Healthy Soil or Poor Soil Health: It is all about Soil Organic Matter and its management

Emphasis on Soil Organic Matter Management (Earthworms in a Chile field at Deming, NM)

Healthy Soil (i.e., a diverse Soil Food Web (SFW))

- Topsoil: Your Farm’s Capital
- Slake test
- Water-stable aggregates (soil is from a field using no-till)

Healthy Soil (i.e., a diverse Soil Food Web (SFW))

- Soil Health Planning Principles:
  - Use plant diversity to increase the diversity in the soil biota
  - Keep a living root growing throughout the year
  - Keep the soil covered as much as possible
  - Manage more by disturbing less
  - Livestock integration where applicable

Poor Soil Health (i.e., a bacterial-dominated Soil Food Web)

- Is your soil “In the red”?
- Water-stable aggregates (soil is from a conventionally-tilled field.)

Poor Soil Health

- Excessive Tillage (e.g., moldboard plow & deep disking), fallow & low residue crops results in a poorly-aerated soil and a poor physical environment (e.g., crusting). This leads to a bacterial-dominated SFW and an increase in wind and water erosion, excessive surface runoff, and other problems (e.g., diseases, weeds, nutrient losses, etc.). Poor soil health will have:
  - Lower water-holding capacity
  - Higher evaporation
  - Lower water-use efficiency
  - Higher soil temperature
  - Lower infiltration rate and more runoff
  - Unstable aggregates (refer to slake test photos)
  - Poor drainage/permeability (refer to infiltration demo photos)
  - Poor nutrient cycling (i.e., soil has a bacterial-dominated SFW)
  - Lower drought tolerance
  - Lower buffering capacity

- Soil macro-aggregates, which are formed by the SFW and roots, provide a well-aerated soil and optimum physical environment for a diverse SFW and roots to flourish. A healthy soil will have:
  - Higher water-holding capacity
  - Lower evaporation
  - Higher water-use efficiency
  - Lower soil temperature
  - Higher infiltration rate & less runoff
  - Water-stable aggregates (refer to slake test photos)
  - Good drainage/permeability (refer to infiltration demo photos)
  - Optimal nutrient cycling (i.e., soil has a diverse SFW)
  - Higher drought tolerance
  - Higher buffering capacity

Healthy Soil

- The maintenance of a high degree of aggregation is one of the most important goals of soil management. (Ref.: The Nature and Properties of Soils, 14 Edition revised. Chapter 4)

USDA is an equal opportunity provider & employer

Soil Health Reference: USDA-NRCS -- Unlock the Secrets in the Soil

Earth Castle 1

- From a SFW organisms perspective, which castle would you live in?

Earth Castle 2

- From a SFW organisms perspective, which castle would you live in?

Infiltration demo (Ray the soil guy)

Tillage disrupts ecosystem processes

Low Soil Organic Matter

- Excessive Tillage (e.g., moldboard plow & deep disking), fallow & low residue crops results in a poorly-aerated soil and a poor physical environment (e.g., crusting). This leads to a bacterial-dominated SFW and an increase in wind and water erosion, excessive surface runoff, and other problems (e.g., diseases, weeds, nutrient losses, etc.). Poor soil health will have:
  - Lower water-holding capacity
  - Higher evaporation
  - Lower water-use efficiency
  - Higher soil temperature
  - Lower infiltration rate and more runoff
  - Unstable aggregates (refer to slake test photos)
  - Poor drainage/permeability (refer to infiltration demo photos)
  - Poor nutrient cycling (i.e., soil has a bacterial-dominated SFW)
  - Lower drought tolerance
  - Lower buffering capacity

USDA is an equal opportunity provider & employer

Soil Health Reference: USDA-NRCS -- Unlock the Secrets in the Soil

Earth Castle 1

- From a SFW organisms perspective, which castle would you live in?

Earth Castle 2

- From a SFW organisms perspective, which castle would you live in?

Infiltration demo (Ray the soil guy)

Tillage disrupts ecosystem processes

Low Soil Organic Matter

- Excessive Tillage (e.g., moldboard plow & deep disking), fallow & low residue crops results in a poorly-aerated soil and a poor physical environment (e.g., crusting). This leads to a bacterial-dominated SFW and an increase in wind and water erosion, excessive surface runoff, and other problems (e.g., diseases, weeds, nutrient losses, etc.). Poor soil health will have:
  - Lower water-holding capacity
  - Higher evaporation
  - Lower water-use efficiency
  - Higher soil temperature
  - Lower infiltration rate and more runoff
  - Unstable aggregates (refer to slake test photos)
  - Poor drainage/permeability (refer to infiltration demo photos)
  - Poor nutrient cycling (i.e., soil has a bacterial-dominated SFW)
  - Lower drought tolerance
  - Lower buffering capacity

USDA is an equal opportunity provider & employer

Soil Health Reference: USDA-NRCS -- Unlock the Secrets in the Soil

Earth Castle 1

- From a SFW organisms perspective, which castle would you live in?

Earth Castle 2

- From a SFW organisms perspective, which castle would you live in?

Infiltration demo (Ray the soil guy)