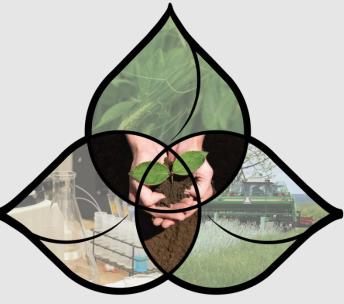
## Adaptive Management and Soil Health Testing

Joe Ve	cornell S	oil H	ealth A	ssessment	
Anyto Agrici Smith Jun's (	ian St. on, NY, 12345 illual Service Provider George Consulting e@junsconsulting.com		Sample ID Field Treatme Tillage Crops Crown Date Sampled Given Soil Ty Given Soil Te Coordinates	No Tail MIX, MIX, MIX 531/2014	
У	leasured Soil Textural Class: Sile	Loam	Sapi	E 5% Sile: 70% Clay: 25%	
		Test	Report		
	Indicator	Value	Rating	Constraint	
	Available Water Capacity	0.13	28	Water Reporting and Availability	
T	Surface Hardness	148	62		
Physical	Subsurface Hardness	425	8	Substantiace Pan Deep Compaction, Dee Rooting, Water and National Access	
	Aggregate Stability	22.5	26	Aetaton, Infiltration, Rooting, Crucing Sealing, Erosian, Romeff	
	Organic Matter	3.2	42		
Insi	ACE Soil Protein Index	6.5	35		
Biological	Root Pathogen Pressure	5.5	44		
181	Respiration	1.17	15	Soil Marrobal Abundance and Actor	
	Active Carbon	391	12	Eastgy Source for Soil Barts	
-	pH	6.0	71		
hemical	Phosphorus	9.3	100		
đ	Potassium	264.7	100		
	Minor Elements Ng 49 7e 11 Ma 129 Ze 19		100		
	Overall Quality Scot		49	Low	



### Aaron Ristow Bob Schindelbeck

#### Soilhealth.cals.cornell.edu

Cornell University College of Agriculture and Life Sciences School of Integrative Plant Science Crop and Soil Sciences Section

### Cornell Soil Health Assessment

- Standardized set of measured indicators
- **Interpreted by scoring functions**
- **Identifies constraints**
- Offers management recs.
- Provides information for quantitative, data-driven decision making

		boil H		lssessment			
Bob Schindelbeck 1004 Bradfield Hall, Comell Univ. Ithaca, NY, 14853			Sample ID: L_77 Field/Treatment: CF intensely cultivated Tillage: 7-9 inches				
Schinde Dept. o	ıltural Service Provider: lelbeck, Bob of Crop and Soil Science cornell.edu		Crops Crown: Date Sampled: Given Soil Typ Given Soil Tex Coordinates:	5/7/2014			
M	Ieasured Soil Textural Class: Silt	Loam	Sano	Sand: 2% Silt: 83% Clay: 15%			
		Test	Report	t			
	Indicator	Value	Rating	Constraint			
	Available Water Capacity	0.14	36				
cal	Surface Hardness	260	15	Rooting, Water Transmission			
Physical	Subsurface Hardness	340	30	Subsurface Pan/Deep Compaction, Deep Rooting, Water and Nutrient Access			
	Aggregate Stability	15.7	16	Aeration, Infiltration, Rooting, Crusting, Sealing, Erosion, Runoff			
	Organic Matter	2.5	22	Nutrient and Energy Storage, Ion Exchange, C Sequestration, Water Retention			
ical	ACE Soil Protein Index	5.1	24	Organic Matter Quality, Organic N Storage, N Mineralization			
Biological	Root Pathogen Pressure	3.2	73				
B	Respiration	0.53	0	Soil Microbial Abundance and Activity			
	Active Carbon	288	4	Energy Source for Soil Biota			
al	рН	6.5	100				
Chemical	Phosphorus	20.0	100				
Ch	Potassium	150.6	100				
	Minor Elements Mg: 131 Fe: 1.2 Mn: 12.9 Zn: 0	0.3	100				
-	<b>Overall Quality Scor</b>	re	48	Low			

What factors does *Adapt-N* include in making a recommendation?

- Weather:
  - High resolution (4x4 km) daily P &T, and SR data
  - Irrigation amounts and dates
- Soil:
  - texture/soil type, slope, rooting depth, % organic matter
  - Tillage: fall or spring plowing; conservation tillage/residue management
  - Fertilizer and manure applications: date, rate, type, N analysis, placement
- Crop:
  - Cultivar; planting date, maturity class, Population and expected yield
  - Rotations: soy, corn silage or grain, or sod last 3 yrs, % legume, surface killed or incorporated
- Economics: Fertilizer and grain prices & profit loss risk





### **Soil Health Drives N Availability**

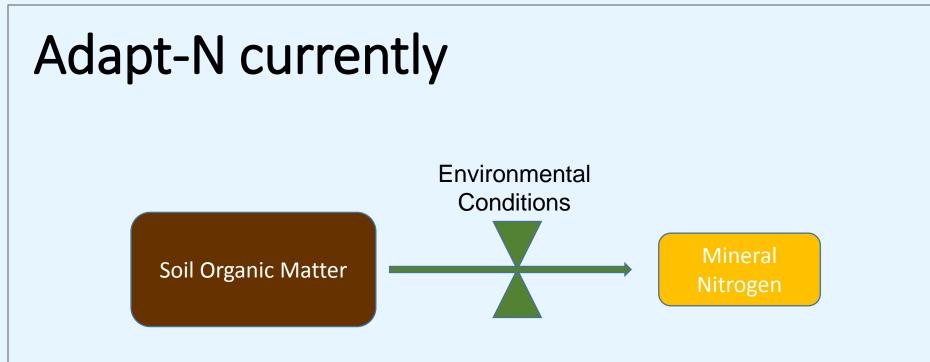
Dynamically interacting with weather:

- <u>Poor soil health = less N available, less N buffering, higher risks</u>
- <u>Biologically</u>: Microbial Activity, OM content and quality determine potential contribution
- <u>Physically</u>: Compaction, infiltration, available water capacity, aggregation, etc., determine loss, access, crop stress

Poor soil health is costly in many ways

Integrating soil health information into N recommendations from Adapt-N to promote short-term and long-term incentives to manage for better soil health



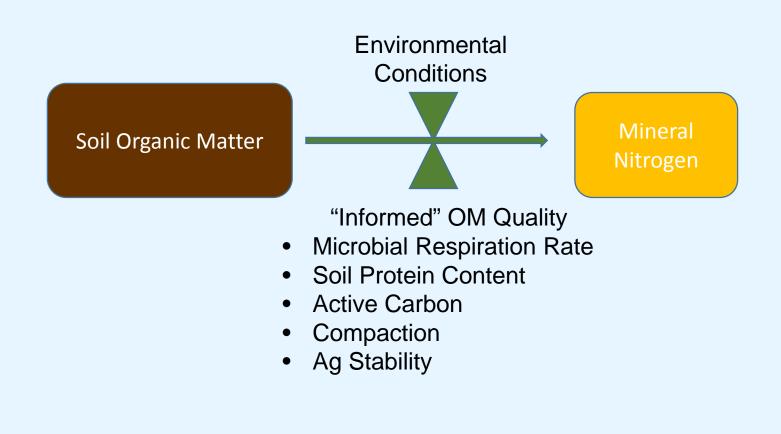


Currently SOM pools are derived from sod, manure and residue

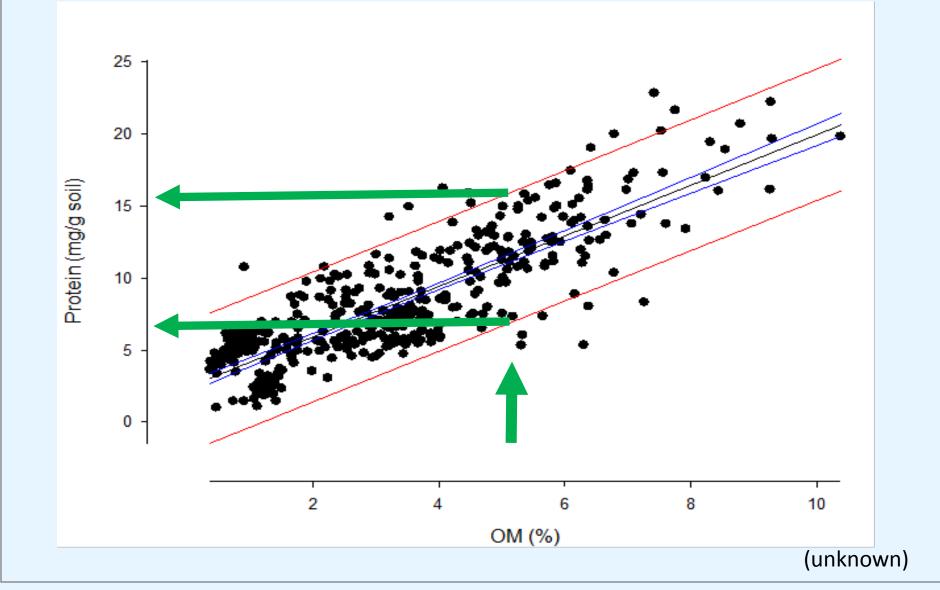
Based on "Average" Organic Matter Quality

SOM quality is constant and microbial decomposition activity responds uniformly

# Adapt-N will integrate organic matter quality and microbial activity



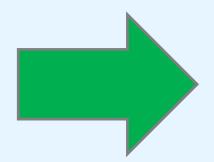
### Organic matter quantity *and quality*



### **Cornell Soil Health Assessment**

We can currently use the Soil Health report to inform N recommendations

We are working on collecting data to integrate this within the Adapt-N software



				r.				
	Cornell S	<u>soil H</u>	ealth A	ssessment				
1004 B Ithaca, Agricu Schind Dept. c	chindelbeck Bradfield Hall, Cornell Univ. , NY, 14853 ultural Service Provider: lelbeck, Bob of Crop and Soil Science cornell.edu		Sample ID: L_77   Field/Treatment: CF intensely cultivated   Tillage: 7-9 inches   Crops Crown: WHT, WHT   Date Sampled: 5/7/2014   Given Soil Type: Collamer   Given Soil Texture: No Soil Texture Given   Coordinates: Coordinates Not Provided					
Μ	Ieasured Soil Textural Class: Silt	Loam	San	d: 2% Silt: 83% Clay: 15%				
-	Test Report							
Indicator V		Value	Rating	Constraint				
	Available Water Capacity	0.14	36					
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	рН	6.5	100					
	Phosphorus	20.0	100					
	Potassium	150.6	100					
	Minor Elements Mg: 131 Fe: 1.2 Mn: 12.9 Zn:	0.3	100					
	<b>Overall Quality Score</b>			Low				

### **Cornell Assessment of SH App**

Very close to completing online **Soil Health application** 

In the future this information can be integrated with Adapt-N software

Cornell Soil	Health Assessment collect Send	Results Parti	icipate	My account	Log out
CSHA Admin	Home				
All Intakes	CSHA Results Edit				
Import Intakes Import Results	Test Report				
mport results	Measured Soil Textural Class: Clay Loam	Sand	l: 29% - S	Silt: 39% Cl	ay: 32%
	Indicators	Value	Rating	Constraints	
	Available Water Capacity	0.23	75		
	Surface Hardness	362	1		
	Subsurface Hardness	383	2		
	Aggregate Stability	83.00	98		
	Organic Matter	5.00	75		
	ACE Soil Protein Index	9.40	63		
	Root Pathogen Pressure		88		
	Soil Respiration	1.49	67		
	Active Carbon	905	75		
	pH	6.00	07		
	Phosphorus	32,00	<u>00</u>		
	Potassium	125.00	100		
	Minor Elements Mg 490.007 Ke: 0.607 Me; 13.507 Zn; 2.50		100		
	Overall Quality Score:	65		Medium	ı

Measured Soil Health Indicators

The Cornell Soll Health Test measures several indicators of soil physical, biological and chemical health. These are listed on the left side of the report summary, on the first page. The "value" column shows each result as a value, measured in the laboratory or in the field, in units of measure as described in the indicator summaries below. The "rating" column

### Acknowledgements

**The Core Development Team at Cornell University**: George Abawi, Beth Gugino (now Penn State), John Idowu (now NMSU), Bianca Moebius-Clune (headed to NRCS), Dan Moebius-Clune, Bob Schindelbeck, Janice Thies, Harold van Es, David Wolfe, Many Growers and Extension Educators

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