Adaptive Management and Soil Health Testing

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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

Cornell Soil Health Assessment

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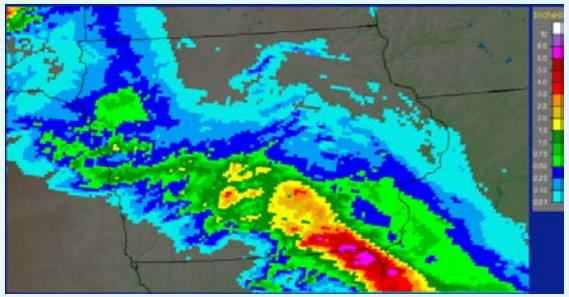
Sample ID: L_77
Field/Treatment: CF intensely cultivated
Tillage: 7-9 inches
Crops Crown: WHT, WHT
Date Sampled: 5/7/2014
Given Soil Type: Collamer
Given Soil Texture: No Soil Texture Given
Coordinates: Coordinates Not Provided

Measured Soil Textural Class: Silt Loam **Sand: 2%** **Silt: 83%** **Clay: 15%**

Test Report

	Indicator	Value	Rating	Constraint
Physical	Available Water Capacity	0.14	36	
	Surface Hardness	260	15	Rooting, Water Transmission
	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
Biological	Organic Matter	2.5	22	Nutrient and Energy Storage, Ion Exchange, C Sequestration, Water Retention
	ACE Soil Protein Index	5.1	24	Organic Matter Quality, Organic N Storage, N Mineralization
	Root Pathogen Pressure	3.2	73	
	Respiration	0.53	0	Soil Microbial Abundance and Activity
	Active Carbon	288	4	Energy Source for Soil Biota
Chemical	pH	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	
	Overall Quality Score		48	Low

Linking Soil Health Info with Adapt-N, a cloud-based N recommendation tool



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

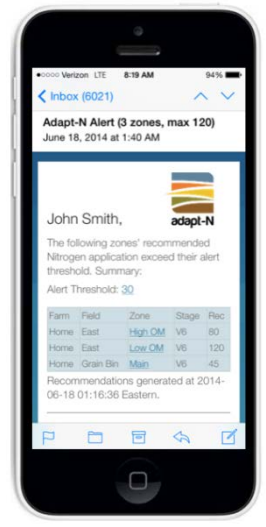
Soil Health Drives N Availability

Dynamically interacting with weather:

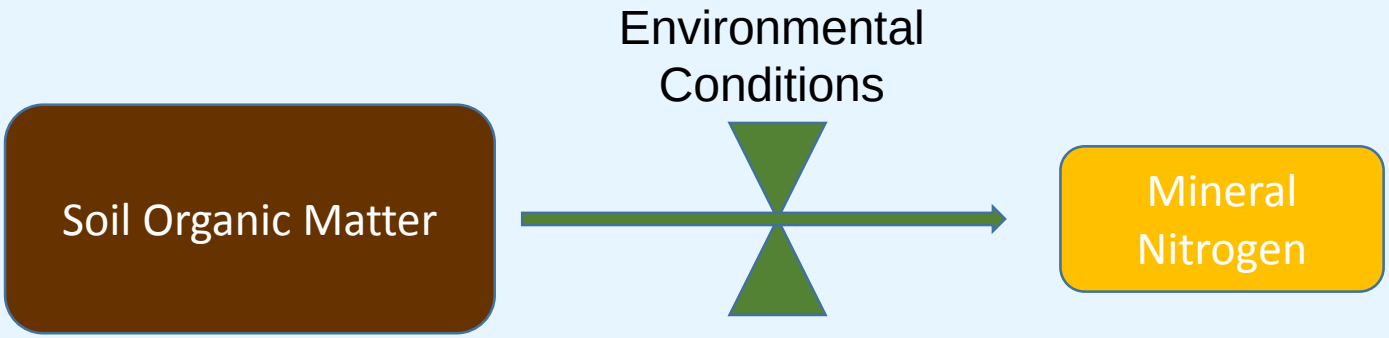
- Poor soil health = less N available, less N buffering, higher risks
- Biologically: Microbial Activity, OM content and quality determine potential contribution
- Physically: Compaction, infiltration, available water capacity, aggregation, etc., determine loss, access, crop stress

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



Adapt-N currently

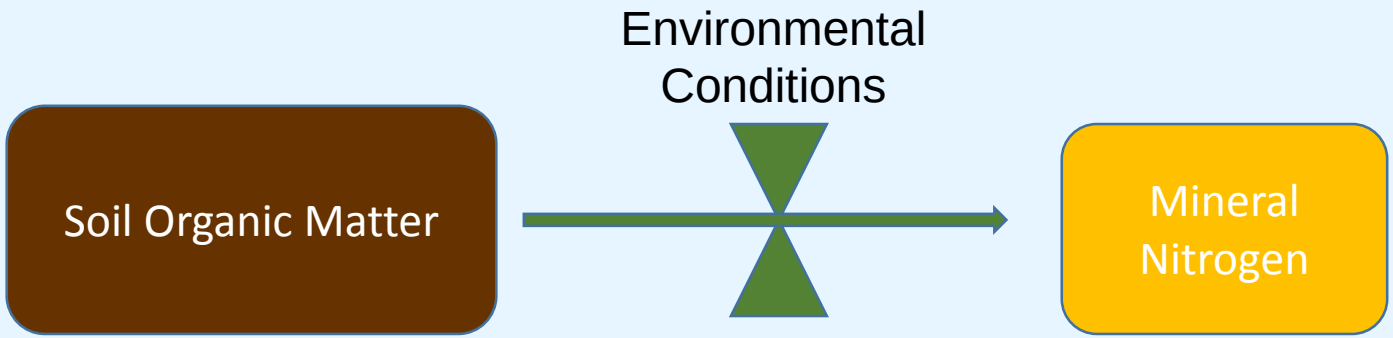


Currently SOM pools are derived from sod, manure and residue

Based on “Average” Organic Matter Quality

SOM quality is constant and microbial decomposition activity responds uniformly

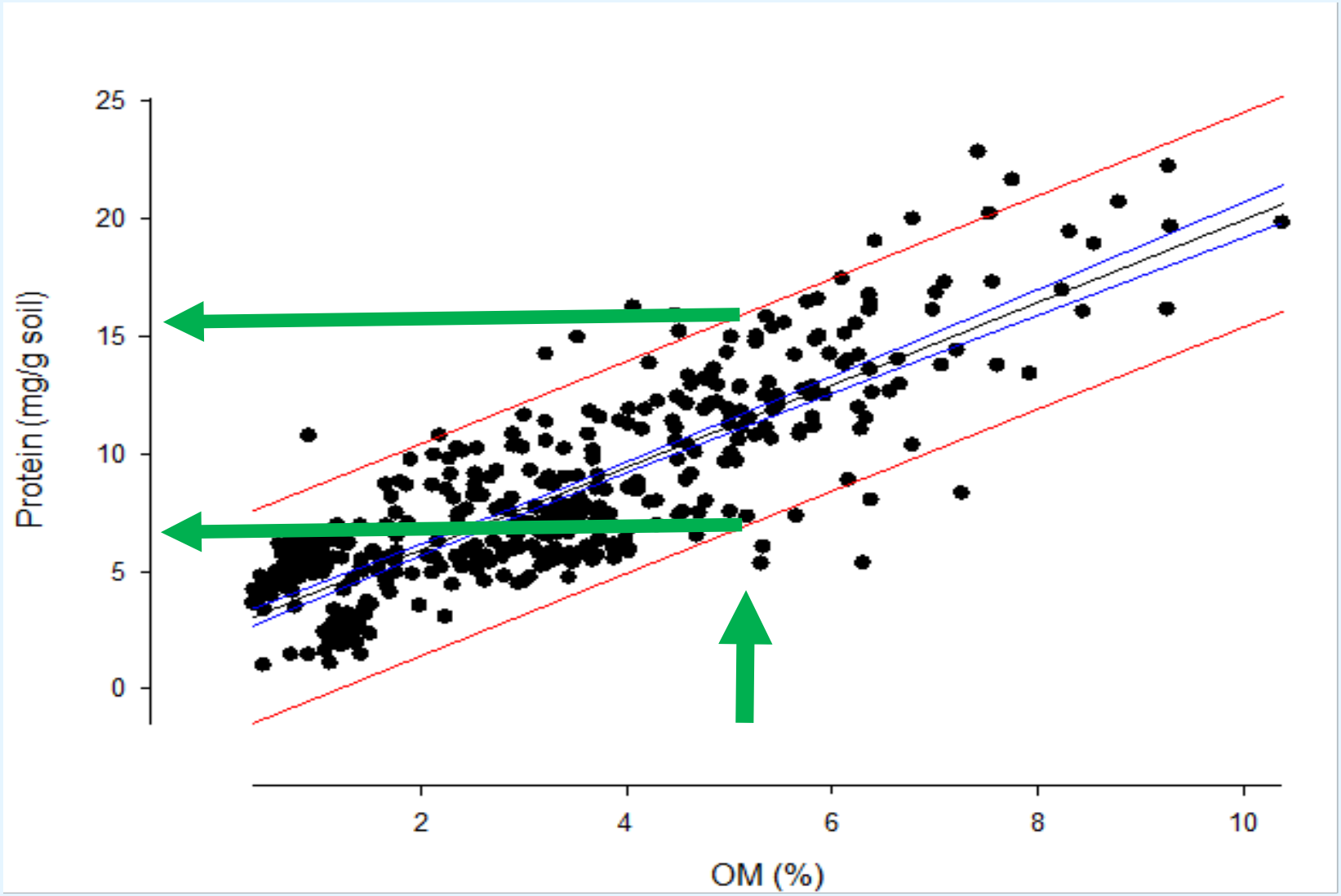
Adapt-N will integrate
organic matter quality and microbial activity



"Informed" OM Quality

- Microbial Respiration Rate
- Soil Protein Content
- Active Carbon
- Compaction
- Ag Stability

Organic matter quantity *and quality*



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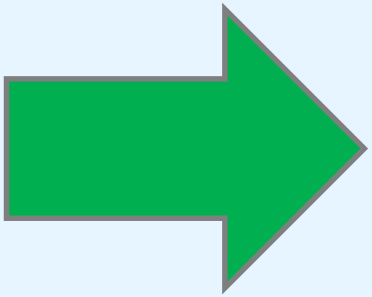
Cornell Soil Health Assessment

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



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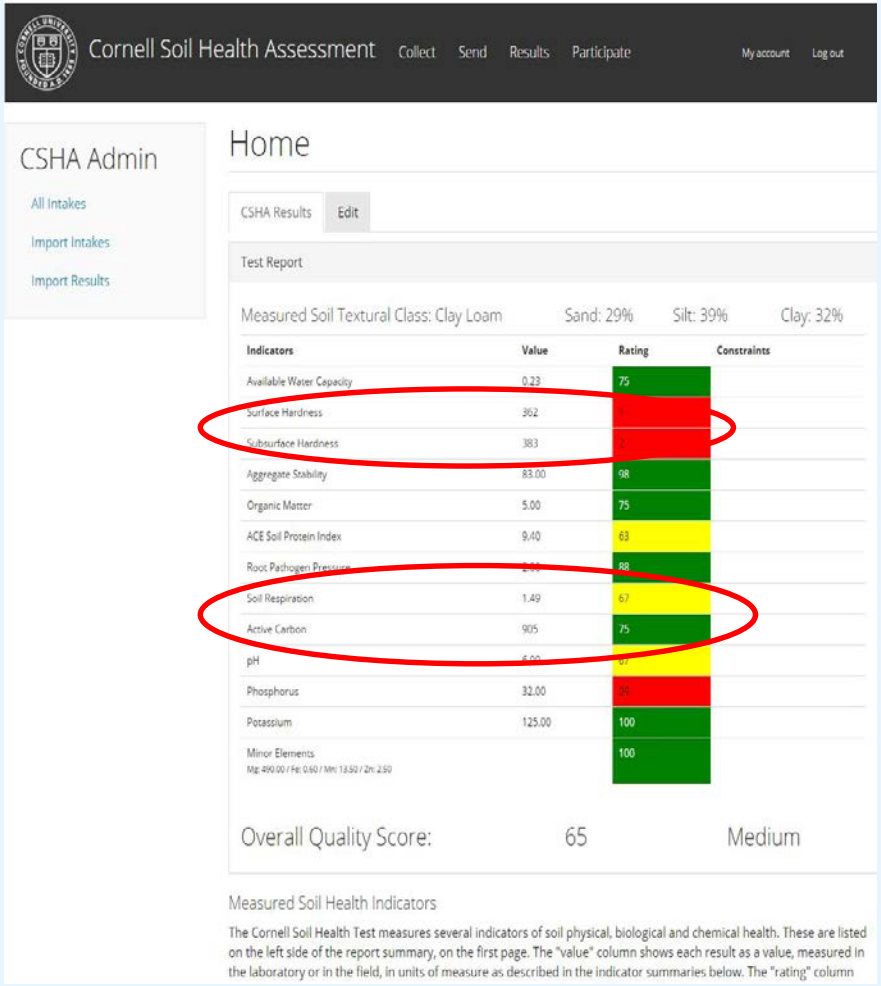
Cornell Assessment of SH App

Very close to completing online Soil Health application

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



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Funders:

Northern New York Agricultural Development Program

Northeast Region SARE
Sustainable Agriculture Research and Education Program

NRCS Natural Resources Conservation Service

IPM Integrated Pest Management

NY farm viability INSTITUTE

USDA United States Department of Agriculture

National Institute of Food and Agriculture

Cornell University Cooperative Extension