

*"A nation that destroys its soil, destroys itself."*

—FRANKLIN ROOSEVELT



A shovel full of earth worms is one way farmer Bob Garey can tell that his soils are healthy.

# Our Connection to Soil

**D**EMOGRAPHERS TELL US there will be nine billion people on this planet by 2050. Farmers will need to produce as much food in the next 40 years as they have in the last 500 – and they will need to do it without forcing an environmental and energy toll that will deplete our natural resources.

In comes soil, the material in which our food supply begins. Soil is the factory for our food and the foundation of sustainable agriculture. The microsystems that exist in the soil need to be teeming with life to be able to give life and energy to plants, insects, wildlife and humans. "Healthy soils sustain a diversity of plant and soil organisms, which in turn attract and increase wildlife throughout the entire food web," said Wayne Lehman, DNREC's Division of Fish and Wildlife Regional Manager.

Being able to feed the world sustainably – especially with exponential population growth – requires healthy and productive lands, which is why keeping our soils healthy is so important. What you may not know is that the top inch of soil, where most plant life is made,

BY DASTINA WALLACE

*Photos by Dastina Wallace  
and Clarissa Havelo*

Soils that are crumbly, dark and loose are models of good soil structure and high in organic matter.





**Tillage destroys organic matter and soil structure; no-till reduces runoff and increases water infiltration and soil productivity.**

isn't replaceable by Mother Nature in your lifetime — or your children's lifetime. It takes approximately 500 years to create one new inch of top soil.

It may be true that most people leave the majority of the growing and harvesting to the farmers and gardeners, but everyone, including wildlife enthusiasts, anglers, bird watchers, hunters and others depend on the health of the soil. Those who are growing for soil health are benefitting wildlife, water quality, food productivity and more — now and for the generations to come.

### Discovering the Cover

Leaving the soil in the best shape possible has always been a goal for Chip Baker in Sussex County. He's been farming for 40 years. He grew up farming, learning the ropes from those who came before him. "In my generation, the tradition was to not plant in the fall to give the soil a rest to improve it—that's just the way it was and that's what I did," said Baker. He left the ground uncovered during the winter months. And "keeping the land pretty," which was also traditional, meant tilling up the crops and leaving no residue.

What Baker didn't realize until much



**Earth worms are a clear indicator of healthy soils as earthworms add porosity to the soil to allow air and water to move through.**

later is fields that are covered in crops year-round, even during the winter season, provide a tremendous amount of benefits compared to a field left fallow.

"If we had known 25 years ago what we know now, then that's what we would've been doing," said Baker. "This has changed the way I farm for good."

Cover crops are planted in late summer or fall around harvest and left to cover the ground before spring planting of the following year. In the last couple of

years, Baker has planted cover crops on his 1,000-acre corn and soybean operation — keeping his ground covered all year around.

Growers who go with cover crops are increasing organic matter by keeping in a living root, they're improving water infiltration with deep-rooted crops, they're protecting the soil against erosive heavy rains and winds, and they're providing winter food and cover for birds and other wildlife, among other benefits.

Jon Stika, a resource soil conservationist with the USDA Natural Resources Conservation Service (NRCS), notes that many soil health practices protect wildlife in addition to natural resources. One such practice, crop residue use, provides immediate benefits to wildlife. "Leaving crop residue in the field — particularly standing residue from corn, provides protection to turkeys, Canada geese and small animals from predators," he said. Crop residue becomes an available food source as wasted grain or insects living in the residue can feed the birds and other small animals.

"Bare soil to wildlife is kind of like a desert. Very little cover, very little food," said Stika.

"During Delaware's stressful, cold winter days, many wildlife species of songbirds and mammals depend on crop residue for survival," said Lehman. "The most impacted species include Canada geese, bobwhite quail, cottontail rabbits, deer, squirrels and raccoons."

### Healthy soil? Check for Worms

An easy way to gauge your soil's health is to check for earthworms. Their presence is usually an indicator of a healthy system. Earthworm burrows add a great deal of porosity to the soil, allowing air and water to move in the soil.

Earthworms reproduce by size — the bigger they get, the sooner they reproduce. Healthy soil systems increase diversity below ground, which improves availability of food for earthworms. That allows them to feed more frequently and reproduce quickly. In addition, cover keeps the soil cooler and moister. In moist conditions, earthworms will move up closer to the topsoil, where more food is available — aiding in reproduction. Soils that are dry and uncovered

ultimately slow the rate in which earthworms reproduce.

### Do Not Disturb the Soil

“Tillage is incredibly destructive to the soil structure and to the soil ecosystem,” said Barry Fisher, an NRCS soil health specialist. “In healthy soil you have 50 percent air and water – which is made possible by the porousness in the soil – and 50 percent mineral and organic matter. But tillage collapses and destroys that structure, making the soil vulnerable to erosion and compaction,” he said.

“Additionally, studies have shown that each tillage pass can release a half an inch of soil moisture from each acre. In short, tillage tends to limit the availability of water in the soil,” Fisher said. “And that could prove very costly during those long, summer dry spells.”

Kent County farmer Robert “Bob” Garey has been farming in some capacity for almost 40 years. He recently started using cover crops, but learned about the benefits associated with minimal disturbance when he began no-tilling more than two decades ago. In his fields where he’s not tilled for 25 years, he notices that the soil holds more moisture and the soil is more productive, which has led to increased yields. No-till planting reduces the number of times equipment passes on



**Chip Baker (left) and NRCS District Conservationist Thelton Savage observe Baker’s no-till corn, which is covered in no-till residue that helps prevent soil erosion from heavy rains and wind.**

the field. This decreases the probability that equipment will disturb nesting birds and their young.

Garey also cautions that there is a bit of a learning curve when farming for soil health management versus traditional methods. “Traditional solutions that you would have for weeds as an example,

would include tillage. Well, that’s not healthy in a soil health management system,” Garey said. “Randomly applying a practice here and there isn’t profitable or sustainable for future generations. If you encourage people to do it, and they don’t do it right, then it won’t work.”

### Soils need our help to be healthy

While managing for improved soil health doesn’t have to be expensive, it does require resources and some instruction. According to Sally Kepfer, NRCS State Resource Conservationist in Delaware, farmers should use a suite of conservation practices, like no-till and diverse cover crops. “The practices we’re encouraging farmers to implement are keeping living plants in the soil as long as possible and keeping the soil surface covered with residue year round.”

Backyard and large-scale production growers who rotate their crops are multiplying the benefits of soil health. Crop diversity prevents disease and pest problems associated with monocultures. It also increases the choices of insects for wildlife and their diet as different insects harbor in different crops.

Everyone with even a small plot can do their part to improve and protect their soil by not disturbing it and allowing dead vegetation to decompose. Using native plants can aid in controlling pests by attracting pollinators that feed on harmful insects. Adding compost, especially worm compost, can help by making soil ecosystems more robust.

Healthy soil is the connector from the ground into our daily lives. It affects us all. While the world’s growing population depends on healthy soil for sustainability, so does plant life, wildlife, water quality and more.

To find out more about managing for soil health, visit [www.de.nrcs.usda.gov](http://www.de.nrcs.usda.gov) or contact your local USDA Service Center. In Sussex County, call 302-856-3990, ext. 3; in Kent County, call 302-741-2600, ext. 3; and in New Castle County, call 302-832-3100, ext. 3. **OD**

DASTINA WALLACE IS A PUBLIC AFFAIRS SPECIALIST WITH THE U.S. DEPARTMENT OF AGRICULTURE’S NATURAL RESOURCES CONSERVATION SERVICE IN DELAWARE.

## 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 not tilled or 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 going into lakes, rivers and streams. Surface and ground water are also protected because there is less leaching and runoff from healthy soils. Additionally, fewer trips across fields with farm machinery mean fewer emissions and better air quality.