Ballance agri-nutrients

Hill Laboratories
BETTER TESTING BETTER RESULTS

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ANALYSIS REPORT

Client:	Centre for Land and Water	**Lab No:**	1143637 s2chpv1
Address:	21 Ruahapia Road RD 10 HASTINGS 4180	**Date Registered:**	08-Jun-2013
		Date Reported:	13-Jun-2013
		Quote No:	55332
		Order No:	
		Client Reference:	Micro-Farm at CLAW
		Add. Client Ref:	Landwise Trial Farm
		Submitted By:	M Redshaw

Sample Name:	pH pH Units	Olsen Phosphorus mg/L	Sulphate Sulphur mg/kg	Potassium MAF units	Calcium MAF units	Magnesium MAF units	Sodium MAF units
1	6.4	56	2	27	12	40	2
2	6.3	50	3	28	12	36	2
3	6.6	39	2	23	12	38	2
4	6.8	44	2	21	13	33	2
5	6.6	59	1	26	13	38	2
6	6.9	71	2	27	14	35	3

Sample Name:	Available Nitrogen (15cm Depth)* kg/ha	Anaerobically Mineralisable N* µg/g	Anaerobically Mineralisable N/Total N Ratio* %	Organic Matter* %	C/N Ratio*	Total Carbon* %	Total Nitrogen* %
1	122	98	2.8	6.1	10.2	3.5	0.35
2	96	78	2.4	6.0	10.6	3.5	0.33
3	121	99	2.9	5.6	9.7	3.3	0.34
4	82	67	2.2	5.4	10.1	3.1	0.31
5	118	94	2.8	5.6	9.5	3.2	0.34
6	99	71	2.2	5.2	9.6	3.0	0.32

Sample Name:	Soil Sample Depth* mm						
1	0-150	-	-	-	-	-	-
2	0-150	-	-	-	-	-	-
3	0-150	-	-	-	-	-	-
4	0-150	-	-	-	-	-	-
5	0-150	-	-	-	-	-	-
6	0-150	-	-	-	-	-	-

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		Submitted By:	M Redshaw

Sample Name: 1
Lab Number: 1143637.1
Sample Type: SOIL Pea (S103)

Analysis		Level	Optimum	Below Optimum	Above
pH	pH Units	6.4	6.0 - 7.0		
Olsen Phosphorus	mg/L	56	30 - 55		
Potassium	MAF units	27	13 - 26		
Calcium	MAF units	12	7 - 14		
Magnesium	MAF units	40	21 - 63		
Sodium	MAF units	2	0 - 24		
Sulphate Sulphur	mg/kg	2	20 - 50		
Available Nitrogen (15cm Depth)*	kg/ha	122	100 - 150		
Anaerobically Mineralisable N*	µg/g	98			
Organic Matter*	%	6.1	7.0 - 17.0		
Total Carbon*	%	3.5			
Total Nitrogen*	%	0.35	0.30 - 0.60		
C/N Ratio*		10.2			
Anaerobically Mineralisable N/Total N Ratio*	%	2.8			
Soil Sample Depth*	mm	0-150			

Base Saturation %	K 7.9	Ca 57	Mg 10.6	Na 0.3
me/100g	K 1.57	Ca 11.4	Mg 2.12	Na 0.06

Additional Properties		
Cation Exchange Capacity (me/100g)		20
Total Base Saturation (%)		76
Volume Weight (g/mL)		0.83

Sample Name: 2
Lab Number: 1143637.2
Sample Type: SOIL Pea (S103)

Analysis		Level	Optimum	Below Optimum	Above
pH	pH Units	6.3	6.0 - 7.0		
Olsen Phosphorus	mg/L	50	30 - 55		
Potassium	MAF units	28	13 - 26		
Calcium	MAF units	12	7 - 14		
Magnesium	MAF units	36	21 - 63		
Sodium	MAF units	2	0 - 24		
Sulphate Sulphur	mg/kg	3	20 - 50		
Available Nitrogen (15cm Depth)*	kg/ha	96	100 - 150		
Anaerobically Mineralisable N*	µg/g	78			
Organic Matter*	%	6.0	7.0 - 17.0		
Total Carbon*	%	3.5			
Total Nitrogen*	%	0.33	0.30 - 0.60		
C/N Ratio*		10.6			
Anaerobically Mineralisable N/Total N Ratio*	%	2.4			
Soil Sample Depth*	mm	0-150			

Base Saturation %	K 8.5	Ca 59	Mg 10.1	Na 0.3
me/100g	K 1.64	Ca 11.4	Mg 1.94	Na 0.06

Additional Properties		
Cation Exchange Capacity (me/100g)		19
Total Base Saturation (%)		78
Volume Weight (g/mL)		0.82

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		Client Reference:	Micro-Farm at CLAW
		Add. Client Ref:	Landwise Trial Farm
		Submitted By:	M Redshaw

Sample Name: 3
Lab Number: 1143637.3
Sample Type: SOIL Pea (S103)

Analysis		Level	Optimum	Below Optimum	Above
pH	pH Units	6.6	6.0 - 7.0		
Olsen Phosphorus	mg/L	39	30 - 55		
Potassium	MAF units	23	13 - 26		
Calcium	MAF units	12	7 - 14		
Magnesium	MAF units	38	21 - 63		
Sodium	MAF units	2	0 - 24		
Sulphate Sulphur	mg/kg	2	20 - 50		
Available Nitrogen (15cm Depth)*	kg/ha	121	100 - 150		
Anaerobically Mineralisable N*	µg/g	99			
Organic Matter*	%	5.6	7.0 - 17.0		
Total Carbon*	%	3.3			
Total Nitrogen*	%	0.34	0.30 - 0.60		
C/N Ratio*		9.7			
Anaerobically Mineralisable N/Total N Ratio*	%	2.9			
Soil Sample Depth*	mm	0-150			

Base Saturation %	K 7.2	Ca 62	Mg 10.9	Na 0.3
me/100g	K 1.36	Ca 11.8	Mg 2.07	Na 0.06
Additional Properties	Cation Exchange Capacity (me/100g)			19
	Total Base Saturation (%)			81
	Volume Weight (g/mL)			0.81

Sample Name: 4
Lab Number: 1143637.4
Sample Type: SOIL Pea (S103)

Analysis		Level	Optimum	Below Optimum	Above
pH	pH Units	6.8	6.0 - 7.0		
Olsen Phosphorus	mg/L	44	30 - 55		
Potassium	MAF units	21	13 - 26		
Calcium	MAF units	13	7 - 14		
Magnesium	MAF units	33	21 - 63		
Sodium	MAF units	2	0 - 24		
Sulphate Sulphur	mg/kg	2	20 - 50		
Available Nitrogen (15cm Depth)*	kg/ha	82	100 - 150		
Anaerobically Mineralisable N*	µg/g	67			
Organic Matter*	%	5.4	7.0 - 17.0		
Total Carbon*	%	3.1			
Total Nitrogen*	%	0.31	0.30 - 0.60		
C/N Ratio*		10.1			
Anaerobically Mineralisable N/Total N Ratio*	%	2.2			
Soil Sample Depth*	mm	0-150			

Base Saturation %	K 6.9	Ca 69	Mg 10.0	Na 0.3
me/100g	K 1.24	Ca 12.5	Mg 1.80	Na 0.06
Additional Properties	Cation Exchange Capacity (me/100g)			18
	Total Base Saturation (%)			86
	Volume Weight (g/mL)			0.82

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	HASTINGS 4180	**Quote No:**	55332
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		Client Reference:	Micro-Farm at CLAW
		Add. Client Ref:	Landwise Trial Farm
		Submitted By:	M Redshaw

Sample Name: 5
Lab Number: 1143637.5
Sample Type: SOIL Pea (S103)

Analysis		Level	Optimum	Below Optimum	Above
pH	pH Units	6.6	6.0 - 7.0		
Olsen Phosphorus	mg/L	59	30 - 55		
Potassium	MAF units	26	13 - 26		
Calcium	MAF units	13	7 - 14		
Magnesium	MAF units	38	21 - 63		
Sodium	MAF units	2	0 - 24		
Sulphate Sulphur	mg/kg	1	20 - 50		
Available Nitrogen (15cm Depth)*	kg/ha	118	100 - 150		
Anaerobically Mineralisable N*	µg/g	94			
Organic Matter*	%	5.6	7.0 - 17.0		
Total Carbon*	%	3.2			
Total Nitrogen*	%	0.34	0.30 - 0.60		
C/N Ratio*		9.5			
Anaerobically Mineralisable N/Total N Ratio*	%	2.8			
Soil Sample Depth*	mm	0-150			
Base Saturation %		K 7.5	Ca 62	Mg 9.9	Na 0.3
me/100g		K 1.50	Ca 12.5	Mg 1.99	Na 0.05
Additional Properties		Cation Exchange Capacity (me/100g)			20
		Total Base Saturation (%)			79
		Volume Weight (g/mL)			0.84

Sample Name: 6
Lab Number: 1143637.6
Sample Type: SOIL Pea (S103)

Analysis		Level	Optimum	Below Optimum	Above
pH	pH Units	6.9	6.0 - 7.0		
Olsen Phosphorus	mg/L	71	30 - 55		
Potassium	MAF units	27	13 - 26		
Calcium	MAF units	14	7 - 14		
Magnesium	MAF units	35	21 - 63		
Sodium	MAF units	3	0 - 24		
Sulphate Sulphur	mg/kg	2	20 - 50		
Available Nitrogen (15cm Depth)*	kg/ha	99	100 - 150		
Anaerobically Mineralisable N*	µg/g	71			
Organic Matter*	%	5.2	7.0 - 17.0		
Total Carbon*	%	3.0			
Total Nitrogen*	%	0.32	0.30 - 0.60		
C/N Ratio*		9.6			
Anaerobically Mineralisable N/Total N Ratio*	%	2.2			
Soil Sample Depth*	mm	0-150			
Base Saturation %		K 8.8	Ca 74	Mg 10.5	Na 0.4
me/100g		K 1.42	Ca 11.9	Mg 1.69	Na 0.07
Additional Properties		Cation Exchange Capacity (me/100g)			16
		Total Base Saturation (%)			93
		Volume Weight (g/mL)			0.93

The above nutrient graph compares the levels found with reference interpretation levels. NOTE: It is important that the correct sample type be assigned, and that the recommended sampling procedure has been followed. R J Hill Laboratories Limited does not accept any responsibility for the resulting use of this information. IANZ Accreditation does not apply to comments and interpretations, i.e. the 'Range Levels' and subsequent graphs.

Analyst's Comments

Samples 1-6 Comment:
The medium range guidelines shown in the histogram report relate to sampling protocols as per Hill Laboratories' crop guides and are based on reference values where these are published. Results for samples collected to different depths than those described in the crop guide should be interpreted with caution.
For pastoral soils, the medium ranges are specific for a 75mm sample depth, but if a 150mm sampling depth is used the nutrient levels measured may appear low against these ranges, as nutrients are typically more concentrated in the top of the soil profile. These soil profile differences are altered upon cultivation or contouring.

Samples 1-6 Comment:
The Available Nitrogen (kg/ha) test above assumes the sample is taken to a 15 cm depth. If the depth is 7.5 cm, then the result reported above should be divided by two.
To calculate Available Nitrogen (as kgN/ha) for other sample depths use the reported Anaerobic Mineralisable Nitrogen (AMN) result in the following equation:
AN (kg/ha) = AMN (µg/g) x VW (g/ml) x sample depth (cm) x 0.1
Note that the AN and AMN results reported include the readily available Mineral N (NH4-N and NO3-N) fraction, which is typically quite low.

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SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Sample Registration*	Samples were registered according to instructions received.	-	1-6
Soil Prep (Dry & Grind)*	Air dried at 35 - 40°C overnight (residual moisture typically 4%) and crushed to pass through a 2mm screen.	-	1-6
pH	1:2 (v/v) soil:water slurry followed by potentiometric determination of pH.	0.1 pH Units	1-6
Olsen Phosphorus	Olsen extraction followed by Molybdenum Blue colorimetry.	1 mg/L	1-6
Sulphate Sulphur	0.02M Potassium phosphate extraction followed by Ion Chromatography.	1 mg/kg	1-6
Potassium (MAF)	1M Neutral ammonium acetate extraction followed by ICP-OES.	1 MAF units	1-6
Calcium (MAF)	1M Neutral ammonium acetate extraction followed by ICP-OES.	1 MAF units	1-6
Magnesium (MAF)	1M Neutral ammonium acetate extraction followed by ICP-OES.	1 MAF units	1-6
Sodium (MAF)	1M Neutral ammonium acetate extraction followed by ICP-OES.	2 MAF units	1-6
Available Nitrogen*	Determined by NIR, calibration based on Available N by Anaerobic incubation followed by extraction using 2M KCl followed by Berthelot colorimetry. (Calculation based on 15cm depth sample).	1 mg/L	1-6
Anaerobically Mineralisable N*	As for Available Nitrogen but reported as µg/g.	5 µg/g	1-6
Organic Matter*	Organic Matter is 1.72 x Total Carbon.	0.2 %	1-6
Total Carbon*	Determined by NIR, calibration based on Total Carbon by Dumas combustion.	0.1 %	1-6
Total Nitrogen*	Determined by NIR, calibration based on Total N by Dumas combustion.	0.04 %	1-6
Potassium	1M Neutral ammonium acetate extraction followed by ICP-OES.	0.01 me/100g	1-6
Calcium	1M Neutral ammonium acetate extraction followed by ICP-OES.	0.5 me/100g	1-6
Magnesium	1M Neutral ammonium acetate extraction followed by ICP-OES.	0.04 me/100g	1-6
Sodium	1M Neutral ammonium acetate extraction followed by ICP-OES.	0.05 me/100g	1-6
Potassium (Sat)	1M Neutral ammonium acetate extraction followed by ICP-OES.	0.1 %BS	1-6
Calcium (Sat)	1M Neutral ammonium acetate extraction followed by ICP-OES.	1 %BS	1-6
Magnesium (Sat)	1M Neutral ammonium acetate extraction followed by ICP-OES.	0.2 %BS	1-6
Sodium (Sat)	1M Neutral ammonium acetate extraction followed by ICP-OES.	0.1 %BS	1-6
CEC	Summation of extractable cations (K, Ca, Mg, Na) and extractable acidity.	2 me/100g	1-6
Total Base Saturation	Calculated from Extractable Cations and Cation Exchange Capacity.	5 %	1-6
Volume Weight	The weight/volume ratio of dried, ground soil.	0.01 g/mL	1-6

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Shelley Edhouse
Senior Technician - Agriculture Division