Introduction to Soil Health

Practical Soil Health Specialist Training
Cortland, NY
September 24th
Soil Health Basics: Who, Why and What

Lesson Objectives

1. Define soil health
2. Understanding how we got to where we are
3. Discuss the importance (why) of soil health in agricultural systems
4. Introduce the Soil Health Management Principles
5. Discuss the field and macro-scale negative consequences (resource concerns) from not adopting SH principles
6. Conduct Demos to reinforce soil health basics
Soil Health What is It?

The continued capacity of the soil to function as a vital living ecosystem that sustains plants, animals, and humans

- Nutrient cycling
- Water (infiltration & availability)
- Filtering and Buffering
- Habitat for Biodiversity (90% is mediated by soil microbes)
- Physical Stability and Support
• Our traditions in agriculture are deeply rooted.
• Early management necessitated working with natural systems.
• As mechanization advanced and scale and intensity grew our management principles became focused on altering natural systems to meet our needs.
Intensive Crop Production
Yields Seem Good
Historic Loss of Soil Carbon

From Lal et al., 1998
Erosion from bare fields into river

Sediment is still the largest water quality pollutant by volume

Oklahoma, October 2012, I-35

Lubbock, Texas Oct. 17, 2011
Why in 2018?

- World population is estimated to be at 9.1 billion by 2050
- To sustain this level of growth, food production will need to rise by 70 percent
- Between 1982-2007, 14 million acres of prime farmland in the U.S. was lost to development

Energy demands:
- Increase use of biofuels (40% of corn used for ethanol)
- Increase use of fertilizer (use of Anhydrous up 48%, Urea up 93%)
- Phosphorous is a finite resource
Challenges

Population growth
Loss of ag soils
Changing climate
Extreme weather
Water quality and quantity
Growing Ag and Mainstream Media Interest

- Missouri Ruralist
- The Furrow
- The Guardian
Soil Health Initiatives in the United States

Soil Health Campaign

[Images of logos and graphics related to soil health initiatives]

United States Department of Agriculture
Agricultural Research Service

Farm Foundation

SOIL RENAISSANCE

SOIL HEALTH INSTITUTE

Land-Grant Colleges and Universities
Characteristics of a Stable Ecosystem

- High Disturbance
- Low Diversity
- High Human inputs
- Disrupted Eco services

Farm or Ranch  
Bacterial Natural Flow of Energy  
Balanced  
Low Disturbance  
High Diversity  
Low Human Inputs  
Highly Functioning Eco services  
Fungal  
Steady State
Mt St Helens 25 years after eruption
This soil is naked, hungry, thirsty and running a fever!

Ray Archuleta 2007
The Fence Row Effect
Agricultural soils do not have a water erosion/runoff problem, they have a water an infiltration problem.
The Battle is Won or Lost Here
Poor soil health leading to erosion and sedimentation reduces the life of conservation practices and increases maintenance costs.

This Wascob was seeded 3x, due to sedimentation.
Alternative water sources & controlled access to stream but no control of grazing time on watershed
After the Storm…

Fall conventional tillage without cover crop

Spring strip tillage with multispecies cover crop

Runoff from two different cropland managements in close proximity and on similar soils after 1” of rainfall in 30 minutes.
Zone tilled in hay/row crops

Continuously plowed for vegetable production
Soil Health Is Understanding How the Soil is Designed to Function and Managing it Accordingly
Understands Soil Function!

Does Not Understand Soil Function!