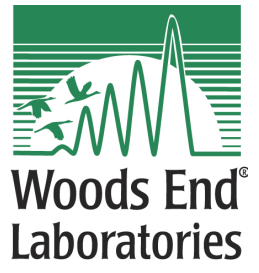


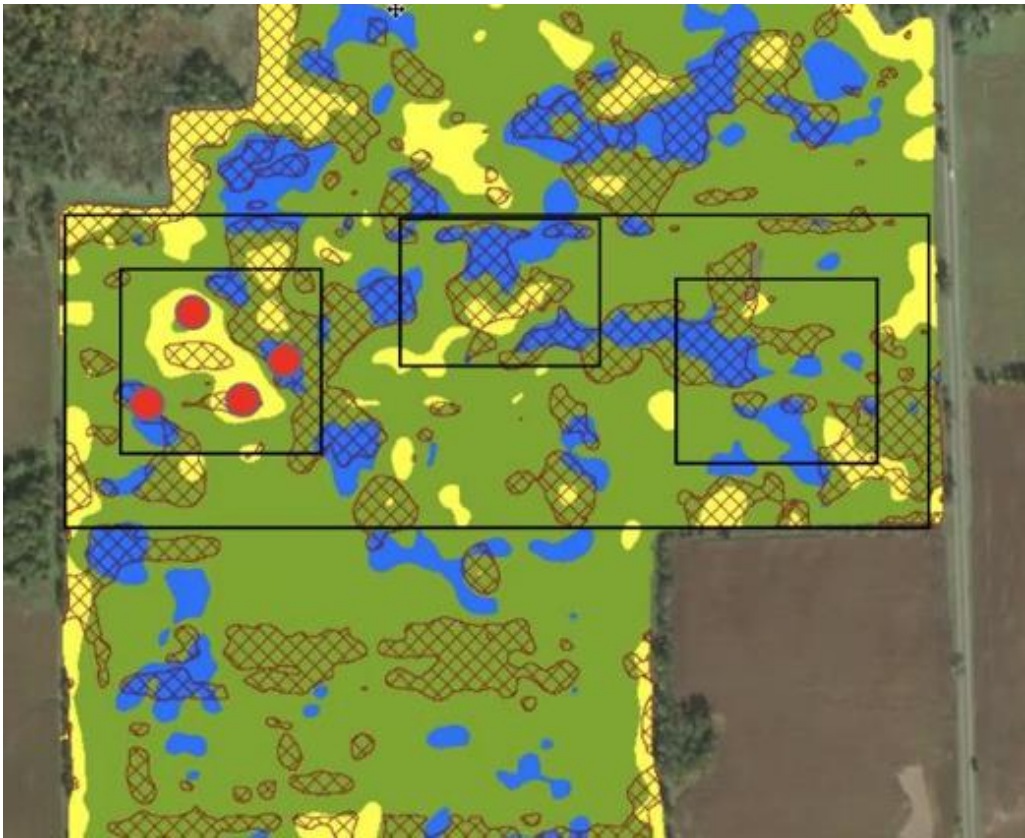
Measures of Soil Health

A simple soil health test for your analytical suite

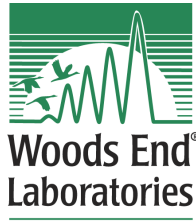
PRESENTER: Rebecca Harvey, PhD
Woods End Laboratories, LLC

DEVERON
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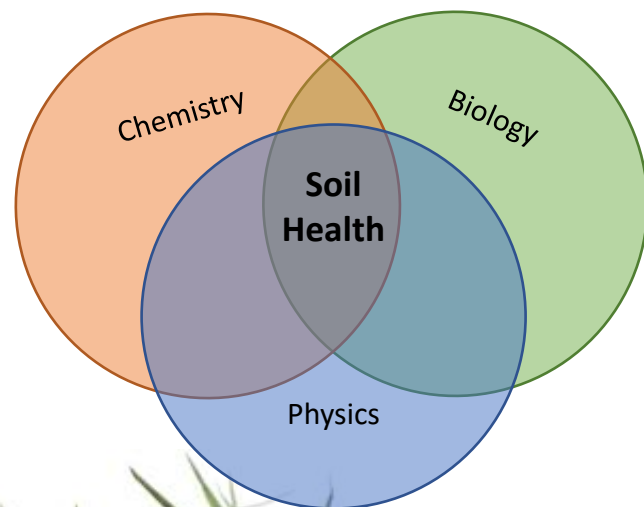
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AGRI-LABS
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Integrated Agricultural Solutions
Sample collection, transfer, analysis, interpretation

Healthy Soil is...



Healthy Soil is...

Review | Published: 13 May 2012

Manipulating the soil microbiome to increase soil health and plant fertility

Jacqueline M. Chaparro, Amy M. Sheflin, Daniel K. Manter & Jorge M. Vivanco

Biology and Fertility of Soils 48, 489–499 (2012) | [Cite this article](#)

20k Accesses | 585 Citations | 9 Altmetric | [Metrics](#)

Abstract

A variety of soil factors are known to increase nutrient availability and plant productivity. The most influential might be the organisms comprising the soil microbial community of the rhizosphere, which is the soil surrounding the roots of plants where complex interactions occur between the roots, soil, and microorganisms. Root exudates act as substrates and signaling molecules for microbes creating a complex and interwoven relationship



Soil La

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soil

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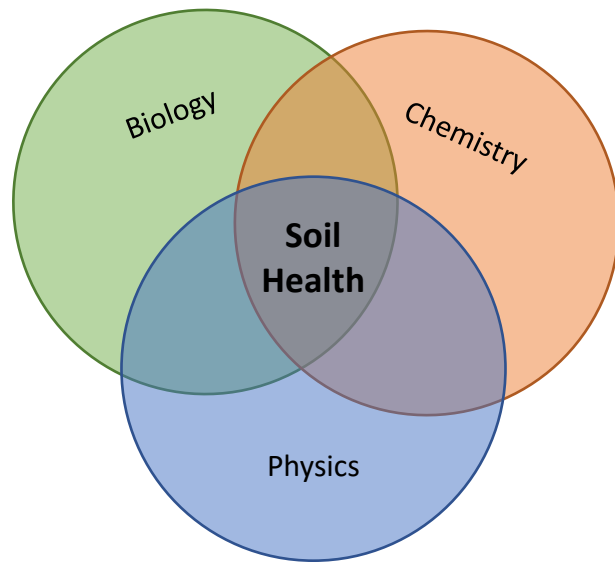
Improved soil biological health increases corn grain yield in N fertilized systems across the Corn Belt

Jordan Wade^{1,2*}, Steve W. Culman¹, Jessica A. R. Logan³, Hanna Poffenbarger⁴, M. Scott Demyan¹, John H. Grove⁴, Antonio P. Mallarino⁵, Joshua M. McGrath⁴, Matthew Ruark⁶ & Jaimie R. West⁶

Nitrogenous fertilizers have nearly doubled global grain yields, but have also increased losses of reactive N to the environment. Current public investments to improve soil health seek to balance productivity and environmental considerations. However, data integrating soil biological health and crop N response to date is insufficient to reliably drive conservation policy and inform management. Here we used multilevel structural equation modeling and N fertilizer rate trials to show that biologically healthier soils produce greater corn yields per unit of fertilizer. We found the effect of soil biological health on corn yield was 18% the magnitude of N fertilization. Moreover, we found this effect was consistent for edaphic and climatic conditions representative of 52% of the rainfed acreage in the Corn Belt (as determined using technological extrapolation domains). While N fertilization also plays a role in building or maintaining soil biological health, soil biological health metrics offer limited *a priori* information on a site's responsiveness to N fertilizer applications. Thus, increases in soil biological health can increase corn yields for a given unit of N fertilizer, but cannot completely replace mineral N fertilization in these systems. Our results illustrate the potential for gains in productivity through investment in soil biological health, independent of increases in mineral N fertilizer use.

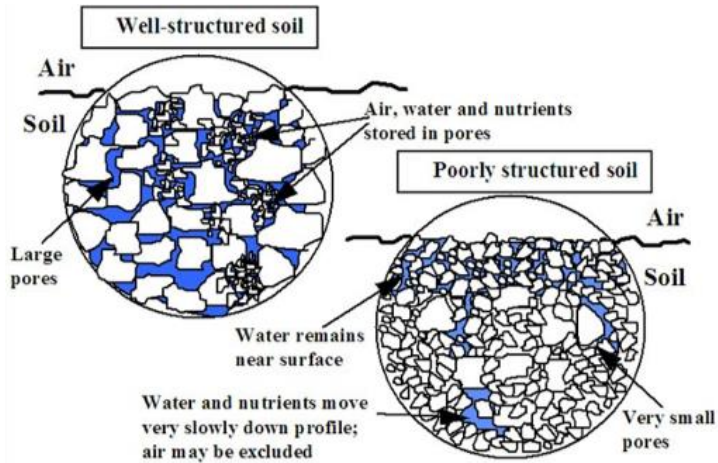
Healthy Soil is...

- The road less taken for modern ag science
- Valuable
- In-demand
- A complex trait that's hard to quantify



Measuring Soil Health

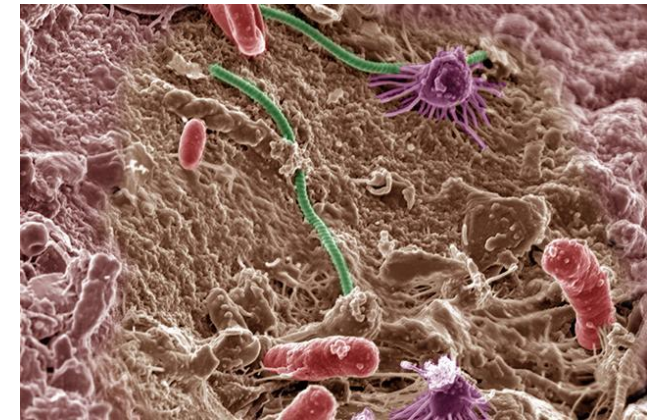
Physics – soil structure



Chemistry - nutrients

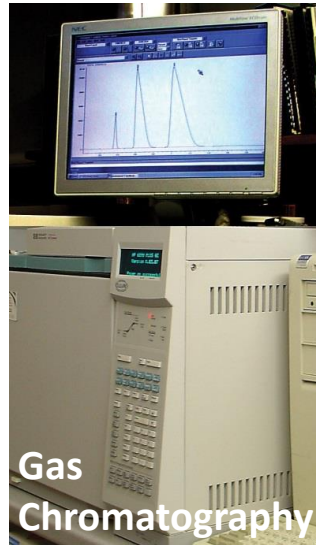


Biology – microbes



Soil Respiration, CO₂

Measuring Soil Health - Respiration



Measuring Soil Respiration – there's a better way



Measuring Soil Health – there's a better way



Place dried, ground soil sample in beaker, place beaker in jar



Add water



Insert CO₂ Probe



Read with DCR at 24 hrs

Solvita[®] CO₂ Burst Method

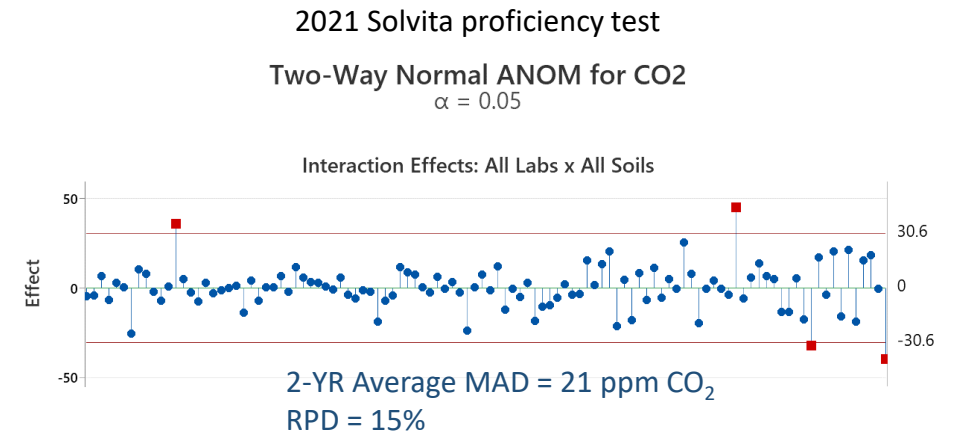
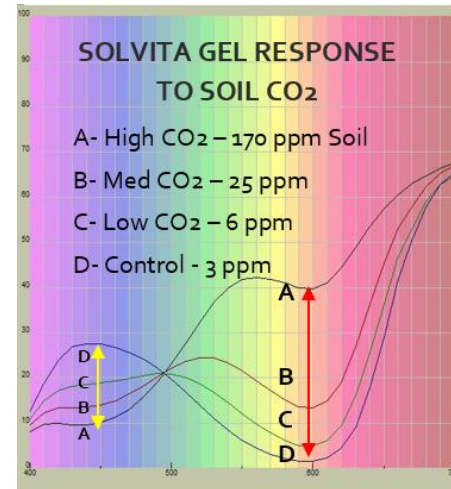
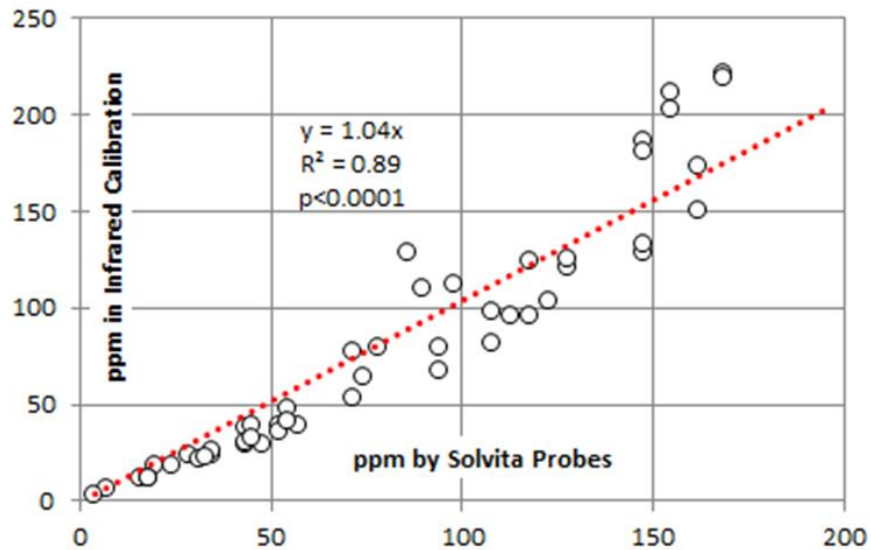
Accolades for Solvita[®]

- Fast, easy, scalable



Accolades for Solvita[®]

- Fast, easy, scalable
- Accurate, sensitive, precise, reproducible



Accolades for Solvita®

- Fast, easy, scalable
- Accurate, sensitive, precise, reproducible
- Adaptable
 - Burst VS Basal
 - Compost maturity
 - Inorganic Carbon
 - SLAN
 - Academia



Published November 27, 2019

Agricultural & Environmental Letters
Research Letters

Soil Carbonate Analysis Using the Solvita Compost Maturity Gel System

C. W. Rogers,* S. Pristupa, and B. Dari

Core Ideas

- The Solvita compost gel system was well calibrated with calcium carbonate C.
- The Solvita compost gel system was highly correlated to the standard pressure calcimeter method.
- The Solvita compost gel system is an alternative method for inorganic C determination.

Abstract: Determination of important for soil fertility an have been developed to d calcimeter method. We comp method and the Solvita gel CO₂ respiration. Results from gel system could be develop Comparison of the Solvita g near 1:1 relationship, where s 13 g kg⁻¹ and slight under indicate the Solvita gel syste determination.

Authors – Year	Title – Institution – Journal/Symposium	Link to Report
Brinton, W., 2022	Solvita Synthesis of Lab Proficiency Results 2021; <i>Journal of the Woods End Research Laboratory, Issue 4.0 2022, summary for download</i>	request by email
Stutler, K. et al, 2022	Mine soil health on surface mined lands reclaimed to grassland, <i>Geoderma 413 (2022) 115764</i> , https://doi.org/10.1016/j.geoderma.2022.115764 .	request by email
Guo, M., 2021	Soil Health Assessment and Management: Recent Development in Science and Practices, <i>Soil Syst. 2021, 5, 61</i> . https://doi.org/10.3390/soilsystems5040061	CLICK HERE
Van Eerd, L., Congreves, K., Arcand, M., Lawley, Y., & Halde, C. 2021	Soil health and management. In M. Krzic, F.L. Walley, A. Diocion, M.C. Paré, & R.E. Farrell (Eds.), <i>Digging into Canadian soils: An introduction to soil science</i> (pp. 463–517). Pinawa, MB: Canadian Society of Soil Science. https://openpress.usask.ca/soilscience/chapter/soil-health-and-management/	CLICK HERE
Chahal, I. et al 2021	Long-term effects of crop rotation, tillage, and fertilizer nitrogen on soil health indicators and crop productivity in a temperate climate, <i>Soil & Tillage Research 213 (2021) 105121</i> , https://doi.org/10.1016/j.still.2021.105121	CLICK HERE

Accolades for Solvita®

- Fast, easy, scalable
- Accurate, sensitive, precise, reproducible
- Adaptable
- Recognized Standard Method
 - Soil Quality Institute
 - USDA
 - NAPT



Soil Health Testing can be integrated into any soil lab process

SOIL FERTILITY & HEALTH REPORT
 Colvita
 Sample Identity: 0878.0
 Act Number: 100
 Sample: Soil North Carolina VST Reference Soil
 Sample Date: 6/22/2016
 Crop: General Crops

SOIL HEALTH SCORE: 6

OVERALL FERTILITY SCORE: 33

Soil Chemical Analysis

Element	Result	Low	Medium	High
N	10.0	Low	Medium	High
P	1.0	Low	Medium	High
K	175	Low	Medium	High
Ca	1000	Low	Medium	High
Mg	100	Low	Medium	High
S	100	Low	Medium	High
Na	100	Low	Medium	High
Cl	100	Low	Medium	High
B	100	Low	Medium	High
Zn	100	Low	Medium	High
Cu	100	Low	Medium	High
Mn	100	Low	Medium	High
Mo	100	Low	Medium	High

NUTRIENT FERTILITY

Element	Units	Result
Ammonium-N	ppm	1
Nitrate-N	ppm	1.5
Water Soluble N	ppm	2.8
Biological N	B/a	10
Biological Nutrients	ppm	2
Phosphorus	ppm	52
Calcium	ppm	144
Magnesium	ppm	88
Sulfur	ppm	52
Rating Factors	Rating	0.53
Nutrient Index	ppm	7
Most Limiting Nutrient Factor		
Other Factors	ppm	0.0
Water Soluble Carbon	ppm	4.6
Water Soluble C/N	ratio	0.7%
Aluminum	ppm	156
Iron	ppm	3.93
Manganese	ppm	6.0
Copper	ppm	0.0
Zinc	ppm	0.0
Boron	ppm	0.0
Molybdenum	ppm	0.0
Soil pH		6.5

Notes and Recommendations
 General Cover Crop Selection
 Types of Cover Crops/Grasses Suggested
 Line Requirement for pH & S
 2.5 tons/acre

VITELLUS Soil Health

A & L Canada Laboratories Inc.
 2115 American Road, Lincoln, Nebraska, NE 68506
 Telephone: (416) 407-2575 Fax: (416) 407-2664

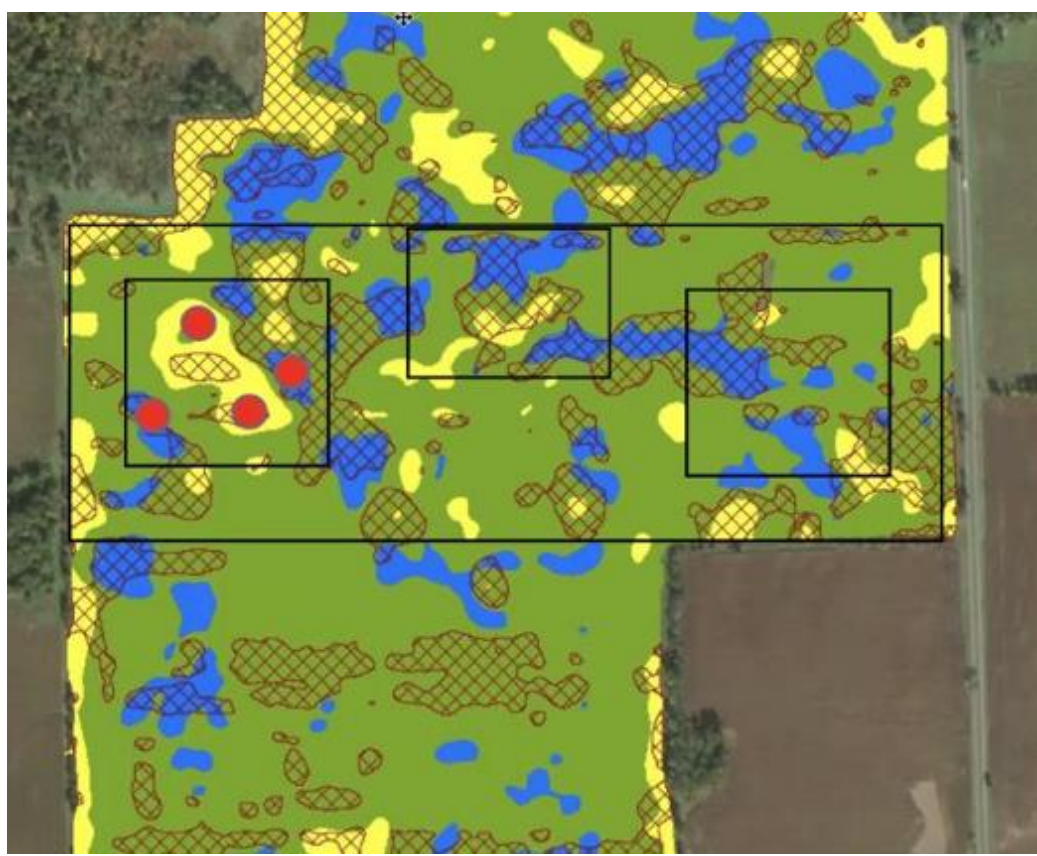
Soil Health Report
 Vitellus
 Sample: 18180-10003
 Reported Date: 2018-08-11
 Printed Date: 2018-08-08

Parameter	Result	Optimum Level
CEC (meq/100g)	11.9	1.20-2.30
pH	6.5	6.0-7.0
EC (dS/m)	28	4.0
Ca (ppm)	1000	100-200
Mg (ppm)	100	60-120
K (ppm)	175	100-200
Na (ppm)	100	10-20
S (ppm)	100	10-20
B (ppm)	100	1-2
Zn (ppm)	100	1-2
Cu (ppm)	100	1-2
Mn (ppm)	100	1-2
Mo (ppm)	100	1-2


Soil Health Report
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Soil Health Report
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 Reported Date: 2018-08-11
 Printed Date: 2018-08-08





DEVERON
A New Level of Farming



**Woods End
Laboratories**

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