

# Colorado NRCS Soil Health Cropland Resource Concern Assessment v. 1.8

<b>Date:</b>	7/27/2024	<b>Site Name</b>		Niwot Farms, Home	Kilt Farm	
<b>Your Name:</b>		<b>Crop Rotation:</b>		corn -> corn -> corn		
<b>NRCS Soil type:</b>	Nunn sandy clay loam	<b>Surface Texture, field est.:</b>				
		<b>Soil Moisture (est.):</b>				
Indicator	<i>Least preferred</i>	Indicator Values		Value for Niwot Farms	Value for Kilt Farm	Soil Function
	1	2	3			
<b>Soil Erosion</b>	Evidence of rills and sheet erosion, pedestals, basal roots, or ephemeral gullies observed, sediment build up apparent around fence post	Some rills and evidence of sheet erosion, few pedestals or basal roots observed, evidence of sediment build up around fence row	Absence of rill or sheet erosion, no pedestals or basal roots observed and sediment build up absent from fence row			W, N, D, S
<b>Soil Structure</b>	Coarse blocky structure, platy structure or Structureless and hard rupture resistance	Medium blocky structure, moderately hard rupture resistance	Granular or fine blocky structure, friable rupture resistance			W, N,D, S
<b>Aggregate Stability</b>	<25% of clod remains intact at 5 minutes	25-75% of clod remains intact at 5 minutes	>75% of clod remains intact after 5 minutes			W, N, D, S
<b>Soil Crusts</b>	Surface crust throughout the field, > 5 mm thick	Surface crusts in places, < than 5 mm thick	No evidence of surface crusts			W, S
<b>Compaction</b>	Clear evidence of compacted layer within 12"	Some penetration resistance within 12" depth	No evidence of compaction			W, N, D, S
<b>Residue (thickness &amp; decomposition)</b>	0-25% of surface covered brown, gray, yellow residue; note thickness	25-75% of surface covered brown, gray, yellow residue; note thickness	> 75% of surface covered brown, gray, yellow residue; note thickness			W, D
<b>Roots and Pores</b>	<10% of roots covered in rhizosheaths no pore or root diversity	>10% but <50% of roots covered rhizosheaths, little root and pore diversity	>50% of roots covered in rhizosheaths, diversity of roots and pore sizes			W, D, N
<b>Soil Color and Smell</b>	Light pale or yellowish brown, no color change with depth; smells like mineral	Light brown; slight color change from top to bottom; little to slight earthy smell	Black or dark brown; distinct color change from top to bottom; strong earthy smell			W, D, N
<b>Soil Food Web</b>	No earthworms, very few macroinvertebrates, insects observed	Presence of 1-5 earthworms and macroinvertebrates and insects observed	> 5 earthworms, macroinvertebrates and insects clearly evident			W, D, N
<b>Soil Temperature</b>	Soil surface temperature and soil temperature at 2" differs > 20 °F	Soil surface temperature and soil temperature at 2" differs < 20° F but > 10° F	Soil surface temperature and soil temperature at 2" differs < 10 °F			D, S
<b>TOTAL</b>						

**W**= Regulates and partitions water and solute flow; **N**= Stores and cycles nutrients and carbon; **D**= Sustains biological diversity, activity, and productivity; **S**= Physical stability and support for plants and structures associated with human habitation

**Useful assessment materials:** Shovel, penetrometer or stake flag, clear plastic cups, water, soil thermometer, small 10x hand lens, texture by feel guide, moisture by feel guide, and a residue handbook.

1. Dig a small soil pit to about 12-16" at three representative locations in the field. It is helpful to cut a soil profile slice from the side wall of the small pit and remove for observation (**photo 1** ). Evaluate each soil horizon individually and document depth.
2. Determine the value for each indicator at three locations and record on the sheet. Scores can range from 1 to 3 by increments 0.25. (1.0, 1.25, 1.5, 1.75, 2.0 etc.) Some properties should be evaluated by measured layers, such as soil structure and color.
3. This assessment provides a qualitative soil health assessment that can serve as a management guide. Different management approaches can address the same identified soil health resource concerns and can effect multiple indicators. Soil chemical properties (nutrients, pH, EC) are best determined by using traditional agronomic laboratory methods. Soil health testing being developed, such as Solvita's (SLAN, CO<sup>2</sup> burst, and VAST) should also be considered to better gain an understanding of overall soil function.

**Soil Erosion:** Note evidence of wind or water erosion. Look for residue movement, rills on surface and coppice mounds around fence rows (**photo 2, residue movement scores 1.75** ).

**Soil Structure:** Observe size, shape and grade of soil structure by horizon or layer (**photo 3, blocky structure in surface layer, scores a 1.5** ).

**Aggregate Stability:** Obtain a golf ball sized clod from the surface just below any residue that may be present. Air dry the sample 24 hours or on a warm day place the clod in the windshield of your vehicle for 3 hours. Submerge the clod in water. Note whether the clod remains intact or falls apart after 60 seconds and again after 5 minutes (**photo 4, score of 3 compared to a 1** ).

**Surface Crusts:** Note whether crusts are throughout the field or only in patches. Crusts will remain intact when they are picked up. Measure thickness of crust in mm. Assess after precipitation and before next tillage ( photo 5, continuous soil crust, score of 1 )

**Compaction:** Insert a wire flag or penetrometer to identify depth of soil compaction. Compare the resistance to a known non-compacted area such as near a fence row. Alternatively, use a knife and cut vertically down the side wall of your observation hole. Feel for areas where there is a significant increased pressure in the knife cutting down into the soil or observe where the soil fractures when a shovel slice is removed. Look for J rooting or platy structure (**photo 6, score of 1** ) Assess moist to wet soil.

**Residue Cover:** Estimate the percent of soil surface covered with dead plant material by using a foot transect (**photo 7, scores a 3 > 75% brown residue** ). Make a note about the color of the residue and decomposition rate.

**Roots and Pores:** Observe root and pore sizes from soil peds. Dig around a plant and carefully remove the plant and the root system. Gently shake the plant/roots to remove loose soil. The roots that remain covered in soil (**photo 8, scores 3, 100%** ) have rhizosheaths or soil bound to the root by biological glues. Make a note of the % of the roots that remain covered in soil.

**Color and smell:** Observe depth of soil color change and if the soil color lightens with depth. Break open a clod from the top soil and smell the soil. Note whether the soil smells more earthy or like inert mineral.

**Soil Food Web** - Earthworms: Look for signs of worms such as their casts (**photo 9a** ) or holes (**photo 9b** ) or in the form of little piles of soil, mineral particles, or organic matter. Assess moist to wet soil for worms . Casts can be seen in dry soil. Fungal hyphae will appear as white to light tan threads or masses (**photo 9c** ) . Also look for invertebrates and insects such as mites, springtails, millipedes, roundworms, beetles, spiders and termites.

