EVALUATION OF SUGARCANE YIELD FOLLOWING TREATMENT WITH SEASOL SEAWEED CONCENTRATE APPLIED THROUGH SUB-SURFACE DRIP IRRIGATION.

ONE LARGE BLOCK TRIAL IN CROP PLANTED IN 2013 AT EMERALD CREEK, MAREEBA, QUEENSLAND.

2020-21 GROWING SEASON (7th RATOON) RESULTS

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1.   <u>SUMMARY   2020-21 Growing Season</u>

One large block field trial is being conducted to investigate the influence of **Seasol Commercial Seaweed Concentrate** on the growth and yield of irrigated sugarcane. The trial crop was planted in 2013 on a commercial sugarcane farm at Emerald Creek (near Mareeba), in far north Queensland, Australia. This report presents details and results of the 2020-21 growing season.

The following treatments are being evaluated:

Treatment	Nominal Rate per Monthly Application (total for 2020-21 season)	Method
Seasol Commercial Seaweed Concentrate	10-20 L/ha[1] (80 L/ha)	Fertigation via sub-surface drip-tape irrigation
Untreated Control	- -	

1: The nominal monthly rate is 10 L/ha. When irrigation (and therefore Seasol fertigation) was not carried out because of wet weather/wet soil, the subsequent fertigation/application of Seasol was usually made at the higher rate of 20 L/ha.

The trial is a large block, single replicate design. The area treated with Seasol is 7.5 hectares and the Untreated Control block is 3.5 hectares. A typical, local agricultural soil type is present uniformly across both treatment blocks. Identical crop management (irrigation timing and amount, nutrition and pest control) is being applied to both treatments.

Seasol is being applied by the farmer, through sub-surface drip tape irrigation lines, buried around 35 cm beneath the crop row. The required amount of Seasol is mixed with 1000-1600 litres of water which is pumped through a sand filter, until evenly distributed over the treated block. Seasol was first applied to the trial block (in 2014), straight after harvest of the plant crop, planted in 2013. Regular applications have been made ever since then, on a monthly nominal basis, except when the soil is too wet.

In the 2020-21 season, the crop was regularly observed for health and vigour and photos were taken, however no measurements were made, apart from yield. Commercial harvest was carried out on the 19 & 20th October 2021. Bin numbers from each treatment block were reconciled with mill processing data from the crush carried out by MSF Sugar Pty Ltd, Lotus Glen.

The general climatic conditions throughout the 2020-21 growing season were satisfactory for crop growth and yield. Applications of Seasol were made monthly at 10 L/ha. Monsoon rains (January-April) delayed irrigation/fertigation temporarily. A total of 80 L/ha Seasol was applied over 6 separate dates. Both crops (Seasol and Untreated) grew normally throughout the season.

At the end of the 2020-21 season, Seasol had produced good increases in yield of raw cut cane, milled sugar and gross return per hectare. Yield of cane (t/ha) treated with Seasol was 20.0% higher than in the Untreated paddock. Based on the QSL sugar price near the time of harvest ($580/tonne), Seasol treated sugarcane returned an extra $1556 (gross) per hectare compared with the Untreated Control sugarcane.

Looking over 6 consecutive crop ratoons (including 2020-21), the Seasol treated trial paddock was found to have an annual average yield of 120.9 t/ha (cut cane), compared with the Untreated Control that yielded 100.5 t/ha. The Untreated Control cane had an average CCS of 14.6%, slightly higher than that of Seasol (14.3%). After mill processing, the Seasol treated paddock was shown to have an annual average yield of 17.2 t/ha (sugar), compared with 14.4 t/ha in the Untreated. Compared with the Untreated, the Seasol treated paddock yielded an extra 19.9% gross $ return per hectare per crop.

Laboratory analyses conducted (by SWEP) after harvest in November 2021, revealed that Seasol treated soil had improved levels of fertility compared with soil from the Untreated Control. The parameters that were significantly (P=0.05) improved by Seasol application were: Organic Matter (%), Organic Carbon (%), Cation Exchange Capacity (mequiv/100 g), available ppm of Calcium, Magnesium, Copper, Zinc Manganese and Boron. Significant increases in total soil Nitrogen and Phosphorous were also revealed. There were positive impacts on populations of beneficial microbes in the soil due to Seasol, with significant increases in lactose active microbes (bacteria and fungi) and actinomycete fungi - compared with the Untreated Control.

2.   <u>INTRODUCTION</u>

One large block field trial is being conducted to investigate the influence of **Seasol Commercial Seaweed Concentrate** when applied monthly, on the growth, yield and rattoon longevity of irrigated sugarcane, grown over several consecutive growing seasons. The trial crop was planted in 2013 on a commercial sugarcane farm at Emerald Creek (near Mareeba), in far north Queensland, Australia. This report presents details and results of the 2020-21 growing season.

3. EXPERIMENTAL DETAILS

3.1 Site Details

Grower/ Co-operator Details	Mr John & Haji Myrteza Gilmore Road, Emerald Creek, 10 km from Mareeba Queensland, Australia
Crop Details	Sugarcane cv Q228 (5th ratoon) Grown in 1.7 m wide rows Irrigated by subsurface drip tape. Water applied as required.
Soil Type	Dark silty loam duplex. Heavy trash cover (4-6 cm).
Crop Management & Paddock History	Typical industry good crop management practices are being followed for both paddocks. Similar amounts of total water, pesticides and fertilisers were applied. In both trial paddocks, tobacco crops were grown for 10-15 years, followed by pumpkins in the 1990s, until sugarcane was first planted in 2013. Preceding trial harvests (ratoon#) 25-26 Sept 2015 (1); 24 Sep 2016 (2); 8 Nov 2017 (3); 22 Oct 2018 (4); 12 Oct 2019 (5); 22-23 Sept 2020 (6)
Rainfall/ Climate	Weather details were recorded by Bureau of Meteorology Stations at Mareeba approx.12 km from the trial. Data is shown in the Appendices.

3.2 Treatment List

Treatment	Nominal Rate per Monthly Application (total for 2020-21 season)	Method
Seasol Commercial Seaweed Concentrate	10-20 L/ha[1] (80 L/ha)	Fertigation via sub-surface drip-tape irrigation
Untreated Control	-	

1: The nominal monthly rate is 10 L/ha. When irrigation (and therefore Seasol fertigation) is not carried out because of wet weather/wet soil, the subsequent fertigation/application of Seasol was made at the rate of 20 L/ha.

3.3 Formulations

SEASOL COMMERCIAL LIQUID SEAWEED CONCENTRATE – is a liquid seaweed extract manufactured and marketed by SEASOL International Pty. Ltd.

3.4   Trial Design & Map

Large single replicate blocks, each with uniform soil type and identical crop management.

SEASOL treated block is 7.5 ha (Mill Zones 7 & 8).
Untreated Block is 3.5 ha (Mill Zone 6).

Aerial Map *(source: Google Earth)* -16.968446S, 145.462703E

Not to scale   North to the top of the map.

3.5   Treatment Method

Equipment	John Deere sand filter; John Deere/Rivulus drip lines and fittings
Field spacing	Single drip tape line 35 cm beneath each crop row
Flow rate & pressure	2 mm/hour/hectare at 10-15 psi

3.6   Seasol Application & <u>Harvest</u> Dates

Application Number	Date[a]	Dose Applied
1	7-10-20	10 L/ha
2	9-11-20	10 L/ha
3	12-12-20	10 L/ha
4[b]	5-6-21	20 L/ha
5	7-7-21	20 L/ha
6	15-8-20	10 L/ha
Total applied		80 L/ha
Harvest	*19/20-10-21*	

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a: each application & date were confirmed by the farmer by sending a text to the field trial agronomist.
b delay due to wet soil and no opportunity to irrigate/fertigate

3.7   Observations and Assessments

Date	Observations and Assessments
Sept 2020 - Oct 2021	Observe growth and health of treatment blocks, at regular intervals.
19/20 Oct 21	H. Myrteza monitored field bins harvested from each treatment and reconciled with mill bin data returned one week later. The crop was crushed by MSF, Lotus Glen.
1 Nov 21	Soil sample replicates were taken from each treatment block soon after crop harvest on 1-Nov-21, to be analysed for levels of cations, soil nutrients, organic matter and microbial activity. Samples were taken by digging out soil (in the root zone) to a depth of 20cm from 10-12 random spots along ≈100 m lengths of interrow. Bulk soil collected from each randomly selected interrow was mixed before a 300-400 g subsample of soil was taken and placed into a labelled plastic bag. In 2020, samples were taken from 4 separate randomly selected interrow replicates per treatment and in 2021, 5 random interrow replicates were sampled per treatment. Soil samples were sent via Aust Express Post to SWEP laboratories, on the day of sampling.

3.8   Photos

Any photos taken of the trial throughout the crop season are shown in the Appendices.

4.   RESULTS AND DISCUSSION

4.1   Yield

Following harvest, average bin weight data and mill processing data were used to determine average yield parameters, for comparing the two treatments. Special care was taken to ensure the harvest bins corresponded to the matching treatment block and no overlap in harvest of the treatment blocks occurred. The farmer was on site to instruct the harvest machinery operators and to confirm the bins were harvested correctly according to the field trial design.

Table 1:   Sugarcane Crop Yield Data and Gross $ Returns – Seasol vs Untreated Control – J & H Myrteza, Mareeba, 2020-21 Season.

Treatment	Raw cane t/ha *(% increase)*	CCS %	Sugar t/ha	$/ha[1]	Extra gross return $/ha (%) due to Seasol
Seasol 10-20 L/ha/month	102.7 *(20.0%)*	14.74	15.1	$8,780	$1,556 *(21.5%)*
Untreated Control	85.6	14.55	12.5	$7,224	

1:QSL sugar price of $580 per tonne (10/21)

The general climatic conditions (ie temperatures and rainfall) throughout the 2020-21 growing season were generally satisfactory for crop growth and yield. Seasol was applied monthly except for several months (January-June 2021) when wet soils from normal seasonal monsoon rains meant that irrigation was not required and that fertigation was not possible. A total of 80 L/ha Seasol was applied per hectare by fertigation on 6 separate application dates during crop growth.

At the end of the 2020-21 season, Seasol had produced good increases in yield of raw cut cane, milled sugar and gross return per hectare. Yield of cane (t/ha) treated with Seasol was 20.0% higher than in the Untreated paddock. Based on the QSL sugar price near the time of harvest ($580/tonne), Seasol treated sugarcane returned an extra $1556 (gross) per hectare compared with the Untreated Control sugarcane.

After looking at yields of the two separate treatments (Seasol and Untreated), the farmer/cooperator considered the options of fallowing the Untreated Control block, fallowing both of the trial treatment blocks, or of continuing the crops in both blocks for at least another year. He said that if the whole trial was yielding as poorly as the Untreated Control was, he would certainly have wanted to fallow both blocks. However, even though the crop in the Untreated block was far inferior to that in the Seasol block, he decided to maintain the crops in both treatment blocks - mainly because of the high sugar price and the unwelcome prospect of missing out on any sugar yield in the Untreated block, if it were to go into a fallow.

In Table 2, average yield data (tonnes of cut cane, milled sugar and $ gross return per hectare) for Seasol and the Untreated Control are presented for the past six crop cycles.

Table 2: Comparison of Seasol and Untreated Control, 6 ratoons (2014/20) Myrteza.

Crop Season	Treatment (applied monthly)	Raw Cane t/ha	%CCS	Milled Sugar t/ha	$/ha	Extra % Gross Return $/ha
2014/15[1]	Seasol 10 L	138.9	13.6	18.9	$7,560	13.1
	Untreated Control	116.1	14.4	16.7	$6,680	
2015/16[2]	Seasol 10 L	150.9	13.7	20.6	$13,596	21.1
	Untreated Control	121.6	13.9	17.0	$11,220	
	Seasol 10 L	14137[8]	13.8	19.5	$12,870	21.8
	Untreated Control	113.8[8]	14.0	16.0	$10,560	
2016/17[3]	Seasol 10 L	131.0	14.0	18.3	$7,686	10.9
	Untreated Control	119.6	13.8	16.5	$6,930	
2017/18[4]	Seasol 10 L	99.7	14.1	14.0	$6,020	12.9
	Untreated Control	91.7	13.6	12.4	$5,332	
2018/19[5]	Seasol 10 L	91.6	16.2	14.8	$5,905	44.5
	Untreated Control	64.0	16.0	10.2	$4,086	
2019/20[6]	Seasol 10 L	111.3	14.5	16.1	$6,778	13.7
	Untreated Control	91.3	16.7	14.2	$5,964	
2020/21[7]	Seasol 10 L	102.7	14.7	15.1	$8,780	21.5
	Untreated Control	85.6	14.6	12.5	$7,224	
Seven Year Average	**Seasol 10 L**	120.93	14.33	17.16	8,649.4	**19.9**
	Untreated Control	100.47	14.63	14.44	7,249.5	

QSL Sugar prices, 1: $400/t; 2: $660/t; 3: $420/t; 4: $430/t; 5: $399/t; 6: $420/t; 7: $580/t.
8: Separately measured bins.

Looking over 6 consecutive crop ratoons (including 2020-21), the Seasol treated trial paddock was found to have an annual average yield of 120.9 t/ha (cut cane), compared with the Untreated Control that yielded 100.5 t/ha. The Untreated Control cane had an average CCS of 14.6%, slightly higher than that of Seasol (14.3%). After mill processing, the Seasol treated paddock was shown to have an annual average yield of 17.2 t/ha (sugar), compared with 14.4 t/ha in the Untreated. Compared with the Untreated, the Seasol treated paddock yielded an extra 19.9% gross $ return per hectare per crop.

4.2 SWEP Soil Testing Results - on Soil Sampled after Harvest 2021

Table 3: pH, EC, Salt, OM & OC

Parameter	Seasol	Untreated		Desirable Value*
pH(1:5 Water)	4.9	4.7	nsd	6.0-7.5
pH(1:5 0.01M CaCl2)	4.3	4.1	nsd	7
Electrical Conductivity EC mS/cm	40.2	38.0	nsd	< 250
TOTAL SOLUBLE SALT ppm	132.7	125.5	nsd	< 825
TOTAL ORGANIC MATTER %	2.1 a	1.7 b	sig	3 - 4
TOTAL ORGANIC CARBON %	1.0 a	0.8 b	sig	1.5 - 2

sig = significant difference P=0.05; nsd = no significant difference P=0.05   *SWEP

Table 4: Exchangeable Cations (% of Adj CEC) and SWEP CATION BALANCE

Parameter	Seasol	Untreated		Desirable Value*
CALCIUM CATIONS	19.4	14.7	nsd	65-70
MAGNESIUM CATIONS	7.4	6.0	nsd	12-15
SODIUM CATIONS	1.4	1.9	nsd	0.5-5
POTASSIUM CATIONS	3.8	3.8	nsd	3-5
ADJ. EXCH. HYDROGEN	68	73.6	nsd	<20
CALCIUM / MAGNESIUM RATIO	2.6	2.5	nsd	2-4
CATION EXCHANGE CAPACITY meq/100 of soil	4.3 a	3.3 b	sig	*SWEP
CATION BALANCE	38.6	36.4	nsd	

* meq/100g soil   sig = significant difference P=0.0(nsd = no significant difference P=0.05

There were no significant treatment differences in soil pH, Electrical Conductivity, or Total Soluble Salts. Soil from the Seasol treated block however, had significantly higher levels of Organic Matter and Organic Carbon, when compared with the Untreated Control. There were no significant treatment differences in Exchangeable Cations, as a % of Adjusted CEC (Cation Exchange Capacity), however Seasol treated soil had significantly higher overall CEC, compared with the Untreated soil.

Table 5: Available Nutrients ppm and SWEP NUTRIENT BALANCE

Parameter	Seasol	Untreated		Desirable Value*
CALCIUM	140.2 a	83.8 b	sig	319
MAGNESIUM	32.1 a	20.4 b	sig	59
SODIUM	11.8	11.9	nsd	<66
NITROGEN	6.5	4.3	nsd	94
PHOSPHORUS	43.1	43.9	nsd	70
POTASSIUM	53.9	42.4	nsd	70
SULPHUR	5.0	4.8	nsd	7-10
COPPER	0.69 a	0.43 b	sig	3
ZINC	2.5 a	1.0 b	sig	4 - 6
IRON	90.0	111.0	nsd	>30
MANGANESE	26.4 a	17.8 b	sig	>20
COBALT	2.1 a	1.0 b	sig	0.5 - 0.7
MOLYBDENUM	0.19 a	0.14 b	sig	0.1 - 0.2
BORON	0.14 a	0.11 b	sig	0.6 - 1.0
TOTAL PHOSPHORUS ppm	278.3 a	207.6 b	sig	-
TOTAL NITROGEN %	0.07 a	0.05 b	sig	-
NUTRIENT BALANCE	43.9 a	37.8 b	sig	

sig = significant difference P=0.(nsd = no significant difference P=0.05   *SWEP

Table 6: Biological Parameters and SWEP BIOLOGICAL BALANCE

Parameters	Seasol	Untreated		Desirable Value*
ACTIVE LACTIC ACID BACTERIA cfu/g soil	264,000	122,000	nsd	48,148
ACTIVE FUNGI cfu/g soil	758,000 a	496,000 b	sig	-
CELLULOSE UTILISERS cfu/g soil	278,000 a	154,000 b	sig	-
TOTAL LACTIC ACTIVE FUNGI cfu/g soil	480,000 a	342,000 b	sig	148,469
ACTIVE YEASTS cfu/g soil	34,000	32,020	nsd	94,480
ACTIVE ACTINOMYCETES cfu/g soil	116,000 a	72,000 b	sig	59,477
ACTIVE PHOTOSYNTHETIC BACTERIA cfu/g soil	100	100	na	-
Total Active Population (TAP) cfu/g soil	1,170,000 a	722,120 b	sig	283,224
CARBON/NITROGEN RATIO	14.8	16.0	nsd	10 - 15
BIOLOGICAL BALANCE	35.4	38.4	nsd	

cfu = colony forming unit   sig = significant difference P=0.(nsd = no significant difference P=0.05   *SWEP

Compared with the Untreated Control, Seasol treated soil had significantly higher levels of available Calcium and Magnesium, as well as Copper, Zinc, Manganese, Cobalt, Molybdenum and Boron. Seasol soil also had greater total levels of Phosphorous and Nitrogen, with an overall Nutrient Balance (SWEP), significantly (P=0.05) better than the Untreated Control.

Biological activity results were very positive for Seasol, with the treated soil having significant (P=0.05) advantages - in numbers of fungal and bacterial colonies and of total active microbe populations – over the Untreated Control.

5.   __CONCLUSIONS__

The general climatic conditions throughout the 2020-21 growing season were satisfactory for crop growth and yield. Applications of Seasol were made monthly at 10 L/ha. Monsoon rains (January-March) delayed irrigation/fertigation temporarily. A total of 80 L/ha Seasol was applied over 6 separate dates. Both crops (Seasol and Untreated) grew normally throughout the season.

At the end of the 2020-21 season, Seasol had produced good increases in yield of raw cut cane, milled sugar and gross return per hectare. Yield of cane (t/ha) treated with Seasol was 20.0% higher than in the Untreated paddock. Based on the QSL sugar price near the time of harvest ($580/tonne), Seasol treated sugarcane returned an extra $1556 (gross) per hectare compared with the Untreated Control sugarcane.

Looking over 6 consecutive crop ratoons (including 2020-21), the Seasol treated trial paddock was found to have an annual average yield of 120.9 t/ha (cut cane), compared with the Untreated Control that yielded 100.5 t/ha. The Untreated Control cane had an average CCS of 14.6%, slightly higher than that of Seasol (14.3%). After mill processing, the Seasol treated paddock was shown to have an annual average yield of 17.2 t/ha (sugar), compared with 14.4 t/ha in the Untreated. Compared with the Untreated, the Seasol treated paddock yielded an extra 19.9% gross $ return per hectare per crop.

Laboratory analyses conducted (by SWEP) after harvest in November 2021, revealed that Seasol treated soil had improved levels of fertility compared with soil from the Untreated Control. The parameters that were significantly ($P=0.05$) improved by Seasol application were: Organic Matter (%), Organic Carbon (%), Cation Exchange Capacity (mequiv/100 g), available ppm of Calcium, Magnesium, Copper, Zinc Manganese and Boron. Significant increases in total soil Nitrogen and Phosphorous were also revealed. There were positive impacts on populations of beneficial microbes in the soil due to Seasol, with significant increases in lactose active microbes (bacteria and fungi) and actinomycete fungi - compared with the Untreated Control.

6.   APPENDICES

6.1   Summary of Raw Data from MSF, Lotus Glen. Myrteza.

MYRTEZA   SUGARCANE TRIAL
                        YIELD 2019/20

2020   Seasol Trial Results.

Blocks Harvest 22,23-9-20.

* ZONE 7   = 383.82 Tonnes. (3.45ha).
                = 111.25 Tonnes/ha.
Seasol - CCS = 14.53
                = 16.67 Sugar.

* Zone 6   = 314.9 Tonnes (3.45ha).
                = 91.27 Tonnes/ha.
No Seasol ⊕ - = 15.96.
                = 14.16 Sugar.

24-11-19   -   10lt/ha applied.
15-4-20   -   20lt/ha applied.
14-5-20   10 L/ha
11-6-20   -   20lt/ha applied.
15-7-20   -   20lt/ha applied.
16-8-20   -   20lt/ha applied.

⊕ UNIRRIGATED CONTROL

Notes summary
from mill data.

6.2   Six Years of Crop Yield Data. Myrteza, Emerald Creek.

Crop Season	Treatment (applied monthly)	Raw Cane t/ha	%CCS	Milled Sugar t/ha	$/ha	Extra % Gross Return $/ha
2014/15[1]	Seasol 10 L	138.9	13.6	18.9	$7,560	13.1
	Untreated Control	116.1	14.4	16.7	$6,680	
2015/16[2]	Seasol 10 L	150.9	13.7	20.6	$13,596	21.1
	Untreated Control	121.6	13.9	17.0	$11,220	
	Seasol 10 L	*141.36[7]*	*13.8*	*19.5*	*$12,870*	21.8
	Untreated Control	*113.8[7]*	*14.0*	*16.0*	*$10,560*	
2016/17[3]	Seasol 10 L	131.0	14.0	18.3	$7,686	10.9
	Untreated Control	119.6	13.8	16.5	$6,930	
2017/18[4]	Seasol 10 L	99.7	14.1	14.0	$6,020	12.9
	Untreated Control	91.7	13.6	12.4	$5,332	
2018/19[5]	Seasol 10 L	91.6	16.2	14.8	$5,905	44.5
	Untreated Control	64.0	16.0	10.2	$4,086	
2019/20[6]	Seasol 10 L	111.3	14.5	16.1	$6,778	13.7
	Untreated Control	91.3	16.7	14.2	$5,964	
Six Year Average	**Seasol 10 L**	**120.6**	**14.4**	**17.1**	**$7,924**	**19.4**
	Untreated Control	**100.7**	**14.7**	**14.5**	**$6,702**	

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6.3 SOIL TEST DATA

Significant P=0.05	Not significant P=0.05

Statistix 10.0   18/11/2021, 6:38:08 PM

Completely Randomized AOV for OM

Source	DF	SS	MS	F	P
Treatment	1	0.53361	0.53361	10.21	0.0127
Error	8	0.41828	0.05229		
Total	9	0.95189			

Grand Mean   1.899   CV   12.04

Homogeneity of var.s	F	P
Levene's Test	0.03	0.8602
O'Brien's Test	0.02	0.88
Brown and Forsythe Test	0	0.9551

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	10.21	0.0128
Error	8		

Component of var. for between groups   0.09627
Effective cell size   5

Treatment	Mean
SEASOL	2.1 a
UNTRTD	1.7 b
Observations per Mean	5
Standard Error of a Mean	0.1023
Std Error (Diff of 2 Means)	0.1446

Completely Randomized AOV for OC

Source	DF	SS	MS	F	P
Treatment	1	0.121	0.121	8.07	0.0218
Error	8	0.12	0.015		
Total	9	0.241			

Grand Mean   0.93   CV   13.17

Homogeneity of var.s	F	P
Levene's Test	0.1	0.7605
O'Brien's Test	0.07	0.7937
Brown and Forsythe Test	0	1

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	8.07	0.0222
Error	7.9		

Component of var. for between groups   0.0212
Effective cell size   5

Treatment	Mean
SEASOL	1.0 a
UNTRTD	0.8 b
Observations per Mean	5
Standard Error of a Mean	0.0548
Std Error (Diff of 2 Means)	0.0775

Completely Randomized AOV for ECuS

Source	DF	SS	MS	F	P
Treatment	1	11.664	11.664	0.79	0.4008
Error	8	118.512	14.814		
Total	9	130.176			

Grand Mean	39.12	CV	9.84

Homogeneity of var.s	F	P
Levene's Test	0.05	0.8294
O'Brien's Test	0.04	0.8534
Brown and Forsythe Test	0	0.9464

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0.79	0.401
Error	7.9		

Component of var. for between groups	-0.63
Effective cell size	5

Treatment	Mean
SEASOL	40.2 a
UNTRTD	38.0 a
Observations per Mean	5
Standard Error of a Mean	1.7213
Std Error (Diff of 2 Means)	2.4343

Completely Randomized AOV for ECdS

Source	DF	SS	MS	F	P
Treatment	1	1.00E-05	1.00E-05	0.67	0.4371
Error	8	1.20E-04	1.50E-05		
Total	9	1.30E-04			

Grand Mean	0.0392	CV	9.86

Homogeneity of var.s	F	P
Levene's Test	0.11	0.7483
O'Brien's Test	0.08	0.7831
Brown and Forsythe Test	0.01	0.915

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0.67	0.4374
Error	7.9		

Component of var. for between groups	-9.90E-07
Effective cell size	5

Treatment	Mean
SEASOL	0.04 a
UNTRTD	0.04 a
Observations per Mean	5
Standard Error of a Mean	1.73E-03
Std Error (Diff of 2 Means)	2.45E-03

Completely Randomized AOV for pHCaCl

Source	DF	SS	MS	F	P
Treatment	1	0.03721	0.03721	2.86	0.1293
Error	8	0.10408	0.01301		
Total	9	0.14129			

Grand Mean	4.191 CV		2.72

Homogeneity of var.s	F	P
Levene's Test	0.06	0.8129
O'Brien's Test	0.04	0.8392
Brown and Forsythe Test	0	0.9732

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	2.86	0.1298
Error	7.9		

Component of var. for between groups	4.84E-03
Effective cell size	5

Treatment	Mean
SEASOL	4.3 a
UNTRTD	4.1 a
Observations per Mean	5
Standard Error of a Mean	0.051
Std Error (Diff of 2 Means)	0.0721

Completely Randomized AOV for CEC

Source	DF	SS	MS	F	P
Treatment	1	2.33289	2.33289	16.7	0.0035
Error	8	1.1176	0.1397		
Total	9	3.45049			

Grand Mean	3.819 CV		9.79

Homogeneity of var.s	F	P
Levene's Test	0.5	0.4994
O'Brien's Test	0.37	0.5611
Brown and Forsythe Test	0.1	0.7645

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	16.7	0.0037
Error	7.8		

Component of var. for between groups	0.43864
Effective cell size	5

Treatment	Mean
SEASOL	4.3 a
UNTRTD	3.3 b
Observations per Mean	5
Standard Error of a Mean	0.1672
Std Error (Diff of 2 Means)	0.2364

Completely Randomized AOV for pH

Source	DF	SS	MS	F	P
Treatment	1	0.03721	0.03721	2.86	0.1293
Error	8	0.10408	0.01301		
Total	9	0.14129			

Grand Mean	4.791	CV	2.38	

Homogeneity of var.s	F	P
Levene's Test	0.06	0.8129
O'Brien's Test	0.04	0.8392
Brown and Forsythe Test	0	0.9732

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	2.86	0.1298
Error	7.9		

Component of var. for between groups	4.84E-03
Effective cell size	5

Treatment	Mean
SEASOL	4.9 a
UNTRTD	4.7 a
Observations per Mean	5
Standard Error of a Mean	0.051
Std Error (Diff of 2 Means)	0.0721

Completely Randomized AOV for TSS

Source	DF	SS	MS	F	P
Treatment	1	127.02	127.021	0.79	0.4008
Error	8	1290.6	161.324		
Total	9	1417.62			

Grand Mean	129.1	CV	9.84	

Homogeneity of var.s	F	P
Levene's Test	0.05	0.8294
O'Brien's Test	0.04	0.8534
Brown and Forsythe Test	0	0.9464

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0.79	0.401
Error	7.9		

Component of var. for between groups	-6.8607
Effective cell size	5

Treatment	Mean
SEASOL	132.7 a
UNTRTD	125.5 a
Observations per Mean	5
Standard Error of a Mean	5.6802
Std Error (Diff of 2 Means)	8.033

Completely Randomized AOV for ESP   *Exch Sodium Percentage*

Source	DF	SS	MS	F	P
Treatment	1	0.26244	0.26244	1.24	0.2981
Error	8	1.69552	0.21194		
Total	9	1.95796			

Grand Mean	1.242	CV	37.07

Homogeneity of var.s	F	P
Levene's Test	0.36	0.5638
O'Brien's Test	0.27	0.6198
Brown and Forsythe Test	0.26	0.6249

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	1.24	0.2993
Error	7.7		

Component of var. for between groups	0.0101
Effective cell size	5

Treatment	Mean
SEASOL	1.1 a
UNTRTD	1.4 a
Observations per Mean	5
Standard Error of a Mean	0.2059
Std Error (Diff of 2 Means)	0.2912

Completely Randomized AOV for Ca/Mg

Source	DF	SS	MS	F	P
Treatment	1	0.05184	0.05184	0.21	0.6564
Error	8	1.9432	0.2429		
Total	9	1.99504			

Grand Mean	2.564	CV	19.22

Homogeneity of var.s	F	P
Levene's Test	7.73	0.0239
O'Brien's Test	5.68	0.0444
Brown and Forsythe Test	2.65	0.1424

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0.21	0.6622
Error	5.4		

Component of var. for between groups	-0.03821
Effective cell size	5

Treatment	Mean
SEASOL	2.6 a
UNTRTD	2.5 a
Observations per Mean	5
Standard Error of a Mean	0.2204
Std Error (Diff of 2 Means)	0.3117

Completely Randomized AOV for Ex Ca

Source	DF	SS	MS	F	P
Treatment	1	53.824	53.824	2.44	0.1568
Error	8	176.34	22.0425		
Total	9	230.164			

Grand Mean	17.06	CV	27.52

Homogeneity of var.s	F	P
Levene's Test	1.7	0.2287
O'Brien's Test	1.25	0.2963
Brown and Forsythe Test	0.73	0.4181

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	2.44	0.1645
Error	6.6		

Component of var. for between groups	6.3563
Effective cell size	5

Treatment	Mean
SEASOL	19.4 a
UNTRTD	14.7 a
Observations per Mean	5
Standard Error of a Mean	2.0996
Std Error (Diff of 2 Means)	2.9693

Completely Randomized AOV for Ex Mg

Source	DF	SS	MS	F	P
Treatment	1	5.041	5.041	1.56	0.2472
Error	8	25.88	3.235		
Total	9	30.921			

Grand Mean	6.67	CV	26.97

Homogeneity of var.s	F	P
Levene's Test	0.2	0.6666
O'Brien's Test	0.15	0.7114
Brown and Forsythe Test	0	0.979

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	1.56	0.2483
Error	7.8		

Component of var. for between groups	0.3612
Effective cell size	5

Treatment	Mean
SEASOL	7.4 a
UNTRTD	6.0 a
Observations per Mean	5
Standard Error of a Mean	0.8044
Std Error (Diff of 2 Means)	1.1375

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Completely Randomized AOV for Ex Na

Source	DF	SS	MS	F	P
Treatment	1	0.576	0.576	1.29	0.2894
Error	8	3.58	0.4475		
Total	9	4.156			

Grand Mean	1.68 CV		39.82

Homogeneity of var.s	F	P
Levene's Test	1.2	0.3051
O'Brien's Test	0.88	0.3752
Brown and Forsythe Test	0.53	0.4878

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	1.29	0.2925
Error	7.3		

Component of var. for between groups	0.0257
Effective cell size	5

Treatment	Mean
SEASOL	1.4 a
UNTRTD	1.9 a
Observations per Mean	5
Standard Error of a Mean	0.2992
Std Error (Diff of 2 Means)	0.4231

Completely Randomized AOV for Ex K

Source	DF	SS	MS	F	P
Treatment	1	0.001	0.001	0	0.9504
Error	8	1.94	0.2425		
Total	9	1.941			

Grand Mean	3.77 CV		13.06

Homogeneity of var.s	F	P
Levene's Test	6.26	0.0369
O'Brien's Test	4.6	0.0644
Brown and Forsythe Test	2.89	0.1274

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0	0.9511
Error	5.4		

Component of var. for between groups	-0.0483
Effective cell size	5

Treatment	Mean
SEASOL	3.8 a
UNTRTD	3.8 a
Observations per Mean	5
Standard Error of a Mean	0.2202
Std Error (Diff of 2 Means)	0.3114

Completely Randomized AOV for Ex H

Source	DF	SS	MS	F	P
Treatment	1	77.841	77.841	1.79	0.2175
Error	8	347.548	43.4435		
Total	9	425.389			

Grand Mean	70.81	CV	9.31

Homogeneity of var.s	F	P
Levene's Test	1.08	0.3296
O'Brien's Test	0.79	0.3995
Brown and Forsythe Test	0.47	0.5116

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	1.79	0.2237
Error	6.8		

Component of var. for between groups	6.8795
Effective cell size	5

Treatment	Mean	
SEASOL	68.0	a
UNTRTD	73.6	a
Observations per Mean	5	
Standard Error of a Mean	2.9477	
Std Error (Diff of 2 Means)	4.1686	

Completely Randomized AOV for Av Ca ppm

Source	DF	SS	MS	F	P
Treatment	1	7975	7974.98	7.38	0.0264
Error	8	8641.3	1080.17		
Total	9	16616.3			

Grand Mean	112	CV	29.34

Homogeneity of var.s	F	P
Levene's Test	0	0.9544
O'Brien's Test	0	0.9609
Brown and Forsythe Test	0.04	0.8381

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	7.38	0.0264
Error	8		

Component of var. for between groups	1378.96
Effective cell size	5

Treatment	Mean	
SEASOL	140.2	a
UNTRTD	83.8	b
Observations per Mean	5	
Standard Error of a Mean	14.698	
Std Error (Diff of 2 Means)	20.786	

Completely Randomized AOV for Av Ca m

Source	DF	SS	MS	F	P
Treatment	1	0.19937	0.19937	7.38	0.0264
Error	8	0.21603	0.027		
Total	9	0.41541			

Grand Mean	0.56	CV	29.34

Homogeneity of var.s	F	P
Levene's Test	0	0.9544
O'Brien's Test	0	0.9609
Brown and Forsythe Test	0.04	0.8381

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	7.38	0.0264
Error	8		

Component of var. for between groups	0.03447
Effective cell size	5

Treatment	Mean
SEASOL	0.70 a
UNTRTD	0.42 b
Observations per Mean	5
Standard Error of a Mean	0.0735
Std Error (Diff of 2 Means)	0.1039

Completely Randomized AOV for Av Mg ppm

Source	DF	SS	MS	F	P
Treatment	1	341.383	341.383	5.34	0.0496
Error	8	511.413	63.927		
Total	9	852.796			

Grand Mean	26.245	CV	30.46

Homogeneity of var.s	F	P
Levene's Test	0	0.9549
O'Brien's Test	0	0.9613
Brown and Forsythe Test	0.01	0.9203

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	5.34	0.0496
Error	8		

Component of var. for between groups	55.4913
Effective cell size	5

Treatment	Mean
SEASOL	32.1 a
UNTRTD	20.4 b
Observations per Mean	5
Standard Error of a Mean	3.5757
Std Error (Diff of 2 Means)	5.0567

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Completely Randomized AOV for Av Mg m

Source	DF	SS	MS	F	P
Treatment	1	0.02371	0.02371	5.34	0.0496
Error	8	0.03551	0.00444		
Total	9	0.05922			

Grand Mean	0.2187	CV	30.46

Homogeneity of var.s	F	P
Levene's Test	0	0.9549
O'Brien's Test	0	0.9613
Brown and Forsythe Test	0.01	0.9203

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	5.34	0.0496
Error	8		

Component of var. for between groups	3.85E-03
Effective cell size	5

Treatment	Mean
SEASOL	0.27 a
UNTRTD	0.17 b
Observations per Mean	5
Standard Error of a Mean	0.0298
Std Error (Diff of 2 Means)	0.0421

Completely Randomized AOV for Av Na ppm

Source	DF	SS	MS	F	P
Treatment	1	0.009	0.0089	0	0.9799
Error	8	105.458	13.1823		
Total	9	105.467			

Grand Mean	11.87	CV	30.59

Homogeneity of var.s	F	P
Levene's Test	0.01	0.9061
O'Brien's Test	0.01	0.9194
Brown and Forsythe Test	0.28	0.6118

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0	0.9799
Error	8		

Component of var. for between groups	-2.63467
Effective cell size	5

Treatment	Mean
SEASOL	11.8 a
UNTRTD	11.9 a
Observations per Mean	5
Standard Error of a Mean	1.6237
Std Error (Diff of 2 Means)	2.2963

Completely Randomized AOV for Av Na m

Source	DF	SS	MS	F	P
Treatment	1	1.69E-07	1.69E-07	0	0.9799
Error	8	1.99E-03	2.49E-04		
Total	9	1.99E-03			

Grand Mean	0.0516	CV	30.59

Homogeneity of var.s	F	P
Levene's Test	0.01	0.9061
O'Brien's Test	0.01	0.9194
Brown and Forsythe Test	0.28	0.6118

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0	0.9799
Error	8		

Component of var. for between groups	-4.98E-05
Effective cell size	5

Treatment	Mean	
SEASOL	0.05	a
UNTRTD	0.05	a
Observations per Mean	5	
Standard Error of a Mean	7.06E-03	
Std Error (Diff of 2 Means)	9.98E-03	

Completely Randomized AOV for Av N ppm

Source	DF	SS	MS	F	P
Treatment	1	11.7072	11.7072	3.37	0.1035
Error	8	27.7576	3.4697		
Total	9	39.4648			

Grand Mean	5.386	CV	34.58

Homogeneity of var.s	F	P
Levene's Test	5.12	0.0535
O'Brien's Test	3.76	0.0885
Brown and Forsythe Test	4.71	0.0619

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	3.37	0.1258
Error	5		

Component of var. for between groups	1.64751
Effective cell size	5

Treatment	Mean	
SEASOL	6.5	a
UNTRTD	4.3	a
Observations per Mean	5	
Standard Error of a Mean	0.833	
Std Error (Diff of 2 Means)	1.1781	

Completely Randomized AOV for Av P ppm

Source	DF	SS	MS	F	P
Treatment	1	1.6	1.6	0.01	0.9118
Error	8	980.04	122.505		
Total	9	981.64			

Grand Mean	43.5	CV	25.44

Homogeneity of var.s	F	P
Levene's Test	2.63	0.1435
O'Brien's Test	1.93	0.2019
Brown and Forsythe Test	1.04	0.3374

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0.01	0.9124
Error	6.6		

Component of var. for between groups	-24.181
Effective cell size	5

Treatment	Mean
SEASOL	43.1 a
UNTRTD	43.9 a
Observations per Mean	5
Standard Error of a Mean	4.9498
Std Error (Diff of 2 Means)	7.0001

Completely Randomized AOV for Av K ppm

Source	DF	SS	MS	F	P
Treatment	1	327.779	327.779	4.78	0.0602
Error	8	548.334	68.542		
Total	9	876.114			

Grand Mean	48.173	CV	17.19

Homogeneity of var.s	F	P
Levene's Test	4.72	0.0615
O'Brien's Test	3.47	0.0995
Brown and Forsythe Test	0.54	0.483

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	4.78	0.0689
Error	6.3		

Component of var. for between groups	51.8475
Effective cell size	5

Treatment	Mean
SEASOL	53.9 a
UNTRTD	42.4 a
Observations per Mean	5
Standard Error of a Mean	3.7025
Std Error (Diff of 2 Means)	5.2361

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Completely Randomized AOV for Av K m

Source	DF	SS	MS	F	P
Treatment	1	2.16E-03	2.16E-03	4.78	0.0602
Error	8	3.61E-03	4.51E-04		
Total	9	5.76E-03			

Grand Mean	0.1235	CV	17.19

Homogeneity of var.s	F	P
Levene's Test	4.72	0.0615
O'Brien's Test	3.47	0.0995
Brown and Forsythe Test	0.54	0.483

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	4.78	0.0689
Error	6.3		

Component of var. for between g	3.41E-04
Effective cell size	5

Treatment	Mean
SEASOL	0.14 a
UNTRTD	0.11 a
Observations per Mean	5
Standard Error of a Mean	9.49E-03
Std Error (Diff of 2 Means)	0.0134

Completely Randomized AOV for Av S ppm

Source	DF	SS	MS	F	P
Treatment	1	0.08836	0.08836	0.18	0.6843
Error	8	3.974	0.49675		
Total	9	4.06236			

Grand Mean	4.872	CV	14.47

Homogeneity of var.s	F	P
Levene's Test	2.58	0.147
O'Brien's Test	1.89	0.206
Brown and Forsythe Test	1.88	0.2073

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0.18	0.6873
Error	6.2		

Component of var. for between g	-0.08168
Effective cell size	5

Treatment	Mean
SEASOL	5.0 a
UNTRTD	4.8 a
Observations per Mean	5
Standard Error of a Mean	0.3152
Std Error (Diff of 2 Means)	0.4458

Completely Randomized AOV for Av Cu ppm

Source	DF	SS	MS	F	P
Treatment	1	0.16796	0.16796	11.09	0.0104
Error	8	0.12113	0.01514		
Total	9	0.28909			

Grand Mean	0.5624	CV	21.88

Homogeneity of var.s	F	P
Levene's Test	4.9	0.0578
O'Brien's Test	3.6	0.0944
Brown and Forsythe Test	4.43	0.0685

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	11.09	0.0255
Error	4.4		

Component of var. for between g	0.03056
Effective cell size	5

Treatment	Mean	
SEASOL	0.69	a
UNTRTD	0.43	b
Observations per Mean	5	
Standard Error of a Mean	0.055	
Std Error (Diff of 2 Means)	0.0778	

Completely Randomized AOV for Av Zn ppm

Source	DF	SS	MS	F	P
Treatment	1	5.52049	5.52049	22.98	0.0014
Error	8	1.92152	0.24019		
Total	9	7.44201			

Grand Mean	1.727	CV	28.38

Homogeneity of var.s	F	P
Levene's Test	6.06	0.0392
O'Brien's Test	4.46	0.0678
Brown and Forsythe Test	5.45	0.0478

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	22.98	0.0059
Error	4.7		

Component of var. for between g	1.05606
Effective cell size	5

Treatment	Mean	
SEASOL	2.5	a
UNTRTD	1.0	b
Observations per Mean	5	
Standard Error of a Mean	0.2192	
Std Error (Diff of 2 Means)	0.31	

Completely Randomized AOV for Av Fe ppm

Source	DF	SS	MS	F	P
Treatment	1	1102.5	1102.5	3.29	0.1071
Error	8	2678	334.75		
Total	9	3780.5			

Grand Mean	100.5 CV		18.21

Homogeneity of var.s	F	P
Levene's Test	0.05	0.8332
O'Brien's Test	0.03	0.8567
Brown and Forsythe Test	0.18	0.6834

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	3.29	0.1073
Error	7.9		

Component of var. for between g	153.55
Effective cell size	5

Treatment	Mean	
SEASOL	90.0	a
UNTRTD	111.0	a
Observations per Mean	5	
Standard Error of a Mean	8.1823	
Std Error (Diff of 2 Means)	11.572	

Completely Randomized AOV for Av Mn ppm

Source	DF	SS	MS	F	P
Treatment	1	184.9	184.9	9.86	0.0138
Error	8	150	18.75		
Total	9	334.9			

Grand Mean	22.1 CV		19.59

Homogeneity of var.s	F	P
Levene's Test	2.36	0.163
O'Brien's Test	1.73	0.2244
Brown and Forsythe Test	0.53	0.4883

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	9.86	0.0217
Error	5.7		

Component of var. for between g	33.23
Effective cell size	5

Treatment	Mean	
SEASOL	26.4	a
UNTRTD	17.8	b
Observations per Mean	5	
Standard Error of a Mean	1.9365	
Std Error (Diff of 2 Means)	2.7386	

Completely Randomized AOV for Av Co ppm

Source	DF	SS	MS	F	P
Treatment	1	2.90952	2.90952	12.96	0.007
Error	8	1.79628	0.22453		
Total	9	4.7058			

Grand Mean	1.5466 CV	30.64

Homogeneity of var.s	F	P
Levene's Test	0.52	0.4915
O'Brien's Test	0.38	0.5538
Brown and Forsythe Test	0.11	0.7494

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	12.96	0.008
Error	7.4		

Component of var. for between groups	0.537
Effective cell size	5

Treatment	Mean
SEASOL	2.1 a
UNTRTD	1.0 b
Observations per Mean	5
Standard Error of a Mean	0.2119
Std Error (Diff of 2 Means)	0.2997

Completely Randomized AOV for Av Mo ppm

Source	DF	SS	MS	F	P
Treatment	1	4.54E-03	4.54E-03	17.14	0.0033
Error	8	2.12E-03	2.65E-04		
Total	9	6.66E-03			

Grand Mean	0.1661 CV	9.8

Homogeneity of var.s	F	P
Levene's Test	0.73	0.4176
O'Brien's Test	0.54	0.4847
Brown and Forsythe Test	0.43	0.5305

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	17.14	0.0043
Error	7		

Component of var. for between groups	8.54E-04
Effective cell size	5

Treatment	Mean
SEASOL	0.19 a
UNTRTD	0.14 b
Observations per Mean	5
Standard Error of a Mean	7.28E-03
Std Error (Diff of 2 Means)	0.0103

Completely Randomized AOV for Av B ppm

Source	DF	SS	MS	F	P
Treatment	1	2.05E-03	2.05E-03	21.34	0.0017
Error	8	7.70E-04	9.62E-05		
Total	9	2.82E-03			

Grand Mean	0.1207	CV		8.13

Homogeneity of var.s	F	P
Levene's Test	0.56	0.4765
O'Brien's Test	0.41	0.54
Brown and Forsythe Test	0.2	0.6655

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	21.34	0.0021
Error	7.4		

Component of var. for between groups	3.92E-04
Effective cell size	5

Treatment	Mean	
SEASOL	0.14	a
UNTRTD	0.11	b
Observations per Mean	5	
Standard Error of a Mean	4.39E-03	
Std Error (Diff of 2 Means)	6.20E-03	

Completely Randomized AOV for Tot P

Source	DF	SS	MS	F	P
Treatment	1	10956.1	10956.1	11.08	0.0104
Error	8	7908	988.5		
Total	9	18864.1			

Grand Mean	240.7	CV		13.06

Homogeneity of var.s	F	P
Levene's Test	1.56	0.2472
O'Brien's Test	1.14	0.3159
Brown and Forsythe Test	0.55	0.4792

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	11.08	0.0165
Error	5.8		

Component of var. for between groups	1993.52
Effective cell size	5

Treatment	Mean	
SEASOL	273.8	a
UNTRTD	207.6	b
Observations per Mean	5	
Standard Error of a Mean	14.061	
Std Error (Diff of 2 Means)	19.885	

Completely Randomized AOV for Tot N ppm

Source	DF	SS	MS	F	P
Treatment	1	1.04E-03	1.04E-03	13.23	0.0066
Error	8	6.28E-04	7.85E-05		
Total	9	1.67E-03			

Grand Mean	0.0622	CV	14.24

Homogeneity of var.s	F	P
Levene's Test	1.37	0.2753
O'Brien's Test	1.01	0.3449
Brown and Forsythe Test	0.42	0.5343

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	13.23	0.0125
Error	5.5		

Component of var. for between groups	1.92E-04
Effective cell size	5

Treatment	Mean	
SEASOL	0.07	a
UNTRTD	0.05	b
Observations per Mean	5	
Standard Error of a Mean	3.96E-03	
Std Error (Diff of 2 Means)	5.60E-03	

Completely Randomized AOV for Lactic

Source	DF	SS	MS	F	P
Treatment	1	5.04E+10	5.04E+10	2.81	0.1321
Error	8	1.43E+11	1.79E+10		
Total	9	1.94E+11			

Grand Mean	193000	CV	69.37

Homogeneity of var.s	F	P
Levene's Test	3.27	0.1083
O'Brien's Test	2.4	0.1599
Brown and Forsythe Test	3.85	0.0854

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	2.81	0.1572
Error	4.8		

Component of var. for between groups	6.50E+09
Effective cell size	5

Treatment	Mean	
SEASOL	264000	a
UNTRTD	122000	a
Observations per Mean	5	
Standard Error of a Mean	59875	
Std Error (Diff of 2 Means)	84676	

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Completely Randomized AOV for Tot Act Fungi

Source	DF	SS	MS	F	P
Treatment	1	1.72E+11	1.72E+11	15.39	0.0044
Error	8	8.92E+10	1.12E+10		
Total	9	2.61E+11			

Grand Mean　　627000 CV　　　　16.84

Homogeneity of Variances	F	P
Levene's Test	1.71	0.2274
O'Brien's Test	1.26	0.295
Brown and Forsythe Test	0.67	0.4376

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	15.39	0.0076
Error	6.1		

Component of variance for be　3.21E+10
Effective cell size　　　　　5

Treatment	Mean	
SEASOL	758000	a
UNTRTD	496000	b
Observations per Mean	5	
Standard Error of a Mean	47223	
Std Error (Diff of 2 Means)	66783	

Completely Randomized AOV for Lactic

Source	DF	SS	MS	F	P
Treatment	1	52.441	52.441	0.53	0.4876
Error	8	792.26	99.0325		
Total	9	844.701			

Grand Mean　　19.07 CV　　　　52.18

Homogeneity of Variances	F	P
Levene's Test	2.22	0.1744
O'Brien's Test	1.63	0.2372
Brown and Forsythe Test	2.06	0.1888

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0.53	0.4926
Error	6.4		

Component of variance for be　-9.3183
Effective cell size　　　　　5

Treatment	Mean	
SEASOL	21.36	a
UNTRTD	16.78	a
Observations per Mean	5	
Standard Error of a Mean	4.4504	
Std Error (Diff of 2 Means)	6.2939	

Completely Randomized AOV for Fungi

Source	DF	SS	MS	F	P
Treatment	1	4.76E+10	4.76E+10	13.96	0.0057
Error	8	2.73E+10	3.41E+09		
Total	9	7.49E+10			

Grand Mean	411000	CV	14.21

Homogeneity of Variances	F	P
Levene's Test	0.01	0.9263
O'Brien's Test	0.01	0.9368
Brown and Forsythe Test	0.01	0.94

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	13.96	0.0058
Error	8		

Component of variance for be	8.84E+09
Effective cell size	5

Treatment	Mean	
SEASOL	480000	a
UNTRTD	342000	b
Observations per Mean	5	
Standard Error of a Mean	26115	
Std Error (Diff of 2 Means)	36932	

Completely Randomized AOV for Cellulose

Source	DF	SS	MS	F	P
Treatment	1	3.84E+10	3.84E+10	8.45	0.0197
Error	8	3.64E+10	4.55E+09		
Total	9	7.48E+10			

Grand Mean	216000	CV	31.23

Homogeneity of Variances	F	P
Levene's Test	5.11	0.0536
O'Brien's Test	3.76	0.0886
Brown and Forsythe Test	2.52	0.1511

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	8.45	0.0327
Error	5.1		

Component of variance for be	6.78E+09
Effective cell size	5

Treatment	Mean	
SEASOL	278000	a
UNTRTD	154000	b
Observations per Mean	5	
Standard Error of a Mean	30166	
Std Error (Diff of 2 Means)	42661	

Completely Randomized AOV for Actinomycetes

Source	DF	SS	MS	F	P
Treatment	1	36.864	36.864	0.51	0.4964
Error	8	580.96	72.62		
Total	9	617.824			

Grand Mean	67.16	CV	12.69

Homogeneity of Variances	F	P
Levene's Test	2.55	0.1493
O'Brien's Test	1.87	0.2086
Brown and Forsythe Test	0.43	0.5302

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0.51	0.4994
Error	6.9		

Component of variance for be	-7.1512
Effective cell size	5

Treatment	Mean
SEASOL	65.2 a
UNTRTD	69.1 a
Observations per Mean	5
Standard Error of a Mean	3.811
Std Error (Diff of 2 Means)	5.3896

Completely Randomized AOV for Yeast

Source	DF	SS	MS	F	P
Treatment	1	9801000	9801000	0.02	0.8993
Error	8	4.59E+09	5.74E+08		
Total	9	4.60E+09			

Grand Mean	33010	CV	72.59

Homogeneity of Variances	F	P
Levene's Test	1.05	0.336
O'Brien's Test	0.77	0.4059
Brown and Forsythe Test	0.3	0.5968

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0.02	0.9001
Error	6.3		

Component of variance for be	-1.13E+08
Effective cell size	5

Treatment	Mean
SEASOL	34000 a
UNTRTD	32020 a
Observations per Mean	5
Standard Error of a Mean	10716
Std Error (Diff of 2 Means)	15155

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Completely Randomized AOV for Tot A Pop

Source	DF	SS	MS	F	P
Treatment	1	5.06E+11	5.06E+11	19.31	0.0023
Error	8	2.10E+11	2.62E+10		
Total	9	7.16E+11			

Grand Mean	947110	CV	17.1

Homogeneity of Variances	F	P
Levene's Test	4.05	0.0789
O'Brien's Test	2.98	0.1227
Brown and Forsythe Test	1.13	0.3184

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	19.31	0.0044
Error	6.1		

Component of variance for	9.60E+10
Effective cell size	5

Treatment	Mean	
SEASOL	1.17E+06	a
UNTRTD	722120	b
Observations per Mean	5	
Standard Error of a Mean	72416	
Std Error (Diff of 2 Means)	102412	

Completely Randomized AOV for Act %

Source	DF	SS	MS	F	P
Treatment	1	0.729	0.729	0.04	0.8397
Error	8	133.58	16.6975		
Total	9	134.309			

Grand Mean	10.11	CV	40.42

Homogeneity of Variances	F	P
Levene's Test	0.2	0.6658
O'Brien's Test	0.15	0.7108
Brown and Forsythe Test	0.08	0.786

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	0.04	0.8398
Error	7.9		

Component of variance for	-3.1937
Effective cell size	5

Treatment	Mean	
SEASOL	10.4	a
UNTRTD	9.8	a
Observations per Mean	5	
Standard Error of a Mean	1.8274	
Std Error (Diff of 2 Means)	2.5844	

Completely Randomized AOV for Yeast

Source	DF	SS	MS	F	P
Treatment	1	11.4005	11.4005	2.17	0.1838
Error	7	36.6995	5.2428		
Total	8	48.1			

Grand Mean	4.0667	CV	56.3

Homogeneity of Variances	F	P
Levene's Test	0.79	0.4024
O'Brien's Test	0.58	0.4698
Brown and Forsythe Test	0.11	0.7473

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	1.95	0.2224
Error	4.9		

Component of variance for	1.38549
Effective cell size	4.4

Treatment	N	Mean	SE
SEASOL	5	3.06	1.024
UNTRTD	4	5.325	1.1449

Completely Randomized AOV for Actmy

Source	DF	SS	MS	F	P
Treatment	1	4.84E+09	4.84E+09	4.12	0.0769
Error	8	9.40E+09	1.18E+09		
Total	9	1.42E+10			

Grand Mean	94000	CV	36.47

Homogeneity of Variances	F	P
Levene's Test	0.96	0.3554
O'Brien's Test	0.71	0.4249
Brown and Forsythe Test	0.48	0.5091

Welch's Test for Mean Differences

Source	DF	F	P
Treatment	1	4.12	0.0793
Error	7.5		

Component of variance for	7.33E+08
Effective cell size	5

Treatment	Mean	
SEASOL	116000	a
UNTRTD	72000	b
Observations per Mean	5	
Standard Error of a Mean	15330	
Std Error (Diff of 2 Means)	21679	

6.3   Climate Data 2020-21 vs Long Term (recorded at-Mareeba BOM)

Month	Mean Min. Temp °C	Mean Max Temp °C	Rainfall (mm)
Oct-20	17.7	27.9	4.2
LT Oct	*17.4*	*30.6*	*14.6*
Nov-20	19.2	32.5	0.4
LT Nov	19.2	31.7	42.6
Dec-20	21.7	32.8	87.0
LT Dec	20.8	32.2	92.6
Jan-21	21.8	30.0	393.2
LT Jan	21.4	31.3	209.8
Feb-21	21.6	30.4	142.0
LT Feb	21.4	30.8	226.4
Mar-21	20.5	30.2	90.8
LT Mar	20.7	29.8	157.5
Apr-21	19.8	28.4	153.0
LT Apr	19.0	28.5	38.7
May-21	17.1	26.5	5.8
LT May	16.8	26.9	13.2
Jun-21	15.9	26.4	1.4
LT Jun	15.3	25.3	10.9
Jul-21	16.6	26.6	3.8
LT Jul	13.9	25.0	5.4
Aug-21	16.6	26.6	0.6
LT Aug	13.8	26.4	7.3
Sep-21	16.5	27.7	0
LT Sep	15.4	28.0	5.0

LT = long term average

6.4   **Photos**

Seasol treatment block, 1 Nov 21 (3 weeks after harvest), Myrteza Mareeba.

Untreated Control block, 1 Nov 21 (3 weeks after harvest), Myrteza Mareeba.

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