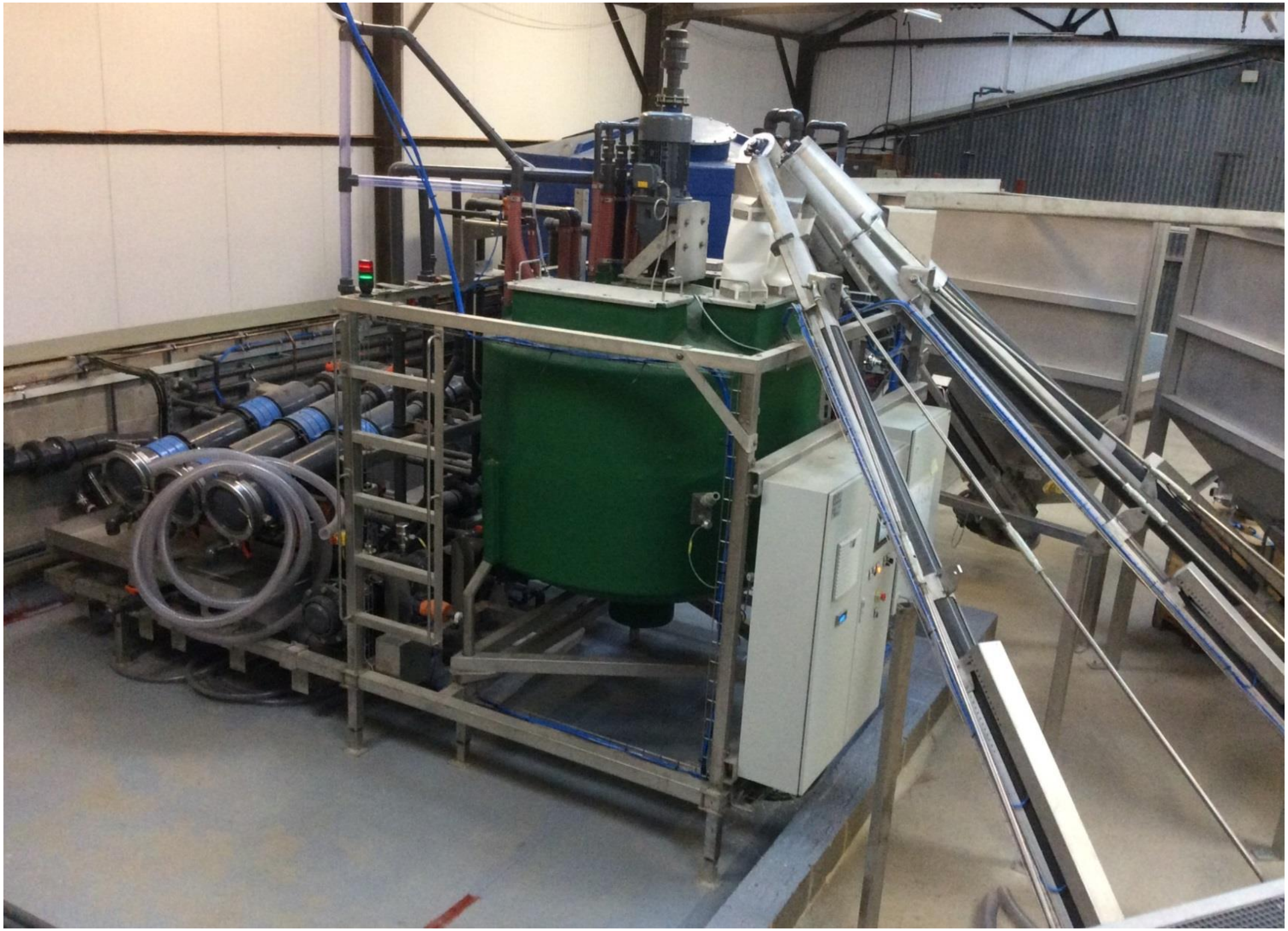
Edaphos

Mike Harrington

www.edaphos.co.uk

Flex Plant



solubilised vs *complex chemistry*

Cl^- Chloride

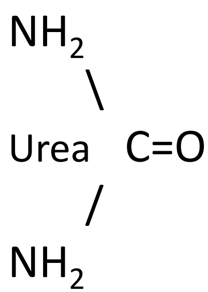
NO_3^- Nitrate

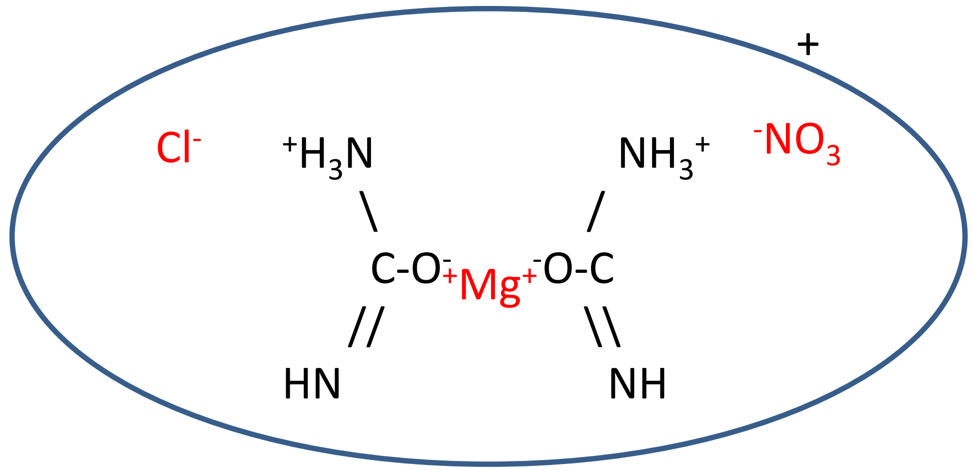
Mg^{++} Magnesium

BO_3^{3-} Borate

Ca^{++} Calcium

Mn^{++} Manganese

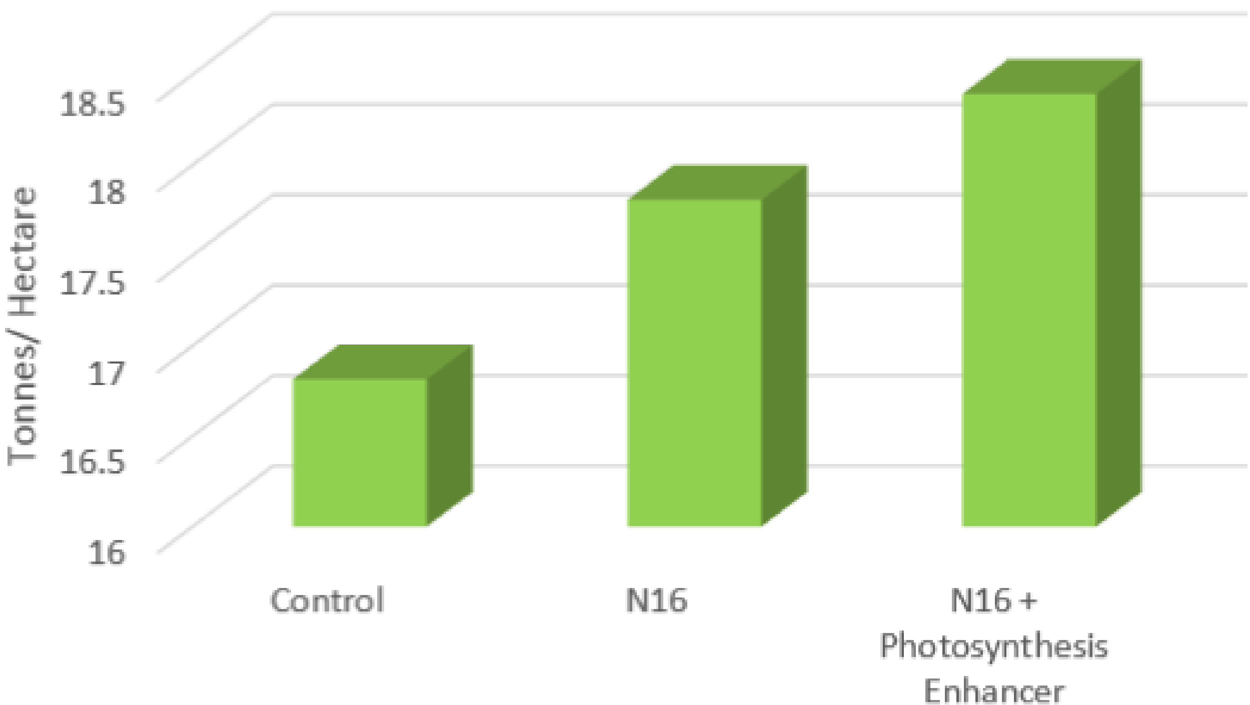




Traditional chemistry

Flex Complex Chemistry

AIVA maize trial (Pioneer) 2015 - Dart



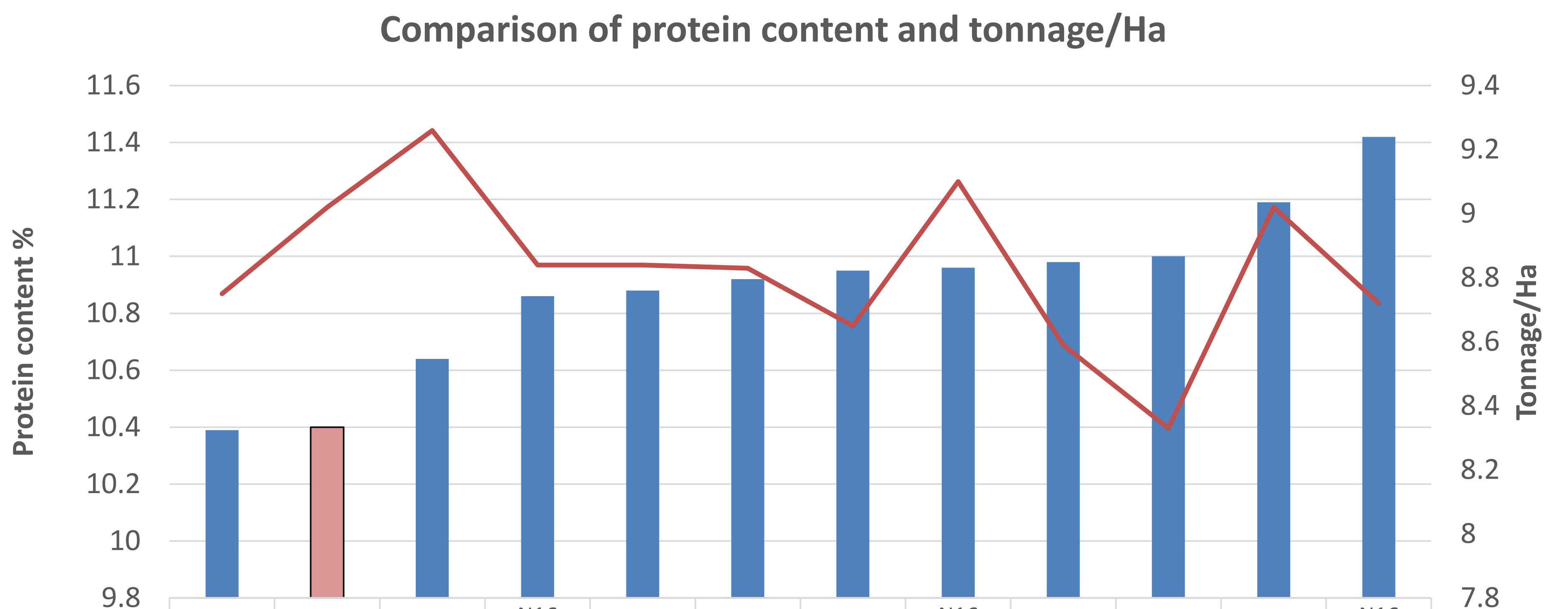
Treatment Name	Digestible Yield Relative to Zero Fert. Control	Dry Matter Yield Relative to Zero Fert. Control	Relative Starch Yield	Effect of Treatment on Crop Dry Matter (Earliness)	Early Vigour Score 9=Best 1=Poor	DM Yld t/ha	D' Value	ME	Digestible Yield T/Ha	Starch %	Starch Yield T/Ha	DM % of Fresh
ZERO Fertiliser ©	100	100	100	-	5.3	18.4	73.2	11.7	13.5	39.2	7.2	35.7
DAP @ 125 kg/ha ©	107	103	102	1.9	8.0	19.0	76.2	12.2	14.5	38.6	7.3	37.7
-	103	101	108	0.8	6.3	18.5	74.6	11.9	13.8	41.9	7.8	36.5
-	107	102	109	1.0	7.3	18.8	76.4	12.2	14.4	41.9	7.9	36.7
Edaphos Flex	110	103	115	1.1	7.0	18.9	78.6	12.6	14.8	43.8	8.3	36.9
-	106	101	108	1.4	6.7	18.6	76.6	12.3	14.2	42.1	7.8	37.1
-	99	98	101	1.3	6.3	18.1	74.0	11.8	13.4	40.4	7.3	37.0
-	101	98	93	-0.1	6.7	18.0	75.6	12.1	13.6	37.6	6.7	35.7
-	101	101	103	1.2	6.3	18.6	73.1	11.7	13.6	39.8	7.4	36.9
-	103	102	97	0.6	6.3	18.7	73.8	11.8	13.8	37.2	7.0	36.4
-	102	100	93	0.4	6.7	18.3	75.1	12.0	13.7	36.6	6.7	36.2
-	105	100	99	0.3	7.0	18.4	76.4	12.2	14.1	38.7	7.1	36.1
-	109	103	105	2.2	6.7	18.9	77.2	12.4	14.6	40.0	7.6	37.9

Activity	Date
Sowing Date	16/05/2016
Harvest Date	12/10/2016
Treatment Application	19/07/2016
Variety	Ambition

Variety	Ambition

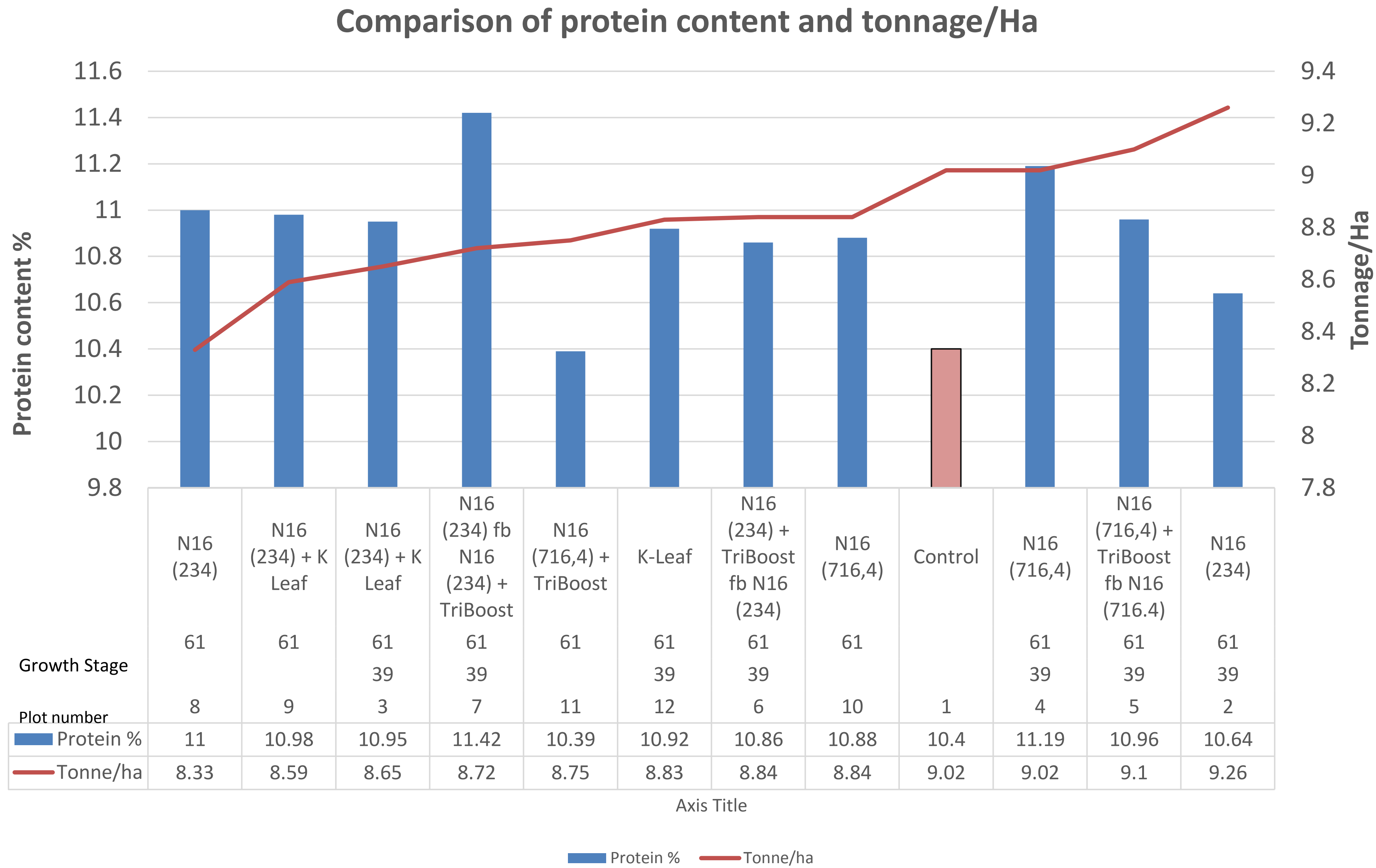
Soil Analysis		01/03/2016	
Index		mg/l (Available)	
P	4	P	47.4
K	3	K	280
Mg	2	Mg	71
Soil pH		7.1	

Together, redefining the future of farming and horticulture



	N16 (716,4) + TriBoost	Control	N16 (234)	N16 (234) + TriBoost fb N16 (234)	N16 (716,4)	K-Leaf	N16 (234) + K Leaf	N16 (716,4) + TriBoost fb N16 (716.4)	N16 (234) + K Leaf	N16 (234)	N16 (716,4)	N16 (234) fb N16 (234) + TriBoost
Growth Stage	61		61 39	61 39	61	61 39	61 39	61 39	61	61	61 39	61 39
Plot number	11	1	2	6	10	12	3	5	9	8	4	7
Protein %	10.39	10.4	10.64	10.86	10.88	10.92	10.95	10.96	10.98	11	11.19	11.42
Tonne/ha	8.75	9.02	9.26	8.84	8.84	8.83	8.65	9.1	8.59	8.33	9.02	8.72

Bars are protein and graph line is yield – Protein being the driver



	N16 (234)	N16 (234) + K Leaf	N16 (234) + K Leaf	N16 (234) fb N16 (234) + TriBoost	N16 (716,4) + TriBoost	K-Leaf	N16 (234) + TriBoost fb N16 (234)	N16 (716,4)	Control	N16 (716,4)	N16 (716,4) + TriBoost fb N16 (716.4)	N16 (234)
Growth Stage	61	61	61 39	61 39	61	61 39	61 39	61		61 39	61 39	61 39
Plot number	8	9	3	7	11	12	6	10	1	4	5	2
Protein %	11	10.98	10.95	11.42	10.39	10.92	10.86	10.88	10.4	11.19	10.96	10.64
Tonne/ha	8.33	8.59	8.65	8.72	8.75	8.83	8.84	8.84	9.02	9.02	9.1	9.26

Bars are protein and graph line is yield – tonnes per hectare line being the driver

041-N16OSR-16

Sydmonton Court Estate,
Cannon Heath Farm,
Overton,
Hampshire.
United Kingdom
RG25 3EJ

Trt No.	Treatment	Rate / ha	Timing	Date of Application
1	Untreated			
2	N16 with Mg, Ca (234)	30 L	Green pod	09.06.16
3	N18 with Mg, Mn, Ca, nitrate (255)	30 L	Green pod	21.06.16
4	N18 with K (364)	30 L	Green pod	21.06.16
5	N16 with Mg, Ca (234) + Krista	30L + 5kg	Green pod	09.06.16

	Treatment	Yield t/ha
1	Untreated	3.13
2	N16 with Mg, Ca (234) 30L/ha	3.13
3	N18 with Mg, Mn, Ca, nitrate (255) 30 L/ha	3.16
4	N18 with K (364) 30 L/ha	3.16
5	N16 with Mg, Ca (234) + Krista 30 L/ha+5kg	3.46

Potential issues with increased erucic acid in the absence of a yield benefit

Premium Crops Linseed Trial 2016

Location of Trial

John White
Wroughton
SN4 0SH

Drilling Date: 20.04.16
Harvest Date: 01.09.16

	Treatment	Applic. 1	Applic. 2	Rep.1	Rep.2	Rep.3	Rep.4	Mean
1	Bionamics SRT Seed dressing 0.5 kg/ 55 kg linseed	Seed treated on 19.04.16 and drilled on 20.04.16		2.4	2.7	2.7	3	2.7
2	Bionamics SRT Seed dressing 1.0 kg/ 55 kg linseed	Seed treated on 19.04.16 and drilled on 20.04.16		2.5	2.6	2.8	2.7	2.6
3	Bioplus T 0.25 kg/ha	30.06.16 GS.45	14.07.16 GS 47-55	2.6	2.7	2.9	2.7	2.7
4	Aiva foliar nitrogen F716.4 (N, K,Mg,Mn,S) 40 L/ha	14.07.16 GS.45		2.7	2.9	2.9	2.8	2.8
5	Control			2.8	2.7	2.9	3.1	2.9

Lancrop Laboratories

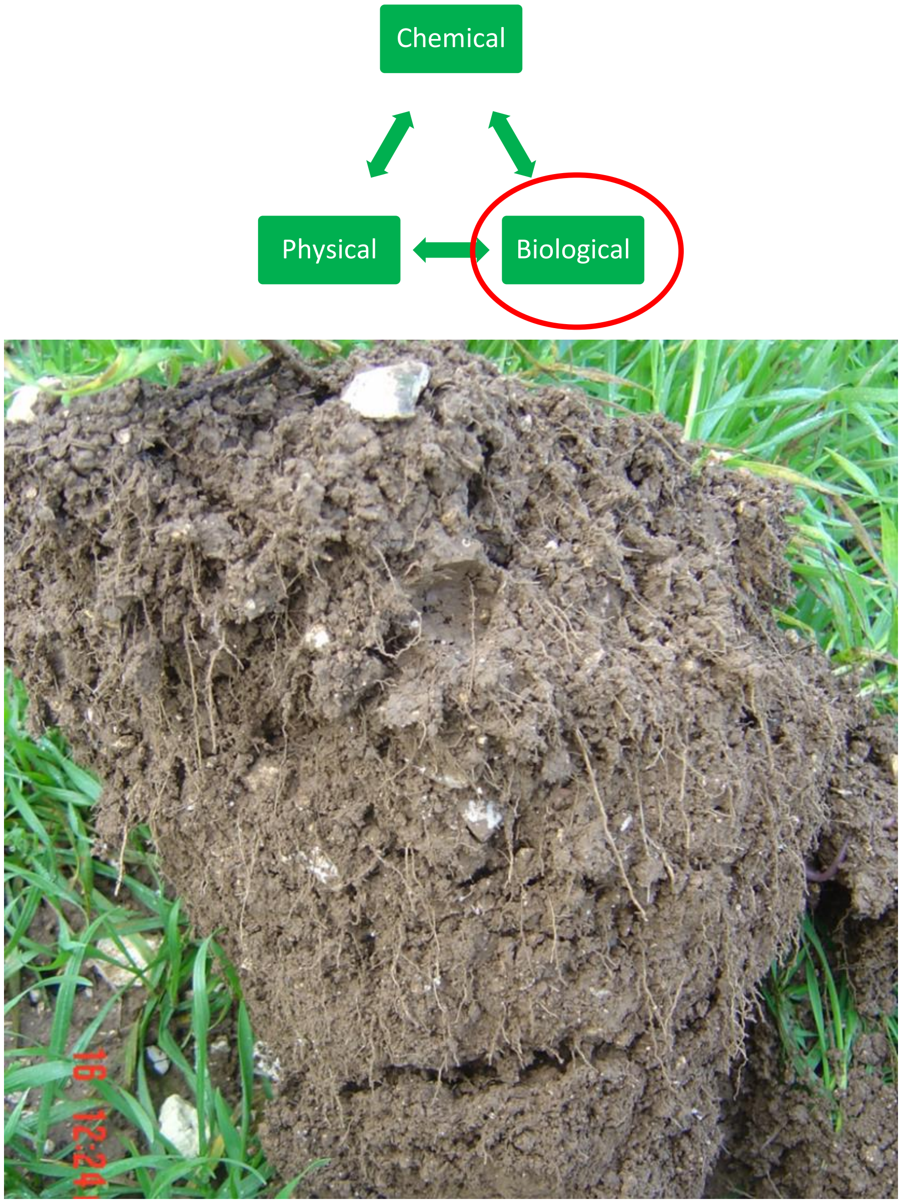
Analysis Results (LEAF)

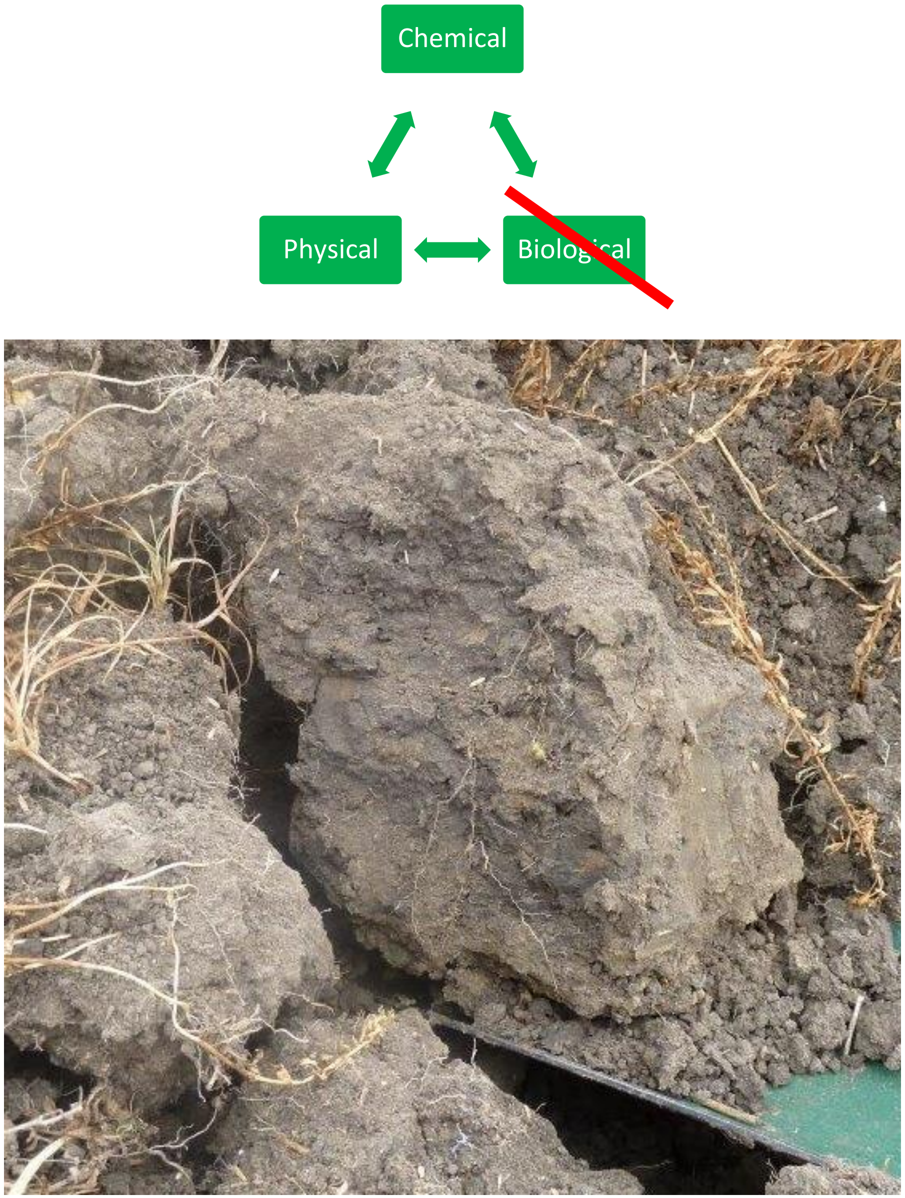
Customer	EDAPHOS MANOR FARM GINGE	**Distributor**	EDAPHOS LTD - ANDREW BAMBER
Sample Ref	LINSEED TRIAL	**Date Received**	13/06/2016
Sample No	E192217		
Crop	LINSEED		

Analysis	Result	Guideline	Interpretation	Comments
Nitrogen (%)	5.78	3.00	High	Above normal range.
Phosphorus (%)	0.56	0.30	Normal	Adequate level.
Potassium (%)	2.23	3.00	Low	PRIORITY FOR TREATMENT.
Calcium (%)	1.58	1.00	Normal	Adequate level.
Magnesium (%)	0.23	0.20	Normal	Adequate level.
Manganese (ppm)	379.9	25.0	Normal	Adequate level.
Boron (ppm)	32.7	25.0	Normal	Adequate level.
Zinc (ppm)	33.0	20.0	Normal	Adequate level.
Iron (ppm)	126	50	Normal	Adequate level.
Copper (ppm)	8.8	7.0	Normal	Adequate level.
Molybdenum (ppm)	0.37	1.50	Very Low	Consider foliar applications of molybdenum.
Sulphur (%)	0.37	0.20	Normal	Adequate level.

Nitrogen is very high in the tissue tests that suggests it is not been cycled, molybdenum is chronically low and essential to create two enzymes that convert nitrate into nitrite and then into ammonia before it can be used to create amino acids. Molybdenum is short, nitrogen cannot be utilised properly – Nitrogen is not required, molybdenum is.

A Biologically active soil makes a huge difference to nutrient availability





Soil analysis – 22nd June 2010

Phosphorous – 26ppm (index 3.7)
Potassium – 230ppm (index 2.9)
Magnesium – 270ppm (index 5.1)

Analysis	Result	Guideline	Interpretation	Comments
pH	6.7	6.5	Normal	Adequate level.
Phosphorus (ppm)	40	26	Normal	(Index 3.7) Adequate Level.
Potassium (ppm)	230	241	Slightly Low	(Index 2.9) 0-25 kg/ha K2O (0-20 units/acre). Maintenance.
Magnesium (ppm)	270	50	High	(Index 5.1) Possible interference on availability of Potassium.
Calcium (UK) (ppm)	4722	1600	Normal	Adequate level.
Sulphur (ppm)	18	10	Normal	Adequate level.
Manganese (ppm)	22.0	55.0	Very Low	PRIORITY FOR TREATMENT.
Copper (ppm)	6.9	2.1	Normal	Adequate level.
Boron (ppm)	1.79	1.60	Normal	Adequate level.
Zinc (ppm)	8.3	2.1	Normal	Adequate level.
Molybdenum (ppm)	0.14	0.40	Very Low	Low priority on this crop. Other crops may be affected.
Iron (ppm)	1257	50	Normal	Adequate level.
Sodium (ppm)	29	90	Very Low	Not a problem for this crop.
C.E.C. (meq/100g)	22.0	15.0	Normal	Cation Exchange Capacity indicates a soil with a good nutrient holding ability.

Tissue analysis – 19th July 2010

Phosphorous - 53%
Potassium - 77%
Magnesium - 25%

Analysis	Result	Guideline	Interpretation	Comments
Nitrogen (%)	1.83	3.00	Low	PRIORITY FOR TREATMENT.
P phorus (%)	0.14	0.30	Very Low	PRIORITY FOR TREATMENT.
Potassium (%)	0.67	3.00	Very Low	PRIORITY FOR TREATMENT.
Calcium (%)	0.81	1.00	Slightly Low	Low priority. See comments below.
Magnesium (%)	0.15	0.20	Slightly Low	Consider foliar applications of MAGNESIUM
Manganese (ppm)	12.4	25.0	Very Low	PRIORITY FOR TREATMENT.
Boron (ppm)	18.2	25.0	Low	PRIORITY FOR TREATMENT.
Zinc (ppm)	22.7	20.0	Normal	Adequate level.
Iron (ppm)	433	50	Normal	Adequate level.
Copper (ppm)	5.6	7.0	Slightly Low	Low priority. See comments below.
Molybdenum (ppm)	1.03	1.50	Low	Consider foliar applications of molybdenum.
Sulphur (%)	0.14	0.20	Low	PRIORITY FOR TREATMENT.

You should never change your cultivation system to one that is worse that the one you have

Where is your starting point?

Is your system moving forwards or backwards?

Tillage: as much as necessary and as little as possible or thoughtful movement of the soil

Direct Drilled - 23rd June 2016

60 litres Flex starter 2843,3 – N:P 8-15 + S, Mg, Mn, B, Zn

Minimum Tilled

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12 litres Flex Foliar 450,1 – N10 + S, Mg, Zn, Cu, Mn, Co, B plus Triboost

5 kg Bittersaltz each pass through the crop

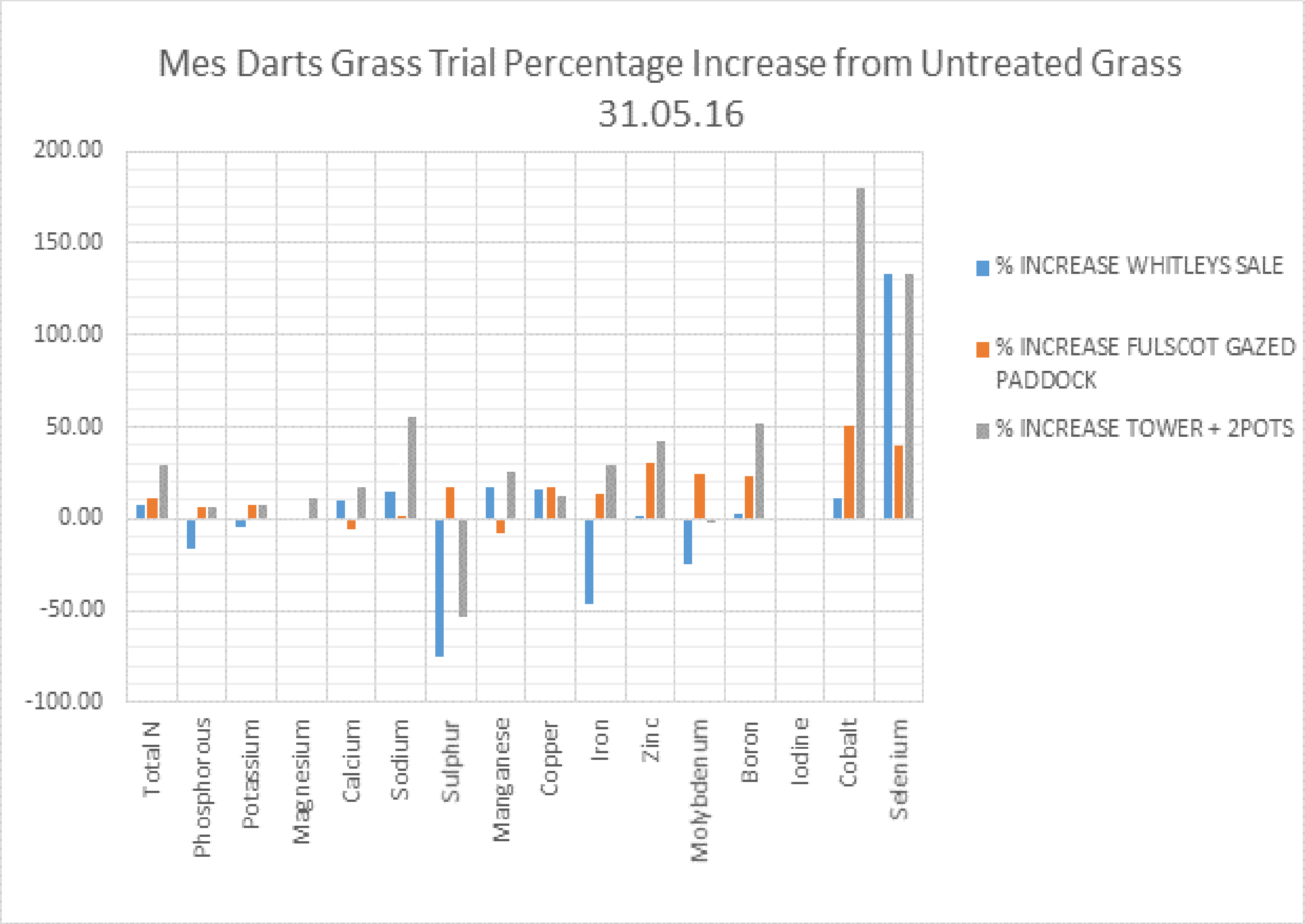

Direct Drilled –
23/6/16
Minimum Tilled


Direct Drilled – 8th August 2016
Minimum Tilled

Direct Drilled yield 5.6 tonnes per hectare

Direct Drilled yield 4 tonnes per hectare

MES Dart grass trial percentage over untreated grass – 31.05.16
Foliar 234,4 N16 + Ca, Mg, Mn, Co, Se, Zn applied at 35 litres per hectare



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Sample Name	Park
Sample ID	DM004
Moisture Removed (%)	88.96
Total Dry Weight per m² (g)	304.59
Total Dry weight per ha (Kg)	3045.94
Nitrogen (N) kg/ha	201.032 (half useable)
Sulphur (S) kg/ha	13.676
Phosphorous (P) kg/ha	30.277
Potassium (K) g/ha	131.280
Calcium (Ca) g/ha	27017
Magnesium (Mg) g/ha	7097
Manganese (Mn) g/ha	118.79
Iron (Fe) g/ha	572.64
Copper (Cu) g/ha	36.25
Zinc (Zn) g/ha	184.28
Boron (B) g/ha	74.02

Tissue Analysis Report

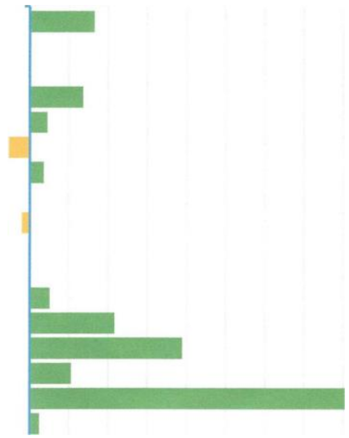
Standard Laboratory Values

Customer:	RANDALL	
Date:	14 June 2016	
Sample:	E207404/02	
Field:	TEMPLE PARK	
Crop:	Oats	32/37

Report - percent	Range	No Adjust	Results
Total Nitrogen	3.4 - 4	1.00	4.01

Report - percent	Range	No Adjust	Results
Phosphorous	0.3 - 0.56	0.28	0.47
Potassium	3.5 - 5	3.80	4.64
Magnesium	0.13-0.18	0.15	0.11
Calcium	0.3 - 1.2	0.40	0.47
Sodium	-	-	
Sulphur	0.28 - 0.35	0.30	0.27

Report - ppm	Range	No Adjust	Results
Manganese	26 - 60	35.00	43.8
Copper	4 - 10	5.00	10.4
Iron	40 - 150	35.00	103
Zinc	29 - 50	20.00	30.5
Molybdenum	0.09 - 0.2	0.15	0.96
Boron	6 - 10	5.00	5.6
Iodine	-	-	-
Cobalt	-	-	-
Selenium	-	-	-



Edaphos

Plants can only grow to the extent of their most deficient element - we need to consider what is the biggest limiter to growth

Deficiency-Excess

-100 -50 0 50 100 150 200 250 300 350 400

Ratios	Desired
N:P	6-18 :1
N: K	1.4-3 :1
N:S	14 :1
K: P	8-11 :
K:Mg	
K:Ca	

Ca: P	Results	<6 :
Ca:Mg	8.5	
Fe: Mn	0.9	>1 :1
Cu: Mo	14.9	5-30 :
	9.9	
	42.2	
	9.9	

1
4.3
2.4
10.8


8 tonnes per hectare yield

Simple measurement techniques can be guide as to progress

Ground beetles are an important indicator of predator invertebrates… and are worth monitoring

Fresh earthworm casts collected this week totalled 5,050kg per hectare since drilling. A half kg sample has been sent off for analysis along with nearby soil.

- Excess calcium reducing
- Potassium, magnesium, sodium, iron, boron, manganese, copper, zinc, cobalt and molybdenum increased
- OM increased by 1%
- 5 tonnes casts per hectare over eight weeks
- Slugs now becoming less of an issue
- Ground beetles up (5 in traps)

Worms can make a big contribution to nutrient availability

- **5 times** as rich in the available nitrate nitrogen
- **7 times** as rich in available phosphorous
- **11 times** as rich in exchangeable potassium
- **Twice** as rich in exchangeable magnesium
- **Increase** in structural stability
- **Increase** in Cation exchange capacity
- **Reduction** in bulk density

- **25 earthworms per cube foot = 1 million worms = 30 tonnes earth casts/year/acre**

EARTHWORMS RENDER FUSARIUM HARMLESS

Earthworms, those most helpful of creatures for good farming, are a true digestive miracle: They not only eat their way through plant remains or carrion, but are even able to render phytopathogenal and toxic fungi harmless. This finding was confirmed by a working group from the Johann Heinrich von Thünen Institute and from the Julius-Kühn Institute in Braunschweig, together with the plant protection department from the Hanover chamber of agriculture. In one experiment they used loess loam soil, collected both types of earthworms, *Lumbricus terrestris* and *Aporrectodea caliginosa*, from the same site and artificially infected Tommi wheat with *Fusarium culmorum*. All other animal life found in the soil was removed by the four participating scientists to rule out the possibility of them influencing the experiment. Of the two types of earthworm, only *L. terrestris* was able to eliminate almost all of the Fusarium fungus and to reduce the concentration of the mycotoxin Deoxynivalenol (DON). In contrast, the *Aporrectodea* earthworm was not able to do this. This achievement really is remarkable: the content of fusarium protein was reduced by 98.8% in five weeks, while the DON content was reduced by 99.7%. ■

Mustard drilled after Rye harvested for AD. Digestate applied late at the end of April

Note high nitrogen and potassium levels

Sample Name	Ryder
Sample ID	Mustard
Moisture Content (%)	
Total Dry weight per ha (Kg)	5503
Nitrogen (N) kg/ha	336 (pot 168kg useable)
Sulphur (S) kg/ha	21
Phosphorous (P) kg/ha	41
Potassium (K) kg/ha	181
Calcium (Ca) kg/ha	133
Magnesium (Mg) kg/ha	8.3
Manganese (Mn) g/ha	280
Iron (Fe) g/ha	690
Copper (Cu) g/ha	42
Zinc (Zn) g/ha	316
Boron (B) g/ha	145
Molybdenum (Mo) g/ha	17

A Plan for Soil?

Build organic matter using cover crops– capture, store and make available nitrogen and other elements

Minimize purchased Nitrogen – Legumes, biological nitrogen fixers, carbon cycling

Maximise Nitrogen efficiency – always add a carbon source, consider foliar applications, always evaluate need and consider balance

Understand what the plants and soil needs are