

Locally-Led On-Farm Demonstration: Promoting Soil Health through Successful Farm Management

Jason Warren
Oklahoma State University

New Project Recently Funded by USDA
Conservation Innovation Grant



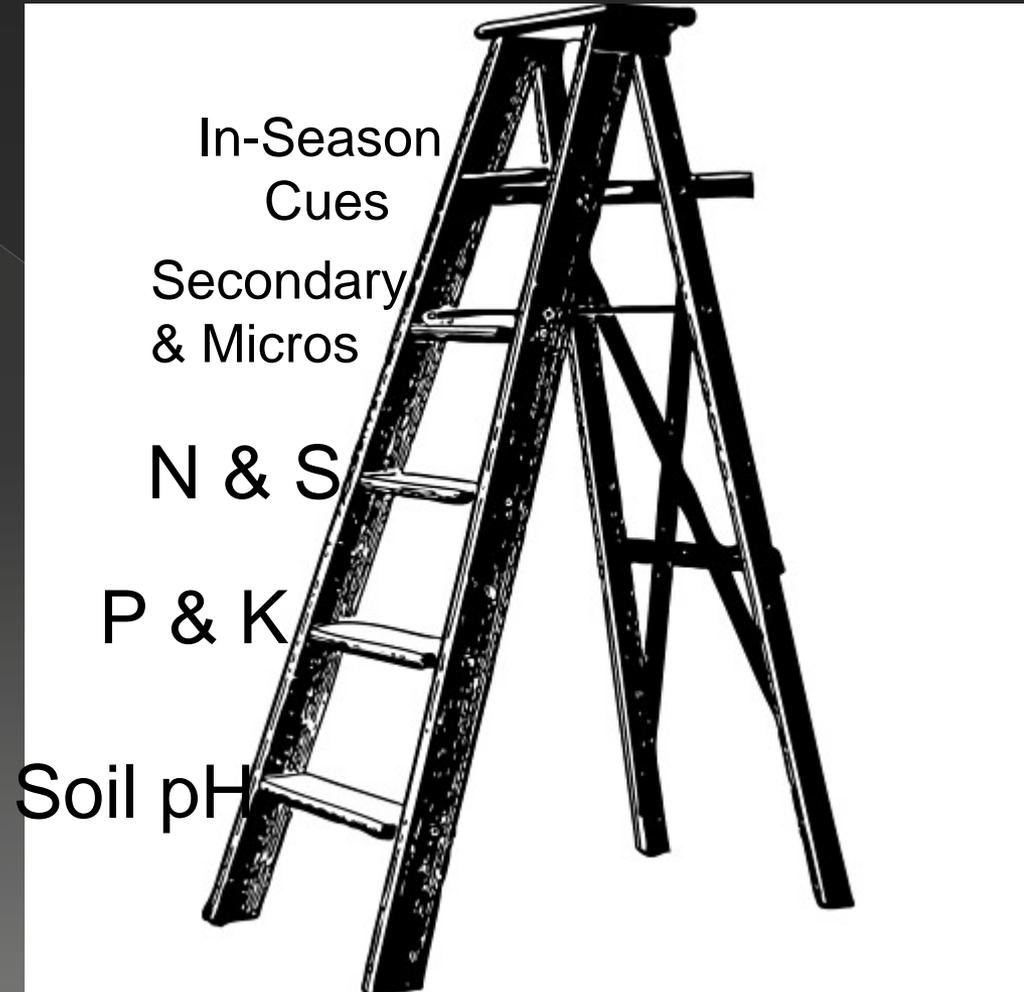
Objectives of Project

1. Provide demonstration of locally relevant soil health promoting practices in counties where **producer interest is sufficiently high to promote local agency participation.**
 - a) Demonstrations will be tailor to address Local interests.
 - b) This will require participations of local Stakeholders.
2. Develop a frame work for field and laboratory calibration of a soil health index.
 - a) Identify relevant soil health indicators
 - b) Determine magnitude of variation and response to management.

Arnall's Fertility Ladder

- > First step in managing for soil health is soil testing

Multi- Nutrient
Variable Application



Interaction with Other Soil Health Parameters

Multi- Nutrient
Variable Application

Soil Structure

Organic Matter

Biodiversity

Biological Activity

In-Season
Cues

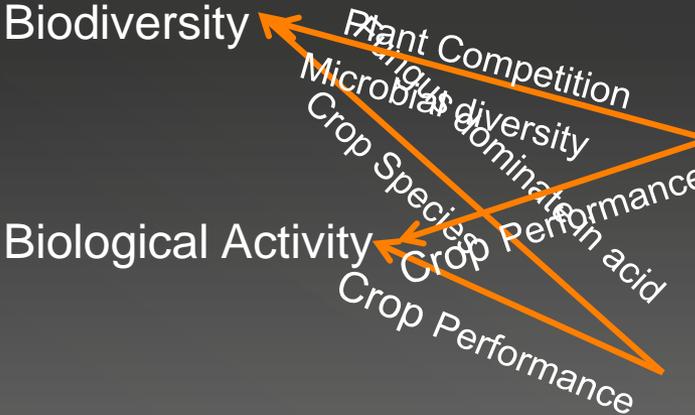
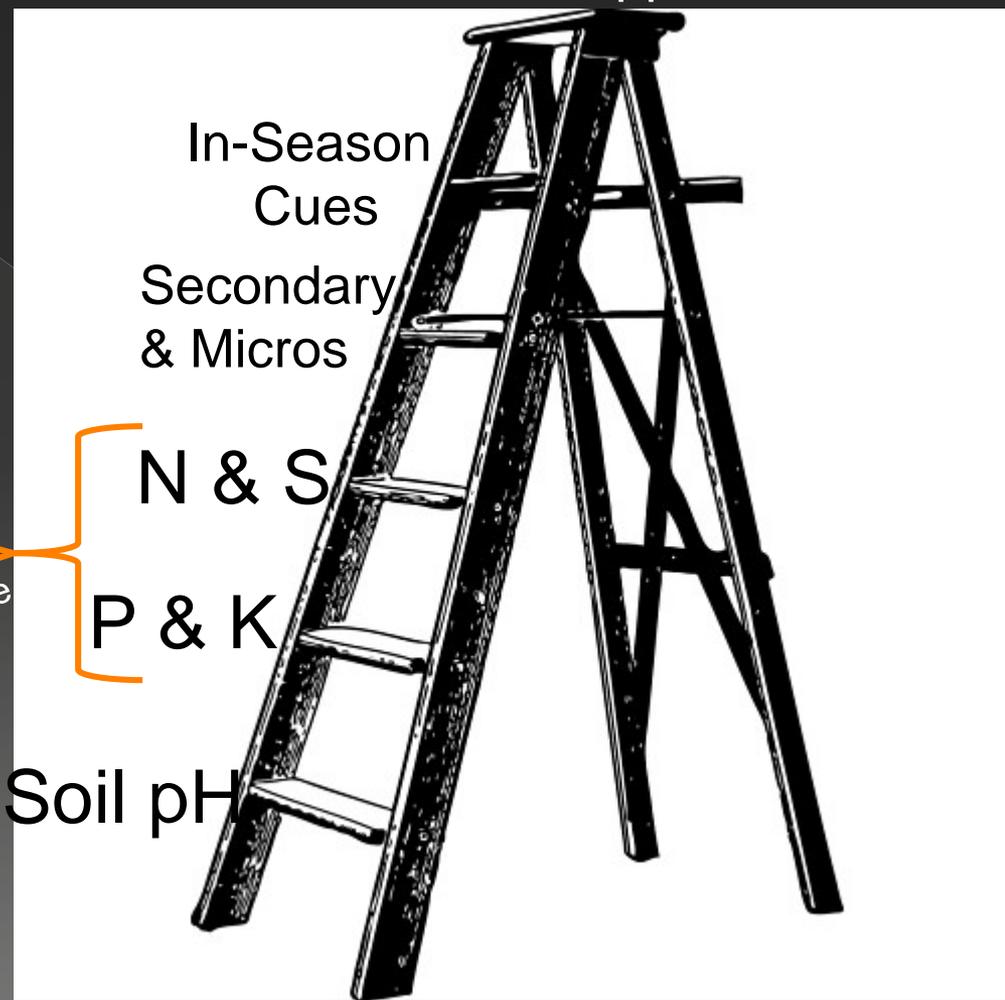
Secondary
& Micros

N & S

P & K

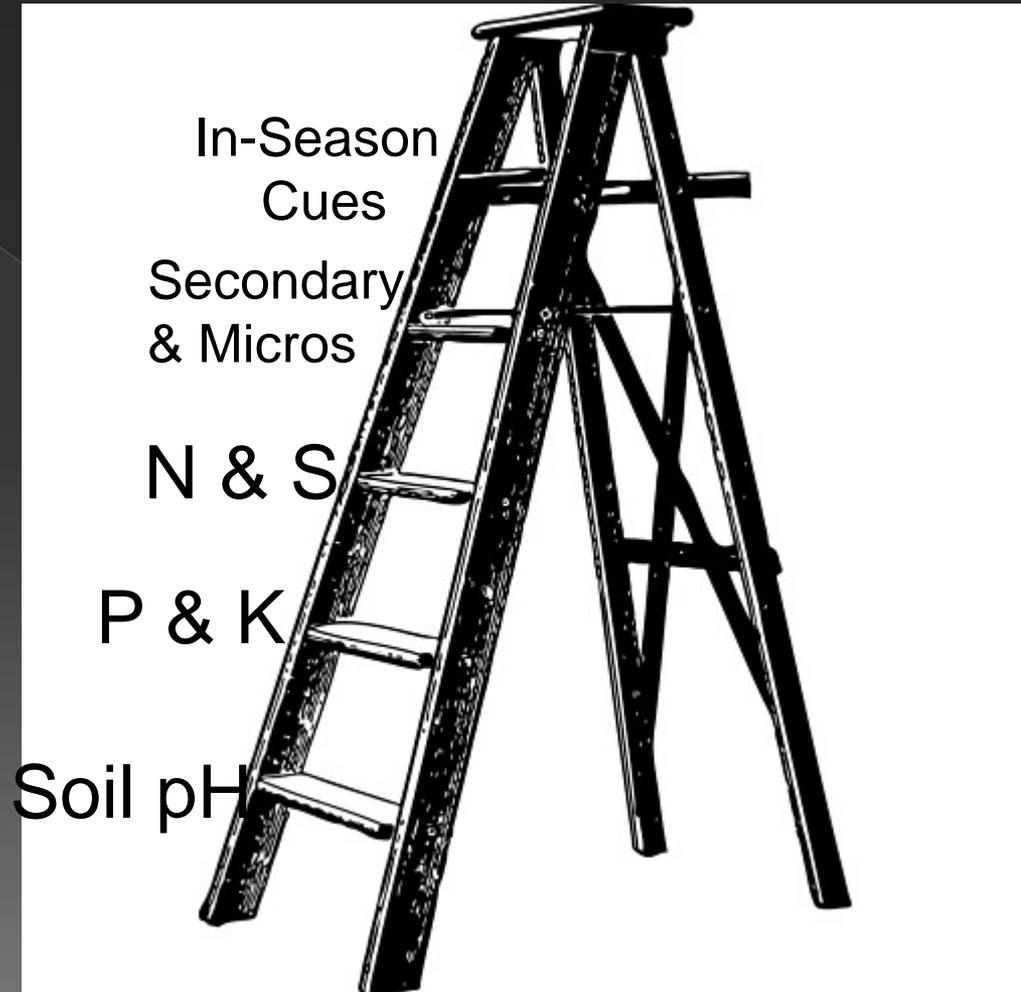
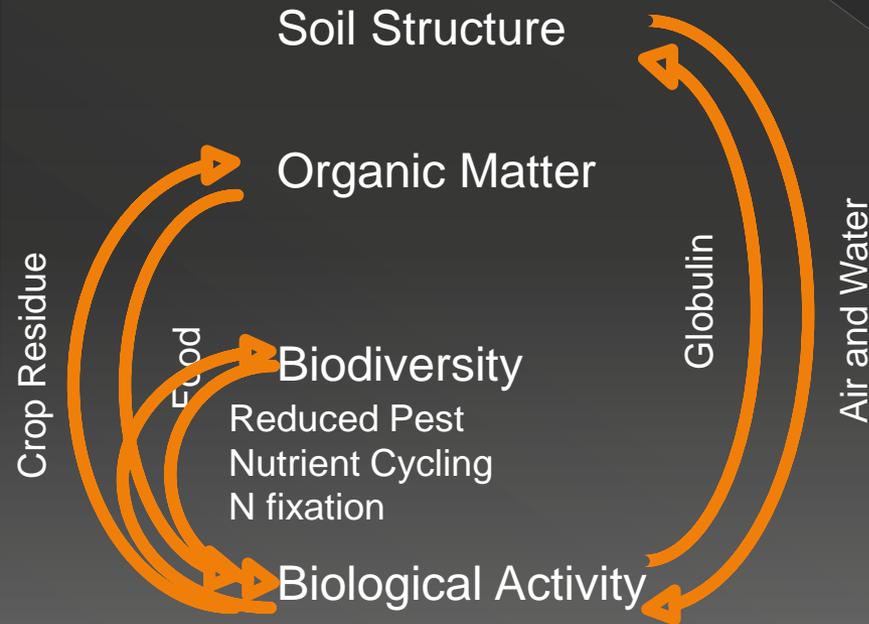
Soil pH

Plant Competition
Fungal diversity
Microbial dominance
Crop Performance
Crop Species
Crop Performance
Crop Performance



Interaction with Other Soil Health Parameters

Multi- Nutrient
Variable Application



How do we Manage for Soil Health

- ◎ Start with the Basics
- ◎ 1. Routine Soil Test
 - › Get the pH, P, K and N right
- ◎ 2. Complete Soil Test
 - › Micros and Macros if needed
 - › Salinity and Sodicity if they are an issue

Building Organic Matter

- Many benefits come from simply increasing organic matter
 - Improved structure, microbial activity and diversity, etc
- This is what gets most of the attention!!!

How do we Building Organic Matter

- ◉ Increase crop performance
- ◉ Grazing management
- ◉ Reduced tillage
- ◉ Intensifying crop rotation
- ◉ Add cover crops
- ◉ Over seeding pastures during dormancy
- ◉ Add organic amendments?

Improve Diversity

- ◉ Increases resilience of production system
 - › Breaks pest cycles, improves habitat for beneficial, decreases risk to seasonal drought
- ◉ Crop rotations
- ◉ Cover crops
- ◉ Intercropping
- ◉ Over seeding pastures
- ◉ Multi-species grazing

On-Farm Demonstration Program

- ◉ Identify Management practices that producers are interested in adopting
 - › Regionally relevant
 - › Specific to Intensive Management Producers
- ◉ Develop protocol that can be achieved with local participation
 - › Unique demonstrations will require higher level of local participation

On-Farm Demonstrations

- Funds are available for supplies, travel, publication and meetings/field days.
- We will also provide any special equipment needed



Example #1

- Darrel McBee, Harper County
- Collaborating with Local NRCS
- Cover Crop Nursery
- Crop Rotation Study
 - › Wheat-Wheat, Wheat-Fallow-Sorghum.
 - › With and without Cover crops?
- This is Ideal situation, but it is unique

Example #2 Jimmy Emmons Dewey County.

- ◉ Currently Collaborating with NRCS to provide a Proof of Concept Farm
- ◉ Would like to incorporate protocols that can isolate how cover crops influence production system
 - > nitrogen contribution from cover crops using N-Rich strips and Greenseeker.
 - > No-cover Strips to evaluate Impact on crop yield

Other Opportunities

◉ Regional Protocols

> Examples:

- NPK, and Lime demonstration strips?
- Cover crop nursery?
- Go back pasture renovation?
- Fallow strips in within CSP and EQIP contract acres
- Impose organic matter building practices across NPK, Lime strips.

◉ Let me know if you have ideas

Planned Demonstrations

- Wheat-sorghum rotation with a double crop of beef!
 - › Alfalfa county
 - › Farmer practice =late summer cover of warm and cool season
 - › Graze from Nov-Jan.
 - › Compare to June planted cover
 - › Evaluate impact of hay removal

Planned Demonstrations

- ◉ Wheat-Cotton rotation
- ◉ Summer cover after late cotton
- ◉ Compare this to grain sorghum
- ◉ Evaluate simulated grazing and hay removal

Cattle Economics

Fescue

- Supplement: \$0.72/hd/d
- Fescue rental: \$0.75/hd/d
- Hay/mineral: \$19.88/hd

Feeding cost: \$140.42/hd

- Sale wt: 602 pounds

Sale value: \$1,474.90

Return: \$51.98/hd

Covers

- Supplement: \$0.43/hd/d
- CC cost: \$0.61/hd/d
- Hay/mineral: \$19.88/hd

Feeding cost: \$105.16/hd

- Sale wt: 626 pounds

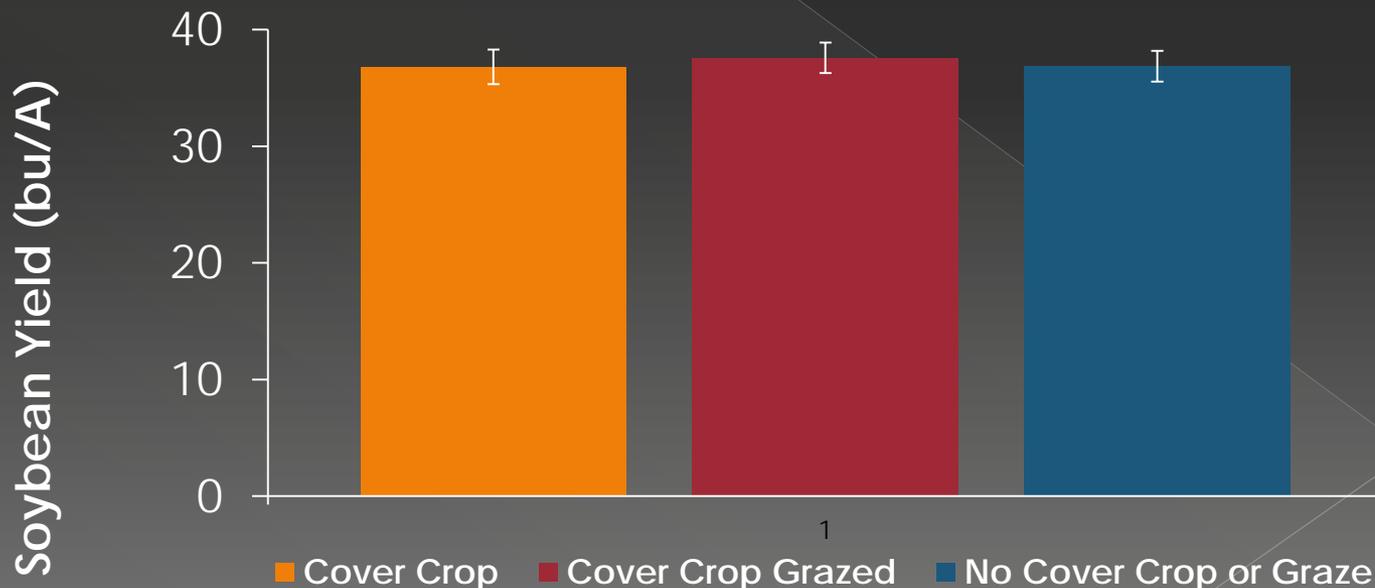
Sale value cattle: \$1,533.70

Return: \$146.04

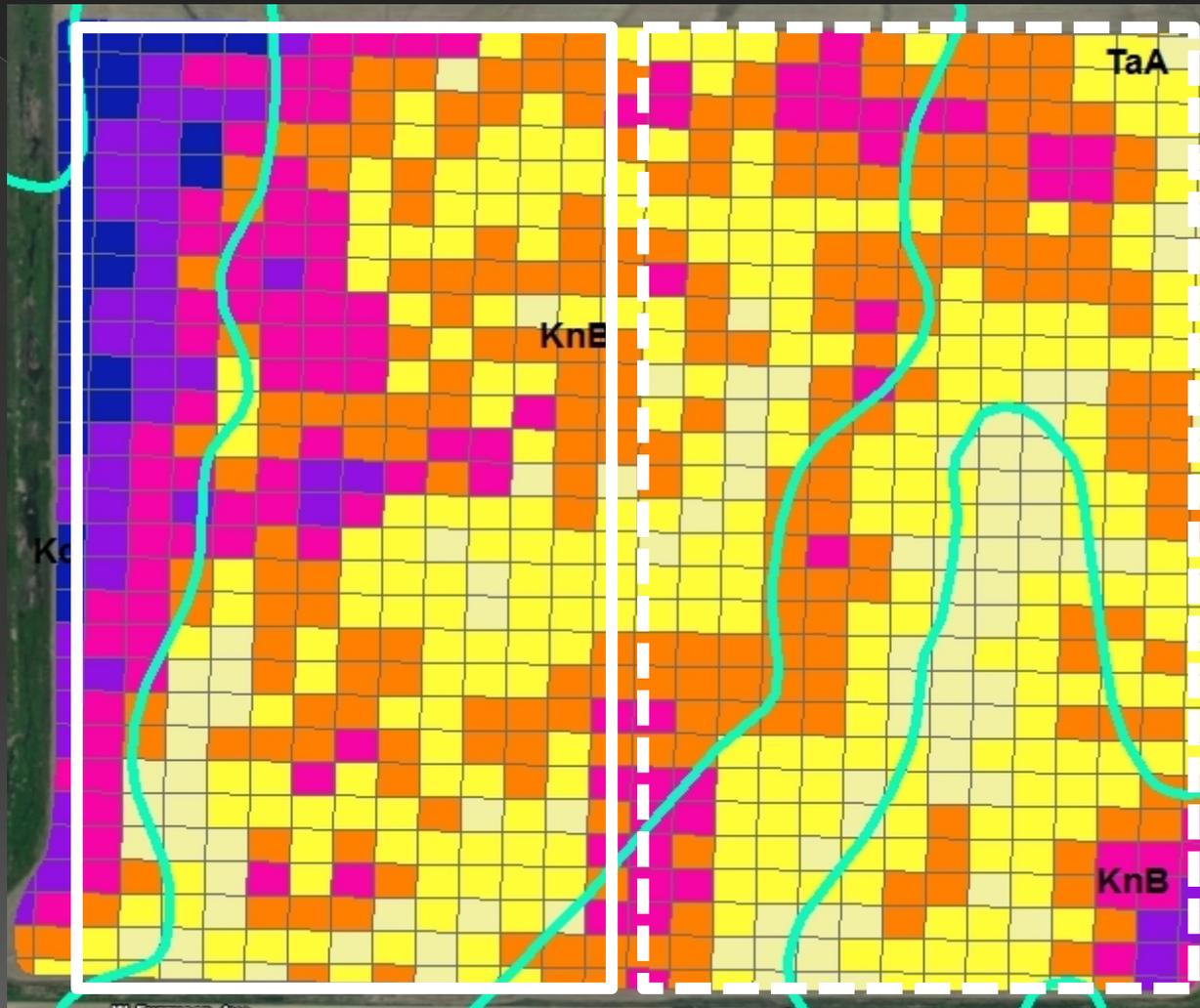
Subsequent Crop Performance

- Soybean were planted in June of 2014 and test weight, moisture, and yield were determined at maturity
 - › No significant yield differences between treatments
 - Grazing or cover crops did not impact soybean yield

Soybean Yield Following Cover Crop and Grazing



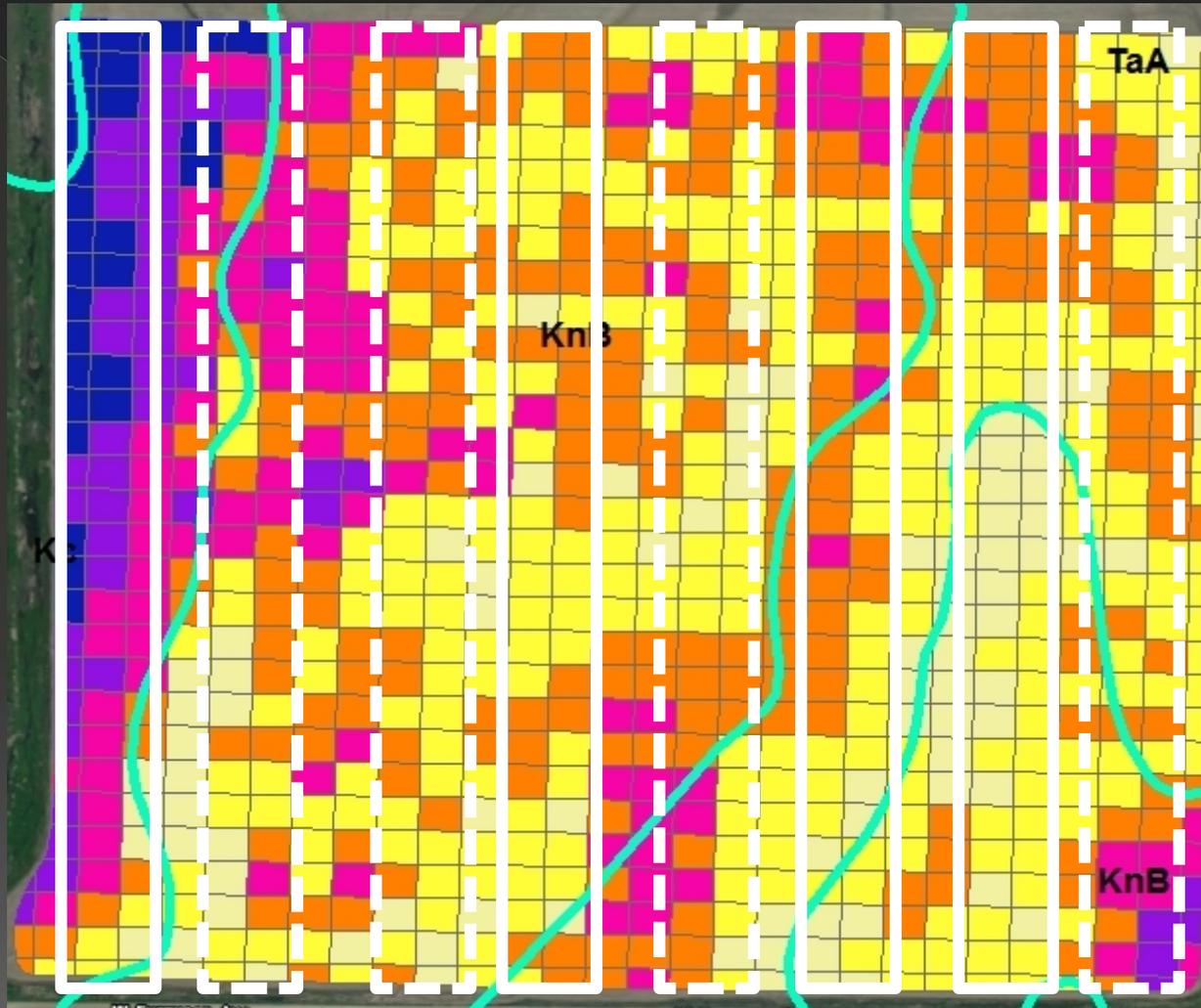
Yield
(bu/acre)



30 bu/acre

25 bu/acre

Yield
(bu/acre)



29 bu/acre

27 bu/acre

Summary

- ◉ My approach to Soil Health management is a systematic
- ◉ Take care of the underlying limitations to crop performance
 - > pH, P, K, N
 - > Salinity
 - > Macro and micro nutrients

Summary

- ◎ Then focus on advanced management
 - › Crop diversity?
 - › Intensive grazing management, etc
 - › How do cover crops and crop rotation influence crop protection
- ◎ Equipment demonstrations?
 - › Planters, drills, strip-tillage, crimpers, etc.

Expertise available for these Demonstrations

- ◉ Randy Taylor- Machinery Specialist
- ◉ Angela Post- Weed Science Specialist
- ◉ Tom Royer- Integrated Pest Management Specialist
- ◉ Bob Hunger- Wheat Plant Pathology Specialist
- ◉ John Damicone- Plant Pathology Specialist
- ◉ Brian Arnall- Precision Nutrient Management Specialist
- ◉ Jeff Edwards- Small Grains Specialist
- ◉ Saleh Taghvaeian- Water and Irrigation Specialist
- ◉ Jason Warren- Soil conservation Specialist
- ◉ No-till On the Plains- Provide systems based no-till management expertise.

Questions and Ideas???

- ◉ Jason.warren@okstate.edu
- ◉ 405-744-1721
- ◉ @oksoilwater
- ◉ Soilwater.okstate.edu
- ◉ Notill.okstate.edu

