	Iron [DTPA] ^	ppm	5-120	22	
	Manganese [DTPA] ^	ppm	5.0-60.0	57.0	
	Copper [DTPA] ^	ppm	2.5-20.0	1.6	
	Zinc [DTPA] ^	ppm	5.0-15.0	5.4	
Salt	Chloride ^	ppm	200-1100	21	
	EC [1:5 H2O] ^	dS/m	0.90-3.0	0.050	
Ratios	Ca:Mg Ratio		2.5-3.0	5.5	

	Analyte	Unit	Desired Level	Level Found	Exchangeable cation % (eCEC)
Exch. cation %	Calcium	%	50.0-75.0	78.9	50.0-75.0 %
	Magnesium	%	5.0-15.0	14.3	5.0-15.0 %
	Potassium	%	2.0-5.0	4.8	2.0-5.0 %
	Sodium	%	1.0-2.0	1.7	1.0-2.0 %
	Aluminium	%		<1.0	

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SOIL ANALYSIS

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Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T3 - 50% Fertiliser Rate Seasol Applied
Barcode:	SDE2564	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

Additional Comments

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SOIL ANALYSIS

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Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T4 - No Fertiliser Seasol Applied
Barcode:	SDE2565	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

	Analyte	Unit	Desired Level	Level Found	ppm	Very Low / Low / Slightly Low / Normal / High
	Colour		#	GREY BROWN		
	Texture		#	SANDY LOAM		
	CEC ^	meq/100g	12.0-40.0	4.73		
	Lime Requirement	t/ha	#	<0.50		
	Organic Matter	%	3.0-8.0	1.5		
	pH [1:5 H2O] ^		6.3-9.0	6.4		
	pH [1:5 CaCl2] ^		5.7-8.4	5.6		
Extractable N-P-K-S	NO3-N ^	ppm	15-70	3.0		
	NH4-N	ppm	#	<1.0		
	Phosphorus [Olsen] ^	ppm	35-130	45		
	Sulphur [MCP] ^	ppm	8-20	36		
Exchangeable cations	Calcium[Am. Acet.] ^	meq/100g	6.00-15.0	3.71	741	
	Magnesium[Am. Acet.] ^	meq/100g	1.00-4.50	0.67	80.0	
	Potassium[Am. Acet.] ^	meq/100g	0.50-1.50	0.27	107	
	Sodium[Am. Acet.] ^	meq/100g	0.3-3.0	0.1	21.0	
	Aluminium[KCl]	meq/100g	1.0-2.5	<0.02		
Trace Elements	Boron[CaCl2] ^	ppm	1.0-5.0	0.3		
	Iron [DTPA] ^	ppm	5-120	24		
	Manganese [DTPA] ^	ppm	5.0-60.0	56.5		
	Copper [DTPA] ^	ppm	2.5-20.0	1.9		
	Zinc [DTPA] ^	ppm	5.0-15.0	5.4		
Salt	Chloride ^	ppm	200-1100	24		
	EC [1:5 H2O] ^	dS/m	0.90-3.0	0.090		
Ratios	Ca:Mg Ratio		2.5-3.0	5.6		

	Analyte	Unit	Desired Level	Level Found	Exchangeable cation % (eCEC)
Exch. cation %	Calcium	%	50.0-75.0	78.3	50.0-75.0 % (0 20 40 60 80 100)
	Magnesium	%	5.0-15.0	14.1	5.0-15.0 % (0 5 10 15 20 25 30 35 40)
	Potassium	%	2.0-5.0	5.8	2.0-5.0 % (0 5 10 15 20)
	Sodium	%	1.0-2.0	1.9	1.0-2.0 % (0 5 10 15 20)
	Aluminium	%		<1.0	(0 5 10 15 20)

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Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T4 - No Fertiliser Seasol Applied
Barcode:	SDE2565	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

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SOIL ANALYSIS

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Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T5 - Standard Fertiliser Rate No Seasol
Barcode:	SDE2566	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

	Analyte	Unit	Desired Level	Level Found	ppm	Very Low / Low / Slightly Low / Normal / High
	Colour		#	GREY BROWN		
	Texture		#	SANDY LOAM		
	CEC ^	meq/100g	12.0-40.0	4.71		
	Lime Requirement	t/ha	#	<0.50		
	Organic Matter	%	3.0-8.0	1.4		
	pH [1:5 H2O] ^		6.3-9.0	6.2		
	pH [1:5 CaCl2] ^		5.7-8.4	5.5		
Extractable N-P-K-S	NO3-N ^	ppm	15-70	11		
	NH4-N	ppm	#	<1.0		
	Phosphorus [Olsen] ^	ppm	35-130	51		
	Sulphur [MCP] ^	ppm	8-20	25		
Exchangeable cations	Calcium[Am. Acet.] ^	meq/100g	6.00-15.0	3.70	741	
	Magnesium[Am. Acet.] ^	meq/100g	1.00-4.50	0.72	86.0	
	Potassium[Am. Acet.] ^	meq/100g	0.50-1.50	0.24	92.0	
	Sodium[Am. Acet.] ^	meq/100g	0.3-3.0	<0.1	<18.4	
	Aluminium[KCl]	meq/100g	1.0-2.5	<0.02		
Trace Elements	Boron[CaCl2] ^	ppm	1.0-5.0	0.4		
	Iron [DTPA] ^	ppm	5-120	23		
	Manganese [DTPA] ^	ppm	5.0-60.0	29.8		
	Copper [DTPA] ^	ppm	2.5-20.0	1.8		
	Zinc [DTPA] ^	ppm	5.0-15.0	5.3		
Salt	Chloride ^	ppm	200-1100	21		
	EC [1:5 H2O] ^	dS/m	0.90-3.0	0.080		
Ratios	Ca:Mg Ratio		2.5-3.0	5.2		

		Unit	Desired Level	Level Found	Exchangeable cation % (eCEC)
Exch. cation %	Calcium	%	50.0-75.0	78.6	50.0-75.0 %
	Magnesium	%	5.0-15.0	15.2	5.0-15.0 %
	Potassium	%	2.0-5.0	5.0	2.0-5.0 %
	Sodium	%	1.0-2.0	1.2	1.0-2.0 %
	Aluminium	%		<1.0	

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SOIL ANALYSIS

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Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T5 - Standard Fertiliser Rate No Seasol
Barcode:	SDE2566	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

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SOIL ANALYSIS

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Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T6 - 75% Fertiliser Rate No Seasol
Barcode:	SDE2567	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

	Analyte	Unit	Desired Level	Level Found	ppm
	Colour		#	GREY BROWN	
	Texture		#	SANDY LOAM	
	CEC ^	meq/100g	12.0-40.0	4.59	
	Lime Requirement	t/ha	#	<0.50	
	Organic Matter	%	3.0-8.0	1.5	
	pH [1:5 H2O] ^		6.3-9.0	6.3	
	pH [1:5 CaCl2] ^		5.7-8.4	5.5	
Extractable N-P-K-S	NO3-N ^	ppm	15-70	14	
	NH4-N	ppm	#	<1.0	
	Phosphorus [Olsen] ^	ppm	35-130	49	
	Sulphur [MCP] ^	ppm	8-20	14	
Exchangeable cations	Calcium[Am. Acet.] ^	meq/100g	6.00-15.0	3.58	715
	Magnesium[Am. Acet.] ^	meq/100g	1.00-4.50	0.68	82.0
	Potassium[Am. Acet.] ^	meq/100g	0.50-1.50	0.25	97.0
	Sodium[Am. Acet.] ^	meq/100g	0.3-3.0	0.1	19.0
	Aluminium[KCl]	meq/100g	1.0-2.5	<0.02	
Trace Elements	Boron[CaCl2] ^	ppm	1.0-5.0	0.4	
	Iron [DTPA] ^	ppm	5-120	23	
	Manganese [DTPA] ^	ppm	5.0-60.0	28.7	
	Copper [DTPA] ^	ppm	2.5-20.0	1.8	
	Zinc [DTPA] ^	ppm	5.0-15.0	4.3	
Salt	Chloride ^	ppm	200-1100	19	
	EC [1:5 H2O] ^	dS/m	0.90-3.0	0.070	
Ratios	Ca:Mg Ratio		2.5-3.0	5.2	

	Analyte	Unit	Desired Level	Level Found	Exchangeable cation % (eCEC)
Exch. cation %	Calcium	%	50.0-75.0	77.9	50.0-75.0 %
	Magnesium	%	5.0-15.0	14.9	5.0-15.0 %
	Potassium	%	2.0-5.0	5.4	2.0-5.0 %
	Sodium	%	1.0-2.0	1.8	1.0-2.0 %

Additional Comments

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SOIL ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	**Report Date:**	09/08/2023
Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T6 - 75% Fertiliser Rate No Seasol
Barcode:	SDE2567	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

- Eurofins APAL will review published literature for crop desired levels, and reserves the right to make changes to this information in test reports as and when these reviews are conducted.
- Soil analyses performed and reported on samples dried at 40°C and sieved to <2mm.
- ^ NATA accredited tests. Accreditation No. 20543.

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SOIL ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	**Report Date:**	09/08/2023
Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T7 - 50% Fertiliser Rate No Seasol
Barcode:	SDE2568	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

	Analyte	Unit	Desired Level	Level Found	ppm
	Colour		#	GREY BROWN	
	Texture		#	SANDY LOAM	
	CEC ^	meq/100g	12.0-40.0	4.51	
	Lime Requirement	t/ha	#	<0.50	
	Organic Matter	%	3.0-8.0	1.3	
	pH [1:5 H2O] ^		6.3-9.0	6.4	
	pH [1:5 CaCl2] ^		5.7-8.4	5.6	
Extractable N-P-K-S	NO3-N ^	ppm	15-70	2.0	
	NH4-N	ppm	#	<1.0	
	Phosphorus [Olsen] ^	ppm	35-130	44	
	Sulphur [MCP] ^	ppm	8-20	25	
Exchangeable cations	Calcium[Am. Acet.] ^	meq/100g	6.00-15.0	3.55	710
	Magnesium[Am. Acet.] ^	meq/100g	1.00-4.50	0.64	77.0
	Potassium[Am. Acet.] ^	meq/100g	0.50-1.50	0.22	88.0
	Sodium[Am. Acet.] ^	meq/100g	0.3-3.0	<0.1	<18.4
	Aluminium[KCl]	meq/100g	1.0-2.5	0.03	
Trace Elements	Boron[CaCl2] ^	ppm	1.0-5.0	0.3	
	Iron [DTPA] ^	ppm	5-120	23	
	Manganese [DTPA] ^	ppm	5.0-60.0	45.2	
	Copper [DTPA] ^	ppm	2.5-20.0	1.8	
	Zinc [DTPA] ^	ppm	5.0-15.0	4.1	
Salt	Chloride ^	ppm	200-1100	18	
	EC [1:5 H2O] ^	dS/m	0.90-3.0	0.060	
Ratios	Ca:Mg Ratio		2.5-3.0	5.6	

	Analyte	Unit	Desired Level	Level Found	Exchangeable cation % (eCEC)
Exch. cation %	Calcium	%	50.0-75.0	78.7	50.0-75.0 %
	Magnesium	%	5.0-15.0	14.2	5.0-15.0 %
	Potassium	%	2.0-5.0	5.0	2.0-5.0 %
	Sodium	%	1.0-2.0	1.5	1.0-2.0 %
	Aluminium	%		<1.0	

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SOIL ANALYSIS

Agent:	APPLIED HORTICULTURE RESEARCH (AHR)	**Report Date:**	09/08/2023
Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T7 - 50% Fertiliser Rate No Seasol
Barcode:	SDE2568	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

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SOIL ANALYSIS

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Agent Address:	BUNDEENA, NSW, 2230	**Sampling Date:**	29/07/2023
Client:	AHR CROPSCIENCE	**Date Received:**	03/08/2023
Test Set or Quotation:	S4	**Sample Name:**	Seasol T8 - No Fertiliser No Seasol
Barcode:	SDE2569	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
		Analysing Laboratory:	Burleigh Heads

	Analyte	Unit	Desired Level	Level Found	ppm	Very Low / Low / Slightly Low / Normal / High
	Colour		#	GREY BROWN		
	Texture		#	SANDY LOAM		
	CEC ^	meq/100g	12.0-40.0	4.48		
	Lime Requirement	t/ha	#	<0.50		
	Organic Matter	%	3.0-8.0	1.7		
	pH [1:5 H2O] ^		6.3-9.0	6.6		
	pH [1:5 CaCl2] ^		5.7-8.4	5.7		
Extractable N-P-K-S	NO3-N ^	ppm	15-70	<1.0		
	NH4-N	ppm	#	<1.0		
	Phosphorus [Olsen] ^	ppm	35-130	47		
	Sulphur [MCP] ^	ppm	8-20	10		
Exchangeable cations	Calcium[Am. Acet.] ^	meq/100g	6.00-15.0	3.47	694	
	Magnesium[Am. Acet.] ^	meq/100g	1.00-4.50	0.66	79.0	
	Potassium[Am. Acet.] ^	meq/100g	0.50-1.50	0.27	103	
	Sodium[Am. Acet.] ^	meq/100g	0.3-3.0	0.1	21.0	
	Aluminium[KCl]	meq/100g	1.0-2.5	<0.02		
Trace Elements	Boron[CaCl2] ^	ppm	1.0-5.0	0.3		
	Iron [DTPA] ^	ppm	5-120	23		
	Manganese [DTPA] ^	ppm	5.0-60.0	63.3		
	Copper [DTPA] ^	ppm	2.5-20.0	1.9		
	Zinc [DTPA] ^	ppm	5.0-15.0	5.0		
Salt	Chloride ^	ppm	200-1100	24		
	EC [1:5 H2O] ^	dS/m	0.90-3.0	0.050		
Ratios	Ca:Mg Ratio		2.5-3.0	5.2		

	Analyte	Unit	Desired Level	Level Found	Exchangeable cation % (eCEC)
Exch. cation %	Calcium	%	50.0-75.0	77.4	50.0-75.0 % (0 20 40 60 80 100)
	Magnesium	%	5.0-15.0	14.8	5.0-15.0 % (0 5 10 15 20 25 30 35 40)
	Potassium	%	2.0-5.0	5.9	2.0-5.0 % (0 5 10 15 20)
	Sodium	%	1.0-2.0	2.1	1.0-2.0 % (0 5 10 15 20)
	Aluminium	%		<1.0	(0 5 10 15 20)

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Test Set or Quotation:	S4	**Sample Name:**	Seasol T8 - No Fertiliser No Seasol
Barcode:	SDE2569	**Crop:**	Lettuce (outdoor)
Submission ID:	B135685	**Sample Depth:**	
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