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Standing Up to Drought

No-till, cover crops build resilient soil for managing water

By Janelle Atyeo

South Dakota farmers slogged through two wet years before the rain shut off in the middle of the last growing season. Now a warm start to winter without much snow cover has farmers heading into the next crop year short on moisture.

But soil health farmers aren't worried. They've built resilience into their soils so they can make the best use of the moisture they get.

Brian Johnson farms near Frankfort in the middle of eastern South Dakota. He grows all his crops without irrigation. He can't control how much water they get, but he doesn't worry about it. Instead, he has faith that no-till practices, residue cover and soil health will get his crops through dry cycles.

"When you eliminate water as a variable in whether you're going to be able to grow a crop or not, that's a huge stress relief," said Johnson, who serves on the South Dakota Soil Health Coalition board of directors. North central South Dakota picked up a foot of snow in October, but the winter months have continued the last year's dry pattern. Selby producer and South Dakota Soil Health Coalition Board Member Doug Sieck says he's not in his comfort zone when it comes to soil moisture.

That said, his 2020 crop pulled through, and his pastures did well. It's a stark contrast from the way farmers used to talk in the 1980s.

"It was common for folks in my neighborhood, on a dry year, to make the comment, 'Well, I hope the corn gets tall enough to cut for silage,'" Sieck said.

The dynamic changed after he and many neighbors started no-till management in the 1990s, he said. Since then, only the extremely dry 2006 season saw a corn crop failure.



Dale Strickler displays soil from two fields. The one on the left has been tilled since shortly after the Civil War. The other has been no-tilled and cover cropped for 25 years. Photo courtesy of Dale Strickler.

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Building Resilience: Soil Health and Stress Reduction

Producers who focus on soil health management report greater confidence in their systems and less stress. They build resilience into their operations so that wide weather swings are less worrisome.

Read the article on Page 4 to learn more.



These two photos were taken in fields across the road from each other. Tilled soil on the left is powder dry. No-till soil on the right with ample residue cover has enough moisture to squeeze liquid out of a soil ball in the hand. Photo courtesy of Dale Strickler.

Sieck credits that resilience to minimal soil disturbance and better soil structure that holds moisture until plants need it.

“No-till combined with diversity in rotation are the two biggest tools that decreased our drought risk,” he said.

As a cattle producer, he’s encouraged to have a drought plan in place that tells him when to cull cows if dry conditions are persisting. Sieck thinks farmers need the same sort of plan, but action on it needs to be pre-emptive.

He and the Johnsons have spent decades building resilient soils, but skipping the tillage pass in a dry cycle can have immediate benefits on any field.

“Don’t do anything to promote water evaporation,” advises Anthony Bly, soils field specialist with South Dakota State University Extension.

Where a tilled field might readily absorb water, it does so for only a brief time before silty particles create a hard crust that water can’t penetrate. Leaving the soil undisturbed and adding diversity lets a healthy community of microbes create soil structure that will allow water to infiltrate, which is ultimately what makes soil more resilient.

“The no-till helps. You’re not down in there tearing their house apart,” Sieck said.

Undisturbed soil and residue from the previous crop build organic matter, which is important for water storage, Bly added. On the surface, residue creates a sort of armor that helps reduce evaporation and erosion.

Cover crops can do even more to help. They keep a living root in the soil past harvest time. They feed the microbiome that’s at work underground building healthy soils and add a diversity of rooting patterns, Bly explained. Soybeans have a taproot, corn roots are fibrous, and small grains are fibrous but more distributed. Cover crops fill in a gap there, Bly said.

Sorghum Sudan grass is good summertime cover, according to agronomist Dale Strickler, who works with Green Cover Seed in south central Nebraska and has written the books “Managing Pasture” and “The Drought-Resilient Farm.”

“Sorghum Sudan has more biomass above ground and below ground than any other annual crop,” he said, adding that it will generate more pounds of forage than anything else for producers looking to supplement livestock feed.

It’s hard to beat the growth cereal rye and triticale cover crops can put on in the winter months, he said, and they have massive root systems.

Those roots make pathways — macropores — where water can filter through the soil. Pores need to be open to the soil surface to get the benefit of water infiltration, Strickler said. Tillage closes those pores.

He equates it to snorkeling: “There’s a big difference between having your snorkel above or below the surface.”

Last year’s dry conditions kept Bly from planting many cover crops after corn and soybeans on his southeastern South Dakota farm. He didn’t want them using any moisture reserves he’d need for his next cash crop; although, he did plant covers after his wheat and oats were harvested.

Understanding your soils and their water holding capacity is important to planting plans. It’s like managing your bank account, he said.

Cover crops are an investment. Starting out is tough, especially in a dry period, Strickler said, but it pays off in subsequent years with better infiltration, better water holding capacity and less evaporation.

A typical cover crop leaves an average 1.5 inches less moisture at termination, according to several studies, Strickler said.

“It only takes one good rain to replenish that inch and a half,” he said. “The cover crop soil usually catches up very rapidly, and once caught up, you stay ahead.”

Strickler believes farmers can do a better job of using the resources they already have. He recalled driving through southwestern Kansas during the drought year of 2012. He saw a tractor at work feeding hay bales on a buffalo grass pasture that was nothing but dirt. On the other side of the fence was a sprayer knocking out 3-foot pigweeds and crabgrass in the wheat stubble. There were about 3 tons per acre of nutritious feed out there, he estimated, but producers aren’t used to looking at weeds and stubble as potential feed sources.

“Thousands of dollars could be saved by opening a gate,” he said.

Johnson, the farmer from Frankfort, said there are resources for producers looking to learn more about how to improve their operation’s ability to withstand weather extremes. The South Dakota Soil Health Coalition website at www.sdsoilhealthcoalition.org has a Healthy Soils Handbook that serves as a technical resource. You can also connect with experienced producers throughout the state by tapping into the Mentor Network.

“We’ve got lots of resources there so you’re not starting from square one,” Johnson said.

Membership Minute: Mike Blaalid

Mike Blaalid operates Big Blue Cattle Co., a custom grazing operation, on 100 percent leased land near Alexandria, S.D., in Hanson County. He has almost completely shifted his operation to managed grazing. That allows him to rest the areas of his pasture that need it the most and gives him the flexibility to use the plants when they are the most nutritious.

On the farmland he started renting for this year, he planted rye on half the acres to graze, and the rest will be planted with a season-long cover crop – with the hope of double cropping 75 percent of the acres.

Right now, Blaalid is focused on the nutrient cycle. It's circular, he says, and he's trying his best not to break it.

"We need to take a hard look at our ag operations and make sure we are heading in the right direction," Blaalid said. "Constantly challenging your operation's goals and objectives is a good litmus test. Find the weak links and move towards repairing them. Poor soils didn't get that way overnight and didn't become degraded by managing them properly."



Mike Blaalid carefully manages the grazing of his pastures so he can rest the grass that needs it. Courtesy photo

Resources for Drought Planning

With the entire state in some level of drought, it's time to start planning for a potentially dry growing season.

Fortunately, the Natural Resources Conservation Service has some tools to help with such planning. The South Dakota Drought Tool can help you figure out if your precipitation is above or below normal and whether or not your stocking or rotation plans need to change accordingly. The South Dakota Grazing Tool gives you stocking rates based on the land you want to graze and production values. To download these tools visit www.nrcs.usda.gov/wps/portal/nrcs/main/sd/technical/landuse/pasture/.

Producers can also contact NRCS staff for specific help in planning for drought and more. NRCS staff also work with partners like the South Dakota Soil Health Coalition and South Dakota Grassland Coalition to help producers find solutions to real-world problems.

The 2021 Grasslands Planning Calendar is both a physical and online calendar with planning recommendations throughout the year. Learn more at www.indianag.org/21calendar.

The National Oceanic and Atmospheric Administration Climate Prediction Center can provide some clues as to what weather conditions will be like for the next month. Learn more at www.cpc.ncep.noaa.gov.

Mesonet at SD State is a system of weather stations throughout the state that offers current weather data including soil temperature. Learn more at climate.sdstate.edu.

Producers can find alternative grazing opportunities for their livestock or offer land for grazing at the South Dakota Grazing Exchange. Learn more at www.sdgrazingexchange.com.

Upcoming Soil Health Events

[March 15](#)

Willow Creek Watershed
'Every Practice Counts'
Project Kickoff
Baltic, SD

[March 16](#)

Beginning Producer
Workshop
Online

[March 16](#)

Tuesday Night Live
Calving Discussion
Online

[March 17](#)

Diversity Tools and
Salinity Discussion
Online

[March 17-18](#)

National Cover Crop
Summit
Online

[March 23](#)

Tuesday Night Live
Calving Discussion
Online

[March 24](#)

Five Principles Tools
and Road to Travel
Discussion
Online

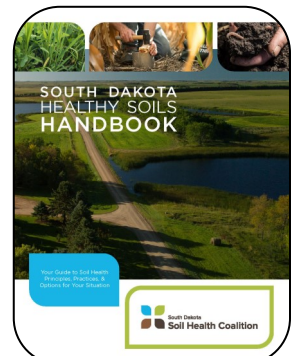
[April 8](#)

SDSHC Board Meeting
Online

[August 25-27](#)

2021 Soil Health School
Mitchell, SD

Access Our Events
Calendar [HERE](#).



Soil Health Producers Have More Confidence in Their Systems

By Lynn Betts

As concerns continue to build about a widespread drought across South Dakota this year, the state's farmers and ranchers face yet another stressful year. Two exceptionally wet years in 2018 and 2019 followed by this year's expected dry weather is an unwelcome signal that wide weather swings may be becoming the norm.

The question for producers is what they can do to prepare for the extremes and the stress such weather swings bring. While not completely stress-free, the farmers and ranchers who are using practices to build healthier soils believe they have at least part of the answer: You can build resilience to both drought and extremely wet weather through your soil.

Kyle Schell, a fourth-generation rancher on the Cheyenne River near Wasta in western South Dakota, says building high soil organic matter levels is the key. "If we can get those soil organic matter levels up, having that organic matter there to manage rainwater when it comes and then hold it there when it's dry," Schell says, "we can get some kind of production off that ground every year, no matter what the weather throws at us."

"This is exactly what we need to be doing to get through these weather extremes," Frankfort, S.D., farmer Brian Johnson said of his soil health practices, after he was able to plant nearly all his fields through the wet weather in 2019. "We had a really good crop, and it confirmed to us what we're doing can withstand the weather extremes. My stress level is significantly less than it used to be."



Crystal and Levi Neuharth and their family check the diversity of plants in their pasture. They say both their cropland and grassland recover more quickly and efficiently with healthier soils, handling weather extremes better than in the past. Photo courtesy of USDA-NRCS SD.

Soil health farmers more optimistic, poll shows

Schell and Johnson are two of the soil health producers who responded to a statewide poll of farmers and ranchers on stress level indicators. As one indicator, the survey asked farmers and ranchers to predict the future resiliency of their farming and ranching operations. Soil health producers — those using no-till, longer crop rotations, cover crops, and grazing principles including rotation, rest and recovery — were significantly more optimistic than their conventional counterparts (83 percent vs. 60 percent) that their operations would be more resilient to weather extremes.

The poll results also suggested that a significantly higher percentage of producers who are using soil health-improving practices on



Fourth generation rancher Kyle Schell (left) says improving his land for the next generation is important to him, and he's confident he's on the right path with his soil health practices. Photo courtesy of USDA-NRCS SD.

their operations experienced less stress, are more satisfied with farming and/or ranching and are more optimistic about their futures than their conventional peers.

Additionally, when asked to look ahead to the next 3-5 years, a significantly higher percentage of soil health producers (69 percent vs. 36 percent) predicted that their farm profitability would increase.

Bank the rain

Levi Neuharth says the land itself is under less stress with healthy soils. "The ground is definitely more stressed in a conventional system because it has to overcome more obstacles — lack of protection from the heat and the wind in dry times, or the rain and erosion in wet years," he says. "Resilience in the soils on our farm means we can recover quicker and more efficiently — we can handle the extremes a little bit better than we could in the past." Neuharth and his wife Crystal operate 2,300 acres of crops and 3,000 acres of pasture in central South Dakota.

Out west near Quinn, S.D., Pat Guptill and his wife Mary Lou have no crops. Their concern is to have enough moisture for their ranch to support a cow-calf operation, custom grazed yearlings and grass finished cattle. "We try to save every drop of rain we get," Guptill says.

"To keep things going, you've got to put the rain in that savings account — the drier it gets, the more we manage the cow herd," Guptill adds. "We try to always leave that ground covered, leave that armor on the ground."

"We don't need to take all that grass off — we leave some to catch snow and feed the microbes," Mary Lou says. Pat says grazing cows all winter each of the last two years has really helped their bottom line, and he adds that in a span of six years, they've more than doubled soil organic matter levels. That means more water storage capacity in a drought.

"I can remember being in the same boat with people whose stress levels are terribly high," Mary Lou Guptill says. "But now we have less inputs, and we don't worry as much. You're confident because of what the ground is doing — what the microbes are doing — and instead of looking out to see what everybody else is doing, you're looking down at your soil. You see the improvements, and that's where your confidence is."

SDSU Extension to Discuss Water, Weather and Climate

SDSU Extension

Nothing impacts the growing season more than weather and water. From irrigation and fertilizer timing to pest control and field workability, daily decisions on-farm are based on what's in the sky and what's in the ground below.

However, Assistant Professor and SDSU Extension Water Management Engineer John McMaine says those decisions can be less arduous if producers have access to the latest research and forecasting tools.

"Subirrigation and subsurface drip irrigation are relatively new technologies and can improve the efficiency of water, energy and nutrient use," says McMaine. "It's also important [that] folks in South Dakota can find information about water quality in the state's lakes and rivers, as well as have tools, such as the Nutrient Loss Calculator, at their disposal."

SDSU Extension will discuss these topics and more during its upcoming Crop Hour series. During Water, Weather and Climate Week, attendees will have the opportunity to tune in each day from 10–11 a.m. CST to hear from local and regional experts on irrigation, water quality, the weather and flood outlook and conservation drainage.

- March 16: "Subsurface Drip Irrigation," Todd Trooien, SDSU National Resources Engineer; "Subirrigation with Tile Drainage," Tom Scherer, NDSU Extension Agricultural Engineer.
- March 17: "South Dakota Water Quality – Where to Find Information and What it Means," David Kringen, SDSU Extension Water Resources Field Specialist; "Measuring Nutrient Loss," John McMaine, SDSU Extension.
- March 18: "Building Water Resilient Systems Through Soil Health and Conservation Drainage," John McMaine, SDSU Extension and Anthony Bly, SDSU Extension Soils Field Specialist.
- March 19: "2021 Weather Outlook and Trends to Watch," Laura Edwards, SDSU Extension State Climatologist; "2021 Runoff and Flood Outlook," Kevin Low, National Oceanic and Atmospheric Administration Missouri Basin River Forecast Center Hydrologist.

Each week SDSU Extension's Crop Hour covers a different area of agronomic production, from field crops and forages to water and weather. The webinar series began Jan. 5 and will conclude March 26.

There is no fee to attend, but participants will need to register for the weekly webinars on the SDSU Extension Crops page. Confirmation Zoom links and reminders will be emailed to attendees.

Educational credits (CEU's) will be available for Certified Crop Advisers for each session.

For more information about the webinar series and to view the weekly topics and speakers, visit the Crops page on the SDSU Extension site.

Unlock Water Infiltration Potential With Cover Crops and Livestock Integration

By Lura Roti

In his presentation at the 2021 Soil Health Conference, Oklahoma farmer and rancher Jimmy Emmons explained that no-till practices are just the beginning of soil health management. Emmons has been implementing soil health practices since 1995. His experience has convinced him that integrating cover crops and cattle into field management is key to achieve maximum moisture infiltration and retention.

He explained when livestock and cover crops are integrated into field management, the soil structure changes.

"Eight years after I began implementing grazing and cover crops, my soil was reclassified to porous with large aggregation," Emmons said. This porous soil not only allows moisture to infiltrate more quickly, but it retains moisture. In fact, following a rain event, Natural Resources Conservation Service testing showed 102 percent moisture retention in a field where cover crops had been grazed, versus 20 percent retention in a field where only no-till practices were implemented.

As his soil health improved, Emmons' overall cost of production was drastically cut. His fuel costs went from \$128,000 to \$20,000. His chemical fertilizer was cut by 85 percent. His feed costs were reduced, and his herbicide and pesticide costs were reduced.

Emmons explains the same cover crop that feeds his cattle and soil biology also controls weeds. "The more cover you have, the less weed pressure. The less weed pressure, the less money you spend on herbicides," Emmons said.

By taking his soil health practices beyond simple no-till, Emmons has seen improvements in his bottom line and his water infiltration rates, and he has even managed to change the color and classification of his soil.



A slide from Jimmy Emmons' Soil Health Conference presentation shows water infiltration of a field where no-till, cover crops and livestock grazing are implemented (left) and a field managed with conventional tillage practices, no cover crops and no grazing (right). Courtesy photo.



116 N Euclid Avenue
Pierre, SD 57501

Phone: 605-280-4190
Email: sdsoilhealth@gmail.com
Website: sdsoilhealthcoalition.org

Beginning Producer Workshop Set for March 16

The South Dakota Soil Health Coalition will host a free Beginning Producer Workshop online March 16, 1-3:30 p.m. CDT. This workshop will go over the options and resources beginning producers can use to strengthen and grow their operations.

Topics include:

- Various funding options and their requirements.
- Risk management and business development options.
- Various programs to provide assistance and funding for conservation efforts.
- Building operational and financial stability through soil health practices.
- Hear advice directly from a panel of young producers on the steps to take at the beginning of your career.

Learn more and register at tinyurl.com/BFR-workshop.

March Planning Webinar Series Underway

The South Dakota Soil Health Coalition is hosting a series of free one-hour webinars on Wednesdays in March. We've held two webinars so far on drought and cover crop planning, and we've got two more scheduled!

- March 17: Diversity Tools and Salinity Discussion.
 - March 24: Five Principles Tools and Road to Travel Discussion.
- Visit sdsoilhealthcoalition.org/events to learn more.

Did you miss the first two webinars?

You're in luck!

All the webinars are being recorded and will be available for viewing at sdsoilhealthcoalition.org/educational-resources/event-recordings.

Have you renewed your SDSHC membership?

If you haven't renewed your South Dakota Soil Health Coalition membership, now is the time! Donations are also welcome! The SDSHC is a 501(c)(3) organization, and donations are tax deductible.

Just visit www.sdsoilhealthcoalition.org/memberships-donations to renew your membership or make a donation.