



Growing your Own Nutrients?

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Extension

UNIVERSITY OF WISCONSIN-MADISON

Why Does Growing Your Own Nutrient Matter?

News

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HEALTH

Nelsonville's water woes: Finding nitrate pollution in wells

Residents of a central Wisconsin village are finding dangerous levels of a common agricultural pollutant in their drinking water and are left trying to filter their supplies or find new sources.

By NATHAN DENZIN | Here & Now

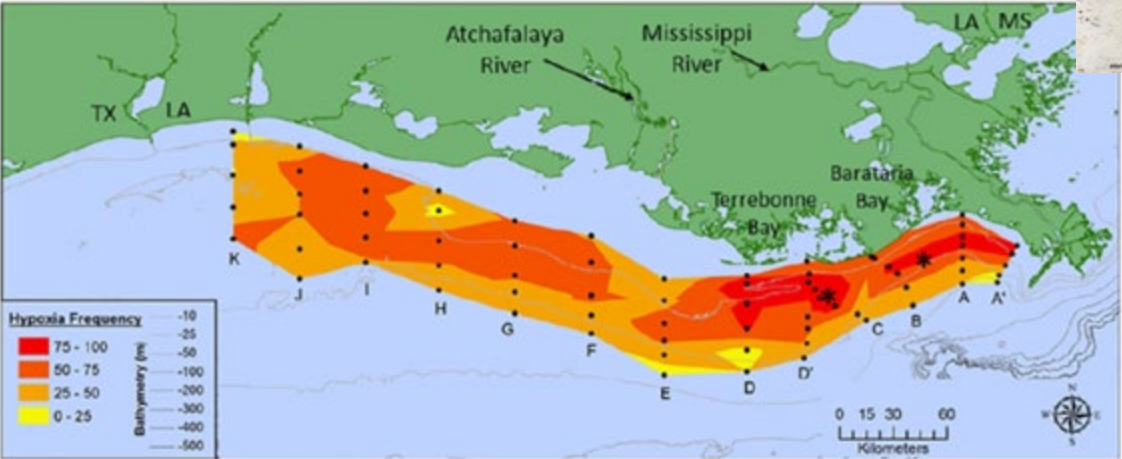
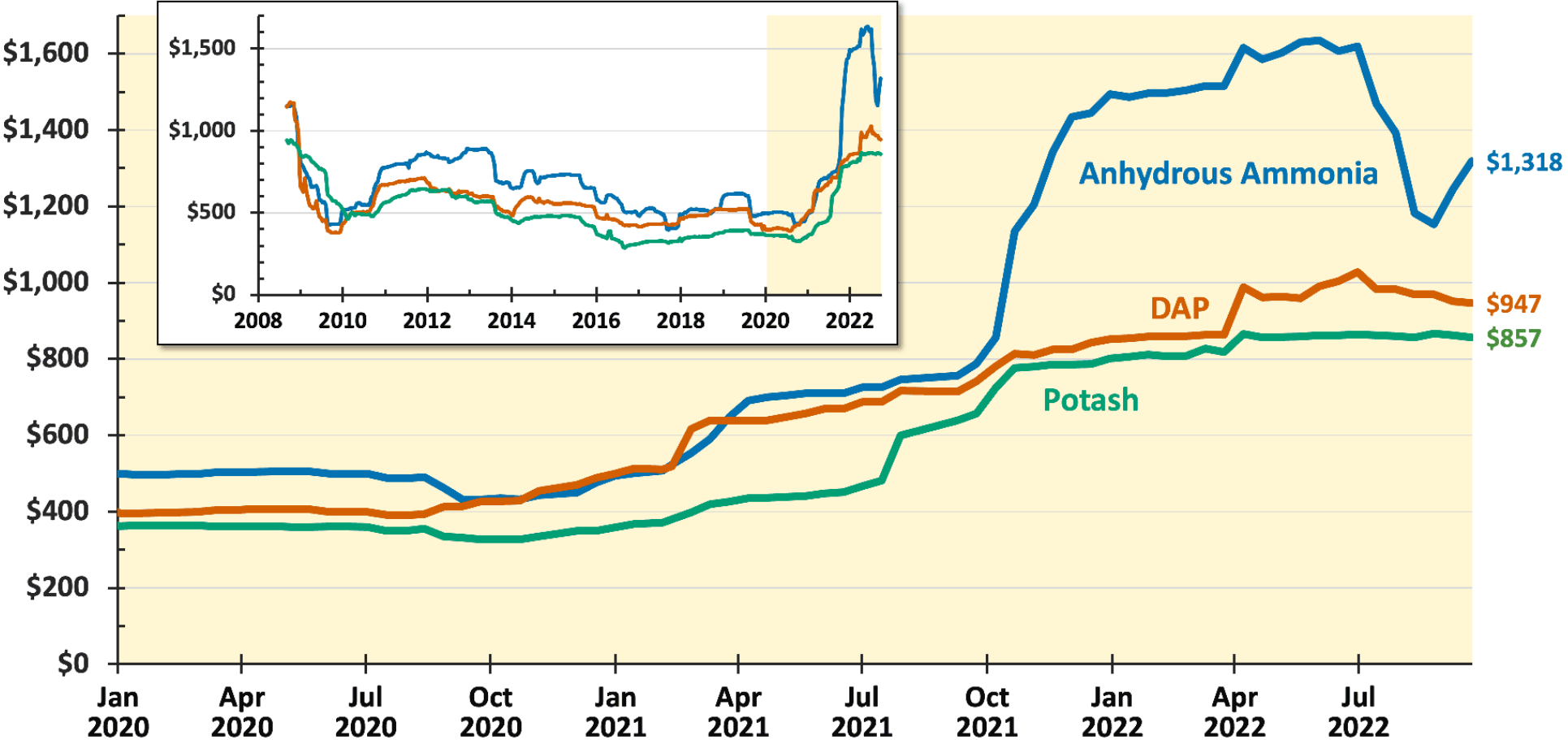


FIG. 1. The frequency of bottom-water hypoxia from shelf-wide hypoxia mapping (1985–2014) (updated from Rabalais et al. (2007b); frequency is determined from stations for which there are data for at least half of all cruises. Asterisks (*) indicate locations of near-bottom oxygen meters; transects C and F identified. Data source: N. N. Rabalais and R. E. Turner.



Why Does Growing Your Own Nutrient Matter?

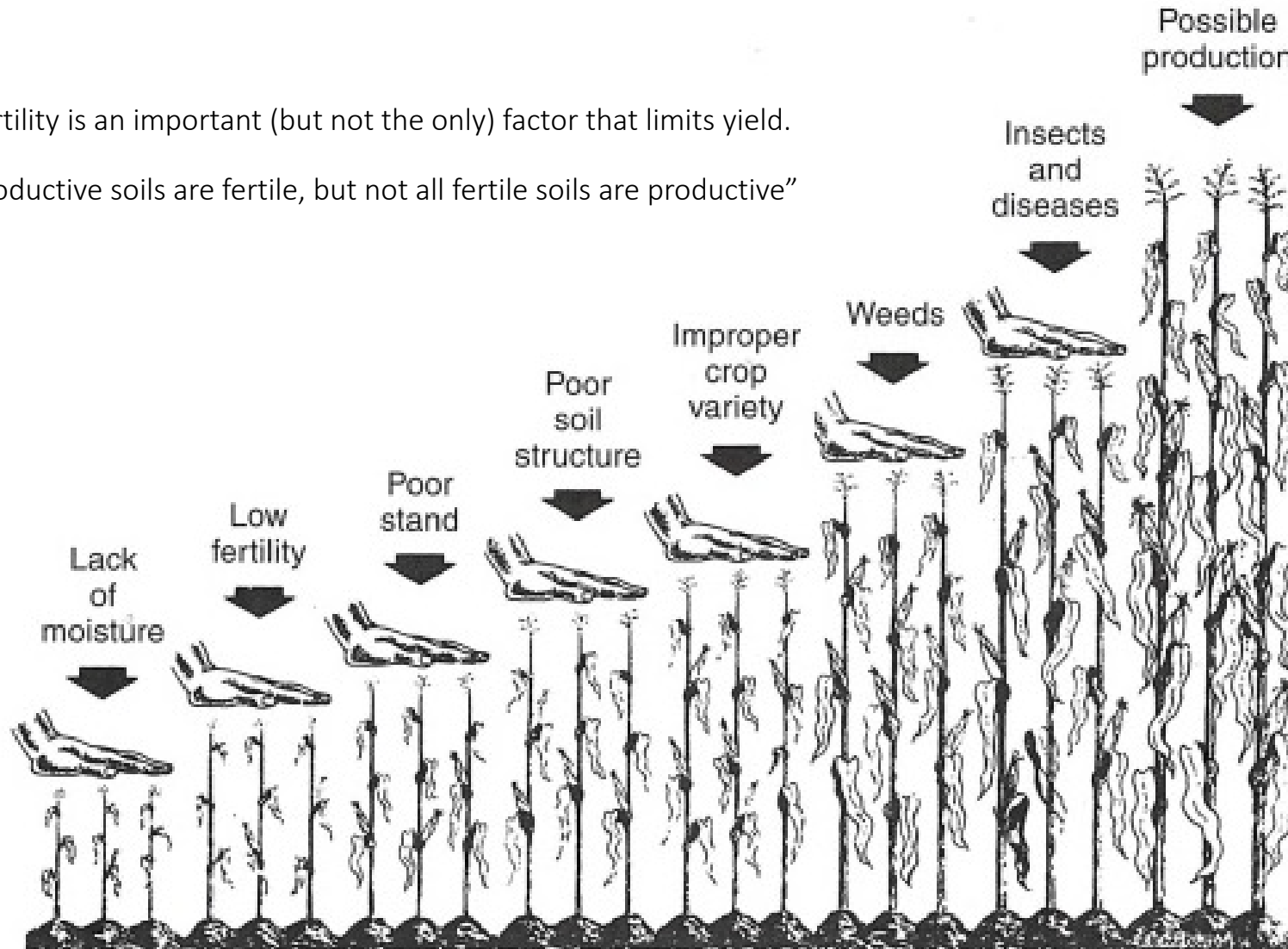
Figure 1. Fertilizer Prices per Ton in Illinois From 2020 to 2022



Remember Soil Fertility is a Piece of the Puzzle

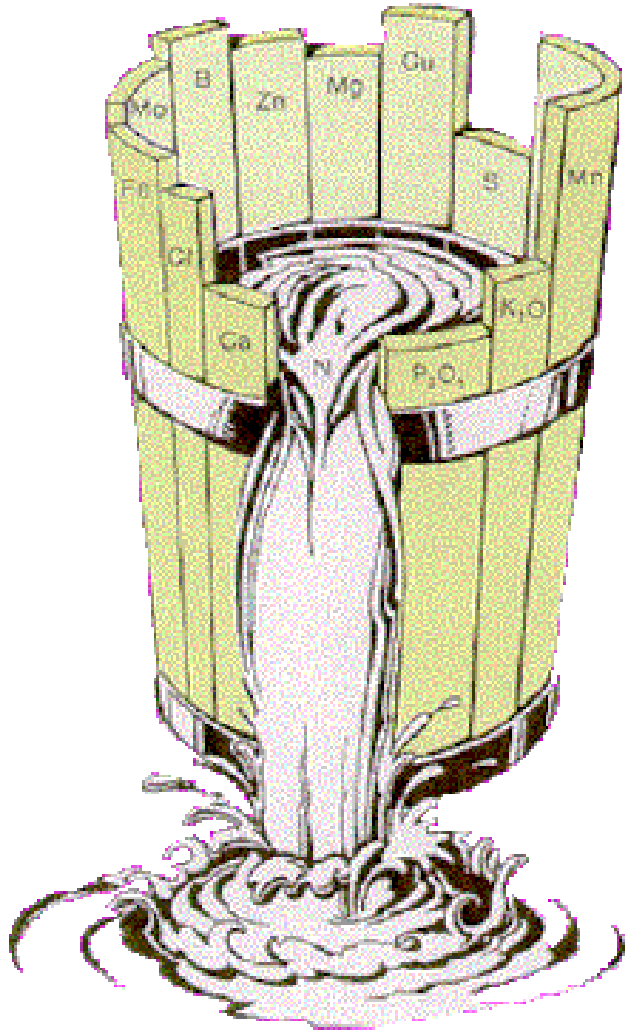
Soil fertility is an important (but not the only) factor that limits yield.

“All productive soils are fertile, but not all fertile soils are productive”



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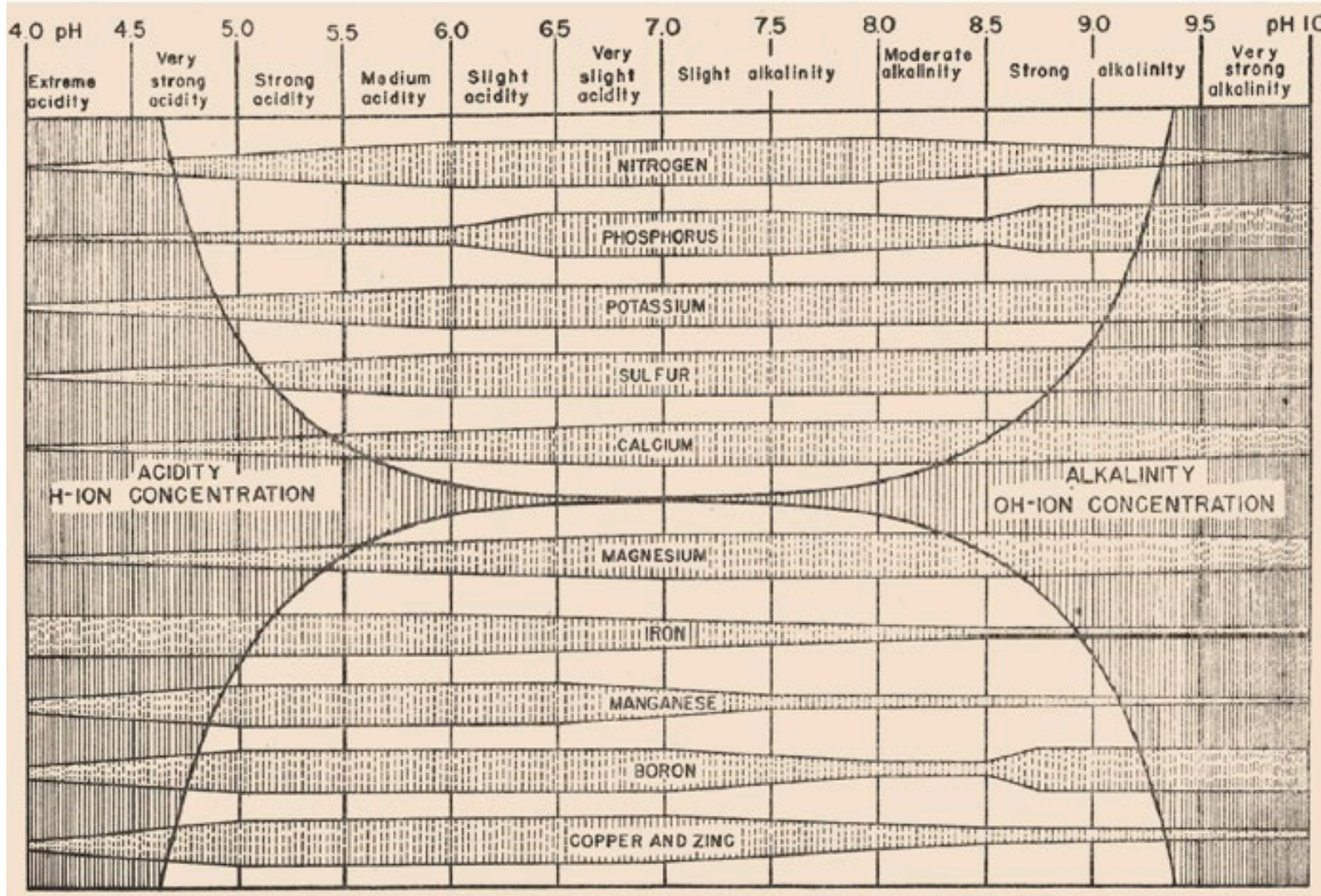
Remember Soil Fertility is a Piece of the Puzzle



- Yield potential is like water in the barrel, nutrients (or other limiting factors) are the staves.
- The lowest stave limits yield, regardless of the other staves.



Prioritize Soil pH



- Alfalfa: 6.8
- Soybean: 6.3
- Corn, Pastures, Wheat: 6.0
- Prioritize highest target pH crop in rotation

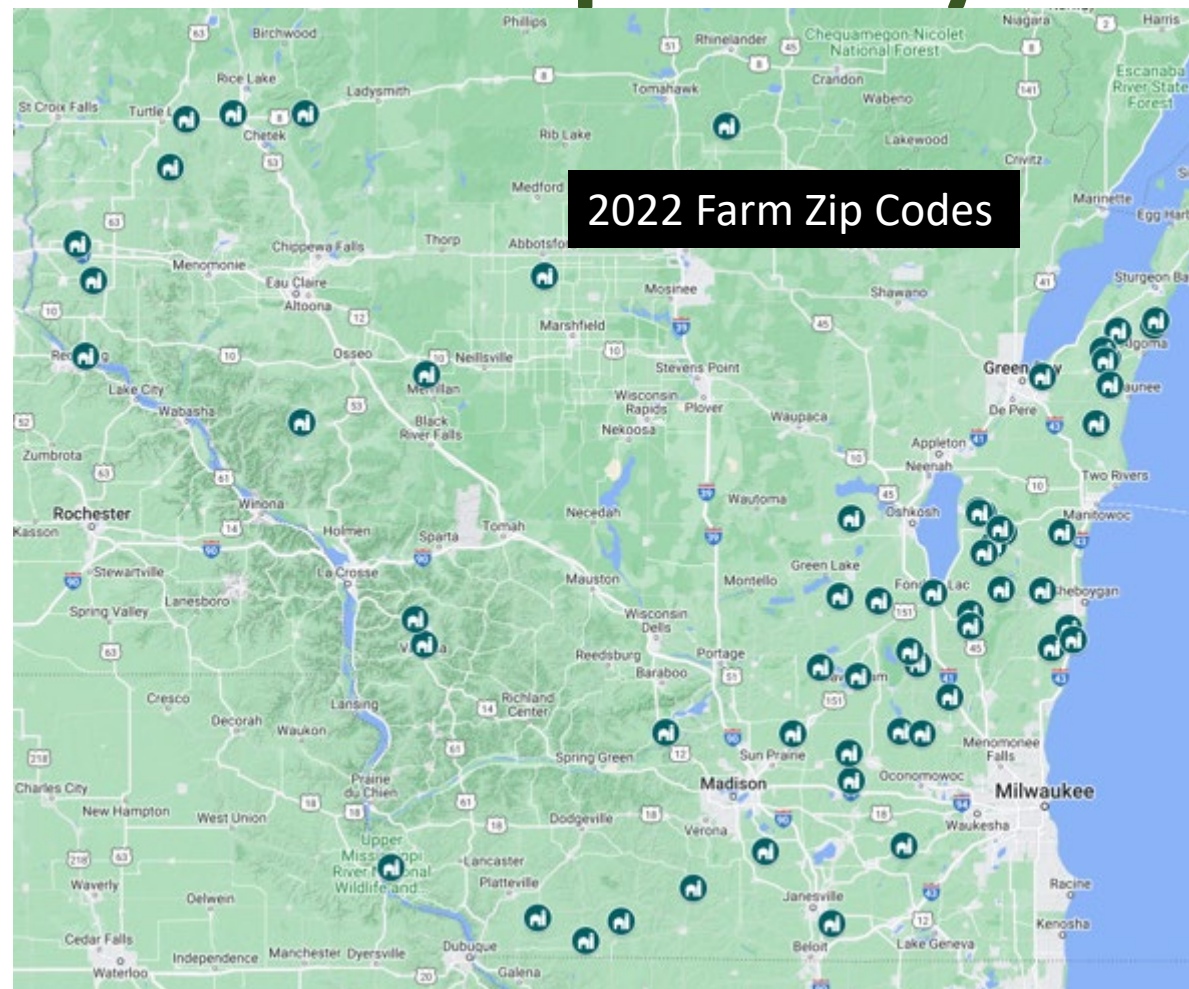


What about Cover Crop Nutrient Credits?

- Current legume/green manure credits are for entire growing season!
- Help reduce erosion (P and K losses)
- Frost seed red clover into winter grain for nitrogen credit!



2020-2022 Wisconsin Cover Crop Survey



Almost 100 Participants over 3 years!



Crop Survey Biomass

- 3- ½ meter samples collected and dried for two weeks for biomass analysis
- New in 2022: 1- 2x2 foot sample collected for cover crop nutrient and forage analysis.



Cover Crop Survey Nutrient Analysis



- 1- 2x2 foot sample.
- **In-field wet weight necessary.**
- Subsample if large amount of biomass is collected.
- Ship samples immediately or dry.
- \$42/sample



Cover Crop Survey Nutrient Analysis Data

Cover Crop Analysis Report

Submitted By: **BN05905**
UNIV OF MADISON - NUT AND PEST CONTROL
445 HENRY MALL RM 318
MADISON, WI 53706

Submitted For:
Dan Smith



Laboratory Sample #
CN04598 - CN04628

Date Sampled:
1/13/2023 12:00:00AM

Date Received:
01/13/2023

Date Reported:
01/19/2023

Information Sheet #

Sample ID: **1**
 Crop: **RYE WHOLE**

Field ID: **22BJ53061_30**
 Growth Stage:

Results of Laboratory Analysis, dry sample

Nitrogen	N, %	1.10
Phosphorus	P, %	0.17
Potassium	K, %	0.63
Calcium	Ca, %	0.68
Magnesium	Mg, %	0.35
Sodium	Na, %	0.02
Sulfur	S, %	0.09
Zinc	Zn, ppm	40.7
Manganese	Mn, ppm	164.2
Copper	Cu, ppm	16.7
Iron	Fe, ppm	4451.6
Boron	B, ppm	5.5
Aluminum	Al, ppm	4388.3
Carbon	C, %	34.99
Dry Matter	DM, %	70.23
Fresh Weight	FW, g	11.3
Area Sampled	Sq. Feet	4

Nutrient Content of Forage, lbs/acre @ 100% Dry Matter

Nitrogen	N	2.2
Phosphorus	P2O5	0.8
Potassium	K2O	1.5
Calcium	Ca	1.4
Magnesium	Mg	0.7
Sodium	Na	0.0
Sulfur	S	0.2
Zinc	Zn	0.01
Manganese	Mn	0.03
Copper	Cu	
Iron	Fe	0.89
Boron	B	
Aluminum	Al	0.88
Carbon	C	70.0
C:N Ratio	C:N	31.8
Total Yield		Tons/acre
Fresh Biomass	As cut	0.14
Dry Biomass	100% dry	0.10

Release of nitrogen and phosphorus are controlled by the C:N ratio of the plant matter as it decomposes. See comments below.

- Eastern, WI
- Winter rye
- Corn silage
- Planted 9/30/22

Cover crop residue with C:N ratios:
 Above 20:1 will immobilize nitrogen
 Below 20:1 will mineralize (release)



Cover Crop Survey Nutrient Analysis Data

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Laboratory Sample #
CN04598 - CN04628

Date Sampled: **1/13/2023 12:00:00AM** Date Received: **01/13/2023** Date Reported: **01/19/2023**

Information Sheet #

Sample ID: **1** Field ID: **22JS53014_33**
 Crop: **RYE WHOLE** Growth Stage:

Results of Laboratory Analysis, dry sample

Nitrogen	N, %	2.40
Phosphorus	P, %	0.35
Potassium	K, %	2.57
Calcium	Ca, %	0.87
Magnesium	Mg, %	0.31
Sodium	Na, %	0.05
Sulfur	S, %	0.25
Zinc	Zn, ppm	25.1
Manganese	Mn, ppm	64.8
Copper	Cu, ppm	9.7
Iron	Fe, ppm	745.9
Boron	B, ppm	11.0
Aluminum	Al, ppm	932.8
Carbon	C, %	45.91
Dry Matter	DM, %	89.78
Fresh Weight	FW, g	372.4
Area Sampled	Sq. Feet	4

Nutrient Content of Forage, lbs/acre @ 100% Dry Matter

Nitrogen	N	192.5
Phosphorus	P2O5	64.3
Potassium	K2O	247.3
Calcium	Ca	69.8
Magnesium	Mg	24.9
Sodium	Na	3.9
Sulfur	S	20.1
Zinc	Zn	0.20
Manganese	Mn	0.52
Copper	Cu	0.08
Iron	Fe	5.98
Boron	B	0.09
Aluminum	Al	7.48
Carbon	C	3681.7
C:N Ratio	C:N	19.1
Total Yield	Tons/acre	
Fresh Biomass	As cut	4.47
Dry Biomass	100% dry	4.01

Release of nitrogen and phosphorus are controlled by the C:N ratio of the plant matter as it decomposes. See comments below.

- Eastern WI
- Berseem and crimson clover radish
- Wheat
- Planted 8/15/22

Cover crop residue with C:N ratios:
 Above 20:1 will immobilize nitrogen
 Below 20:1 will mineralize (release)



Cover Crop Survey Site 25

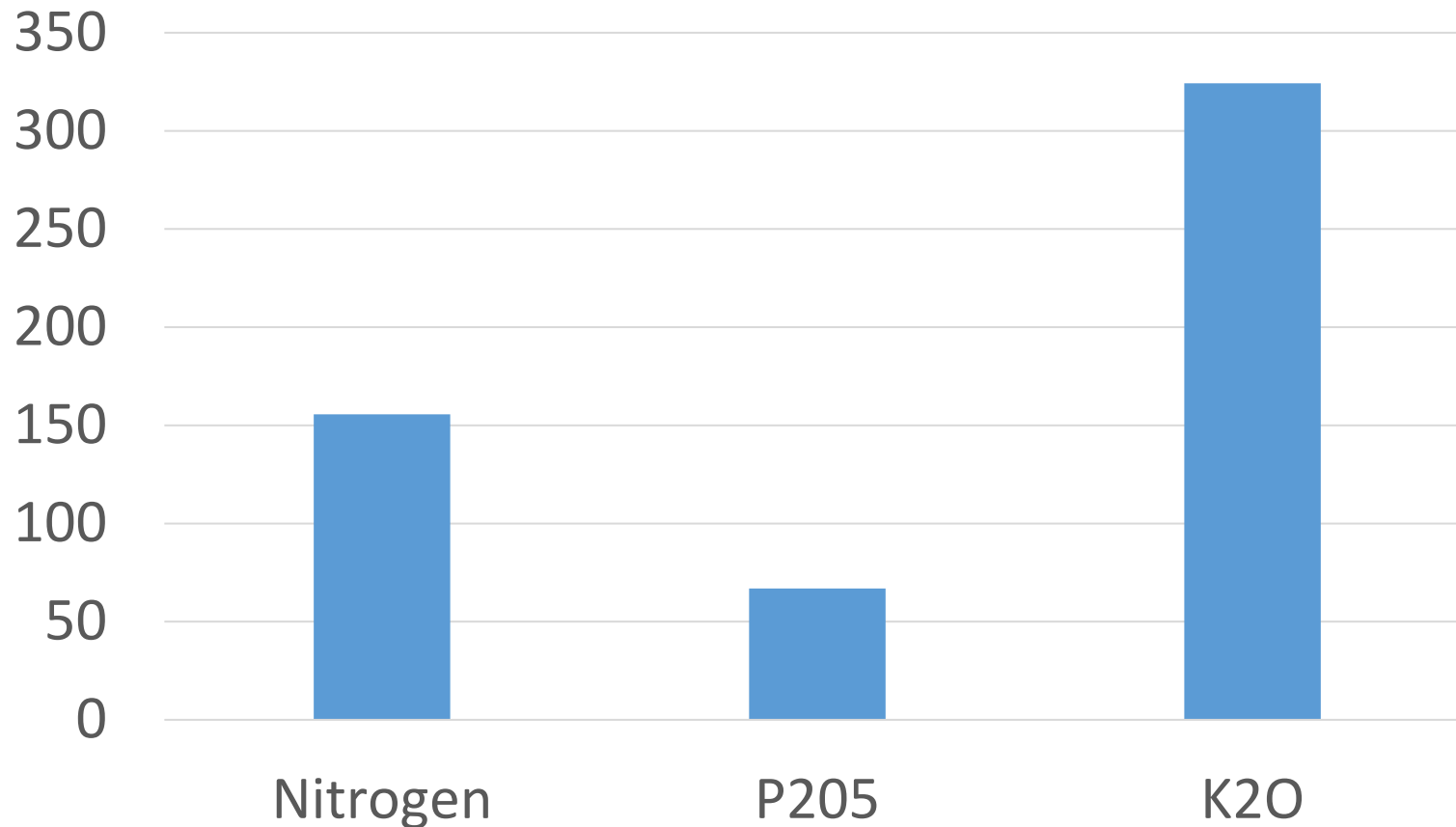


- Site visited by Ricardo Costa- TNC
- SE WI
- Planted following wheat on 7/25/2022
- No-till planted with 1 ton of manure applied
- Canola/rapeseed, winter rye, cowpea, hairy vetch, oats, radish, red clover, sunflower, sorghum-sudangrass
- 48+ inches of biomass



Cover Crop Survey Site 25

Nutrient Content of Cover Crop Sample
Site 25



- **3.95 tons of dry biomass**
- **24.2 carbon to nitrogen ratio**



Cover Crop Survey Site 53

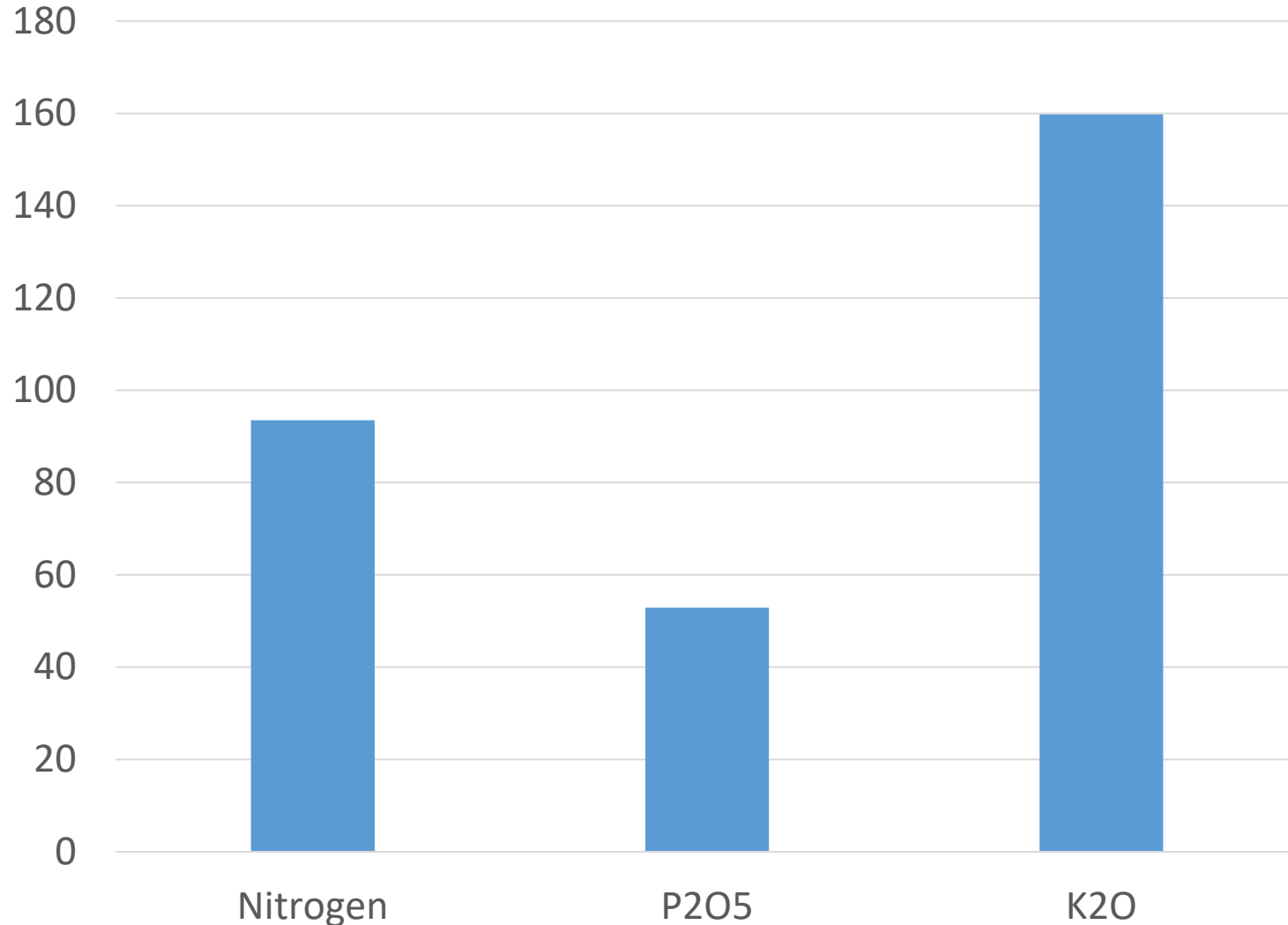


- Site visited by Josh Kamps- UW Extension
- SW WI
- Planted following wheat on 8/5/2022
- 12lb. Peas and oats mix, 6 lbs. sorghum-sudangrass, 3 lb.. hairy vetch on 15 inch and 3 lb.. radish, 3 lb. red clover, 3 lb.. alfalfa on 7.5 inch spacing
- 24+ inches of biomass



Cover Crop Survey Site 53

Nutrient Content of Cover Crop Sample Site 53



- **2.96 tons of dry biomass**
- **28.7 carbon to nitrogen ration**



How Will You Use This Data?



Nitrogen Availability + Consumption = Nitrogen for Next Crop?

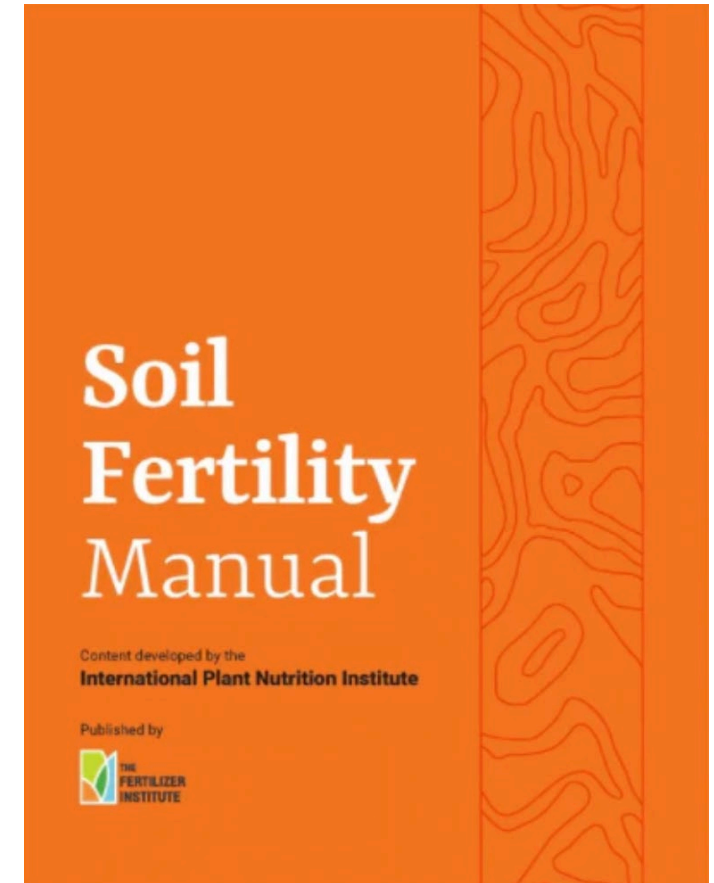
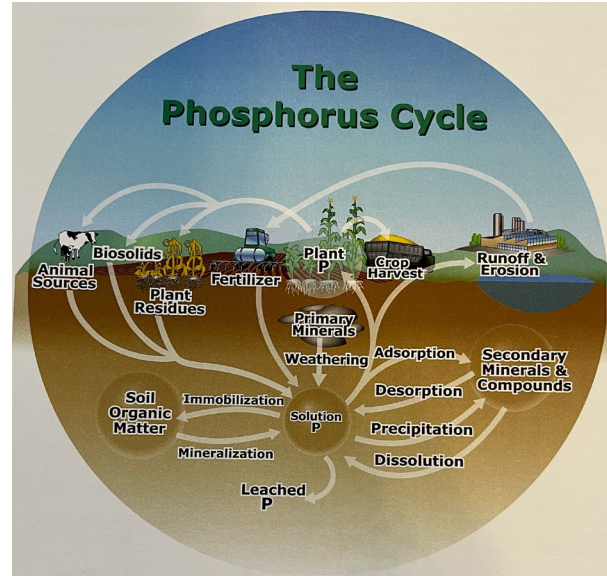


- Nitrogen Credits
- Green Manure Credits
- Fairly simple
- NH_4 and NO_3



Phosphorus Availability Factors

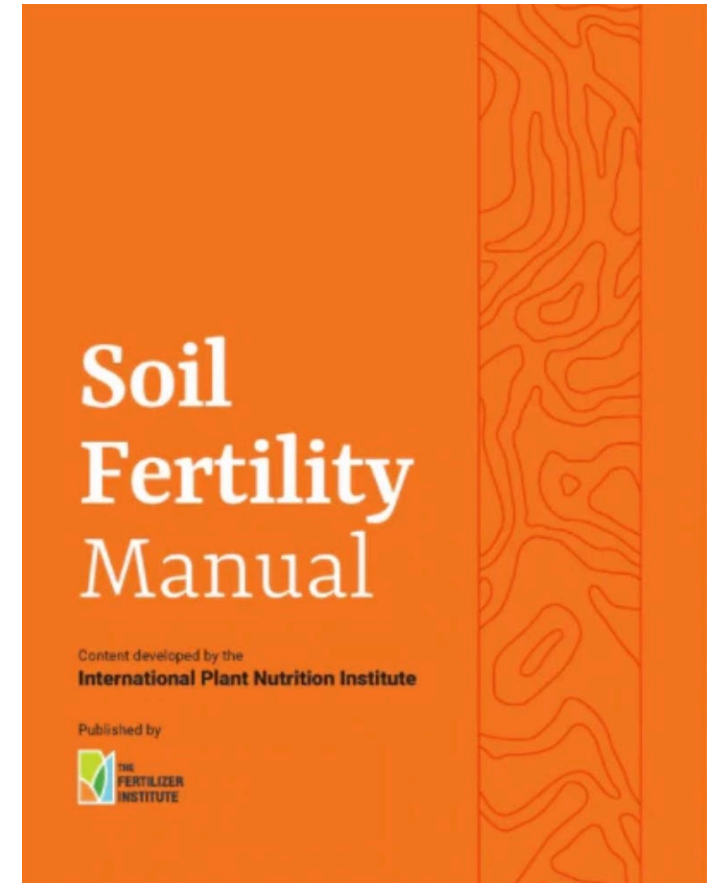
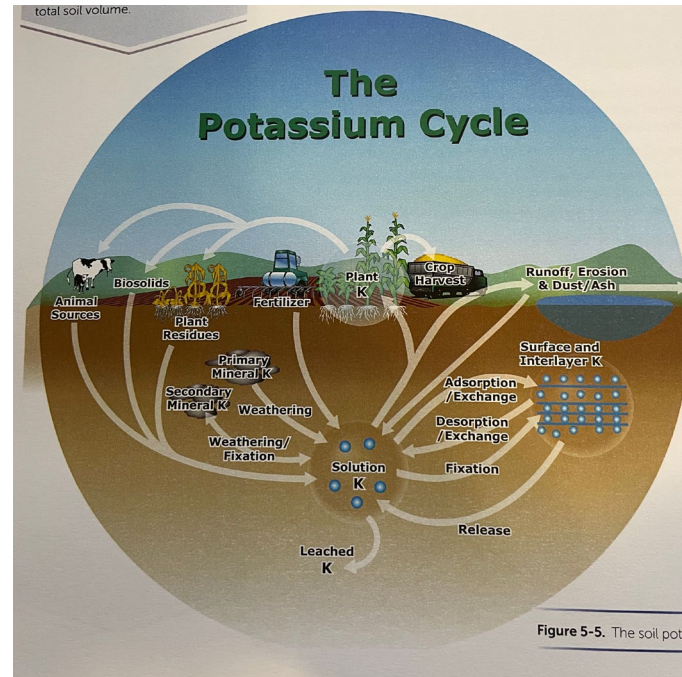
- Clay Content and type
- Aeration
- Compaction
- Moisture
- Soil P saturation
- Temperature
- Soil pH
- Other nutrients (law of minimum)
- Crop
- Time of application
- Soil biology- mycorrhiza fungo on plant roots increase uptake and some microbes convert organic P



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Potassium Availability Factors

- Soil aeration
- Soil test K
- Fixation- minerals trapping K
- CEC- Higher= more storage
- Soil temperature
- Soil moisture



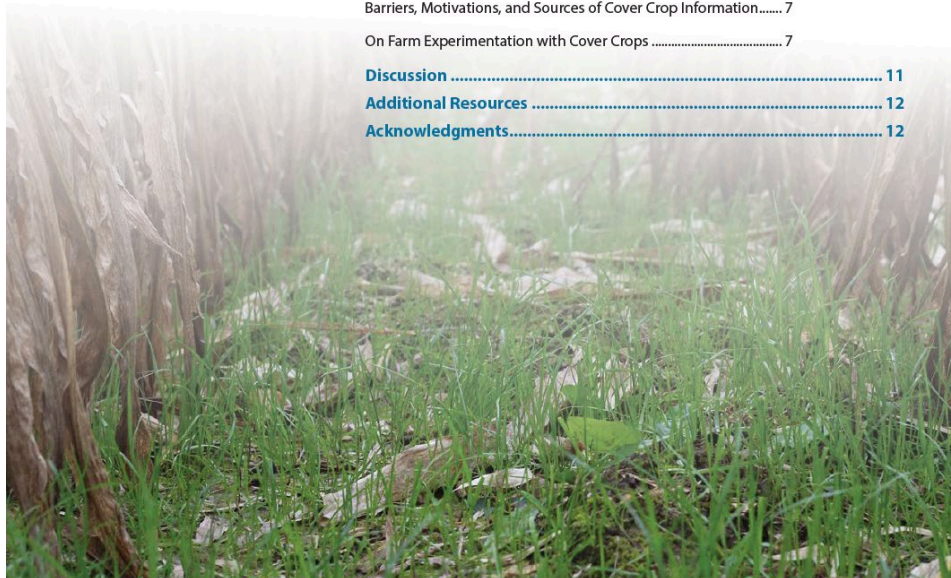
More info:



2022 SOIL HEALTH COLLABORATIVE REPORT

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Welcome to the new Nutrient Management Fast Facts magazine! The Nutrient and Pest Management (NPM) Program has produced many stand alone publications to help learn the basics of what is involved in writing and implementing a nutrient management plan. This new format combines many of these existing publications with new materials to provide a comprehensive reference guide!



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Thank you!

Questions?

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