
Monitoring & Collecting Data
for a Pasture Program

Monitoring

To watch and check a situation over a period of time in order to discover something about it.

Things we might want to keep an eye on in a pasture program include:

- Plant germination, establishment and growth
- Pest and disease incidence and damage
- Impact of weather events
- Soil moisture
- Livestock health
- etc…

Data Collection

The process of gathering and measuring information on targeted variables in an established system, which then enables one to answer relevant questions and evaluate outcomes.

Why collect data in a pasture program?

- Determine pasture quantity and quality
- Assess soil function and fertility
- Identify issues and limiting factors compromising production
- Evaluate the outcomes of different practices
- Inform management decisions
- Track the progress of our operation

What type of data should we collect?

- DIY and laboratory options
- Relevance and benefit to our program
- Practical considerations
- Cost

Decide what data is worth collecting

When should we collect data?

- Seasonal conditions
- Stages of growth
- Management implications

Establish a data collection schedule

Where we collect our data can be based on:

- Soil types
- Conditions
- Plant types
- Infrastructure
- Practices
- History

Choose appropriate locations

To collect good data you must:

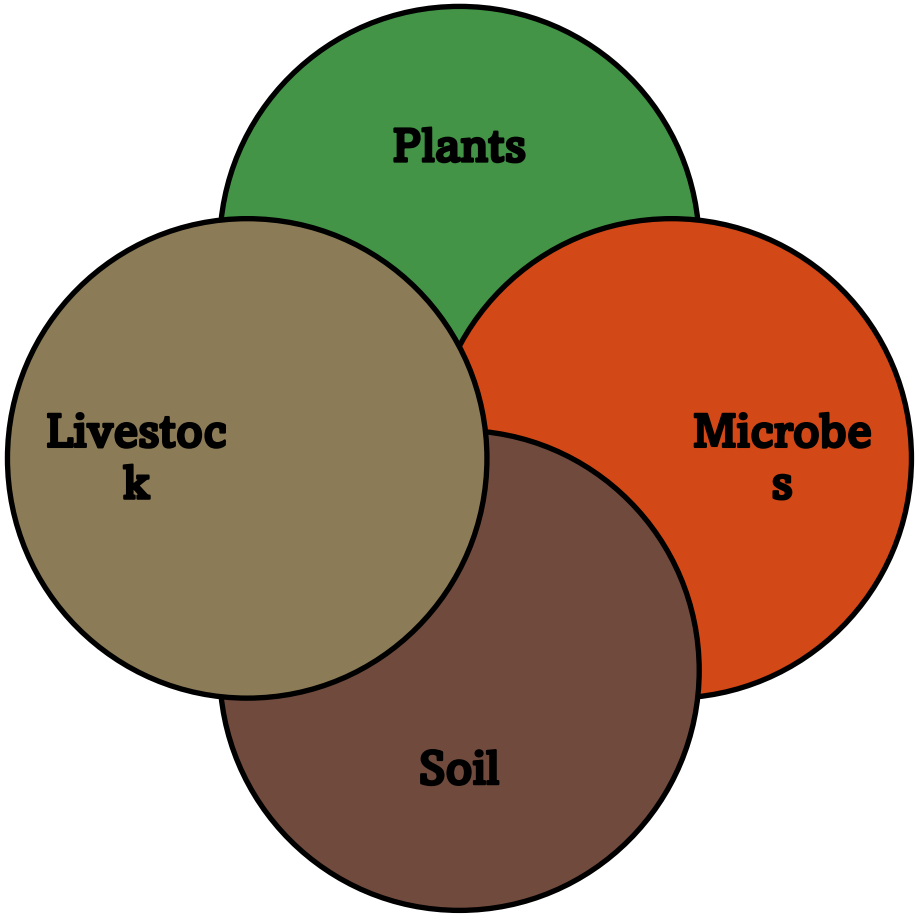
- Make sure you have the right materials and equipment for the job
- Mark or record where you're collecting data
- Use reliable methodology
- Keep records – diary, spreadsheets, files, photos...


Searles
SOIL pH TEST KIT

The Chicken and the Egg

What came first:

healthy plants, active microbes, good soil or happy animals ?



Field Assessment of Pasture

Pasture Quality Indicators

- Maturity
- Dung Score
- Coverage
- Species Composition
- Plant Diversity
- Visual Plant Assessment
- Brix etc…


Pasture Maturity


Dung Score


Basal/Foliar Coverage

Species Composition and Plant Diversity

Species:
Radish, Oats, Vetch, Linseed, Crimson Cover, Field Peas, Lupins, Ryegrass, Mouse Ear Chickweed, Plantain, Chicory, Capeweed.

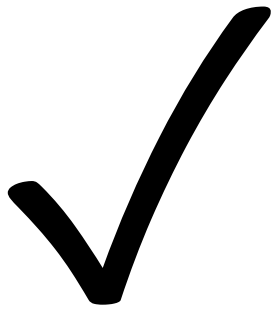
Families:

- BRASSICACEAE
- POACEAE
- FABACEAE
- LINACEAE
- CAROPHYLLACEAE
- PLANTAGINACEAE
- ASTERACEAE

Visual Plant Assessment

Brix etc…

Recording the Data



Pasture Quality Indicators

Location: **Date:**

Pasture Maturity	
Age	Stage of Growth

Dung Score	
Characteristics	Descripton
Consistency	
Form	
Moisture Content	

Coverage	
Type of Coverage (Basal/Foliage)	% of Soil Covered

Species Composition			
Desirable Plant Species	Approx. %	Undesirable Plant Species	Approx. %

Plant Diversity	
Plant Families	Approximate % of Each

Visal Plant Health	
Possible Issues	Discription
Nutrient Deficiencies	
Growth Issues	
Physiological Issues	
Pest and Disease Attack	

Brix Reading	
Level (0-32)	
Dividing Line Definition	

Field Assessment of Microbial Activity

- Legume Nodulation
- Rhizosheath Development
- Beneficial Soil Fauna – Earthworms, Springtails, Ants etc…
- Organic Matter Decomposition
- Dung Beetles

Nodulation

Rhizosheath Development

Beneficial Soil Fauna


Organic Matter Decomposition

Dung Beetle Activity

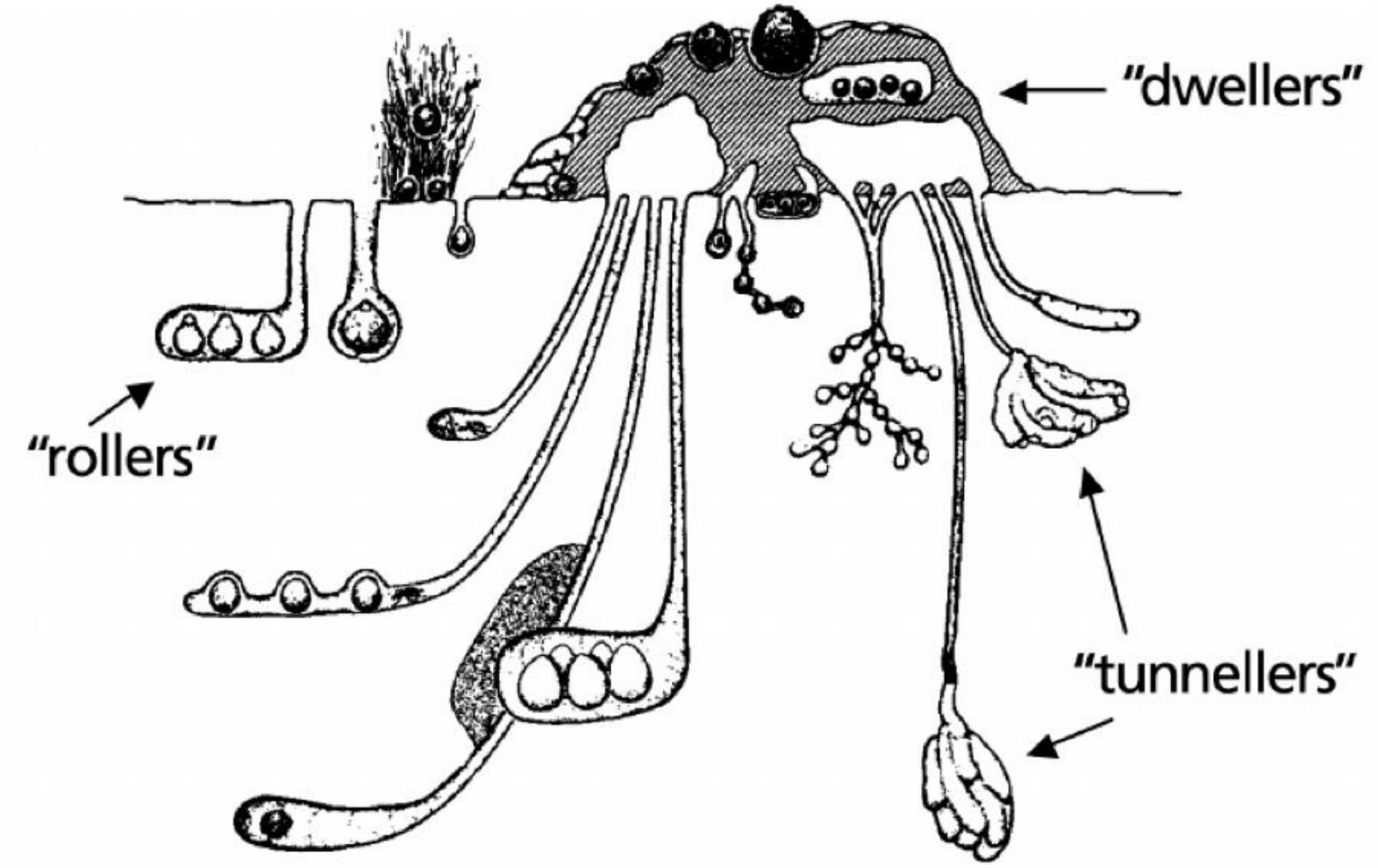


Photo Credit: Kevin Floate, Agriculture and Agri-food Canada, 2011.

Microbial Activity Indicators

Location: **Date:**

Legume Nodulation	
Total No. of Nodules	
Depth Nodulation	
Colouring Inside Nodules	
Rhizosheath Development (Young Plants)	
Plant Species	Approx % of Roots Covered
Beneficial Soil Fauna (per 20cm3 spade block)	
Species	Amount
Earthworms	
Number of Other Species	
Litter Decomposition	
% Callico Strip Decomposed @1 Month	
Visual Decomposition Activity	
Dung Beetles	
Time Taken for Dung Breakdown	
Dung Beetle Presence in Manure	
Incidence of Holes in the Soil Beneath	

Field Assessment of Soil

Soil Health Indicators:

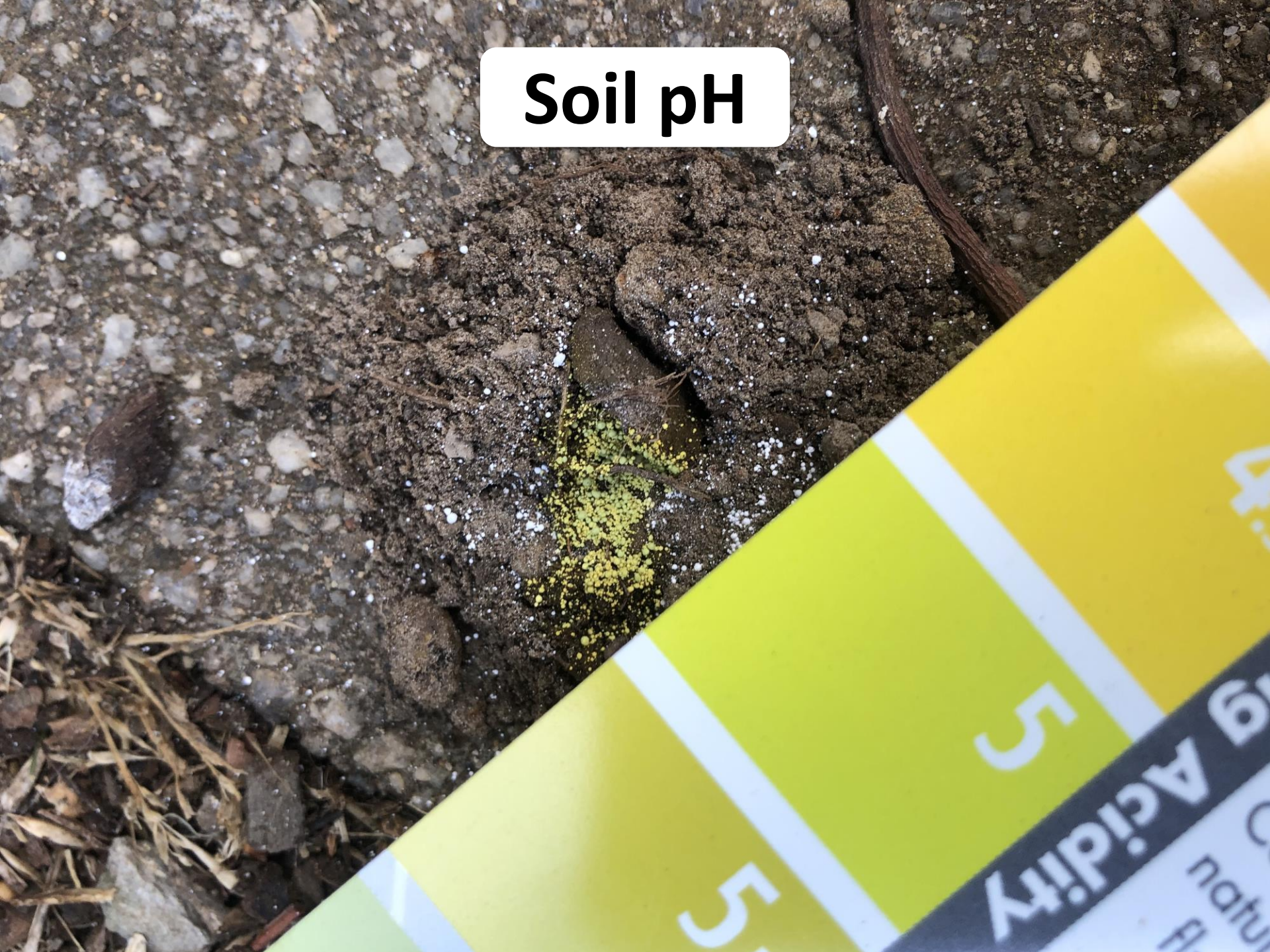
- Topsoil Depth and Colour
- Bulk Root Depth
- Structural Appearance
- Aggregate Stability
- pH
- Compaction
- Water Infiltration

Topsoil Depth & Colour

Root Depth

Structural Appearance

Aggregate Stability


Soil pH
4
5
Aciﬁty

Soil Compaction

Water Infiltration

Soil Health Indicators

Location: **Date:**

Topsoil Depth and Colour	
Depth	
Colour	
Root Depth	
Depth of Root Bulk	
Depth of Deepest Roots	
Structural Appearance	
% Crumbly, Fine, Round Aggregates	
% Large, Firm, Angular Clods	
% Loose Unstructured Soil	
Aggregate Stability	
% Slaking @ 2hrs	
% Dispersion @ 20hrs	
Soil pH	
Depth	pH
Compaction	
Depth of Threshold Changes	
Reading (PSI)	
Water Infiltration	
mm	minutes

Interpreting the Data

?

Pasture Quality Assessment

Location: **Date:**

Inicators	Parameters	**Poor**	**Medium**	**Good**
Pasture Maturity	Poor - Unestablished or Setting Seed Mediocre - Flowering Good - Established Vegetative Growth			
Dung Score	Poor - Sloppy or Hard and Dry Mediocre - Soft, Collapsed, Wet Good - Firm, Well Formed, Moist			
Basal Coverage (>12 weeks age)	Poor - Less Than 50% Mediocre - 50 to 75% Good - Above 75%			
Foliage Coverage (>12 weeks age)	Poor - Less Than 75% Mediocre - 75 to 90% Good - Above 90%			
Species Composition	Poor - Less Than 60% Desirable Mediocre - 60 to 90% Good - Above 90%			
Plant Diversity (number of families well represented)	Poor - 1 Mediocre - 2 or 3 Good - 4 or More			
Visual Plant Health	Poor - Multiple Issues Mediocre - 1 Issue Good - No Issues			
Brix Reading	Poor - Less Than 6 Mediocre - 6 - 12 Good - Above 12			

Score:

Percent:

Microbial Activity Assessment

Location: **Date:**

Inicators	Parameters	**Poor**	**Medium**	**Good**
Legume Noulation (applies to plants over 12 weeks old)	Poor - Shallow, No Colour, <10 per Plant Mediocre - Sparse, Pink, 10 - 20 Good - Entire Root, Red, >20 per Plant			
Root Rhizosheaths (young plants)	Poor - Most Roots Bare Mediocre - Most Roots Covered Good - Roots Totally Covered			
Earthworms (per 20cm cube of soil)	Poor - Less Than 3 Mediocre - 3 to 5 Good - More Than 5			
Beneficial Soil Fauna (per 20cm cube of soil)	Poor - None Mediocre - 1-3 Species Good - 4 or More Species			
Litter Decomposition (callico decay/visual decomposition activity	Poor - <50% Callico Decay, None Mediocre - 50 - 75% Callico Decay, Some Good - >75% Callico Decay, Lots			
Dung Beetles (dung breakdown, beetle and holes)	Poor - >1 Month, None Mediocre - >1 Week, a Few Good - Within a Week, Lots			

Score:

Percent:

Soil Health Assessment

Location: **Date:**

Inicators	Parameters	**Poor**	**Medium**	**Good**
Topsoil Depth	Poor - Less Than 15cm Mediocre - 15-30cm Good - Greater Then 30cm			
Topsoil Colour	Poor - Light Colour Mediocre - Inbetween Colour Good - Dark Colour			
Bulk (80%) Root Depth	Poor - Less Than 10cm Mediocre - 10-20cm Good - More Than 20cm			
Structural Appearance	Poor - Mostly Large Clods or Loose Soil Mediocre - Similar Portions of Both Good - Mostly Friale, Round, Aggregates			
pH	Poor - Under 5 or Above 8.5 Mediocre - 5-6 or 7.5-8.5 Good - Between 5 and 6			
Compaction	Poor - Greater Than 300PSI Mediocre - 200-300PSI Good - Less Than 200PSI			
Water Infiltration	Poor - Less Than 25mm/hr Mediocre - 25-100mm/hr Good - Greater Than 100mm/hr			

Score:

Percent:

Laboratory Analysis:

Pasture Analysis

- Dry Matter Cuts
- Feed Analysis
- Leaf Tissue/Sap Tests

Microbiology Assessment

- Microscopy Microbiology Analysis
- Soil Microbiology Tests - DNA, Enzyme, Respiration

Soil Testing

- Organic Matter
- Carbon:Nitrogen
- Available Nutrients
- pH, CEC etc…


Collecting Samples

Dry Matter

Site	Treatment	cut#	dry wt (g)	DM yield (kg/ha)	Value ($/ha) @$200/t
Kate	Cover Crop	5	110.6	2212	$ 442.40
Kate	Pasture Control	3	58.6	1953	$ 390.67
Brett	Cover Crop	8	110.2	1378	$ 275.50
Brett	Pasture Control	4	78.5	1963	$ 392.50
Ecovillage	Cover Crop	5	130.8	2616	$ 523.20
Ecovillage	Pasture Control	5	36.8	736	$ 147.20

Feed Analysis

DATE OF ISSUE: 4/08/22 **REPORT NO:** R22-01105-[R00]

ANALYSIS RESULTS								
			1	2	3	4	5	6
Test Description	**LOR**	**UNITS**	**Kate Crop**	**Kate Pasture**	**Brett Crop**	**Brett Pasture**	**Eco Crop**	**Eco Pasture**
Dry Matter	0.5	%	N/A	N/A	N/A	N/A	N/A	N/A
Moisture		%	N/A	N/A	N/A	N/A	N/A	N/A
Neutral Detergent Fibre - NIR	10	%	53	54	47	51	49	48
Acid Detergent Fibre - NIR	4	%	29	28	25	25	27	29
Crude Protein - NIR	2	%	14.3	16.7	21.3	14.2	11.6	13.0
Inorganic Ash - NIR	3	%	10	11	11	9	8	11
Organic Matter - NIR		%	90	89	89	91	92	89
DMD	39	%	67	65	72	71	71	58
DOMD	38	%	63	64	68	69	67	60
Calculation of ME	4.3	MJ/kg DM	9.8	9.9	10.9	11.0	10.5	9.1
WSC - NIR	4	%	8.4	5.6	6.5	12.5	15.2	<4.0
AFIA Hay and Silage Grade			NO GRADE	NO GRADE	NO GRADE	NO GRADE	NO GRADE	NO GRADE

Leaf Sap and Tissue Testing

Mineral		Current Level	Optimum	
Total Sugars	%	3,4	0,7 - 3,4	1
	%	2,3		2
pH		6,6	6,2 - 6,6	1
		6,0		2
EC	mS/cm	14,7	13,6 - 17,1	1
	mS/cm	16,2		2
K - Potassium	ppm	5920	5800 - 7650	1
	ppm	3248		2
Ca - Calcium	ppm	507	535 - 965	1
	ppm	1349		2
K / Ca		11,67		1
		2,41		2
Mg - Magnesium	ppm	259	200 - 400	1
	ppm	528		2
Na - Sodium	ppm	835	26 - 178	1
	ppm	1908		2
NH4 - Ammonium	ppm	197	210 - 625	1
	ppm	383		2
NO3 - Nitrate	ppm	<20	< 350	1
	ppm	<20		2
N in Nitrate	ppm	<5	< 79	1
	ppm	<5		2
N - Total Nitrogen	ppm	2367	1870 - 3670	1
	ppm	2735		2
Cl - Chloride	ppm	3173	630 - 1700	1
	ppm	5126		2
S - Sulfur	ppm	411	280 - 580	1
	ppm	635		2
P - Phosphorus	ppm	568	280 - 520	1
	ppm	465		2
Si - Silica	ppm	21,6	38,6 - 67,4	1
	ppm	46,6		2
Fe - Iron	ppm	2,61	2,45 - 5,05	1
	ppm	2,22		2
Mn - Manganese	ppm	3,24	2,60 - 6,90	1
	ppm	5,69		2
Zn - Zinc	ppm	2,92	1,55 - 3,10	1
	ppm	5,65		2
B - Boron	ppm	0,56	0,60 - 1,70	1
	ppm	0,86		2
Cu - Copper	ppm	0,88	0,50 - 0,95	1
	ppm	2,44		2
Mo - Molybdenum	ppm	0,22	0,10 - 0,35	1
	ppm	0,21		2
Al - Aluminium	ppm	<0,50		1
	ppm	1,41		2

Consult your advisor for appropriate fertilizer recommendations.

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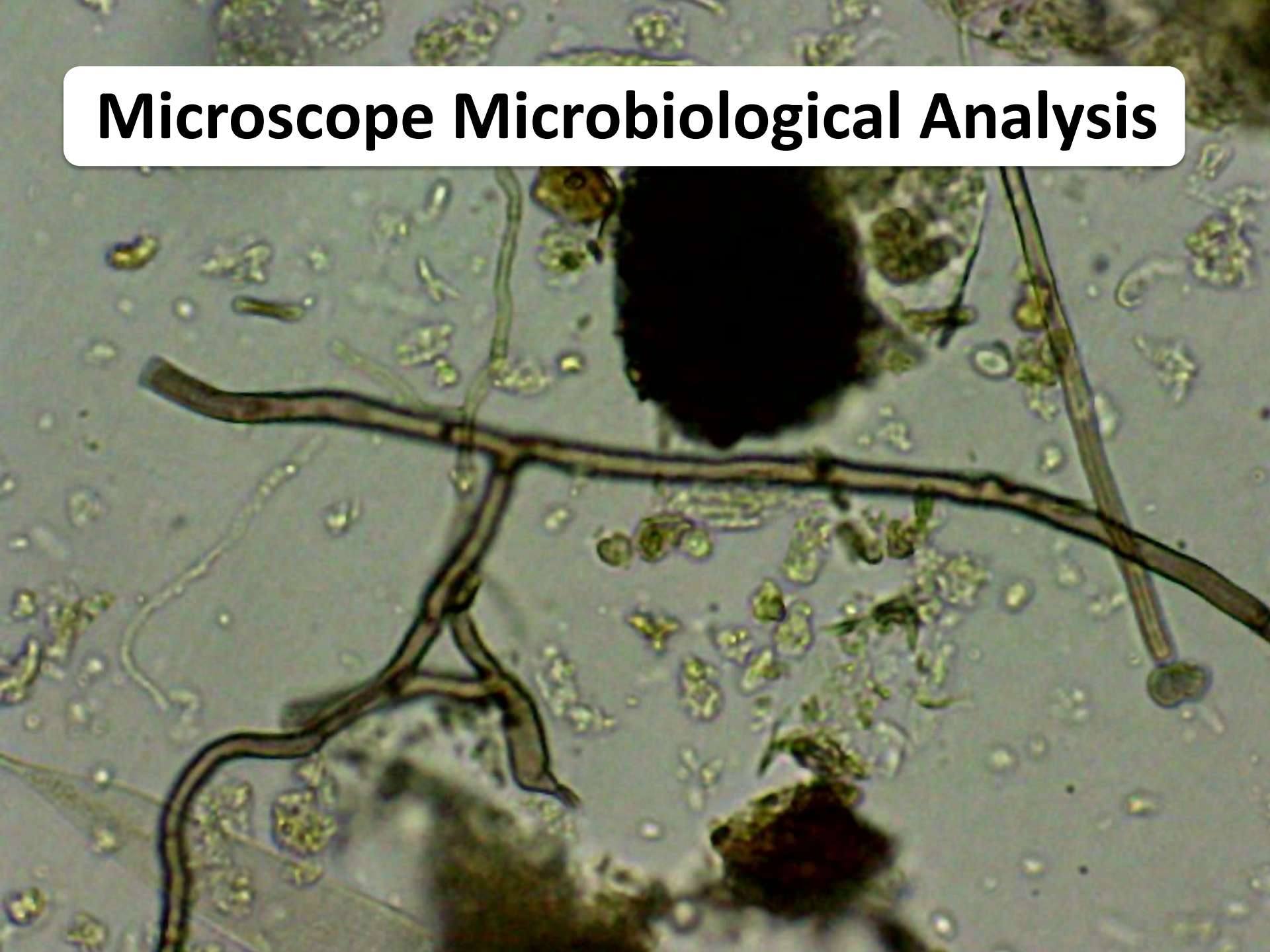
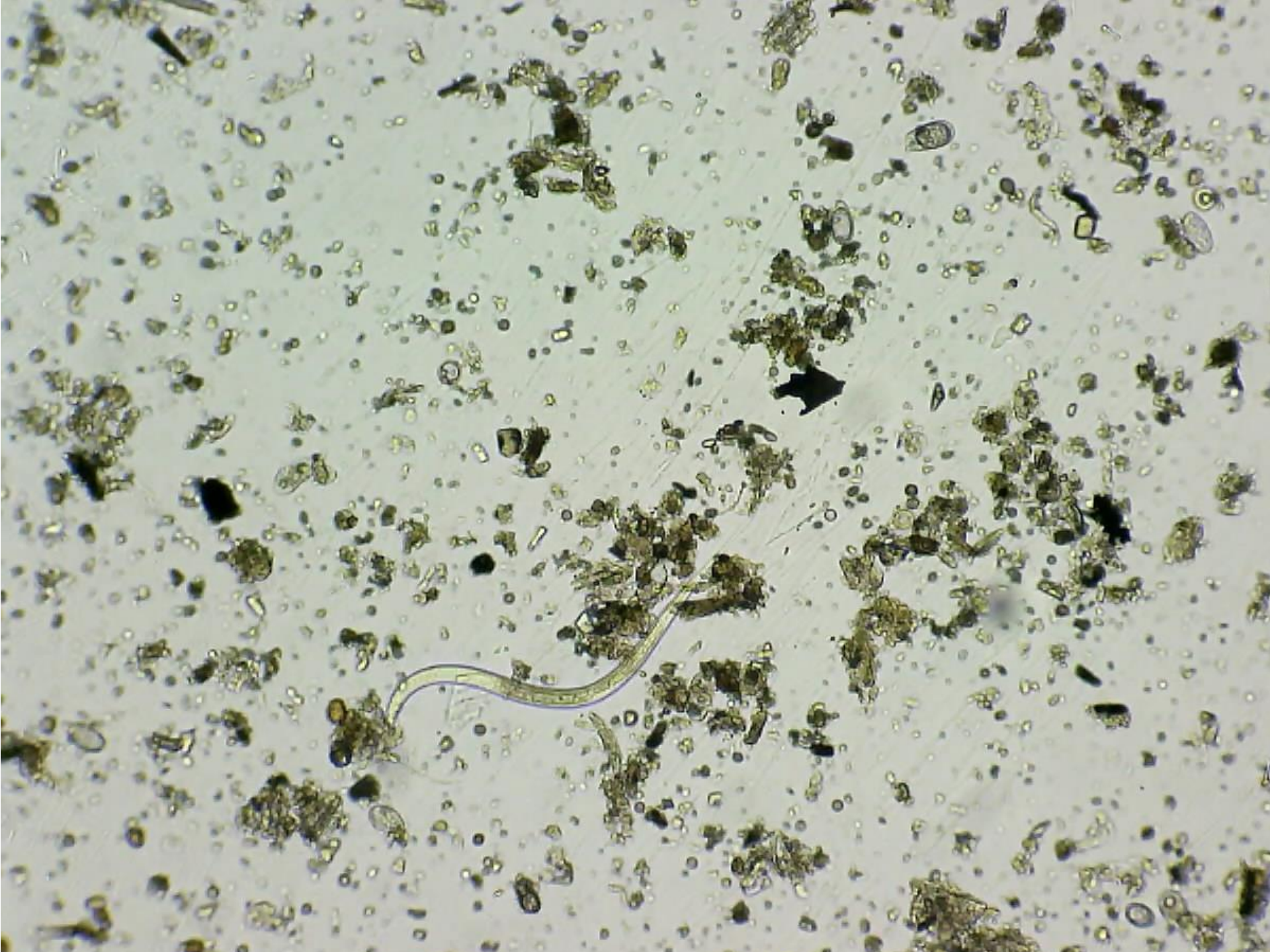

Microscope Microbiological Analysis



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MICROBE WISE FOR COMPOST

Name: **YLAD** Sample: **Compost** Analysis no.: **1239-1** Date: **24-08-16**

Key Microbe Groups

Group	Biomass (mg/kg) Yours	Guide
Total microorganisms	**320.1**	50.0
Total bacteria	**47.1**	15.0
Total fungi	**267.3**	33.8
Bacteria		
Pseudomonas	**8.108**	1.000
Actinomycetes	**1.266**	1.000
Gram positive	**25.984**	4.000
Gram negative	**21.100**	11.000
Methane oxidisers	**BDL***	0.500
Sulphur reducers	**BDL***	< 0.005
True anaerobes	**1.122**	< 0.005
Eukaryotes		
Protozoa	**5.719**	1.250
Mycorrhizal fungi (including VAM)	**27.716**	10.000

Useful indicators	Yours	Guide
Microbial diversity	**72.8**	80.0
Fungi : Bacteria	**5.7**	2.3
Bacterial stress	**0.5**	< 0.5
Compost maturity	**98.3**	80.0
Disease suppression	**100.0**	80.0

Nutrients held in microbes	Concentration (mg/kg) Yours	Guide
Nitrogen (N)	**18.084**	3.450
Phosphorus (P)	**9.603**	1.500
Potassium (K)	**3.201**	0.500
Sulphur (S)	**3.201**	0.500
Calcium (Ca)	**3.201**	0.250
Magnesium (Mg)	**3.201**	0.250
Carbon (C)	**146.687**	22.688

Poor **Fair** **Good**

Key

Comments

Total microbial biomass was very good. Biomasses of other key desirable microbial groupswere also very good, including Mycorrhizal fungi (VAM) and Protozoa. VAM fungi require a living plant host to survive, so their presence here is a plus. Protozoa often appear after composts have aged for some time, and their presence here is an indication of maturity. The Fungi to Bacteria ratio was elevated compared to the guide, but this may be advantageous if the aim was to produce a fungi-dominated compost. Microbial diversity was good. True anaerobes were elevated, which may be indicative of lack of aeration or excessive watering. These results indicate that this compost would be an excellent amendment, particularly to soils with low fungi.

Explanations

The Microbe Wise test measures the biomasses of key microbial groups directly from your sample. It uses molecular ('DNA type') technology to analyse the unique cell membrane 'fingerprint' of each microbe type to identify and quantify key groups important to compost and soil processes. This method is more accurate and precise than other methods, such as direct microscopy or plate culture, because it uses chemical extraction to remove the maximum amount of microbial material from the sample and is repeatable to 0.01% between replicate analyses. It measures organisms that are alive or recently dead (within a few days). Always compare your results with a control sample. Guide values are included as a help, but because a large number of factors affect microbiology the guide levels may not be optimal for your specific conditions. Visit www.microbelabs.com.au for more information.

HANEY SOIL ANALYSIS REPORT

7 samples supplied by Terry Young on 05/05/2023. Lab Job No.P0363

Analysis requested by Terry Young. Your Job: Soil samples

276 Youngs Road UNGARRA SA 5607

Test	Parameter	Method reference	Sample 7 Sample ID: Y19-W Crop: N/G Client: TRY P0363/7	AVERAGE (120 random samples)
	Haney Soil Health Score	Calculation: (Solvita CO_2/10) + (Total Water Extractable Carbon/100) + (Total Water Extractable Nitrogen/10)	14	8.2
Solvita	Microbial Respiration (mg/kg CO_2)	Solvita CO_2 Burst	102	44
Water Extraction	Water Extractable Organic Carbon (mg/kg C)	Shimadzu TOC-L	143	185
	Water Extractable Nitrogen (mg/kg N)	Shimadzu TNM-L	27	20
	Water Extractable Nitrate (mg/kg N)	Haney 2010 FIA (Water Extract)	20	5.4
	Water Extractable Ammonium (mg/kg N)		1.6	2.0
	Organic Carbon: Nitrogen ratio (C:N ratio)	Calculation: Total Water Extractable Carbon:Total Water Extractable Nitrogen	5.2	9.5
	Inorganic Nitrogen (mg/kg N)	Calculation: Water extractable Nitrate + Ammonium	22	7.4
	Organic Nitrogen (mg/kg N)	Calculation: Total Water Extractable Nitrogen - Inorganic Nitrogen (Nitrate + Ammonium)	5.3	13
Haney Extraction	Calcium (mg/kg)	Haney 2010 ICP-OES (H3A-2 Extract)	446	453
	Magnesium (mg/kg)		84	123
	Potassium (mg/kg)		104	87
	Sodium (mg/kg)		73	62
	Sulfur (mg/kg)		12	30
	Zinc (mg/kg)		2.9	3.1
	Manganese (mg/kg)		3.4	17
	Iron (mg/kg)		19	314
	Copper (mg/kg)		0.2	1.2
	Aluminum (mg/kg)		37	577
	H3A-2 Nitrate (mg/kg N)	Haney 2010 FIA (H3A-2 Extract)	13.7	7.3
	H3A-2 Ammonium (mg/kg N)		2.7	9.5
	Total Available Phosphorous (mg/kg)	Haney 2010 ICP-OES (H3A-2 Extract)	111	25
Other	pH_w	Rayment & Lyons 2011 - 4A1 (1:5 Water)	8.01	..
	Electrical Conductivity (dS/m)	Rayment & Lyons 2011 - 3A1 (1:5 Water)	0.145	..
	Labile Carbon (%)	Blair 1995 - 0.333 M Potassium Permanganate	0.35	..
	Total Carbon (% C)	Inhouse S4a (LECO Trumac Analyser)	1.12	..
	Total Nitrogen (% N)		0.12	..
	Estimated Organic Matter (% OM)	Calculation: Total Carbon x 1.75	2.0	..
	Carbon/Nitrogen Ratio	Calculation: Total Carbon/Total Nitrogen	9.2	..

Notes:

1. All results presented as a 40 °C oven dried weight. Soil sieved and lightly crushed to < 2 mm.
2. Methods from Haney RL, Haney EB, Hossner, LR and Arnold JG. 2010a. Modifications to the new soil extractant H3A-1: a multinutrient extractar *Communications in Soil Science and Plant Analysis* . **41(12):1513–1523**. This method uses the modification to H3A-1 and is referred to as H3A-2
3. Analysis conducted between sample arrival date and reporting date.
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6. This report was issued on 22/05/2023.

Useful links/References

- https://soils.vidacycle.com/soil-tests/
- https://cdn.environment.sa.gov.au/landscape/docs/ep/rapid_assessment_of_soil_health_rash_manual.pdf
- https://www.bioagrinomics.com/visual-soil-assessment
- https://ecovineyards.com.au/soil-health-indicators-for-australian-vineyards/