



# Conservation Notes

USDA - Natural Resources Conservation Service - Michigan

March/April 2016

## Conserving Energy on the Farm

Profit margins on the farm can be pretty thin, reducing energy costs can be a painless way to improve an operation's bottom line. The USDA's National On-Farm Energy Initiative can help farmers use energy more efficiently and save money.

Financial assistance from the Natural Resources Conservation Service or Rural Development is contingent on a completed energy audit. NRCS can provide financial assistance for energy audits conducted by a certified Technical Service Provider. Energy audits conducted by a non-TSP provider may be acceptable for qualifying for USDA assistance but the audit itself will not be.

Portland-area farmer Stuart Pinkston had an energy audit conducted on his farm in 2014 by a TSP. Pinkston primarily grows corn, soybeans and wheat and does not keep livestock. With USDA financial assistance, he figured he had nothing to lose by having an energy audit.

Pinkston's audit was conducted by Bethany Reinholtz who completed the Michigan Farm Energy Audit Program at Michigan State University and is also an NRCS certified TSP. Pinkston accompanied Reinholtz during the audit which took less than an hour. "We looked at whatever was using energy," said Pinkston.

Reinholtz works for an engineering firm in Wisconsin where most of her job is conducting farm energy audits, she said. The audits include



*Grain drying is an area where farms can typically save energy, and money, by increasing energy efficiency. Stuart Pinkston, above right, with a grain bin that was retrofitted with a floor aeration system.*

the whole farm, although there is less attention to cropping. She conducts audits on all types of farms including dairies, greenhouse operations, orchards and even maple syrup producers. Finding energy savings on crop farms is more challenging than livestock operations for example, because the equipment is only used during part of the year. The less the equipment is used the longer it takes to recover the costs of energy

- continued on page 3 -



United States  
Department of  
Agriculture

### Natural Resources Conservation Service

Michigan State Office  
3001 Coolidge Road, Suite 250  
East Lansing, MI 48823  
Phone: (517) 324-5270  
www.mi.nrcs.usda.gov



State Conservationist's Message	Page 2
MSU Farm Energy Audit Program	4
Amending Soils with Gypsum	5
Improving Soil Health in the UP	6
Updated Know Your Farmer Website	7
Earth Day	8
NRCS Updates & Other News	9
Event Calendar	10

## State Conservationist's Message

NRCS Chief Jason Weller along with the state conservationists from Michigan, Ohio and Indiana took part in a public meeting in late March to announce a new conservation initiative in the Western Lake Erie Basin. The event also included a report on the findings of a USDA Conservation Effects Assessment Project in the Basin.

Western Lake Erie is relatively shallow and is the only Great Lake with a major agricultural watershed draining into it. The USDA made the WLEB a priority area for conservation efforts well before the Toledo water crisis in 2014. Agriculture Secretary Tom Vilsack visited Michigan in 2012 to announce targeted assistance for the region and dedicated state-level conservation assistance began at least as early as 2008.

The CEAP study of the Western Lake Erie Basin sought to determine what effect conservation efforts have had and what more needs to be done to reduce the amount of phosphorus and other nutrients entering the lake. These nutrients create the vast algae blooms which produce toxins endangering aquatic life, drinking water and other resources the lake provides.

The study found that conservation efforts are having an impact but that more needs to be done. Here are some of the study's key findings:

- Average annual phosphorus application rates decreased from 21.5 pounds per acre in 2003-06 to 18.7 pounds in 2012.
- Application methods that reduce the risk of phosphorus runoff and leaching losses increased from use on 45 percent of farm acres to use on 60

percent of acres.

- Edge-of-field trapping practices that reduce runoff losses, such as filter strips, increased from being in use on 18 percent of acres to being in use on 31 percent of acres.

- The 2012 CEAP survey indicates the regional investment in conservation increased by nearly \$69 million since the 2003-2006 CEAP-1 survey, to a total annual investment of \$277 million.

- The average number of practices adopted per acre increased to 2.36 from 1.8 during the same time period, with an annual investment of \$56.98 per acre.

- Conservation practices in use in 2012 reduce annual sediment losses by 81 percent (9.1 million tons per year), reduce total nitrogen losses by 36 percent (40.6 million pounds per year), and reduce total phosphorus losses by 75 percent (11.4 million pounds per year).

- Soluble phosphorus loss is the greatest treatment need in WLEB, with 42 percent of acres exceeding an average annual loss threshold of 1 pound per acre per year. The majority of soluble phosphorus losses occur through the subsurface pathway.

- Subsurface nitrogen loss is the second greatest treatment need, with 29 percent of acres exceeding the 25-pound-per-acre average annual threshold.

[Link](#) for complete CEAP report and summary.



State Conservationist  
Garry Lee



NRCS Chief Jason Weller announcing a new USDA initiative to improve water quality in the Western Lake Erie Basin. The event included a report from the USDA Conservation Effects Project on the impact of conservation efforts in the Basin.

- continued from page 1 -

## Conserving Energy on the Farm

improvements.

After his energy audit, Pinkston retrofitted two of his existing grain bins with floor aeration systems. Without aerated floors, heated grain couldn't be added to the bin because there is nowhere for condensation to go after it cools, said Reinholtz. With aerated floors, grain can go from the dryer to the bin before it cools and it will continue to dry. Grain moisture can be lowered another 3 percent after drying by utilizing an aeration flooring system. The system acts as a component of the grain dryer by keeping the grain dryer hot and not having to complete the grain drying process within the grain dryer itself.

Pinkston expects it will take about 3 and-a-half years to recover the cost of aerating two 27-foot bins. The cost was partially offset by financial assistance provided by NRCS. His energy audit identified other places to save energy but the floor aeration system was the most cost effective, said Pinkston. He may decide to make additional energy improvements such as a more efficient grain dryer.

No matter the kind of farm operation, energy audits are useful. "There's always something here or there that can be more efficient," said Reinholtz.

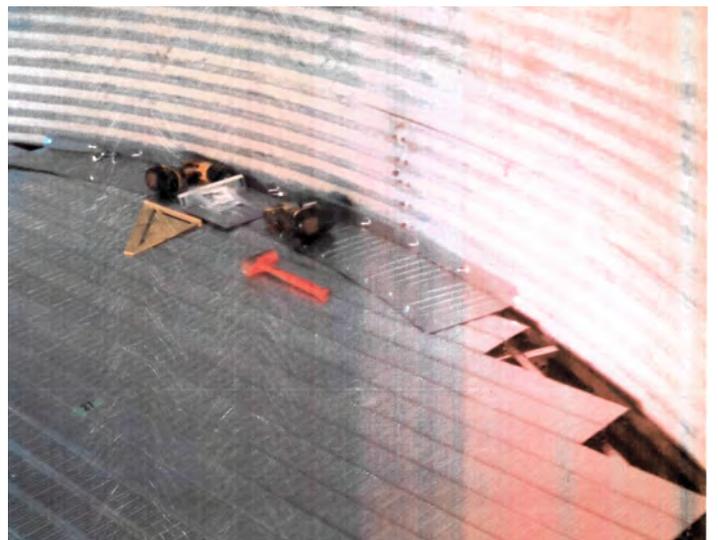
NRCS offers financial assistance for a variety of energy conservation practices including grain dryers, replacing gas or diesel-powered motors with electric, installing high-efficiency lighting, heating and cooling efficiency improvements and many others. Financial assistance is only available for improving the efficiency of existing equipment and facilities.

Financial assistance for energy improvements and renewable energy is also available from USDA Rural Development through its Rural Energy for American Program (REAP). REAP offers a combination of grant assistance, of up to 25 percent of costs, and guaranteed loans. Grain dryers and solar panels each make up about a third of the funding provided in Michigan, said Rick Vanderbeek, who coordinates the program

in Michigan. Other popular energy conservation improvements include greenhouse curtains, and replacing gas and diesel motors with electric. Like EQIP, REAP only provides assistance for upgrading existing equipment or facilities to increase energy efficiency.



*A grain bin aeration floor system saves energy by allowing grain to continue to dry after being heated by a grain dryer. The system consists of metal braces (above) supporting an elevated floor (below). The floor is perforated to allow air to circulate and for condensation to escape underneath.*



## MSU Farm Energy Audit Program Tailored to Farmers' Needs

When the energy title of the 2002 Farm Bill was enacted, Michigan wasn't exactly the first horse out of the gate.

"There really wasn't anything in Michigan," admitted Rick Vanderbeek, who coordinates [USDA Rural Development's Rural Energy for America Program](#) in Michigan.

Michigan was one of the bottom 10 states for the amount of funding it received through REAP. REAP provides loans and grants for energy efficiency improvements and renewable energy for farms and rural businesses.

The problem? Applicants needed to undergo an energy audit as part of the application process. Unfortunately, finding a company to conduct an on-farm energy audit in Michigan was not so easy. "There really wasn't any service available," said Vanderbeek.

The lack of USDA energy assistance going to Michigan did not go unnoticed in the Mitten. The Michigan Department of Agriculture and Rural Development and Michigan State University contacted Rural Development to see if they could do anything to encourage farmers to apply for REAP funding. They were told that Michigan needed a program to train on-farm energy auditors.

MSU did its research before starting its program, said Aluel Go, manager of the MSU Farm and Business Energy Audit Program. When energy consultants began doing energy audits after the 2002 Farm Bill they applied "the industrial playbook," said Go. The industrial playbook did not work well for farms.

"Agriculture is a unique puppy in a way, quite unique," said Go.

Farms utilize different equipment and have different regulatory requirements than most industries, said Go. For example, dairies must cool milk within two hours, greenhouses require the proper spectrum of light for growing. Farmers also hold on to equipment much longer

than factories and sometimes engineers weren't familiar with it. As a result, many farmers were not happy with the results of their audits, and some began backing out before they were completed. Many farmers became resistant to having an energy audit.

"Farmers are a word of mouth community," said Go.



After studying the feedback of producers from these early energy audits and studying farm energy audit programs elsewhere in the country, many lessons were learned. One of the main lessons was that engineers needed to know about agriculture and consult with the farmer during the energy audit. Farmers have generations of experience and know the equipment on their farms better than anyone else, said Go.

MSU started its Farm and Rural Business Energy Audit Program in 2009. The program is a five month course with four phases based on the energy audit standard of the American Society of Agricultural and Biological Engineers. The program is a combination of agricultural training and energy consulting. Those taking the program include students with an engineering background and others with an agricultural operations background, said Go. About 50 people have completed the program and earned Michigan Farm Energy Program certification.

An audit conducted by an MFEP certified technician is now accepted by the USDA to qualify a producer for REAP or Environmental Quality Incentives Program assistance. Once we had qualified energy auditors applicants came beating down the door, said Vanderbeek. Michigan rose as high as number three in the country in REAP funding. Go sees similar potential for participation in EQIP.

For more information about the MSU Farm and Rural Business Energy Audit Program visit your local MSU Extension Service office or go to their website at <http://msue.anr.msu.edu>.

## Amending Soils with Gypsum for Soil Health

Greg DeMott isn't just the owner of Mid-Michigan Lime & Gypsum, he's also a client.

DeMott has a 160-acre farm in Gratiot County and farms an additional 1,000 acres in three counties, growing primarily corn and soybeans with some winter wheat. He started applying gypsum 17 years ago to amend the nutrients in his fields and improve soil structure.

Gypsum is composed of calcium sulfate dehydrate and it is the main material in dry wall and plaster among other products. For agricultural use, it is applied as a fine white powder. Farmers have been using gypsum as a fertilizer source of calcium and sulfur since at least the 19th century.

DeMott became interested in applying gypsum after soil tests showed higher levels of magnesium and lower levels of calcium than he preferred. Soil compaction was another concern, he noticed a hard pan forming about 8 inches below the field surface. The compaction was primarily found on his rented ground that had been worked while still wet. For 30 years, DeMott has practiced no-till for both soybeans and corn so compaction is not an issue on his own farm and ground he has been farming for a long period.

DeMott started using gypsum only on strips to determine if it was beneficial. He liked the results so much, that after two years he and three neighbors together purchased their own spreader and offered the service to area farmers. Gypsum is surface applied similar to applying lime.

DeMott has seen impressive results when gypsum is added to fields with poor soil chemistry. One piece of land "that could hardly grow dust" saw a 12-bushel per acre gain in corn production the first year, he said. In fields with less dramatic soil health issues the benefits of gypsum are greatest after about three years, said DeMott.

There are many claimed benefits for applying gypsum, some of these receive more agreement



*Gratiot County farmer Greg DeMott started his own company to provide gypsum to other Mid-Michigan farmers.*

from experts than others. DeMott credits the application of gypsum with improving compacted soils and increasing water infiltration.

Before applying gypsum, DeMott had fields with a calcium percentage of 60 to 65 percent and a magnesium percentage of 20 to 29 percent. After annual applications of gypsum, he has seen the same fields change to 75 to 85 percent calcium and 10 to 13 percent magnesium. Calcium and magnesium cations have a major impact on soil structure. The NRCS practice standard for amending soil properties with gypsum, sets a criteria of 70 to 80 percent calcium and 10 to 13 percent magnesium for good soil structure.

An Agricultural Resource Service study published in 2006, found that applying gypsum reduced soluble soil phosphorus in a field containing a high soil test level of the nutrient. The study found that this was accomplished by gypsum forming soil particles which allows the increased adsorption of phosphorus onto the soil,

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## Adapting Soil Health Practices to the UP

by Jim Isleib, Michigan State University Extension

All of the buzz about soil health – benefits for crop production, how to improve it, how to measure it – has left some Michigan farmers wondering where they fit into the discussion. Two main practices stand out front and center in the soil health discussion: no-till or reduced tillage planting systems, and inclusion of cover crops into rotations. Many of Michigan's Upper Peninsula farmers are somewhat skeptical about the practical application of these techniques in their cropping systems because of short growing seasons and the widespread conviction that no-till "doesn't work up here." To simplify the issue, a focus on soil organic matter content may be helpful.

In February 2015, 57 Upper Peninsula farmers and agriculture industry people attended Michigan State University Extension cover crop educational meetings held in four Upper Peninsula locations: Rudyard, Chatham, Hancock and Escanaba, Michigan. Many of these farmers were primarily livestock producers with main crops of hay, pastures and occasional small grains. Feedback from attendees indicated farmers are interested in improving their soils,



but feel that currently promoted practices focus on annual crop rotations and don't apply to their systems. After all, when your rotation includes perhaps nine years of perennial forage and one year with a small grain including a new hay seeding, you are cover cropping as much as you could possibly be, right? And won't that long-lasting perennial hay or pasture result in a maximum of soil organic matter accumulation?

Don't we have some information about the results of no-till practices under Upper Peninsula conditions? Well, yes we do, but not from a controlled research project. Soil organic matter

tests have been collected occasionally at the MSU Upper Peninsula Research and Extension Center. This was not done as part of a research project, but rather in the course of normal feed production for the Center's cattle. The following MSU soil test report information is interesting. Keep in mind this is not a research project, just typical farm information:

- No-till management started in 1991.

- continued on page 6 -

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## Amending Soils with Gypsum for Soil Health

reducing the amount leaving the field as runoff. DeMott has observed this after applying gypsum on the fine clay soils he farms.

"It makes clay soil kind of like sugar (in texture)."

Some research has found that gypsum can increase crop-rooting depth, total root biomass and nitrogen uptake. Other recent research indicates that gypsum may work more effectively when it combines with organic matter on the surface, such as on land where conservation tillage is practiced, said NRCS State Agronomist Jerry Grigar.

Amending soil with gypsum was added to the practices eligible for financial assistance through the NRCS Environmental Quality Incentives Program in Michigan during 2016. NRCS is promoting the practice in the Western Lake Erie Basin as another tool to reduce the amount of phosphorus runoff. Phosphorus entering the lake has led to harmful algae blooms. Farmers throughout the state can apply for financial assistance to apply gypsum if soil testing indicates it can be beneficial.

## Revamped Know Your Farmer Website Launched

In April the USDA rolled out the revamped Know Your Farmer, Know Your Food website. The site was redesigned to offer a more user-friendly experience that makes it easier to navigate the wealth of USDA and partner resources.

Using updated web standards and visuals to optimize the user-experience, USDA reorganized the information and gathered new content. In short, the KYF2 website has become an even better one-stop-shop for information on USDA's local and regional food systems work.

In addition to information on technical assistance and funding opportunities, the website is organized by "role" in the local and regional food system. For instance, if you work for a food hub, there are sections just for you such as, "Processing and Aggregation", and another on "Distribution".



Another exciting development is the addition of an Urban Agriculture section, highlighting the new face of agriculture in urban communities.

An important holdover from the previous KYF2 website is the KYF2 Compass, where you can find USDA local and regional food system investments in your community, and beyond. The compass is currently undergoing an upgrade, and we look forward to including even more information soon.

The KYF2 Initiative showcases how USDA supports local and regional food systems across the entire supply chain with funding, technical assistance, and more. We hope you will find this beautiful new website dynamic and intuitive, and will use it to identify resources to continue the important work of small- and mid-sized producers, food entrepreneurs, and others in your community.

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## Adapting Soil Health Practices to the UP

- Typical rotation included corn, small grain, alfalfa.
- Soil organic matter levels were not measured until 1998.
- Average organic matter of 19 fields in no-till rotation tested in 1998 was 3.3 percent.
- Average organic matter of 16 fields in no-till rotation tested in 2013 was 3.6 percent.
- Average organic matter of 12 fields in permanent hay (no rotation) since 1991 tested in 2013 was 4.1 percent.

It is logical to assume that the 4.1 percent organic matter may serve as a goal for those other fields that were under a conventional tillage system through 1991 and under no-till through 2013.

The soil organic matter averages suggest a trend of soil organic matter build-up amounting to 0.3 percent increase over 15 years (0.02 percent per year) between 1998 and 2013 – slow but steady. Using this data, the goal of 4.1 percent organic matter might be reached in another 25 years or so. This would be about 47 years after the implementation of no-till planting practices in 1991. Certainly not a scientific analysis, but puts the process into perspective for this type of cropping system.

*This article was published by Michigan State University Extension. For more information, visit [www.msue.msu.edu](http://www.msue.msu.edu).*

## Earth Day - Celebrations and Education



Students from the Benzie Central High School environmental youth group, BCIA (Benzie: Conserve, Inspire, Adapt). From left to right, Marshal, Seamus, Savannah, Benzie CD advisor Aimé, Raina, Alexis, Brooke, and Cory--celebrate Earth Day by planting native serviceberry trees at the Archangel Ancient Tree Archive facility in Copenish



NRCS Area Biologist Jim Marshall performs the "slake test" for students attending the Earth Day event at Constitution Hall in downtown Lansing. The presentation demonstrates how good soil health improves soil stability.



NRCS Soil Scientist Carla Ahlschwede assists participants in a FFA soil judging competition held at MSU on April 22.



The Calhoun Conservation District held its 16th annual Earth Day Festival on April 22, 2016. Area 1st, 2nd, and 3rd graders visited stations that discussed pollinators, water quality, recycling, soils, and plants. The students above are playing a session of "Water Jeopardy."

## NRCS-Michigan Staffing Update



Oliver Freeman

Last December, Oliver Freeman began his current position as agronomist for the Rose Lake Plant Materials Center.

Freeman served briefly as a soil conservationist in Huron County before starting work at the PMC.

He grew up on a vegetable farm on John's Island, S.C.

Freeman earned a Bachelor's degree in agronomy from North Carolina State University, followed by a Master's degree from Prairie View A&M in Texas and a Ph.D. from Kansas State University.

At Rose Lake, Freeman conducts research for the NRCS National Plant Materials Program, testing and setting standards for plants used in conservation practices. Part of his current research is studying prairie cord grass for suppressing reed canary grass.

### New Hires

Jonathan Diaz Cruz, Soil Scientist, Grand Rapids MLRA Office

### Departures

Wilma Bird, Soil Conservationist, Ann Arbor (transferred to Oxnard, Calif.)

## Lawn and Garden Soil Test Kits

Homeowners and gardeners can submit soil for testing by purchasing a soil test kit from Michigan State University Extension.

A soil test self-mailer can be purchased on line for \$25 ([http://msue.anr.msu.edu/resources/soil\\_test\\_kit\\_self-mailer](http://msue.anr.msu.edu/resources/soil_test_kit_self-mailer)). The kit has everything needed to submit a soil sample for testing at the MSU Soils Laboratory. Results are typically received in about 10 days to two weeks.

A separate kit for testing soil lead levels is also available at additional cost.

## Farmer Field School at MSU

*MSU Student Organic Farm*

Begun in 2015, the MSU Farmer Field School is comprised of intensive one and two day hands-on workshops. They are tailored to deliver in-depth, practical information built upon the foundational work of the MSU Organic Farmer Training Program and the wealth of knowledge in Michigan's farming community.

With an emphasis on vegetable production, the Field School is designed to help improve the profitability of diversified, sustainable, Michigan farmers in their first 10 years of farming who serve local and regional markets.

The Field School is part of a broader vision and collaboration among statewide organizations including the MSU Center for Regional Food Systems and Michigan Food and Farming Systems. The workshops help increase new farm success by working to make farming a more prosperous, secure, and sustainable career choice for the many beginning as well as future farmers in Michigan.

Summer sessions in 2016 include Crop Establishment and Scheduling for Direct Seeded and Transplanted Crops to be held June 26 through 28 in Alma, and Summer Fruiting Crops in High Tunnels, scheduled for Aug. 18 starting in Battle Creek and including a visit to an operation in Bath.

For more information go to:  
[www.msuorganicfarm.org](http://www.msuorganicfarm.org)

## Upcoming Application Cut-off Dates

### End of Each Month

- **Saginaw Bay Conservation Partnership Program**

### May 20

- **Great Lakes Restoration Initiative**
- **Forest Health for At-Rick Wildlife (RCPP)**
- **EQIP - Michigan Agriculture Environmental Assurance Program**

## Upcoming Events - Upcoming Events

June

- 2 Eaton Conservation District Native Plant Sale, 3 p.m. to 7 p.m., Dimondale Farmers' Market - Dimondale, pre-orders due May 27, for more information call 517/543-1512 ext. 5 or go to [www.eatoncd.org](http://www.eatoncd.org)
- 4 Native Plant Sale, Branch Conservation District - Coldwater, for more information call 517/278-2725 ext. 5
- 5 Introduction to Raising Sheep for Fiber & Food, 1 p.m. to 5 p.m., Halleaux Farm - Durand, for more information go to [www.miffs.org](http://www.miffs.org)
- 19 Bee Palooza, 1 p.m. to 4 p.m., MSU Horticulture Demonstration Gardens - East Lansing, for more information go to <http://spartanyouth.msu.edu>
- 24 Kalkaska Conservation District Soil Health Field Day, 9:30 a.m. to 3:30 p.m.,
- 26 MSU Organic Farm Summer Workshop "Crop Establishment & Scheduling for Direct Seeded and Transplanted Crops, 8 a.m. to 5 p.m., Monroe Organic Farms - Alma, \$150 registration fee, for more information go to [www.msuorganicfarm.org](http://www.msuorganicfarm.org)



NATURAL RESOURCES CONSERVATION SERVICE (NRCS)

# unlock the secrets in the soil

[www.nrcs.usda.gov](http://www.nrcs.usda.gov)

"We know more about the movement of celestial bodies than about the soil underfoot."  
-Leonardo da Vinci

Living in the soil are plant roots, bacteria, fungi, protozoa, algae, mites, nematodes, worms, ants, maggots, insects and grubs, and larger animals.

**science of soil**

**soil is** made of about **45% minerals**, **25% water**, **5% organic matter**, and **25% air**

**what's underneath**

Healthy soil has amazing water-retention capacity. Every **1%** increase in organic matter results in as much as **25,000** gal of available soil water per acre.

One teaspoon of healthy soil contains **100 million-1 billion** individual bacteria

All of the soil microbes in **1ac/ft** of soil weigh more than **2 cows**

Earthworm populations consume **2 tons** of dry matter per acre per year, partly digesting and mixing it with soil

**what it does**

Healthy soil is key to feeding **9 billion** people by **2050**

Soil Health fact sheets, infographics, videos and more can be found at [www.nrcs.usda.gov](http://www.nrcs.usda.gov)

**unlock the SECRETS IN THE SOIL**

Source: Comparison of soil The Nature & Properties of Soils page 17; Alan Brady, Ray R. Roldán | Water holding capacity Annual State Extension- Agronomy 4 (October 2017) July 8, 2012 | Bacteria in a teaspoon Soil Biology Primer page 4 | James Kaplan, Andrew R. Mosander, Chad E. Owens | The Nature & Properties of Soils page A01 | Earthworm population monitoring Earthworms & Their Role publications by David Curtis, Anne, PhD of Soil Management and Richard Steiner, Assoc. Prof. environmental Soil Science, Cornell University | The United Nations | USDA is an equal opportunity provider and employer.

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