IN-FIELD INDICATORS OF HEALTHY SOILS

These soil health assessments can be done in the field using simple tools and your senses.

INDICATOR	CRITERIA

AGGREGATE STABILITY

Promotes water infiltration and storage and creates habitat for soil organisms important in nutrient cycling. Water-stable soil aggregates decrease erosion, surface ponding, and runoff.

Aggregates should:

- Remain intact when submerged in water
- Hold together when wet soils are handled after a rain
- Resist "slaking" or separation of the soil particles

SHI's free smartphone app, Slakes, offers an easy way to measure aggregate stability. Learn more and download Slakes by scanning the QR code with your phone's camera.

RESIDUE BREAKDOWN

Indicates how biologically active soils are.

Residue should:

- Display various stages of decay
- Have minimal residue from older crops
- Cover >70% of the field

Evaluate before full-width tillage. Residue cover can be estimated as shown in this USDA NRCS guide:

WATER INFILTRATION

Ponding indicates poor aggregate stability, surface crusting, degraded soil structure, and/or compaction.

Healthy soils should have:

- No ponding 24 hours after a rain
- No evidence of surface crusting
- No runoff channels
- No soil movement
- Infiltration rates of 1" or more in less than 30 minutes

Comparing your fields to a fence row or other undisturbed areas after rainfall will show how management affects infiltration.

While these indicators can help you assess soil health in the field, the Soil Health Institute has also identified several useful lab measurements. Learn more at **soilhealthinstitute.org/our-work/initiatives/measurements**

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INDICATOR	CRITERIA

SURFACE CRUST

Unstable soil aggregates fall apart when bombarded by rain drops, resulting in a surface crust that can inhibit seedling emergence, reduce infiltration, and increase runoff.

Healthy soils have aggregates that:

- Keep the soil surface from drying out
- Provide a mellow seedbed that ensures good seed to soil contact

Crusting generally shows up after intense rainfall or irrigation on tilled fields with no residue cover. Healthy soils have a surface layer that isn't dense or dried out with cracks.

COMPACTION

Caused by tillage, heavy equipment, or hooves, compacted layers decrease rooting depth and plant growth and create an unfavorable environment for soil organisms, contributing to reduced nutrient and water cycling and poor soil structure.

Healthy soil profiles have:

- Granular or aggregated structure
- Roots that grow straight, with no signs of being restricted
- Water that infiltrates quickly after rainfall or irrigation

Compaction can be evaluated nearly any time of the year using a shovel, knife, or metal rod to identify dense layers in the soil profile. Root structure can be used to assess compaction, provided roots have been growing for a sufficient time.

SOIL COLOR

In general, darker soils contain more organic matter, which is important for all soil functions.

Healthy soils:

- Generally are darker on the surface and transition to a lighter color deeper in the soil profile
- Have topsoil that is easy to distinguish from subsoil

Evaluate by comparing samples from the field with undisturbed areas outside the field boundary.

SOIL BIOLOGY

Soil organisms are instrumental in nutrient and water cycling, pest suppression, and building soil aggregates.

Healthy soils will contain:

- Millipedes, centipedes, pill bugs, and springtails
- Earthworms, channels, and huts
- Fungal hyphae (cobwebs) on residue and/or soil aggregates

Evaluate when soil temperatures and moisture are most suitable, generally in the spring or fall. Larger organisms tend to be found in the top 2" to 4" of the soil.

This card was created by referencing the USDA NRCS Soil Health Technical Note No. 450-06 Cropland In-Field Soil Health Assessment Guide.

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