

# Soil Health Key Points



## What's critical about soil health now?

1. World population is projected to increase from 7 billion in 2013 to more than 9 billion in 2050. To sustain this level of growth, food production will need to rise by 70 percent.
2. Between 1982–2007, 14 million acres of prime farmland in the U.S. were lost to development.
3. Improving soil health is key to long-term, sustainable agricultural production.

## Soil health matters because:

1. Healthy soils are high-performing, productive soils.
2. Healthy soils reduce production costs—and improve profits.
3. Healthy soils protect natural resources on **and** off the farm.
4. Franklin Roosevelt's statement, "The nation that destroys its soil destroys itself," is as true today as it was 75 years ago.
5. Healthy soils can reduce nutrient loading and sediment runoff, increase efficiencies, and sustain wildlife habitat.

## What are the benefits of healthy soil?

1. Healthy soil holds more water (by binding it to organic matter), and loses less water to runoff and evaporation.
2. Organic matter builds as tillage declines and plants and residue cover the soil. Organic matter holds 18-20 times its weight in water and recycles nutrients for plants to use.
3. One percent of organic matter in the top six inches of soil would hold approximately 27,000 gallons of water per acre!
4. Most farmers can increase their soil organic matter in **three to 10 years** if they are motivated about adopting conservation practices to achieve this goal.

## How to begin your path to Healthy Soils:

1. Keep it covered.
2. Do not disturb.
3. Use cover crops and rotation to feed your soil.
4. Develop a **soil health management plan** with the help of NRCS.

## Follow four basic soil health principles to improve soil health and sustainability:

1. Use plant diversity to increase diversity in the soil.
2. Manage soils more by disturbing them less.
3. Keep plants growing throughout the year to feed the soil.
4. Keep the soil covered as much as possible.

## What is a Soil Health Management Plan?

1. It's a roadmap to soil health.
2. It outlines a system of practices needed to enhance crop production and soil function, and improve or sustain water quality, air quality, energy efficiency and wildlife habitat.  
Some of the recommended conservation practices include: Conservation Crop Rotation, Cover Crops, No Till, Mulching, Nutrient Management, and Pest Management.
3. It provides environmental, economic, health, and societal benefits.
4. It **saves energy** by using less fuel for tillage, and maximizes nutrient cycling.
5. It **saves water** and increases drought tolerance by increasing infiltration and water holding capacity as soil organic matter increases.
6. It **reduces disease** and pest problems.
7. It **improves income sustainability** for farms and ranches.
8. It **improves plant health**.



# unlock the secrets in the soil basics & benefits



**Healthy, fully  
functioning soil is  
balanced to provide  
an environment  
that sustains and  
nourishes plants,  
soil microbes and  
beneficial insects.**

Managing for soil health is one of the most effective ways for farmers to increase crop productivity and profitability while improving the environment. Positive results are often realized within the first year, and last well into the future.

## **Soil Health**

Soil is made up of air, water, decayed plant residue, organic matter from living and dead organisms, and minerals, such as sand, silt and clay. Increasing soil organic matter typically improves soil health since organic matter affects several critical soil functions. Healthy soils are also porous, which allows air and water to move freely through them. This balance ensures a suitable habitat for the myriad of soil organisms that support growing plants.

It's not difficult to improve soil health. Here's how: till the soil as little as possible; grow as many different species of plants as possible through rotations and a diverse mixture of cover crops; keep living plants in the soil as long as possible with crops and cover crops; and keep the soil surface covered with residue year round.

## Soil Health Benefits

Farmers who manage their land in ways that improve and sustain soil health benefit from optimized inputs, sustainable outputs and increased resiliency. Healthy soils benefit all producers – managers of large, row crop operations to people with small, organic vegetable gardens. Healthy soils provide financial benefits for farmers, ranchers and gardeners, and environmental benefits that affect everyone.

Healthy soils lead to:



**Increased Production** – Healthy soils typically have more organic matter and soil organisms which improve soil structure, aeration, water retention, drainage and nutrient availability. Organic matter holds more nutrients in the soil until the plants need them.



**Increased Profits** – Healthy soils may require fewer passes over fields because they are only minimally tilled and they aren't over-reliant upon excessive nutrient inputs to grow crops. Healthy soils can increase farmers' profit margins by reducing labor and expenses for fuel, and optimizing inputs.



**Natural Resource Protection** – Healthy soils hold more available water. The soil's water-holding capacity reduces runoff that can cause flooding, and increases the availability of water to plants during droughts. Good infiltration and less need for fertilizers and pesticides keep nutrients and sediment from loading into lakes, rivers, and streams. Groundwater is also protected because there is less leaching from healthy soils. Additionally, fewer trips across fields with farm machinery mean fewer emissions and better air quality.

## Soil Health Management Systems

Implementing Soil Health Management Systems can lead to increased organic matter, more soil organisms, reduced soil compaction and improved nutrient storage and cycling. As an added bonus, fully functioning, healthy soils absorb and retain more water, making them less susceptible to runoff and erosion. This means more water will be available for crops when they need it. Soil Health Management Systems allow farmers to improve profitability because they spend less on fuel and energy while benefiting from the higher crop yields resulting from improved soil conditions.

Contact your local NRCS office to learn more about Soil Health Management Systems and the technical and financial assistance available to help "Unlock the Secrets in the Soil."





# unlock your farm's potential discover the cover



## **Biodiversity increases the success of most agricul- tural systems.**

Biodiversity helps to prevent disease and pest problems associated with monocultures. Using cover crops and increasing diversity within crop rotations improves soil health and soil function, reduces costs, and increases profitability. Diversity above ground improves diversity below ground, which helps create healthy productive soils.

## **Cover Crops**

Cover crops can be an integral part of a cropping system. Cover crops can be managed to improve soil health, as they help to develop an environment that sustains and nourishes plants, soil microbes and beneficial insects.

Cover crops are typically planted in late summer or fall around harvest and before spring planting of the following year's crops. Examples of cover crops include rye, wheat, oats, clovers and other legumes, turnips, radishes, and triticale. Planting several cover crop species together in a mixture can increase their impact on soil health. Each cover crop provides its own set of benefits, so it's important to choose the right cover crop mixture to meet management goals.

## Cover Crop Benefits



**Restoring Soil Health** – Cover crops help increase organic matter in the soil and improve overall soil health by adding living roots to the soil during more months of the year. Cover crops can improve water infiltration into the soil. Deep-rooted crops like forage radishes create natural water passages. Legume cover crops serve as natural fertilizers while grasses scavenge nutrients that are often lost after harvest or during winter.



**Natural Resource Protection** – Along with crop residue above ground, cover crops protect the soil against erosive heavy rains and strong winds. Cover crops trap excess nitrogen, keeping it from leaching into groundwater or running off into surface water – releasing it later to feed growing crops.



**Livestock Feed** – Cover crops can provide livestock producers with additional grazing or haying opportunities.



**Wildlife Habitat** – Cover crops provide winter food and cover for birds and other wildlife. During the growing season, they can provide food for pollinators.

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# unlock your farm's potential do not disturb



## If soil health is your goal, till as little as possible.

Tillage can destroy soil organic matter and structure along with the habitat that soil organisms need. Tillage, especially during warmer months, reduces water infiltration, increases runoff and can make the soil less productive. Tillage disrupts the soil's natural biological cycles, damages the structure of the soil, and makes soil more susceptible to erosion.

### Benefits of Reduced-Till/No-Till




**Aiding in Plant Growth** – Soils managed with reduced/no-till for several years contain more organic matter and moisture for plant use. Healthy soils cycle crop nutrients, support root growth, absorb water and sequester carbon more efficiently.



**Reducing Soil Erosion** – Soil that is covered year-round with crops, crop residue, grass or cover crops is much less susceptible to erosion from wind and water. For cropping systems, practices like no-till keep soil undisturbed from harvest to planting.



**Saving Money** – Farmers can save money on fuel and labor by decreasing tillage. Improving nutrient cycling allows farmers to potentially reduce the amount of supplemental nutrients required to maintain yields, further reducing input costs.

A simple green leaf icon with three leaves on a stem.

**Providing Wildlife Habitat** – Crop residue, grass and cover crops provide food and escape for wildlife.

## Production Inputs

Soils can be disturbed if inputs are not applied properly, potentially disrupting the delicate relationship between plants and soil organisms. Soil Health Management Systems help minimize that potential disturbance, while maximizing nutrient cycling, which can lead to greater profitability for producers.

## Livestock Grazing

Improperly managed grazing can disturb the soil. There are several ways to graze livestock to reduce environmental impacts. For example, implementing a rotational grazing system instead of allowing livestock to continuously graze pasture allows pasture plants to rest and regrow.

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Soil Health Management Systems allow farmers to enjoy profits over time because they spend less on fuel and energy while benefiting from the higher crop yields resulting from improved soil conditions. Healthy soils also provide a buffer for precipitation extremes (too wet or too dry).

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