# Module 9 Implementing a Soil Health Management System

Soil Health & Sustainability for Field Employees



"If we are bold in our thinking, courageous in accepting new ideas, and willing to work with instead of against our land, we shall find in conservation farming an avenue to the greatest food production the world has ever known ..."

Hugh Hammond Bennett

1943







# Soil Health Management System

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

Address all four of the soil health principles

**Create a "synergistic" effect** 

**Cropping system specific** 



# Soil Health Management System

#### Achieving soil health through:

- A <u>Quality</u> No-till/ Strip-till System
- <u>Diverse</u> and <u>Strategic</u> Cover Crops
- <u>Adapted</u> Nutrient Management
- <u>Integrated</u> Weed & Pest Management
- <u>Diverse</u> Crop Rotations
- <u>Precision</u> Farming Technology
- <u>Prescriptive</u> Buffers



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

#### **Adapted Nutrient Management**

#### Quality No-Till/Strip-till

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> New Technology and Integrated Weed & Pest Management

Prescribed Cover Crops

Diverse Crop Rotation

#### **Quality No-Till/Strip-till**

#### pted Nutrient Management

echnology and Integrated ed & Pest Management



Prescribed Cover Crops

#### **Diverse Crop Rotation**

## No-Till / Strip-Till

## Planter set-up and maintenance is critical

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## **Poor Structure = Yield Loss**



## **No-Till Planter Attachments**

Less total down pressure is needed



## **Spread the Weight!**

## Spread the Detritus (residue)

#### Quality No-Till/Strip-till

#### **Adapted Nutrient Management**

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

**Prescribed Cover Crops** 

#### **Diverse Crop Rotation**

## Compounding extent of soil degradation and effect on other cycles

### Denitrification:

 Anaerobic conditions cause Losses of N<sub>2</sub>, NO and N<sub>2</sub>O

### 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







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# **Effect of Tillage on Microbial Activity**





## **No-Till Planters**

# With Space Shuttle Tech

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Sense and adapt to field conditions on the go!



Lines

JOH

#### **Quality No-Till/Strip-till**

#### **Adapted Nutrient Management**

New Technology and Integrated Weed & Pest Management

N

NO

#### **Prescribed Cover Crops**

#### **Diverse Crop Rotation**

#### What about Corn?



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

Material			
Rye Straw	82:1	2	
Wheat Straw	80:1	Dea	
Oat Straw	70:1	oył	
Corn Stover	57:1	S S	
Rye Cover Crop (Anthesis)	37:1	d fo	C C C C
Rye Cover Crop (Vegetative)	26:1	00	
Mature Legumes	25:1	Ŭ	
<b>Balanced Microbial Diet</b>	24:1		
Daikon Radish	19:1	Ę	
Crimson Clover	17:1	Cor	
Ryegrass (Vegetative)	15:1	or (	
Young Alfalfa	13:1	d f	
Hairy Vetch Cover Crop	11:1	00	
Soil Microbes (Average)	8:1 —		



# Strategically...CC should complement the following crop ...Which is better?

## **Corn into:**

 High Carbon (Cereals Rye/Wheat)

#### ...or

- High Nitrogen (Protein)
- Cover Crop (Clover/Peas)





## Corn into:

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





Corn after High C (Corn) plus High N (Protein)





## Corn into a mix: High Protein Can Provide:

- Optimum
  Nutrient Release
- Extra water
  During rapid
  demand





## Corn into a mix:

## High Carbon (Rye)

Provides:

- Erosion Control
- Moisture Savings

Uses/ immobilizes:

- Nitrogen/ nutrients
- Disease?

Starter N a must!





- Soybeans do well into a high carbon Cover Crop. ...Why?
- Weed Control, Late Season Water and Nutrient Cycling





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

1. Drill or Aerial Seed Cereal Rye or Annual Ryegrass into Corn Stalks





# Strategically...Planning the System

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







# Strategically...Planning the system

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





# Strategically...Planning the system

3. Plant a low C:N mix into or after Soybean





# Strategically...Planning the system

4. NT Corn into a: Biologically active high functioning

soil





## Strategically... Planning the system

### 5. Enjoy The Rewards of Soil Health!





### Managing for a Living Ecosystem is Key to Optimum Production

"We can take production and conservation further with management systems that continually build Soil Health"

Capture the potential