



# Fodder Beet Trial at Seaton Farming Ltd

## 2014/2015

### ***Introduction***

This paddock trial in conjunction with Calvin Bracken of Sustainable Soils, and Seaton Farming Ltd, was designed to determine the effectiveness of an EM treatment, against an untreated control on Fodder beet, at Seaton's Farm, Aylesbury.

### ***Method and Materials***

**History of paddock:** Ex grass

**Soil test results:** See appendix

**Plot size and layout:** See table 1

**Fodder beet variety:** Splendide

**Sowing date:** 25<sup>th</sup> Nov 2014, Sowing rate: 1 box/ha (80,000 seeds/ha).

**Date of EM application;**

20<sup>th</sup> December 2014, Rate: 20 litres/ha

Fertiliser applied 10<sup>th</sup> November;

- 200 kg/ha Viafos V10 (21kg P)
- 100 kg/ha Viafos K (22kgK)
- 25 kg /ha OrganiBor
- 150 kg/ha Kieserite ( 24kg Mg & 24kg S)
- 200 kg/ha Salt
- 5 kg /ha Copper
- 3 kg/ha Zinc

Leaf test done early Feb, showed lower than desired Potassium. Mid Feb 10 litres/ha liquid Potassium 25% applied.



## Sampling Technique

Calvin Bracken (Sustainable Soils) and Paul Daly together selected 4 sampling areas in the EM treated area and paired them with 4 sampling areas in the control or untreated area. At each of these sites we harvested two row areas (10 beets in each) giving us a total of 8 sample sites for each treatment. The 10 beets were pulled and weighed for each sample site. A sub sample of beets were retained for Drymatter and quality analysis (Table 4)

## Results

**Table 1, Fodder beet yield data, Seatons Farm comparing EM application against control (non-treated)**

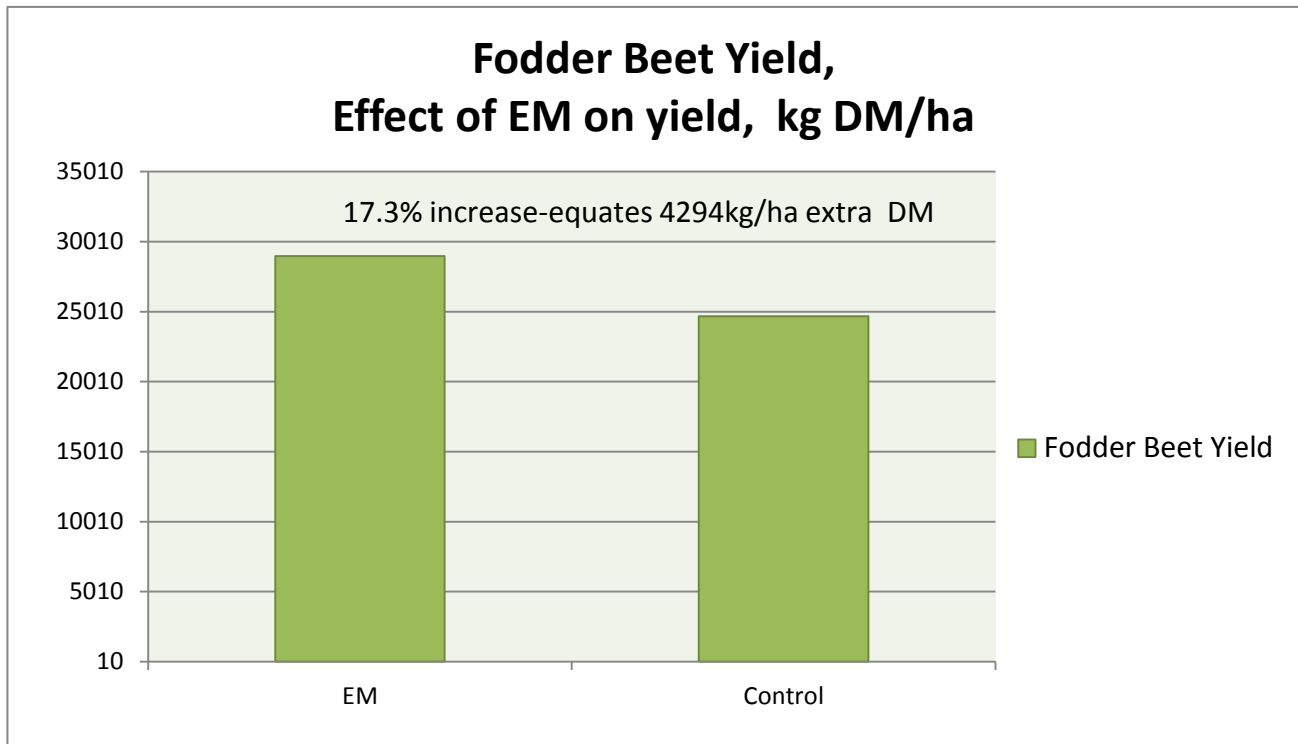
Data from Harvest				
Sample	EM fresh wt	Control fresh wt	EM DM	Control DM
1	22.85	18.35	3.93477	3.15987
2	21.65	17.45	3.72813	3.00489
3	24.75	16.7	4.26195	2.87574
4	17.5	16.45	3.0135	2.83269
5	22.55	16.95	3.88311	2.91879
6	18.45	18.7	3.17709	3.22014
7	19.9	18.85	3.42678	3.24597
8	20.7	19.95	3.56454	3.43539
		means/8 samples	3.623734	3.086685
		mean DM T/ha	28989.9	24693.5

**A statistical analysis of variance (Anova), gave a P value of 0.0056 (highly significant)**

The data shows a consistently higher yield on the areas treated with EM. The data was analysed using ANOVA and this demonstrated a highly significant increase in yield consistent across all of the samples (Table 1)



**Table 2, Graph demonstrating mean yield DM T/ha of Fodder beet yield data, Seatons Farm comparing EM application against control (non-treated)**



When we look at the data as a graph we can see the difference in yield from a single application of EM at 20 litres per ha. This equated to an increase of 17.3 %, which converted to just over 4 tonne of extra dry matter per ha.

The value of this extra feed at 28cents/kg DM equates to \$1202 per ha.

The cost of the EM to the farmer at 20 litres per ha was \$45 plus application cost \$20 per ha, makes it a very economical input, and high return on input costs.



**Table 3 below is a comparison of EM treated and control beets for a full quality analysis.**

<b>Table 3</b>		<b>EM Tops</b>	<b>Control Tops</b>		<b>EM Bulbs</b>	<b>Control Bulbs</b>	
<b>Analysis of Bulbs+Tops</b>		<b>Level Found</b>	<b>Level Found</b>	<b>Difference</b>	<b>Level Found</b>	<b>Level Found</b>	<b>Difference</b>
<b>Nitrogen</b>	%	3.6	2.9	<b>0.7</b>	0.8	0.8	<b>0</b>
<b>Nitrogen</b>	%DM	3.8	3	<b>0.8</b>	0.8	0.9	<b>-0.1</b>
<b>Phosphorus</b>	%	0.34	0.26	<b>0.08</b>	0.13	0.09	<b>0.04</b>
<b>Potassium</b>	%	3.4	3.6	<b>-0.2</b>	1.3	1.1	<b>0.2</b>
<b>Sulphur</b>	%	0.3	0.29	<b>0.01</b>	0.05	0.05	<b>0</b>
<b>Calcium</b>	%	0.82	0.97	<b>-0.15</b>	0.11	0.17	<b>-0.06</b>
<b>Magnesium</b>	%	0.53	0.46	<b>0.07</b>	0.14	0.15	<b>-0.01</b>
<b>Sodium</b>	%	1.899	2.05	<b>-0.151</b>	0.113	0.107	<b>0.006</b>
<b>Iron</b>	mg/kg	691	558	<b>133</b>	91	108	<b>-17</b>
<b>Manganese</b>	mg/kg	110	114	<b>-4</b>	43	48	<b>-5</b>
<b>Zinc</b>	mg/kg	60	46	<b>14</b>	80	24	<b>56</b>
<b>Copper</b>	mg/kg	8	6	<b>2</b>	95	4	<b>91</b>
<b>Boron</b>	mg/kg	38	33	<b>5</b>	10	11	<b>-1</b>
				<b>0</b>			
<b>Molybdenum</b>	mg/kg	1.11	1.16	<b>-0.05</b>	0.11	0.11	<b>0</b>
<b>Cobalt</b>	mg/kg	0.28	0.24	<b>0.04</b>	0.07	0.06	<b>0.01</b>
<b>Selenium</b>	mg/kg	0.05	0.05	<b>0</b>	0.02	0.02	<b>0</b>
<b>Chlorine</b>	%	2.6	3	<b>-0.4</b>	0.17	0.2	<b>-0.03</b>
<b>Dry Matter</b>	%	11.8	10.9	<b>0.9</b>	18.2	19.2	<b>-1</b>
<b>Crude Protein</b>	%DM	23.5	18.7	<b>4.8</b>	5.3	5.3	<b>0</b>
<b>Acid Detergent Fibre</b>	%DM	16.1	19.7	<b>-3.6</b>	5.4	6.3	<b>-0.9</b>
<b>Neutral Detergent Fibre</b>	%DM	25.7	29.6	<b>-3.9</b>	9.1	8.8	<b>0.3</b>
<b>Ash</b>	%DM	15.9	17.9	<b>-2</b>	3.9	3.3	<b>0.6</b>
<b>Organic Matter</b>	%DM	84.1	82.1	<b>2</b>	96.1	96.7	<b>-0.6</b>
<b>Soluble Sugars</b>	%DM	16.9	20.1	<b>-3.2</b>	74.1	71.3	<b>2.8</b>
<b>Starch</b>	%DM	0.5	0.5	<b>0</b>	0.5	0.9	<b>-0.4</b>
<b>Crude Fat</b>	%DM	2.4	2.7	<b>-0.3</b>	0.5	0.5	<b>0</b>
<b>Digestability of Organic Matter in DM</b>	%	72.2	66.1	<b>6.1</b>	94	94.6	<b>-0.6</b>
<b>Metabolisable Energy</b>	MJ/KgDM	11.6	10.6	<b>1</b>	15	15.1	<b>-0.1</b>
<b>Non Structural Carbohydrate</b>	%DM	32.4	31.1	<b>1.3</b>	81.6	82.3	<b>-0.7</b>
<b>OMD in-vivo</b>	%DM	85.9	80.5	<b>5.4</b>	97.9	97.8	<b>0.1</b>
<b>Grass Staggers Index</b>	me	1	1.1	<b>-0.1</b>	1.9	1.3	<b>0.6</b>
<b>K/Na Ratioi</b>		2	2	<b>0</b>	11	10	<b>1</b>
<b>Ca/P Ratio</b>		2.4	3.7	<b>-1.3</b>	0.8	1.8	<b>-1</b>
<b>DCAD</b>	me/kg	780	781	<b>-1</b>	299	246	<b>53</b>



The main difference in nutrition is showing in the tops. With the EM treated fodder beet showing slightly higher Nitrogen levels, and this is reflected in the Crude protein, DOM%, ME and OMD levels being higher. Iron was higher in the tops of EM fodder beet, and Zinc levels were also higher on EM fodder beet for both tops and bulbs.

From this result we can assume the quality of EM treated fodder beet is higher.

### ***Summary***

This on farm trial arranged by Calvin Bracken (Soil Consultant), and jointly measured by Calvin and ourselves, compared one application of foliar EM, against the untreated portion of the paddock. The results showed that a significant increase in yield was achieved. The economics of this EM application was hugely profitable showing a net return of \$1100 per ha