



Introduction to Our Farm, Soil Health and Cover Crops

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AGENDA

- 5:00 – Michael Vittetoe: Intro to Our Farm, Soil Health, & Cover Crops.
- 5:30 – Chow Time
- 6:00 – Dr Alison Robertson: Seedling Disease & Cover Crops.
- 6:30 – Break Time
- 6:45 – Michael Vittetoe: PFI Trials Update, Cover Cropping Experiences
- 7:30 – Live Look: Michael's Backyard Test Field



Google

OUR FARM:

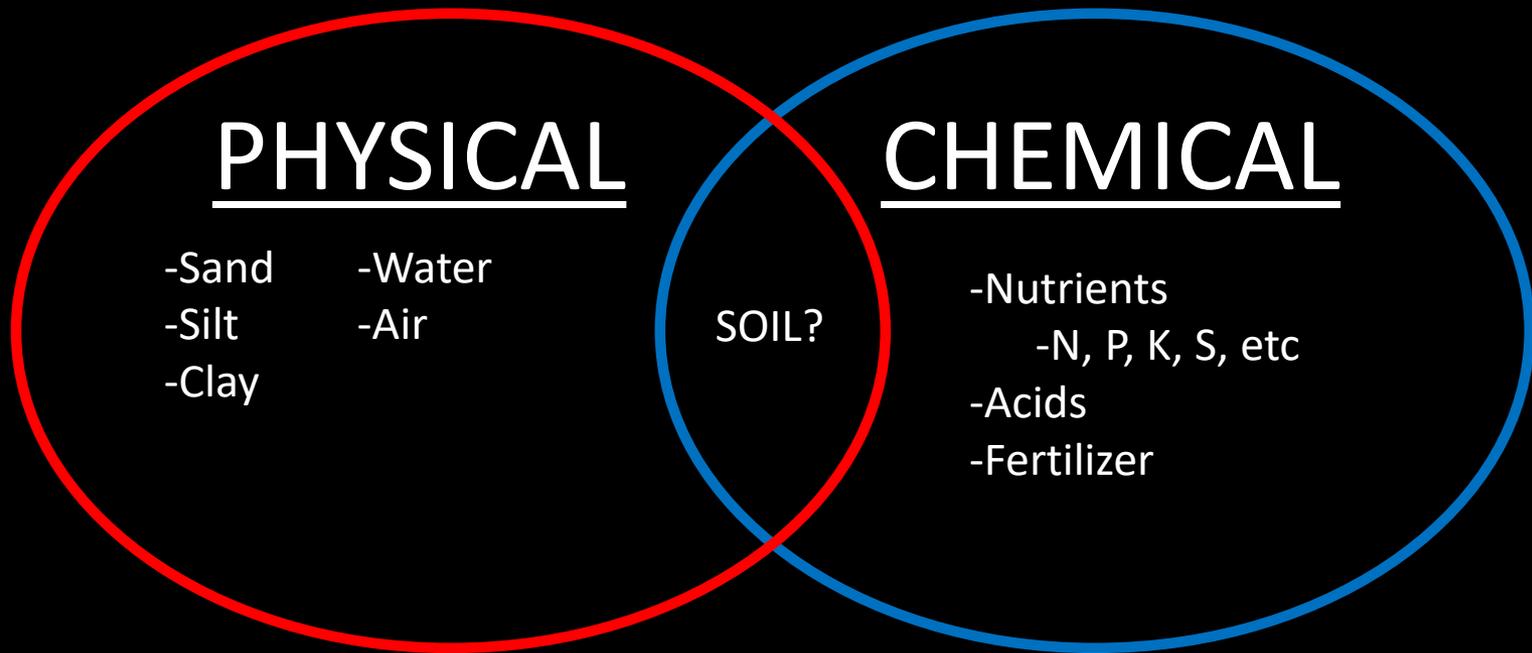


- Multi-Generation Family Farm
- Approximately 1400 acres
- Crops: Corn & Soybeans
- 30+ years NoTill
- Cover Crops: Cereal Rye & Diverse Mixes
- Livestock: Primarily Swine, also Cattle & Poultry

CONTEXT: Understand the System

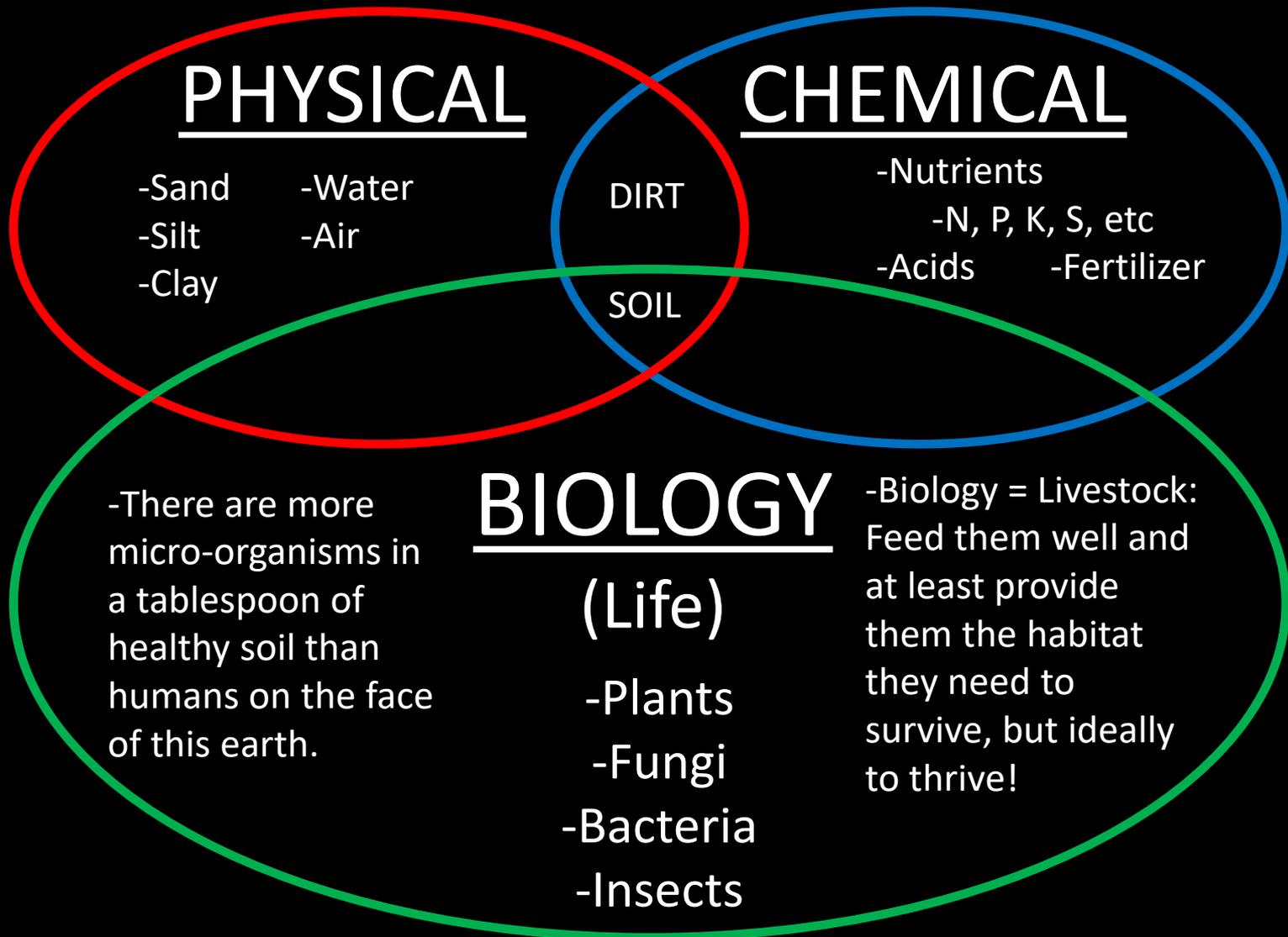
- Where do our crop's nutrients come from?
 - Fertilizer? --Manure?
 - Soil? --Secret Nutrient Fairy?
- Inherent Nutrient Quantity of Soil Minerals
 - N = 200-5000 ppm → 360 – 9000 lbs/ac in top 6”
 - P = 20-6800 ppm → 36 – 12240 lbs/ac in top 6”
 - K = 50-63000 ppm → 90 – 113400 lbs/ac in top 6”
 - Source: “Environmental Soil Chemistry” –Sparks 2003
 - Assuming soil bulk density = 83 pcf
- So how do we access these huge nutrient pools?

CONTEXT: Understand the System



- We are good at managing the chemical component.
 - Soil Tests, Variable Rate Fertilizer, Split N Applications, etc
- Why aren't we tapping into our inherent nutrient pools?
- What is missing in this picture?

CONTEXT: Understand the System



CONTEXT: Understand the System

Mars



Physical
Chemical

Earth



Physical
Chemical
Biological

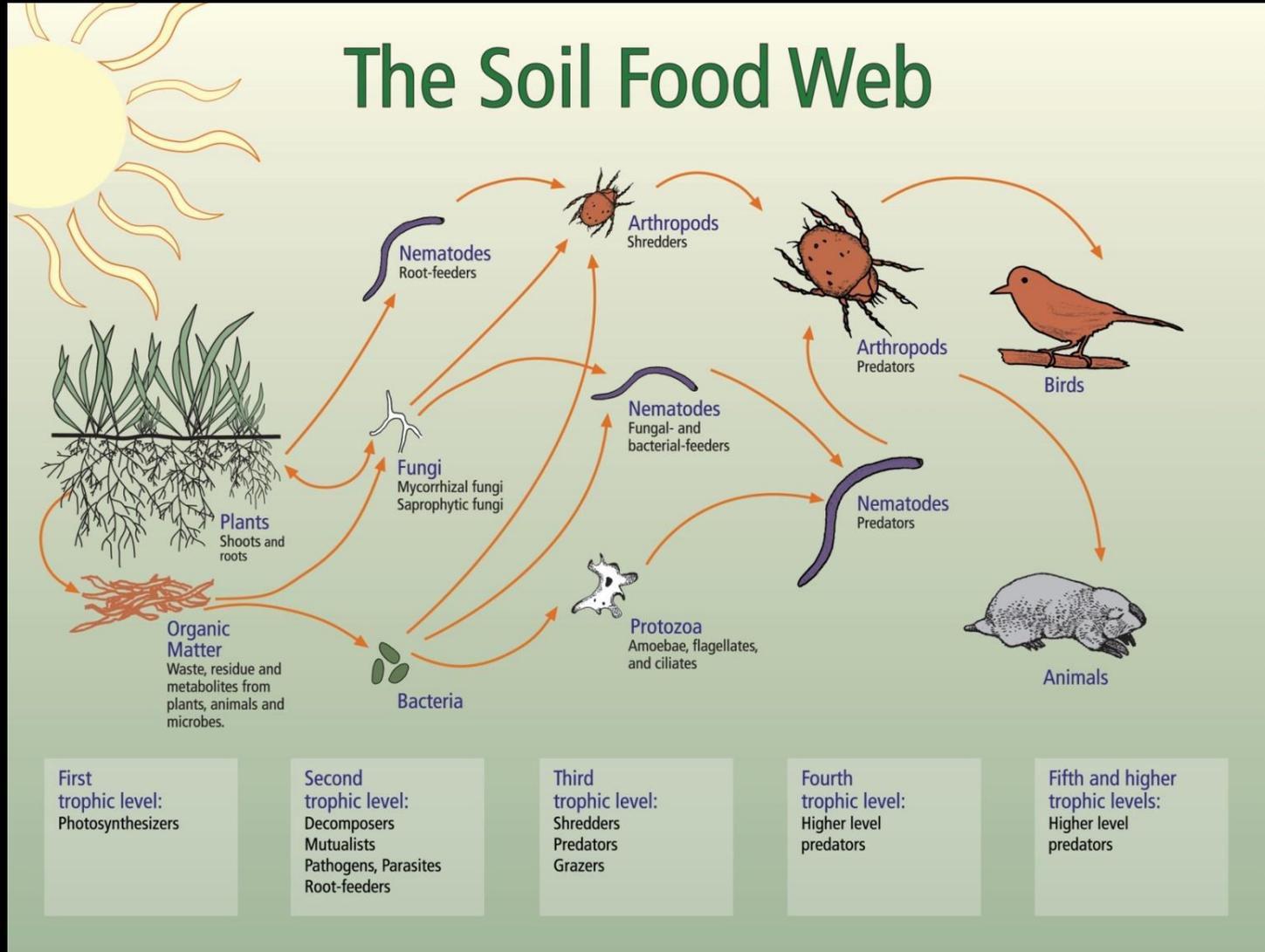
CONTEXT: Understand the System

- 85-90% of soil function is mediated by soil biology.
 - Sustainable Farming Association
- Know your soil livestock
 - Bacteria
 - Fungi
 - Mycorrhizae (AMF)**
 - Nematodes
 - Protozoa
 - Microarthropods
 - Earthworms, Moles, etc



**AMF Hyphae growing out of a corn root, Acquiring nutrients outside the root depletion zone, trading them to the corn plant in exchange for liquid carbon (photosynthesis) (Photo- Dr Kris Nichols)

CONTEXT: Understand the System



What drives this system?

CONTEXT: Understand the System

- How do we support & build our soil biology?
 - Eliminate/overcome our excuses.
 - The majority of our compaction issues are between our ears.
 - Living Plants/Roots 24/7/365 = SUNLIGHT HARVEST.
 - Cash Crops
 - Cover Crops
 - Plant Diversity.
 - Supports different species of microbes, insects, etc.
 - Avoiding major stressors as much as possible.
 - Tillage
 - Pesticides
 - Fallow Periods

Cover Crops 101

What is a “Cover Crop”

- Google: “A crop grown for the protection and enrichment of the soil.”
- Michael: “Any plant purposefully grown without intention of harvesting as a Cash Crop.”
- Most People in Iowa: “Cereal Rye”
- Skeptics: “A yield robbing weed & crop nuisance.”
- Fanboys: “The best thing since wide mouth cans.”

Cover Crops 101: Benefits

1. Stimulate Soil Biology
2. Livestock Grazing
3. Erosion Control/Infiltration
4. H₂O Qlty/Nutrient Scavenging
5. Weed Suppression
6. Carbon Sequestration
7. Nitrogen Fixation
8. Reduces Sunlight Spills



NOTE: Not all cover crop species accomplish all of these tasks. DO YOUR RESEARCH!

Cover Crops 101: Cereal Rye

- Most popular cover crop in the Midwest.
- Cool Season Grass
- Very winter hardy
- Good root system
- Supports AMF
- Erosion control
- Nutrient Scavenger
- Easy to establish
- Grazing



Cereal Rye Cover: May 11, 2017

Cover Crops 101: Other Species

- Hundreds of individual plant species. (or more)
 - Warm & Cool Season Grasses & Broadleaf Species.
- Tailor species to meet your individual goals/needs.
- Can be more difficult to get established.



Photos: Gabe Brown, Brown's Ranch

Cover Crops 101: Negatives

1. Possibly antagonistic to Cash Crops.

- I. Nutrient Tie-Up
- II. Pathogen Harboring
- III. Insect Pests

2. Time & Money.

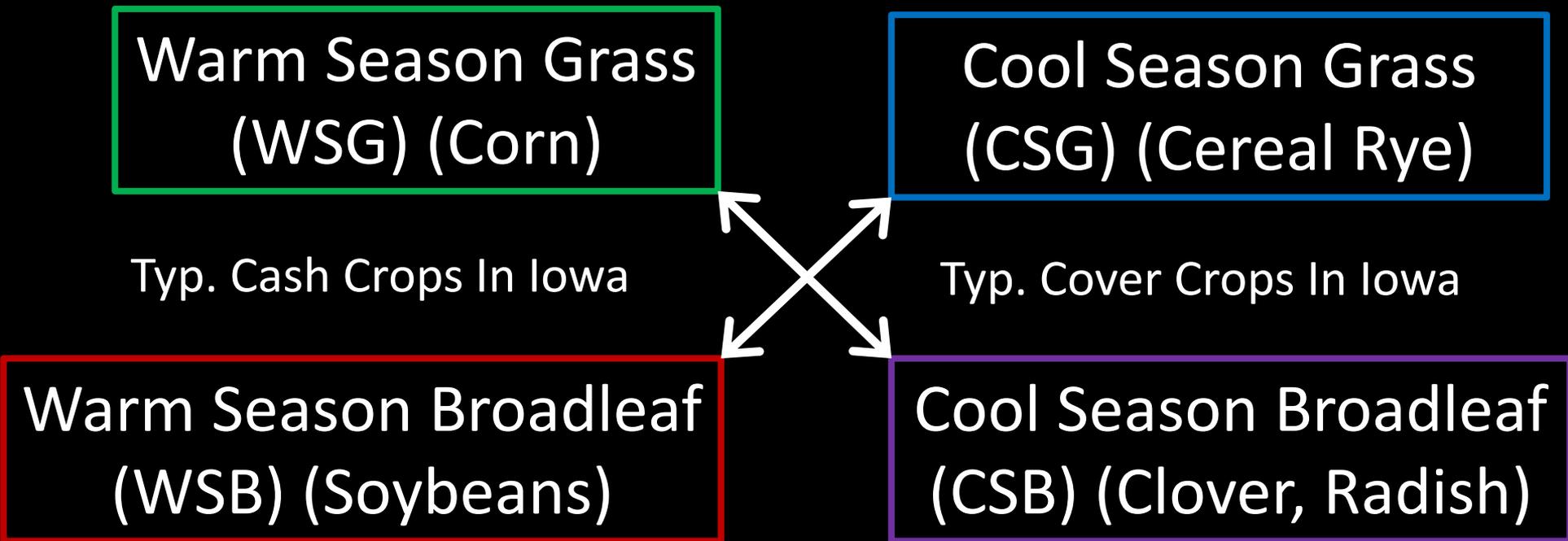
- I. Seed & Herbicide
- II. Labor & Equipment

3. Another layer/variable to learn & manage in an already complex system.



Cover Crops 101: Pathogen Harboring

Result of: Improper Rotational Sequence



Goal is to rotate to opposite season & plant type.

Examples: Cereal Rye (CSG) → Soybeans (WSB) = Good

Cereal Rye (CSG) → Corn (WSG) = Problematic

Cover Crops 101: Adding Diversity

- Small Grain as 3rd Crop (Wheat, Rye, Oats, Barley)
 - Seed a diverse mix after small grain harvest.
 - Lack of markets & profitability makes this a challenge.



11.24.2016

Photo: David Brandt

So now what?

THINK OUTSIDE
THE BOX

X	O	X
O	O	X
O	X	O

Look for answers in the NATIVE SYSTEM



Iowa's Native System:
Tallgrass Prairie

Photo: Tallgrass Prairie Center

Nature's Blueprint:

- Native Tallgrass Prairie System (TGP):
 - Dominant Warm Season Grass
 - Diverse Population of Forbs
- TGP capable of supporting significant biodiversity.
 - 237 plant species recorded in 1 sq mile near Lincoln, NE
 - How many can we find in our fields?
 - How does lack of diversity affect the natural system?
 - What can we do to bring diversity back to our fields?

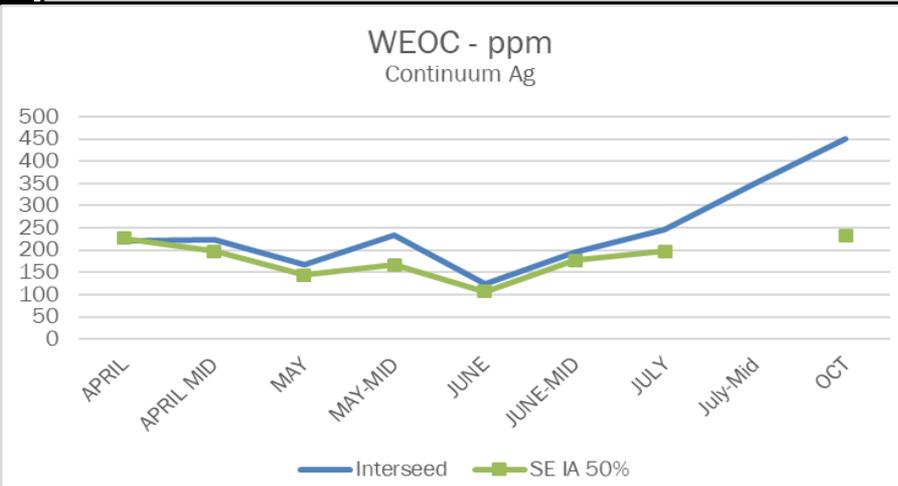
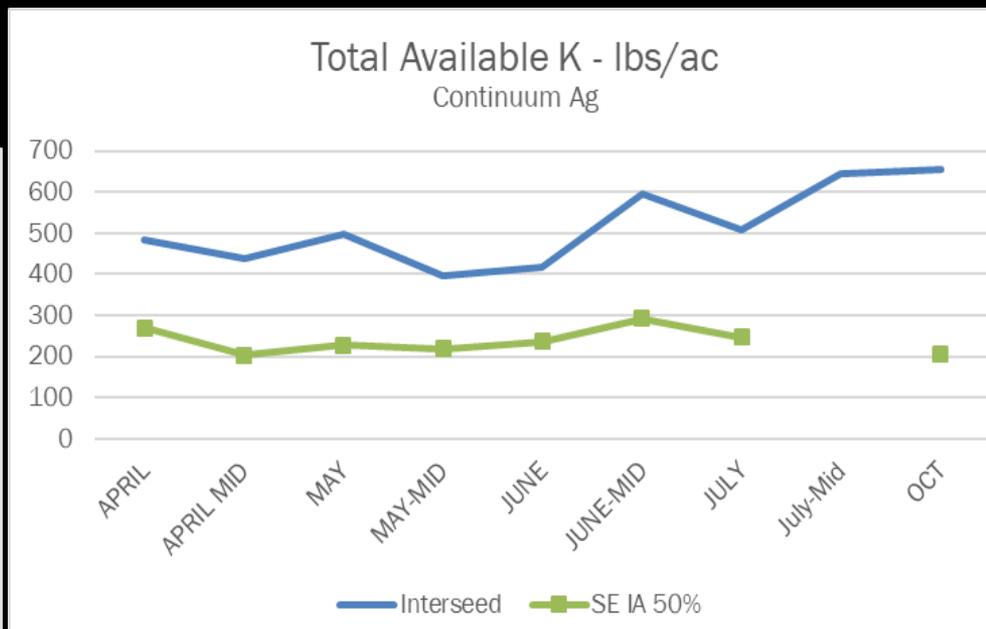
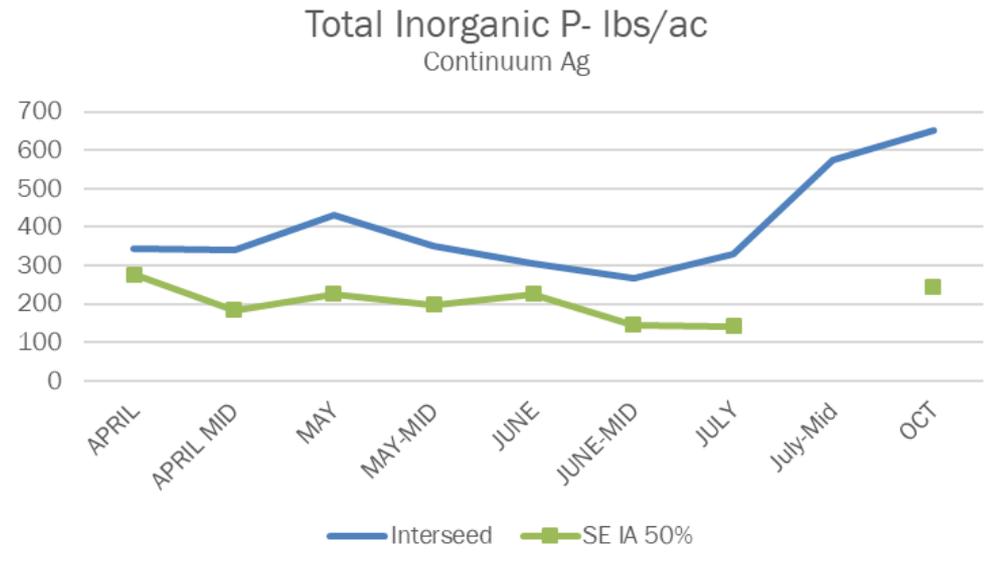
Cover Crops 101: Adding Diversity

- Corn with Interseeded Covers
 - Seed a diverse mix into a growing corn crop (V2-V6).
 - Imitates our Native Tallgrass Prairie.
 - Dominant Warm Season Grass → Corn
 - Diverse Population of Forbs → Interseeded Covers



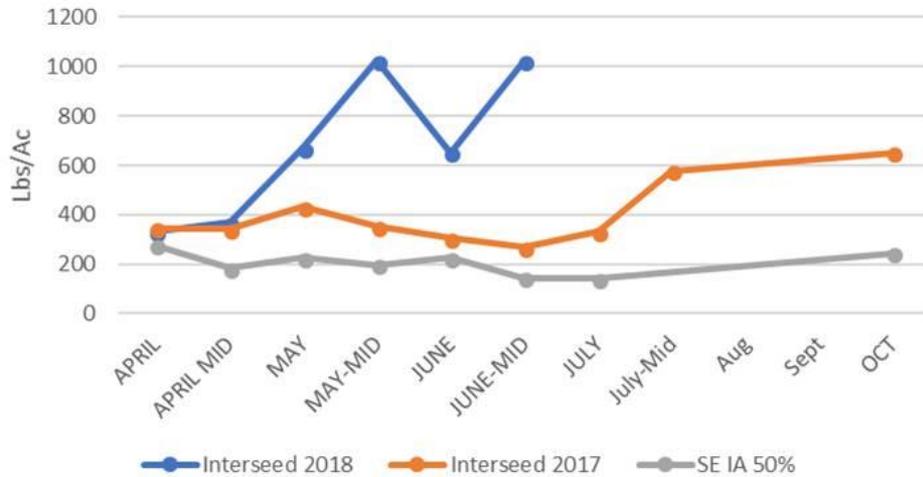
2017 Haney Test Results

Organic Matter (360°C LOI) %		4.27	
Estimated Nitrogen Release lb/A		93	
ANIONS	SOLUBLE SULFUR* ppm		14
	PHOSPHORUS	MEHLICH III lb/A P as P_2O_5	1049
		ppm of P	229
	BRAY II	lb/A P as P_2O_5	1099
		ppm of P	240
OLSEN	lb/A P as P_2O_5		
EXCHANGEABLE CATIONS	CALCIUM*	lb/A	6456
		ppm	3228
	MAGNESIUM*	lb/A	788
		ppm	394
	POTASSIUM*	lb/A	1602
	ppm	801	
	SODIUM*	lb/A	46
	ppm	23	

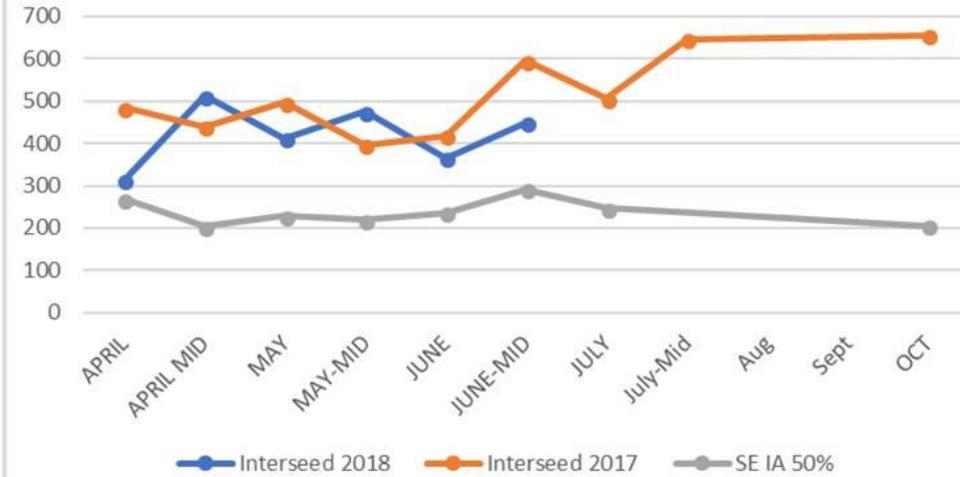


2018 Haney Test Results

Interseed P2O5 vs SE IA Group



K2O



Organic Carbon

