

A Case for Soil Health

Managing for soil health leverages natural processes to keep soil and nutrients on the ground, and to maintain and even enhance soil productivity for agriculture. Healthy soil is a win-win for both production agriculture and environmental quality.



Field-Tested Science

The U.S. Department of Agriculture's Natural Resources Conservation Service defines soil health as "the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans."

The biology, physics and chemistry of the soil impact plant growth, crop resilience, yields at harvest and long-term earning potential. Management with soil health in mind seeks to optimize these soil factors for positive outcomes by using practices like conservation tillage, nutrient management, cover crops and crop rotations.

A few of the advantages of healthy soil can include:

- **Reduced erosion and soil loss**—Direct comparisons of soil erosion under conventional and no-till methods show that no-till practices reduce soil erosion up to 1,000 times more effectively.¹
- **Nutrient use efficiency and retention**—When legumes (e.g., clover) and/or brassicas (e.g., turnip, radish) follow corn or wheat, they help to decompose residues, making nutrients available to the next season's crop.²
- **Farm resilience with weather variability**—Increasing water holding capacity by building soil organic matter can decrease variability in yields by 20 percent.³
- **Improved water utilization and management**—More soil organic matter can improve water retention by increasing infiltration rates and improving soil structure. Water holding capacity can more than double when soil organic matter increases.⁴



Landowner Advantage

- Decreased erosion and soil loss
- Improved percentage of organic matter in soil
- Decreased variability in productivity over time



Farmer Advantage

- Nutrient use efficiency
- Better crop health and weed suppression
- Improved water retention



A Case for Soil Health

Conservation Approach

Soil health can be achieved through the use of one or more practices like the ones outlined below.

Cover Crop

Cover crops are planted during or after harvest to keep living roots in the soil through most of the year. Cover crop species may include grasses (like annual ryegrass and spring oats) or legumes (including hairy vetch or red clover). Cover crops are either killed by cold temperatures or are terminated by the operator in the spring.

No-Till

Soil structure and biological cycles can be disrupted through tillage. No-till or low-till allows crop growth with less soil disturbance, which can lead to better plant growth and decreased erosion.

Nutrient Management

Nutrient management seeks to manage soil nutrients and nutrient amendments to meet crop production needs while minimizing the impact on the environment. Regular soil testing can allow both the owner and operator to understand the locations of high- and low-nutrient areas on the farm. With this knowledge, nutrient planning and precision agriculture—a suite of tools that can improve efficiencies and resource use—can be applied to achieve optimal economic and conservation returns.

Resources

Natural Resources Conservation Service (NRCS) Soil Health Page
<https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>

Soil Health Institute
<http://soilhealthinstitute.org/>

1. Montgomery, D. (2007) *Soil erosion and agricultural sustainability*. PNAS 104 (33).
<http://www.pnas.org/content/104/33/13268.abstract?tab=author-info>
2. USDA NRCS. (2011). *Carbon to Nitrogen Ratios in Cropping Systems*. USDA NRCS East National Technology Support Center. Greensboro, North Carolina.
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1166766.pdf
3. Williams A., Hunter M.C., Kammerer M., Kane D.A., Jordan N.R., Mortensen D.A., et al. (2016) *Soil Water Holding Capacity Mitigates Downside Risk and Volatility in US Rainfed Maize: Time to Invest in Soil Organic Matter?* PLoS ONE 11(8): e0160974. <https://doi.org/10.1371/journal.pone.0160974>
4. USDA NRCS. (2014). *Sustainability Grows in Healthy Soil*. NRCS Webpage.
<https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>

“I want our tenants to understand our goals for the land so we can work as a team to care for it. They have to know we care. After I explained that to one of our tenants, he said he was so glad to work with us, because he shared the same goal of land stewardship.”

*Ruth Rabinowitz
Farmland owner*

“These practices enable me to apply nutrients more efficiently, which saves me money, and they help improve water infiltration, which stops my soil from eroding. My soil structure has changed for the better.”

*Tim Smith
Farm owner/operator*

“We feel [cover crops] have been successful, that we’re getting results, and our grandsons are thinking they’re a good thing to do, too. It will help keep the farm in good order for future generations.”

*Marilyn Geidel
Farmland owner*

Read more success stories like these at the NRCS webpages “Profiles in Soil Health” and “Conservation Showcase.”

The Nature Conservancy 

nature.org/farmland
farmland@tnc.org
(317) 643 0906

PURDUE
UNIVERSITY