

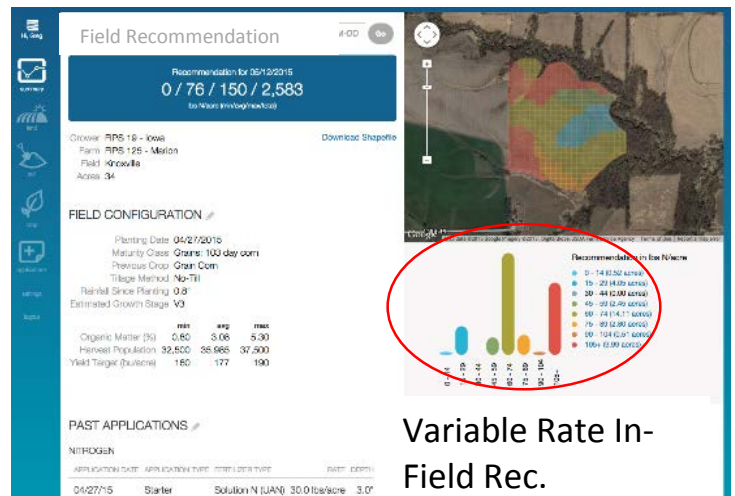
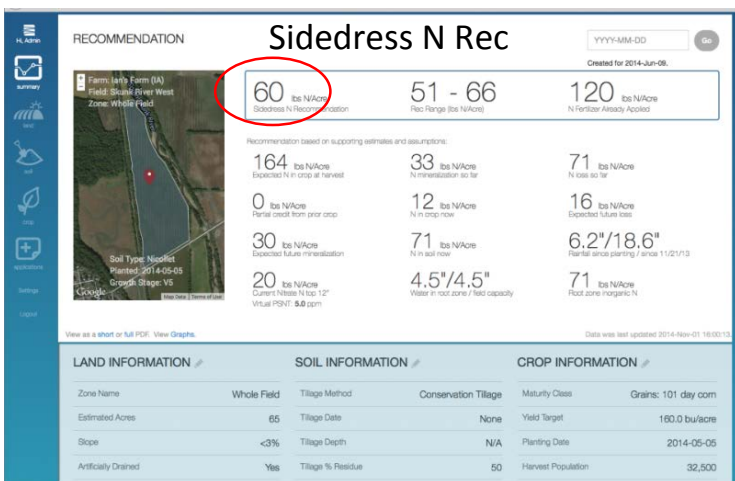


# 2015 SOIL HEALTH WORKSHOP

## Soil Health and Adaptive Nitrogen Management

### Adapt-N (Adapt-N.com)

Adapt-N is a web-based tool which uses near real-time high resolution climate data, and field-specific management, soils, and crop information supplied by users, as inputs for a dynamic simulation model. The model simulates daily soil C and N transformations, soil water storage and transport, and uptake of water and N by the maize crop. The Adapt-N interface provides in-season N sidedress recommendations, as well as graphs visualizing seasonal dynamics of soil N, crop growth, temperature, and precipitation for each management unit.



Variable Rate In-Field Rec.

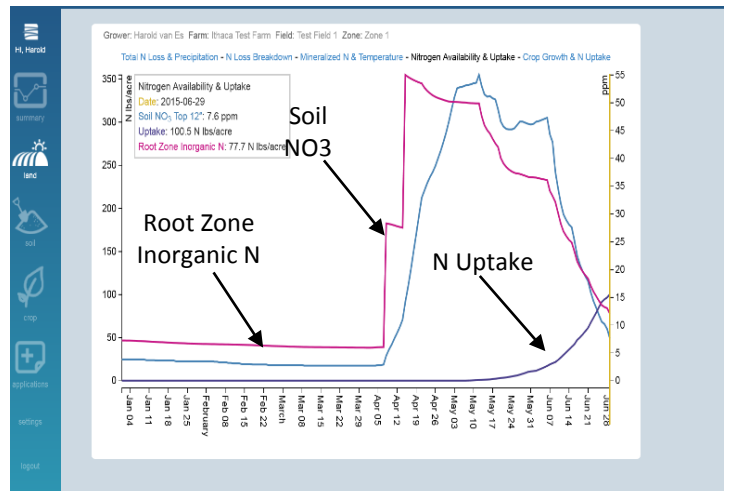
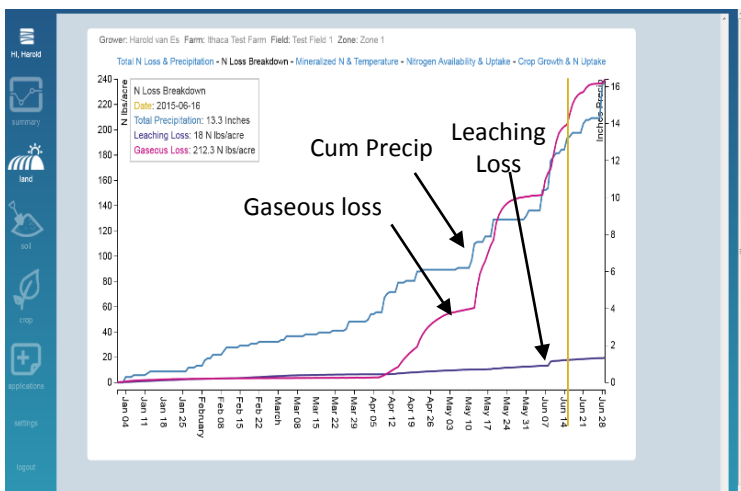


Figure 1. Selected Adapt-N output examples (field-zone based and site specific). Daily N recommendation updates can also be received by text message or email (not shown). New to 2015 in the commercial version, the model can generate within-field site-specific N recommendations.



# 2015 SOIL HEALTH WORKSHOP

## Results

Table 1. Comparison of Adapt-N recommended and Grower-selected N rates from on-farm strip trials in New York. The majority of the cases where Adapt-N caused lower profits were associated with either user-inputted underestimated expected yields or mid-season droughts following higher Adapt-N recommendations.

### Adapt-N vs. Grower rates: New York Trials (2011-2014)

State-Year	NY2011	NY2012	NY2013	NY2014	Mean
N input diff (lbs/ac)	-62.7	-66	19.1	-32.6	-35.55
Yield diff (bu/ac)	-0.05	-1.85	20.60	-3.20	3.88
Profit diff (\$/ac)	\$35	\$24	\$97	\$6	\$40.50
Trials with greater profit	91%	76%	82%	55%	76%
Leaching change (lbs/ac)	-23.8	-22.7	15.7	-4.5	-8.83
Gaseous loss change (lbs/ac)	-14.3	-22.6	9.5	-4	-7.85

### Profit difference in focus: New York Trials (2011-2014)



Figure 2. Profit difference between Adapt-N and Grower conventional practice in \$/ac.





# 2015 SOIL HEALTH WORKSHOP

## Results

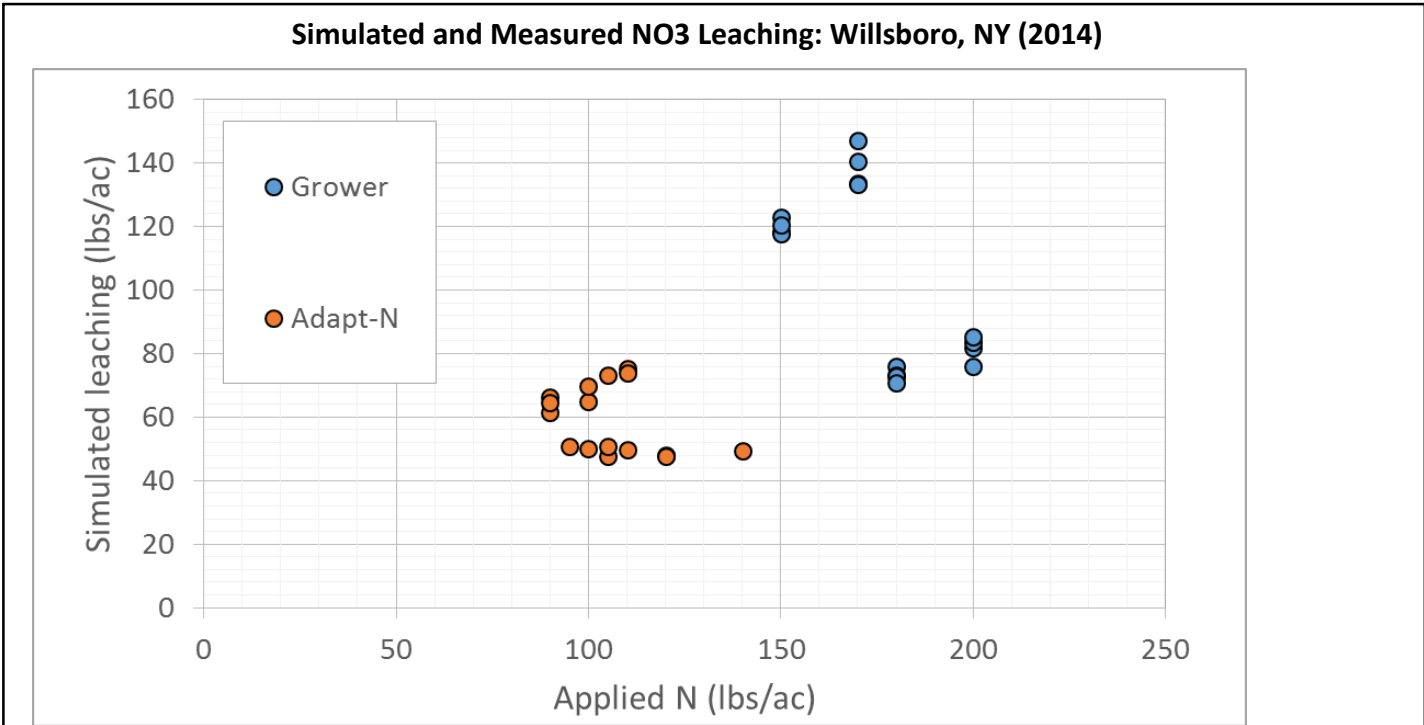


Figure 3. Simulated N leaching losses from the Adapt-N model using zones from the Willsboro, NY trials.

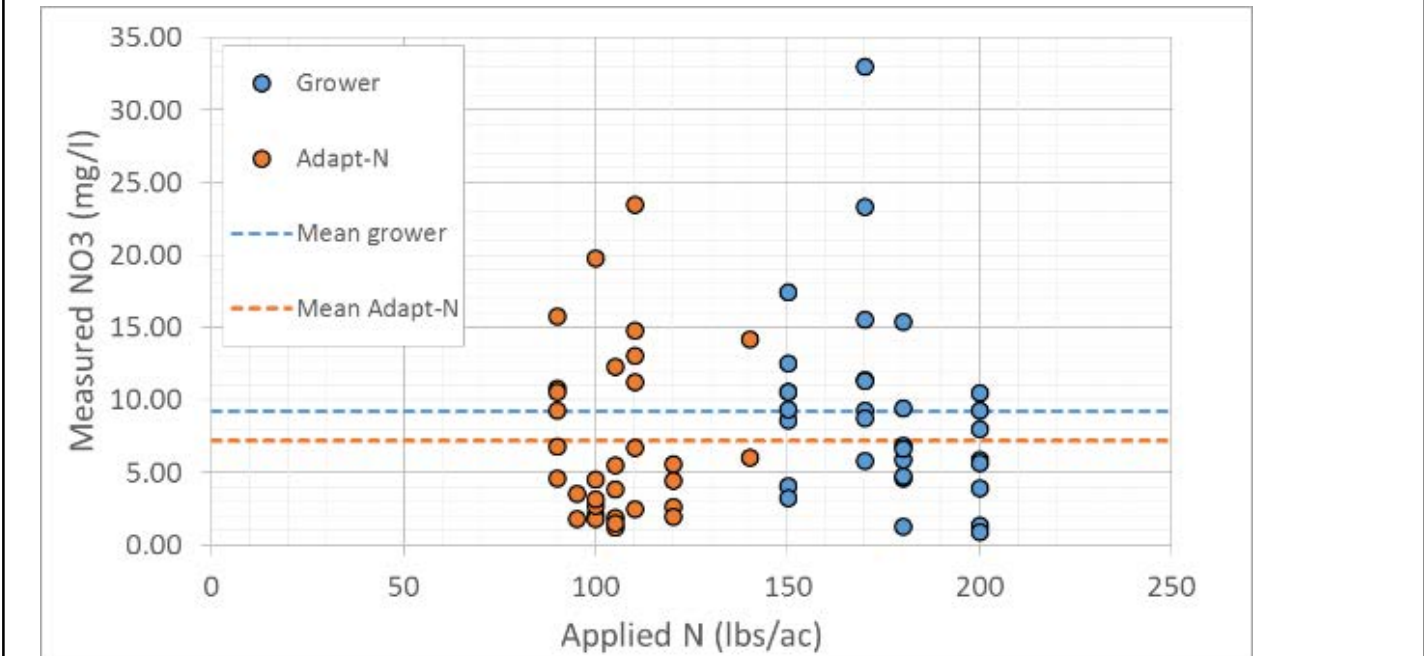


Figure 4. Measured leaching losses from two early spring events using lysimeter plots in Willsboro, NY.



# 2015 SOIL HEALTH WORKSHOP

## Soil Health ([soilhealth.cals.cornell.edu](http://soilhealth.cals.cornell.edu))

The Cornell Comprehensive Assessment of Soil Health Framework combines chemical, physical, and biological indicators, and provides a deeper view than standard soil testing, distinguishes between soils, identifies constraints and provides a framework to provide effective management planning.

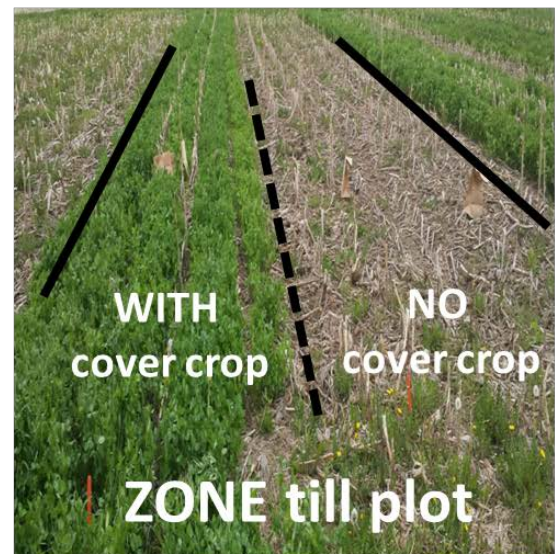
### Musgrave Farm- Field E -Lima silt loam soil Long-term tillage trial – corn grain

<i>2011-2014 Field E grain yields (bu/A)</i>					
	2011	2012	2013	2014	AVG.
<b>PLOW till</b>	126.5	147.7	173.4	178.5	156.5
<b>ZONE till</b>	136.4	167.2	197.1	174.5	168.8

### Cover crop interseeding exp.

- Split-plot design at sidedress
- Cocktail mix- vetch, clover, ryegrass

2014 Field E grain yields (bu/A)		
Year 2 of cover crop interseeding		
	NO	WITH
	<u>cover crop</u>	<u>cover crop</u>
PLOW till	178.5	179.6
ZONE till	174.5	181.8





Musgrave Farm- Field E 2015  
Lima silt loam soil  
Long-term tillage, COG/COG/COG

**Moldboard PLOW**

Cornell Soil Health Assessment				
Measured Soil Textural Class: Loam		Sand: 42% Silt: 39% Clay: 19%		
Test Results				
Indicator	Value	Rating	Constraint	
Available Water Capacity	0.19	73		
Surface Hardness	184	45		
Subsurface Hardness	350	27	Subsurface Pn/Deep Compaction, Deep Rooting, Water and Nutrient Access	
Aggregate Stability	10.7	11	Aeration, Infiltration, Rooting, Crusting, Sealing, Erosion, Runoff	
Organic Matter	2.6	24	Nutrient and Energy Storage, Ion Exchange, C Sequestration, Water Retention	
ACE Soil Protein Index	4.1	22	Organic Matter Quality, Organic N Storage, N Mineralization	
Respiration	0.45	30	Soil Microbial Abundance and Activity	
Active Carbon	421	22	Energy Source for Soil Biota	
pH	7.3	90		
Phosphorus	4.6	100		
Potassium	69.4	95		
Minor Elements Mg: 30 Fe: 0.6 Mn: 9.1 Zn: 0.3		100		
Overall Quality Score				53
				Low

**Zone till WITH cover crop interseeded**

Cornell Soil Health Assessment				
Measured Soil Textural Class: Loam		Sand: 38% Silt: 44% Clay: 18%		
Test Results				
Indicator	Value	Rating	Constraint	
Available Water Capacity	0.22	89		
Surface Hardness	248	19	Rooting, Water Transmission	
Subsurface Hardness	360	23	Subsurface Pn/Deep Compaction, Deep Rooting, Water and Nutrient Access	
Aggregate Stability	39.7	48		
Organic Matter	3.1	37		
ACE Soil Protein Index	4.6	27	Organic Matter Quality, Organic N Storage, N Mineralization	
Respiration	0.62	53		
Active Carbon	619	63		
pH	7.0	100		
Phosphorus	9.6	100		
Potassium	91.2	100		
Minor Elements Mg: 37 Fe: 0.5 Mn: 9.2 Zn: 0.5		100		
Overall Quality Score				63
				Medium



**What's Next.....**

Soil Health:

- Meet national needs and promote standards
- Marginal field area productivity and profitability, based on yield monitor data
- Whole-profile soil health

Adapt-N:

- Incorporate cover crops
- Incorporate soil health information
- Incorporate Veris Optic- Mapper information