

Geophysical soil mapping allows farmers to see the soil profile of their land without digging down into the earth, by using electrical signals and sound waves in geophysics to create a soil map.

PHOTOS: NATURAL RESOURCES CONSERVATION SERVICE

Getting Geophysical

Soil Mapping Can Let Farmers Know What's Going On Underground

BY RITA BRHEL
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Often, growers know why part of their crop field doesn't grow as well as another area. It may be because of poor drainage or a sandy soil type or a chronic nutrient deficiency or even a recurring disease or pest problem.

But, sometimes, the cause remains a mystery. Perhaps because whatever the issue is, is underground.

"There is no substitute to good geology," said Hamid Farahani, agricultural engineer for the Natural Resources Conservation Service in Greensboro, N.C., who is a leading expert in agricultural geophysics, along with fellow agricultural engineer, Barry Allred, with Ohio State University in Columbus, Ohio.

When most people think of geophysical mapping — illustrating the features of and within the soil profile through the use of electrical signals and sound waves — it's associated with the study of earthquakes and volcanoes, not production agriculture. And despite research on the agricultural application of geophysics dating back to 1897, the technology has only come into widespread knowledge at about 2008 and is largely relegated to a narrow use in precision agriculture.

Precision agriculture is an approach to growing crops on the premise that crop growth factors are not one-size-fits-all across a single field — that different areas of the field require their own customized management strategies because of

varying soil types and growing conditions. Agricultural geophysics operates on the same basis — that the whole field is not uniform.

"Changes in the soil across the field can cause changes in the yield," Farahani said.

Geophysics can be used in creating soil suitability maps, soil water mapping, evaluations of tree and crop root biomass, soil nutrient monitoring after application of fertilizer or manure, finding the clay pan, evaluation of soil drainage, and evaluation of herbicide application, Allred said.

Geophysics can also be applied to feedlots, orchards, forest management, and turfgrass areas and to a variety of scales, from test plots to an entire watershed. Agricultural geophysical mapping focuses on the top six feet of soil — the crop root zone, which includes the topsoil and immediate subsoil.

There are three geophysical measurements typically used in agriculture: resistivity, which sends an electrical signal into the soil that measures how much resistance it receives while working through the soil; electromagnetic induction, which measures how easily an electrical signal moves through the soil; and ground penetrating radar, which sends sound waves down into the soil that bounce off objects at varying depths. Resistivity and electromagnetic induction are useful in creating a profile map of topsoil and subsoil depths, as well as varying soil types and soil moisture content, whereas ground penetrating radar is helpful in adding additional non-soil features such as pipes.

"Soil electrical conductivity mapping is the simplest and most rapid method of identifying the nature of soil variability," Farahani said. "Once you get a map, you don't have to get another map for five or 10 years."

The purpose of agricultural geophysics is to gain understanding of what is going on in the field underground, and research has shown that geophysics has as much of a place in crop production as soil nutrient tests, Allred said.

"There is a very good correlation between soil electrical conductivity and crop yield," he added.

Like soil tests measuring nitrogen, geophysics show the nature of soil variability but that may not necessarily help producers identify the cause, Farahani said. More investigation is needed by the producer, but geophysics offers a solid first step.

The major challenge is that the equipment used to take measurements is small — about the size of a wheel barrow, and operated much like wheel barrow being pushed along the ground, pulsing electrical signals or sound waves into the ground; the equipment doesn't do well over rough terrain, is labor intensive, and quite plainly is not practical for whole-field evaluations, Farahani said.

Researchers are working on ways to resolve these issues by incorporating it onto farm equipment and aerial imagery, integrating it with RTK and GPS technologies, and developing multi-sensor platforms.

"Eventually, we'd like to see geophysics allow for even on-the-go decisions," Allred added.

What To Consider When Feeding 2012 Corn To Hogs

BROOKINGS — Crops grown in stressful conditions, like this year's drought, are more susceptible to mold growth, and consequentially, mycotoxins. Hog producers need to take extra precautions when feeding corn that may be mycotoxin-infected, says Bob Thaler, SDSU Extension Swine Specialist.

"We know that this year's grain crop will be poorer quality than normal, and may be contaminated with molds. I encourage hog producers to begin preparing today, and that also means conserving the remaining high quality 2011 corn crop for sows and nursery pigs. They need to test their feed as it comes in or when they harvest it to determine if it is infected with mold and what types of molds."

Corn can be infected by more than 200 varieties of mold, however, Thaler explains that only a few of these varieties produce mycotoxins which is produced by the mold, and can lead to feed refusal, abortions and even death.

The three molds Thaler says hog producers need to test for are aflatoxin, vomitoxin (DON), and zearalenone.

- **Aflatoxin:** Aflatoxin is not typically seen in South Dakota, and appears around about every 10 years. Aflatoxin can kill hogs at very high levels, so Thaler says when a test shows that feed is positive for the mycotoxin; producers should add binders to the feed.

"Binders control the majority of the problem for aflatoxin," Thaler said.

- **Vomitoxin (DON):** Thaler expects DON to be the most common mycotoxin to show up in grain this harvest. Although it does not kill animals or cause problems with the reproductive cycle, like its name suggests, vomitoxin does cause feed refusal.

"If animals eat more than 1 ppm they will begin vomiting and will go off feed, which then reduces gain and sow performance" Thaler said.

If this is found in tested feed, Thaler says producers need to blend it with clean grains so that the total level in the diet is below 1 ppm. He says mycotoxin binders are not as consistently effective against other mycotoxins besides aflatoxin, and if producers are considering a binder, Thaler says they need to use one

that has university research to back it.

"Unfortunately with vomitoxin and zearalenone, there are commercial binders available, but their effectiveness varies, and we've not been able to find one that will consistently and completely alleviate the symptoms," Thaler said.

- **Zearalenone:** This mycotoxin's estrogen-like effects will disrupt a sow's reproductive cycle causing abortions if it reaches levels above 1 ppm.

Because the level and type of mycotoxins found in a field of corn can vary greatly throughout the field, Thaler encourages producers to take a number of samples from every section of the field, and combine them into one sample for testing. The samples then need to be placed in a cloth or paper bag and sent to a qualified lab for mycotoxin analysis.

He encourages pork producers to review the data and if they have any questions on blending, consult their nutritionist or an SDSU Extension Specialist.

"Before producers can begin blending below 1 ppm, they need to know what specific mycotoxin they

are dealing with and what level it is in the first place," he said.

If producers have clean grain on hand, Thaler says they need to hold it back to feed to their sow herd and nursery pigs and for blending.

"Grow/finish pigs can handle higher levels of mycotoxins, and pork producers will more than likely need clean grain to blend with infected grain to bring the levels down," Thaler said. For a list of testing labs and more information on this topic, visit iGrow.org.

Soil Conservation Award Winners Announced

PIERRE — Producers from eight South Dakota conservation districts have been selected to receive the 2012 Soil Conservation Award.

The winners include: Kenneth Dickson of Beadle County; Raymond Urban of Brule-Buffalo; Will and Kathy Roe of Codington County; Tom Barnes of Custer County; Dennis Namken of Hamlin County; Heinrich Brothers of Moody County; Ron and Janeen Kohl of Roberts County; and Larry Skorepa of Yankton County.

Each award winner will get a certificate and a recognition sign that recipients may install on the property for which their conservation efforts are being recognized.

"Even though agriculture is the largest industry in South Dakota, the land stewardship ethic of producers is often overlooked by the general public," said Walt Bones, Secretary of the South Dakota Department of Agriculture. "This award highlights their dedication to natural resource conservation and demonstrates that South Dakota farmers and ranchers are leaders when it comes to sustainable agricultural production."

The Soil Conservation Award Program was created by the 2008 state Legislature to recognize exceptional farming and ranching practices in South Dakota that conserve soil and other natural resources. The program was implemented by the State Conservation Commission.

Current state residents or groups may nominate any South Dakota farming or ranching operation for the award by submitting a nomination form — available at any Conservation District office — to the producer's local Conservation District. Nominations must be received by Jan. 1 of each year.

Producers are eligible for the award if they make use of grassed waterways, terraces, crop rotations, sufficient crop residue to protect soil stability, no-till, grasslands managed for sustainable productivity, livestock management to limit soil and nutrient runoff, or forest lands managed according to a forest stewardship plan.

Applications For Donated 2011 Hay Sought

PIERRE — South Dakota Secretary of Agriculture Walt Bones announced the South Dakota Department of Agriculture (SDDA) is spearheading the distribution of approximately 400 donated 2011 CRP mid-term management hay bales. Applications are being accepted by SDDA until 5 p.m. on Friday, Sept. 7.

In order to respond to livestock feed needs due to widespread drought conditions and wildfires, USDA-FSA is allowing producers with 2011 CRP mid-term management hay to donate the baled residue to SDDA, rather than destroy it.

South Dakota livestock owners who own or lease grassland impacted by wildfire in 2012 are eligible for the donated hay. Submitting an application does not guarantee distribution of hay to your operation.

"With this summer's extreme drought conditions, hay is scarce," said Bones. "The donation of this CRP hay will hopefully lighten the burden on a few of the livestock producers here in South Dakota."

Baled residue from participating producers will be available in limited quantities. SDDA will coordinate the donation effort between the CRP participant and the livestock producer. The recipient will be responsible for expenses and arrangements associated with transporting the donated hay. Extra precautions may need to be exercised as movability of the hay is limited.

Producers receiving hay will be selected by SDDA based on the number of applications received, the amount of hay available and need.

Applications for the program can be found at www.sdda.sd.gov, <http://drought.sd.gov> or contact SDDA. Applications must be received by 5 p.m. on Friday, Sept. 7, 2012. For questions on eligibility and conditions, contact Jamie Crew at 605-773-4073.

Acreage Mgt. Considerations During Drought

BROOKINGS — "Take Half, Leave Half," is a grazing rule of thumb which Mindy Hubert, SDSU Extension Small Acreage Field Specialist, says has taken on a new meaning during the drought.

"This is a difficult management technique to implement when the plant is less than half of its previous year's total growth before grazing season even started," Hubert said.

Although the drought has taken its toll on pastures and hay availability, Hubert provides a list of management tips to help acreage managers to minimize the negative impact of the drought on their land and pocketbook:

- **Save your pastures:** Even with the sky-high price of hay, the long-term damage that can be done to pastures by overgrazing is not worth the extra day or two of not feeding hay to horses.

- **Monitor pastures:** Pastures that lasted two months last year, might not last even one month this year. Don't assume, but rather check the pasture every few days and remove animals before half the forage has been removed. In certain areas of South Dakota, grasshoppers are accounting for a significant amount of forage removal.


- **Buy hay in bulk:** Get together with other livestock owners and share the shipping costs, if necessary. Buy round bales or large square bales, if you have the equipment to handle them. For more information on where to locate hay, contact Hubert at 605-394-1722 or mindy.hubert@sdsu.edu.

- **Budget:** Estimate annual feed consumption and be sure to purchase enough hay, knowing that pastures won't last as long as they have the past couple of wet years. Otherwise livestock owners will run short and the price of hay will only increase as we enter the winter. If acreage managers cannot afford to feed all of their livestock, they may have to consider selling them or, if feasible, taking out a feed loan. "If the numbers just don't pencil out, don't put yourself at financial risk," Hubert advises.

- **Feed efficiency:** Invest in a quality hay feeder that minimizes waste. Horses can waste more than 50 percent of a round bale if not placed in a feeder. Feeder type can also greatly affect the amount of waste.

For more information, visit iGrow Horse (<http://igrow.org/livestock/horse/>) today. Monitor your animals' body condition and don't over feed. Consider limiting the time they spend at the hay feeder.

For more information, visit iGrow.org.



Savor the Possibilities

It's all about fresh, seasonal dishes prepared by our culinary expert, Chef Staci Stengle.

Check out Staci's case-for pre-made salads and side dishes, ready for your table! Or pick your favorites for the perfect picnic to take to the lake or your campsite!

Chef Staci will also answer your food questions and give advice on how to prepare chef inspired meals.

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Meet Dr. Garry, General Surgeon

YANKTON MEDICAL CLINIC, P.C. IS PLEASED TO ANNOUNCE THE ASSOCIATION OF
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Board Eligible in General Surgery

Dr. Garry is a graduate of Sanford School of Medicine of The University of South Dakota School of Medicine, Sioux Falls, South Dakota. He completed his general surgery residency at Exemplar St. Joseph in Denver Colorado and Iowa Methodist Medical Center in Des Moines, Iowa.

Dr. Garry will perform general surgery procedures such as laparoscopic hernia, stomach, colon, adrenal and splenectomy surgery; colonoscopies; esophagogastroduodenoscopy (EGDs); "Painless" hemorrhoid surgery; and minimally invasive parathyroidectomy.

Dr. Garry joins Drs. Appelwick, Kampshoff and Serck in providing care as a general surgeon.

Please join us in welcoming Dr. Garry, his wife Kari, and their children, Regan, Kael and Reese, to Yankton.

Dr. Garry began seeing patients at the Yankton Medical Clinic on August 20, 2012.
For an appointment please call 605-664-2742.

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