What is Soil/Lab Testing's Role in Soil Health?

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Background

- Definition: "Soil health, also referred to as soil quality, is defined as the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans." –USDA NRCS
- What do we measure and how?



What and How

- Focus on the different parts that make soil
- Components of Soil
 - Mineral
 - Organic
 - Air/Water



What and How



Tier 1

- organic carbon,
- ► pH,
- water-stable aggregation,
- crop yield,
- texture,
- penetration resistance,
- cation exchange capacity,
- electrical conductivity,
- nitrogen,

- phosphorus,
- potassium,
- carbon mineralization,
- nitrogen mineralization,
- erosion rating,
- base saturation,
- bulk density,
- available water holding capacity,
- infiltration rate, and
- micronutrients

What and How

- Ward Laboratories'' Test Packages
- Traditional Soil Test
 - Basic to extensive
- Haney Soil Health Assessment
 - Many tests rolled into one package
- Microbes and Others
 - PFLA, FAME
 - Enzymes





Good tests start with good samples

Depth:

- All soil test result interpretations based on uniform sample depths
- 0" 6", 0" 8" are what most Universities have used
- Can be different
- Constant depth is more critical than what depth.



Good tests start with good samples

of cores

- More is always better
- Elements have varying degrees of certainty
- Strike a balance
- 15-20 for Composite/Zone
- 10-12 for grid



Good tests start with good samples

- Miscellaneous things to consider
 - Plastic bucket
 - Stainless steel probe
 - Lubricants









Ag Testing - Consulting

Biological Soil Analysis Report

Account No. : 20765

Haney Test Results

What does this all mean?

1246823 10/17/2017 10/19/2017	Invoice No. : ate Received : ate Reported :	Da Da	68845	ER, TERRY D Y NE	BUETTNER, TE 2122 20 RD KEARNEY
				TERRY BUETTNER	Results For : TERR
		Sample ID 3 :		: HALF PIVOT	Sample ID 1 : HALF
		Sample ID 4 :		: 1 : 11731	Sample ID 2 : 1 Lab No. : 11731
		ealth Analysis	Haney - Soil H		
5		ICAP Sulfur, ppm S	7.4		1:1 Soli pH
268		ICAP Calcium, ppm Ca	0.19	ts, mmho/om	1:1 Soluble Salts, mmh
73	a	ICAP Magnesium, ppm Mg	NONE	sting	Excess Lime Rating
16		ICAP Sodium, ppm Na	1.8	%LOI	Organio Matter, %LOI
284.30		ICAP Aluminum, ppm Al			
		Calculations	10.2	COs-C, ppm C	Soli Respiration CO ₂ -C,
6.9	(%MAC)	Microbially Active Carbon			Water Extract
10.2		Organic C : Organic N	16.8	en, ppm N	Total Nitrogen, ppm
5.4		Organic N : Inorganic N	14.5	ogen, ppm N	Organic Nitrogen, pr
4.0	, ppm N	Organic Nitrogen Release,	148	ic Carbon, ppm C	Total Organic Carbo
10.5	, ppm N	Organic Nitrogen Reserve,			H3A Extract
1.5	ase, ppm P	Organic Phosphorus Relea	2.2	NOp-N	Nitrate, ppm NOs-N
6.1	erve, ppm P	Organic Phosphorus Rese	0.5	ppm NH+-N	Ammonium, ppm NH
		Soll Health	2.7	trogen, ppm N	inorganic Nitrogen, p
5.43		Soll Health Calculation	16	Phosphorus, ppm P	Total (ICAP) Phosph
egume 50% Grass	50% Leg	Cover Crop Suggestion	8.0	IA) Phosphorus, ppm P	inorganic (FIA) Phos
			7.6	sphorus, ppm P	Organic Phosphorus
			90	sium, ppm K	ICAP Potassium, pp
			2.83	opm Zn	ICAP Zinc, ppm Zn
			155.7	pm Fe	ICAP Iron, ppm Fe
			4.0	anese, ppm Mn	ICAP Manganese, p
			0.14	r, ppm Cu	ICAP Copper, ppm (
Page 1 of 2	Copy:1	1/23/2018		Lance Gunderson	Reviewed By : Lonce G

Traditional Soil Test Data

▶ pH: 6.0-7.2

	1:1 Soil pH	7.4
Soluble Salts: <1.5	1:1 Soluble Salts, mmho/cm	0.19
Excess Lime: None	Excess Lime Rating	NONE
	Organic Matter, %LOI	1.8

Organic Matter: Soil Dependent

Respiration

- Notice new name
 - Range 31-70 ppm CO₂

Soil Respiration CO₂-C, ppm C

10.2

Water Extract

Total N	10-30 ppm*
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- Organic N 10-30 ppm
- Total OC 100-300 ppm

Water Extract	
Total Nitrogen, ppm N	16.8
Organic Nitrogen, ppm N	14.6
Total Organic Carbon, ppm C	148

H3A Extract

Nitrogen

- Excess or left over fertilizer
- Inorganic < 5.0 ppm</p>

H3A Extract

Nitrate, ppm NO3-N	2.2
Ammonium, ppm NH4-N	0.5
Inorganic Nitrogen, ppm N	2.7

H3A Extract

Phosphorus

- Total 15-25 ppm
- Inorganic 10-30 ppm

Inorganic used for recs	Total (ICAP) Phosphorus, ppm P	16
 Organic (difference) 	Inorganic (FIA) Phosphorus, ppm P	8.0
	Organic Phosphorus, ppm P	7.6



H3A Extract

Cations

- K 80-120 ppm
- Ca 500-1000 ppm
- Mg 100-350 ppm
- Na < 50 ppm</p>
- Not to be used for CEC calculations
- Sulfur
 - **5**-10 ppm

ICAP Potassium, ppm K	90
ICAP Calcium, ppm Ca	268
ICAP Magnesium, ppm Mg	73
ICAP Sodium, ppm Na	16
ICAP Sulfur, ppm S	Ę





Micros	ICAP Zinc, ppm Zn	2.83
Zn 0.2-0.5 ppm	ICAP Iron, ppm Fe	155.7
Still need to work with the others	ICAP Manganese, ppm Mn	4.0
	ICAP Copper, ppm Cu	0.14

Calculated Values

- MAC 50%-75%
- OC:ON 10:1-12:1
- ON:IN >5.0

Calculations

Microbially Active Carbon (%MAC)	6.9
Organic C : Organic N	10.2
Organic N : Inorganic N	5.4
Organic Nitrogen Release, ppm N	4.0
Organic Nitrogen Reserve, ppm N	10.5
Organic Phosphorus Release, ppm P	1.6
Organic Phosphorus Reserve, ppm P	6.1

Calculated Values

Soil Health Score

- 7 and up
- Cover Crop Suggestion

Soil Health	
Soil Health Calculation	5.43
Cover Crop Suggestion	50% Legume 50% Grass

Recommendations

- Haney Test comes with full set of fertilizer recommendations
 - Level of certainty high with most nutrients

What's not listed in this report?



Resources

G calendar	- Google Search 🗙 👾 Haney Information - War 🗙				- 0	x
$\leftrightarrow \ \ominus \ G$	(i) wardlab.com/haney-info.php			☆		1 E
	EXARD Laboratories, Inc.	(800) 887-7645	🖑	Monday - Friday 8:00 AM - 5:00 PM		
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HANEY/SOIL HEALTH TEST INFORMATION REV. 1.0

HOME > HANEY/SOIL HEALTH TEST INFORMATION REV. 1.0

HANEY/SOIL HEALTH TEST INFORMATION REV. 1.0

PDF of information below: Haney/Soil Health Test Information Rev 1.0

The Haney Test or Soil Health Test is an integrated approach to soil testing using chemical and biological soil test data. It is designed to mimic nature's approach to soil nutrient availability as best we can in the lab. The Haney Test is designed to work with any soil under any management scenario because the program asks simple, universally applicable questions.

- 1. What is your soil's condition?
- 2. Is your soil in balance?
- 3. What can you do to help your soil?

Procedure Outline:

LINKS	
Sampling Information	>
Haney Report Example (PDF)	>
Haney Report Definitions	>
Haney Interpretation Guide	>
References	>
External Links	>

Questions

Thank You!