

Soil Health Overview Worksheet

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What Is Soil Health?

- The capacity of soil to function as a living ecosystem that sustains life (NRCS)
- A metaphor used to describe soil functionality & promote stewardship
- Context-dependent: varies across locations, individuals, cultures
- Assessing soil health: choose indicators & outcomes based on the specific soil functions that are relevant for your unique context & management goals

Functional Properties
→ Outcomes of Practices that Build Soil Health
-Indicators of Soil Health

Chemical (aka Soil Fertility)
→ Increasing Plant Essential Nutrients & Carbon in the Soil

- pH
- Soil Organic Matter (SOM)
- Soil Organic Carbon (SOC)
- Cation Exchange Capacity (CEC)
- Available Macro- & Micronutrients
- Electrical Conductivity (EC)

Physical (aka Soil Structure)
→ Improving Water Retention & Resistance to Erosion

- Bulk density
- Infiltration rate
- Penetration resistance
- Aggregate stability
- Water holding capacity
- Water content

Biological
→ Promoting Plant Symbioses & Pathogen Suppression

- Enzyme activity
- Microbial biomass
- Microbial respiration
- Microbial diversity & community composition
- Arthropods, earthworms, nematodes, roots, etc.

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Question 1: Thinking about your own farm and looking at just the **outcomes** (arrows) above, which ones would you like to learn more about? Circle them.

Brief Explanations of Soil Health Indicators

- Chemical
 - Soil Organic Matter (SOM): any material in the soil originally produced by living organisms, total amount of SOM is estimated using SOC
 - Soil Organic Carbon (SOC): the carbon component of organic compounds
 - pH: a scale of alkalinity and acidity that influences nutrient availability
 - Cation Exchange Capacity (CEC): the soil's total negative charges that hold onto nutrient cations (positively charged ions), cation "parking spots"
 - Electrical Conductivity (EC): the ability of soil water to carry an electrical current, indicates soil salinity
 - Nutrients that are essential for plant functioning:
 - Macronutrients are required in higher amounts and include nitrogen, phosphorus, potassium, sulfur, calcium, magnesium
 - Micronutrients are required in lower amounts and include iron, manganese, zinc, boron, molybdenum, copper, nickel, chlorine

- Physical
 - Bulk Density: the dry weight of soil in a given volume, indicates soil compaction
 - Infiltration Rate: how quickly water enters the soil vs. pooling or running off
 - Penetration Resistance: an indicator of soil compaction
 - Aggregate Stability: how well the soil resists water impact & erosion
 - Available Water Holding Capacity: how much plant-available water a soil can hold
 - Water Content: the current status of the amount of water in the soil

- Biological
 - Microbial Biomass: the total amount of living bacteria, fungi, and protozoa
 - Microbial Diversity: the range and variety of different types of microbes
 - Microbial Community Composition: the identity & amount of key groups
 - Microbial Respiration: the amount of carbon dioxide released by microbes
 - Enzyme Activity: microbial proteins that accelerate chemical reactions
 - Nematodes: microscopic, wormlike organisms
 - Active Carbon: the portion of SOM actively involved in nutrient cycling

Question 2: Skimming through these **indicators**, which ones are you considering using to help you understand your outcomes? Put check marks next to your top 3-5, just as a place to start. Put a question mark next to any that you would like to know more about.