USDA

United States Department of Agriculture

unlock the SECRETS IN THE SOIL

Natural Resources Conservation Service

2014 Soil Planner

Healthy Soils Are Essential to Our Survival

They keep valuable nutrients on the land, where they should be, and out of our streams, lakes, and water supplies...

They help ensure a productive and sustainable agricultural sector – providing food to feed millions of people in the United States and around the world...

They trap and store carbon, helping to mitigate climate change...

Across the country, working with our partners, NRCS is helping farmers and ranchers implement proven conservation practices to improve the health of their soils – and they're seeing the results. Soil Health Management Systems are helping to sustain their production levels and bottom lines, while at the same time protecting our environment. And thanks to the improved water-holding and infiltration capacity of healthy soils, farms and ranches are more resilient to weather extremes, like droughts and flooding.

Healthy soil is the foundation of sustainable agriculture and has been the foundation of our agency from the very beginning. We're putting a renewed emphasis on enhancing our soil resources – and helping producers and the public understand and manage soil ecosystems more efficiently and effectively.

This year's Soil Planner highlights some of the incredible benefits healthy soils can provide, including some little-known facts and figures that may surprise you. To learn more about soil health, visit our website at www.nrcs.usda.gov.

We owe our existence to our living and life-giving soil. In the face of a growing global population – along with climage change and agricultural production challenges – there's no better time to make a concerted, cooperative, long-term commitment to improve its health. Without question, the promise of our future depends on it.

Jason Weller
Chief, Natural Resources
Conservation Service

USDA United States Department of Agriculture

Soil Health to Feed the World

There continues to be much discussion on meeting future food production goals to feed the world's population, focusing on expansion of land area for agricultural production and/or intensified crop production on existing agricultural lands. The potential for increasing production will largely depend on the suitability of the land for agriculture as compared to other uses such as wildlife, forest or recreational uses, as well as on improved soil, crop, and water management practices.

The Web Soil Survey is one example of tools used to evaluate both soil suitability and susceptibility to land use practices, as well as the soil's capability to support sustainable land use.

Soil Science Society of America is an educational organization with more than 6,000 scientists and professionals in over 80 countries committed to the advancement of soil science, with our mission to advance soils as fundamental to life. SSSA supports the education and research that it takes to protect and understand this natural resource for the health and welfare of our planet. SSSA is pleased to continue our active partnership with the USDA Natural Resources Conservation Service in producing educational materials such as the 2014 Soils Planner for our members, the public, and the science community.

Jan W. Hopmans

President, Soil Science Society of America
www.soils.org

Soil Science Society of America

Loretta Sandoval
Canocito, New Mexico

David Brandt
Carroll, Ohio

Healthy soil: The promise of our future.

There are an increasing number of innovative farmers who recognize that the promise of our future lies not just in new technology, but also in getting back to basics: protecting our soil. These innovators are rediscovering that soil is a living ecosystem, and that if we are to meet the world's growing production needs while simultaneously addressing environmental and resource challenges, we must farm differently, in a way that prevents erosion and improves the health and function of our precious top soil.

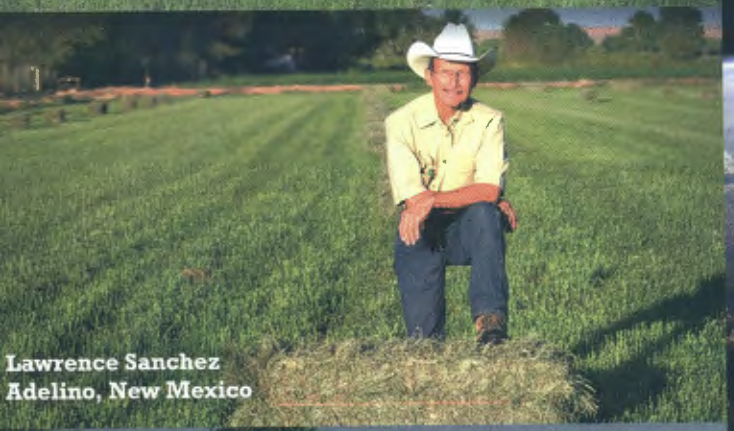
These individuals are farming using principles and systems that include cover crops, no-till, nutrient management, and diverse cropping rotations that improve the habitat for the trillions of soil-dwelling microbes so they can, in turn, provide us with their amazing, life-giving benefits—all at a greater profit for farmers.

They know that farming following four basic core principles can help improve soil health, which can lead to more productive, resilient, and sustainable farms for generations to come. Those four core soil health principles are:

1. **Minimize soil disturbance.**
2. **Energize with diversity.**
3. **Keep the soil covered.**
4. **Maximize living roots.**

Used in the right combination, these soil health-building principles can significantly improve the function and productivity of the soil.

Dexter Gilbert
Cottondale, Florida



Lawrence Sanchez
Adelino, New Mexico

This generation of farmer-conservationists is bringing together old, new, and newly appreciated insights into production systems that can make our farms—and by extension our society—more successful and sustainable. America's food supply and ability to feed the world depends on our living and life-giving soil. In an age of rapidly increasing populations and extreme weather events, there is no better time to make a long-term commitment to improve its health.

The future depends on it.

Image courtesy of the Image Science & Analysis Laboratory, NASA Johnson Space Center

healthy soil is key...

to feeding 9 billion by 2050

Healthy soils feed the plants that feed us.

did you know?

If world population growth continues at its current rate, we will need to produce as much food in the next 40 years as we have in the past 500.

Because soil is the factory of most of that food, keeping soil healthy and functioning properly is central to feeding the more than 9 billion people who will be showing up for dinner by the year 2050.

unlock the SECRETS IN THE SOIL

january 2014

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Natural Resources Conservation Service

healthy soil is made of...

about:

45% minerals

25% water

5% organic matter

25% air

did you know?

Soil microorganisms, fungi, and other tiny life forms help build organic matter, providing moisture and nutrients to growing crops. Those creatures need the right habitat—including the right amount of air and water to help us grow our food and fiber.

Soil health management systems allow farmers to build the right soil structure and increase organic matter—creating habitat for the life beneath the soil to help all of the life above it.

unlock the SECRETS IN THE SOIL

february 2014

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Natural Resources Conservation Service

earthworm populations...

consume TON TON of **dry matter** /acre /year, partly digesting and mixing it to form healthy soil.

did you know?

The burrowing and feeding activity of earthworms provides improved water infiltration and soil aeration.

Total earthworm populations in long-term no-tilled fields are typically at least twice those of clean-tilled fields because tillage destroys the habitat earthworms need to survive.

Tillage creates greater day/night temperature fluctuations. Tillage also brings earthworms to the surface where they are subject to predators such as birds.

Total earthworm populations in long-term no-tilled fields are typically at least twice those of clean-tilled fields.

unlock the SECRETS IN THE SOIL

march 2014

FEBRUARY 2014

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Natural Resources Conservation Service

energy saving soil conservation...

Soil Health Management System conservation practices like no-till can save the average 1,200-acre North Dakota wheat farmer

about **$10,000** per year in diesel.

did you know?

Reducing or eliminating tillage (or plowing) not only improves soil health but can save energy.

In fact, at 2012 prices, a 50-percent reduction in fuel costs at $4/gallon would come to a $10,000 annual savings on the average 1,200-acre farm.

In addition, after 5 years of no-till, nitrogen cycling is so enhanced that North Dakota State University recommends 50 pounds per acre per year less applied nitrogen in that system.

unlock the SECRETS IN THE SOIL

april 2014

MARCH 2014

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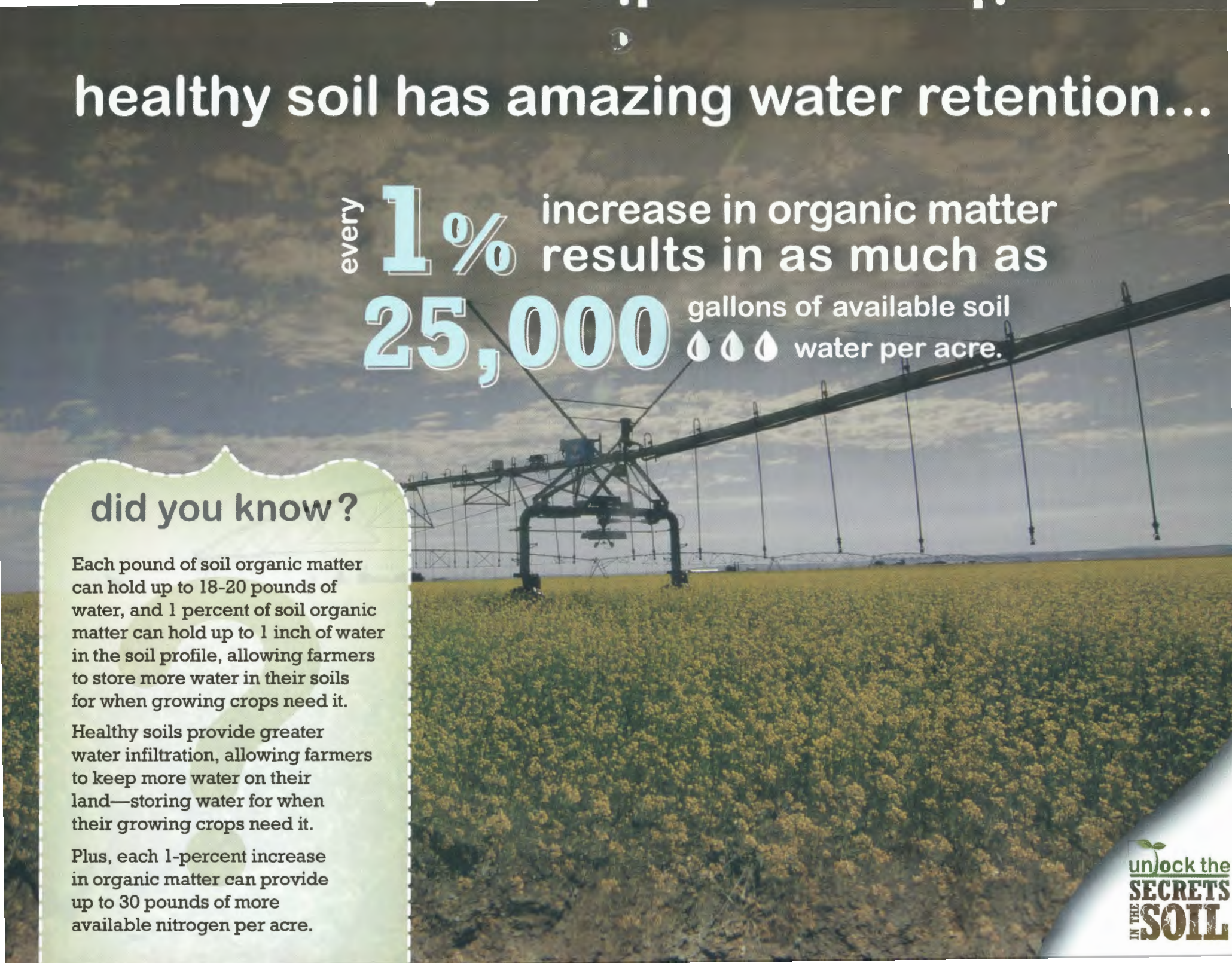
Natural Resources Conservation Service

healthy soil has amazing water retention...

every **1%** increase in organic matter results in as much as **25,000** gallons of available soil water per acre.



did you know?

Each pound of soil organic matter can hold up to 18-20 pounds of water, and 1 percent of soil organic matter can hold up to 1 inch of water in the soil profile, allowing farmers to store more water in their soils for when growing crops need it.

Healthy soils provide greater water infiltration, allowing farmers to keep more water on their land—storing water for when their growing crops need it.

Plus, each 1-percent increase in organic matter can provide up to 30 pounds of more available nitrogen per acre.

unlock the SECRETS IN THE SOIL

may 2014

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Memorial Day

Natural Resources
Conservation Service

healthy soil is active soil...

growing plants capture energy and feed microbial populations, which improves soil health.

did you know?

Healthy soil should be "active" with live roots for as long as possible. Contrary to conventional thought, healthy soil should not lie "fallow" from time to time (that is, to lie bare without growing plants).

Having plants grow all the time to capture energy and feed microbial populations helps improve soil health.

unlock the SECRETS IN THE SOIL

june 2014

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Natural Resources Conservation Service

a farmer's favorite cocktail ...

may not be what you think:

diversity.

innovative farmers are seeding a cover crop "cocktail mix."

did you know?

Innovative farmers are breathing new life into their soil by seeding a "cocktail mix" of 6-12 cover plants to get diversity above-ground, which creates much-needed diversity below the ground.

Through that diversity, farmers are mimicking the soil-building and microbial-friendly conditions of the diverse native prairies.

unlock the SECRETS IN THE SOIL

july 2014

JUNE 2014

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to keep soil happy ...

keep it **covered**

all the time with living plants or plant residues.

did you know?

Cover crops can actually help provide moisture to thirsty cash crops.

While it is true cover crops use some of the water in the soil profile, they simultaneously improve the soil structure by building soil aggregates, provide a mulch that reduces evaporation and runoff losses, and break up subsoil to increase water recharge.

By using cover crops, no-till, and crop rotations, farmers are finding soil actually has more available water for their cash crops, especially when those crops need it. As a result, cover crops can help protect farms against weather extremes like drought.

unlock the SECRETS IN THE SOIL

august 2014

JULY 2014

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Natural Resources Conservation Service

when temperatures rise...

to **100°** cover crops and their residues **20°** cooler can help keep soil more than than on cropland without cover crops.

did you know?

The blanket of mulch provided by the cover crop residue not only lowers soil temperatures, which protects soil microorganisms, but it also reduces the amount of water lost through evaporation and protects the soil from erosion.

The combination of lower temperatures and more moisture in the soil profile helps reduce plant stress and increases yields—making farms more resilient during periods of drought.

unlock the SECRETS IN THE SOIL

september 2014

AUGUST 2014

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Natural Resources Conservation Service

one teaspoon of healthy soil contains...

100 million - 1 billion

individual bacteria

Microscopic life and processes below ground are more abundant than life above the ground.

did you know?

Millions of species and billions of organisms—bacteria, algae, microscopic insects, earthworms, beetles, ants, mites, fungi and more reside in the soil—representing the greatest concentration of biomass anywhere on the planet.

Microbes, which make up only 1-half of 1 percent of the total soil mass, are the yeasts, algae, protozoa, bacteria, nematodes, and fungi that process organic matter into rich, dark, stable humus in the soil.

unlock the SECRETS IN THE SOIL

october 2014

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Natural Resources Conservation Service

the green mile...

separate strands of mycorrhizal fungi can total more than

1 mile

in just a handful of healthy soil.

did you know?

Arbuscular mycorrhizal fungi (abundant in healthy soils) have a symbiotic relationship with many plants.

They attach themselves either on or inside plant roots to tap into the carbohydrates transported from the plant leaves. In turn, the fungal hyphae (filaments) grow out from the roots and bring water and soil nutrients back to the plant.

unlock the SECRETS IN THE SOIL

november 2014

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2 Daylight Savings Time ends	3	4	5	6	7	8
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Natural Resources Conservation Service

healthy soil is bio-powered...

Natural biological processes in the soil are responsible for about **60%** of the available nitrogen and **50%** of the available phosphorus in soil.

did you know?

Many nutrients taken up by plant roots are first cycled through a soil organism before becoming available to the plant.

We're learning that the soil/plant interchange of nutrients and water is far more dynamic and elegant than we had ever imagined.

unlock the SECRETS IN THE SOIL

december 2014

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21 Winter Solstice	22	23	24	25 Christmas Day	26	27
28	29	30	31 New Year's Eve			

Natural Resources Conservation Service

2014 Events

January

JANUARY 21-22, 2014
Soil Science Society of North Carolina, 57th Annual Meeting
Jane S. McKimmon Center, Raleigh, NC

February

FEBRUARY 2-5, 2014
National Association of Conservation Districts (NACD), 41st Annual National Meeting, Anaheim, CA

March

MARCH 6- 9, 2014
Soil Science Society of America Ecosystem Services Conference, Soil's Role in Restoring Ecosystem Services, Sacramento, CA, www.soils.org/meetings/specialized-conferences/ecosystem-services

MARCH 24- 27, 2014
Soil Change Matters symposium joint meeting of the IUSS Global Soil Change and Soil Monitoring Working Groups, Bendigo, VIC 3551 Australia; http://www.dpi.vic.gov.au/vro/usfs

April

APRIL 3-5, 2014
Soil-Waste-Water workshop Landau, Germany
www.soil-waste-water.de

APRIL 6- 8, 2014
SSSA Onsite Wastewater Conference, Albuquerque, NM
www.soils.org/meetings/specialized-conferences/onsite-wastewater

May

MAY 5-8, 2014
Socio-economic indicators of climate change, impacts of climate changes on sustainable development of natural resources, Egyptian Society of Soil Science Kafr El-Sheikh, Egypt
www.esss.org.eg

June

JUNE 2-5, 2014
North Central Regional Cooperative Soil Survey Conference, Ames, IA

JUNE 8-13, 2014
Soils Embrace Life and Universe 20th World Congress of Soil Science Jeju Island, South Korea
http://www.20wcss.org

JUNE 16-20, 2014
West Regional Cooperative Soil Survey Conference, Portland, OR

JUNE 23-27, 2014
North Eastern Regional Cooperative Soil Survey Conference, Conway, NH

JUNE 23-27, 2014
South Regional Cooperative Soil Survey Conference, Nashville, TN

July

JULY 27-30, 2014
Soil and Water Conservation Society (SWCS) International Annual Conference, Chicago, IL

August

AUGUST 10-15, 2014
99th Ecological Society of America (ESA) Annual Meeting 2014, Sacramento, CA

October

OCTOBER 14-16, 2014
The Soul of Soil and Civilisation, Side Antalya, Turkey

OCTOBER 19-22, 2014
Geological Society of America Annual Meeting, Vancouver, British Columbia, Canada

November

NOVEMBER 2-5, 2014
Soil Science Society of America (SSSA) International Annual Meeting, Long Beach, CA
www.soils.org/meetings/annual-meeting

NOVEMBER 9-15, 2014
Latin-American Soil Science Congress, Latin-American Soil Science Society (SLCS) (www.slcs.org.mx) and the Peruvian Soil Science Society in Cuzco, Peru
http://www.slcs.org.mx

December

DECEMBER 15-19, 2014
American Geophysical Union Annual Meetings, San Francisco, CA

2015 Calendar

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OCTOBER 2015

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25	26	27	28	29	30	31

NOVEMBER 2015

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

DECEMBER 2015

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

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