SOIL HEALTH INSTITUTE

Enriching Soil, Enhancing Life

Can soil health practices provide more water for crops during a drought?



This tool is for you if:

- You're exploring how soil health practices like no-till and cover crops can increase drought resilience
- You're curious about the benefits you might see during a drought year for your fields with soil health management

Drought costs U.S. farmers over $4 billion in lost yields annually. With climate patterns becoming more unpredictable, understanding your soil's drought resilience is essential.

Healthy soil holds more water, uses it more efficiently, and supports stronger crop yields, which is especially helpful during dry years. The **Soil Health Institute's Drought Resilience Calculator (DRC)** models how soil health practices that increase residue cover and soil carbon can improve water cycling on farms and provide protection against drought.

The DRC helps growers, advisors, and conservation professionals understand how soil health management can improve plant water availability at any location the user selects. It does this by analyzing the growing-season water cycle with local weather data.

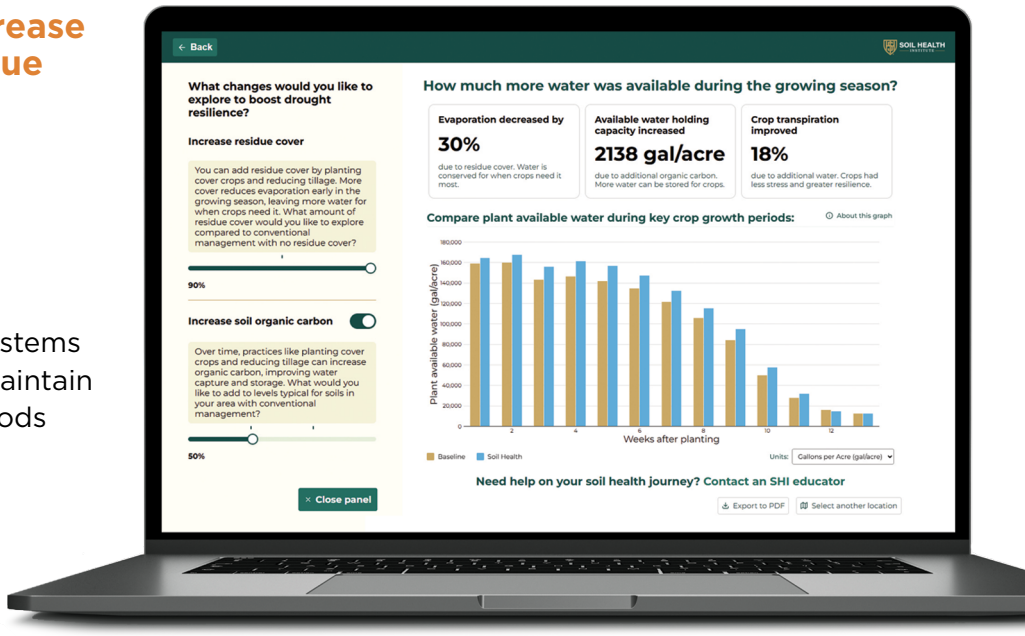
The DRC compares:	
Conventional Management	**Soil Health Management**
Minimal residue cover	Higher residue cover
Baseline soil organic carbon	Higher soil organic carbon
Conventional tillage	Reduced/no till practices and winter cover crops

How does soil health increase drought resilience?

- Organic matter, as measured by Soil Organic Carbon (SOC), improves soil structure, allowing the soil to hold more water.
- Residue cover reduces evaporation from the soil, so less water is lost to the atmosphere before crops can use it. It also helps maintain soil structure by reducing crusting and compaction.
- Soil health practices shift more of the total water in the soil toward transpiration — water pulled from the soil to support plant growth — helping crops stay productive during dry periods.

Soil health practices that increase soil organic carbon and residue cover translate to:

- More water stored in the root zone and accessed by plants
- Greater access to usable water throughout the season
- Improved resilience, as cropping systems recover better from drought and maintain productivity longer during dry periods



How does soil health increase drought resilience?

It's simple!

1. **Select a location**
2. **Select a crop and planting date**
3. **Select a change in soil organic carbon and residue cover to model**

The DRC then analyzes what will happen to your farm's soil water holding capacity if **soil organic carbon** increases by 25%, 50%, 75%, and 100%. The model evaluates residue covers of 30%, 60%, and 90% — levels commonly achieved with reduced tillage and winter cover crops.

The DRC uses soil and weather data to run simulations and calculate weekly plant available water and changes in evaporation and transpiration during the growing season. You can view and save your results or test other changes.

NOTE: *The DRC uses historical weather patterns and soil characteristics to simulate water cycling outcomes. While results represent modeled scenarios based on decades of scientific research, actual outcomes will vary based on your specific field conditions, weather patterns, management practices, and other factors. The DRC is intended to inform decision-making by illustrating the potential benefits of soil health management practices.*

Understanding Your Results

The DRC's custom report illustrates the weekly differences in plant available water between a Baseline/Conventional Management System and a Soil Health Management System. The example above shows a 90% residue increase and 50% soil carbon increase throughout the maize growing season.

What does this mean for your farm?

In this example, soil health practices provided crops with additional water throughout the growing season — including periods when water stress reduced yields.

Ready to explore what soil health could do for your farm's drought resilience?

Try the Drought Resilience Calculator at **drc.soilhealthinstitute.org**.

The Drought Resilience Calculator was supported by the generosity of Cargill.

