

Strategizing & Implementing a Soil Health Management System Module 9

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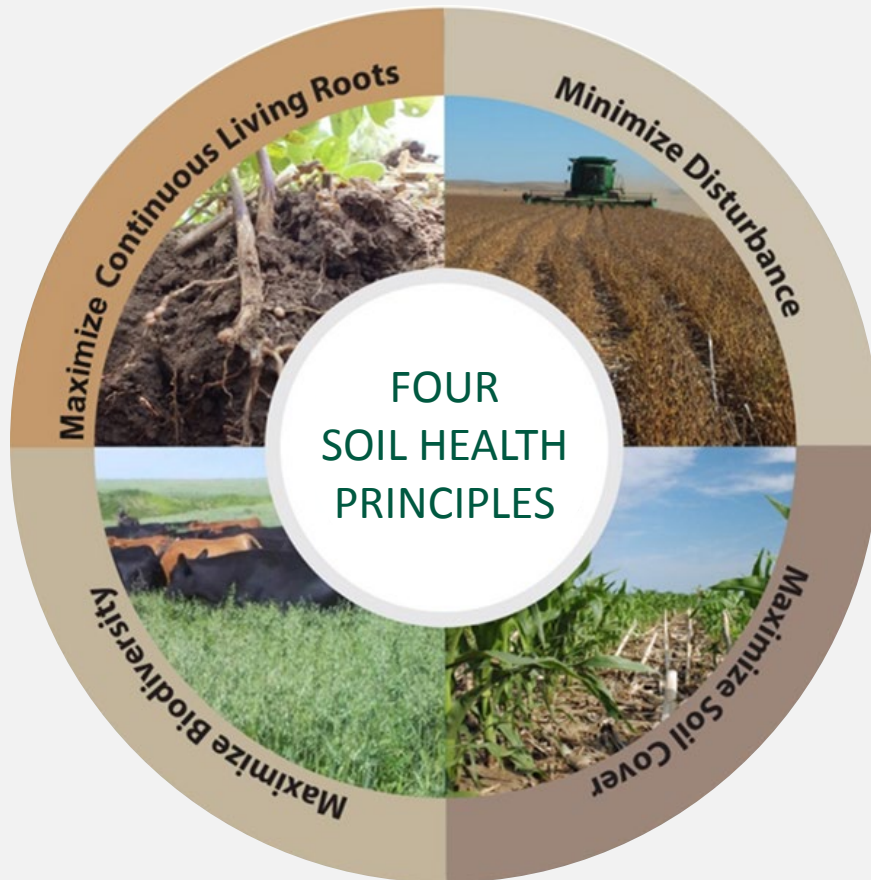
Goals

By the end of this lesson
you will be able to:

1. Identify key components of practices and activities to develop a Soil Health Management System
2. Describe the interaction, dependency and synergy between practices in a SHMS
3. Recognize barriers to implementation
4. Describe an entry level strategy to develop a SHMS

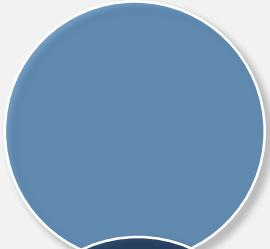


The 4 Principles that Conserve the Soil Ecosystem



1. Minimize Disturbance
2. Maximize Living Cover
3. Maximize Biodiversity
4. Maximize Continuous Living Roots

Soil Health Management System



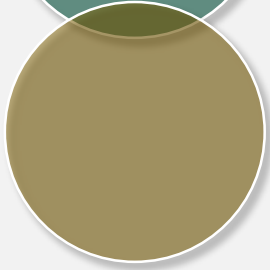
Collection of NRCS conservation practices, BMPs, activities, that focus on maintaining or enhancing soil health



Address all 4 of the soil health principles



Create a “synergistic” effect



Cropping system specific

Best Accepted New Technology

- Conservation activities that might not be in an NRCS conservation practice standard. Examples:
- Companion cropping
- Traffic management
- Precision application of nutrients and pesticides
- Use of flotation tires



Soil Health Management System

- Achieving soil health through:
 - A Quality No-till/ Strip-till System
 - Diverse and Strategic Cover Crops
 - Adapted Nutrient Management
 - Integrated Weed & Pest Management
 - Diverse Crop Rotations
 - Precision Farming Technology
 - Prescriptive Buffers



Soil Health is not a destination...it's a Journey

Quality No-Till/Strip-till



Adapted Nutrient Management



**New Technology and
Integrated Weed & Pest
Management**



Prescribed Cover Crops

Diverse Crop Rotation



No-Till / Strip-Till

Planter set-up and maintenance is critical



Goal: Every seed at the exact same depth...





No-Till Planter Attachments

Less total down pressure is needed

Match field conditions on the go!

RID



Crimp and Plant



The Sci
Conser
We De


NRC
East



Spread the Weight!

Spread the Detritus (residue)





My feet are
hurtin' in these
tight shoes!

Crop Talk!

- Listen to what the crop is telling you...




Compounding extent of soil degradation and effect on other cycles

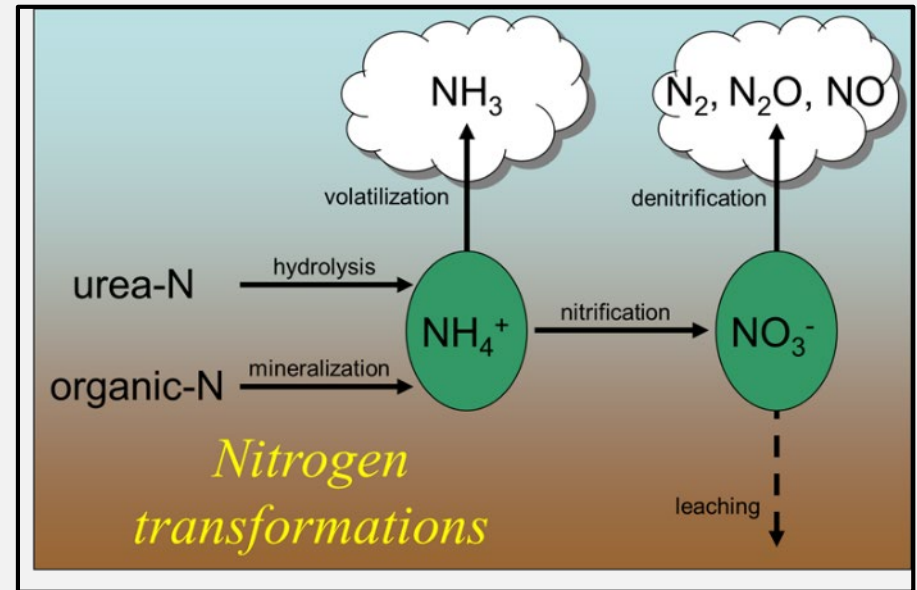
Denitrification:

- Anaerobic conditions cause Losses of N_2 , NO and N_2O

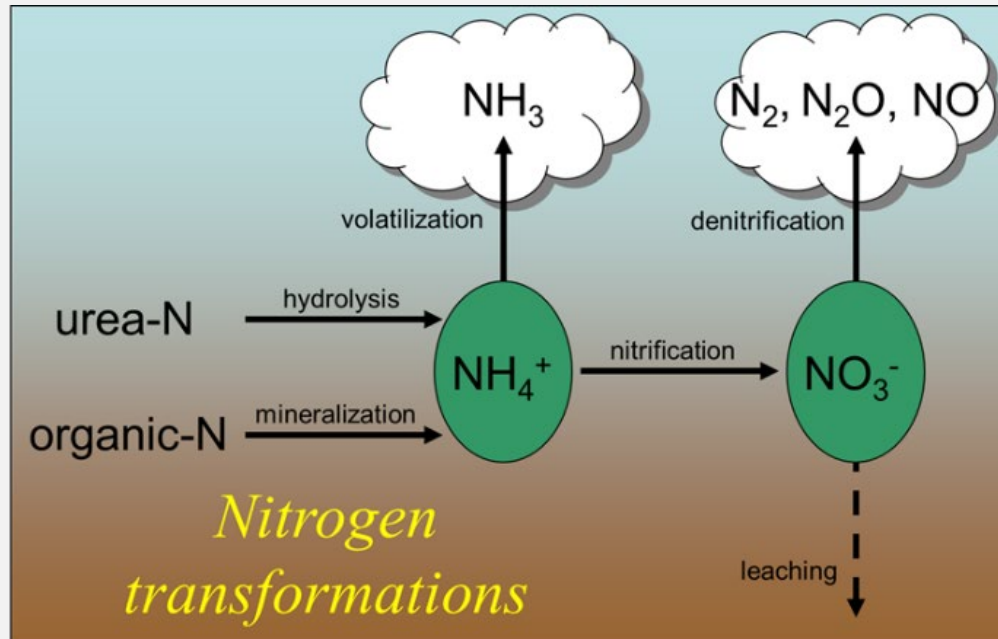
Leaching

- Plenty of heat to convert ammonium to nitrate
- Nitrate leaves with the water

 Both applied and soil available N are at risk of loss



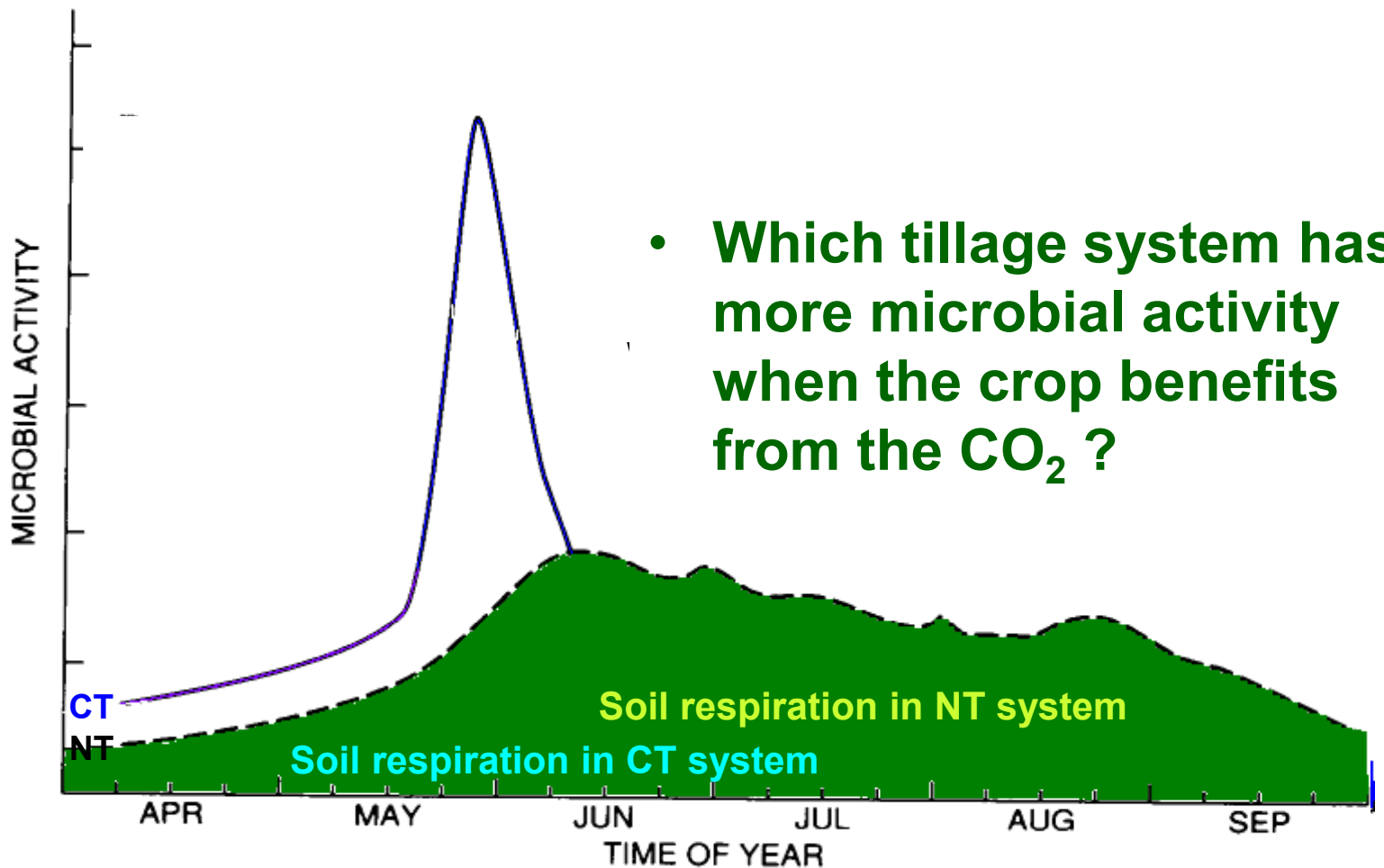
Nitrogen Mineralization and Immobilization



Biology



Effect of Tillage on Microbial Activity



Havlin et al. (1999)

No-Till Planters

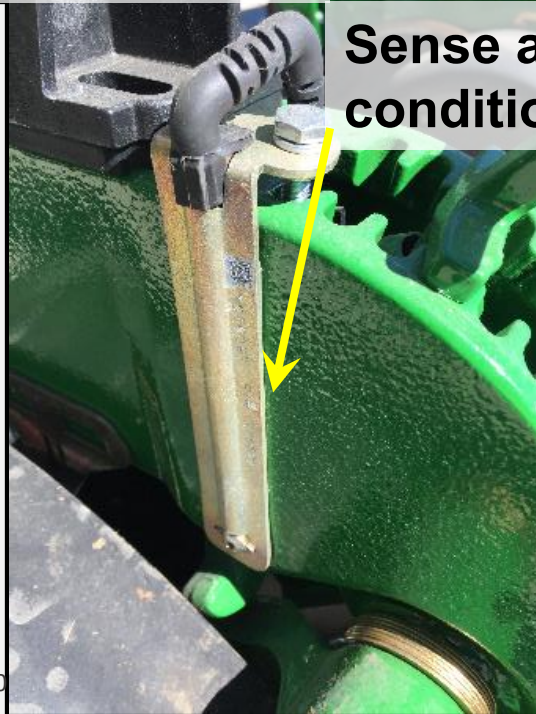


**Precision nutrient
placement and rate**



**Sense and adapt to field
conditions on the go!**

**With Space
Shuttle Tech**





Integrated Pest Management

- Prevention
- Avoidance
- Monitoring
- Suppression



Cont No- Till Corn SB-Wheat Rotation 60 Bushel Soybeans



Gleaner R52 Crary Air Reel



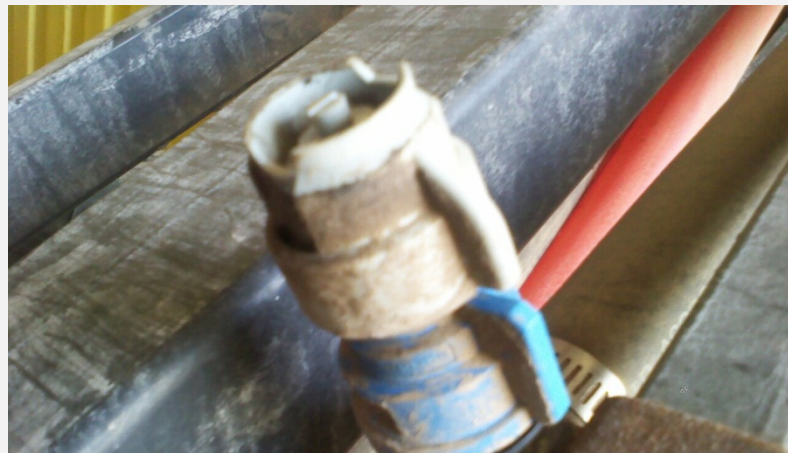
Poly Skid Shoes



Harvesting Soybeans September 2013









The Nozzles

Part Numbers

TDXL/TDCXL 11001
TDXL/TDCXL 110015
TDXL/TDCXL 11002
TDXL/TDCXL 110025
TDXL/TDCXL 11003
TDXL/TDCXL 11004
TDXL/TDCXL 11005
TDXL/TDCXL 11006
TDXL/TDCXL 11008
TDXL/TDCXL 11010



Description

110° Flat Fan Multi-purpose medium pressure air induction nozzle

20 - 120 psi Overall pressure range
30 - 90 psi Optimal pressure range

Estimated life (60' boom, 20" centers)
20,000 - 30,000 acres TDXL
50,000 - 80,000 acres TDCXL

Polyacetal Venturi body and SprayMax TipCap nozzle with EPDM seat gasket.

TDXL has ceramic metering orifice in

The most proven multi-purpose Venturi air injection nozzle

TurboDrop® XL Medium Pressure Nozzle (TDXL)

Wide Pressure Range:	TDXL 20-120psi TDCXL 30-150psi
Wide Drift Control Range:	Sizes 01-02: 20-60+ psi Sizes 025-04: 20-80+ psi Sizes 05-10: 20-100+ psi
Separate Injector (Venturi)	Comes apart by hand, easy to clean (no tools required).
Patented Stabilization Chamber	Even and uniform mixing of air with liquid which gives a tighter, more uniform droplet spectrum and a homogeneous spray solution across a wide operating range.
Excellent With Rate Controllers	Wide pressure range allows greatest speed variations.
Improved Coverage, Reduced Runoff	Air-filled droplets spread on the target surface rather than bouncing off.
Reduced Clogging	Round metering orifice versus elliptical slit.
Interchangeable Tip / Cap	Two spray nozzles in one. Other tips may also be used.
Proven TurboDrop® Technology	Over 17 Years in 40 countries.
Longer Wear Life	TDXL: 20-30,000 Acres

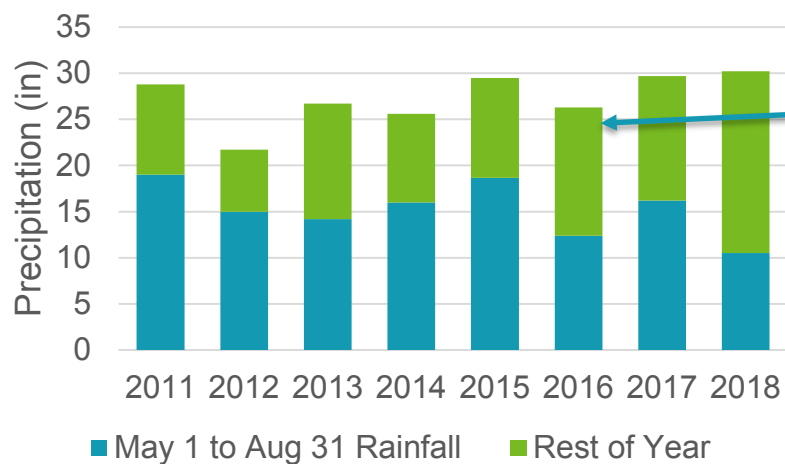
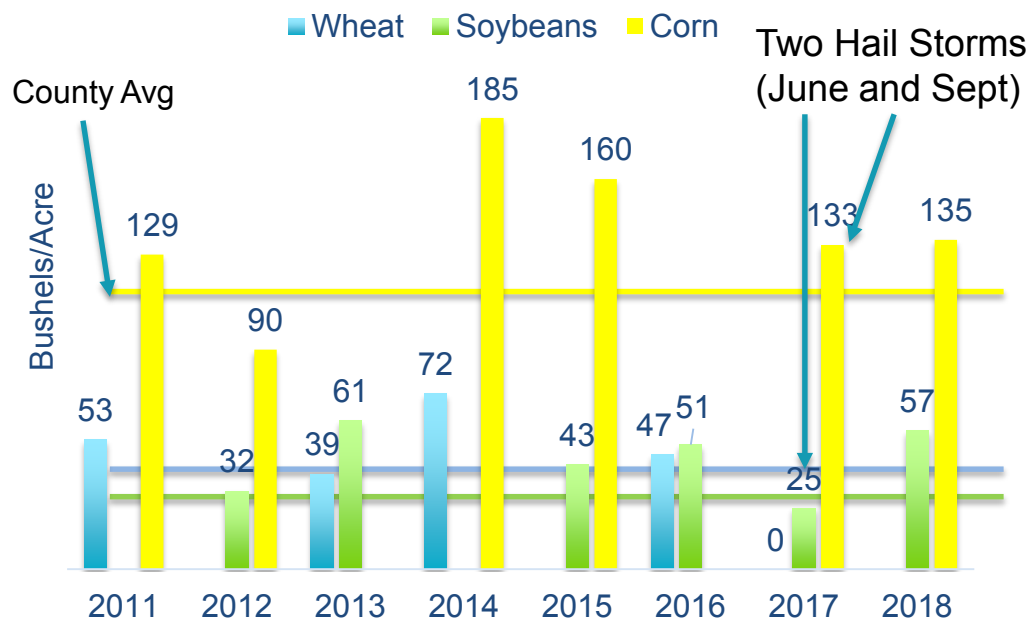
Roundup Resistant Water- hemp



New Herbicide for Resistant Weeds

- Enlist Weed Control system includes seeds that are genetically modified to tolerate the new herbicide from Dow, Enlist Duo.
- Enlist Duo contains 2,4-D that adds another mode of action to the glyphosate-based herbicides.
- Better protection against tougher weeds, which have been growing resistant to the glyphosate.
- Commercial application of the system requires both the new seed traits as well as the new herbicide to be approved by the regulatory authorities
- Corn production in 2014, for soybean production in 2015 and cotton production in 2016.

Drought and Heavy Rainfall Resilience

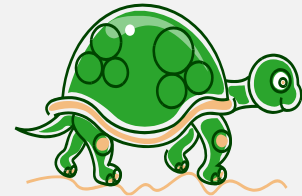


Strategically...CC Should Complement the Following Crop

What about Corn?

Strategically...CC should match desired C:N Ratio

Material	C:N Ratio		
Rye Straw	82:1	}	Good for Soybean
Wheat Straw	80:1		
Oat Straw	70:1		
Corn Stover	57:1		
Rye Cover Crop (Anthesis)	37:1		
Rye Cover Crop (Vegetative)	26:1		
Mature Legumes	25:1	}	Good for Corn
Balanced Microbial Diet	24:1		
Daikon Radish	19:1		
Crimson Clover	17:1		
Ryegrass (Vegetative)	15:1		
Young Alfalfa	13:1		
Hairy Vetch Cover Crop	11:1		
Soil Microbes (Average)	8:1		



Strategically...CC Should Complement the Following Crop

Corn into:

- High N (Protein)
- Cover Crop (Clover/Peas)
- Contributes high quality N
- Less likely to harbor disease pathogens



Strategically...CC Should Complement the Following Crop

Corn into a mix:

High Carbon (Rye)

Provides:

- Erosion Control
- Moisture Savings

Uses/ immobilizes:

- Nitrogen/ nutrients
- Disease?

Starter N a must!



Strategically...

- Soybeans do well into a high carbon Cover Crop.
...Why?
- Low nitrate conditions early, weed control, late season soil moisture and late season nutrient cycling (residue mineralization)







Strategically...Planning the System Using the Step by Step Approach

1. Drill or Aerial Seed Cereal Rye or Annual Ryegrass into Corn Stalks (early maturing corn)



2. Terminate the Cereal Rye at 12"...



Strategically...Planning the system

2. Plant a short season Soybean into the Cereal rye (preferably early in the season)



Strategically...Planning the system

**3. Plant a low
C:N mix into
Soybean at
senescence
(oat, barley,
radish,
rapeseed,
turnip)**



Strategically...Planning the system

4. NT Corn into a: Biologically active high functioning soil



5. Enjoy The Rewards of Soil Health!



SHMS Keys

- Implementation phase (compaction, residue breakdown slow, N-tie-up following wheat, equipment adjustments balling up residue in drill/planter)
- Planting depth, uniformity of stand important
- Residue Uniformity, PolySkids allow header to run on ground for soybeans without any problems with corn stalks; wheat stubble height, fall grazing on corn stubble
- Reduce weed pressure and disease with canopy & mulch cover, & rotate WS grass, WS broadleaf, CS grass
- Rotate herbicides and crops to minimize weed resistance (water hemp resistance biggest challenge)
- Keep sprayer in top condition (do your own spraying)

SHMS Keys

- Residue cover = money in hot dry conditions (need more residue as biology increases)
- Cover crops, C:N ratio 25, avoid brassica monoculture, limit water use, some years will not use cover crops, canopy and ground cover = less weeds and lower “E” in ET
- Uniform emergence is important (Corn 2-1/2; SB 1-1/2, Sorghum 2”) (deeper than we used to, consider planting dates)
- Fertilizer mgt (gradually need less N fertilizer, split apply N on wheat for yields by first node, P starter for corn and SB, manage pH)

Questions

Mike Kucera Agronomist

